

**FINAL SITE-SPECIFIC HEALTH AND SAFETY PLAN
FOR
CONSTRUCTION TASKS
GM-38 AREA GROUNDWATER REMEDIATION
AT
NAVAL WEAPONS INDUSTRIAL RESERVE PLANT
BETHPAGE, NEW YORK**

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APPROVALS

By their signature, the undersigned hereby certify that this Site-Specific Health and Safety Plan (SHSP) has been reviewed and approved for use during the remedial actions involving the construction of the groundwater treatment plant for the GM-38 Area Groundwater Remediation Construction Tasks at the Bethpage, NY Site.

PROJECT MANAGER

DATE

PROJECT SUPERINTENDENT

DATE

PROJECT ENVIRONMENTAL AND SAFETY MANAGER

DATE

SITE HEALTH AND SAFETY OFFICER

DATE

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ACRONYMS AND ABBREVIATIONS

| | |
|------------------------|---|
| 1,1,1-TCA | 1,1,1-trichloroethane |
| 1,2-DCE | 1,2-dichloroethene |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| AHA | Activity Hazard Analysis |
| AIHA | American Industrial Hygiene Association |
| amp | ampere |
| ANSI | American National Standards Institute |
| bgs | below ground surface |
| BWD | Bethpage Water District |
| BZ | Breathing Zone |
| °C | Degrees Celsius |
| CFR | Code of Federal Regulations |
| CGI/O ₂ /CO | Combustible Gas Indicator/Oxygen/Carbon Monoxide |
| CIH | Certified Industrial Hygienist |
| CNS | Central Nervous System |
| CPR | Cardiopulmonary Resuscitation |
| CRF | Change Request Form |
| CRZ | Contamination Reduction Zone |
| CSP | Certified Safety Professional |
| CSQ | Client Service Quality |
| CTO | Contract Task Order |
| EC | Emergency Coordinator |
| EFANE | Engineering Field Activity, Northeast |
| EHS | Environmental Health and Safety |
| ESQ | Environmental Safety Quality |
| EZ | Exclusion Zone |
| °F | Degrees Fahrenheit |
| GFCI | Ground Fault Circuit Interrupters |
| GOCO | Government Owned Contractor-Operated |
| GPR | Ground Penetrating Radar |
| kV | kilovolt |
| MSDS | Material Safety Data Sheets |
| NEC | National Electric Code |
| NGC | Northrop Grumman Corporation |
| NWIRP | Naval Weapons Industrial Reserve Plant |
| NYS | New York State |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| NYSDOT | New York State Department of Transportation |
| OSHA | Occupational Safety and Health Administration |
| OU | Operable Unit |
| PCBs | Polychlorinated Biphenyls |
| PCE | Tetrachloroethene |
| PESM | Project Environmental and Safety Manager |

ACRONYMS AND ABBREVIATIONS - *continued*

| | |
|-------|---------------------------------------|
| PID | Photo Ionization Detector |
| PM | Project Manager |
| POTW | Publicly Owned Treatment Works |
| ppb | parts per billion |
| PPE | Personal Protective Equipment |
| ppm | parts per million |
| PS | Project Superintendent |
| ROD | Record of Decision |
| RW | Recovery Well |
| SHSO | Site Health and Safety Officer |
| SHSP | Site-Specific Health and Safety Plan |
| SVOCs | Semi-Volatile Organic Compounds |
| SZ | Support Zone |
| TAC | Technical Advisory Committee |
| TCE | Trichloroethene |
| TLVs | Threshold Limit Values |
| TtEC | Tetra Tech EC, Inc. |
| µg/L | micrograms per liter |
| UL | Underwriters Laboratories |
| USACE | United States Army Corps of Engineers |
| VOCs | Volatile Organic Compounds |
| VPBs | Vertical Profile Borings |
| WBGT | Wet Bulb Globe Temperature |
| ZIP | Zero Incident Performance |

1.2.3 Groundwater Injection System Installation

The following tasks will be performed:

- Well vault installation.
- Trench excavation and backfilling associated with connecting the injection wells to the treatment building.
- Construction of the Treated Groundwater Injection System.

1.2.4 Groundwater Treatment System Installation

For the construction of the groundwater treatment system, installation work will include the following tasks:

- Equalization tank.
- Sodium hydroxide chemical feed system.
- Crane operation, including preparation of a Critical Lift Plan.
- Particulate Filtration Unit.
- Liquid- and Vapor-phase granular activated carbon units.
- Process pumps and sump pumps.
- Air compressor and drier system.

1.2.5 Site Restoration

The following restoration tasks will be performed:

- Placing sod, seed and hay as needed.
- Placing topsoil, fertilizer and mulching as needed.
- Planting trees within the NYSDOT right-of-way and other properties/site locations.
- Constructing a berm around the treatment plant.
- Repair areas where damage may have occurred, including the replacement of roadways, curbs and sidewalks (including the curb/sidewalk along Broadway Avenue).

1.2.6 Startup and Shakedown of Treatment Plant

Work will include the following:

- Material, mechanical and pipe tests.
- Electrical, acceptance and hydraulic tests/testing.

1.2.7 New Groundwater Monitoring Well Installation

The tasks will include installing new groundwater monitoring wells and well vaults.

1.2.8 New Injection Well Installation

The tasks will include installing new injection wells and well vaults.

1.2.9 Off-Site Waste Transportation and Disposal

The following wastes will be removed from the site:

- Cleared and grubbed debris.
- General trash/Construction debris.
- Drill Cuttings in Roll-off boxes.
- Development/purge water in frac tanks.
- Old stripper tower packing.

1.2.10 Demobilization

Upon completion and approval of the project, all potentially contaminated equipment and facilities will be pressure washed prior to demobilization. All equipment and supplies will be removed from the site.

1.3 Application

The SHSP applies to all personnel involved in the above tasks who wish to gain access to active work areas, including but not limited to:

- Client representatives - The Navy is responsible for ensuring that its personnel comply with OSHA and USACE EM 385-1-1 applicable requirements.
- Federal, state or local representatives.

TtEC employees and subcontractors will develop Activity Hazard Analysis (AHA) that will be reviewed by TtEC prior to start of work.

2.0 PROJECT ORGANIZATION

2.1 Project Manager (PM)

The PM is Stavros Patselas. His responsibilities include the following:

- Ensures implementation of this program through coordination with the responsible PESM.
- Conducts monthly inspections.
- Participates in all incident investigations.
- Ensures the SHSP has all of the required approvals before any site work is conducted.

- Ensures that the PESM or Site Health and Safety Officer (SHSO) is informed of project changes which require modifications of the SHSP.
- Has overall project responsibility for Project Health and Safety.

2.2 PESM

The PESM is an individual certified by the American Board of Industrial Hygiene as a Certified Industrial Hygienist (CIH) or by the Board of Certified Safety Professionals as a Certified Safety Professional (CSP) with experience in hazardous waste site remediation activities. The PESM is Grey Coppi, CIH, CSP. His responsibilities include the following:

- Provides for the development and approval of the SHSP.
- Serves as the primary contact to review health and safety matters that may arise.
- Approves revised or new safety protocols for field operations.
- Approves individuals who are assigned SHSO responsibilities.
- Approves SHSO to fulfill other project roles.
- Coordinates revisions of this SHSP with field personnel.
- Coordinates upgrading or downgrading of personal protective equipment (PPE) with the SHSO.
- Assists in the investigation of all incidents.
- Conducts quarterly inspections for compliance with the SHSP.

2.3 Project Superintendent (PS)

The PS is Ed Urbanek. His responsibilities include the following:

- Ensures that the SHSP is implemented in conjunction with the designated PESM and SHSO.
- Ensures that field work is scheduled with adequate personnel and equipment resources to complete the job safely.
- Ensures that adequate communication between field crews and emergency response personnel is maintained.
- Ensures that field site personnel are adequately trained and qualified to work at the site.
- Enforces site health and safety rules.
- Investigates all incidents.
- Conducts daily safety briefings.
- Conducts weekly site inspections.
- Acts as Emergency Coordinator (EC).

2.4 SHSO

The SHSO is Ed Casey. The SHSO is responsible for the following:

- Works as a member of the project team to ensure implementation of the SHSP.

- Ensures that all health and safety activities identified in the SHSP are conducted and/or implemented.
- Identifies operational changes which require modifications to health and safety procedures and the SHSP, and ensures that the procedure modifications are implemented and documented through changes to the SHSP.
- Directs and coordinates health and safety monitoring activities.
- Ensures that proper PPE is utilized by field teams.
- Assists in conducting and documenting daily safety briefings.
- Monitors compliance with this SHSP.
- Notifies PESM of all accidents/incidents.
- Coordinates with PM in any accident/incident investigation.
- Maintains Accident/Incident Report Forms.
- Determines upgrades or downgrades of PPE based on site conditions and/or real-time monitoring results.
- Ensures that monitoring instruments are calibrated.
- Reports to PESM to provide summaries of field operations and progress.
- Maintains health and safety field log books.
- Displays/maintains postings and handbooks such as:
 - OSHA Job Safety and Health Poster.
 - OSHA Noise Regulation.
 - Department of Labor Postings (Minimum wage, fair labor standards).
 - Hazard Warning Signs.
 - Noise Hazard Warning Sign.
 - Do It Right Poster.
 - Client Service Quality (CSQ) Poster.
 - TtEC Shared Vision.
 - TtEC Mission Statement.
 - TtEC Hot Line Poster.
 - TtEC Work Rules.
 - TtEC Environmental Safety Quality (ESQ) Policy Poster.
 - Zero Incident Performance (ZIP) Bulletins.
 - Flash reports.
 - Emergency telephone numbers.
 - Diagrams showing the location of fire extinguishers and emergency equipment.
 - Emergency exit, evacuation routes and staging area.
 - Project Rules Handbook.

2.5 Site Personnel

Site Personnel responsibilities include the following:

- Report any unsafe or potentially hazardous conditions to the SHSO.
- Maintain knowledge of the information, instructions and emergency response actions contained in the SHSP.

- Comply with rules, regulations and procedures as set forth in this SHSP and any revisions.
- Prevent admittance to work sites by unauthorized personnel.
- Inspect all tools and equipment, including PPE, daily prior to use.

3.0 SITE LOCATION AND DESCRIPTION

3.1 Site Location

NWIRP Bethpage is located in east central Nassau County, Long Island, New York, approximately 30 miles east of New York City. The Navy's property totaled approximately 109.5 acres and was formerly a Government Owned Contractor-Operated (GOCO) facility that was operated by the Northrop Grumman Corporation (NGC) until September 1998. NWIRP Bethpage is bordered on the north, west, and south by property owned, or formerly owned, by NGC that covered approximately 605 acres, and, on the east, by a residential neighborhood.

The facilities at NWIRP Bethpage include four plants (Nos. 3, 5, and 20, used for assembly and prototype testing; and No. 10, which contains a group of quality control laboratories), two warehouse complexes, a salvage storage area, water recharge basins, an industrial wastewater treatment plant, and several smaller support buildings.

The GM-38 Area is approximately 8,500 feet south-southeast and hydraulically downgradient of NWIRP Bethpage.

3.2 Site Background and Description

NWIRP Bethpage was established in 1933. Since inception, the primary mission of the facility has been the research, prototyping, testing, design engineering, fabrication, and primary assembly of military aircraft. Historical operations that resulted in hazardous material generation at the facility included metal finishing processes, maintenance operations, painting of aircraft and components, and other activities that involved aircraft manufacturing. Wastes generated by plant operations were disposed of directly into either drainage sumps, dry wells, and/or on the ground surface, resulting in the disposal of a number of hazardous wastes, including the Volatile Organic Compounds (VOCs) tetrachloroethene (PCE) and trichloroethene (TCE), the semi-volatile organic compounds (SVOCs) polychlorinated biphenyls (PCBs), and the inorganics chromium and cadmium at the site. Some of these contaminants have migrated from the points of disposal to surrounding areas, including the soils of these sites and the groundwater beneath and downgradient of the NWIRP Bethpage property.

The GM-38 Area refers to a cluster of monitoring wells that were installed in the 1990s by NGC and that first identified an isolated groundwater contaminant plume in this area. Chlorinated VOCs were identified in moderately deep groundwater (220 to 470 feet below ground surface [bgs]) at concentrations greater than 500 micrograms per liter ($\mu\text{g/L}$). The contaminated groundwater in the area represents a relatively large mass of chlorinated VOCs that would remain for extended periods and could adversely affect public water supplies in the area, as well

The Navy's selected remedy for off-site groundwater includes the following:

- Groundwater Remedial Program:
 - Contaminant removal through groundwater extraction and treatment at an off-site area near the GM-38 monitoring well cluster.
 - Pre-design investigation to determine the optimal groundwater extraction locations in the GM-38 Area.
 - Operation and maintenance of the GM-38 Area remedy.
 - Additional investigation in the vicinity of well GM-75D2, or any other area identified as requiring additional groundwater investigation, to determine if a contaminant removal program similar to the GM-38 program is necessary.
 - Continued participation in the Technical Advisory Committee (TAC) established by NYSDEC.

- Public Water Supply Protection Program:
 - Installation of Vertical Profile Borings (VPBs) to gather water quality and lithologic data to aid in the placement of outpost monitoring wells.
 - Development of a Public Water Supply Well Contingency Plan.
 - Installation of outpost monitoring wells in areas upgradient of potentially affected water supply wellfields as outlined in the Public Water Supply Well Contingency Plan.
 - Public water supply wellhead treatment or comparable alternative measures, if necessary, for wellfields that become affected in the future by site-related contaminants.
 - Provision of public water to residential or commercial users that have private drinking water wells determined to be affected or potentially affected by site-related contaminants.

4.0 POTENTIAL HAZARDS

This section presents an assessment of the chemical, biological, and physical hazards that may be encountered during the tasks specified under SHSP Section 1.1. Additional information can be found in Appendix B- Material Safety Data Sheets or in Appendix C-Activity Hazard Analyses.

4.1 Chemical Hazards

The contaminants previously detected in groundwater are listed below in Table 4-1:

**Table 4-1
Contaminants of Concern Groundwater Concentrations**

| Contaminant | Average Concentration (µg/L) | |
|-----------------------|------------------------------|-------|
| | RW-1 | RW-2 |
| 1,1,1-Trichloroethane | 4.1 | 0 |
| 1,1-Dichloroethene | 2.0 | 0.6 |
| 1,2-Dichloroethene | 41.8 | 3.5 |
| Trichloroethene | 461.1 | 277.3 |
| Tetrachloroethene | 45.8 | 1.3 |
| Vinyl Chloride | 6.5 | 0.1 |

Note: RW = Recovery Well

The contaminants of concern for the site are PCE, TCE, 1,2-dichloroethene (1,2-DCE), 1,1,1-trichloroethane (1,1,1-TCA), vinyl chloride, and other related chlorinated solvents.

Exposure to these compounds, listed in Table 4-1, may occur through inhalation of contaminated dust particles, inhalation of volatile contaminants, dermal absorption, skin contamination, or accidental ingestion of the contaminant.

The action levels for the contaminants of concern were based upon the known concentration of contaminants, physical and chemical properties, toxicity, and distribution of these compounds at the site. Due to the vapor pressures of these chemicals, inhalation is the primary route of exposure. Skin absorption is also a possible route of exposure, leading to the same symptoms as inhalation overexposure. Symptoms of exposure to these potential site contaminants, especially if they are encountered in their pure form, can range from irritation of skin, mucous membranes and other sensitive tissues such as the eyes, to nausea and vomiting, fatigue, lightheadedness/dizziness and headache. Potential damage of major organ systems (e.g., liver, kidneys, central nervous system (CNS), blood forming organs, reproductive systems) could result from chronic exposure or acute exposure to high concentrations of the materials. VOCs are potent narcotics and may cause CNS and lung damage. Some of the site contaminants that may potentially be encountered are suspected carcinogens.

Due to the nature of the work being performed, the anticipated levels of exposure to potential site contaminants are expected to be moderate. Table 4-2 contains a summary of the toxicological and chemical properties of the compounds that may be encountered during field activities.

Table 4-2
Chemical Data

| COMPOUNDS | ACGIH TLV | OSHA PEL | NIOSH IDLH | ROUTES OF EXPOSURE | SYMPTOMS OF EXPOSURE | TARGET ORGANS | PHYSICAL DATA |
|-----------------------|-----------|----------|------------|---|---|--|--|
| 1,1,1-Trichloroethane | 350 ppm | 350 ppm | | Inhalation, Ingestion, Contact | Headache, dizziness, weakness, nausea, vomiting, eye irritation, dermatitis, potential carcinogen | Skin, eyes, respiratory system; liver, kidneys, CNS | MW: 133.40; IP: 11.25 ev; Sp. Gr.: 1.34; LEL: 7%; UEL: 16%; VP: 100 mmHg |
| 1,1,2-Trichloroethane | 10 ppm | 10 ppm | 100 ppm | Inhalation, Ingestion, Contact | Drunkenness, eye and skin irritation, vomiting, headache | CNS, liver | MW: 133.4; IP: 11 ev; Sp. Gr.: 1.4416; LEL: N/A; UEL: N/A; VP: 17 mmHg |
| 1,1-Dichloroethene | 5 ppm | 1 ppm | 1000 ppm | Inhalation, Ingestion, Contact | Drunkenness, severe eye and skin irritation | CNS, liver | MW: 96.64; IP: 10 ev; Sp. Gr.: 1.213; LEL: 5.6%; UEL: 11.4%; VP: 400 mmHg |
| 1,1-Dichloroethane | 100 ppm | 100 ppm | 3000 ppm | Inhalation, Ingestion, Contact, Absorption | Nausea, headache, dizziness, vomiting, weakness, skin irritation | Skin, liver, kidneys, lungs, CNS | MW: 98.97; IP: 11.06 ev; Sp. Gr.: 1.174; LEL: 5.6%; UEL: N/A; VP: 230 mmHg |
| 1,2-Dichloroethene | 200 ppm | 200 ppm | 1000 ppm | Inhalation, Ingestion, Contact | Eye and skin irritation, nausea, vomiting, drowsiness, drunkenness | CNS | MW: 96.94; IP: 9.66 ev; Sp. Gr.: 1.2837; LEL: 9.7%; UEL: 12.8%; VP: 400 mmHg |
| 1,2-Dichloroethane | 10 ppm | 50 ppm | 50 ppm | Inhalation, Ingestion, Contact, Absorption | Headache, weakness, nausea, vomiting, diarrhea, skin and eye irritation, possible carcinogen | Eyes, skin, kidneys, liver, CNS, cardiovascular system | MW: 98.96; IP: 11.04 ev; Sp. Gr.: 1.24; LEL: 6.2%; UEL: 15.9%; VP: 87 mmHg |

Table 4-2
Chemical Data

| COMPOUNDS | ACGIH TLV | OSHA PEL | NIOSH IDLH | ROUTES OF EXPOSURE | SYMPTOMS OF EXPOSURE | TARGET ORGANS | PHYSICAL DATA |
|-------------------|-----------|----------|------------|---|---|--|--|
| Tetrachloroethene | 25 ppm | 100 ppm | 150 ppm | Inhalation, Ingestion, Contact, Absorption | Irritable eyes, nose, throat; nausea; flush face, neck; vertigo, dizziness, giddiness, incoordination, headache, skin erythema (skin redness), suspect carcinogen | Eyes, skin, respiratory system, liver, kidneys, CNS | MW: 165.83; IP: 9.32ev; Sp. Gr.: 1.62; VP: 14 mmHg |
| Trichloroethene | 50 ppm | 100 ppm | 1000 ppm | Inhalation, Ingestion, Contact | Headache, vertigo, visual disturbance, tremors, vomiting, eye irritation, dermatitis, fatigue, giddiness, potential carcinogen | Eyes, respiratory system, liver, CNS | MW: 131.39; IP: 9.4ev; Sp. Gr.: 1.46; LEL: 10.5%; UEL: NA; VP: 58 mmHg |
| Vinyl Chloride | 1 ppm | 1 ppm | | Inhalation, Ingestion, Contract | Eye and skin irritation, nausea, difficulty breathing, headache, drowsiness, dizziness, known carcinogen | CNS | MW: 62.5; IP: 10.0 ev; Sp. Gr.: 0.9106; LEL:3.6 %; UEL: 33%; VP: 2515.6 mmHg |

Abbreviations:

ACGIH = American Conference of Governmental Industrial Hygienists
CNS = Central Nervous System

Hg = Mercury

IDLH = Immediately Dangerous to Life and Health

IP = Ionization Potential

LEL = Lower Explosive Limit

mm = millimeter

MW = Molecular Weight

NA = Not Applicable

NIOSH = National Institute for Occupational Safety and Health

OSHA = Occupational Safety & Health Administration

PEL = Permissible Exposure Limit

ppm = Parts Per Million

Sp. Gr. = Specific Gravity

TLV = Threshold Limit Value
UEL = Upper Explosive Limit
VP = Vapor Pressure

4.2 Biological Hazards

During the course of the project, there is a potential for workers to encounter biological hazards such as animals, insects and plants.

4.2.1 Animals

During site operations, animals such as dogs, cats, raccoons, skunks, mice, and snakes may be encountered. Workers will use discretion and avoid all contact with animals. If these animals present a problem, efforts will be made to remove these animals from the site by contacting a licensed pest control technician.

4.2.2 Insects

Insects, such as mosquitoes, ticks, bees and wasps may be present during certain times of the year. Workers will be encouraged to wear repellents (DEET for Ticks) when working in areas where insects are expected to be present. If insects are prevalent, efforts will be made to remove them from the site by contacting a licensed pest control technician.

Rocky Mountain Ticks



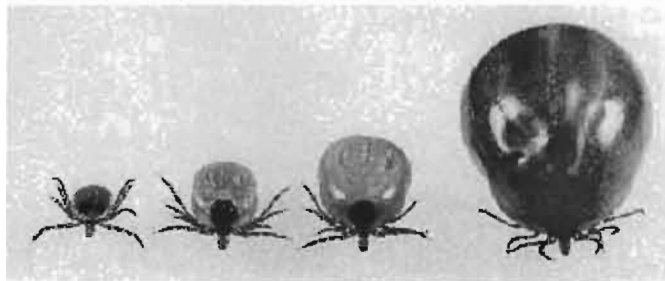
Left to Right: female, male

4.2.2.1 Lyme Disease

Since the site is located in the mid-Atlantic region, the potential for coming into contact with deer ticks exists. Lyme disease is caused by an infection from a deer tick that is about the size of the head of a pin. After a blood feeding, the tick becomes engorged and may vomit its stomach contents into the host, a microorganism (spirochete) may be transmitted into the bloodstream that may lead to Lyme disease. The feeding time is 24 to 48 hours. The effects of the disease vary from person to person, which often makes it difficult to diagnose. Typically, the incubation period ranges from two days to two weeks. In most cases, the infected area will resemble a red bull's eye with concentric rings. Within the same period, flu-like symptoms may develop. If left untreated, the red ringed area will eventually fade and Lyme disease may further develop into an arthritis-like condition.



Deer tick - Black Legged tick



The changing face as the deer tick engorges

Left to Right: unengorged female, 1/4 engorged, 1/2 engorged and fully engorged

The best method for stopping insect borne disease is to avoid the bite. Control measures to prevent Lyme Disease include the following:

- Avoid dense or high brush, when possible.
- Wear light colored clothing.
- Spray DEET on your skin and Permethrin on clothing and work boots.
- Tuck pant legs into socks and shirts into gloves, if possible.
- Self/Buddy check of neck, hairline, groin and body after working in areas that may contain deer ticks.
- Wear light colored tyvek or clothing.
- Wear booties over work boots.
- Look for ticks upon returning from field work.
- Shower as soon as possible.
- If a tick is found, suffocate it with baby oil applied to the tick, then remove it by pulling gently at the head with tweezers or better, the Pro-Tick removal system (see below).
- Report any of the above symptoms and all tick bites to the SHSO for evaluation. Employees bitten by deer ticks during the course of employment or one who finds an engorged tick on their body, will be given a medical examination.

- Analysis of the tick for Spirochete may be warranted. Administration of antibiotic therapy may be warranted. Either action may be taken with the concurrence of the Corporate Medical Consultant.



A source for Pro-Tick removal systems as well as Deet and Permethrin based lotions and sprays as well as sun screen can be found on-line at <http://www.scs-mall.com/store/>

The following is from the "Pro-Tick Remover" ad on the above web site: Pro-Tick Remedy (now includes a 5X magnifier) makes this sometimes difficult and distasteful task easier than any other tool. The Pro-Tick has consistently tested superior when tested against other tick removers and tweezers. Here's a quote from a research paper published in 1995. ". . . *while others (tick removers and tweezers) broke the tip of the hypostome and chelicerae (mouthparts) in at least one tick. The Pro-Tick remedy succeeded in removing all fifty-one ticks without damaging any mouthparts . . . results indicate that the Pro-Tick Remedy removed the most tick cement while causing the least damage . . .*" More recent tests against nymph ticks (the dangerous immature ones) showed that the Pro-Tick Remedy removes nymph ticks better than any other instrument.

4.2.3 Snakes

Snakes are a hazard in the forests and wetlands, if you see a snake, avoid it! If you are bitten, try to identify the snake and seek emergency medical help immediately. Venomous snakes native to this area include:

- **Northern Copperhead:** This snake grows to 24 inches to 36 inches in length. The Northern Copperhead Snake has a stocky body that may be copper, orange or pinkish in color. Dark, chestnut-colored bands cross the body, breaking the color pattern into alternating bands of darker and lighter color. Young copperheads are lighter in color than the adults, and they have a yellow-tipped tail that they often flick.
- **Timber Rattlesnake:** It often lives on rocky hillsides and in wooded areas. The Timber Rattlesnake has a head and body that are pinkish-gray to yellowish-brown with a pattern of dark bands on the back and a grayish-white belly. The tail is black with a rattle. Size of average adult is 3 - 4.5 feet long.

4.2.4 Plants

Plants such as poison ivy and poison oak may be prevalent at the site during certain times of the year. Workers will be trained to recognize these plants and to minimize contact with them. Employees may wear PPE to reduce the potential for exposure. Pre-exposure topical lotions such as Tecnu may be applied prophylactically. "Ivy Block" is an easy to use non-prescription, pre-exposure lotion. You apply it like sunscreen to all exposed skin. It dries quickly and the active ingredient, bentoquatam, guards you against the harmful oil in poison ivy, oak and sumac. Remove lotion with running water and soap after risk of exposure has ended. Toll FREE ORDER LINE (800) 421-1223.



The use of Clorox wipes to decontaminate reusable clothing to preclude exposure to poison ivy may prove valuable. Gloves should be worn during decontamination and removal of PPE.

4.3 Physical Hazards

Most safety hazards are discussed in the AHAs in Appendix C for the different phases of the project. In addition to the AHAs, general work rules and other safety procedures are described in Section 10 of this SHSP.

4.3.1 Heat Stress

Heat stress is a significant potential hazard, which is greatly exacerbated with the use of PPE in hot environments. A heat stress prevention program will be implemented when ambient temperatures exceed 70 degrees Fahrenheit (°F) for personnel wearing impermeable clothing and for other personnel when the Wet Bulb Globe Temperature (WBGT) index exceeds the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values (TLVs). The following are the main elements of the TtEC Environmental Health and Safety (EHS) Program (EHS 4-6) related to temperature extremes, which can be found in Appendix D.

- Selection of PPE to reduce the risk of heat related illness.
- Hydration.
- Cool rest areas.
- Engineering Controls (i.e., air conditioned cabs, drenching).
- Administrative Controls (work schedules, acclimatization, work/rest regimens).
- PPE (i.e., ice vests, vortex tubes).
- Monitoring (body core temperature, pulse rate).

- Identification of heat related illnesses (heat cramps, heat exhaustion, and heat stroke).
- Employee training.

4.3.2 Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, poor judgment and unauthorized procedural changes. The following are the main elements of the TtEC EHS Program 4-6 related to temperature extremes, which can be found in Appendix D.

- PPE (i.e. hard hat liners, boot and glove liners, insulated coveralls).
- Engineering controls (i.e. heaters, wind shields, covered metal handles).
- Administrative controls (i.e. work/warm up schedule, acclimatization).
- Recognition of Cold Stress Related Injury (frostbite and hypothermia).
- Warm rest area.
- Employee training.

4.3.3 Noise

Noise is a potential hazard associated with the operation of heavy equipment, power tools, pumps and generators. All employees routinely working within 10 feet of these operations will wear hearing protection. All employees receive a pre-employment audiogram as part of their physical examination. High noise areas will be designated.

4.3.4 Underground Utilities

When intrusive work activities are conducted on-site the threat of contact with underground utilities exists. Underground utilities include lines such as electrical, gas, and sewer. An assessment of the presence of underground utilities will be made before conducting any intrusive activities. In preparing the AHA, TtEC's EHS Procedure 3-15 was considered.

Striking underground utilities is a possible hazard whenever excavation is conducted. All steps will be taken to locate underground utilities as per EHS 3-15, which can be found in Appendix E. This will include white lining the area of excavation, calling the NYS One-Call System, having utilities located and when on private property, use of a private locating service to perform a geophysical survey.

4.3.5 Excavation and Trenching

Excavation will be conducted in accordance with the Excavation and Trenching Procedure, ESH 6-3 of the TtEC EHS Program. Procedures in this document incorporate the requirements of 29 CFR 1926, Subpart P-Excavations. EHS 6-3 requires the designation of a "Competent Person" by the PM and approval by the PESM and requirements for safe excavating practices. A checklist of competency elements must be completed to assess ability of the designated

competent person to fulfill the requirements of Procedure EHS 6-3, which can be found in Appendix F. A competency determination must be completed and documented prior to assignment.

The Excavation and Trenching Program also includes requirements for the monitoring of potentially hazardous atmospheres; protection from water hazards; analyzing and maintaining the stability of adjacent structures; daily competent person inspections; soil classification; sloping and benching; protective systems; and training.

Trenching to a depth greater than four feet will require atmospheric monitoring and the use of ladders for safe entry/egress. The competent person will determine the need for cave-in protection. If trenches exceed five feet in depth, cave-in protection will be implemented in accordance with the Excavation and Trenching Procedure, EHS 6-3.

Competent persons will have an adequate combination of experience and training to classify soil types and select protective systems outlined in EHS 6-3. Training and experience pertaining to qualification as a competent person will be documented and will include the following:

- Knowledge of general safety practices related to working in/near open excavations.
- Inspection requirements and techniques.

The competent person(s) will be the PS and is responsible for the following:

- Day-to-day oversight and inspection of open excavations and trenches.
- Conducting soil classifications.
- Selection of protective systems.
- Providing the SHSO with all required documentation on a daily basis.

4.3.6 Falls

Fall protection, in the form of safety nets, guardrails, or personal fall arrest systems, will be provided as needed and whenever any worker is exposed to a fall distance of greater than six feet. TtEC's Fall Protection Procedure, EHS 3-8, will be followed for providing the proper body harness and anchor point to avoid falls, which can be found in Appendix G. All fall protection equipment must meet American National Standards Institute (ANSI) Z359.1 requirements. A "competent person," able to evaluate the hazards of fall protection systems and stop work when required, will be appointed by the PM.

4.3.7 Hazardous Energy Control

Energy-using devices as well as overhead/underground power lines pose a danger of shock or electrocution if workers contact/sever them during site operations. Training will be provided to anyone involved in any phase of this work.

The following safe work practices will be implemented:

- Ground fault circuit interrupters (GFCI) will be used on all 15 ampere (amp), 20 amp, and 120 volt circuits.
- Inspect all extension cords daily for structural integrity, ground continuity, and damage. Inspect extension cord connections. Extension cords must be of the “hard” or “extra hard” service type.
- Elevate or cover electric wire or flexible cord passing through work area to protect it from damage by foot traffic, vehicles, sharp corners, projections, or pinching.
- Keep plugs and receptacles out of water unless they are approved submersible-types.
- Ground all electrical circuits in accordance with the National Electrical Code (NEC) or other applicable standards and regulations.
- A minimum 15-foot safe separation distance will be maintained between equipment and 50 kilovolt (kV) overhead electrical lines. This distance will increase 0.4 inches for each 1 kV above 50 kV.

4.3.8 Other Physical Hazards

Other physical hazards at the site include the following:

- Drill rig.
- Possible explosive atmosphere during drilling.
- Crane.
- Other heavy equipment.

5.0 AHA

An AHA has been developed for each task. The AHA considers the hazards discussed in Section 4.0.

An additional or expanded AHA will be developed by the SHSO, or subcontractors, for all unanticipated work and/or prior to working on a new task.

The AHA will be used to instruct workers on the hazards of the associated activities during a safety meeting.

AHAs are included in Appendix C for the following phases of work:

- Mobilization, Site Preparation & Demobilization.
- Treatment Plant Building Construction.
- Treatment Building Systems Installation.
- Extraction System Construction.
- Groundwater Injection System Installation.
- Groundwater Treatment System Installation.
- Site Restoration.

- Treatment Plant Startup & Shakedown.
- New Groundwater Monitoring Wells Installation.
- Off-Site Waste Transportation & Disposal.

Subcontracted work will be evaluated for hazards in a manner consistent with self-performed work. The PS or SHSO is responsible to obtain and review AHA from subcontractors or will develop accurate AHA for subcontracted work.

6.0 PPE

For the purposes of PPE selection, the PESM and SHSO are considered competent persons. The signatures on the front of this SHSP constitute certification of the hazard assessment. As established in this SHSP, the initial level of PPE will be modified Level D for all activities. Sampling data and past experience indicate a relatively low hazard for exposure.

For activities not covered by an AHA, the SHSO will conduct the hazard assessment and select the PPE using the form provided in Appendix H and will certify the assessment by signing the form. PPE selection will be made in consultation with the PESM. Modifications for initial PPE selection may also be made by the SHSO in consultation with the PESM. A written justification for downgrades will be provided to the PESM for approval by the Navy as a CRF.

Table 6-1 describes PPE for site tasks.

6.1 Hazard Assessment for Selection of PPE

The initial levels of protection were selected by performing a hazard assessment taking into consideration the following:

- Potential chemical and physical hazards present or suspected.
- Work operations to be performed.
- Potential routes of exposure.
- Characteristics, capabilities and limitations of PPE.
- Hazards that the PPE presents or magnifies.

The primary routes of exposure for the contaminants are skin contact and inhalation, ingestion is a secondary route of exposure. During well installation and development activities there is a potential for skin contact with chemical contaminants; the SHSO will need to exercise judgment in determining an upgrade in level of PPE. Additionally, the type of respiratory protection will be dependent on real-time air monitoring results. The air monitoring program, along with use of respirators equipped with organic vapor cartridges, if necessary, will provide adequate respiratory protection to minimize potential exposure via inhalation. Strict adherence to decontamination and personal hygiene procedures will effectively eliminate ingestion as a potential route of exposure.

**Table 6-1
PPE Selection**

| TASK | HEAD | EYES/FACE | FEET | HANDS | BODY | HEARING | RESPIRATORY |
|---|------|------------------------------------|------|-------|------|--------------|---|
| Mobilization, Site Preparation & Demobilization | HH | SG; (SG & PFS for Equipment Decon) | STB | LWG | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| Treatment Plant Building Construction | HH | SG | STB | Nit | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| Treatment Building Systems Installation | HH | SG | STB | Nit | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| Extraction System Construction | HH | SG | STB | Nit | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| Groundwater Injection System Installation | HH | SG | STB | Nit | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| Groundwater Treatment System Installation | HH | SG | STB | Nit | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| Site Restoration | HH | SG | STB | Nit | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| Treatment Plant Startup & Shakedown | HH | SG | STB | LWG | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| New Groundwater Monitoring Wells Installation | HH | SG | STB | Nit | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| New Injection Well Installation | HH | SG | STB | Nit | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |
| Off-Site Waste Transportation & Disposal | HH | SG | STB | Nit | WC | EP as needed | Initial LOP: D; Upgrades based on real time readings and conditions |

Legend:

EP = Ear Plugs

HH = Hard Hat

Nit = Nitrile Gloves

LWG = Leather Work Gloves

PFS = Plastic Face Shield

SG = Safety Glasses

STB = Steel Toe Boots

WC = Work Clothes

6.2 Respirator Cartridge Change-Out Schedule

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

- Cartridges will be removed and disposed of after four (4) hours of use, when cartridges become wet or wearer experiences breakthrough, whichever occurs first.
- If the humidity exceeds 85%, then cartridges will be removed and disposed of after two (2) hours of use.

Respirators will not be stored at the end of the shift with contaminated cartridges left on. Cartridges will not be reused on another shift, regardless of use time on a previous shift.

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

- Analytical data that is available regarding site contaminants.
- Using the Rules of Thumb provided by the American Industrial Hygiene Association (AIHA).
- All of the chemicals have boiling points greater than 70 degrees Celsius (°C).
- Total airborne concentration of contaminants is anticipated to be less than 200 parts per million (ppm).
- The humidity is expected to be less than 85%.
- Desorption of contaminants (including those with poor warning properties) after partial use of the chemical cartridge can occur after a short period (hours) without use (i.e. overnight) and result in a non-use exposure.

The following is a partial list of factors that may affect the usable cartridge service life and/or the degree of respiratory protection attainable under actual workplace conditions. These factors have been considered when developing the cartridge change-out schedule.

- Type of contaminant(s).
- Contaminant concentration.
- Relative humidity.
- Breathing rate.
- Temperature.
- Changes in contaminant concentration, humidity, breathing rate and temperature.
- Mixtures of contaminants.
- Accuracy in the determination of the conditions.
- The contaminant concentration in the workplace can vary greatly. Consideration must be given to the quality of the estimate of the workplace concentration.
- Storage conditions between multiple uses of the same respirator cartridges. It is recommended that the chemical cartridges be replaced after each work shift. Contaminants adsorbed on a cartridge can migrate through the carbon bed without airflow.
- Age of the cartridge.
- Condition of the cartridge and respirator.

- Respirator and cartridge selection.
- Respirator fit.
- Respirator assembly, operation, and maintenance.
- User training, experience and medical fitness.
- Warning properties of the contaminant.
- The quality of the warning properties should be considered when establishing the chemical cartridge change schedule. Good warning properties may provide a secondary or back-up indication for cartridge change-out.

7.0 AIR MONITORING

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

7.1 Real Time Air Monitoring

This section addresses the real time air monitoring that will be conducted, including instrumentation selection, frequency and location of air sampling. At a minimum, real-time air monitoring will be conducted during excavation, well installation and well development. Air monitoring will continue in this manner until sufficient data is developed to consider a frequency reduction or cessation for a particular activity. Table 7-1 lists the Real Time Air Monitoring Action Levels to be used in all work areas. Table 7-2 presents a breakdown of each main activity and provides the instrumentation, frequency and location of real-time air monitoring for the site. All air monitoring readings will be recorded, regardless of concentrations.

The following instruments will be used for real-time air monitoring:

- Photo Ionization Detector (PID) with an 11.7 eV lamp.
- Combustible Gas Indicator/Oxygen (CGI/O₂/CO).
- Detector tube for vinyl chloride, low range tube, able to detect < 1 ppm.

Organic vapor concentrations will be measured using the PID and vinyl chloride detector tubes. Measurements will be recorded during the above activities, at a minimum. The monitoring for organic vapors will consist of measurements recorded at the breathing zone (BZ) height in the area of highest employee exposure risk. Readings will be taken in accordance with Table 7-2.

Monitoring for combustible gases will be conducted during well installation and development activities and any other activities that may generate combustible gas or vapors.

Based on real time air monitoring readings and site conditions, the SHSO or designee may increase/decrease the frequency at which the readings are taken, using professional judgment. Table 7-1 provides the real-time air monitoring action levels. Real-time air monitoring will be conducted in order to confirm the “no exposure scenario.”

Real-time air monitoring results for on-site activities will be reviewed with craft labor periodically by the SHSO in site daily health and safety briefings.

**Table 7-1
Real Time Air Monitoring Action Levels**

| Air Monitoring Instrument | Monitoring Location | Action Level | Site Action | Reason |
|------------------------------|--------------------------|----------------------------------|---|--|
| PID w/11.7 lamp | Breathing Zone | >0.5 ppm | Use detector tube for vinyl chloride | Conservative action level based on the potential exposure to vinyl chloride |
| | Breathing Zone | < 2.5 ppm, no vinyl chloride | Level D | Conservative action level based on the potential exposure to carbon tetrachloride. |
| | Breathing Zone | >2.5 – 25 ppm, no vinyl chloride | Level C | Based on increasing potential for exposure to VOCs |
| | Breathing Zone | >25 ppm no vinyl chloride | Level B | Assume conservative protection factor for respirators |
| Vinyl Chloride Detector Tube | Breathing Zone | <1 ppm | Level D | PEL for vinyl chloride is 1 ppm |
| | Breathing Zone | >1 ppm | Cease activities, contact PM and PESM for further instruction | There are currently no approved cartridges for vinyl chloride |
| CGI/O ₂ /CO | Breathing Zone, borehole | 1% LEL-10% LEL | Investigate possible cause, use caution | Increasing potential for ignition of vapors |
| | Breathing Zone, borehole | Conc. > 10% LEL | Cease activities, contact PM and PESM for further instruction | Potential for ignition of vapors |

7.2 Frequency and Location of Real Time Air Monitoring

Table 7-2 provides the frequency and location of real time air monitoring.

**Table 7-2
Frequency and Location of Air Monitoring**

| Activity | Air Monitoring Instrument | Frequency And Location |
|---|---|-------------------------|
| Excavation, Well installation and development | PID, CGI/O ₂ /CO, and VC tubes | BZ: every 15-30 minutes |

7.3 Integrated Air Monitoring

Integrated air monitoring will not be performed due to the nature of the work and the contaminants.

7.4 Data Quality Assurance

7.4.1 Calibration

Instrument calibration will be documented and included in a dedicated Health and Safety Logbook or on separate calibration pages. All instruments will be calibrated before and will be

subject to a continuous calibration check after each shift. Calibration checks may be used during the day to confirm instrument accuracy. Duplicate readings may be taken to confirm individual instrument response.

7.4.2 Operations

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

7.4.3 Data Review

The SHSO will interpret all monitoring data based on Table 7-1 and professional judgment. The SHSO will review the monitoring and sampling data with the PESM to evaluate the potential for worker exposure and upgrades/downgrades in level of protection.

7.5 Noise Monitoring

Noise monitoring will not be conducted. Hearing protection will be worn by workers in proximity to heavy equipment, fans, blowers and pumps. When equipment requires the wearing of ear muffs the equipment will be labeled as hazardous to hearing, and the hazard radius noted on the warning.

8.0 ZONES, PROTECTION AND COMMUNICATION

8.1 Site Control

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 will include an Exclusion Zone (EZ), Contamination Reduction Zone (CRZ) and a Support Zone (SZ). Specific zones will be established on the work site when operations begin. A map showing these zones will be developed on-site and posted in the field office. All maps will be posted at the site and used during initial site-specific training.

This project is a hazardous waste remediation project, and any person working in an area where the potential for exposure to site contaminants exists, will only be allowed access after providing the SHSO with evidence of proper training and medical documentation.

The zones are based upon current knowledge of proposed site activities. It is possible that the zone configurations may be altered due to work plan revisions. Should this occur, the Site Zones will be adjusted accordingly.

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

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

CRZ - 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 EZ. The CRZ will be used for EZ entry and egress in addition to access for heavy equipment and emergency support services.

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

Site personnel and visitors must log in and out of the EZ and CRZ daily.

8.2 Contamination Control

Decontamination areas will be established for the following activities:

8.2.1 Personnel Decontamination Station

Personnel hygiene, coupled with diligent decontamination, will significantly reduce the potential for exposure of off-site areas to contaminants from the site. When participating in potentially dust-raising activities, such as excavating soil, it will be crucial for field personnel to adhere to the following personal hygiene guidelines:

- Wash hands and face after leaving the CRZ.
- Every effort will be made to reduce dust production through engineering controls (i.e., watering, if deemed necessary based on weather conditions).

8.2.2 Minimization of Contact with Contaminants

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

8.2.3 Personnel Dry Decontamination Sequence

When decontamination is needed, a dry decon will be used whenever possible. Personal decontamination procedures are as follows:

Perform dry decon if contact with contaminants occurred.

- Remove exterior protective clothing carefully and dispose of same.
- Remove and clean respirator, if applicable.
- Remove gloves without touching outside surface of gloves and dispose of same.
- Wash hands and face thoroughly.

8.2.4 Heavy Equipment Decontamination

Heavy equipment and hand held equipment that has come into contact with contaminated material will be decontaminated upon completion of the required project operations and after traveling from the EZ into other work zones from the site. Decontaminate rinsate will then be containerized in approved 55-gallon drums before being disposed off-site.

Heavy equipment will not be permitted to leave the EZ unless it has been thoroughly decontaminated and visually inspected by the SHSO or their designee.

8.3 Communication

The following communications equipment will be specified as appropriate:

- Hand-held two-way radios are utilized as appropriate by field teams for communication with the site office trailer.
- Telephones - A telephone will be located in the site office trailer in the SZ for communication with emergency support services/facilities.
- Air Horns - Air horns will be carried by field teams or be strategically located within the EZ and will be maintained as the means for announcing emergency evacuation procedures and backup for other forms of communication.
- Hand Signals - Hand signals will be used by field teams along with the buddy system. They will be known by the entire field team before operations commence and their use covered during site-specific training. Typical hand signals are the following:

| <u>SIGNAL</u> | <u>MEANING</u> |
|--|--|
| Hand gripping throat. | Out of air, can't breathe.. |
| Grip on a partner's wrist or placement of both hands around a partner's waist. | Leave the area immediately, no debate. |
| Hands on top of head. | Need general assistance. |
| Hands raised above head. | Need immediate assistance. |
| Thumbs up. | Okay, I'm all right, I understand. |
| Thumbs down. | No, negative. |

9.0 MEDICAL SURVEILLANCE PROCEDURES

All contractor and subcontractor personnel performing field work where potential exposure to contamination exists are required to have passed a medical surveillance examination in accordance with 29 CFR 1910.120(f).

The TtEC Medical Surveillance Program is described in detail in EHS 4-5 of the EHS Program. The Corporate Medical Consultant is WorkCare, located in Anaheim, California. Dr. Peter Greaney, the Director, is Board certified in occupational medicine and may be reached at 800-455-6155.

9.1 Medical Surveillance Requirements

A physician's medical release for work will be confirmed by the SHSO before an employee can work in the EZ. The examination will be taken annually at a minimum and upon termination of hazardous waste site work if the last examination was not taken within the previous six months. Additional medical testing may be required by the PESH in consultation with the Corporate Medical Consultant and the SHSO if an over-exposure or accident occurs, if an employee exhibits symptoms of exposure, or if other site conditions warrant further medical surveillance.

9.2 Medical Data Sheet

A medical data sheet is provided in Appendix I. This medical data sheet is voluntary and should be completed by all on-site personnel and will be maintained at the site. Where possible, this medical data sheet will accompany the personnel needing medical assistance. The medical data sheet will be maintained in a secure location, treated as confidential, and used only on a need-to-know basis.

10.0 SAFETY CONSIDERATIONS

10.1 General Health and Safety Work Rules

A list of work rules and general safe work practices has been included from the TtEC EHS Program, EHS 3-6. These rules have been incorporated into the SHSP as Appendix J. The work rules will be posted in a conspicuous location at the site.

10.2 General Construction Hazards

The following is a list of applicable safety considerations for the major tasks. Further information is provided in the specific AHA and the specific TtEC EHS Program.

- Slips/Trips/Falls.
- Punctures/Cuts.
- Lifting/Materials Handling.

10.3 High Loss Potential Hazards

Activities that have the potential for a serious injury to occur, include the following:

- Excavation/Intrusive activities.
- Exposure to energized electric lines / underground utility lines.
- Heavy Equipment operation (See Appendix K Critical Lifts)
- Building assembly.
- Drill Rig operation.

10.3.1 Underground Utilities

Striking underground utilities is a possible hazard whenever intrusive activities are conducted. All steps will be taken to locate underground utilities as per Procedure EHS 3-15 (see Appendix E, Underground Utilities). This includes white lining the area of intrusive activity and calling the "One-Call" number to have underground utilities located and marked.

Underground utility avoidance requires a "competent person" be designated. "Competent person" means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

The Competent Person will be responsible for the following:

- Obtaining a copy of, and understanding the applicable regulations for NYS.
- Contacting the appropriate One-Call agency or private locating service, as applicable.
- Recording One-Call locate numbers.
- If necessary, renewing One-Call locate numbers before expiration.
- Ensuring that white-lining of the area of intrusive work is performed.
- Ensuring that a "positive response" has been received from every utility owner/operator identified by the One-Call agency and that they have located their underground utilities and have appropriately marked any potential conflicts with the areas of planned intrusive activities.
- Completion of the *Underground Utilities Locating and Marking Checklist* and the *Underground Utilities Management Checklist*.
- Reviewing applicable AHA with all project members before work begins.
- Conducting training on communication protocols to be used by the intrusive activities observer and equipment operator.
- Ensuring implementation of appropriate work practices during intrusive activities.
- Conducting daily inspections of the intrusive activities area to make sure that all markings are intact.
- Maintaining required records.
- Providing the SHSO with all required documentation on a daily basis.

10.3.2 Excavation and Trenching

Excavation will be conducted in accordance with the Excavation and Trenching Program, EHS 6-3 of the TtEC Corporate EHS Program, which is in Appendix F. Procedures in this document incorporate the requirements of 29 CFR 1926, Subpart P-Excavations. EHS 6-3 requires the designation of a "Competent Person" by the PM and requirements for safe excavating practices. The program also includes requirements for the monitoring of potentially hazardous atmospheres; protection from water hazards; analyzing and maintaining the stability of adjacent structures; daily competent person inspections; soil classification; sloping and benching; protective systems; and training.

TtEC technical personnel will assist the Competent Person in their duties.

Trenches 4 feet or greater in depth will require atmospheric monitoring and ladders for safe entry/egress. The Competent Person will determine the need for cave-in protection. If trenches exceed 5 feet in depth, cave-in protection will be implemented in accordance with the Excavation and Trenching Program, EHS 6-3 of the TtEC Corporate EHS Program.

The competent person(s) will be responsible for the following:

- Day-to-day oversight of open excavations and trenches.
- Conducting soil classifications.
- Selection of protective systems.
- Conducting daily inspections of open excavations and trenches.
- Providing the SHSO with all required documentation on a daily basis.

Competent persons will have an adequate combination of experience and training to classify soil types and select protective systems as outlined in EHS 6-3. Training and experience pertaining to qualification as a competent person will be documented and include the following:

- General safety practices related to working in or near open excavations.
- Inspection requirements and techniques.
- Classification of soils in accordance with EHS 6-3.
- Uses, limitations, and specifications of protective systems in accordance with EHS 6-3.

Prior to any excavation or underground work, utilities will be identified and located following EHS 3-15 of the TtEC EHS Program.

11.0 WASTE DISPOSAL PROCEDURES

All discarded materials, waste materials or other objects will be handled in such a way as to preclude the potential for spreading contamination, creating a sanitary hazard or causing litter to be left on site. To the extent possible, cuttings will be placed back into boreholes. Water from well purging and well development can be discharged to the Publicly Owned Treatment Works (POTW) without prior treatment. All potentially contaminated materials, e.g., clothing, gloves,

etc., will be bagged or drummed as necessary, labeled and segregated for disposal. All non-contaminated materials will be collected and bagged for appropriate disposal as non-hazardous solid waste. Additional waste disposal procedures may be developed with the ESQ Department Regulatory Specialist as applicable.

12.0 EMERGENCY RESPONSE PLAN

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

12.1 Responsibilities

12.1.1 PESM

The PESM is Grey Coppi, CIH, CSP.

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

12.1.2 SHSO

The SHSO is Ed Casey.

The SHSO is responsible for ensuring that all personnel are evacuated safely and that machinery and processes are shut down or stabilized in the event of a stop work order or evacuation. The SHSO is required to immediately notify the PESM of any fatalities or catastrophes (three or more workers injured and hospitalized) so that the PESM can notify OSHA within the required time frame. The PESM will be notified of all OSHA recordable injuries, fires, spills, releases or equipment damage in excess of \$500 within 24 hours. The SHSO also serves as the Alternate EC.

12.1.3 EC

The EC is Ed Urbanek.

The EC will make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the EC will inform interested parties about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants. The EC will locate emergency phone numbers and

identify hospital routes prior to beginning work on site. The EC will make necessary arrangements to be prepared for any emergencies that could occur.

The EC will implement the Emergency Response/Contingency Plan whenever conditions at the site warrant such action.

12.1.4 Site Personnel

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

12.2 Communication

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

12.2.1 Radio Communication

The primary form of communication during an emergency between field groups in the EZ and the EC will be radio communications. Each field team within the EZ will have a radio. During an emergency situation, the lines will be kept clear so that all field teams can receive instructions.

12.2.2 Telephone Communication

A telephone will be maintained in the office trailer.

12.2.3 Air Horns

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

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

Air horns can be found in the office trailer and site vehicles. The procedure to activate the air horns consists of depressing the air horn button or switch while pointing it in the direction of the area to be signaled. Air horns will be tested at least monthly to ensure that they are working properly.

12.2.4 Hand Signals

Field teams will employ hand signals (Section 8.3) where necessary for communication during an emergency.

12.3 Local Emergency Support Units

In order to be able to deal with any emergency that might occur during remedial activities at the site, Table 12-1 will be posted prominently in the field office and in all places where telephone service is available.

A route map from the site to the nearest hospital is located in Appendix K. This map will be posted adjacent to the above emergency telephone numbers in the field office and in all places where telephone service is available. It should also be placed in all on site vehicles.

| Table 12-1 Emergency Telephone Numbers | | |
|---|--|--|
| Contact | Firm or Agency | Telephone Number |
| Police | Nassau County Police Department | 516-573-6800 |
| Fire | Bethpage Fire Department | 516-931-2660 |
| Hospital | New Island Hospital 4295 Hempstead Turnpike Bethpage, New York 11714 | 516-579-6000 |
| Ambulance | Bethpage EMS | 516-931-0666 |
| Non-emergency Medical Clinic – approved by WorkCare | Island Occupational Medical 4 Dorothy Gate Massapequa, New York | 516-795-5544 |
| PM - Stavros Patselas | TtEC | Office - 215-702-4099 Cell - 267-688-9967 |
| PS - Ed Urbanek | TtEC | Cell - 401-225-6346 |
| SHSO – Ed Casey | TtEC | Cell – 610-842-3973 |
| PESM - Grey Coppi | TtEC | Office - 973-630-8101 Cell - 215-327-0751 |
| Facility Contact, Al Taormina | J.A. Jones Management Services NWIRP Bethpage | 516-346-0344 516-702-5861 |
| RPM- James Colter | EFANE | 610-595-0567 ext. 163 |
| Navy ROICC – Bob Ingram | | 516-575-2121 |
| WorkCare | Anaheim, California | 800-455-6155 |
| Poison Control Center | | 800-222-1222 |
| National Response Center | | 800-424-8802 |

12.4 Pre-Emergency Planning

TtEC will communicate directly with administrative personnel from the emergency room at the hospital in order to determine whether the hospital has the facilities and personnel needed to treat cases of trauma resulting from exposure to any of the contaminants expected to be found on the site. Instructions for finding the hospital will be posted conspicuously in the site office and in each site vehicle.

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

12.5 Emergency Medical Treatment

The procedures and rules in this SHSP are designed to prevent employee injury. However, should an injury occur, no matter how slight, it will be reported to the SHSO immediately. First-aid equipment will be available on site at the following locations:

- First Aid Kit: Field Office and Site Vehicles
- Emergency Eye Wash (Meets ANSI Z.358.1-2004 for a 15 minute flush): Field Office and CRZ

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

TtEC will provide at least two personnel with current First Aid and Cardiopulmonary Resuscitation (CPR) certification on each active work shift. When personnel are transported to the hospital, the SHSO will provide a copy of the Medical Data Sheet to the paramedics and treating physician.

Only in non-emergency situations will an injured person be transported to the hospital by means other than an ambulance. The WorkCare-approved clinic is:

| Clinic | Hospital |
|---|--|
| Island Occupational Medical 4 Dorothy Gate Massapequa, NY 516-795-5544 | New Island Hospital 4295 Hempstead Turnpike Oyster Bay, NY 516-579-6000 |

12.6 Emergency Site Evacuation Routes and Procedures

In order to mobilize the manpower resources and equipment necessary to cope with a fire or other emergency, a clear chain of authority will be established. The EC will take charge of all emergency response activities and dictate the procedures that will be followed for the duration of the emergency. The EC will report immediately to the scene of the emergency, assess the seriousness of the situation, and direct whatever efforts are necessary until the emergency response units arrive. At their discretion, the EC also may order the closure of the site for an indefinite period.

All project personnel will be instructed on proper emergency response procedures and locations of emergency telephone numbers during the initial site safety meeting. If an emergency occurs, including but not limited to fire, explosion or significant release of toxic gas into the atmosphere, an air horn will be sounded on the site. The horn will sound continuously for one blast, signaling that immediate evacuation of all personnel is necessary due to an immediate or impending danger. All heavy equipment will be shut down and all personnel will evacuate the work areas and assemble at the assigned locations.

The EC will give directions for implementing whatever actions are necessary. Any project team member may be assigned to be in charge of emergency communications during an emergency.

The project team member will attend the site telephone specified by the EC from the time the alarm sounds until the emergency has ended.

After sounding the alarm and initiating emergency response procedures, the EC will check and verify that access roads are not obstructed. If traffic control is necessary, as in the event of a fire or explosion, a project team member, who has been trained in these procedures and designated at the site safety meeting, will take over these duties until local police and fire fighters arrive.

The EC will remain at the site to provide any assistance requested by emergency-response squads as they arrive to deal with the situation. A map showing evacuation routes, meeting places, and location of emergency equipment will be developed on site and will be posted in all field offices and vehicles and used during site-specific training.

12.6.1 Evacuation Drills

An evacuation drill will be conducted within two weeks of mobilization to test the emergency notification and response system.

The drill will simulate situations that may be likely to occur on-site. The SHSO will critique the drill according to TtEC EHS Program, EHS 2-1.

12.7 Fire Prevention and Protection

In the event of a fire or explosion, procedures will include immediately evacuating the site (air horn will sound for a single continuous blast), and notification of local fire and police departments. No personnel will fight a fire beyond the stage where it can be put out with a portable extinguisher (incipient stage).

12.7.1 Fire Prevention

The major workplace fire hazards are flammable liquids and fuels, motorized vehicles and equipment.

Fires will be prevented by adhering to the following precautions:

- Good housekeeping and storage of materials.
- Storage of flammable liquids and gases away from oxidizers.
- No smoking in the EZ or any work area.
- No hot work without a properly executed hot work permit.
- Shutting off engines to refuel.
- Grounding and bonding metal containers during transfer of flammable liquids.
- Use of Underwriters Laboratories (UL) approved flammable storage cans. The use of plastic cans to store flammable/combustible liquids is not permitted.
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities.
- Monthly inspections of all fire extinguishers.

12.7.2 Fire Protection

A map of all fire extinguisher locations will be developed on-site and posted in the field office.

The person responsible for the maintenance of fire prevention and/or control equipment is the SHSO.

The person responsible for the control of fuel source hazards is the SHSO.

12.8 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the Material Safety Data Sheet (MSDS) or recommended by the Corporate Medical Consultant will be followed, when necessary. He may be reached at (800) 455-6155.

SKIN AND EYE CONTACT: Use copious amounts of water. Rinse affected areas thoroughly, then provide appropriate medical attention. Eyes and skin should be rinsed for 15 minutes upon chemical contamination.

INHALATION: Move to fresh air. Decontaminate and transport to hospital or local medical provider.

INGESTION: Decontaminate and transport to emergency medical facility.

PUNCTURE WOUND OR LACERATION: Decontaminate and transport to emergency medical facility.

12.9 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment is required, normal decontamination procedures may need to be abbreviated or postponed. The SHSO or designee will accompany contaminated victims to the medical facility to advise on matters involving decontamination,

when necessary. The outer garments can be removed if they do not cause delays, interfere with treatment or aggravate the problem. Respiratory equipment must always be removed. Protective clothing can be cut away. If the outer contaminated garments cannot be safely removed on-site, a plastic barrier placed between the injured individual and clean surfaces should be used to help prevent contamination of the inside of ambulances and/or medical personnel. Outer garments may then be removed at the medical facility. No attempt will be made to wash or rinse the victim if their injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

12.10 Accident/Incident Reporting

As soon as first aid and/or emergency response needs have been met, the following parties are to be contacted by telephone:

- PESH - Grey Coppi, CIH, CSP, (973) 630-8101, cell (215) 327-0751
- PM – Stavros Patselas (215) 702-4099, cell (267) 688-9967
- The employer of any injured worker who is not a TtEC employee.

Written confirmation of verbal reports is to be submitted within 24 hours. The accident/incident report is found in the TtEC EHS Program EHS 1-7. If the employee involved is not a TtEC employee, their employer will receive a copy of the report.

12.11 Adverse Weather Conditions

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

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

Site activities will be limited to daylight hours, or when suitable artificial light is provided, and acceptable weather conditions prevail. The SHSO will determine the need to cease field operations or observe daily weather reports and evacuate, if necessary, in case of severe inclement weather conditions.

12.12 Spill Control and Response

All small hazardous spills/environmental releases will be contained as close to the source as possible. Whenever possible, the MSDS will be consulted to assist in determining the best

means of containment and cleanup. For small spills, sorbent materials such as sand, sawdust or commercial sorbents should be placed directly on the substance to contain the spill and aid recovery. Any acid spills should be diluted or neutralized carefully prior to attempting recovery. Berms of earthen or sorbent materials can be used to contain the leading edge of the spills. Drains or drainage areas should be blocked. All spill containment materials will be properly disposed. An EZ of 50-100 feet around the spill area should be established depending on the size of the spill.

The following steps, in order, should be taken by the EC:

- Determine the nature, identity and amounts of major spill components.
- Make sure all unnecessary persons are removed from the spill area.
- Notify appropriate response teams and authorities and PM as well as PESM.
- Use proper PPE.
- If a flammable liquid, gas or vapor is involved, remove all ignition sources and use non-sparking and/or explosive proof equipment to contain or clean up the spill (diesel only vehicles, air operated pumps, etc).
- If possible, try to stop the leak with appropriate material.
- Remove all surrounding materials that can react or compound with the spill.
- Contact Lee Dixon at (617) 457-8258 for spill reporting information and assistance.

12.13 Emergency Equipment

The following minimum emergency equipment will be kept and maintained on-site:

- Industrial first aid kit.
- Burn kit.
- Portable eye washes (one per field team) (Meets ANSI Z.358.1-2004 for 15 minute flush.).
- Air horns (one per field team).
- Fire extinguishers (one per trailer/vehicle, trailers and located at hot work stations).
- Two-way radios.
- Absorbent material.

12.14 Postings

The following information will be posted at various, conspicuous locations throughout the site:

- Emergency telephone numbers.
- Diagrams showing the location of fire extinguishers and emergency equipment.
- Emergency exit, evacuation routes and staging area.
- Hospital route map.

12.15 Restoration and Salvage

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

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

13.0 TRAINING

13.1 General Health and Safety Training

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

13.1.1 Three Day Supervised On-the-Job Training

In addition to the required initial hazardous waste operations training, each employee will have received three days of directly supervised on-the-job training. This training will address the duties the employees are expected to perform.

13.2 Annual Eight-Hour Refresher Training

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

13.3 Supervisory Training

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

13.4 Site-Specific Training

Prior to commencement of field activities, all field personnel assigned to the project will have completed training that will specifically address the activities, procedures, monitoring, and equipment used in the site operations. It will include site and facility layout, hazards and

emergency services at the site and will highlight all provisions contained within this SHSP. This training will also allow field workers to clarify anything they do not understand and to reinforce their responsibilities regarding safety and operations for their particular activity.

On-Site Safety Briefings

Project personnel and visitors will be given on-site health and safety briefings daily by the SHSO to assist site personnel in safely conducting their work activities. The briefings will include information on new operations to be conducted, changes in work practices or changes in the site's environmental conditions, as well as periodic reinforcement of previously discussed topics. The briefings will also provide a forum to facilitate conformance with safety requirements and to identify performance deficiencies related to safety during daily activities or as a result of safety inspections. The meetings will also be an opportunity for the SHSO to periodically update the workers on air monitoring results. Prior to starting any new activity, a training session using the AHA will be held for workers involved in the activity.

13.5 First Aid and CPR

The SHSO will identify those individuals requiring First Aid and CPR training in order to ensure that emergency medical treatment is available during field activities. The training will be consistent with the requirements of the American Red Cross Association and include Bloodborne Pathogens training.

13.6 Hazard Communication

Hazard communication training will be provided in accordance with the requirements contained in the TtEC EHS Program, EHS 4-2.

14.0 LOGS, REPORTS AND RECORD KEEPING

The following is a summary of required health and safety logs, reports and record keeping.

14.1 CRF

A CRF is to be completed for initiating a change to the SHSP. The Navy, PESM and PM or designee approval is required. The original will be kept in the project file. Approved changes will be reviewed with affected field personnel at a safety briefing. Copies will be distributed to the Client Representative.

14.2 Medical and Training Records

Copies or verification of training (40 hour, 8 hour, supervisor, site-specific training and documentation of three day on-the-job) and medical clearance for hazardous waste site work and respirator use will be maintained on-site. Records for all subcontractor employees will also be kept on-site. All employee medical records will be maintained by the Corporate Medical Consultant – WorkCare in accordance with TtEC EHS Program, EHS 1-9.

14.3 On-Site Log

A log of personnel on-site each day will be kept by the PS or designee.

14.4 Weekly/Monthly Safety Reports

The SHSO will complete and submit weekly and monthly safety reports to the PESM. The reports are provided in Appendix L.

14.5 Exposure Records

All personal air monitoring results, laboratory reports, calculations and air sampling data sheets are part of an employee exposure record. These records will be maintained by the SHSO during site work. At the end of the project they will be maintained according to 29 CFR 1910.1020 and TtEC EHS Program, EHS 1-9.

14.6 Accident/Incident Reports

Completion of all incident and investigation reports will be in accordance with TtEC EHS Program, EHS 1-7.

14.7 OSHA Form 300

An OSHA Form 300 will be kept at the project site. All recordable injuries or illnesses will be recorded on this form. At the end of the project, the original will be sent to the PESM for maintenance. Subcontractor employers must also meet the requirements of maintaining an OSHA 300 form. The incident report form referenced in Section 12.10 meets the requirements of the OSHA Form 301(supplemental record) and must be maintained with the OSHA Form 300 for all recordable injuries or illnesses.

14.8 Health and Safety Logbook

The SHSO will maintain a logbook during site work. The daily site conditions, personnel, air monitoring results and significant events will be recorded. The original logbook will become part of the exposure records file.

14.9 Hazard Communication Program/MSDS

MSDS will be obtained for applicable substances and included in the site hazard communication file. The hazard communication program will be maintained onsite in accordance with 29 CFR 1910.1200 and TtEC EHS Program EHS 4-2.

14.10 Work Permits

All work permits, including confined space entry, hot work, lockout/tagout, and line breaking permits will be maintained in the project files.

15.0 FIELD PERSONNEL REVIEW

This form serves as documentation that field personnel have read, or have been informed of, and understand the provisions of the SHSP. It is maintained on-site by the SHSO as a project record.

Each field person team will sign this section after site-specific training is completed and before being permitted to work on site.

I have read, or have been informed of, this SHSP for GM-38 Area Groundwater Remediation Construction Tasks at NWIRP, Bethpage, NY, and understand the information presented. I will comply with the provisions contained therein.

| Name (Print and Sign) | Date |
|-----------------------|------|
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16.0 REFERENCES

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Appendix A
Change Request Form

**Tetra Tech EC, Inc.
Change Request Form**

Section 1 through 4 to be filled out by Tetra Tech EC, Inc., Section 5 to be filled out by Navy

| | | |
|---------------------------------|---------------------------|---|
| PROJECT: Navy RAC CTO 96 | OFS No.: 2282-0096 | Change Request Form: CRF - 001 Rev. 0 |
|---------------------------------|---------------------------|---|

To: _____ Dept.: _____ Location: _____ Date: _____

Re: Drawing No. _____ Title _____

Spec. No. _____ Title _____

Other _____

1. DESCRIPTION *(Items involved, submit sketch if applicable)*

2. REASONS FOR CHANGE *(If from disposition of nonconformance report, list report number)*

3. RECOMMENDED DISPOSITION

| | |
|---|--|
| <input type="checkbox"/> Technical Clarification [NTR & COTR approval required] | <input type="checkbox"/> Cost Growth |
| <input type="checkbox"/> In Scope Adjustment [COTR approval required] | <input type="checkbox"/> ROM Estimate (If Applicable) \$ _____ |
| <input type="checkbox"/> Out of Scope [CO & COTR approval required] | <input type="checkbox"/> Schedule Impact (describe below) |

TtEC Initiator (Signature/Title):

| | | | |
|-------------------------------------|------|--|------|
| 4. TtEC Project Manager (Signature) | Date | Project Superintendent Concurrence (Signature) | Date |
|-------------------------------------|------|--|------|

5. NAVY DISPOSITION

Approved per recommended disposition

Not approved (give reason)

Approved with modification(s) [describe below]

| | | | |
|---|------|--|------|
| NTR Concurrence (signature) | Date | ROICC Concurrence (Signature) | Date |
| Contracting Officer Technical Representative Approval (Signature) | | Contracting Officer Approval (Signature) | Date |

Engineer signs and transmits to Resident Engineer with copies to:

| | |
|------------------------------|--------------------------|
| _____ Project Manager | Others as Required _____ |
| _____ Project Superintendent | File: _____ |
| _____ Quality Control | _____ |

Appendix B
Material Safety Data Sheets



**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**

111 TRICHLOROETHANE

| | |
|---|--|
| Section 1 - Product and Company Identification | Section 9 - Physical & Chemical Properties |
| Section 2 - Composition/Information on Ingredients | Section 10 - Stability & Reactivity Data |
| Section 3 - Hazards Identification Including Emergency Overview | Section 11 - Toxicological Information |
| Section 4 - First Aid Measures | Section 12 - Ecological Information |
| Section 5 - Fire Fighting Measures | Section 13 - Disposal Considerations |
| Section 6 - Accidental Release Measures | Section 14 - MSDS Transport Information |
| Section 7 - Handling and Storage | Section 15 - Regulatory Information |
| Section 8 - Exposure Controls & Personal Protection | Section 16 - Other Information |

The information in this document is compiled from information maintained by the United States Department of Defense (DOD). Anyone using this information is solely responsible for the accuracy and applicability of this information to a particular use or situation.

Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

**Section 1 - Product and Company Identification
111 TRICHLOROETHANE**

Product Identification: 111 TRICHLOROETHANE
Date of MSDS: 01/01/1987 **Technical Review Date:** 12/05/1998
FSC: 6810 **NIIN:** 00-930-6311
Submitter: G AW
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: DIHOMA CHEMICAL MANUFACTURING, INC.
Manufacturer's Address1: ROUTE 3, BOX 375
Manufacturer's Address2: MULLINS, SC 29574
Manufacturer's Country: US
General Information Telephone: 803-423-7799
Emergency Telephone: 803-423-7799
Emergency Telephone: 803-423-7799
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 0FMP6
Special Project Code: N

Item Description

Item Name: TRICHLOROETHANE, TECHNICAL
Item Manager:
Specification Number: 0-T-620
Type/Grade/Class: TYPE III
Unit of Issue:
Unit of Issue Quantity:
Type of Container: CAN

Contractor Information

Contractor's Name: DIHOMA CHEMICAL & MFG INC
Contractor's Address1: RT 3
Contractor's Address2: MULLINS, SC 29574
Contractor's Telephone: 803-423-7799
Contractor's CAGE: 0FMP6

Section 2 - Compositon/Information on Ingredients
111 TRICHLOROETHANE

Ingredient Name: 111 TRICHLORO ETHANE
Ingredient CAS Number: 71-55-6 **Ingredient CAS Code:** M
RTECS Number: KJ2975000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <95.0

% Environmental Weight:
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 350 PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 350 PPM **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: 1

Ingredient Name: CARBON DIOXIDE (PROPELLANT)
Ingredient CAS Number: 124-38-9 **Ingredient CAS Code:** M
RTECS Number: FF6400000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: NK
% Environmental Weight:
Other REC Limits: NONE RECOMMENDED
OSHA PEL: NOT ESTABLISHED **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT ESTABLISHED **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
111 TRICHLOROETHANE

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
N/P

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
Inhalation: N/P
Skin: N/P

Ingestion: N/P

Carcenogenicity Indicators

NTP: N/P

IARC: N/P

OSHA: N/P

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures
111 TRICHLOROETHANE

First Aid:
N/P

Section 5 - Fire Fighting Measures
111 TRICHLOROETHANE

Fire Fighting Procedures:
N/P

Unusual Fire or Explosion Hazard:
N/P

Extinguishing Media:
N/P

Flash Point: Flash Point Text: NONE

Autoignition Temperature:
Autoignition Temperature Text: NK
Lower Limit(s):
Upper Limit(s):

Section 6 - Accidental Release Measures
111 TRICHLOROETHANE

Spill Release Procedures:
N/P

Section 7 - Handling and Storage
111 TRICHLOROETHANE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
111 TRICHLOROETHANE

Respiratory Protection:
N/P

Ventilation:

N/P

Protective Gloves:

N/P

Eye Protection: N/P

Other Protective Equipment: N/P

Work Hygienic Practices: N/P

Supplemental Health & Safety Information: N/P

Section 9 - Physical & Chemical Properties
111 TRICHLOROETHANE

HCC: V2

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: N/A

Melting/Freezing Point: Melting/Freezing Text: N/A

Decomposition Point: Decomposition Text: N/A

Vapor Pressure: N/P Vapor Density: N/P

Percent Volatile Organic Content:

Specific Gravity: N/P

Volatile Organic Content Pounds per Gallon:

pH: N/P

Volatile Organic Content Grams per Liter:

Viscosity: NK

Evaporation Weight and Reference: N/P

Solubility in Water: N/P

Appearance and Odor:

Percent Volatiles by Volume: N/P

Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
111 TRICHLOROETHANE

Stability Indicator: N/P

Materials to Avoid:

N/P

Stability Condition to Avoid:

N/P

Hazardous Decomposition Products:

N/P

Hazardous Polymerization Indicator: N/P

Conditions to Avoid Polymerization:

N/P

Section 11 - Toxicological Information
111 TRICHLOROETHANE

Toxicological Information:

N/P

Section 12 - Ecological Information
111 TRICHLOROETHANE

Ecological Information:

N/P

Section 13 - Disposal Considerations
111 TRICHLOROETHANE

Waste Disposal Methods:

N/P

Section 14 - MSDS Transport Information
111 TRICHLOROETHANE

Transport Information:

N/P

Section 15 - Regulatory Information
111 TRICHLOROETHANE

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
111 TRICHLOROETHANE

Other Information:

N/P

HMIS Transportation Information

Product Identification: 111 TRICHLOROETHANE

Transportation ID Number: 92803

Responsible Party CAGE: 0FMP6

Date MSDS Prepared: 01/01/1987

Date MSDS Reviewed: 10/09/1996

MFN: 10/09/1996

Submitter: G AW

Status Code: C

Container Information

Unit of Issue:

Container Quantity:

Type of Container: CAN

Net Unit Weight: NK

Article without MSDS: N

Technical Entry NOS Shipping Number: NK

Radioactivity: NK

Form:

Net Explosive Weight: NK

Coast Guard Ammunition Code: NK
Magnetism: N/P
AF MMAC Code: NK
DOD Exemption Number: NK
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
NK

Department of Transportation Information

DOT Proper Shipping Name: CONSUMER COMMODITY
DOT PSN Code: DTJ
Symbols: D
DOT PSN Modifier:
Hazard Class: ORM-D
UN ID Number:
DOT Packaging Group:
Label: NONE
Special Provision(s):
Packaging Exception:
Non Bulk Packaging: 156,306
Bulk Packaging: NONE
Maximum Quantity in Passenger Area: 30KGGROSS
Maximum Quantity in Cargo Area: 30KGGROSS
Stow in Vessel Requirements: A
Requirements Water/Sp/Other:

IMO Detail Information

IMO Proper Shipping Name: AEROSOLS/AEROSOL PRODUCT ?
IMO PSN Code: AKH
IMO PSN Modifier:
IMDG Page Number: SEE 9022
UN Number: 1950
UN Hazard Class: 9?
IMO Packaging Group: -
Subsidiary Risk Label: -
EMS Number: 2-13
Medical First Aid Guide Number:

IATA Detail Information

IATA Proper Shipping Name: AEROSOLS, FLAMMABLE
IATA PSN Code: ALS
IATA PSN Modifier: (EACH NOT EXCEEDING 1 L CAPACITY)
IATA UN Id Number: 1950
IATA UN Class: 2.1
Subsidiary Risk Class:
UN Packaging Group:
IATA Label: FLAMMABLE GAS
Packaging Note for Passengers: 203
Maximum Quantity for Passengers: 75KG

Packaging Note for Cargo: 203
Maximum Quantity for Cargo: 150KG
Exceptions:

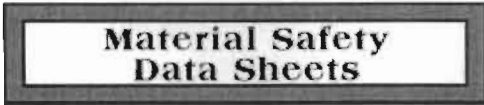
AFI Detail Information

AFI Proper Shipping Name: AEROSOLS, FLAMMABLE, N.O.S.
AFI Symbols: *
AFI PSN Code: ALR
AFI PSN Modifier: (EACH NOT EXCEEDING 1L CAPACITY)
AFI UN Id Number: UN1950
AFI Hazard Class: 2.1
AFI Packing Group: N/A
AFI Label:
Special Provisions: P4
Back Pack Reference: A6.3

HAZCOM Label Information

Product Identification: 111 TRICHLOROETHANE
CAGE: 0FMP6
Assigned Individual: N
Company Name: DIHOMA CHEMICAL & MFG INC
Company PO Box:
Company Street Address1: RT 3
Company Street Address2: MULLINS, SC 29574 US
Health Emergency Telephone: 803-423-7799
Label Required Indicator: Y
Date Label Reviewed: 10/12/1999
Status Code: A
Manufacturer's Label Number:
Date of Label:
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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Division of Facilities Services

DOD Hazardous Material Information (ANSI Format) For Cornell University Convenience Only

F29 1,1-DICHLOROETHENE

| | |
|---|--|
| Section 1 - Product and Company Identification | Section 9 - Physical & Chemical Properties |
| Section 2 - Composition/Information on Ingredients | Section 10 - Stability & Reactivity Data |
| Section 3 - Hazards Identification Including Emergency Overview | Section 11 - Toxicological Information |
| Section 4 - First Aid Measures | Section 12 - Ecological Information |
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| Section 6 - Accidental Release Measures | Section 14 - MSDS Transport Information |
| Section 7 - Handling and Storage | Section 15 - Regulatory Information |
| Section 8 - Exposure Controls & Personal Protection | Section 16 - Other Information |

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification F29 1,1-DICHLOROETHENE

Product Identification: F29 1,1-DICHLOROETHENE

Date of MSDS: 01/26/1995 **Technical Review Date:** 04/10/1996

FSC: 6550 **NIIN:** LIIN: 00F037520

Submitter: F BT

Status Code: C

MFN: 02

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: CHEM SERVICE INC
Post Office Box: 3108
Manufacturer's Address1: 660 TOWER LN
Manufacturer's Address2: WEST CHESTER, PA 19381-3108
Manufacturer's Country: US
General Information Telephone: 215-692-3026/800-452-9994
Emergency Telephone: 215-386-2100/215-692-3026
Emergency Telephone: 215-386-2100/215-692-3026
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 84898
Special Project Code: N

Preparer Information

Preparer's Name: CHEM SERVICE INC
Post Office Box: 3108
Preparer's Address1: N/K
Preparer's Address2: WEST CHESTER, PA 19381
Preparer's CAGE: 84898
Assigned Individual: N

Contractor Information

Contractor's Name: CHEM SERVICE INC
Post Office Box: 3108
Contractor's Address1: N/K
Contractor's Address2: WEST CHESTER, PA 19381
Contractor's Telephone: 215-692-3026
Contractor's CAGE: 84898

Contractor Information

Contractor's Name: CHEM SERVICE, INC
Post Office Box: 599
Contractor's Address1: 660 TOWER LN
Contractor's Address2: WEST CHESTER, PA 19301-9650
Contractor's Telephone: 610-692-3026
Contractor's CAGE: 8Y898

Section 2 - Composition/Information on Ingredients
F29 1,1-DICHLOROETHENE

Ingredient Name: VINYLIDENE CHLORIDE, 1,1-DICHLOROETHENE, 1,1-DICHLOROETHYLENE, VDC
Ingredient CAS Number: 75-35-4 **Ingredient CAS Code:** M
RTECS Number: KV9275000 **RTECS Code:** M

=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K
% Enviromental Weight:
Other REC Limits: 5 PPM
OSHA PEL: N/K OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 20 MG/CUM ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 100 LBS
DOT Reporting Quantity: 100 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
F29 1,1-DICHLOROETHENE

Health Hazards Acute & Chronic: SKIN: IRRITATION & SENSITIZATION, CAN CAUSE AN ALLERGIC SKIN REACTION. INHALATION: CAN BE IRRITATING TO MUCOUS MEMBRANES. NARCOTIC AT HIGH CONCENTRATIONS, EXPOSURE CAN CAUSE LIVER & KIDNEY DAMAGE, NERVOUS SYSTEM INJURY & CARDIOVASCULAR SYSTEM INJURY. CAN CAUSE DELAYED ADVERSE HEALTH EFFECTS.

Signs & Symptoms of Overexposure:
IRRITATION.

Medical Conditions Aggravated by Exposure:
N/K

LD50 LC50 Mixture: ORAL LD50(RAT/MOUSE): 200 MG/KG

Route of Entry Indicators:
Inhalation: YES
Skin: NO
Ingestion: NO

Carcenogenicity Indicators
NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures
F29 1,1-DICHLOROETHENE

First Aid:

EYES: FLUSH CONTINUOUSLY W/WATER FOR 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURED-USE SOAP & WATER TO CLEANSE.
INHALATION: REMOVE TO FRESH AIR. GIVE OXYGEN/MOUTH TO MOUTH I F NEEDED.
CONTINUE LIFE SUPPORTING MEASURES UNTIL MEDICAL ASSISTANCE HAS ARRIVED.
KEEP WARM & QUIET. INGESTION: DON'T GIVE LIQUIDS/INDUCE VOMITING TO AN UNCONSCIOUS/CONVULSING PERSON. (SEE SUPP)

Section 5 - Fire Fighting Measures
F29 1,1-DICHLOROETHENE

Fire Fighting Procedures:

N/K

Unusual Fire or Explosion Hazard:

FLAMMABLE CHEMICAL.

Extinguishing Media:

CO2, DRY CHEMICAL POWDER. DON'T USE WATER!

Flash Point: Flash Point Text: 5F**Autoignition Temperature:****Autoignition Temperature Text:** N/A**Lower Limit(s):** 6.5**Upper Limit(s):** 15.5

Section 6 - Accidental Release Measures
F29 1,1-DICHLOROETHENE

Spill Release Procedures:

EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE/SIMILAR MATERIAL. SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SUR FACES TO REMOVE ANY RESIDUES.

Section 7 - Handling and Storage
F29 1,1-DICHLOROETHENE

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection
F29 1,1-DICHLOROETHENE

Respiratory Protection:

USE APPROPRIATE OSHA/MSHA APPROVED SAFETY EQUIPMENT.

Ventilation:

CHEMICAL HOOD.

Protective Gloves:

N/K

Eye Protection: GLASS SHIELDS**Other Protective Equipment:** N/K**Work Hygienic Practices:** REMOVE/LAUNDER CONTAMINATED CLOTHING BEFORE REUSE.**Supplemental Health & Safety Information:** IF PATIENT IS VOMITING-WATCH CLOSELY TO MAKE SURE AIRWAY DOESN'T BECOME OBSTRUCTED BY VOMIT. OBTAIN MEDICAL ATTENTION IN ALL CASES. AN ANTIDOTE IS A SUBSTANCE INTENDED TO COUNTERACT THE EFFECT OF A POISON. IT SHOULD BE GIVEN ONLY BY A PHYSICIAN/TRAINED EMERGENCY PERSONNEL. GET MEDICAL ADVICE FROM POISON CONTROL CENTER.

Section 9 - Physical & Chemical Properties**F29 1,1-DICHLOROETHENE**

HCC:**NRC/State License Number:****Net Property Weight for Ammo:****Boiling Point: Boiling Point Text:** 89.06F**Melting/Freezing Point: Melting/Freezing Text:** -188.5F**Decomposition Point: Decomposition Text:** N/K**Vapor Pressure: 500 Vapor Density:** N/K**Percent Volatile Organic Content:****Specific Gravity:** N/K**Volatile Organic Content Pounds per Gallon:****pH:** N/K**Volatile Organic Content Grams per Liter:****Viscosity:** N/P**Evaporation Weight and Reference:** N/K**Solubility in Water:** SLIGHT**Appearance and Odor:** COLORLESS LIQUID W/FRUITY/PLEASANT ODOR**Percent Volatiles by Volume:** N/K**Corrosion Rate:** N/K

Section 10 - Stability & Reactivity Data**F29 1,1-DICHLOROETHENE**

Stability Indicator: YES**Materials to Avoid:**

INCOMPATIBLE MATERIALS

Stability Condition to Avoid:

HEAT, AIR, PRESSURE.

Hazardous Decomposition Products:

N/K

Hazardous Polymerization Indicator: YES**Conditions to Avoid Polymerization:**

MAY POLYMERIZE UPON STANDING.

Section 11 - Toxicological Information**F29 1,1-DICHLOROETHENE**

Toxicological Information:

N/P

Section 12 - Ecological Information
F29 1,1-DICHLOROETHENE

Ecological Information:
N/P

Section 13 - Disposal Considerations
F29 1,1-DICHLOROETHENE

Waste Disposal Methods:
BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AN AFTERBURNER & SCRUBBER
LAW/FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
F29 1,1-DICHLOROETHENE

Transport Information:
N/P

Section 15 - Regulatory Information
F29 1,1-DICHLOROETHENE

SARA Title III Information:
N/P
Federal Regulatory Information:
N/P
State Regulatory Information:
N/P

Section 16 - Other Information
F29 1,1-DICHLOROETHENE

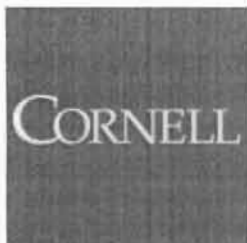
Other Information:
N/P

HAZCOM Label Information

Product Identification: F29 1,1-DICHLOROETHENE
CAGE: 84898
Assigned Individual: N
Company Name: CHEM SERVICE INC
Company PO Box: 3108
Company Street Address1: N/K
Company Street Address2: WEST CHESTER, PA 19381 US
Health Emergency Telephone: 215-386-2100/215-692-3026
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P

Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
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1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

| | |
|---|--|
| Section 1 - Product and Company Identification | Section 9 - Physical & Chemical Properties |
| Section 2 - Composition/Information on Ingredients | Section 10 - Stability & Reactivity Data |
| Section 3 - Hazards Identification Including Emergency Overview | Section 11 - Toxicological Information |
| Section 4 - First Aid Measures | Section 12 - Ecological Information |
| Section 5 - Fire Fighting Measures | Section 13 - Disposal Considerations |
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**Section 1 - Product and Company Identification
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632**

Product Identification: 1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Date of MSDS: 09/01/1988 **Technical Review Date:** 12/27/1995

FSC: 6810 **NIIN:** LIIN: 00N067782

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: CHEM SERVICE INC
Post Office Box: 3108
Manufacturer's Address1:
Manufacturer's Address2: WEST CHESTER, PA 19381
Manufacturer's Country: US
General Information Telephone: 215-692-3026
Emergency Telephone: 215-692-3026
Emergency Telephone: 215-692-3026
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 84898
Special Project Code: N

Contractor Information

Contractor's Name: CHEM SERVICE INC
Post Office Box: 3108
Contractor's Address1: N/K
Contractor's Address2: WEST CHESTER, PA 19381
Contractor's Telephone: 215-692-3026
Contractor's CAGE: 84898

Contractor Information

Contractor's Name: CHEM SERVICE, INC
Post Office Box: 599
Contractor's Address1: 660 TOWER LN
Contractor's Address2: WEST CHESTER, PA 19301-9650
Contractor's Telephone: 610-692-3026
Contractor's CAGE: 8Y898

Section 2 - Compositon/Information on Ingredients
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Ingredient Name: 1,2-DIBROMO-1,1-DICHLOROETHANE
Ingredient CAS Number: 75-81-0 **Ingredient CAS Code:** M
RTECS Number: **RTECS Code:** X
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:

% Text: N/K

% Environmental Weight:

Other REC Limits: N/K

OSHA PEL: N/K (FP N) **OSHA PEL Code:** M

OSHA STEL: **OSHA STEL Code:**

ACGIH TLV: N/K (FP N) **ACGIH TLV Code:** M

ACGIH STEL: N/P **ACGIH STEL Code:**

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Health Hazards Acute & Chronic: ACUTE: CAN CAUSE EYE AND SKIN IRRITATION. CAN BE IRRITATING TO MUCOUS MEMBRANES. CAN BE HARMFUL IF INHALED, SWALLOWED, OR ABSORBED THROUGH THE SKIN. CHRONIC: CAN CAUSE LIVER AND KIDNEY INJURY. PROLONG ED EXPOSURE MAY CAUSE NAUSEA, HEADACHE, DIZZINESS AND/OR EYE DAMAGE.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES

Skin: YES

Ingestion: YES

Carcinogenicity Indicators

NTP: NO

IARC: NO

OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT.

Section 4 - First Aid Measures
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

First Aid:

AN ANTIDOTE IS A SUBSTANCE INTENDED TO COUNTERACT EFT OF POIS. IT SHOULD BE ADMIN ONLY BY MD/TRAINED EMER PERS. MED ADVICE CAN BE OBTAINED FROM POIS CTL CTR. EYES: FLUSH CONTINUOUSLY W/WATER FOR AT LE AST 15 MIN. SKIN: FLUSH W/WATER FOR 15-20 MIN. IF NO BURNS HAVE OCCURRED, USE SOAP & WATER TO CLEANSE SKIN. INHAL: REMOVE TO FRESH AIR. ADMIN OXYGEN IF DFCLT BRTHG. IF BRTHG HAS STOPPED, (SUP DAT)

Section 5 - Fire Fighting Measures
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Fire Fighting Procedures:

WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

NONE SPECIFIED BY MANUFACTURER.

Extinguishing Media:

USE CARBON DIOXIDE, DRY CHEMICAL POWDER OR WATER SPRAY.

Flash Point: Flash Point Text: N/K

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Spill Release Procedures:

EVACUATE AREA. WEAR APPROPRIATE OSHA-REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP AND PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.

Section 7 - Handling and Storage
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Respiratory Protection:

USE NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).

Ventilation:

THIS CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.

Protective Gloves:

IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGLES (FP N).

Other Protective Equipment: EMERGENCY EYEWASH & DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N).

Work Hygienic Practices: CONTACT LENSES SHOULD NOT BE WORN IN THE LABORATORY.

Supplemental Health & Safety Information: FIRST AID PROC: ADMIN ARTF RESP. IF PATIENT IN CARD ARREST, ADMIN CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL MED ASSIST HAS ARRIVED. OTHER PREC: THIS PROD MAY NOT BE USED AS DRUGS,

COSMETICS, AGRICULTURAL/PESTICIDAL PRODS, FOOD ADDITIVES/AS HOUSEHOLD CHEMICALS.

Section 9 - Physical & Chemical Properties
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 347F,175C

Melting/Freezing Point: Melting/Freezing Text: N/K

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: N/K Vapor Density: N/K

Percent Volatile Organic Content:

Specific Gravity: N/K

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/K

Solubility in Water: INSOLUBLE

Appearance and Odor: COLORLESS LIQUID, WITH ETHER-LIKE ODOR

Percent Volatiles by Volume: N/K

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Stability Indicator: YES

Materials to Avoid:

INCOMPATIBLE WITH STRONG OXIDIZING AGENTS, STRONG BASES.

Stability Condition to Avoid:

COMBUSTIBLE.

Hazardous Decomposition Products:

DECOMPOSITION LIBERATES TOXIC FUMES. DECOMPOSITION PRODUCTS ARE CORROSIVE.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT.

Section 11 - Toxicological Information
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Toxicological Information:

N/P

Section 12 - Ecological Information
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Ecological Information:

N/P

Section 13 - Disposal Considerations
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Waste Disposal Methods:

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE OF IN ACCORDANCE W/LOCAL, STATE & FEDERAL REGULATIONS (FP N).

Section 14 - MSDS Transport Information
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Transport Information:

N/P

Section 15 - Regulatory Information
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

Other Information:

N/P

HAZCOM Label Information

Product Identification: 1,2-DIBROMO-1,1-DICHLOROETHANE, O-632

CAGE: 84898

Assigned Individual: N

Company Name: CHEM SERVICE INC

Company PO Box: 3108

Company Street Address1: N/K

Company Street Address2: WEST CHESTER, PA 19381 US

Health Emergency Telephone: 215-692-3026

Label Required Indicator: Y

Date Label Reviewed: 12/27/1995

Status Code: C

Manufacturer's Label Number:

Date of Label: 12/27/1995

Year Procured: N/K

Organization Code: G

Chronic Hazard Indicator: Y

Eye Protection Indicator: YES

Skin Protection Indicator: YES

Respiratory Protection Indicator: YES

Signal Word: CAUTION

Health Hazard: Slight

Contact Hazard: Slight

Fire Hazard: Slight

Reactivity Hazard: None

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BRTHG HAS STOPPED, (SUP DAT)

Section 5 - Fire Fighting Measures
TRANS-1,2-DICHLOROETHENE, O-660

Fire Fighting Procedures:

WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

NONE SPECIFIED BY MANUFACTURER.

Extinguishing Media:

USE CARBON DIOXIDE, DRY CHEMICAL POWDER OR WATER SPRAY.

Flash Point: Flash Point Text: 42.8F,6.0C

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/K

Upper Limit(s): N/K

Section 6 - Accidental Release Measures
TRANS-1,2-DICHLOROETHENE, O-660

Spill Release Procedures:

EVACUATE AREA. WEAR APPROPRIATE OSHA-REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP AND PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.

Section 7 - Handling and Storage
TRANS-1,2-DICHLOROETHENE, O-660

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
TRANS-1,2-DICHLOROETHENE, O-660

Respiratory Protection:

USE NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).

Ventilation:

THIS CHEMICAL SHOULD BE HANDLED ONLY IN A HOOD.

Protective Gloves:

IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGLES (FP N).

Other Protective Equipment: EMERGENCY EYEWASH & DELUGE SHOWER MEETING ANSI DESIGN CRITERIA (FP N).

Work Hygienic Practices: CONTACT LENSES SHOULD NOT BE WORN IN THE LABORATORY.

Supplemental Health & Safety Information: FIRST AID PROC: ADMIN ARTF RESP. IF PATIENT IN CARD ARREST, ADMIN CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL MED

ASSIST HAS ARRIVED. INGEST: CALL MD IMMED (FP N). OTHER PREC: THIS PROD MAY NOT BE USED AS DRUGS, COSMETICS, AGRICULTURAL/PESTICIDAL PRODS, FOOD ADDITIVES/AS HOUSEHOLD CHEMICALS.

Section 9 - Physical & Chemical Properties
TRANS-1,2-DICHLOROETHENE, O-660

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 118F,48C

Melting/Freezing Point: Melting/Freezing Text: -58F,-50C

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: N/K Vapor Density: N/K

Percent Volatile Organic Content:

Specific Gravity: 1.257

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/K

Solubility in Water: INSOLUBLE

Appearance and Odor: COLORLESS LIQUID

Percent Volatiles by Volume: N/K

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
TRANS-1,2-DICHLOROETHENE, O-660

Stability Indicator: YES

Materials to Avoid:

INCOMPATIBLE WITH STRONG OXIDIZING AGENTS, STRONG BASES. REACTS WITH WATER AND MOST REACTIVE HYDROGEN COMPOUNDS.

Stability Condition to Avoid:

FLAMMABLE.

Hazardous Decomposition Products:

DECOMPOSITION LIBERATES TOXIC FUMES. DECOMPOSITION PRODUCTS ARE CORROSIVE.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT.

Section 11 - Toxicological Information
TRANS-1,2-DICHLOROETHENE, O-660

Toxicological Information:

N/P

Section 12 - Ecological Information
TRANS-1,2-DICHLOROETHENE, O-660

Ecological Information:

N/P

Section 13 - Disposal Considerations
TRANS-1,2-DICHLOROETHENE, O-660

Waste Disposal Methods:

BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCRUBBER. DISPOSE OF IN ACCORDANCE W/LOCAL, STATE & FEDERAL REGULATIONS (FP N).

Section 14 - MSDS Transport Information
TRANS-1,2-DICHLOROETHENE, O-660

Transport Information:

N/P

Section 15 - Regulatory Information
TRANS-1,2-DICHLOROETHENE, O-660

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
TRANS-1,2-DICHLOROETHENE, O-660

Other Information:

N/P

HAZCOM Label Information

Product Identification: TRANS-1,2-DICHLOROETHENE, O-660

CAGE: 84898

Assigned Individual: N

Company Name: CHEM SERVICE INC

Company PO Box: 3108

Company Street Address1: N/K

Company Street Address2: WEST CHESTER, PA 19381 US

Health Emergency Telephone: 215-692-3026

Label Required Indicator: Y

Date Label Reviewed: 12/27/1995

Status Code: C

Manufacturer's Label Number:

Date of Label: 12/27/1995

Year Procured: N/K

Organization Code: G

Chronic Hazard Indicator: Y

Eye Protection Indicator: YES

Skin Protection Indicator: YES

Respiratory Protection Indicator: YES

Signal Word: DANGER

Manufacturer's Information

Manufacturer's Name: CHEM SERVICE INC
Post Office Box: 3108
Manufacturer's Address1:
Manufacturer's Address2: WEST CHESTER, PA 19381
Manufacturer's Country: US
General Information Telephone: 215-692-3026
Emergency Telephone: 215-692-3026
Emergency Telephone: 215-692-3026
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 84898
Special Project Code: N

Contractor Information

Contractor's Name: CHEM SERVICE INC
Post Office Box: 3108
Contractor's Address1: N/K
Contractor's Address2: WEST CHESTER, PA 19381
Contractor's Telephone: 215-692-3026
Contractor's CAGE: 84898

Contractor Information

Contractor's Name: CHEM SERVICE, INC
Post Office Box: 599
Contractor's Address1: 660 TOWER LN
Contractor's Address2: WEST CHESTER, PA 19301-9650
Contractor's Telephone: 610-692-3026
Contractor's CAGE: 8Y898

Section 2 - Compositon/Information on Ingredients
TETRACHLOROETHENE, 0-663

Ingredient Name: ETHYLENE, TETRACHLORO-; (TETRACHLOROETHYLENE) (SARA III)
Ingredient CAS Number: 127-18-4 **Ingredient CAS Code:** M
RTECS Number: KX3850000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:

% Text: N/K
% Environmental Weight:
Other REC Limits: N/K
OSHA PEL: 25 PPM **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: 25 PPM;100 PPM **STEL ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 100 LBS
DOT Reporting Quantity: 100 LBS
Ozone Depleting Chemical: N

Ingredient Name: EYE PROTECTION: FULL LENGTH FACESHIELD (FP N).
Ingredient CAS Number: **Ingredient CAS Code:** X
RTECS Number: 9999999ZZ **RTECS Code:** M
=WT: **=WT Code:**
=Volume: **=Volume Code:**
>WT: **>WT Code:**
>Volume: **>Volume Code:**
<WT: **<WT Code:**
<Volume: **<Volume Code:**
% Low WT: **% Low WT Code:**
% High WT: **% High WT Code:**
% Low Volume: **% Low Volume Code:**
% High Volume: **% High Volume Code:**
% Text: N/K
% Environmental Weight:
Other REC Limits: N/K
OSHA PEL: N/K (FP N) **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: N/K (FP N) **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Ingredient Name: ING 2: ARRIVED. INGESTION: CALL MD IMMEDIATELY (FP N).
Ingredient CAS Number: **Ingredient CAS Code:** X
RTECS Number: 9999999ZZ **RTECS Code:** M
=WT: **=WT Code:**
=Volume: **=Volume Code:**
>WT: **>WT Code:**
>Volume: **>Volume Code:**
<WT: **<WT Code:**
<Volume: **<Volume Code:**
% Low WT: **% Low WT Code:**
% High WT: **% High WT Code:**
% Low Volume: **% Low Volume Code:**
% High Volume: **% High Volume Code:**
% Text: N/K
% Environmental Weight:
Other REC Limits: N/K

OSHA PEL: N/K (FP N) OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: N/K (FP N) ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Ingredient Name: SUPP DATA: RESPS. IF PATIENT IS IN CARD ARREST ADMIN CPR.
 CONTINUE LIFE SUPPORTING MEASURES UNTIL MED ASSIST HAS (ING 3)

Ingredient CAS Number: Ingredient CAS Code: X

RTECS Number: 9999999ZZ RTECS Code: M

=WT: =WT Code:

=Volume: =Volume Code:

>WT: >WT Code:

>Volume: >Volume Code:

<WT: <WT Code:

<Volume: <Volume Code:

% Low WT: % Low WT Code:

% High WT: % High WT Code:

% Low Volume: % Low Volume Code:

% High Volume: % High Volume Code:

% Text: N/K

% Enviromental Weight:

Other REC Limits: N/K

OSHA PEL: N/K (FP N) OSHA PEL Code: M

OSHA STEL: OSHA STEL Code:

ACGIH TLV: N/K (FP N) ACGIH TLV Code: M

ACGIH STEL: N/P ACGIH STEL Code:

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview
TETRACHLOROETHENE, 0-663

Health Hazards Acute & Chronic: CONT LENSES SHOULD NOT BE WORN IN LAB. ALL CHEMS SHOULD BE CONSIDERED HAZ-AVOID DIRECT PHYS CONT! CAN BE HARMFUL IF ABSORB THRU SKIN. CAN BE HARMFUL IF INHALED. CAN BE FATAL IF ABSORB THRU SKIN! CAN B E FATAL IF INHALED! MAY BE FATAL IF SWALLOWED! SUSPECTED CARCIN-MAY PRDCE CANCER. LACHRYMATOR-CAUSES (EFTS OF OVEREXP)

Signs & Symptoms of Overexposure:

HLTH HAZ: SEV EYE IRRIT. VAPS &/OR DIRECT EYE CONT CAN CAUSE SEV EYE BURNS. CAN CAUSE EYE IRRIT. VAPS &/OR DIRECT EYE CONT CAN CAUSE SEV EYE BURNS. CAN CAUSE EYE IRRIT. CAN CAUSE SKIN IRRIT. CAN CAUSE SKIN BURNS. CAN CAUSE SEV SKIN BURNS. CAN BE HARMFUL IF SWALLOWED. CAN CAUSE LIVER INJ. CAN CAUSE KIDNEY INJ. (SUPDAT)

Medical Conditions Aggravated by Exposure:

NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: LD50 (ORAL,RAT): 8850 MG/KG.

Route of Entry Indicators:

Inhalation: YES

Skin: YES

Ingestion: YES

Carcinogenicity Indicators

NTP: YES

IARC: YES

OSHA: NO

Carcinogenicity Explanation: TETRACHLOROETHYLENE: IARC MONOGRAPHS SUPP, VOL 7, PG 355, 1987: GRP 2B. NTP 7TH ANNUAL REPORT ON CARCINS, 1994: (SUPDAT)

Section 4 - First Aid Measures
TETRACHLOROETHENE, 0-663

First Aid:

AN ANTIDOTE IS SUBSTANCE INTENDED TO COUNTERACT EFT OF POIS. IT SHOULD BE ADMIN ONLY BY PHYS/TRAINED EMER PERS. MED ADVICE CAN BE OBTAINED FROM POIS CNTRL CNTR. EYE: FLUSH CONTINUOUSLY W/WATER FOR AT LST 15-20 MINS. SKIN: FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURRED-USE SOAP & WATER TO CLEANSE SKIN. INHAL: REMOVE PATIENT TO FRESH AIR. ADMIN OXYGEN IF PATIENT IS HAVING DFCLTY (SUPDAT)

Section 5 - Fire Fighting Measures
TETRACHLOROETHENE, 0-663

Fire Fighting Procedures:

WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

NONE SPECIFIED BY MANUFACTURER.

Extinguishing Media:

CARBON DIOXIDE, DRY CHEMICAL POWDER OR SPRAY.

Flash Point: Flash Point Text: NON-FLAMMABLE

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/A

Upper Limit(s): N/A

Section 6 - Accidental Release Measures
TETRACHLOROETHENE, 0-663

Spill Release Procedures:

EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP AND PLACE IN AN

Section 16 - Other Information
TETRACHLOROETHENE, 0-663

Other Information:

N/P

HAZCOM Label Information**Product Identification:** TETRACHLOROETHENE, 0-663**CAGE:** 84898**Assigned Individual:** N**Company Name:** CHEM SERVICE INC**Company PO Box:** 3108**Company Street Address1:** N/K**Company Street Address2:** WEST CHESTER, PA 19381 US**Health Emergency Telephone:** 215-692-3026**Label Required Indicator:** Y**Date Label Reviewed:** 11/03/1994**Status Code:** C**Manufacturer's Label Number:****Date of Label:** 11/03/1994**Year Procured:** N/K**Organization Code:** G**Chronic Hazard Indicator:** Y**Eye Protection Indicator:** YES**Skin Protection Indicator:** YES**Respiratory Protection Indicator:** YES**Signal Word:** WARNING**Health Hazard:** Moderate**Contact Hazard:** Moderate**Fire Hazard:** None**Reactivity Hazard:** None

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**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**

TRICHLOROETHENE, 0-664

| | |
|---|--|
| Section 1 - Product and Company Identification | Section 9 - Physical & Chemical Properties |
| Section 2 - Composition/Information on Ingredients | Section 10 - Stability & Reactivity Data |
| Section 3 - Hazards Identification Including Emergency Overview | Section 11 - Toxicological Information |
| Section 4 - First Aid Measures | Section 12 - Ecological Information |
| Section 5 - Fire Fighting Measures | Section 13 - Disposal Considerations |
| Section 6 - Accidental Release Measures | Section 14 - MSDS Transport Information |
| Section 7 - Handling and Storage | Section 15 - Regulatory Information |
| Section 8 - Exposure Controls & Personal Protection | Section 16 - Other Information |

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**Section 1 - Product and Company Identification
TRICHLOROETHENE, 0-664**

Product Identification: TRICHLOROETHENE, 0-664

Date of MSDS: 01/07/1993 **Technical Review Date:** 10/26/1994

FSC: 6810 NIIN: **LIIN:** 00N054683

Submitter: N EN

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: CHEM SERVICE INC
Post Office Box: 3108
Manufacturer's Address1:
Manufacturer's Address2: WEST CHESTER, PA 19381
Manufacturer's Country: US
General Information Telephone: 215-692-3026
Emergency Telephone: 215-692-3026
Emergency Telephone: 215-692-3026
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 84898
Special Project Code: N

Contractor Information

Contractor's Name: CHEM SERVICE INC
Post Office Box: 3108
Contractor's Address1: N/K
Contractor's Address2: WEST CHESTER, PA 19381
Contractor's Telephone: 215-692-3026
Contractor's CAGE: 84898

Contractor Information

Contractor's Name: CHEM SERVICE, INC
Post Office Box: 599
Contractor's Address1: 660 TOWER LN
Contractor's Address2: WEST CHESTER, PA 19301-9650
Contractor's Telephone: 610-692-3026
Contractor's CAGE: 8Y898

Section 2 - Compositon/Information on Ingredients
TRICHLOROETHENE, 0-664

Ingredient Name: ETHYLENE, TRICHLORO-; (TRICHLOROETHYLENE) (SARA III). LD50:
(ORAL,RAT) 4920 MG/KG.
Ingredient CAS Number: 79-01-6 **Ingredient CAS Code:** M
RTECS Number: KX4550000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:

% High Volume: % High Volume Code:
% Text: N/K
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 100 PPM OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 50 PPM;100 STEL ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 100 LBS
DOT Reporting Quantity: 100 LBS
Ozone Depleting Chemical: N

Ingredient Name: OTHER PREC:CAUSE THE FORMATION OF HCL &/OR PHOSGENE (FP N).
Ingredient CAS Number: Ingredient CAS Code: X
RTECS Number: 9999999ZZ RTECS Code: M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: NOT APPLICABLE OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT APPLICABLE ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Ingredient Name: SUPDAT:BY MD/TRAINED EMERGENCY PERSONNEL. MEDICAL ADVICE CAN BE OBTAINED FROM A POISON CONTROL CENTER.
Ingredient CAS Number: Ingredient CAS Code: X
RTECS Number: 9999999ZZ RTECS Code: M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: N/K

% Environmental Weight:
Other REC Limits: N/K
OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M
OSHA STEL: **OSHA STEL Code:**
ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview
TRICHLOROETHENE, 0-664

Health Hazards Acute & Chronic: ALL CHEMS SHOULD BE CONSIDERED HAZ - AVOID DIRECT PHYSICAL CONT! SUSPECTED CARCIN - MAY PRDCE CANCER. MAY BE HARMFUL IF ABSORBED THRU SKIN, INHALED/SWALLOWED. LACHRYMATOR - CAUSES SEV EYE IRRIT. VAPS &/OR DIRECT EYE CONT CAN CAUSE SEV EYE BURNS. CAN CAUSE SKIN/EYE IRRIT. CAUSE CAUSE SKIN BURNS. CAN (EFTS OF OVEREXP)

Signs & Symptoms of Overexposure:

HLTH HAZ:CAUSE SEV SKIN BURNS. EXPOS CAN CAUSE LIVER/KIDNEY DMG. CAN CAUSE GI DISTURBS. CAN BE IRRIT TO MUC MEMBS. PRLNG EXPOS MAY CAUSE NAUS, HDCH, DIZZ &/OR EYE DMG. CAN CAUSE SENSIT BY SKIN CONT. C HLOROCARBON MATLS HAVE PRDCD SENSIT OF MYOCARDIUM TO EPINEPHRINE IN LAB ANIMALS & COULD HAVE SIMILAR EFT IN (SUPP DATA)

Medical Conditions Aggravated by Exposure:

NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: SEE INGREDIENT.

Route of Entry Indicators:

Inhalation: YES
Skin: YES
Ingestion: YES

Carcinogenicity Indicators

NTP: NO
IARC: NO
OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
TRICHLOROETHENE, 0-664

First Aid:

INGEST:CALL MD IMMED (FP N). EYES:FLUSH CONTINUOUSLY W/WATER FOR AT LST 15-20 MINS. SKIN:FLUSH W/WATER FOR 15-20 MINS. IF NO BURNS HAVE OCCURRED - USE SOAP & WATER TO CLEANSE SKIN. INHAL:REMOVE PATIENT TO FRESH AIR. ADMIN

OXYGEN IF PATIENT IS HAVING DIFFICULTY BREATHING. IF PATIENT HAS STOPPED BREATHING ADMINISTER ARTIFICIAL RESPIRATION. IF PATIENT IS IN CARDIAC ARREST ADMINISTER CPR. CONTINUE LIFE SUPPORTING MEASURES UNTIL (SUPPORT) IS AVAILABLE.

Section 5 - Fire Fighting Measures

TRICHLOROETHENE, 0-664

Fire Fighting Procedures:

USE NIOSH/MSHA APPROVED PRESSURE DEMAND SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE HCL & PHOSGENE (FP N).

Extinguishing Media:

CARBON DIOXIDE, DRY CHEMICAL POWDER OR SPRAY.

Flash Point: **Flash Point Text:** NON-FLAMMABLE

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): 11%

Upper Limit(s): 41%

Section 6 - Accidental Release Measures

TRICHLOROETHENE, 0-664

Spill Release Procedures:

EVACUATE AREA. WEAR APPROPRIATE OSHA REGULATED EQUIPMENT. VENTILATE AREA. ABSORB ON VERMICULITE OR SIMILAR MATERIAL. SWEEP UP & PLACE IN AN APPROPRIATE CONTAINER. HOLD FOR DISPOSAL. WASH CONTAMINATED SURFACES TO REMOVE ANY RESIDUES.

Section 7 - Handling and Storage

TRICHLOROETHENE, 0-664

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection

TRICHLOROETHENE, 0-664

Respiratory Protection:

NIOSH/MSHA APPROVED RESPIRATOR APPROPRIATE FOR EXPOSURE OF CONCERN (FP N).

Ventilation:

THIS CHEMICAL SHOULD ONLY BE HANDLED IN A HOOD.

Protective Gloves:

IMPERVIOUS GLOVES (FP N).

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGLES (FP N).

Other Protective Equipment: USE APPROPRIATE NIOSH/MSHA APPROVED SAFETY EQUIPMENT.

Work Hygenic Practices: CONTACT LENSES SHOULD NOT BE WORN IN THE LABORATORY. ANSI APPRVD EYE WASH & DELUGE SHOWER (FP N).

Supplemental Health & Safety Information: EFTS OF OVEREXP:HUMANS. ADRENOMIMETICS (E.G., EPINEPRHINE) MAY BE CONTRAINDICATED EXCEPT FOR LIFE-SUSTAINING USES IN HUMANS ACUTELY/CHRONICALLY EXPOS TO CHLOROCARBONS (FP N). FIRST AID PROC: MED ASSIST ANCE HAS ARRIVED. NOTE: AN ANTIDOTE IS A SUBSTANCE INTENDED TO COUNTERACT EFT OF A POIS. IT SHOULD BE ADMIN ONLY (ING 2)

Section 9 - Physical & Chemical Properties
TRICHLOROETHENE, 0-664

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 189F,87C

Melting/Freezing Point: Melting/Freezing Text: -125F,-87C

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: 58 @ 20C Vapor Density: N/K

Percent Volatile Organic Content:

Specific Gravity: 1.462

Volatile Organic Content Pounds per Gallon:

pH: N/K

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/K

Solubility in Water: INSOL (IMMISCIBLE)

Appearance and Odor: COLORLESS LIQUID.

Percent Volatiles by Volume: N/K

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
TRICHLOROETHENE, 0-664

Stability Indicator: YES

Materials to Avoid:

INCOMPATIBLE W/STRONG BASES, STRONG OXIDIZING AGENTS.

Stability Condition to Avoid:

NONE SPECIFIED BY MANUFACTURER.

Hazardous Decomposition Products:

DECOMPOSITION LIBERATES TOXIC FUMES. DECOMPOSTION PRODUCTS ARE CORROSIVE. VOLATILE. HCL, PHOSGENE (FP N).

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT

Section 11 - Toxicological Information
TRICHLOROETHENE, 0-664

Toxicological Information:

N/P

Section 12 - Ecological Information

TRICHLOROETHENE, 0-664

Ecological Information:N/P

Section 13 - Disposal Considerations**TRICHLOROETHENE, 0-664**

Waste Disposal Methods:

DISPOSAL MUST BE I/A/W FEDERAL, STATE & LOCAL REGULATIONS (FP N). BURN IN A CHEMICAL INCINERATOR EQUIPPED W/AFTERBURNER & SCRUBBER.

Section 14 - MSDS Transport Information**TRICHLOROETHENE, 0-664**

Transport Information:N/P

Section 15 - Regulatory Information**TRICHLOROETHENE, 0-664**

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:N/P

Section 16 - Other Information**TRICHLOROETHENE, 0-664**

Other Information:

N/P

HAZCOM Label Information**Product Identification:** TRICHLOROETHENE, 0-664**CAGE:** 84898**Assigned Individual:** N**Company Name:** CHEM SERVICE INC**Company PO Box:** 3108**Company Street Address1:** N/K**Company Street Address2:** WEST CHESTER, PA 19381 US**Health Emergency Telephone:** 215-692-3026**Label Required Indicator:** Y**Date Label Reviewed:** 10/26/1994**Status Code:** C**Manufacturer's Label Number:****Date of Label:** 10/26/1994**Year Procured:** N/K**Organization Code:** G**Chronic Hazard Indicator:** Y**Eye Protection Indicator:** YES**Skin Protection Indicator:** YES

Respiratory Protection Indicator: YES

Signal Word: DANGER

Health Hazard: Moderate

Contact Hazard: Severe

Fire Hazard: None

Reactivity Hazard: None

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**Material Safety
Data Sheets**

Division of Facilities Services

**DOD Hazardous Material Information (ANSI Format)
For Cornell University Convenience Only**

PLASTISOL, VINYL CHLORIDE

| | |
|---|--|
| Section 1 - Product and Company Identification | Section 9 - Physical & Chemical Properties |
| Section 2 - Composition/Information on Ingredients | Section 10 - Stability & Reactivity Data |
| Section 3 - Hazards Identification Including Emergency Overview | Section 11 - Toxicological Information |
| Section 4 - First Aid Measures | Section 12 - Ecological Information |
| Section 5 - Fire Fighting Measures | Section 13 - Disposal Considerations |
| Section 6 - Accidental Release Measures | Section 14 - MSDS Transport Information |
| Section 7 - Handling and Storage | Section 15 - Regulatory Information |
| Section 8 - Exposure Controls & Personal Protection | Section 16 - Other Information |

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Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

**Section 1 - Product and Company Identification
PLASTISOL, VINYL CHLORIDE**

Product Identification: PLASTISOL, VINYL CHLORIDE
Date of MSDS: 01/01/1996 **Technical Review Date:** 07/09/1997
FSC: 8030 **NIIN:** 00-763-4841
Submitter: GAW
Status Code: C
MFN: 01
Article: N
Kit Part: Y

Manufacturer's Information

Manufacturer's Name: INTERNATIONAL COATINGS CO
Manufacturer's Address1: 13929 EAST 166TH ST
Manufacturer's Address2: CERRITOS, CA 90701
Manufacturer's Country: US
General Information Telephone: 310-925-0747
Emergency Telephone: 310-926-8332
Emergency Telephone: 310-926-8332
MSDS Preparer's Name: EISENHARD
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 0M246
Special Project Code: N

Item Description

Item Name: COATING COMPOUND, PLASTISOL
Item Manager: GSA
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue: KT
Unit of Issue Quantity: 4
Type of Container: NK

Contractor Information

Contractor's Name: CHEMICAL COMMODITIES AGENCY, INC.
Contractor's Address1: 27447 PACIFIC STREET
Contractor's Address2: HIGHLAND, CA 92346-2640
Contractor's Telephone: 909-864-2310
Contractor's CAGE: 60777

Contractor Information

Contractor's Name: INTERNATIONAL COATINGS
Contractor's Address1: 7059 BARRY ST
Contractor's Address2: ROSEMONT, IL 60018
Contractor's Telephone: 312-824-6070
Contractor's CAGE: 0M246

Section 2 - Composition/Information on Ingredients
PLASTISOL, VINYL CHLORIDE

Ingredient Name: DIBASIC LEAD PHTHLATE
Ingredient CAS Number: 7439-92-1 **Ingredient CAS Code:** M
RTECS Number: OF7525000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:

>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 2.75
% Enviromental Weight:
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 0.05 MG/M3 OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.15 MG/M3 ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Ingredient Name: VINYL CHLORIDE MONOMER (SARA III)
Ingredient CAS Number: 75-01-4 Ingredient CAS Code: M
RTECS Number: KU9625000 RTECS Code: M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <0.003
% Enviromental Weight:
Other REC Limits: NK
OSHA PEL: 1 PPM; 5 PPM CEILING OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5 PPM ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 1 LB
DOT Reporting Quantity: 1 LB
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
PLASTISOL, VINYL CHLORIDE

Health Hazards Acute & Chronic: CHRONIC: SEVERE DAMAGE TO BLOOD, GI, NERVOUS & REPRODUCTIVE SYSTEMS. INGEST: HARMFUL. SKIN/EYE: IRRITATION, ABSORPTION.

Signs & Symptoms of Overexposure:
 NK

Medical Conditions Aggravated by Exposure:
NK

LD50 LC50 Mixture: NK

Route of Entry Indicators:
Inhalation: YES
Skin: YES
Ingestion: YES

Carcinogenicity Indicators
NTP: NO
IARC: YES
OSHA: NO

Carcinogenicity Explanation: LEAD CHROMATE IS LISTED AS A SUSPECTED CARCINOGEN.

Section 4 - First Aid Measures
PLASTISOL, VINYL CHLORIDE

First Aid:
EYE: FLUSH W/WATER FOR >15 MINUTES. SKIN: WASH W/SOAP & WATER. INHAL:
REMOVE TO FRESH AIR. INGEST: GIVE FLUIDS. SEEK MEDICAL ATTENTION IN ALL
CASES.

Section 5 - Fire Fighting Measures
PLASTISOL, VINYL CHLORIDE

Fire Fighting Procedures:
USE NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT.
Unusual Fire or Explosion Hazard:
CLOSED CONTAINERS MAY EXPLODE W/HEAT.
Extinguishing Media:
WATER SPRAY, FOAM, CARBON DIOXIDE, DRY CHEMICAL.
Flash Point: **Flash Point Text:** 415F,213C

Autoignition Temperature:
Autoignition Temperature Text: NK
Lower Limit(s): 0.4%
Upper Limit(s): NA

Section 6 - Accidental Release Measures
PLASTISOL, VINYL CHLORIDE

Spill Release Procedures:
ABSORB, TRANSFER TO CONTAINER FOR DISPOSAL AS HAZARDOUS WASTE.

Section 7 - Handling and Storage
PLASTISOL, VINYL CHLORIDE

Handling and Storage Precautions:**Other Precautions:**

Section 8 - Exposure Controls & Personal Protection
PLASTISOL, VINYL CHLORIDE

Respiratory Protection:

NONE REQUIRED.

Ventilation:

GOOD VENTILATION SHOULD BE PROVIDED

Protective Gloves:

IMPERVIOUS GLOVES (NEOPRENE).

Eye Protection: CHEM WORKERS GOGGS.**Other Protective Equipment:** NOT REQUIRED.**Work Hygenic Practices:** WASH HANDS AFTER USE, BEFORE EATING, DRINKING OR SMOKING.**Supplemental Health & Safety Information:** MORE INFORMATION ON FILE.

Section 9 - Physical & Chemical Properties
PLASTISOL, VINYL CHLORIDE

HCC:**NRC/State License Number:** NK**Net Property Weight for Ammo:** NK**Boiling Point:** Boiling Point Text: 410F,210C**Melting/Freezing Point:** Melting/Freezing Text: NK**Decomposition Point:** Decomposition Text: NK**Vapor Pressure:** NIL Vapor Density: >1.0**Percent Volatile Organic Content:****Specific Gravity:** 1-1.4**Volatile Organic Content Pounds per Gallon:****pH:** NK**Volatile Organic Content Grams per Liter:****Viscosity:** NK**Evaporation Weight and Reference:** NIL (BUTYL ACETATE=1)**Solubility in Water:** NIL**Appearance and Odor:** SMOOTH THICK LIQUID; FAINT ODOR.**Percent Volatiles by Volume:** NK**Corrosion Rate:** NK

Section 10 - Stability & Reactivity Data
PLASTISOL, VINYL CHLORIDE

Stability Indicator: YES**Materials to Avoid:**

STRONG OXIDIZERS.

Stability Condition to Avoid:

ELEVATED TEMPERATURES.

Hazardous Decomposition Products:

CARBON MONOXIDE, CARBON DIOXIDE, HYDROGEN CHLORIDE, ACETIC ACID, TOXIC METAL FUMES.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NK

Section 11 - Toxicological Information
PLASTISOL, VINYL CHLORIDE

Toxicological Information:

N/P

Section 12 - Ecological Information
PLASTISOL, VINYL CHLORIDE

Ecological Information:

N/P

Section 13 - Disposal Considerations
PLASTISOL, VINYL CHLORIDE

Waste Disposal Methods:

DISPOSE OF ALL WASTES I/A/W FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
PLASTISOL, VINYL CHLORIDE

Transport Information:

N/P

Section 15 - Regulatory Information
PLASTISOL, VINYL CHLORIDE

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
PLASTISOL, VINYL CHLORIDE

Other Information:

N/P

HMIS Transportation Information

Product Identification: PLASTISOL, VINYL CHLORIDE

Transportation ID Number: 84766

Responsible Party CAGE: 0M246

Date MSDS Prepared: 01/01/1996

Date MSDS Reviewed: 07/09/1997

MFN: 07/09/1997

Submitter: G AW
Status Code: C

Container Information

Unit of Issue: KT
Container Quantity: 4
Type of Container: NK
Net Unit Weight: NK

Article without MSDS: N
Technical Entry NOS Shipping Number: NK
Radioactivity: NK
Form:
Net Explosive Weight: NK
Coast Guard Ammunition Code: NK
Magnetism: N/P
AF MMAC Code: NK
DOD Exemption Number: NK
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: Y
Review Indicator: Y
Additional Data:
NK

Department of Transportation Information

DOT Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
DOT PSN Code: ZZZ
Symbols: N/R
DOT PSN Modifier:
Hazard Class: N/R
UN ID Number: N/R
DOT Packaging Group: N/R
Label: N/R
Special Provision(s): N/R
Packaging Exception: N/R
Non Bulk Packaging: N/R
Bulk Packaging: N/R
Maximum Quantity in Passenger Area: N/R
Maximum Quantity in Cargo Area: N/R
Stow in Vessel Requirements: N/R
Requirements Water/Sp/Other: N/R

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R

Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

IATA Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
IATA PSN Code: ZZZ
IATA PSN Modifier:
IATA UN Id Number: N/R
IATA UN Class: N/R
Subsidiary Risk Class: N/R
UN Packaging Group: N/R
IATA Label: N/R
Packaging Note for Passengers: N/R
Maximum Quantity for Passengers: N/R
Packaging Note for Cargo: N/R
Maximum Quantity for Cargo: N/R
Exceptions: N/R

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R
AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: PLASTISOL, VINYL CHLORIDE
CAGE: 0M246
Assigned Individual: N
Company Name: INTERNATIONAL COATINGS
Company PO Box:
Company Street Address1: 7059 BARRY ST
Company Street Address2: ROSEMONT, IL 60018 US
Health Emergency Telephone: 310-926-8332
Label Required Indicator: Y
Date Label Reviewed: 10/12/1999
Status Code: A
Manufacturer's Label Number:
Date of Label:
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:

Fire Hazard:
Reactivity Hazard:

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Appendix C
Activity Hazard Analysis

ACTIVITY HAZARD ANALYSES

| Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP Activity: General Site Hazards | | Location: <u>Bethpage, NY</u> | |
|--|-------------------|--|--|
| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS | |
| General Site Hazards | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices should be used to reduce manual handling of materials. ◆ Team lifting should be utilized if mechanical devices are not available. | |
| | Slips/Trips/Falls | Slips/Trips/Falls <ul style="list-style-type: none"> ◆ Maintain work areas safe and orderly. ◆ Unloading areas should be on even terrain. ◆ Mark and repair if possible tripping hazards. | |
| | Vehicular Traffic | Vehicular Traffic <ul style="list-style-type: none"> ◆ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. | |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. ◆ All ground personnel will stay clear of suspended loads. ◆ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. ◆ All overhead hazards will be identified prior to commencing work operations. | |
| | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ Steel toe boots meeting ANSI Standard Z41 will be worn. | |
| | Noise | Noise <ul style="list-style-type: none"> ◆ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs). ◆ SHSO will determine the need for hearing protection. ◆ All equipment will be equipped with manufacturer's required mufflers. | |
| | Eye Injuries | Eye Injuries <p>Safety glasses meeting ANSI Standard Z87 will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions.</p> <p>http://www.shop.com/op/-AO_Safety_Maxim_153_2x2_Goggle-prod-12292770</p> | |
| | | | |
| | | | |
| | | | |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|--|--|
| | Heavy Equipment (overhead hazards, spills, struck by or against) | Heavy Equipment <ul style="list-style-type: none"> ◆ Equipment will have seat belts. ◆ Operators will wear seat belts when operating equipment. ◆ Do not operate equipment on grades that exceed manufacturer's recommendations. ◆ Equipment will have guards, canopies or grills to protect from flying objects. ◆ Ground personnel will stay clear of all suspended loads. ◆ Spill and absorbent materials will be readily available. ◆ Drip pans, polyethylene sheeting or other means will be used for secondary containment. ◆ Ground personnel will stay out of the swing radius. ◆ Eye contact with operators will be made before approaching equipment. ◆ Operator will acknowledge eye contact by removing his hands from the controls. ◆ Equipment will not be approached on blind sides. ◆ All equipment will have backup alarms. |
| | Heat Stress | Heat Stress <ul style="list-style-type: none"> ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| | Cold Stress | Cold Stress <ul style="list-style-type: none"> ◆ Wear adequate number of dry layered clothing. ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. |
| | Struck by vehicle/equipment | Struck by vehicle/equipment <ul style="list-style-type: none"> ◆ Be aware of heavy equipment operations. ◆ Keep out of the swing radius of heavy equipment. ◆ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times. ◆ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ◆ Ground personnel will not stand directly behind heavy equipment when it is in operation. ◆ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---|--|
| | Struck by tools | Struck by tools <ul style="list-style-type: none"> ◆ Cut resistant Kevlar work gloves will be worn when working with sharp objects. ◆ All hand and power tools will be maintained in safe condition. ◆ Guards will be kept in place while using hand and power tools. |
| | Caught in/on/between | Caught in/on/between <ul style="list-style-type: none"> ◆ Workers will not position themselves between equipment and a stationary object. ◆ Workers will not wear long hair or jewelry if working with tools/machinery. |
| | Contact with electricity/lightning | Contact with electricity/lightning <ul style="list-style-type: none"> ◆ All electrical tools and equipment will be equipped with GFCI. ◆ Electrical extension cords will be of the "Hard" or "Extra Hard" service type. ◆ All electrical work will be conducted by a licensed electrician. ◆ All utilities will be marked prior to excavation activities proceeding, follow EHS 3-15 "Underground Utilities" (Appendix E). ◆ All equipment will stay a minimum of 15 feet from overhead energized electrical lines (50 kV); this distance will increase 4 inches for each 1 kV above 50 kV. ◆ The weather will be monitored for approaching electrical storms. All outside work will stop if lightning is sighted and will not resume until 30 minutes after the last report of lightning. |
| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
| <ol style="list-style-type: none"> 1. Heavy Equipment 2. Small tools 3. Appropriate PPE 4. First Aid Kits 5. Portable Eyewash | <ol style="list-style-type: none"> 1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on tools prior to each use. 3. Inspections will be performed on PPE prior to each use. 4. Weekly inspections will be performed on first aid kits. 5. Portable eye wash will be inspected weekly | <ol style="list-style-type: none"> 1. Personnel have read and comply with SHSP & AHA. 2. Site specific training. 3. Qualified operators will be used for equipment operation. 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training. |

ACTIVITY HAZARD ANALYSES

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Mobilization/Demobilization, Site Preparation

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---|--|
| Mobilization/Demobilization of Equipment and Supplies | Struck by Heavy Equipment/Vehicles | Struck by Heavy Equipment/Vehicles <ul style="list-style-type: none"> ◆ Be aware of heavy equipment operations. ◆ Keep out of the swing radius of heavy equipment. ◆ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times. ◆ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ◆ Ground personnel will not stand directly behind heavy equipment when it is in operation. ◆ All vehicles & equipment will be operated at a reasonable speed. ◆ Only qualified persons will operate equipment. |
| | Struck by Equipment/Supplies | Struck by Equipment/Supplies <ul style="list-style-type: none"> ◆ Workers will maintain proper space around their work area, if someone enters it, stop work. ◆ When entering another worker's workspace, give a verbal warning so they know you are there. |
| | Overexertion Unloading/Loading Supplies | Overexertion Unloading/Loading Supplies <ul style="list-style-type: none"> ◆ Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. ◆ Avoid repetitive tasks; rotate personnel at regular intervals. ◆ No person should lift loads over 50 lbs. alone. |
| | Caught in/on/between | Caught in/on/between <ul style="list-style-type: none"> ◆ Do not place yourself between two vehicles or between a vehicle and a fixed object. |
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Immediately report slip/trip/fall hazards to workers & supervisors. ◆ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. ◆ Unloading areas should be on even terrain. ◆ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ◆ Drivers will check surface before stepping, not jumping down. ◆ Any ladders used will be tied off to a support structure. ◆ Personnel will not work at heights greater than 6 feet above a surface without fall protection consisting of guardrails or personal fall arrest systems with approved anchors. |
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Immediately report slip/trip/fall hazards to workers & supervisors. ◆ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. ◆ Unloading areas should be on even terrain. ◆ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ◆ Drivers will check surface before stepping, not jumping down. ◆ Any ladders used will be tied off to a support structure. ◆ Personnel will not work at heights greater than 6 feet above a surface without fall protection consisting of guardrails or personal fall arrest systems with approved anchors. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---|--|
| Site Preparation | Overexertion Installing Soil Erosion Controls Struck against wood stakes | Overexertion Installing Soil Erosion Controls ♦ Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. Struck against wood stakes ♦ Wear Leather Work Gloves as per Table 6-1 to prevent splinters. |
| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
| 1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Fire Extinguishers 6. Air Monitoring Equipment | 1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Weekly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected weekly 5. Weekly inspections will be performed on fire extinguishers. 6. Air monitoring equipment will be pre- and post calibrated according to manufacturer's specifications. | 1. Personnel have read and comply with SHSP 2. Site specific training 3. Qualified operators will be used for equipment operation 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training 5. Instruct personnel on proper use of fire extinguishers 6. Qualified individuals will use air monitoring equipment. |

ACTIVITY HAZARD ANALYSES

| MAJOR STEPS | | POTENTIAL HAZARDS | | PROTECTIVE MEASURES/CONTROLS | |
|--|--|---|---|--|--|
| <p>Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP Activity: <u>Clearing & Grubbing</u></p> <p style="text-align: right;">Location: <u>Bethpage, NY</u></p> | | <p>Slip, Trip and Fall</p> <p>Operating Heavy Equipment</p> | <p>Slip, Trip and Fall</p> <p>Operating Heavy Equipment</p> | <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. <p>Operating Heavy Equipment</p> <ul style="list-style-type: none"> ◆ Prior to start-up and operation of a piece of heavy equipment, a visual walk-around inspection shall be performed. ◆ Operators shall always maintain three points of contact when getting on or off equipment. ◆ Operators of heavy equipment shall be qualified to operate the equipment they are assigned to. ◆ Seat belts shall be worn at all times during operation. ◆ All heavy equipment shall be operated in a manner consistent with the manufacturer's recommendations for the work being performed. ◆ Passengers shall not be allowed on construction equipment. ◆ Heavy equipment shall not be used as a personnel lift (elevator) or as a work platform. ◆ Riding in the bed of a dump truck shall not be permitted. ◆ When parking heavy equipment, operators shall utilize the proper braking and parking techniques for the equipment, such as lowering buckets or blades to the ground, using chocks on the wheels, or lowering of forks. ◆ Review Emergency Response Plan for liquid spills including oils, fuels, etc. and ensure equipment/material is available for clean-up. | |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Clearing & Grubbing

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--------------------------------|---|---|
| Clearing and Grubbing (cont'd) | Working Near Heavy Equipment | Working Near Heavy Equipment <ul style="list-style-type: none"> ◆ Drivers/Operators will keep workers on foot in sight at all times, if you lose sight of someone, Stop! ◆ Do not approach heavy equipment unless eye contact with appropriate hand signals has been made with the operator to cease activity. Equipment operators shall confirm that eye contact had been made by stopping operation and clearly showing their hands are off of the controls. ◆ Keep out of the swing radius of heavy equipment. ◆ Ground personnel in the vicinity of heavy equipment operations shall be within the view of the operator at all times. ◆ Ground personnel shall be aware of the counterweight swing and an adequate buffer zone shall be barricaded to prevent entry. |
| Clearing using weed wacker | Struck by flying debris in eyes | Struck by flying debris in eyes <ul style="list-style-type: none"> ◆ Safety glasses will be worn while on site. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Face shield will be worn in addition to safety glasses while using weed wacker. |
| | Fall on same level | Fall on same level <ul style="list-style-type: none"> ◆ Personnel will stay away from debris covered areas when possible. ◆ Area will be cleared before walking in it. |
| | Contact with biological hazards (e.g., poison ivy; ticks) | Contact with biological hazards (e.g., poison ivy; ticks) <ul style="list-style-type: none"> ◆ Avoid animals and insects, poison ivy/oak, animal/bird droppings, and poisonous snakes. ◆ Get first aid for any insect bites and report to supervisor or Site Health and Safety Officer (SHSO). ◆ Identify personnel with a known allergic reaction to insect bites or stings at the site orientation. ◆ Personnel will wear tyvek and use insect repellent when walking/working in overgrown areas. ◆ Personnel will conduct frequent checks for ticks. |
| | Contact with heat/hot engines | Contact with heat/hot engines <ul style="list-style-type: none"> ◆ Instruct personnel to avoid contact with hot engines. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Clearing & Grubbing

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---|---|
| Use farm-type tractor with mower attachment to clear areas | <p>Contact with noise</p> <p>Struck by flying debris in eyes</p> | <p>Contact with noise</p> <ul style="list-style-type: none"> ◆ Personnel will wear ear plug or ear muffs while operating weed wacker. ◆ Safety glasses will be worn while on site. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/-AO_Safety_Maxim_153_2x2_Goggle;-prod-12292770 |
| | Caught in rotating shaft | <p>Caught in rotating shaft</p> <ul style="list-style-type: none"> ◆ Guard shaft. |
| | Contact with biological hazards | <p>Contact with biological hazards</p> <ul style="list-style-type: none"> ◆ Personnel will wear tyvek and use insect repellent when walking/working in overgrown areas. ◆ Personnel will conduct frequent checks for ticks. |
| | Contact with heat/hot engines | <p>Contact with heat/hot engines</p> <ul style="list-style-type: none"> ◆ Equipment will be shut off during re-fueling. ◆ Fire extinguisher will be kept in area during re-fueling. |
| | Contact with noise | <p>Contact with noise</p> <ul style="list-style-type: none"> ◆ Personnel will wear ear plug or ear muffs while operating weed wacker. |
| | Environmental release while fueling/operating tractor | <p>Environmental release while fueling/operating tractor</p> <ul style="list-style-type: none"> ◆ Equipment fuels and maintenance fluids will be kept in approved safety containers and flammable storage cabinets. ◆ Spill control kits will be kept in re-fueling area. |
| Use chain saw to cut small trees | <p>Struck by flying debris in eyes</p> <p>Struck by chain saw blade</p> | <p>Struck by flying debris in eyes</p> <ul style="list-style-type: none"> ◆ Safety glasses will be worn while on site. ◆ Face shield will be worn while using chain saw. <p>Struck by chain saw blade</p> <ul style="list-style-type: none"> ◆ Wear Kevlar chaps; always use two hands when starting and operating chain saw. ◆ Start chain saw on ground; cut below shoulder height. ◆ Avoid kickback by not cutting with blade nose or tip, or having tip strike another object. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|--|---|
| | Struck by falling trees | Struck by falling trees <ul style="list-style-type: none"> ◆ Wear steel-toed safety boots. ◆ Carefully plan cuts; determine escape route before felling tree (45° from direction of fall of tree). ◆ When tree (> 4" diameter) starts to fall- turn off chain saw, set it down and proceed along escape route- do not return until tree is not moving. Contact with heat/hot engines <ul style="list-style-type: none"> ◆ Equipment will be shut off during re-fueling. ◆ Fire extinguisher will be kept in area during re-fueling. Contact with noise <ul style="list-style-type: none"> ◆ Personnel will wear ear plug or ear muffs while operating weed wacker. |
| Feed material to chipper | Struck by flying debris in eyes | Struck by flying debris in eyes <ul style="list-style-type: none"> ◆ Safety glasses will be worn while on site. Cordon off area with tape. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/-AO_Safety_Maxim_153_2x2_Google-prod-12292770 Struck by brush <ul style="list-style-type: none"> ◆ Workers will maintain a safe distance from each other when manually moving brush. |
| EQUIPMENT USED <ol style="list-style-type: none"> 1. Heavy Equipment 2. Chain Saw 3. Tractor with mower attachment 4. Chipper | INSPECTION REQUIREMENTS <ol style="list-style-type: none"> 1. Heavy equipment shall be inspected on arrival and daily prior to use. 2. Inspect saw prior to use- ensure teeth are sharpened, check tension and lubrication system for proper function; Also check air filter, sparkplug and muffler. 3. Inspect to ensure mover/blade is secured and guards are in place. 4. Inspect tow hitch and ensure jack is raised for towing; check infeed, belts, hoses and hydraulic fittings; check function of safety bar. | TRAINING REQUIREMENTS <ol style="list-style-type: none"> 1. Operators shall be trained and qualified to operate the equipment. 2. Site specific training 3. Operator has training on proper use and maintenance of chain saw. 4. Operator has training on proper use and maintenance of brush hog. 5. Operator has training on proper use and maintenance of chipper. |

ACTIVITY HAZARD ANALYSES

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Fence Installation

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|------------------------------------|--------------------------------------|--|
| Drill holes for fence posts | Strike against Underground Utilities | Strike against Underground Utilities <ul style="list-style-type: none"> ◆ Follow EHS 3-15 "Underground Utilities". ◆ Mark area to be excavated with white lines. ◆ Call the "One-Call" center to have utilities on public property located and marked. ◆ On private property, a private locating service will be needed and/or a Geophysical Survey will need to be done. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. ◆ All ground personnel will stay clear of suspended loads. ◆ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. ◆ All overhead hazards will be identified prior to commencing work operations. ◆ All equipment will stay a minimum of 15 feet from energized electrical lines (50kV). This distance will increase .4 inches for each 1kV above 50 kV. |
| | Struck by Heavy Equipment/Vehicles | Struck by Heavy Equipment/Vehicles <ul style="list-style-type: none"> ◆ Speed limit for traffic is 15 mph for all areas of the site. ◆ Operators/Drivers will submit a copy of their valid driver's license on initial arrival for each vehicle brought on site. ◆ Drivers will maintain workers on foot in sight, if you lose sight of someone, Stop! ◆ Design the site to minimize backing operations. ◆ Personnel are not allowed to use a cellular phone while driving a vehicle on-site. ◆ Use spotters for traffic control whenever there is "blind spots", backing, or where there are road hazards or unsafe road conditions. ◆ Do not approach heavy equipment unless eye contact with appropriate hand signals has been made with the operator to cease activity. ◆ Equipment operators will confirm that eye contact had been made by stopping operation and clearly showing their hands are off of the controls. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--------------------------------------|------------------------------|--|
| | Struck By/Against/ Caught By | <p>Struck By/Against/ Caught By</p> <ul style="list-style-type: none"> ◆ No loose clothing, gauntlet-type gloves, rings, or watches will be worn by personnel operating drill rig equipment. ◆ Personnel will be trained as to the manufacturer recommended procedures prior to commencing operations. ◆ Personnel will understand and review hand signals. ◆ Drill rigs and support equipment will be equipped with backup alarms. ◆ The drill rig operator will verbally alert employees and visually ensure employees are clear from dangerous parts of the equipment prior to starting or engaging equipment. ◆ All drill rig equipment shall be equipped with emergency shutoff devices. Internal combustion engines will be equipped with an ignition or grounding switch. Diesel engines will be equipped with quick closing valves, which will shut off air to the intake manifold. Electric motors will be equipped with suitable switch in motor circuits. |
| | Chemical hazards | <p>Chemical Hazards</p> <ul style="list-style-type: none"> ◆ If a gas powered hole digger is used, try to work upwind because the unit gives off carbon monoxide. |
| | Flying Objects and Debris | <p>Flying Objects and Debris</p> <ul style="list-style-type: none"> ◆ Safety glasses meeting ANSI Standard Z87 will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/-AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Splash shields and chemical goggles meeting ANSI Standard Z87 will be worn where applicable. ◆ A portable eye wash station will be located adjacent to the work area. |
| | Fire | <p>Fire</p> <ul style="list-style-type: none"> ◆ ABC type fire extinguishers shall be readily available; no smoking in work area. |
| | Fuel Spills | <p>Fuel Spills</p> <ul style="list-style-type: none"> ◆ Spill and absorbent materials will be readily available. |
| | Pinch/Cut/Smash | <p>Pinch/Cut/Smash</p> <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn when dealing with sharp objects. ◆ All hand and power tools will be maintained in safe condition. ◆ Guards will be kept in place while using hand and power tools. ◆ Overhead Hazards. ◆ All personnel will wear hard hats meeting ANSI Standard Z89.1. ◆ All equipment will stay a minimum of 15 feet from energized electrical lines. This distance will increase as the voltage of the power lines increase. |
| Install fence posts and fence | Overhead Hazards | |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWRP
 Activity: Fence Installation

Location: Bethpage, NY

| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
|---|---|--|
| <ol style="list-style-type: none"> 1. Heavy Equipment 2. Post Hole Digger 3. Appropriate PPE 4. First Aid Kits 5. Portable Eyewash | <ol style="list-style-type: none"> 1. Heavy equipment will be inspected daily prior to use. 2. Inspections will be performed on equipment prior to each use. 3. Inspections will be performed on PPE prior to each use. 4. Weekly inspections will be performed on first aid kits. 5. Portable eye wash will be inspected weekly | <ol style="list-style-type: none"> 1. Personnel have read and comply with SHSP. 2. Site-specific training. 3. Qualified operators will be used for equipment operation. 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training. |

ACTIVITY HAZARD ANALYSES

| Project: <u>GM-38 Area Groundwater Treatment Building & Systems-NWIRP</u> Activity: <u>Excavation & Backfilling</u> | | Location: <u>Bethpage, NY</u> |
|--|---|---|
| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
| Excavation & Backfilling | <p>Strike against Underground Utilities</p> <p>Fall into Excavation</p> <p>Cave-ins</p> | <p>Strike against Underground Utilities</p> <ul style="list-style-type: none"> ◆ Follow EHS 3-15 "Underground Utilities": ◆ Mark area to be excavated with white lines. ◆ Call the "One-Call" center to have utilities on public property located and marked. ◆ On private property a private locating service will be needed and/or a Geophysical Survey will need to be done. <p>Fall into Excavation</p> <ul style="list-style-type: none"> ◆ Fill all excavations as soon as possible. ◆ Workers who must work near edge of trench should wear fall protection. ◆ Barricade excavations to prevent falls. ◆ Do not go closer than 5 feet to the open excavation without fall protection, such as guardrails. <p>Cave-ins</p> <ul style="list-style-type: none"> ◆ All excavation work shall be performed in accordance with 29 CFR 1926, Subpart P. ◆ A "designated" competent person shall evaluate and approve the stability of excavations and ensure proper personnel protection systems are in place. ◆ Stockpile excavated material at least 3 feet from the edge of excavations. ◆ Do not leave excavations open overnight whenever possible. ◆ Install open trench warning devices/barricades. <p>Equipment Tipping Over</p> <ul style="list-style-type: none"> ◆ Heavy equipment shall have rollover equipment as required by 29 CFR 1926.1000. ◆ Seat belts shall be worn at all times during operation. ◆ Operators shall not use equipment on slopes steeper than 1.5H:1.0V unless operation is consistent with manufacturer's recommendations. ◆ Operators of heavy equipment with blades, buckets, beds, etc. shall keep them lowered or in a stable position while on slopes. ◆ Ensure ground personnel are located out of the way of potential equipment turnover or failure (including buckets). ◆ Operators and spotters are to be in constant visual sight. ◆ When dumping a load, a spotter will be used (at a safe distance) to determine if load is not releasing sufficiently. ◆ Equipment not to be left running unattended. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|------------------------------------|--|
| | Struck by cave-in | <p>Struck by cave-in</p> <ul style="list-style-type: none"> ◆ Worker engaged in collecting soil samples for screening or analysis should collect samples from the bucket of the excavator and not enter the pit/trench if it can be avoided. ◆ Follow EHS 6-3 "Excavation and Trenching". ◆ Slope or bench sides of excavation or use shoring or a trench box if workers must enter the excavation. ◆ Keep all soil and other burden at least three feet from edge of trench. |
| | Struck by Heavy Equipment/Vehicles | <p>Struck by Heavy Equipment/Vehicles</p> <ul style="list-style-type: none"> ◆ Speed limit for traffic is 15 mph for all areas of the site. ◆ Operators/Drivers will submit a copy of their valid driver's license on initial arrival for each vehicle brought on site. ◆ Drivers will maintain workers on foot in sight, if you lose sight of someone, Stop! ◆ Design the site to minimize backing operations. ◆ Personnel are not allowed to use a cellular phone while driving a vehicle on-site. ◆ Use spotters for traffic control whenever there is "blind spots", backing, or where there are road hazards or unsafe road conditions. ◆ Do not approach heavy equipment unless eye contact with appropriate hand signals has been made with the operator to cease activity. Equipment operators will confirm that eye contact had been made by stopping operation and clearly showing their hands are off of the controls. |
| | Exposure to Dust | <p>Exposure to Dust</p> <ul style="list-style-type: none"> ◆ All workers will work upwind from dust generation. ◆ Dust control procedures will be initiated whenever visible dust is generated. ◆ Wear proper PPE as per Table 6-1. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/-AO_Safety_Maxim_153_2x2_Goggle-prod-1292770 |
| | Struck By/Against/ Caught By | <p>Struck By/Against/ Caught By</p> <ul style="list-style-type: none"> ◆ Personnel will be trained as to the manufacturer recommended procedures prior to commencing operations. ◆ Personnel will understand and review hand signals. ◆ Heavy equipment will be equipped with backup alarms. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Excavation & Backfilling

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---|--|
| | Flying Objects and Debris | Flying Objects and Debris <ul style="list-style-type: none"> ◆ Safety glasses meeting ANSI Standard Z87 will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Splash shields and chemical goggles meeting ANSI Standard Z87 will be worn where applicable. ◆ A portable eye wash station will be located adjacent to the work area. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel will wear hard hats meeting ANSI Standard Z89.1. ◆ All personnel will stay clear of the GeoProbe working area. ◆ All equipment will stay a minimum of 15 feet from energized electrical lines. This distance will increase as the voltage of the power lines increase. |
| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
| 1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash | 1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Weekly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected weekly | 1. Personnel have read and comply with SHSP. 2. Site-specific training. 3. Qualified operators will be used for equipment operation. 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training. |

ACTIVITY HAZARD ANALYSES

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Installation of Access Road & Parking Areas

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------------------------|------------------------------------|--|
| Place & compact base material | Struck by Heavy Equipment/Vehicles | Struck by Heavy Equipment/Vehicles <ul style="list-style-type: none"> ◆ Speed limit for traffic is 15 mph for all areas of the site. ◆ Operators/Drivers will submit a copy of their valid driver's license on initial arrival for each vehicle brought on site. ◆ Drivers will maintain sight contact with workers on foot, if you lose sight of someone, Stop! ◆ Design the site to minimize backing operations. ◆ Personnel are not allowed to use a cellular phone while driving a vehicle on-site. ◆ Use spotters for traffic control whenever there is "blind spots", backing, or where there are road hazards or unsafe road conditions. ◆ Do not approach heavy equipment unless eye contact with appropriate hand signals has been made with the operator to cease activity. Equipment operators will confirm that eye contact had been made by stopping operation and clearly showing their hands are off the controls. |
| | Fall into Excavation | Fall into Excavation <ul style="list-style-type: none"> ◆ Do not leave excavations open overnight, fill them whenever possible or barricade. ◆ Install open trench warning devices/barricades. |
| | Caught on/in/between | Caught on/in/between <ul style="list-style-type: none"> ◆ Do not place yourself between two vehicles or between a vehicle and a fixed object. |
| | Struck By/Against | Struck By/Against <ul style="list-style-type: none"> ◆ Eye contact with operators will be made before approaching equipment. ◆ Equipment will not be approached on blind sides. ◆ Personnel will avoid equipment swing areas and blind sides. ◆ Personnel will understand and review hand signals. ◆ All machines will be equipped with backup alarms. |
| | Rollovers | Rollovers <ul style="list-style-type: none"> ◆ Equipment will have rollover protective structures and seat belts, if applicable. ◆ Operators will wear seat belts when operating equipment, if feasible. ◆ Equipment will not be operated on grades which exceed manufacturer's recommendations. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|--|---|
| | Flying Objects and Debris | Flying Objects and Debris <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Windows and doors will be closed during equipment operation (if so equipped). |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ Equipment will be provided with guards, canopies or grills (if applicable) to protect the operator from falling or flying objects. ◆ All personnel will wear hard hats. ◆ All slings, chains and ropes will be rated for the load in which it is expected to lift. ◆ All ground personnel will stay clear of all suspended loads. ◆ All equipment will stay a minimum of 10 feet from power lines. This distance will increase as the voltage of the power lines increase. |
| | Inhalation Hazards in the Exclusion Zone | Inhalation Hazards in the Exclusion Zone <ul style="list-style-type: none"> ◆ Work will not be conducted in exclusion zone areas (for Early Action Phase). |
| | Contaminant Exposure | Contaminant Exposure <ul style="list-style-type: none"> ◆ Exclusion zone areas will be identified. Work will not be conducted in exclusion zone areas. |
| | Noise | Noise <ul style="list-style-type: none"> ◆ All equipment will be equipped with manufacturers required mufflers. ◆ Hearing protection will be provided with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs will be worn). |
| | Open Excavations | Open Excavations <ul style="list-style-type: none"> ◆ No excavations are required for this operation, however some small areas of old pavement may be removed. ◆ The areas of removed pavement will be barricaded to prevent field personnel from falling into the open area. |
| EQUIPMENT USED <ol style="list-style-type: none"> 1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash | INSPECTION REQUIREMENTS <ol style="list-style-type: none"> 1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Weekly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected weekly | TRAINING REQUIREMENTS <ol style="list-style-type: none"> 1. Personnel have read and comply with SHSP. 2. Site-specific training. 3. Qualified operators will be used for equipment operation. 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training. |

ACTIVITY HAZARD ANALYSES

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Installation of Treatment Building Sumps

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|---|---|
| Concrete Placement & Finishing | Collapse of Concrete Formwork or Uncured Concrete | <ul style="list-style-type: none"> ◆ Collapse of Concrete Formwork or Uncured Concrete Formwork & shoring shall be designed to support all loads that may be reasonable anticipated. ◆ Forming & shoring shall be installed by experienced & competent craftsmen per the specified erection drawings. ◆ Formwork & shoring shall be inspected for defects or deviations from specifications by a qualified person prior to, during, and immediately after placement of concrete. ◆ No additional loads, or any applied force of any kind, shall be placed on uncured concrete and its formwork, which exceed the specified limits for the affected area. ◆ No formwork, shoring or bracing shall be removed until the concrete has sufficient strength to support its own weight and the total loads involved. The Engineer shall specify the minimum cure period & strength that is acceptable. |
| | Specifications for Concrete Strength & Curing Time Not Provided | <ul style="list-style-type: none"> ◆ Testing of concrete shall be performed by qualified personnel to assure compliance with the design specification. |
| | Employee Contact With Wet Concrete | Employee Contact With Wet Concrete <ul style="list-style-type: none"> ◆ Employees placing concrete shall wear full length pants, long sleeve shirts, rubber boots and gloves. Washing facilities or waterless soap & eyewash solution shall be provided on-site. ◆ Where appropriate on slab placements, place wire mesh on top rebar layer to prevent workers from falling through opening in rebar grid. ◆ Review MSDSs for concrete, cement, and associated chemical admixtures with all personnel directly involved with this phase of work. ◆ Contact lenses shall not be worn when working with concrete. |
| | Struck by Concrete Pump or Other Heavy Equipment | Struck by Concrete Pump or Other Heavy Equipment <ul style="list-style-type: none"> ◆ Designate one person to signal the boom pump truck operator. ◆ Restrict activities within swing radius of equipment. ◆ Ensure all guards and shields are in place. ◆ Restrict activities in vicinity of pump during concrete placing activities. ◆ Utilize experienced and competent craftsman. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|---|--|
| | <p>Injuries Resulting From Falls From, Or Contact With Concrete Buckets</p> | <p>Injuries Resulting From Falls From, Or Contact With Concrete Buckets</p> <ul style="list-style-type: none"> ◆ Ensure bucket is in good operating condition and that gates close tightly keeping concrete in bucket during lifting operations. ◆ Employees shall not ride in/on concrete buckets. ◆ Tag line(s) shall be required on all loads unless tag lines create a safety hazard, i.e., dragging on a high voltage line, critical valves, becoming stuck on rebar, causing a tripping hazard for personnel walking a load, etc. Use as many tag lines as necessary to adequately control the load. ◆ Personnel shall not place hands on load until it is at least shoulder height and arm is kept fully extended. If area of placement is congested and if sudden load shift would trap personnel between loads and other objects, the shoulder method shall not be used (only taglines; until load is within 1 foot of ground or cribbing). ◆ Employees shall not work under concrete buckets. |
| <p>Electric Shock</p> | | <p>Electric Shock</p> <ul style="list-style-type: none"> ◆ All overhead power lines that may come in contact with placing equipment shall be de-energized or guarded to protect from electrical shock. If unable to de-energized or guard, contact Project Superintendent for evaluation. ◆ Handles on bull floats, when used where the possibility exists to contact electrical lines, shall be constructed of a non-conductive material or insulated with a non-conductive sheath. ◆ When using wet cutting concrete saws, care should be taken that waste water does not come in contact with nearby electrical cords and equipment. ◆ All electric power tools and equipment shall have GFCI, except double insulated tools such as concrete vibrators. |
| <p>Runaway Powered Troweling Machines</p> | | <p>Runaway Powered Troweling Machines</p> <ul style="list-style-type: none"> ◆ Manually guided, fuel powered troweling machines shall be equipped with an automatic shutoff, which stops the machine when the operator removes his hands. |
| <p>Hazardous Atmospheres</p> | | <p>Hazardous Atmospheres</p> <ul style="list-style-type: none"> ◆ Where fuel powered troweling machines are used inside buildings or enclosed areas, the air shall be monitored for hazardous atmospheres. |
| <p>Protruding Ends Of Reinforcing Steel</p> | | <p>Protruding Ends Of Reinforcing Steel</p> <ul style="list-style-type: none"> ◆ All ends of reinforcing steel which could cause an impalement hazard to employees shall be covered. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|--|---|
| | Contact with or struck-by pressure washer | Contact with or struck-by pressure washer <ul style="list-style-type: none"> ◆ Operator of pressure washer shall be trained in operation and safety practices prior to using equipment. ◆ Operator prior to starting operation shall ensure initial blast area is clear of personnel. ◆ Personnel working in the area are responsible for maintaining a safe distance from pressure washing operations (20 feet). ◆ Personnel working in the area wanting to approach the operator of the pressure washing equipment must make eye contact prior to approaching within 20 feet. |
| Mixing Mortar With Machine | Contact with mortar mixing machinery | Contact with mortar mixing machinery <ul style="list-style-type: none"> ◆ Operator of mixing machine shall be trained in operation and safety practices prior to using equipment. ◆ Personnel working in the area are responsible for maintaining a safe distance from mixing machine operations. ◆ Personnel working in the area wanting to approach the operator of the mixing machine must make eye contact prior to approaching within 10 feet. |
| Working Near Exposed Rebar | Impalement Hazard | Impalement Hazard <ul style="list-style-type: none"> ◆ Rebar that is of a height to create an impalement hazard shall be guarded. |
| Activities that Involve Potential for Falls | Falls From Elevations Greater Than Six Feet | Falls From Elevations Greater Than Six Feet <ul style="list-style-type: none"> ◆ All employees working six feet or more from the ground or next level shall be provided with fall protection 100% of the time. Fall protection shall consist of one of the following: standard railing, warning line system, catch platform, rebar positioning hook, safety monitoring system, or a full body harness equipped with a pig-tail, shock-absorbing lanyard. |
| | Failure Of Damaged Fall Protection Equipment | Failure Of Damaged Fall Protection Equipment <ul style="list-style-type: none"> ◆ All fall protection equipment shall be inspected for damage or wear prior to use on the job site and daily before each use. ◆ Fall protection equipment shall not be modified. Synthetic materials shall not be painted. |
| | Damage Occurring To Fall Protection Equipment Due To Improper Storage or Maintenance | Damage Occurring To Fall Protection Equipment Due To Improper Storage or Maintenance <ul style="list-style-type: none"> ◆ Fall protection equipment shall be stored and maintained as per manufacturer's recommendations. |
| | Failure Of Standard Railings | Failure Of Standard Railings <ul style="list-style-type: none"> ◆ All standard railings shall be constructed to withstand a load of 200 lbs. in any direction with minimal deflection. |
| | Failure of Tie-Off Point To Withstand Force of Falling Individual | Failure Of Standard Railings <ul style="list-style-type: none"> ◆ Tie-off points shall be capable of supporting 5,000 lbs. of dead weight. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Installation of Treatment Building Sumps

Location: Bethpage, NY

| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
|---|---|--|
| <ol style="list-style-type: none"> 1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Mortar Mixing Machine 6. Power Masonry Saws | <ol style="list-style-type: none"> 1. Inspections will be performed on equipment prior to each use. 2. Inspections will be performed on PPE prior to each use. 3. Weekly inspections will be performed on first aid kits. 4. Portable eye wash will be inspected weekly | <ol style="list-style-type: none"> 1. Personnel have read and comply with SHSP. 2. Site-specific training. 3. Qualified operators will be used for equipment operation. 4. At least two individuals on-site will have current CPR, First aid and bloodborne pathogen training. |

ACTIVITY HAZARD ANALYSIS

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Treatment Plant Building Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|-------------------------|--|
| Placing & Securing Concrete Forms for Building Foundation | Slip/Trip/Fall | <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Debris will not be allowed to accumulate where it becomes a hazard. |
| | Back Injuries | <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| | Overhead Hazards | <ul style="list-style-type: none"> ◆ All personnel are required to wear hard hats. ◆ All slings, chains & ropes will be rated for the load it is expected to lift. ◆ All ground personnel will stay clear of suspended loads. |
| | Sharp Objects | <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn. ◆ All hand & power tools will be maintained in safe condition. ◆ First aid kits will be readily available. ◆ Guards will be kept in place while using hand or power tools. |
| | Flying Objects & Debris | <ul style="list-style-type: none"> ◆ ANSI-approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. |
| Rebar Placement/Tying Rebar | Dropped Objects | <ul style="list-style-type: none"> ◆ Steel toe boots will be worn. |
| | Sharp Objects | <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn. ◆ All hand & power tools will be maintained in safe condition. ◆ First aid kits will be readily available. ◆ Caps will be placed on the protruding ends of rebar. |
| | Slip/Trip/Fall | <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping & poor footing hazards will be repaired as they are discovered or will be clearly identified. |
| | Dropped Objects | <ul style="list-style-type: none"> ◆ Steel toe boots will be worn. |
| | Flying Objects & Debris | <ul style="list-style-type: none"> ◆ ANSI-approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---------------------|-------------------------|---|
| | Fire | <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work areas. ◆ Hot work permits will be required for all cutting, welding, open flame & flames/spark-producing equipment. ◆ A fire watch will be assigned to watch for dangerous sparks in the areas during hot work operations. ◆ After completion of hot work, the fire watch will be maintained for 30 minutes. ◆ All requirements outlined in EM 385-1-1, Section 10 and 29 CFR 1926, Subpart J will be followed. |
| | Dermal Burns | <ul style="list-style-type: none"> ◆ Protective equipment will be worn to prevent burns from hot slag. |
| | Flying Objects & Debris | <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. |
| | Back Injuries | <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| | Overhead Hazards | <ul style="list-style-type: none"> ◆ All personnel are required to wear hard hats. ◆ All slings, chains & ropes will be rated for the load it is expected to lift, and will be inspected prior to each use. Damaged equipment will be tagged & removed from service. ◆ All ground personnel will stay clear of suspended loads. |
| Oiling Forms | Chemical Exposure | <ul style="list-style-type: none"> ◆ Protective clothing (nitrile inner gloves, tyvek & booties) will be worn. ◆ Exclusion zone areas will be identified. ◆ Skin will be rinsed with water if contact with hazardous chemicals occurs. |
| | Fire | <ul style="list-style-type: none"> ◆ All fuel tanks/trucks will be grounded during fueling operations. ◆ All equipment will be equipped with 10-lb. ABC type fire extinguishers. ◆ 10-lb. ABC type fire extinguishers will be located by work area. ◆ Smoking & open flames are not permitted in areas of fueling & greasing operations. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|----------------------------|------------------------|---|
| | Spills | <ul style="list-style-type: none"> ◆ Drum of forming oil will be stored in a posted, covered & bermed containment area. ◆ Spill & absorbent materials will be readily available. ◆ Employees will be instructed on chemical transfer operations. |
| | Eye Injury | <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ An eye wash station will be readily available by the work area. |
| Pouring of Concrete | Flying Debris (Splash) | <ul style="list-style-type: none"> ◆ Flying Debris (Splash) ◆ ANSI approved safety glasses will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| | Struck By/Against | <ul style="list-style-type: none"> ◆ Struck By/Against ◆ Eye contact with operators will be made before approaching equipment. ◆ Equipment will not be approached on blind sides. ◆ Personnel will avoid equipment swing areas & blind spots. ◆ Personnel will understand & review hand signals. ◆ All machines will be equipped with backup alarms. |
| | Fire | <ul style="list-style-type: none"> ◆ Fire ◆ All equipment will be equipped with 10-lb. ABC type fire extinguishers. ◆ 10-lb. ABC type fire extinguishers will be located by work area. ◆ Smoking & open flames are not permitted in work area. |
| | Chemical | <ul style="list-style-type: none"> ◆ Chemical ◆ Protective clothing (nitrile inner gloves & outer work gloves) will be worn. ◆ Skin will be rinsed with water if contact with hazardous chemicals occurs. |
| | Spills | <ul style="list-style-type: none"> ◆ Spills ◆ Employees will be instructed on proper cleanup operations. |
| | Overhead Hazards | <ul style="list-style-type: none"> ◆ Overhead Hazards ◆ All ground personnel will stay clear of the concrete truck boom. ◆ All personnel will wear hard hats. |
| | Leg Injury | <ul style="list-style-type: none"> ◆ Leg Injury ◆ All personnel will avoid walking in wet concrete. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|-------------------|---|
| | Noise | Noise <ul style="list-style-type: none"> ◆ All equipment will be equipped with manufacturer's required mufflers. ◆ Hearing protection will be provided with a noise reduction rating capable of maintaining personal exposures to less than 85 dBA (ear muffs or ear plugs will be worn). |
| Concrete Pouring – Vibrator Operations | Noise | Noise <ul style="list-style-type: none"> ◆ All equipment will be equipped with manufacturer's required mufflers. ◆ Hearing protection will be provided with a noise reduction rating capable of maintaining personal exposures to less than 85 dBA (ear muffs or ear plugs will be worn). |
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping & poor footing hazards will be repaired as they are discovered or will be clearly identified. |
| | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ Steel toe boots will be worn. |
| | Electrocution | Electrocution <ul style="list-style-type: none"> ◆ Ground fault circuit interrupters will be used. ◆ Cords will be kept off of & out of wet areas. ◆ Work will not be conducted in the rain. ◆ Cords will be inspected prior to each use for damage. Damaged equipment will be tagged & taken out of service. |
| | Fire | Fire <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguishers will be located by work area. ◆ Smoking & open flames are not permitted in work areas. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn. ◆ First aid kits will be readily available. |

Project: CM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Treatment Plant Building Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|--|---|
| <p>Removal of Concrete Forms</p> | <p>Struck By/Against</p> | <p>Struck By/Against</p> <ul style="list-style-type: none"> ◆ Eye contact with operators will be made before approaching equipment. ◆ Equipment will not be approached on blind sides. ◆ Personnel will avoid equipment swing areas & blind spots. ◆ Personnel will understand & review hand signals. ◆ All machines will be equipped with backup alarms. ◆ Personnel will stay clear of post drivers & rotating equipment when operating. ◆ All equipment will be inspected prior to use. All defective equipment will be tagged & taken out of service. |
| | <p>Flying Objects & Debris</p> <p>Overhead Hazards</p> | <p>Flying Objects & Debris</p> <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Windows & doors will be closed during operations if equipped. <p>Overhead Hazards</p> <ul style="list-style-type: none"> ◆ All heavy equipment will be provided with guards, canopies or grills to protect the operator from falling and/or flying objects. ◆ All personnel are required to wear hard hats. ◆ All slings, chains & ropes will be rated for the load it is expected to lift, and will be inspected prior to each use. Damaged equipment will be tagged & removed from service. ◆ All ground personnel will stay clear of suspended loads. |
| | <p>Noise</p> | <p>Noise</p> <ul style="list-style-type: none"> ◆ All equipment will be equipped with manufacturer's required mufflers. ◆ Hearing protection will be provided with a noise reduction rating capable of maintaining personal exposures to less than 85 dBA (ear muffs or ear plugs will be worn). |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Treatment Plant Building Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-----------------------------------|--|---|
| | <p>Confined Space (Removal of forms in the foundation of the treatment building)</p> | <p>Confined Space</p> <ul style="list-style-type: none"> ◆ If the dimensions of the sump areas fall within the definition of a confined space outlined in 29 CFR 1910.146 and EM 385-1-1, Section 06.I, then all procedures outlined within these standards will be followed. ◆ Prior to removing the forms, the crew members must go through a confined space training class, consisting of confined space awareness, entrant, attendant, supervisory and equipment training. ◆ Workers entering the confined space are required to wear a full body harness which is attached to a retrieval line. ◆ An attendant is required to monitor the space. ◆ Emergency equipment (SCBA units) must be readily available. ◆ One person involved in the confined space entry must be trained in first aid & CPR. |
| <p>Working Off of Scaffolding</p> | <p>Fire</p> <p>Injuries Resulting From Falls From Scaffolding</p> | <p>Fire</p> <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguishers will be located by work area. ◆ Smoking & open flames are not permitted in work areas. <p>Injuries Resulting From Falls From Scaffolding</p> <ul style="list-style-type: none"> ◆ Scaffolds shall be erected, dismantled, or modified under the supervision of a Competent Person. ◆ Fall protection equipment, full body harness with shock absorbing lanyard & lifelines (when there are no anchorage points), shall be used when erecting scaffold or working from incomplete scaffold. ◆ All scaffolding shall be provided with an access ladder. ◆ Scaffolding greater than four (4) feet high, and less than 45 inches wide in any horizontal dimension, shall be equipped with a standard railing. ◆ No work shall be performed from scaffold during high winds or electrical storms. |
| | <p>Falls from Scaffold</p> | <p>Falls from Scaffold</p> <ul style="list-style-type: none"> ◆ Employees shall not ride rolling scaffolds. Employee will exit the scaffold before moving. ◆ Caster brakes shall be applied at all times, except when scaffold is being moved. ◆ The height of rolling scaffold must not exceed 4 times the smallest base dimension. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Treatment Plant Building Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|--|--|
| | Failure of Scaffold | <p>Failure of Scaffold</p> <ul style="list-style-type: none"> ◆ Scaffolds shall be designed to withstand 4 times the intended load. ◆ At no time shall scaffold loads exceed the manufacturer recommendations. ◆ Lumber used in the construction of scaffolding shall be dressed, straight grained, and free of knots or other defects. ◆ Platform lumber shall be select grade, undressed tested planks. These shall be clearly identified as scaffold platform lumber. ◆ Damaged or excessively rusted scaffold sections shall not be used. |
| | Scaffold Tipping Over or Blowing Over | <p>Scaffold Tipping Over or Blowing Over</p> <ul style="list-style-type: none"> ◆ Scaffold shall be adequately secured to the building at intervals not to exceed 30 feet horizontally and 26 feet vertically. |
| | Material/Tools Falling From Scaffold | <p>Material/Tools Falling From Scaffold</p> <ul style="list-style-type: none"> ◆ Toeboards shall be provided for all scaffolds when personnel are working below. ◆ Personnel shall not access the area below scaffolding. In situations where persons are required to work or pass under scaffolding, a screen between the toeboard and guardrail, or other acceptable barrier, shall be provided. ◆ Only materials being used for work in progress shall be on the scaffolding. |
| | Electric Shock | <p>Electric Shock</p> <ul style="list-style-type: none"> ◆ Scaffold shall not be erected within 15 feet of energized power lines unless Lockout/Tagout is performed or other protective measures such as insulating blankets are used. |
| Construction Work Involving Floor and Wall Openings | Falls From Open Sided Floors of Platforms Greater Than Six (6) Feet | <p>Falls From Open Sided Floors of Platforms Greater Than Six (6) Feet</p> <ul style="list-style-type: none"> ◆ All employees working six (6) feet or more from the ground or next level shall be provided with fall protection 100% of the time. Fall protection shall consist of one of the following: standard railing, warning line system, catch platform, rebar positioning hook, safety monitoring system, or a full body harness equipped with a pig-tail, shock-absorbing lanyard. |
| | Fall Through Unguarded Wall Openings From Which There Is a Drop Of Four (4) Feet or More | <p>Fall Through Unguarded Wall Openings From Which There Is a Drop Of Four (4) Feet or More</p> <ul style="list-style-type: none"> ◆ Wall openings in which the bottom of the opening is less than three (3) feet above the working surface shall be provided with either an intermediate or standard rail. |
| | Materials Or Tools Being Dropped or Knocked Through Wall Openings | <p>Materials Or Tools Being Dropped or Knocked Through Wall Openings</p> <ul style="list-style-type: none"> ◆ Wall openings from which the bottom is less than four (4) inches above the working surface shall be provided with a standard toeboard or protective screen. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Treatment Plant Building Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-----------------------|--|---|
| | Falls Through Unguarded Floor Openings or Holes | <p>Falls Through Unguarded Floor Openings or Holes</p> <ul style="list-style-type: none"> ◆ All floor openings or holes shall be guarded by either a standard railing or a floor opening cover capable of supporting, without failure, at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time and secured to guard against displacement and marked "Danger – Hole Cover". |
| Steel Erection | <p>Fall From A Runway Four (4) Feet or More Above Ground Level</p> <p>Falls From Structural Steel During Erection Activities</p> | <p>Fall From A Runway Four (4) Feet or More Above Ground Level</p> <ul style="list-style-type: none"> ◆ Runways shall be guarded by standard railings on all open sides. ◆ Falls From Structural Steel During Erection Activities <ul style="list-style-type: none"> ◆ 100% fall protection over six (6) feet or within six (6) feet of an unprotected edge, shall be required for employees erecting steel. Fall protection shall consist of one or more of the following: standard railing, warning line system, catch platform, rebar positioning hook, safety monitoring system, or a full body harness equipped with a pig-tail, shock-absorbing lanyard. |
| | Equipment or Materials Falling From Overhead | <p>Equipment or Materials Falling From Overhead</p> <ul style="list-style-type: none"> ◆ Containers shall be provided for storing and carrying bolts, rivets and other fasteners. These containers shall be secured against accidental displacement. ◆ Impact wrenches shall be provided with locking devices to retain the sockets. ◆ When bolts, rivets, or drift pins are being knocked-out, a means shall be provided to prevent them from falling. |
| | Collapse of Structure During Erection | <p>Collapse of Structure During Erection</p> <ul style="list-style-type: none"> ◆ During placement of solid web structural members, the load shall not be released from the hoisting line until the member is secured with not less than two wrench tight bolts, or the equivalent at each connection. ◆ During erection, structural steel members shall be braced to resist horizontal forces such as wind. ◆ At no time shall there be more than two floors or 24 vertical feet of unfinished bolting or welding above the uppermost permanently secured floor. ◆ No open web joist shall be placed on any structural steel framework until the framework is safely bolted or welded. ◆ Loads shall not be placed on unsecured open web joist. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|---|---|
| Steel Members Swinging Into Employees or Other Structures | Steel Members Swinging Into Employees or Other Structures | <ul style="list-style-type: none"> ◆ Tag line(s) shall be required on all loads unless tag lines create a safety hazard, (i.e., dragging on a high voltage line, critical valves, becoming stuck on rebar, causing a tripping hazard for personnel walking a load, etc.). Use as many tag lines as necessary to adequately control the load. ◆ Personnel shall not place hands on load until it is at least shoulder height and arm is kept fully extended. If area of placement is congested and if sudden load shift would trap personnel between loads and other objects shoulder method shall not be used (only taglines; until load is within 1 foot of ground or cribbing). |
| Lift Slab Construction | Falls From Temporary Floors | <ul style="list-style-type: none"> ◆ Falls From Temporary Floors ◆ Temporary flooring shall be secured to prevent accidental displacement. |
| | Failure of Lift Slab Operations | <ul style="list-style-type: none"> ◆ Failure of Lift Slab Operations ◆ Lift Slab operations shall be designed & planned by a registered professional engineer who is competent in lift slab construction. |
| | Injuries to Employees During Failed Lift | <ul style="list-style-type: none"> ◆ Injuries to Employees During Failed Lift ◆ Only essential workers shall be allowed in the immediate area of the building or structure being lifted. |
| Use of Hand and Power Tools | Contusions, Abrasions, Cuts & Amputations | <ul style="list-style-type: none"> ◆ Contusions, Abrasions, Cuts & Amputations ◆ Tools shall be inspected quarterly and prior to use. ◆ All power tools originally equipped with a safety guard of any type shall only be used with the guard in place and functioning properly. ◆ Defective tools shall be tagged and removed from service. ◆ Tools shall be used only for their intended purpose. ◆ Electric tools shall be unplugged when changing attachments or performing maintenance. ◆ Pneumatic tools shall be disconnected and air pressure released before repair or adjustments are made. ◆ Sections of air hoses that are not equipped with quick release fittings shall be secured together with a safety chain or tie. |
| | Electric Shock | <ul style="list-style-type: none"> ◆ Electric Shock ◆ Electric tools with missing ground prongs, or cut or frayed cords shall be removed from service. ◆ Electric tools used in highly conductive locations, such as where the employee may contact water, shall be approved for use in those locations. ◆ Power for portable electric tools shall be supplied from a GFCI receptacle. ◆ Electrical tools must be grounded, except tools that are equipped with double insulation. ◆ Electric tools shall not be used in hazardous locations such as flammable or explosive atmospheres unless they are approved for such locations. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Treatment Plant Building Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|--|--|
| Burns | Burns | <ul style="list-style-type: none"> ◆ Fuel powered tools (generators, tamps, pumps, etc.) shall be turned off and allowed to cool down three (3) minutes prior to refueling. |
| Burns From Welding Iron used in water stop application | Burns From Welding Iron used in water stop application | <ul style="list-style-type: none"> ◆ Be aware of hand positioning when using the welding iron. ◆ Leather gloves shall be worn during use of welding iron. ◆ When leaving iron unattended, caution flagging shall be placed around area to warn other employees. |
| Crushing Injuries | Crushing Injuries | <ul style="list-style-type: none"> ◆ The rated capacity of hydraulic jacks shall not be exceeded. |
| Asphyxiation | Asphyxiation | <ul style="list-style-type: none"> ◆ The use of fuel powered tools in confined spaces shall be monitored. |
| Puncture Wounds | Puncture Wounds | <ul style="list-style-type: none"> ◆ When using powder actuated tools the user shall guard against firing through the material. Individuals must be trained on the use of powder actuated tools. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--------------------------------|----------------------------------|---|
| <p>Crane Operations</p> | <p>Operator Error</p> | <p>Operator Error</p> <ul style="list-style-type: none"> ◆ Cranes shall only be operated by qualified operators or trainees under the direct supervision of a qualified supervisor. ◆ The operator shall use the crane in accordance with the manufacturer's operating instructions. ◆ Operators shall be in constant visual or radio contact with signal-person(s) before and during every lift. ◆ The operator of the crane will sound an air-horn to warn personnel prior to having a load pass over the building area that is under construction. ◆ Operators shall consider the total weight of the lift and the capacity of the crane, and be able to accurately use load and lift charts provided by the crane manufacturer. If in the judgment of the operator, a load will approach the cranes capacity in a particular configuration, the operator's supervisor is responsible for providing the operator with the actual or calculated weight of the load. Total load shall include all rigging and equipment below the hook. Note: Weather loading (i.e., ice buildup). ◆ Operators shall not leave the control station of a crane during a lift or pick, except under the following conditions: <ul style="list-style-type: none"> • The load is lowered or raised to a safe landing area and fully supported with no tension on the load line. • After positioning all brakes, pawls, switches, or clutches in a safe position, to turn the crane over to another qualified operator. • When required to do so by an approved emergency procedure. ◆ The equipment operator shall not engage any by-pass, override, or otherwise disable any crane safety feature. |
| | <p>Crane Failure During Lift</p> | <p>Crane Failure During Lift</p> <ul style="list-style-type: none"> ◆ All applicable inspections shall be performed on cranes by a qualified inspector following manufacturer's recommendations and specifications. ◆ No modifications shall be made to any crane without the prior written approval of the manufacturer. ◆ Crane load charts and the operator's manual shall be posted in the cab of every crane. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|---|--|
| | Crane Instability | <p>Crane Instability</p> <ul style="list-style-type: none"> ◆ Cranes equipped with outriggers shall have outriggers fully extended or as allowed by manufacturer's instructions and set on firm footings before every lift. If setting outriggers on soft surfaces or over buried pipe cannot be avoided, oak blocking should be used under the outrigger loads to distribute the crane loads over sufficient area to ensure crane stability. If outriggers are utilized, tires must not be in contact with the ground. The crane shall be level within 1% of the grade. |
| | Contact With the Crane or Load During Operation | <p>Contact With the Crane or Load During Operation</p> <ul style="list-style-type: none"> ◆ The swing radius of the crane counterweight shall be flagged or barricaded. Employees shall not get on or off a crane while it is in motion. Adjustments, repairs, or lubrication shall not be permitted on moving equipment unless it is required by manufacturer's recommendations. Tool boxes, oil cans, sling racks, water coolers, or other items shall not be placed within the swing radius of the counterweight. The oiler, where required, shall stand clear of the swing radius and assist the operator in keeping other employees outside the swing radius. ◆ Note: Cranes with the counterweight located higher than 8 feet above the surrounding personnel access level need not be guarded unless a platform or other circumstance would allow personnel to be struck or crushed by the rotating counterweight. Guy wires within the swing radius of the crane or load shall be marked with highly visible flagging or rope. ◆ Personnel shall not stand, pass or place any body part under a suspended load. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---------------------------------|---|--|
| | <p>Contact With Energized Power Lines of Work Near Critical Systems or Piping</p> | <p>Contact With Energized Power Lines of Work Near Critical Systems or Piping</p> <ul style="list-style-type: none"> ◆ The Project Superintendent, SHSO, and Rigging Supervisor shall evaluate if any part of the hoisting equipment or load: ◆ Could approach 15 feet of 50 to 200 kV overhead electrical distribution and transmission lines. ◆ Are within 15 feet of 50 to 200 kV overhead electrical distribution and transmission lines. ◆ Is near transmitter towers where an electrical charge can be induced in the equipment or load. ◆ The maximum achievable boom length and 360 degree boom rotation shall be assumed when making the above clearance determinations. <p>Notes:</p> <ul style="list-style-type: none"> ◆ Lines shall be considered energized unless the person owning such line or the Project Superintendent verifies that it is not an energized line. ◆ Lines having long spans tend to move laterally and vertically due to wind and this potential must be considered in determining minimum clearance. ◆ For minimum allowable distance to distribution and transmission lines with voltages greater than 200 kV, refer to 29 CFR 1926.550(a)(15)(ii). |
| Critical Lifts | Critical Lifts | <p>Critical Lifts</p> <ul style="list-style-type: none"> ◆ A written Critical Lift Plan shall be developed specifying job details and special safety measures. |
| Crane Being Struck by Lightning | Crane Being Struck by Lightning | <p>Crane Being Struck by Lightning</p> <ul style="list-style-type: none"> ◆ Crane operations shall cease when dangerous weather is imminent. |
| Load Instability | Load Instability | <p>Load Instability</p> <ul style="list-style-type: none"> ◆ Tag line(s) shall be required on all loads unless tag lines create a safety hazard, (i.e., dragging on a high voltage line, critical valves, becoming stuck on rebar, causing a tripping hazard for personnel walking a load, etc.). Use as many tag lines as necessary to adequately control the load. ◆ The load shall be safely landed (supported) and determined to be stable before workers are permitted to approach the load. ◆ Crane operations shall cease if wind loading becomes questionable due to wind direction or velocity, boom length, boom angle, or size or weight of load. |
| Fire on Crane | Fire on Crane | <p>Fire on Crane</p> <ul style="list-style-type: none"> ◆ An accessible fire extinguisher with a minimum 10ABC rating shall be provided on every crane. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Treatment Plant Building Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|------------------------------------|--|---|
| <p>Hoisting and Rigging</p> | <p>Failure of Slings, Chains, Chokers, or Other Hoisting & Rigging Equipment</p> | <p>Failure of Slings, Chains, Chokers, or Other Hoisting & Rigging Equipment</p> <ul style="list-style-type: none"> ◆ All hoisting and rigging equipment shall be inspected for excessive wear and defects prior to, during, and after each use. ◆ Hoisting and rigging equipment shall not be loaded in excess of its safe working load limit (WLL). |
| | <p>Defective or Unsafe Hoisting And Rigging Equipment Being Used On The Job Site</p> | <p>Defective or Unsafe Hoisting And Rigging Equipment Being Used On The Job Site</p> <ul style="list-style-type: none"> ◆ Job or shop hooks and links, or makeshift devices, formed from bolts, rods, etc., or other such attachments shall not be used. ◆ Only equipment designed for hoisting and rigging shall be used in hoisting and rigging operations. ◆ Wire rope shall not be secured by knots. |
| | <p>Failure of Custom Lifting Devices</p> | <p>Failure of Custom Lifting Devices</p> <ul style="list-style-type: none"> ◆ Custom lifting devices shall be marked with the safe working load limit. ◆ Custom lifting devices shall have a documented proof test prior to initial use and PE stamp. |
| | <p>Slings or Shackles Coming Loose From Hooks</p> | <p>Slings or Shackles Coming Loose From Hooks</p> <ul style="list-style-type: none"> ◆ Hooks used for hoisting and rigging operations shall be provided with safety latches. |
| | <p>Unqualified Persons Performed Rigging Activities</p> | <p>Unqualified Persons Performed Rigging Activities</p> <ul style="list-style-type: none"> ◆ Only trained and qualified persons shall engage in rigging and signaling activities. |
| | <p>Unforeseen Problems During A Lift</p> | <p>Unforeseen Problems During A Lift</p> <ul style="list-style-type: none"> ◆ Every employee involved in lifting operations shall have the authority to stop a lift if any condition or situation occurs that could affect the safety or success of the lift. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Treatment Plant Building Construction

Location: Bethpage, NY

| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
|--|---|---|
| 1. Heavy Equipment | 1. Initial inspection will be conducted prior to use. | 1. Hydraulic license for operators is required. |
| 2. Fire Extinguishers | 2. Monthly inspections will be performed. | 2. Personnel will be given instructions on proper use of fire extinguishers. |
| 3. PID and CGI/O2 meter | 3. Pre and Post Calibration/system checks will be performed daily. | 3. Proficiency training for users will be given. |
| 4. PPE (coveralls, tyvek, full faced masks, booties, steel toe boots, hard hats, safety glasses, leather or Kevlar gloves, ear plugs or ear muffs and SCBA units). | 4. An initial inspection of each lot of PPE will be performed. SCBA units will be inspected prior to each confined space entry. | 4. Personnel will be given training on proper donning/doffing procedures. Personnel will be given proficiency training for all potential users of SCBA units. |
| 5. First Aid Kits | 5. Daily safety & weekly inspections will be performed. | 5. Personnel with first aid & CPR training will be identified. Bloodborne pathogen training will be reviewed with CPR & first aid trained employees. |
| 6. Diesel Fuel/Oil & Other Potentially Hazardous Materials | 6. Daily safety inspection of storage & use areas will be conducted. | 6. Hazard communication training will be given. |
| 7. Spill Control Materials | 7. Daily safety inspection of spill control materials will be conducted. | 7. Personnel will be given training on how to respond to spilled materials. |
| 8. Chains, Slings or Ropes | 8. Inspections prior to each use will be conducted. | 8. Personnel will be trained on proper inspection & use of chains, slings & ropes. |
| 9. Hand Tools (e.g., hammers) | 9. Initial inspections will be conducted prior to use. | 9. Personnel will be given training on the safety procedures associated with hand tools. |
| 10. Augers & Fence Post Drivers | 10. Initial inspections will be conducted prior to use. | 10. Proficiency training will be given. |
| 11. Safety Cans | 11. Daily safety inspections of storage & use areas will be performed. | 11. Use & storage procedures will be reviewed. |
| 12. Concrete Trucks | 12. Initial inspections will be conducted prior to use. | 12. Proficiency training will be conducted. |
| 13. Concrete Vibrators | 13. Initial inspections will be conducted prior to use. | 13. Proficiency training will be conducted. |
| 14. GFIs | 14. Monthly inspections will be performed. | 14. Personnel will be instructed on proper use of GFIs. |
| 15. Extension Cords | 15. Monthly inspections will be performed. | 15. Personnel will be instructed on proper use of extension cords. |
| 16. Ladders | 16. Monthly inspections will be performed. | 16. Personnel will be instructed on proper use of ladders. |

ACTIVITY HAZARD ANALYSES

| MAJOR STEPS | | POTENTIAL HAZARDS | | PROTECTIVE MEASURES/CONTROLS | |
|--|---|--|--|------------------------------|--|
| Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP Activity: Treatment Building Systems Installation | | Location: <u>Bethpage, NY</u> | | | |
| Potable Water Service Hook-Up | Slip, Trip and Fall | Slip, Trip and Falls <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. | Contusions, Abrasions, Cuts & Amputations <ul style="list-style-type: none"> ◆ Tools shall be inspected quarterly and prior to use. ◆ All power tools originally equipped with a safety guard of any type shall only be used with the guard in place and functioning properly. ◆ Defective tools shall be tagged and removed from service. ◆ Tools shall be used only for their intended purpose. ◆ Electric tools shall be unplugged when changing attachments or performing maintenance. ◆ Pneumatic tools shall be disconnected and air pressure released before repair or adjustments are made. ◆ Sections of air hoses that are not equipped with quick release fittings shall be secured together with a safety chain or tie. | | |
| Use of Hand and Power Tools | Contusions, Abrasions, Cuts & Amputations | Contusions, Abrasions, Cuts & Amputations <ul style="list-style-type: none"> ◆ Tools shall be inspected quarterly and prior to use. ◆ All power tools originally equipped with a safety guard of any type shall only be used with the guard in place and functioning properly. ◆ Defective tools shall be tagged and removed from service. ◆ Tools shall be used only for their intended purpose. ◆ Electric tools shall be unplugged when changing attachments or performing maintenance. ◆ Pneumatic tools shall be disconnected and air pressure released before repair or adjustments are made. ◆ Sections of air hoses that are not equipped with quick release fittings shall be secured together with a safety chain or tie. | | | |
| Piping Installation | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. | Chemical Contact <ul style="list-style-type: none"> ◆ Review the MSDS for the proper PPE to be worn when handling the chemicals (e.g., pipe cement) used for connecting piping. ◆ Wash any exposed skin that may have contacted pipe cement; wash hands before hand to mouth activities. | | |
| | Chemical Contact | Chemical Contact <ul style="list-style-type: none"> ◆ Review the MSDS for the proper PPE to be worn when handling the chemicals (e.g., pipe cement) used for connecting piping. ◆ Wash any exposed skin that may have contacted pipe cement; wash hands before hand to mouth activities. | | | |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1). ◆ All wire ropes, chains & slings will be rated for the load that it is expected to lift. ◆ All lifting materials will be inspected at the beginning of each work shift and prior to each use. Defective equipment will be tagged and taken out of service. ◆ All ground personnel will stay clear of all suspended loads. | | | |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Treatment Building Systems Installation

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|----------------------------|---|
| <p>Plumbing Installation</p> | <p>Slip, Trip and Fall</p> | <p>Slip, Trip and Fall</p> <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-I Section 21 and 29 CFR 1926.500. |
| <p>Heating, Ventilation & Air Conditioning System Installation</p> | <p>Back Injuries</p> | <p>Back Injuries</p> <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. <p>Back Injuries</p> <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Treatment Building Systems Installation

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-----------------------------|---------------------|--|
| | Slip, Trip and Fall | Slip, Trip and Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-1 Section 21 and 29 CFR 1926.500. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1). ◆ All wire ropes, chains & slings will be rated for the load that it is expected to lift. ◆ All lifting materials will be inspected at the beginning of each work shift and prior to each use. Defective equipment will be tagged and taken out of service. ◆ All ground personnel will stay clear of all suspended loads. |
| Sanitary Sewer Installation | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---------------------|---|
| | Slip, Trip and Fall | <p>Slip, Trip and Fall</p> <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-1 Section 21 and 29 CFR 1926.500. |
| | Overhead Hazards | <p>Overhead Hazards</p> <ul style="list-style-type: none"> ◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1). ◆ All wire ropes, chains & slings will be rated for the load that it is expected to lift. ◆ All lifting materials will be inspected at the beginning of each work shift and prior to each use. Defective equipment will be tagged and taken out of service. ◆ All ground personnel will stay clear of all suspended loads. |
| <p>Fire Detection, Alarm & Monitoring System Installation</p> | Back Injuries | <p>Back Injuries</p> <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---------------------|--|
| | Slip, Trip and Fall | Slip, Trip and Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-J Section 21 and 29 CFR 1926.500. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1). ◆ All wire ropes, chains & slings will be rated for the load that it is expected to lift. ◆ All lifting materials will be inspected at the beginning of each work shift and prior to each use. Defective equipment will be tagged and taken out of service. ◆ All ground personnel will stay clear of all suspended loads. |
| Security Alarm & Monitoring System Installation | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|---------------------|---|
| | Slip, Trip and Fall | <p>Slip, Trip and Fall</p> <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-1 Section 21 and 29 CFR 1926.500. |

Project: GM-58 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Treatment Building Systems Installation

Location: Bethpage, NY

| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
|---|--|--|
| 1. Heavy Equipment | 1. Initial inspection will be conducted prior to use. | 1. Only qualified equipment operators will be used. |
| 2. Fire Extinguishers | 2. Monthly inspections will be performed. | 2. Personnel will be given instructions on proper use of fire extinguishers. |
| 3. PID, and CGI/O2 meter | 3. Pre and Post Calibration/system checks will be performed daily. | 3. Proficiency training for users will be given. |
| 4. PPE (coveralls, tyvek, full faced masks, booties, steel toe boots, hard hats, safety glasses, leather or Kevlar gloves, ear plugs or ear muffs). | 4. An initial inspection of each lot of PPE will be performed. | 4. Personnel will be given training on proper donning/doffing procedures. |
| 5. First Aid Kits | 5. Daily safety & weekly inspections will be performed. | 5. Personnel with first aid & CPR training will be identified. Bloodborne pathogen training will be reviewed with CPR & first aid trained employees. |
| 6. Diesel Fuel/Oil & Other Potentially Hazardous Materials | 6. Daily safety inspection of storage & use areas will be conducted. | 6. Hazard communication training will be given. |
| 7. Spill Control Materials | 7. Daily safety inspection of spill control materials will be conducted. | 7. Personnel will be given training on how to respond to spilled materials. |
| 8. Chains, Slings or Ropes | 8. Inspections prior to each use will be conducted. | 8. Personnel will be trained on proper inspection & use of chains, slings & ropes. |
| 9. Hand Tools (e.g., wrenches, hammers) | 9. Initial inspections will be conducted prior to use. | 9. Personnel will be given training on the safety procedures associated with hand tools. |
| 10. Safety Cans | 10. Daily safety inspections of storage & use areas will be performed. | 10. Use & storage procedures will be reviewed. |
| 11. Extension Cords | 11. Monthly inspections will be performed. | 11. Personnel will be instructed on proper use of extension cords. |
| 12. Ladders | 12. Monthly inspections will be performed. | 12. Personnel will be instructed on proper use of ladders. |
| 13. Torches, welders and grinders | 13. Initial inspections will be conducted prior to use. | 13. Proficiency training for users will be given. |
| 14. Powered Tools | 14. Initial inspections will be conducted prior to use. | 14. Personnel will be given training on the safety procedures associated with powered tools. |
| 15. Man Lifts/Scissor Lifts | 15. Initial inspections will be conducted prior to use. | 15. Personnel will be instructed on fall protection requirements. |
| 16. Full-Body Harnesses and Lanyards | 16. Initial inspections will be conducted prior to use. | 16. Personnel will be trained on proper use of full-body harnesses and lanyards. |
| 17. GFCLs | 17. Monthly inspections will be performed. | 17. Personnel will be instructed on proper use of GFCLs. |

ACTIVITY HAZARD ANALYSIS

| Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP Activity: Extraction System Construction | | Location: <u>Bethpage, NY</u> |
|--|---|--|
| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
| Installation of Pipe and Electrical Conduit | Back Injuries Slip, Trip and Fall | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. Slip, Trip and Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. |
| | Contusions, Abrasions, Cuts & Amputations | Contusions, Abrasions, Cuts & Amputations <ul style="list-style-type: none"> ◆ Tools shall be inspected quarterly and prior to use. ◆ All power tools originally equipped with a safety guard of any type shall only be used with the guard in place and functioning properly. ◆ Defective tools shall be tagged and removed from service. ◆ Tools shall be used only for their intended purpose. ◆ Electric tools shall be unplugged when changing attachments or performing maintenance. ◆ Pneumatic tools shall be disconnected and air pressure released before repair or adjustments are made. ◆ Sections of air hoses that are not equipped with quick release fittings shall be secured together with a safety chain or tie. |
| Installation of Well Vaults and Associated Piping, Instrumentation and Pumps | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| | Slip, Trip and Fall | Slip, Trip and Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--------------------------------|----------------------------------|--|
| <p>Crane Operations</p> | <p>Operator Error</p> | <p>Operator Error</p> <ul style="list-style-type: none"> ◆ Cranes shall only be operated by qualified operators or trainees under the direct supervision of a qualified supervisor. ◆ The operator shall use the crane in accordance with the manufacturer's operating instructions. ◆ Operators shall be in constant visual or radio contact with signal-person(s) before and during every lift. ◆ The operator of the crane will sound an air-horn to warn personnel prior to having a load pass over the building area that is under construction. ◆ Operators shall consider the total weight of the lift and the capacity of the crane, and be able to accurately use load and lift charts provided by the crane manufacturer. If in the judgment of the operator, a load will approach the cranes capacity in a particular configuration, the operator's supervisor is responsible for providing the operator with the actual or calculated weight of the load. Total load shall include all rigging and equipment below the hook. ◆ Operators shall not leave the control station of a crane during a lift or pick, except under the following conditions: <ul style="list-style-type: none"> • The load is lowered or raised to a safe landing area and fully supported with no tension on the load line. • After positioning all brakes, pawls, switches, or clutches in a safe position, to turn the crane over to another qualified operator. • When required to do so by an approved emergency procedure. ◆ The equipment operator shall not engage any by-pass, override, or otherwise disable any crane safety feature. |
| | <p>Crane Failure During Lift</p> | <p>Crane Failure During Lift</p> <ul style="list-style-type: none"> ◆ All applicable inspections shall be performed on cranes by a qualified inspector following manufacturer's recommendations and specifications. ◆ No modifications shall be made to any crane without the prior written approval of the manufacturer. ◆ Crane load charts and the operator's manual shall be posted in the cab of every crane. |
| | <p>Crane Instability</p> | <p>Crane Instability</p> <ul style="list-style-type: none"> ◆ Cranes equipped with outriggers shall have outriggers fully extended or as allowed by manufacturer's instructions and set on firm footings before every lift. If setting outriggers on soft surfaces or over buried pipe cannot be avoided, oak blocking should be used under the outrigger loads to distribute the crane loads over sufficient area to ensure crane stability. If outriggers are utilized, tires must not be in contact with the ground. The crane shall be level within 1% of the grade. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Extraction System Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|---|--|
| | <p>Contact With the Crane or Load During Operation</p> | <p>Contact With the Crane or Load During Operation</p> <ul style="list-style-type: none"> ◆ The swing radius of the crane counterweight shall be flagged or barricaded. Employees shall not get on or off a crane while it is in motion. Adjustments, repairs, or lubrication shall not be permitted on moving equipment unless it is required by manufacturer's recommendations. Tool boxes, oil cans, sling racks, water coolers, or other items shall not be placed within the swing radius of the counterweight. The oiler, where required, shall stand clear of the swing radius and assist the operator in keeping other employees outside the swing radius. ◆ Note: Cranes with the counterweight located higher than 8 feet above the surrounding personnel access level need not be guarded unless a platform or other circumstance would allow personnel to be struck or crushed by the rotating counterweight. Guy wires within the swing radius of the crane or load shall be marked with highly visible flagging or rope. ◆ Personnel shall not stand, pass or place any body part under a suspended load. |
| | <p>Contact With Energized Power Lines of Work Near Critical Systems or Piping</p> | <p>Contact With Energized Power Lines of Work Near Critical Systems or Piping</p> <ul style="list-style-type: none"> ◆ The Project Superintendent, SHSO, and Rigging Supervisor shall evaluate if any part of the hoisting equipment or load: ◆ Could approach 15 feet of 50 to 200 kV overhead electrical distribution and transmission lines. ◆ Are within 15 feet of 50 to 200 kV overhead electrical distribution and transmission lines. ◆ Is near transmitter towers where an electrical charge can be induced in the equipment or load. ◆ The maximum achievable boom length and 360 degree boom rotation shall be assumed when making the above clearance determinations. <p>Notes:</p> <ul style="list-style-type: none"> • Lines shall be considered energized unless the person owning such line or the Project Superintendent verifies that it is not an energized line. • Lines having long spans tend to move laterally and vertically due to wind and this potential must be considered in determining minimum clearance. • For minimum allowable distance to distribution and transmission lines with voltages greater than 200 kV, refer to 29 CFR 1926.550(a)(15)(ii). |
| | <p>Critical Lifts</p> | <p>Critical Lifts</p> <ul style="list-style-type: none"> ◆ A written Critical Lift Plan shall be developed specifying job details and special safety measures. |
| | <p>Crane Being Struck by Lightning</p> | <ul style="list-style-type: none"> ◆ Crane Being Struck by Lightning. ◆ Crane operations shall cease when dangerous weather is imminent. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---|---|
| | Load Instability | <p>Load Instability</p> <ul style="list-style-type: none"> ◆ Tag line(s) shall be required on all loads unless tag lines create a safety hazard, (i.e., dragging on a high voltage line, critical valves, becoming stuck on rebar, causing a tripping hazard for personnel walking a load, etc.). Use as many tag lines as necessary to adequately control the load. ◆ The load shall be safely landed (supported) and determined to be stable before workers are permitted to approach the load. ◆ Crane operations shall cease if wind loading becomes questionable due to wind direction or velocity, boom length, boom angle, or size or weight of load. |
| | Fire on Crane | <p>Fire on Crane</p> <ul style="list-style-type: none"> ◆ An accessible fire extinguisher with a minimum 10ABC rating shall be provided on every crane. |
| Installation of Electrical Components | Back Injuries | <p>Back Injuries</p> <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| | Slip, Trip and Fall | <p>Slip, trip and fall</p> <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. |
| Use of Hand and Power Tools | Contusions, Abrasions, Cuts & Amputations | <p>Contusions, Abrasions, Cuts & Amputations</p> <ul style="list-style-type: none"> ◆ Tools shall be inspected quarterly and prior to use. ◆ All power tools originally equipped with a safety guard of any type shall only be used with the guard in place and functioning properly. ◆ Defective tools shall be tagged and removed from service. ◆ Tools shall be used only for their intended purpose. ◆ Electric tools shall be unplugged when changing attachments or performing maintenance. ◆ Pneumatic tools shall be disconnected and air pressure released before repair or adjustments are made. ◆ Sections of air hoses that are not equipped with quick release fittings shall be secured together with a safety chain or tie. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Extraction System Construction

Location: Bethpage, NY

| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
|---|--|--|
| 1. Heavy Equipment | 1. Initial inspection will be conducted prior to use. | 1. Only qualified equipment operators will be used. |
| 2. Fire Extinguishers | 2. Monthly inspections will be performed. | 2. Personnel will be given instructions on proper use of fire extinguishers. |
| 3. PID, and CGI/O2 meter | 3. Pre and Post Calibration/system checks will be performed daily. | 3. Proficiency training for users will be given. |
| 4. PPE (coveralls, tyvek, full faced masks, booties, steel toe boots, hard hats, safety glasses, leather or Kevlar gloves, ear plugs or ear muffs). | 4. An initial inspection of each lot of PPE will be performed. | 4. Personnel will be given training on proper donning/doffing procedures. |
| 5. First Aid Kits | 5. Daily safety & weekly inspections will be performed. | 5. Personnel with first aid & CPR training will be identified. Bloodborne pathogen training will be reviewed with CPR & first aid trained employees. |
| 6. Diesel Fuel/Oil & Other Potentially Hazardous Materials | 6. Daily safety inspection of storage & use areas will be conducted. | 6. Hazard communication training will be given. |
| 7. Spill Control Materials | 7. Daily safety inspection of spill control materials will be conducted. | 7. Personnel will be given training on how to respond to spilled materials. |
| 8. Chains, Slings or Ropes | 8. Inspections prior to each use will be conducted. | 8. Personnel will be trained on proper inspection & use of chains, slings & ropes. |
| 9. Hand Tools (e.g., hammers) | 9. Initial inspections will be conducted prior to use. | 9. Personnel will be given training on the safety procedures associated with hand tools. |
| 10. Augers & Fence Post Drivers | 10. Initial inspections will be conducted prior to use. | 10. Proficiency training will be given. |
| 11. Safety Cans | 11. Daily safety inspections of storage & use areas will be performed. | 11. Use & storage procedures will be reviewed. |
| 12. Concrete Trucks | 12. Initial inspections will be conducted prior to use. | 12. Proficiency training will be conducted. |
| 13. Concrete Vibrators | 13. Initial inspections will be conducted prior to use. | 13. Proficiency training will be conducted. |
| 14. GFIs | 14. Monthly inspections will be performed. | 14. Personnel will be instructed on proper use of GFIs. |
| 15. Extension Cords | 15. Monthly inspections will be performed. | 15. Personnel will be instructed on proper use of extension cords. |
| 16. Ladders | 16. Monthly inspections will be performed. | 16. Personnel will be instructed on proper use of ladders. |

ACTIVITY HAZARD ANALYSIS

| Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP Activity: Groundwater Injection System Construction | | Location: Bethpage, NY |
|---|---------------------------|--|
| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
| Crane Operations | Operator Error | Operator Error <ul style="list-style-type: none"> ◆ Cranes shall only be operated by qualified operators or trainees under the direct supervision of a qualified supervisor. ◆ The operator shall use the crane in accordance with the manufacturer's operating instructions. ◆ Operators shall be in constant visual or radio contact with signal-person(s) before and during every lift. ◆ The operator of the crane will sound an air-horn to warn personnel prior to having a load pass over the building area that is under construction. ◆ Operators shall consider the total weight of the lift and the capacity of the crane, and be able to accurately use load and lift charts provided by the crane manufacturer. If in the judgment of the operator, a load will approach the cranes capacity in a particular configuration, the operator's supervisor is responsible for providing the operator with the actual or calculated weight of the load. Total load shall include all rigging and equipment below the hook. Note: Weather loading (i.e., ice buildup). ◆ Operators shall not leave the control station of a crane during a lift or pick, except under the following conditions: <ul style="list-style-type: none"> • The load is lowered or raised to a safe landing area and fully supported with no tension on the load line. • After positioning all brakes, pawls, switches, or clutches in a safe position, to turn the crane over to another qualified operator. • When required to do so by an approved emergency procedure. ◆ The equipment operator shall not engage any by-pass, override, or otherwise disable any crane safety feature. |
| Crane Failure During Lift | Crane Failure During Lift | Crane Failure During Lift <ul style="list-style-type: none"> ◆ All applicable inspections shall be performed on cranes by a qualified inspector following manufacturer's recommendations and specifications. ◆ No modifications shall be made to any crane without the prior written approval of the manufacturer. ◆ Crane load charts and the operator's manual shall be posted in the cab of every crane. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Groundwater Injection System Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|---|--|
| | Crane Instability | <p>Crane Instability</p> <ul style="list-style-type: none"> ◆ Cranes equipped with outriggers shall have outriggers fully extended or as allowed by manufacturer's instructions and set on firm footings before every lift. If setting outriggers on soft surfaces or over buried pipe cannot be avoided, oak blocking should be used under the outrigger loads to distribute the crane loads over sufficient area to ensure crane stability. If outriggers are utilized, tires must not be in contact with the ground. The crane shall be level within 1% of the grade. |
| | Contact With the Crane or Load During Operation | <p>Contact With the Crane or Load During Operation</p> <ul style="list-style-type: none"> ◆ The swing radius of the crane counterweight shall be flagged or barricaded. Employees shall not get on or off a crane while it is in motion. Adjustments, repairs, or lubrication shall not be permitted on moving equipment unless it is required by manufacturer's recommendations. Tool boxes, oil cans, sling racks, water coolers, or other items shall not be placed within the swing radius of the counterweight. The oiler, where required, shall stand clear of the swing radius and assist the operator in keeping other employees outside the swing radius. ◆ Note: Cranes with the counterweight located higher than 8 feet above the surrounding personnel access level need not be guarded unless a platform or other circumstance would allow personnel to be struck or crushed by the rotating counterweight. Guy wires within the swing radius of the crane or load shall be marked with highly visible flagging or rope. ◆ Personnel shall not stand, pass or place any body part under a suspended load. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Groundwater Injection System Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---------------------------------|---|--|
| | <p>Contact With Energized Power Lines of Work Near Critical Systems or Piping</p> | <p>Contact With Energized Power Lines of Work Near Critical Systems or Piping</p> <ul style="list-style-type: none"> ◆ The Project Superintendent, SHSO, and Rigging Supervisor shall evaluate if any part of the hoisting equipment or load: <ul style="list-style-type: none"> • Could approach 15 feet of 50 to 200 kV overhead electrical distribution and transmission lines. • Are within 15 feet of 50 to 200 kV overhead electrical distribution and transmission lines. • Is near transmitter towers where an electrical charge can be induced in the equipment or load. ◆ The maximum achievable boom length and 360 degree boom rotation shall be assumed when making the above clearance determinations. <p>Notes:</p> <ul style="list-style-type: none"> • Lines shall be considered energized unless the person owning such line or the Project Superintendent verifies that it is not an energized line. • Lines having long spans tend to move laterally and vertically due to wind and this potential must be considered in determining minimum clearance. • For minimum allowable distance to distribution and transmission lines with voltages greater than 200 kV, refer to 29 CFR 1926.550(a)(15)(ii). |
| Critical Lifts | | <p>Critical Lifts</p> <ul style="list-style-type: none"> ◆ A written Critical Lift Plan shall be developed specifying job details and special safety measures. |
| Crane Being Struck by Lightning | | <p>Crane Being Struck by Lightning</p> <ul style="list-style-type: none"> ◆ Crane operations shall cease when dangerous weather is imminent. |
| Load Instability | | <p>Load Instability</p> <ul style="list-style-type: none"> ◆ Tag line(s) shall be required on all loads unless tag lines create a safety hazard, (i.e., dragging on a high voltage line, critical valves, becoming stuck on rebar, causing a tripping hazard for personnel walking a load, etc.). Use as many tag lines as necessary to adequately control the load. ◆ The load shall be safely landed (supported) and determined to be stable before workers are permitted to approach the load. ◆ Crane operations shall cease if wind loading becomes questionable due to wind direction or velocity, boom length, boom angle, or size or weight of load. |
| Fire on Crane | | <p>Fire on Crane</p> <ul style="list-style-type: none"> ◆ An accessible fire extinguisher with a minimum 10BC rating shall be provided on every crane. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-----------------------------|---|---|
| Install New Injection Wells | Struck By/Against/ Caught By Underground Hazards | Struck By/Against/ Caught By <ul style="list-style-type: none"> ◆ No loose clothing, gauntlet-type gloves, rings, or watches will be worn by personnel operating drill rig. Underground Hazards <ul style="list-style-type: none"> ◆ All underground utilities will be identified prior to drilling. The New York State One-Call System will be contacted and drilling locations will be screened using geophysical techniques, such as GPR or magnetometer. ◆ All marked utilities will be inspected so that personnel are familiar with types and locations of utilities. Any drilling will take place at least five feet away from any marked utilities. ◆ Follow EHS procedure 3-15: Underground Utilities. |
| | Flying Objects and Debris | Flying Objects and Debris <ul style="list-style-type: none"> ◆ Safety glasses meeting ANSI Standard Z87 will be worn. ◆ Splash shields and chemical goggles meeting ANSI Standard Z87 will be worn where applicable. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel will wear hard hats meeting ANSI Standard Z89.1. ◆ All ropes will be rated for the load which it is expected to lift. All ropes will be inspected at the beginning of each work shift. ◆ All ground personnel will stay clear of all suspended loads. |
| | Inhalation Hazards | Inhalation Hazards <ul style="list-style-type: none"> ◆ Work activities will be conducted in modified Level D PPE, with upgrades in respiratory protection based on real time air monitoring results, site conditions and the SHSO's judgment. ◆ Air monitoring will be performed per the SHSP. The frequency of monitoring may be reduced at the discretion of the SHSO. |
| | Spills | Spills <ul style="list-style-type: none"> ◆ Absorbent material will be readily available. ◆ Drip pans, polyethylene sheeting or other means will be used for secondary containment. |
| | Noise | Noise <ul style="list-style-type: none"> ◆ All equipment will be equipped with manufacturers required mufflers. ◆ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (earmuffs or plugs). |
| | Fire | Fire <ul style="list-style-type: none"> ◆ Smoking and open flames are not permitted. ◆ All equipment shall be equipped with 10 lb. ABC type fire extinguishers. ◆ 10 lb. ABC type fire extinguishers shall be readily available. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Groundwater Injection System Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---------------------------|--------------------|--|
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways and stairs of equipment and materials. ◆ Other obstructions will be marked, identified, or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Debris will not be allowed to accumulate where it becomes a hazard. ◆ Cover all open boreholes at the end of the work day. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ No person shall lift more than 50 lbs. unaided. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| | Electrical Hazards | Electrical Hazards <ul style="list-style-type: none"> ◆ Use GFCI devices with any items that plug into an electrical outlet. ◆ Inspect electrical and extension cords prior to use. Repair or dispose of any frayed cords. |
| | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves will be worn when handling sharp objects. ◆ Only use utility knives with self-retracting blades or those equipped with a guard over the blade. See www.martor.com for knife types. ◆ Do not use pocket knives or knife found on Leatherman-type tools. ◆ All hand and power tools will be maintained in safe condition. ◆ First aid kits will be available by work area. |
| | Eye Injury | Eye Injury <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. ◆ http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Portable eye wash station will be available. |
| Equipment Decontamination | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Groundwater Injection System Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|---|--|
| | Struck By (Water Stream) | Struck By (Water Stream) <ul style="list-style-type: none"> ◆ Proper instruction on safe use of pressure washers will be conducted. ◆ Operators will not fix the hand trigger in the open position such that if the wand were left unattended, water would spray from the tip. ◆ Operator will not hold any equipment while washing it. ◆ All pressure washers will be equipped with a deadman's switch. ◆ Use nominal temperature and pressure. ◆ Use wand extenders only. ◆ Pressure washers shall not be left running unattended. ◆ Pressure washers will be inspected daily and prior to use (hoses, gaskets, tips, connections). Ones that are not in good working order will be red tagged (removed from service) and repaired before use. ◆ First aid kit will be located adjacent to work area. ◆ Face-shields will be worn when pressure washing, face-shields are to be worn in addition to safety glasses not in lieu of them. ◆ Washers will be utilized in a manner that they were designed for, no changes to the operational condition will be accepted. (i.e. operational pressures will not be increased). ◆ Turn pressure washer off when performing maintenance or changing out tips. |
| | Eye Injury from Liquids and Foreign Objects | Eye Injury from Liquids and Foreign Objects <ul style="list-style-type: none"> ◆ Safety glasses and full faced shield complying with ANSI Standard Z87 will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ A portable eye wash station will be located by work area. |
| | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn. ◆ All hand and power tools will be maintained in safe condition. ◆ First aid kits will be readily available. ◆ Guards will be kept in place while using hand or power tools. ◆ Only use utility knives with self-retracting blades or those equipped with a guard over the blade. See www.martor.com for knife types. ◆ Do not use pocket knives, box cutters or knife found on Leatherman-type tools. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Groundwater Injection System Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---------------------|---|
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Work areas and means of access shall be maintained safe and orderly. ◆ Obstructions will be marked, identified, or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Wet surfaces will be marked and identified. ◆ Accumulation of ice or standing water will be removed as necessary during decon work. |
| | Fire | Fire <ul style="list-style-type: none"> ◆ Refueling or maintenance will only be performed when the pressure washer has been shut down. Always keep Gasoline, Diesel away from any potential ignition sources that may exist within the refueling area. ◆ Pressure washers will not be started unless a steady flow of water is running to the machine (pressure washers shall not be run dry). ◆ 10 lb. ABC type fire extinguishers will be located adjacent to work area. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel are required to wear hard hats. |
| | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ All personnel are required to wear steel toe boots. ◆ All tools will be tethered. |
| Install Piping from Wells to Treatment Building | Slip, Trip and Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Practice good housekeeping. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Groundwater Injection System Construction

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|--|---|
| <p>Use of Hand and Power Tools</p> | <p>Contusions, Abrasions, Cuts & Amputations</p> | <p>Contusions, Abrasions, Cuts & Amputations</p> <ul style="list-style-type: none"> ◆ Tools shall be inspected quarterly and prior to use. ◆ All power tools originally equipped with a safety guard of any type shall only be used with the guard in place and functioning properly. ◆ Defective tools shall be tagged and removed from service. ◆ Tools shall be used only for their intended purpose. ◆ Electric tools shall be unplugged when changing attachments or performing maintenance. ◆ Pneumatic tools shall be disconnected and air pressure released before repair or adjustments are made. ◆ Sections of air hoses that are not equipped with quick release fittings shall be secured together with a safety chain or tie. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Groundwater Injection System Construction

Location: Bethpage, NY

| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
|---|--|--|
| 1. Heavy Equipment | 1. Initial inspection will be conducted prior to use. | 1. Only qualified equipment operators will be used. |
| 2. Fire Extinguishers | 2. Monthly inspections will be performed. | 2. Personnel will be given instructions on proper use of fire extinguishers. |
| 3. PID and CGI/O2 meter | 3. Pre and Post Calibration/system checks will be performed daily. | 3. Proficiency training for users will be given. |
| 4. PPE (coveralls, tyvek, full faced masks, booties, steel toe boots, hard hats, safety glasses, leather or Kevlar gloves, ear plugs or ear muffs). | 4. An initial inspection of each lot of PPE will be performed. | 4. Personnel will be given training on proper donning/doffing procedures. |
| 5. First Aid Kits | 5. Daily safety & weekly inspections will be performed. | 5. Personnel with first aid & CPR training will be identified. Bloodborne pathogen training will be reviewed with CPR & first aid trained employees. |
| 6. Diesel Fuel/Oil & Other Potentially Hazardous Materials | 6. Daily safety inspection of storage & use areas will be conducted. | 6. Hazard communication training will be given. |
| 7. Spill Control Materials | 7. Daily safety inspection of spill control materials will be conducted. | 7. Personnel will be given training on how to respond to spilled materials. |
| 8. Chains, Slings or Ropes | 8. Inspections prior to each use will be conducted. | 8. Personnel will be trained on proper inspection & use of chains, slings & ropes. |
| 9. Hand Tools (e.g., hammers) | 9. Initial inspections will be conducted prior to use. | 9. Personnel will be given training on the safety procedures associated with hand tools. |
| 10. Augers & Fence Post Drivers | 10. Initial inspections will be conducted prior to use. | 10. Proficiency training will be given. |
| 11. Safety Cans | 11. Daily safety inspections of storage & use areas will be performed. | 11. Use & storage procedures will be reviewed. |
| 12. Concrete Trucks | 12. Initial inspections will be conducted prior to use. | 12. Proficiency training will be conducted. |
| 13. Concrete Vibrators | 13. Initial inspections will be conducted prior to use. | 13. Proficiency training will be conducted. |
| 14. GFIs | 14. Monthly inspections will be performed. | 14. Personnel will be instructed on proper use of GFIs. |
| 15. Extension Cords | 15. Monthly inspections will be performed. | 15. Personnel will be instructed on proper use of extension cords. |
| 16. Ladders | 16. Monthly inspections will be performed. | 16. Personnel will be instructed on proper use of ladders. |

ACTIVITY HAZARD ANALYSIS

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Groundwater Treatment System Installation

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|---|--|
| Equalization Tank Installation | Slip, Trip and Fall | Slip/Trip and Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| Sodium Hydroxide Chemical Feed System Installation | Slip, Trip and Fall | Slip, Trip and Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| Use of Hand and Power Tools | Contusions, Abrasions, Cuts & Amputations | Contusions, Abrasions, Cuts & Amputations <ul style="list-style-type: none"> ◆ Tools shall be inspected quarterly and prior to use. ◆ All power tools originally equipped with a safety guard of any type shall only be used with the guard in place and functioning properly. ◆ Defective tools shall be tagged and removed from service. ◆ Tools shall be used only for their intended purpose. ◆ Electric tools shall be unplugged when changing attachments or performing maintenance. ◆ Pneumatic tools shall be disconnected and air pressure released before repair or adjustments are made. ◆ Sections of air hoses that are not equipped with quick release fittings shall be secured together with a safety chain or tie. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Groundwater Treatment System Installation

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|------------------|---------------------------|---|
| Crane Operations | Operator Error | <p>Operator Error</p> <ul style="list-style-type: none"> ◆ Cranes shall only be operated by qualified operators or trainees under the direct supervision of a qualified supervisor. ◆ The operator shall use the crane in accordance with the manufacturer's operating instructions. ◆ Operators shall be in constant visual or radio contact with signal-person(s) before and during every lift. ◆ The operator of the crane will sound an air-horn to warn personnel prior to having a load pass over the building area that is under construction. ◆ Operators shall consider the total weight of the lift and the capacity of the crane, and be able to accurately use load and lift charts provided by the crane manufacturer. If in the judgment of the operator, a load will approach the crane's capacity in a particular configuration, the operator's supervisor is responsible for providing the operator with the actual or calculated weight of the load. Total load shall include all rigging and equipment below the hook. ◆ Operators shall not leave the control station of a crane during a lift or pick, except under the following conditions: <ul style="list-style-type: none"> • The load is lowered or raised to a safe landing area and fully supported with no tension on the load line. • After positioning all brakes, pawls, switches, or clutches in a safe position, to turn the crane over to another qualified operator. • When required to do so by an approved emergency procedure. ◆ The equipment operator shall not engage any by-pass, override, or otherwise disable any crane safety feature. |
| | Crane Failure During Lift | <p>Crane Failure During Lift</p> <ul style="list-style-type: none"> ◆ All applicable inspections shall be performed on cranes by a qualified inspector following manufacturer's recommendations and specifications. ◆ No modifications shall be made to any crane without the prior written approval of the manufacturer. ◆ Crane load charts and the operator's manual shall be posted in the cab of every crane. |
| | Crane Instability | <p>Crane Instability</p> <ul style="list-style-type: none"> ◆ Cranes equipped with outriggers shall have outriggers fully extended or as allowed by manufacturer's instructions and set on firm footings before every lift. If setting outriggers on soft surfaces or over buried pipe cannot be avoided, oak blocking should be used under the outrigger loads to distribute the crane loads over sufficient area to ensure crane stability. If outriggers are utilized, tires must not be in contact with the ground. The crane shall be level within 1% of the grade. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|---|--|
| | <p>Contact With the Crane or Load During Operation</p> | <p>Contact With the Crane or Load During Operation</p> <ul style="list-style-type: none"> ◆ The swing radius of the crane counterweight shall be flagged or barricaded. Employees shall not get on or off a crane while it is in motion. Adjustments, repairs, or lubrication shall not be permitted on moving equipment unless it is required by manufacturer's recommendations. Tool boxes, oil cans, sling racks, water coolers, or other items shall not be placed within the swing radius of the counterweight. The oiler, where required, shall stand clear of the swing radius and assist the operator in keeping other employees outside the swing radius. ◆ Note: Cranes with the counterweight located higher than 8 feet above the surrounding personnel access level need not be guarded unless a platform or other circumstance would allow personnel to be struck or crushed by the rotating counterweight. Guy wires within the swing radius of the crane or load shall be marked with highly visible flagging or rope. ◆ Personnel shall not stand, pass or place any body part under a suspended load. |
| | <p>Contact With Energized Power Lines of Work Near Critical Systems or Piping</p> | <p>Contact With Energized Power Lines of Work Near Critical Systems or Piping</p> <ul style="list-style-type: none"> ◆ The Project Superintendent, SHSO, and Rigging Supervisor shall evaluate if any part of the hoisting equipment or load: <ul style="list-style-type: none"> • Could approach 15 feet of 50 to 200 kV overhead electrical distribution and transmission lines. • Are within 15 feet of 50 to 200 kV overhead electrical distribution and transmission lines. • Is near transmitter towers where an electrical charge can be induced in the equipment or load. ◆ The maximum achievable boom length and 360 degree boom rotation shall be assumed when making the above clearance determinations. <p>Notes:</p> <ul style="list-style-type: none"> • Lines shall be considered energized unless the person owning such line or the Project Superintendent verifies that it is not an energized line. • Lines having long spans tend to move laterally and vertically due to wind and this potential must be considered in determining minimum clearance. • For minimum allowable distance to distribution and transmission lines with voltages greater than 200 kV, refer to 29 CFR 1926.550(a)(15)(ii). |
| | <p>Critical Lifts</p> | <p>Critical Lifts</p> <ul style="list-style-type: none"> ◆ A written Critical Lift Plan shall be developed specifying job details and special safety measures. |
| | <p>Crane Being Struck by Lightning</p> | <p>Crane Being Struck by Lightning</p> <ul style="list-style-type: none"> ◆ Crane operations shall cease when dangerous weather is imminent. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---|---|
| | Load Instability | <p>Load Instability</p> <ul style="list-style-type: none"> ◆ Tag line(s) shall be required on all loads unless tag lines create a safety hazard, (i.e., dragging on a high voltage line, critical valves, becoming stuck on rebar, causing a tripping hazard for personnel walking a load, etc.). Use as many tag lines as necessary to adequately control the load. ◆ The load shall be safely landed (supported) and determined to be stable before workers are permitted to approach the load. ◆ Crane operations shall cease if wind loading becomes questionable due to wind direction or velocity, boom length, boom angle, or size or weight of load. |
| | Fire on Crane | <p>Fire on Crane</p> <ul style="list-style-type: none"> ◆ An accessible fire extinguisher with a minimum 10ABC rating shall be provided on every crane. |
| Particulate Filtration Unit Installation | Slip, Trip and Fall | <p>Slip, Trip and Fall</p> <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. |
| | Back Injuries | <p>Back Injuries</p> <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| Use of Hand and Power Tools | Contusions, Abrasions, Cuts & Amputations | <p>Contusions, Abrasions, Cuts & Amputations</p> <ul style="list-style-type: none"> ◆ Tools shall be inspected quarterly and prior to use. ◆ All power tools originally equipped with a safety guard of any type shall only be used with the guard in place and functioning properly. ◆ Defective tools shall be tagged and removed from service. ◆ Tools shall be used only for their intended purpose. ◆ Electric tools shall be unplugged when changing attachments or performing maintenance. ◆ Pneumatic tools shall be disconnected and air pressure released before repair or adjustments are made. ◆ Sections of air hoses that are not equipped with quick release fittings shall be secured together with a safety chain or tie. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|---------------------|--|
| Liquid and Vapor-Phase GAC Units Installation | Slip, Trip and Fall | Slip, Trip and Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. |
| Process Pumps and Sump Pumps Installation | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| | Slip, Trip and Fall | Slip, Trip and Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| Air Compressor and Drier System Installation | Slip, Trip and Fall | Slip, Trip and Fall <ul style="list-style-type: none"> ◆ Maintain work area free of clutter and debris. ◆ Mark holes, drop offs and uneven surfaces in work area and inform workers to avoid these areas. ◆ Keep walking surfaces dry. ◆ Practice good housekeeping. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |

| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
|---|--|--|
| 1. Heavy Equipment | 1. Initial inspection will be conducted prior to use. | 1. Only qualified equipment operators will be used. |
| 2. Fire Extinguishers | 2. Monthly inspections will be performed. | 2. Personnel will be given instructions on proper use of fire extinguishers. |
| 3. PID and CGI/O2 meter | 3. Pre and Post Calibration/system checks will be performed daily. | 3. Proficiency training for users will be given. |
| 4. PPE (coveralls, tyvek, full faced masks, booties, steel toe boots, hard hats, safety glasses, leather or Kevlar gloves, ear plugs or ear muffs). | 4. An initial inspection of each lot of PPE will be performed. | 4. Personnel will be given training on proper donning/doffing procedures. |
| 5. First Aid Kits | 5. Daily safety & weekly inspections will be performed. | 5. Personnel with first aid & CPR training will be identified. Bloodborne pathogen training will be reviewed with CPR & first aid trained employees. |
| 6. Diesel Fuel/Oil & Other Potentially Hazardous Materials | 6. Daily safety inspection of storage & use areas will be conducted. | 6. Hazard communication training will be given. |
| 7. Spill Control Materials | 7. Daily safety inspection of spill control materials will be conducted. | 7. Personnel will be given training on how to respond to spilled materials. |
| 8. Chains, Slings or Ropes | 8. Inspections prior to each use will be conducted. | 8. Personnel will be trained on proper inspection & use of chains, slings & ropes. |
| 9. Hand Tools (e.g., hammers) | 9. Initial inspections will be conducted prior to use. | 9. Personnel will be given training on the safety procedures associated with hand tools. |
| 10. Augers & Fence Post Drivers | 10. Initial inspections will be conducted prior to use. | 10. Proficiency training will be given. |
| 11. Safety Cans | 11. Daily safety inspections of storage & use areas will be performed. | 11. Use & storage procedures will be reviewed. |
| 12. Concrete Trucks | 12. Initial inspections will be conducted prior to use. | 12. Proficiency training will be conducted. |
| 13. Concrete Vibrators | 13. Initial inspections will be conducted prior to use. | 13. Proficiency training will be conducted. |
| 14. GFIs | 14. Monthly inspections will be performed. | 14. Personnel will be instructed on proper use of GFIs. |
| 15. Extension Cords | 15. Monthly inspections will be performed. | 15. Personnel will be instructed on proper use of extension cords. |
| 16. Ladders | 16. Monthly inspections will be performed. | 16. Personnel will be instructed on proper use of ladders. |

ACTIVITY HAZARD ANALYSIS

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Site Restoration

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|------------------------|--|
| Placing Sod, Seed and Hay | Eye Injury | <ul style="list-style-type: none"> ◆ Proper face and eye protection shall be worn during the application of seed. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| | Strain | <ul style="list-style-type: none"> ◆ Use proper lifting techniques and if appropriate use mechanical lifting devices. |
| | Dust | <ul style="list-style-type: none"> ◆ Use appropriate respiratory protection, if required. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| | Slip/Trip/Fall | <ul style="list-style-type: none"> ◆ Mark all low spots in area with banner tape. Instruct personnel to use care in these areas. |
| Placing Topsoil, Fertilizer and Mulching | Equipment Tipping Over | <ul style="list-style-type: none"> ◆ Heavy equipment shall have rollover equipment as required by 29 CFR 1926.1000. ◆ Seat belts shall be worn at all times during operation. ◆ Operators shall not use equipment on slopes steeper than 1.5H:1.0V unless operation is consistent with manufacturer's recommendations. ◆ Operators of heavy equipment with blades, buckets, beds, etc. shall keep them lowered or in a stable position while on slopes. ◆ Ensure ground personnel are located out of the way of potential equipment turnover or failure (including buckets). ◆ Operators and spotters are to be in constant radio contact or visual sight. ◆ Equipment not to be left running unattended. |
| | Eye Injury | <ul style="list-style-type: none"> ◆ Proper face and eye protection shall be worn during the application of seed. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| | Dust | <ul style="list-style-type: none"> ◆ Use appropriate respiratory protection, if required. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| | Back Injury | <ul style="list-style-type: none"> ◆ Use proper lifting techniques and if appropriate use mechanical lifting devices. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Site Restoration

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|----------------|--|--|
| Planting Trees | <p>Slip/Trip/Fall</p> <p>Eye Injury</p> <p>Dust</p> <p>Back Injury</p> | <p>Slip/Trip/Fall</p> <ul style="list-style-type: none"> ◆ Mark all low spots in area with banner tape. Instruct personnel to use care in these areas. <p>Eye Injury</p> <ul style="list-style-type: none"> ◆ Proper face and eye protection shall be worn during the application of seed. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 <p>Dust</p> <ul style="list-style-type: none"> ◆ Use appropriate respiratory protection, if required. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 <p>Back Injury</p> <ul style="list-style-type: none"> ◆ Use proper lifting techniques and if appropriate use mechanical lifting devices. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|--|--|
| Construction of Berm Around Treatment Building | Slip/Trip/Fall | Slip/Trip/Fall ♦ Mark all low spots in area with banner tape. Instruct personnel to use care in these areas. |
| Repair Damaged Roadways, Curbs and Sidewalks | Back Injury | Back Injury ♦ Use proper lifting techniques and if appropriate use mechanical lifting devices. |
| | Slip/Trip/Fall | Slip/Trip/Fall ♦ Mark all low spots in area with banner tape. Instruct personnel to use care in these areas. |
| | Back Injury | Back Injury ♦ Use proper lifting techniques and if appropriate use mechanical lifting devices. |
| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
| 1. Heavy Equipment 2. Fire Extinguishers 3. PID and CGI/O2 meter 4. PPE (coveralls, tyvek, full faced masks, booties, steel toe boots, hard hats, safety glasses, leather or Kevlar gloves, ear plugs or ear muffs). 5. First Aid Kits 6. Diesel Fuel/Oil & Other Potentially Hazardous Materials 7. Spill Control Materials 8. Hand Tools (e.g., hammers) 9. Safety Cans 10. Concrete Trucks 11. Concrete Vibrators 12. GFIs | 1. Initial inspection will be conducted prior to use. 2. Monthly inspections will be performed. 3. Pre and Post Calibration/system checks will be performed daily. 4. An initial inspection of each lot of PPE will be performed. 5. Daily safety & weekly inspections will be performed. 6. Daily safety inspection of storage & use areas will be conducted. 7. Daily safety inspection of spill control materials will be conducted. 8. Initial inspections will be conducted prior to use. 9. Daily safety inspections of storage & use areas will be performed. 10. Initial inspections will be conducted prior to use. 11. Initial inspections will be conducted prior to use. 12. Monthly inspections will be performed. | 1. Only qualified equipment operators will be used. 2. Personnel will be given instructions on proper use of fire extinguishers. 3. Proficiency training for users will be given. 4. Personnel will be given training on proper donning/doffing procedures. 5. Personnel with first aid & CPR training will be identified. Bloodborne pathogen training will be reviewed with CPR & first aid trained employees. 6. Hazard communication training will be given. 7. Personnel will be given training on how to respond to spilled materials. 8. Personnel will be given training on the safety procedures associated with hand tools. 9. Use & storage procedures will be reviewed. 10. Proficiency training will be conducted. 11. Proficiency training will be conducted. 12. Personnel will be instructed on proper use of GFIs. |

ACTIVITY HAZARD ANALYSIS

| Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP Activity: Startup and Shakedown of Treatment Plant | | Location: <u>Bethpage, NY</u> |
|---|--|---|
| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
| Mobilization of Equipment & Supplies | Slips/Trip/Fall Vehicular Traffic Back Injuries Dropped Objects Overhead Hazards Eye Injury | <ul style="list-style-type: none"> ◆ Work areas and means of access shall be maintained safely & orderly. ◆ Even terrain will be utilized as unloading areas. ◆ Tripping & poor footing hazards will be repaired as they are discovered or clearly identified/marked. <ul style="list-style-type: none"> ◆ Spotters will be used when backing up trucks & moving equipment. <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual handling of materials. ◆ Team lifting will be used if mechanical devices are not available. <ul style="list-style-type: none"> ◆ Dropped Objects ◆ ANSI approved steel toe boots will be worn. <ul style="list-style-type: none"> ◆ Overhead Hazards ◆ Personnel will be required to wear ANSI approved hard hats. <ul style="list-style-type: none"> ◆ Eye Injury ◆ ANSI approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| Spills | Spills | <ul style="list-style-type: none"> ◆ Spill & absorbent materials will be readily available. ◆ All process chemicals will be stored in their appropriate storage areas inside the treatment building. ◆ Incompatible materials will be stored separately. |
| Chemical Exposure | Chemical Exposure | <ul style="list-style-type: none"> ◆ Protective clothing (i.e., chemical gloves, aprons & safety goggles) will be worn when handling process chemicals. ◆ Skin will be rinsed with water if contact with hazardous materials occurs. ◆ Hazard communication training will be conducted. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|----------------------------|-------------------|--|
| | Heat Stress | Heat Stress <ul style="list-style-type: none"> ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| | Cold Stress | Cold Stress <ul style="list-style-type: none"> ◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats). ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Air temperature and wind chill should be monitored. |
| Material Handling - Manual | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Work areas and means of access shall be maintained safely & orderly. ◆ Even terrain will be utilized as unloading areas. ◆ Tripping & poor footing hazards will be repaired as they are discovered or clearly identified/marked. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ Personnel will be required to wear ANSI approved hard hats (Standard Z89.1). ◆ All wire ropes, chains & slings will be rated for the load that it is expected to lift. ◆ All lifting materials will be inspected at the beginning of each work shift and prior to each use. ◆ All ground personnel will stay clear of all suspended loads. |
| | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ Steel toe boots meeting ANSI standard Z41 will be worn. ◆ Ground personnel will be instructed to stay clear of suspended loads. ◆ Personnel will be instructed on proper rigging procedures. |
| | Eye Injury | Eye Injury <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| | Noise | Noise <ul style="list-style-type: none"> ◆ Hearing protection (ear muffs or ear plugs) shall be worn in work areas where the decibel level may be above 85dbA. ◆ Wear hearing protection when in the vicinity of heavy equipment, pumps or other noise producing machinery or if having difficulty speaking with someone when standing 3 feet apart. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------------|-------------------|---|
| Back Injuries | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual handling of materials. ◆ Team lifting will be used if mechanical devices are not available. |
| Sharp Objects | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn. ◆ All hand & power tools will be maintained in safe condition. ◆ First aid kits will be available adjacent to work areas. ◆ Guards will be kept in place on all hand & power tools. |
| Chemical Exposure | Chemical Exposure | Chemical Exposure <ul style="list-style-type: none"> ◆ Protective clothing (i.e., chemical gloves, aprons & safety goggles) will be worn when handling process chemicals. ◆ Skin will be rinsed with water if contact with hazardous materials occurs. ◆ Hazard communication training will be conducted. |
| Spills | Spills | Spills <ul style="list-style-type: none"> ◆ Spill an absorbent materials will be readily available. ◆ All process chemicals will be stored in their appropriate storage areas inside the treatment building. ◆ Incompatible materials will be stored separately. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|----------------------------------|---|---|
| <p>Electrical Testing</p> | <p>Electrocution/Contact with Electricity</p> | <p>Electrocution/Contact with Electricity</p> <ul style="list-style-type: none"> ◆ All electrical work/testing will be conducted or supervised by a licensed electrician. ◆ All lockout/tagout procedures will be followed. ◆ Live parts of wiring or equipment shall be guarded to protect all persons or objects from contacting them. ◆ When working/testing on live parts of wiring or equipment less than 480 volts, insulated tools must be used. ◆ When it is necessary to work/test on energized lines or equipment greater than or equal to 480 volts, rubber gloves & other protective equipment or hotline tools meeting the provisions of ANSI/ASTM standards shall be used. Insulation mats or platforms of substantial construction and providing good footing shall be placed on the floors & on the frames of equipment that has exposed live parts so that the operator or person cannot come into contact with the live parts. ◆ In the following situations, at least two persons shall work together – one person trained to recognize electrical hazards shall be delegated to watch the movements of the others during work to provide warning if they get dangerously close to line conductors or perform other unsafe acts and so that assistance can be provided in case of an accident: <ul style="list-style-type: none"> ◆ Work involving handling energized conductors or apparatus. ◆ Work at remote or isolated locations. ◆ Work at night or during inclement weather. ◆ Work in substations where wiring is congested. ◆ Barriers will be established to prevent equipment & people from entering a work area. ◆ Plugs & receptacles shall be kept out of water unless they are of the approved submersible type. ◆ All electrical tools and equipment will be equipped with GFCI. ◆ Electrical extension cords will be of the “Hard” or “Extra Hard” service type. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWJRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---------------------------|---------------------------|--|
| Dropped Objects | Dropped Objects | <ul style="list-style-type: none"> ◆ ANSI approved steel toe boots will be worn. |
| Fire | Fire | <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |
| Struck By/Caught Between | Struck By/Caught Between | <ul style="list-style-type: none"> ◆ The lift and swing path of man/scissor lifts will be maintained clear of obstructions. ◆ All personnel will maintain a safe distance from man/scissor lifts when raising & lowering. |
| Heat Stress | Heat Stress | <ul style="list-style-type: none"> ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| Cold Stress | Cold Stress | <ul style="list-style-type: none"> ◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats). ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Air temperature and wind chill should be monitored. |
| Flying Objects and Debris | Flying Objects and Debris | <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| Noise | Noise | <ul style="list-style-type: none"> ◆ Hearing protection (ear muffs or ear plugs) shall be worn in work areas where the decibel level may be above 85dba. ◆ Wear hearing protection when in the vicinity of heavy equipment, pumps or other noise producing machinery or if having difficulty speaking with someone when standing 3 feet apart. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|--------------------------|--|
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Even terrain will be utilized for equipment use. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-1 Section 21 and 29 CFR 1926.500. |
| Instrumentation/Mechanical Tests | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ ANSI approved steel toe boots will be worn. |
| | Fire | Fire <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |
| | Struck By/Caught Between | Struck By/Caught Between <ul style="list-style-type: none"> ◆ The lift and swing path of man/scissor lifts will be maintained clear of obstructions. ◆ All personnel will maintain a safe distance from man/scissor lifts when raising & lowering. ◆ When it is necessary to observe/test energized mechanical equipment, the following precautions should be taken: <ul style="list-style-type: none"> • Barriers will be established to prevent equipment and people from entering a work area. • Personnel will keep hands and loose clothing away from all moving parts. • Personnel will be briefed on emergency shut down procedures. • Only necessary guards will be removed to observe/test equipment. • All lockout/tagout procedures will be followed, if manual tests on any of the equipment are performed. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|---------------------------|--|
| | Heat Stress | Heat Stress <ul style="list-style-type: none"> ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| | Cold Stress | Cold Stress <ul style="list-style-type: none"> ◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats). ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Air temperature and wind chill should be monitored. |
| | Flying Objects and Debris | Flying Objects and Debris <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. ◆ http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Coggle-prod-12292770 ◆ ANSI approved safety goggles and splash shields will be worn if a splash potential exists. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---------------------|--|---|
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Even terrain will be utilized for equipment use. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-I Section 21 and 29 CFR 1926.500. |
| | Electrocution/Contact with Electricity | Electrocution/Contact with Electricity <ul style="list-style-type: none"> ◆ Live parts of wiring or equipment shall be guarded to protect all persons or objects from contacting them. ◆ Plugs & receptacles shall be kept out of water unless they are of the approved submersible type. ◆ Cords will be kept from heat and sharp edges. ◆ All electrical tools and equipment will be equipped with GFCI. |
| | Noise | Noise <ul style="list-style-type: none"> ◆ Hearing protection (ear muffs or ear plugs) shall be worn in work areas where the decibel level may be above 85dba. ◆ Wear hearing protection when in the vicinity of heavy equipment, pumps or other noise producing machinery or if having difficulty speaking with someone when standing 3 feet apart. |
| System Tests | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ ANSI approved steel toe boots will be worn. |
| | Fire | Fire <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|---------------------------|--|
| | Struck By/Caught Between | <p>Struck by/Caught Between</p> <ul style="list-style-type: none"> ◆ The lift and swing path of man/scissor lifts will be maintained clear of obstructions. ◆ All personnel will maintain a safe distance from man/scissor lifts when raising & lowering. ◆ When it is necessary to observe/test energized mechanical equipment, the following precautions should be taken: ◆ Barriers will be established to prevent equipment and people from entering a work area. ◆ Personnel will keep hands and loose clothing away from all moving parts. ◆ Personnel will be briefed on emergency shut down procedures. ◆ Only necessary guards will be removed to observe/test equipment. ◆ All lockout/tagout procedures will be followed, if manual tests on any of the equipment is performed. ◆ Personnel shall stand to the side when opening & closing valve assemblies. |
| | Heat Stress | <p>Heat Stress</p> <ul style="list-style-type: none"> ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| | Cold Stress | <p>Cold Stress</p> <ul style="list-style-type: none"> ◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats). ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Air temperature and wind chill should be monitored. |
| | Flying Objects and Debris | <p>Flying Objects and Debris</p> <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ◆ ANSI approved safety goggles and splash shields will be worn if a splash potential exists. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|--|--|
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Even terrain will be utilized for equipment use. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-J Section 21 and 29 CFR 1926.500. |
| | Electrocution/Contact with Electricity | Electrocution/Contact with Electricity <ul style="list-style-type: none"> ◆ Live parts of wiring or equipment shall be guarded to protect all persons or objects from contacting them. ◆ Plugs & receptacles shall be kept out of water unless they are of the approved submersible type. ◆ Cords will be kept from heat and sharp edges. ◆ All electrical tools and equipment will be equipped with GFCI. |
| Repairs (Electrical, Plumbing, Mechanical) | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ ANSI approved steel toe boots will be worn. |
| | Fire | Fire <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |
| | Struck By/Caught Between | Struck By/Caught Between <ul style="list-style-type: none"> ◆ The lift and swing path of man/scissor lifts will be maintained clear of obstructions. ◆ All personnel will maintain a safe distance from man/scissor lifts when raising & lowering. ◆ Lockout/Tagout procedures will be followed. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|--|---|
| | Chemical Exposure | <p>Chemical Exposure</p> <ul style="list-style-type: none"> ◆ Protective clothing (i.e., chemical gloves & safety glasses) will be worn. ◆ Skin will be rinsed with water if contact with hazardous materials occurs. ◆ Hazard communication training will be conducted. |
| | Inhalation Hazard | <p>Inhalation Hazards</p> <ul style="list-style-type: none"> ◆ Air monitoring will be performed per the SHSP. ◆ Respiratory protection will be required if air monitoring levels exceed recommended exposure limits. |
| | Confined Space Entry | <p>Confined Space Entry</p> <ul style="list-style-type: none"> ◆ Confined space entry procedures outlined in 29 CFR 1910.146, EM 385-1-1 Section 06.I will be followed. |
| | Noise | <p>Noise</p> <ul style="list-style-type: none"> ◆ Hearing protection (ear muffs or ear plugs) shall be worn in work areas where the decibel level may be above 85dba. ◆ Wear hearing protection when in the vicinity of heavy equipment, pumps or other noise producing machinery or if having difficulty speaking with someone when standing 3 feet apart. |
| | Electrocution/Contact with Electricity | <p>Electrocution/Contact with Electricity</p> <ul style="list-style-type: none"> ◆ Live parts of wiring or equipment shall be guarded to protect all persons or objects from contacting them. ◆ Plugs & receptacles shall be kept out of water unless they are of the approved submersible type. ◆ Cords will be kept from heat and sharp edges. ◆ All electrical tools and equipment will be equipped with GFCI. |
| | Back Injuries | <p>Back Injuries</p> <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual handling of materials. ◆ Team lifting will be used if mechanical devices are not available. |
| | Sharp Objects | <p>Sharp Objects</p> <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn. ◆ All hand & power tools will be maintained in safe condition. ◆ First aid kits will be available adjacent to work areas. ◆ Guards will be kept in place on all hand & power tools. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---------------------------------|--|---|
| | Heat Stress | <p>Heat Stress</p> <ul style="list-style-type: none"> ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| | Cold Stress | <p>Cold Stress</p> <ul style="list-style-type: none"> ◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats). ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Air temperature and wind chill should be monitored. |
| | Slip/Trip/Fall | <p>Slip/Trip/Fall</p> <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Even terrain will be utilized for equipment use. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-1 Section 21 and 29 CFR 1926.500. |
| Hand Tools (Non-powered) | Flying Objects and Debris Dropped Objects | <p>Flying Objects and Debris</p> <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. <p>Dropped Objects</p> <ul style="list-style-type: none"> ◆ ANSI approved steel toe boots will be worn. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|----------------------|---------------------------|---|
| | Struck By | <ul style="list-style-type: none"> ◆ Work gloves will be worn. ◆ First aid kits will be available adjacent to the work area. |
| | Slip/Trip/Fall | <ul style="list-style-type: none"> ◆ Tools will be kept in storage when not in use. ◆ Work areas and means of access will be maintained safe and orderly. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. |
| | Overhead Hazards | <ul style="list-style-type: none"> ◆ All personnel are required to wear ANSI approved hard hats. |
| | Back Injuries | <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual handling of materials. ◆ Team lifting will be used if mechanical devices are not available. |
| Powered Tools | Flying Objects and Debris | <ul style="list-style-type: none"> ◆ Flying Objects and Debris ◆ ANSI approved safety glasses will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| | Dropped Objects | <ul style="list-style-type: none"> ◆ Dropped Objects ◆ ANSI approved steel toe boots will be worn. ◆ When work is being performed overhead, tools not in use shall be secured or placed in holders. |
| | Struck By | <ul style="list-style-type: none"> ◆ Work gloves will be worn. ◆ First aid kits will be available adjacent to the work area. |
| | Slip/Trip/Fall | <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. |
| | Overhead Hazards | <ul style="list-style-type: none"> ◆ All personnel are required to wear ANSI approved hard hats. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|-------------------|--|
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual handling of materials. ◆ Team lifting will be used if mechanical devices are not available. |
| | Noise | Noise <ul style="list-style-type: none"> ◆ Hearing protection (ear muffs or ear plugs) shall be worn in work areas where the decibel level may be above 85dba. ◆ Wear hearing protection when in the vicinity of heavy equipment, pumps or other noise producing machinery or if having difficulty speaking with someone when standing 3 feet apart. |
| | Fire | Fire <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |
| | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn. ◆ All power tools will be maintained in safe condition. ◆ First aid kits will be available adjacent to work areas. ◆ Guards will be kept in place on all power tools. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|-------------------|--|
| Struck By | Struck By | <p>Struck By</p> <ul style="list-style-type: none"> ◆ All saws will be equipped with guards that automatically & completely enclose the cutting edges, splitters & anti-kickback devices. ◆ For saws equipped with upper & lower guards, when the tool is withdrawn from work, the lower guard will automatically & instantly return to the covered position. ◆ Power saws will not be left running unattended. ◆ Power tools shall be disconnected when not in use, before servicing, and when changing accessories, such as blades, bits and cutters. ◆ Tools shall be secured to the working surface where applicable to free both hands to operate the tool. ◆ Good footing and balance shall be maintained when operating machinery. ◆ Power tools designed to accommodate guards shall be equipped with such guards when in use. Reciprocating, rotating and moving parts of equipment shall be guarded if exposed to contact by personnel or otherwise create a hazard. ◆ Hand-held powered tools including: drills, tappers, fastener drivers; horizontal, vertical & angle grinders with wheels larger than 2 inches in diameter; disc & belt sanders, reciprocating saws, saber saws, and other similar tool shall be equipped with a momentary contact On-Off control switch. These tools also may be equipped with a lock-on control provided that turnoff can be accomplished by a single motion of the same finger or fingers that turn it on. ◆ Hand-held powered tools including: platen sanders, disc sanders & grinders with discs 2 inches or less in diameter; routers, planners, laminated trimmers, nibblers, shears, scroll saws and jigsaws with blade shanks 1/4-inch wide or less shall be equipped with a positive On-Off control switch. ◆ Hand-held powered tools such as circular saws having a blade diameter greater than 2 inches, chain saws & percussion tools without positive accessory holding means must be equipped with a constant pressure switch that will shut off the power when the pressure is released. ◆ A push-stick, block or other safe means shall be used on all operations close to high-speed cutting edges. ◆ The use of cracked, bent or otherwise defective parts, such as saw blades, cutters or knives is prohibited. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|--|--|
| | Electrocution/Contact with Electricity | Electrocution/Contact with Electricity <ul style="list-style-type: none"> ◆ Ground fault circuit interrupters (GFCIs) will be used. ◆ Exterior work will not be conducted in the rain. ◆ Cords will be inspected for damage prior to each use. Damaged equipment will be tagged & taken out of service. ◆ All equipment will be unplugged after use. ◆ Cords shall be kept off of & out of wet areas unless they are of the approved submersible type. ◆ Powered tools will not be carried by the cord or hose. ◆ Powered tools will not be disconnected from the receptacle by yanking the cord. ◆ Cords will be kept from heat and sharp edges. ◆ Powered tools will be equipped with either three-wire cords with ground and be grounded, be double-insulated, or be powered by a low-voltage isolation transformer. |
| Cutting/Welding & Abrasion of Steel (Torches/Chop Saws/Grinder) | Fire | Fire <ul style="list-style-type: none"> ◆ Hot work permits will be required for all cutting, welding, open flame and flame/spark-producing equipment. ◆ A fire watch will be assigned to watch for dangerous sparks in the areas during hot work operations. ◆ After completion of hot work, the fire watch will be maintained for 30 minutes. ◆ All requirements outlined in EM 385-1-1, Section 10 and 29 CFR 1926 Subpart J will be followed. ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |
| | Dermal Burns | Dermal Burns <ul style="list-style-type: none"> ◆ Protective equipment will be worn to prevent burns from hot slag. |
| | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn. ◆ All hand & powered tools will be maintained in safe condition. ◆ First aid kits will be available adjacent to work areas. ◆ Guards will be kept in place on all powered tools. |
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--------------------------|---------------------------|---|
| | Flying Objects and Debris | Flying Objects and Debris <ul style="list-style-type: none"> ◆ Safety goggles (the appropriate type of eye protection for the task will be chosen) meeting ANSI Standard Z87 will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ Steel toe boots meeting ANSI Standard Z41 will be worn. |
| Chemical Handling | Inhalation Hazards | Inhalation Hazards <ul style="list-style-type: none"> ◆ Air monitoring will be performed per the SHSP. ◆ Respiratory protection will be required if air monitoring levels exceed recommended exposure limits. |
| | Chemical Exposure | Chemical Exposure <ul style="list-style-type: none"> ◆ Protective clothing (i.e., chemical gloves, aprons & safety goggles) will be worn when handling process chemicals. ◆ Skin will be rinsed with water if contact with hazardous materials occurs. ◆ Hazard communication training will be conducted. |
| | Spills | Spills <ul style="list-style-type: none"> ◆ Spill & absorbent materials will be readily available. ◆ All process chemicals will be stored in their appropriate storage areas inside the treatment building. ◆ Incompatible materials will be stored separately. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual handling of materials. ◆ Team lifting will be used if mechanical devices are not available. |
| | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves will be worn. ◆ All hand & powered tools will be maintained in safe condition. ◆ First aid kits will be available adjacent to work areas. ◆ Guards will be kept in place on all powered tools. |
| | Eye Injury | Eye Injury <ul style="list-style-type: none"> ◆ ANSI approved safety goggles or full-faced respirator will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 <ul style="list-style-type: none"> ◆ Portable eye wash station will be readily available. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|-------------------|--|
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Debris will not be allowed to accumulate where it becomes a hazard. ◆ Even terrain will be utilized for equipment use. |
| | Noise | Noise <ul style="list-style-type: none"> ◆ Hearing protection (ear muffs or ear plugs) shall be worn in work areas where the decibel level may be above 85dbA. ◆ Wear hearing protection when in the vicinity of heavy equipment, pumps or other noise producing machinery or if having difficulty speaking with someone when standing 3 feet apart. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1). ◆ All wire ropes, chains & slings will be rated for the load that it is expected to lift. All lifting materials will be inspected at the beginning of each work shift and prior to each use. Defective equipment will be tagged and taken out of service. ◆ All ground personnel will stay clear of all suspended loads. |
| | Heat Stress | Heat Stress <ul style="list-style-type: none"> ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| | Cold Stress | Cold Stress <ul style="list-style-type: none"> ◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats). ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Air temperature and wind chill should be monitored. |
| | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ Steel toe boots meeting ANSI Standard Z41 will be worn. ◆ Ground personnel will be instructed to stay clear of suspended loads. ◆ Personnel will be instructed on proper rigging procedures. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--------------------------|--------------------------|--|
| Fire | Fire | <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |
| Material and Pipe Tests | Dropped Objects | <ul style="list-style-type: none"> ◆ Dropped Objects ◆ ANSI approved steel toe boots will be worn. |
| Fire | Fire | <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |
| Struck By/Caught Between | Struck By/Caught Between | <ul style="list-style-type: none"> ◆ The lift and swing path of man/scissor lifts will be maintained clear of obstructions. ◆ All personnel will maintain a safe distance from man/scissor lifts when raising & lowering. ◆ When it is necessary to observe/test energized mechanical equipment, the following precautions should be taken: <ul style="list-style-type: none"> • Barriers will be established to prevent equipment and people from entering a work area. • Personnel will keep hands and loose clothing away from all moving parts. • Personnel will be briefed on emergency shut down procedures. • Only necessary guards will be removed to observe/test equipment. • All lockout/tagout procedures will be followed, if manual tests on any of the equipment is performed. • Personnel shall stand to the side when opening & closing valve assemblies. |
| Heat Stress | Heat Stress | <ul style="list-style-type: none"> ◆ Heat Stress ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| Cold Stress | Cold Stress | <ul style="list-style-type: none"> ◆ Cold Stress ◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats). ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Air temperature and wind chill should be monitored. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|--|---|
| | Flying Objects and Debris | Flying Objects and Debris <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ ANSI approved safety goggles and splash shields will be worn if a splash potential exists. |
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Even terrain will be utilized for equipment use. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-1 Section 21 and 29 CFR 1926.500. |
| | Electrocution/Contact with Electricity | Electrocution/Contact with Electricity <ul style="list-style-type: none"> ◆ Live parts of wiring or equipment shall be guarded to protect all persons or objects from contacting them. ◆ Plugs & receptacles shall be kept out of water unless they are of the approved submersible type. ◆ Cords will be kept from heat and sharp edges. ◆ All electrical tools and equipment will be equipped with GFCI. |
| Acceptance and Hydraulic Tests/Testing | Ruptures/Leaks | Rupture/Leaks <ul style="list-style-type: none"> ◆ Use clean water for hydrostatic test (no air or process water allowed) ◆ Do not exceed tank & valve pressure ratings. ◆ If a leak is detected, relieve pressure prior to repair or adjustment. ◆ No tightening or adjusting while under pressure. ◆ Relieve & confirm pressure when testing is complete. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--------------------------|--------------------------|--|
| Dropped Objects | Dropped Objects | <ul style="list-style-type: none"> ◆ ANSI approved steel toe boots will be worn. |
| Fire | Fire | <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |
| Struck By/Caught Between | Struck By/Caught Between | <p>Struck by/Caught Between</p> <ul style="list-style-type: none"> ◆ The lift and swing path of man/scissor lifts will be maintained clear of obstructions. ◆ All personnel will maintain a safe distance from man/scissor lifts when raising & lowering. ◆ When it is necessary to observe/test energized mechanical equipment, the following precautions should be taken: <ul style="list-style-type: none"> • Barriers will be established to prevent equipment and people from entering a work area. • Personnel will keep hands and loose clothing away from all moving parts. • Personnel will be briefed on emergency shut down procedures. • Only necessary guards will be removed to observe/test equipment. • All lockout/tagout procedures will be followed, if manual tests on any of the equipment is performed. • Personnel shall stand to the side when opening & closing valve assemblies. |
| Heat Stress | Heat Stress | <p>Heat Stress</p> <ul style="list-style-type: none"> ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| Cold Stress | Cold Stress | <p>Cold Stress</p> <ul style="list-style-type: none"> ◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats). ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Air temperature and wind chill should be monitored. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--------------------------------|--|--|
| | Flying Objects and Debris | Flying Objects and Debris <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ ANSI approved safety goggles and splash shields will be worn if a splash potential exists. |
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Even terrain will be utilized for equipment use. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-I Section 2I and 29 CFR 1926.500. |
| | Electrocution/Contact with Electricity | Electrocution/Contact with Electricity <ul style="list-style-type: none"> ◆ Live parts of wiring or equipment shall be guarded to protect all persons or objects from contacting them. ◆ Plugs & receptacles shall be kept out of water unless they are of the approved submersible type. ◆ Cords will be kept from heat and sharp edges. ◆ All electrical tools and equipment will be equipped with GFCI. |
| Hot Start-Up Procedures | Inhalation Hazards | Inhalation Hazards <ul style="list-style-type: none"> ◆ Air monitoring will be performed per the SHSP. ◆ Respiratory protection will be required if air monitoring levels exceed recommended exposure limits. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|-------------------|---|
| | Chemical Exposure | Chemical Exposure <ul style="list-style-type: none"> ◆ Protective clothing (per the SHSP) will be worn. ◆ Skin will be rinsed with water if contact with hazardous materials occurs. ◆ Hazard communication training will be conducted to review the hazards associated with the chemicals to be handled. |
| | Spills | Spills <ul style="list-style-type: none"> ◆ Spill and absorbent materials will be readily available. ◆ All process chemicals will be stored in their appropriate storage areas inside the treatment building. ◆ Incompatible materials will be stored separately. |
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual handling of materials. ◆ Team lifting will be used if mechanical devices are not available. |
| | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves will be worn. ◆ All hand & powered tools will be maintained in safe condition. ◆ First aid kits will be available adjacent to work areas. |
| | Eye Injury | Eye Injury <ul style="list-style-type: none"> ◆ ANSI approved safety goggles or full-faced respirator will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Portable eye wash station will be readily available. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|-------------------|---|
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Debris will not be allowed to accumulate where it becomes a hazard. ◆ Even terrain will be utilized for equipment use. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-1 Section 21 and 29 CFR 1926.500. |
| | Noise | Noise <ul style="list-style-type: none"> ◆ Hearing protection (ear muffs or ear plugs) shall be worn in work areas where the decibel level may be above 85dba. ◆ Wear hearing protection when in the vicinity of heavy equipment, pumps or other noise producing machinery or if having difficulty speaking with someone when standing 3 feet apart. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1). ◆ All wire ropes, chains & slings will be rated for the load that it is expected to lift. ◆ All lifting materials will be inspected at the beginning of each work shift and prior to each use. Defective equipment will be tagged and taken out of service. ◆ All ground personnel will stay clear of all suspended loads. |

Project: CM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|-------------------|--|
| | Heat Stress | Heat Stress <ul style="list-style-type: none"> ◆ Drink adequate amounts of liquids throughout the workday. ◆ Eat three meals a day to supply nourishment. ◆ Seek cool area and rest when needed. ◆ Watch fellow workers for signs of heat stress. ◆ Institute work/rest regimens as necessary. ◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F. |
| | Cold Stress | Cold Stress <ul style="list-style-type: none"> ◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats). ◆ Seek heated area when needed. ◆ Watch fellow workers for signs of cold stress. ◆ Air temperature and wind chill should be monitored. |
| | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ Steel toe boots meeting ANSI Standard Z41 will be worn. ◆ Ground personnel will be instructed to stay clear of suspended loads. ◆ Personnel will be instructed on proper rigging procedures. |
| | Fire | Fire <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguisher will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |
| Sampling Effluent, Groundwater and Extraction Wells | Eye Injury | Eye Injury <ul style="list-style-type: none"> ◆ ANSI approved safety goggles or full-faced respirator will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. ◆ http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Portable eye wash station will be readily available. |
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Debris will not be allowed to accumulate where it becomes a hazard. ◆ Even terrain will be utilized for equipment use. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--------------------|---|---|
| Noise | <p>◆ Hearing protection (ear muffs or ear plugs) shall be worn in work areas where the decibel level may be above 85dba.</p> <p>◆ Wear hearing protection when in the vicinity of heavy equipment, pumps or other noise producing machinery or if having difficulty speaking with someone when standing 3 feet apart.</p> | <p>◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1).</p> |
| Overhead Hazards | <p>◆ Drink adequate amounts of liquids throughout the workday.</p> <p>◆ Eat three meals a day to supply nourishment.</p> <p>◆ Seek cool area and rest when needed.</p> <p>◆ Watch fellow workers for signs of heat stress.</p> <p>◆ Institute work/rest regimens as necessary.</p> <p>◆ Physiological monitoring to be conducted when ambient temperatures greater than 85°F.</p> | <p>◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1).</p> |
| Heat Stress | <p>◆ Wear adequate number of dry, layered clothing (insulated coveralls, gloves, hats).</p> <p>◆ Seek heated area when needed.</p> <p>◆ Watch fellow workers for signs of cold stress.</p> <p>◆ Air temperature and wind chill should be monitored.</p> | <p>◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1).</p> |
| Cold Stress | <p>◆ Steel toe boots meeting ANSI Standard Z41 will be worn.</p> | <p>◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1).</p> |
| Dropped Objects | <p>◆ Steel toe boots meeting ANSI Standard Z41 will be worn.</p> | <p>◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1).</p> |
| Fire | <p>◆ 10-lb. ABC type fire extinguishers will be located adjacent to the work area.</p> <p>◆ Smoking will not be allowed in the work area.</p> | <p>◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1).</p> |
| Inhalation Hazards | <p>◆ Air monitoring will be performed per the SHSP.</p> <p>◆ Respiratory protection will be required if air monitoring levels exceed recommended exposure limits.</p> | <p>◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1).</p> |
| Chemical Exposure | <p>◆ Protective clothing (per the SHSP) will be worn.</p> <p>◆ Skin will be rinsed with water if contact with hazardous materials occurs.</p> <p>◆ Hazard communication training will be conducted to review the hazards associated with the chemicals to be handled.</p> | <p>◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1).</p> |

Project: GM-38 Area Groundwater Treatment Building & Systems-NIWRP
 Activity: Startup and Shakedown of Treatment Plant

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|------------------------------------|---|--|
| Off-Gas Effluent Monitoring | <p>Spills</p> <p>Dermal Burns</p> <p>Inhalation Hazards</p> <p>Chemical Exposure</p> <p>Overhead Hazards</p> <p>Dropped Objects</p> <p>Fire</p> | <p>Spills</p> <ul style="list-style-type: none"> ◆ Spill and absorbent materials will be readily available. <p>Dermal Burns</p> <ul style="list-style-type: none"> ◆ When handling sample lines & equipment, insulated gloves will be worn. ◆ Hot surfaces will be labeled with warning signs. ◆ When opening valves, personnel will stand to the side and not in front of the valve that is to be opened. <p>Inhalation Hazards</p> <ul style="list-style-type: none"> ◆ Air monitoring will be performed per the SHSP. ◆ Respiratory protection will be required if air monitoring levels exceed recommended exposure limits. <p>Chemical Exposure</p> <ul style="list-style-type: none"> ◆ Protective clothing (per the SHSP) will be worn. ◆ Skin will be rinsed with water if contact with hazardous materials occurs. ◆ Hazard communication training will be conducted to review the hazards associated with the chemicals to be handled. <p>Overhead Hazards</p> <ul style="list-style-type: none"> ◆ All personnel will be required to wear ANSI approved hard hats (Standard Z89.1). <p>Dropped Objects</p> <ul style="list-style-type: none"> ◆ Steel toe boots meeting ANSI Standard Z41 will be worn. <p>Fire</p> <ul style="list-style-type: none"> ◆ 10-lb. ABC type fire extinguishers will be located adjacent to the work area. ◆ Smoking will not be allowed in the work area. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|---|---|
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Personnel will clear walkways of equipment & materials. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Debris will not be allowed to accumulate where it becomes a hazard. ◆ Even terrain will be utilized for equipment use. ◆ The anchor point of a lanyard shall be strong enough to support at least two times the potential impact load of the employee's fall. ◆ Ladders shall be extended three feet beyond the landing zone. ◆ Ladders shall be placed on firm, level surfaces and tied off at both the top & bottom. ◆ When utilizing man and scissor lifts, do not exceed the manufacturer's recommended platform load capacities. ◆ A full-body harness and lanyard shall be used when operating an extend-a-boom lift. ◆ All man and scissor lifts shall meet the requirements outlined in 29 CFR 1910.68. ◆ Fall protection shall be provided to workers exposed to falls of 6 feet or more, as specified by EM 385-1-1 Section 21 and 29 CFR 1926.500. |
| | Eye Injury | Eye Injury <ul style="list-style-type: none"> ◆ ANSI approved safety goggles or full-faced respirator will be worn. ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. ◆ http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Portable eye wash station will be readily available. |
| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
| <ol style="list-style-type: none"> 1. Heavy Equipment 2. Fire Extinguishers 3. PID, Detector Tubes, and CGI/O2 meter 4. PPE (coveralls, tyvek, full faced masks, booties, steel toe boots, hard hats, safety glasses, leather or Kevlar gloves, ear plugs or ear muffs). 5. First Aid Kits | <ol style="list-style-type: none"> 1. Initial inspection will be conducted prior to use. 2. Monthly inspections will be performed. 3. Pre and Post Calibration/system checks will be performed daily. 4. An initial inspection of each lot of PPE will be performed. 5. Daily safety & weekly inspections will be performed. | <ol style="list-style-type: none"> 1. Only qualified equipment operators will be used. 2. Personnel will be given instructions on proper use of fire extinguishers. 3. Proficiency training for users will be given. 4. Personnel will be given training on proper donning/doffing procedures. 5. Personnel with first aid & CPR training will be identified. Bloodborne pathogen training will be reviewed with CPR & first aid trained employees. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|---|---|
| 6. Diesel Fuel/Oil & Other Potentially Hazardous Materials 7. Spill Control Materials | 6. Daily safety inspection of storage & use areas will be conducted. 7. Daily safety inspection of spill control materials will be conducted. | 6. Hazard communication training will be given. 7. Personnel will be given training on how to respond to spilled materials. |
| 8. Chains, Slings or Ropes 9. Hand Tools (non-powered) 10. Torches, welders and grinders 11. Powered Tools 12. Safety Cans 13. Man Lifts/Scissor Lifts 14. Full-Body Harnesses and Lanyards 15. GFCIs 16. Extension Cords 17. Ladders | 8. Inspections will be performed prior to each work shift and each use. 9. Initial inspections will be conducted prior to use. 10. Initial inspections will be conducted prior to use. 11. Initial inspections will be conducted prior to use. 12. Daily safety inspections of storage & use areas will be performed. 13. Initial inspections will be conducted prior to use. 14. Initial inspections will be conducted prior to use. 15. Monthly inspections will be performed. 16. Monthly inspections will be performed. 17. Monthly inspections will be performed. | 8. Personnel will be trained on proper use of chains, slings and ropes. 9. Personnel will be given training on the safety procedures associated with hand tools. 10. Proficiency training for users will be given. 11. Personnel will be given training on the safety procedures associated with powered tools. 12. Use & storage procedures will be reviewed. 13. Personnel will be instructed on fall protection requirements. 14. Personnel will be trained on proper use of full-body harnesses and lanyards. 15. Personnel will be instructed on proper use of GFCIs. 16. Personnel will be instructed on proper use of extension cords. 17. Personnel will be instructed on proper use of ladders. |

ACTIVITY HAZARD ANALYSIS

| MAJOR STEPS | | PROTECTIVE MEASURES/CONTROLS | |
|---|---------------------------|--|--|
| Project: <u>GM-38 Area Groundwater Treatment Building & Systems-NWIRP</u> Activity: <u>New Groundwater Monitoring Well Installation</u> Location: <u>Bethpage, NY</u> | | | |
| Drill Rig Operations | | Struck By/Against/ Caught By | Struck By/Against/Caught By |
| Underground Hazards | Underground Hazards | <ul style="list-style-type: none"> ◆ No loose clothing, gauntlet-type gloves, rings, or watches will be worn by personnel operating drill rig. | <ul style="list-style-type: none"> ◆ All underground utilities will be identified prior to drilling. The New York State One-Call System will be contacted and drilling locations will be screened using geophysical techniques, such as GPR or magnetometer. ◆ All marked utilities will be inspected so that personnel are familiar with types and locations of utilities. Any drilling will take place at least five feet away from any marked utilities. |
| Flying Objects and Debris | Flying Objects and Debris | <ul style="list-style-type: none"> ◆ Safety glasses meeting ANSI Standard Z87 will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dustgeneratingtasks/conditions. ◆ http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Splash shields and chemical goggles meeting ANSI Standard Z87 will be worn where applicable. | <ul style="list-style-type: none"> ◆ Safety glasses meeting ANSI Standard Z87 will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dustgeneratingtasks/conditions. ◆ http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Splash shields and chemical goggles meeting ANSI Standard Z87 will be worn where applicable. |
| Overhead Hazards | Overhead Hazards | <ul style="list-style-type: none"> ◆ All personnel will wear hard hats meeting ANSI Standard Z89.1. ◆ All ropes will be rated for the load which it is expected to lift. All ropes will be inspected at the beginning of each work shift. ◆ All ground personnel will stay clear of all suspended loads. | <ul style="list-style-type: none"> ◆ All personnel will wear hard hats meeting ANSI Standard Z89.1. ◆ All ropes will be rated for the load which it is expected to lift. All ropes will be inspected at the beginning of each work shift. ◆ All ground personnel will stay clear of all suspended loads. |
| Inhalation Hazards | Inhalation Hazards | <ul style="list-style-type: none"> ◆ Work activities will be conducted in modified Level D PPE, with upgrades in respiratory protection based on real time air monitoring results, site conditions and the SHSO's judgment. ◆ Air monitoring will be performed per the SHSP. The frequency of monitoring may be reduced at the discretion of the SHSO. | <ul style="list-style-type: none"> ◆ Work activities will be conducted in modified Level D PPE, with upgrades in respiratory protection based on real time air monitoring results, site conditions and the SHSO's judgment. ◆ Air monitoring will be performed per the SHSP. The frequency of monitoring may be reduced at the discretion of the SHSO. |
| Spills | Spills | <ul style="list-style-type: none"> ◆ Absorbent material will be readily available. ◆ Drip pans, polyethylene sheeting or other means will be used for secondary containment. | <ul style="list-style-type: none"> ◆ Absorbent material will be readily available. ◆ Drip pans, polyethylene sheeting or other means will be used for secondary containment. |
| Noise | Noise | <ul style="list-style-type: none"> ◆ All equipment will be equipped with manufacturers required mufflers. ◆ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (earmuffs or plugs). | <ul style="list-style-type: none"> ◆ All equipment will be equipped with manufacturers required mufflers. ◆ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (earmuffs or plugs). |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: New Groundwater Monitoring Well Installation

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---------------------------|--------------------|---|
| Fire | Fire | <ul style="list-style-type: none"> ◆ Smoking and open flames are not permitted. ◆ All equipment shall be equipped with 10 lb. ABC type fire extinguishers. ◆ 10 lb. ABC type fire extinguishers shall be readily available. |
| Slip/Trip/Fall | Slip/Trip/Fall | <ul style="list-style-type: none"> ◆ Personnel will clear walkways and stairs of equipment and materials. ◆ Other obstructions will be marked, identified, or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Debris will not be allowed to accumulate where it becomes a hazard. ◆ Cover all open boreholes at the end of the work day. |
| Back Injuries | Back Injuries | <ul style="list-style-type: none"> ◆ Back Injuries ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ No person shall lift more than 50 lbs. unaided. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| Electrical Hazards | Electrical Hazards | <ul style="list-style-type: none"> ◆ Electrical Hazards ◆ Use GFCI devices with any items that plug into an electrical outlet. ◆ Inspect electrical and extension cords prior to use. Repair or dispose of any frayed cords. |
| Sharp Objects | Sharp Objects | <ul style="list-style-type: none"> ◆ Sharp Objects ◆ Cut resistant work gloves such as Kevlar will be worn when handling sharp objects. ◆ Only use utility knives with self-retracting blades or those equipped with a guard over the blade. See www.martor.com for knife types. ◆ Do not use pocket knives, box cutters or knife found on Leatherman-type tools. ◆ All hand and power tools will be maintained in safe condition. ◆ First aid kits will be available by work area. |
| Eye Injury | Eye Injury | <ul style="list-style-type: none"> ◆ Eye Injury ◆ ANSI approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. ◆ http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Portable eye wash station will be available. |
| Equipment Decontamination | Back Injuries | <ul style="list-style-type: none"> ◆ Back Injuries ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|---|--|
| | Eye Injury from Liquids and Foreign Objects | Eye Injury from Liquids and Foreign Objects <ul style="list-style-type: none"> ◆ Safety glasses and full faced shield complying with ANSI Standard Z87 will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ A portable eye wash station will be located by work area. |
| | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn. ◆ All hand and power tools will be maintained in safe condition. ◆ First aid kits will be readily available. ◆ Guards will be kept in place while using hand or power tools. ◆ Only use utility knives with self-retracting blades or those equipped with a guard over the blade. See www.martor.com for knife types. ◆ Do not use pocket knives, box cutters or knife found on Leatherman-type tools. |
| | Slip/Trip/Fall | Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Work areas and means of access shall be maintained safe and orderly. ◆ Obstructions will be marked, identified, or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Wet surfaces will be marked and identified. ◆ Accumulation of ice or standing water will be removed as necessary during decon work. |

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-----------------------|--------------------------------|---|
| | Struck By (Water Stream) | <p>Struck by (Water Stream)</p> <ul style="list-style-type: none"> ◆ Proper instruction on safe use of pressure washers will be conducted. ◆ Operators will not fix the hand trigger in the open position such that if the wand were left unattended, water would spray from the tip. ◆ Operator will not hold any equipment while washing it. ◆ All pressure washers will be equipped with a deadman's switch. ◆ Use nominal temperature and pressure. ◆ Use wand extenders only. ◆ Pressure washers shall not be left running unattended. ◆ Pressure washers will be inspected daily and prior to use (hoses, gaskets, tips, connections). Ones that are not in good working order will be red tagged (removed from service) and repaired before use. ◆ First aid kit will be located adjacent to work area. ◆ Face-shields will be worn when pressure washing, face-shields are to be worn in addition to safety glasses not in lieu of them. ◆ Washers will be utilized in a manner that they were designed for, no changes to the operational condition will be accepted. (i.e. operational pressures will not be increased). ◆ Turn pressure washer off when performing maintenance or changing out tips. |
| | Fire | <ul style="list-style-type: none"> ◆ Refueling or maintenance will only be performed when the pressure washer has been shut down. Always keep Gasoline, Diesel away from any potential ignition sources that may exist within the refueling area. ◆ Pressure washers will not be started unless a steady flow of water is running to the machine (pressure washers shall not be run dry). ◆ 10 lb. ABC type fire extinguishers will be located adjacent to work area. |
| | Overhead Hazards | <ul style="list-style-type: none"> ◆ All personnel are required to wear hard hats. |
| | Dropped Objects | <ul style="list-style-type: none"> ◆ All personnel are required to wear steel toe boots. ◆ All tools will be tethered. |
| | Chemical Exposure | <ul style="list-style-type: none"> ◆ Protective clothing (poly-coated tyveks, chemical gloves, safety glasses, full faced splash shields, and chemical boots) will be worn. Level D respiratory protection will be worn unless PID readings require upgrade. ◆ Skin will be rinsed with water if contact with hazardous materials occurs. |
| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: New Groundwater Monitoring Well Installation

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|--|--|---|
| 1. Drill Rig | 1. Initial inspection by TEC will be conducted prior to use. Daily inspection thereafter. | 1. Only qualified drillers will operate drill rig. |
| 2. Fire Extinguishers | 2. Monthly inspections will be performed. | 2. Personnel will be given instructions on proper use of fire extinguishers. |
| 3. PID and CGI/O ₂ Meter | 3. Pre and post calibrations/system checks will be performed daily. | 3. Proficiency training for users will be given. |
| 4. Level D and Level C PPE | 4. An initial inspection of each lot of PPE will be performed. | 4. Personnel will be given training on proper donning and doffing procedures. |
| 5. First Aid Kits | 5. Daily safety and weekly inspections will be performed. | 5. Personnel with first aid and CPR will be identified. Bloodborne pathogen training will be reviewed with CPR and first aid trained employees. |
| 6. Diesel Fuel/Oil and Other Potentially Hazardous Materials | 6. Daily safety inspection of storage and use areas will be conducted. | 6. Hazard communication training will be given. |
| 7. Spill Control Materials | 7. Weekly inspections of spill control materials will be conducted. | 7. Personnel will be given training on how to respond to spilled materials. |
| 8. Hand Tools (e.g., hammers) | 8. Initial inspections will be conducted prior to use. | 8. Personnel will be given training on the safety procedures associated with hand tools. |
| 9. Safety Cans | 9. Daily safety inspections of storage & use areas will be performed. | 9. Use & storage procedures will be reviewed. |
| 10. Pressure Washers | 10. Daily inspections and inspections prior to use will be performed (hoses gaskets, tips, connections). | 10. Personnel will be given instructions on the safe use of pressure washers. |

ACTIVITY HAZARD ANALYSIS

| MAJOR STEPS | | POTENTIAL HAZARDS | | PROTECTIVE MEASURES/CONTROLS | |
|--|------------------------------|---|---|------------------------------|--|
| Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP Activity: Off-Site Waste Transportation and Disposal Location: Bethpage, NY | | | | | |
| Place Waste into Roll-off Boxes, Frac Tanks or Drums | Struck By/Against/ Caught By | Struck by/Against/Caught By | <ul style="list-style-type: none"> ◆ Be aware of heavy equipment operations. ◆ Keep out of the swing radius of heavy equipment. ◆ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times. ◆ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ◆ Ground personnel will not stand directly behind heavy equipment when it is in operation. ◆ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! | | |
| | Flying Objects and Debris | Flying Objects and Debris | <ul style="list-style-type: none"> ◆ Safety glasses meeting ANSI Standard Z87 will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. | | |
| | Noise | Noise | <ul style="list-style-type: none"> ◆ All equipment will be equipped with manufacturers required mufflers. ◆ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (earmuffs or plugs). | | |
| | Fire | Fire | <ul style="list-style-type: none"> ◆ Smoking and open flames are not permitted. ◆ All equipment shall be equipped with 10 lb. ABC type fire extinguishers. ◆ 10 lb. ABC type fire extinguishers shall be readily available. | | |
| | Slip/Trip/Fall | Slip/Trip/Fall | <ul style="list-style-type: none"> ◆ Personnel will clear walkways and stairs of equipment and materials. ◆ Other obstructions will be marked, identified, or barricaded. ◆ Tripping and poor footing hazards will be repaired as they are discovered or will be clearly identified. ◆ Debris will not be allowed to accumulate where it becomes a hazard. ◆ Cover all open boreholes at the end of the work day. | | |
| Back Injuries | Back Injuries | <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ No person shall lift more than 50 lbs. unaided. ◆ Team lifting will be utilized in lieu of mechanical devices. | | | |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Off-Site Waste Transportation and Disposal

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|---|---------------------------|--|
| | Sharp Objects | Sharp Objects <ul style="list-style-type: none"> ◆ Cut resistant work gloves such as Kevlar will be worn when handling sharp objects. ◆ Only use utility knives with self-retracting blades or those equipped with a guard over the blade. See www.marlor.com for knife types. ◆ Do not use pocket knives, box cutters or knife found on Leatherman-type tools. ◆ All hand and power tools will be maintained in safe condition. ◆ First aid kits will be available by work area. |
| | Eye Injury | Eye Injury <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. ◆ http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 ◆ Portable eye wash station will be available. |
| Hand Tools (e.g., spark-proof bung wrench, ratchets) | Struck By | Struck By <ul style="list-style-type: none"> ◆ Work gloves will be worn. ◆ First aid kits will be available adjacent to the work area. |
| | Slips/Trips/Falls | Slips/Trips/Falls <ul style="list-style-type: none"> ◆ Tools will be kept in storage. ◆ Work areas and means of access shall be maintained safe and orderly. ◆ Other obstructions will be marked, identified or barricaded. ◆ Tripping or poor footing hazards will be repaired as they are discovered or will be clearly identified. |
| | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ Steel toe boots will be worn. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel are required to wear hard hats. |
| | Flying Objects and Debris | Flying Objects and Debris <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. ◆ http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |
| Drum Handling | Vehicular Traffic | Vehicular Traffic <ul style="list-style-type: none"> ◆ Spotters will be used when backing up trucks and moving equipment. ◆ Vehicles will be equipped with backup alarms. |

Project: GM-38 Area Groundwater Treatment Building & Systems-NWIRP
 Activity: Off-Site Waste Transportation and Disposal

Location: Bethpage, NY

| MAJOR STEPS | POTENTIAL HAZARDS | PROTECTIVE MEASURES/CONTROLS |
|-------------|-------------------|---|
| | Back Injuries | Back Injuries <ul style="list-style-type: none"> ◆ Site personnel will be instructed on proper lifting techniques. ◆ Mechanical devices will be utilized to reduce manual material handling. ◆ Team lifting will be utilized in lieu of mechanical devices. |
| | Overhead Hazards | Overhead Hazards <ul style="list-style-type: none"> ◆ All personnel will wear hard hats. |
| | Dropped Objects | Dropped Objects <ul style="list-style-type: none"> ◆ Steel toe boots will be worn. |
| | Flying Debris | Flying Debris <ul style="list-style-type: none"> ◆ ANSI approved safety glasses will be worn. ◆ ANSI approved, tight fitting, safety goggles will be worn during high wind or dust generating tasks/conditions. http://www.shop.com/op/~AO_Safety_Maxim_153_2x2_Goggle-prod-12292770 |

Project: GM-38 Area Groundwater Treatment Building & Systems-NW/IRP
 Activity: Off-Site Waste Transportation and Disposal

Location: Bethpage, NY

| EQUIPMENT USED | INSPECTION REQUIREMENTS | TRAINING REQUIREMENTS |
|--|--|---|
| 1. Heavy Equipment | 1. Initial inspection will be conducted prior to use. | 1. Only qualified equipment operators will be used. |
| 2. Fire Extinguishers | 2. Monthly inspections will be performed. | 2. Personnel will be given instructions on proper use of fire extinguishers. |
| 3. Level D and Level C PPE | 3. An initial inspection of each lot of PPE will be performed. | 3. Personnel will be given training on proper donning and doffing procedures. |
| 4. First Aid Kits | 4. Daily safety and weekly inspections will be performed. | 4. Personnel with first aid and CPR will be identified. Bloodborne pathogen training will be reviewed with CPR and first aid trained employees. |
| 5. Diesel Fuel/Oil and Other Potentially Hazardous Materials | 5. Daily safety inspection of storage and use areas will be conducted. | 5. Hazard communication training will be given. |
| 6. Spill Control Materials | 6. Weekly inspections of spill control materials will be conducted. | 6. Personnel will be given training on how to respond to spilled materials. |
| 7. Hand Tools (e.g., wrench, hammers) | 7. Initial inspections will be conducted prior to use. | 7. Personnel will be given training on the safety procedures associated with hand tools. |
| 8. Safety Cans | 8. Daily safety inspections of storage & use areas will be performed. | 8. Use & storage procedures will be reviewed. |

Appendix D
Temperature Extremes

EHS 4-6:


Temperature Extremes (Previously HS 4-6)

Purpose

The purpose of this program is to prevent heat and cold stress related injuries and illnesses at field operations.

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Table of Contents

See Below

1.0 PURPOSE

The purpose of this program is to prevent heat and cold stress related injuries and illnesses at field operations.

2.0 SCOPE

This program applies to all Tetra Tech EC, Inc. ("the Company") and subcontractor field personnel that may be exposed to heat or cold stress during the performance of their field work assignments.

3.0 MINIMUM REQUIREMENTS

3.1 Responsibilities

3.1.1 Line Management

Site Supervisors have the responsibility to:

- a. Provide resources and facilities necessary to prevent health effects from temperature extremes
- b. Enforce work rules related to such prevention
- c. Ensure implementation of the requirements of this program as specified in the Site Environmental, Safety and Health (EHS) plans.

3.1.2 Environmental, Health and Safety Personnel

The Project Environmental and Safety Manager (PESM) will make the initial determination of heat and cold stress prevention requirements as part of the site EHS Plan (see EHS 3-2, EHS Plans) and oversee the implementation of this program on a project basis for all Company field programs.

The Environmental Safety Supervisor (ESS) will assist with implementation of heat and cold stress prevention programs. The ESS will, in most cases, be the person responsible for monitoring heat and cold stress on the job, determining work/rest and work/warm-up schedules where used, and will implement emergency response or corrective action, if needed. The ESS will train site personnel on the effects of temperature extremes and the site prevention program, and will maintain records related to this program.

The ESS will implement the appropriate heat stress or cold stress requirements when temperatures indicate a potential heat or cold stress condition. The ESS will work with the line management to implement work rest regimens or other administrative controls such as ceasing certain activities, changing PPE, or engineering controls such as warming areas, cooling areas or shifting work schedules.

3.2 General Program Requirements

Adverse weather conditions must be considered when planning site operations. Excessively hot or cold working environments can produce a number of different injuries. Critical to the ability to care for those injuries is a basic understanding of the way in which the body maintains its temperature and how it physiologically adjusts to extremes of heat and cold. Attachment 1 provides information on the body's physiological responses to heat and cold stress.

Proper care of victims who are suffering from the effects of heat or cold exposure will help to minimize injuries and speed recovery. On the other hand, improper treatment of these emergencies can result in serious injury, disability, or death.

The most effective first aid for any injury is prevention. When acceptable monitoring and prevention programs are followed, there should be no victims.

3.3 Heat Stress

A heat stress prevention program will be implemented when ambient temperatures exceed 70°F (21° C) for personnel wearing impermeable clothing and for other personnel when the WBGT index exceeds the ACGIH Threshold Limit Values. When a WBGT is not available or applicable (enclosed work areas, work over asphalt or reflective materials etc.) physiological (pulse, temperature) monitoring may be used in its place.

WBGT devices located away from the project (up to several miles) maybe used for monitoring the project if the general weather and measured work surfaces are similar.

3.3.1 Selection of Chemical Protective Clothing

The PESH will review site data and working conditions and select the personal protective equipment ensemble that best protects the employees from site hazards. The risk of heat related illness will be fully considered in balancing the risks and benefits of the PPE.

Where contact with a waste material is unlikely; contact is not expected to result in a serious dermal hazard; and significant absorption of the contaminants is not likely to occur, then impermeable clothing should not be required. In this case, the risk of heat related illness may grossly outweigh the benefits provided by such equipment. Even when chemical protective clothing is needed, the PESH should consider the probable exposure scenarios and select protective equipment accordingly. For example, if dermal exposure is likely to be localized, strong consideration should be given to using gloves, boots, gauntlets, leggings, aprons, bibs, face shields, etc., in lieu of full body coveralls and respirators.

3.3.2 Hydration

The Company will supply cool (50°–59°F) potable water or other suitable drinks (e.g., sport electrolyte replacements) for fluid replacement. Employees involved in the heat stress prevention program will be trained and encouraged to drink at a rate of approximately 8 oz. every 20 minutes. Individual cups will be used and kept in closed containers or dispensers.

3.3.3 Cool Rest Areas

Shaded rest areas will be provided. On large remediation projects, air conditioned rest

areas should be provided for workers exposed to heat stress conditions. In low humidity locations, evaporative coolers or misting devices and fans can be used to provide cool down locations. On smaller projects, personnel can use air-conditioned vehicles as cool down areas.

3.3.4 Other Prevention Elements

The PESM, ESS and the Project Manager will incorporate other elements into the heat stress prevention program as necessary. The selected elements will be described in the EHS plans. Engineering controls are preferred. Where their use is not feasible, the program must incorporate administrative/work practice controls, personal protective equipment, or a combination. Examples of prevention program elements include:

a. Engineering Controls

- Air conditioned cabs for heavy equipment and vehicles (Such controls may eliminate the need for other program elements)
- Fans or blowers
- Cold water for drenching personnel in impermeable clothing. This can be provided through a garden hose, a garden sprayer filled with ice water, a clean drum full of water for "hard hat dipping" or containers of ice water and clean towels in the rest area to hasten cool down

b. Administrative and Work Practice Controls

- Adjusting work schedules to do the bulk of the work during the cooler parts of the day
- Acclimatizing workers
- Implementing work/rest regimens (See Attachment 2 for Work/Rest Regimen Procedures)

c. Personal Protective Equipment

- Ice vests
- Circulating water vests
- Vortex tubes and air circulating vests

Where ice vests and circulating water vests are used, rest periods of approximately 15 minutes should be taken when ice packs or batteries need to be changed. Continuous work over long periods of time with these devices may present an increased musculoskeletal injury risk due to the extra weight. Since the duration of the cooling effectiveness of these devices will vary with heat and work loads, users must be instructed to leave the area to replenish ice or batteries at the first sign of loss of cooling.

d. Monitoring

A program of environmental and physiological monitoring must be established in order to use work/rest regimens to verify the effectiveness of the regimens. The monitoring procedures are described in Attachment 2.

3.3.5 Training

All site personnel must receive training on the following topics:

- a. Health effects of hot environments and symptoms of heat related illness
- b. Personal risk factors; work loads
- c. Effect of personal protective equipment on heat stress conditions
- d. Preventive measures
 - Physiological monitoring methods and thresholds
 - Acclimatization
- e. Fluid replacement; including taking frequent breaks for fluid replacement on an as-needed basis
- f. Elements of the site Heat Stress Prevention Program
- g. First aid and emergency response

Records shall be maintained in accordance with EHS 1-9, Recordkeeping

3.4 Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trenchfoot or immersion foot, and hypothermia as well as slippery surfaces, brittle equipment, poor judgment and taking short cuts. The current ACGIH threshold limit values (TLVs) for cold stress will be used as a guideline. The Company will implement the following cold stress prevention program elements when there is a potential for cold related injuries.

3.4.1 Personnel Protective Equipment

The following personal protective equipment will be provided as necessary to Company employees when conditions indicate a potential for cold-related injury. Subcontractors will be expected to supply appropriate equipment to their employees.

- a. Hard hat liners
- b. Gloves or glove liners
- c. Rain gear or water impermeable coveralls and gloves for potentially wet operations
- d. Fleeced boot liners where rubber steel-toe boots are used
- e. Winter coveralls

3.4.2 Engineering Controls

A variety of engineering controls shall be evaluated to minimize cold stress. These include:

- a. General or spot heating should be used to increase temperature at the workplace.
- b. If fine work is to be performed with bare hands in a cold environment, special provisions should be made to keep the workers' hands warm. Warm air jets, radiant heaters, or contact warm plates can be used
- c. The work area should be shielded from winds and drafts that may affect the wind chill factor
- d. The air velocity in refrigerated rooms should be minimized as much as possible, and should not exceed 1m/sec in the work zone
- e. At temperatures below freezing, metal handles of tools and control bars should be covered with thermal insulating material
- f. Unprotected metal chair sets should not be used as they conduct heat away from the body
- g. When necessary, equipment and processes should be substituted, isolated, relocated, or redesigned to reduce cold stress at the worksite
- h. Power tools, hoists, cranes, or lifting aids should be used to reduce metabolic workload
- i. Heated warming shelters such as tents and cabins should be made available if work is performed continuously in an equivalent chill temperature of 20°F or below
- j. The ESS may implement a work-rest schedule to reduce exposure to cold stress
- k. Scheduled rest breaks should be enforced
- l. Personnel exposed to the cold should be provided the opportunity for frequent intake of warm, sweet, caffeine-free, nonalcoholic liquids or soup
- m. Work should be moved to warmer areas whenever possible
- n. Extra workers should be assigned to highly demanding tasks
- o. Workers should be allowed to pace themselves, taking breaks when needed
- p. Workers shall be trained in the prevention, symptoms, and emergency response to cold stress
- q. Utilize the "buddy system" to monitor cold stress symptoms among the workers
- r. Allow new employees time to adjust or "acclimate" to cold conditions
- s. Minimize the need to sit or stand in one place for long periods of time
- t. Minimize the amount of work time spent in a cold environment
- u. Allow for the weight and bulkiness of protective clothing when estimating work performance goals and tasks

3.4.3 Warm Rest Areas

The Company will make warm rest areas, e.g., heated trailers, available for rest breaks in cold weather. Employees will be permitted and encouraged to use the heated trailers whenever they experience symptoms of cold stress.

3.4.4 Work/Warm-Up Schedules

The work/warm-up schedule found in the ACGIH TLVs for cold stress will be followed. In addition, the Company will make warm-up periods available to employees who need to change into dry clothing to prevent immersion foot or hypothermia.

3.4.5 Training

All Company employees and subcontractors will be trained in:

- a. The effects of cold stress, including frostbite, immersion foot and hypothermia
- b. Personal risk factors
- c. Recognition of the symptoms
- d. Methods employees can use to protect themselves
- e. First aid procedures and recognition of medical emergencies

Records shall be maintained in accordance with EHS 1-9, Recordkeeping

4.0 GUIDELINES

This section shall contain optional guidance information to successfully execute the procedure or guideline.

4.1 Definitions

4.1.1 Adjusted Temperature

The dry bulb temperature adjusted to account for solar radiation, to be used as a heat stress indicator for personnel in impermeable protective clothing.

4.1.2 Deep Frostbite

The tissue beneath the skin is solid to the touch; it may involve a full thickness freeze to the bone. This is an extreme emergency and can result in permanent tissue loss.

4.1.3 Frostbite

Freezing of body tissue.

4.1.4 Frostnip or Incipient Frostbite

A cold related injury that progresses slowly and is painless while developing. The

victim is usually unaware that he/she has frost nip. The skin first becomes reddened, then changes to white; no freezing of tissue occurs.

4.1.5 Heat Cramp

Painful muscle spasms usually occurring on the arms, legs, and abdomen; caused by excessive loss of body electrolytes from profuse sweating.

4.1.6 Heat Exhaustion/Fatigue

Heat Exhaustion is a form of shock that occurs when the body loses large amounts of water and electrolytes from excessive perspiration after exposure to heat and physical activity; also called heat prostration. Symptoms include profuse sweating, pale, cool, sweaty skin and other symptoms identified in Attachment 1, Section 1.3.

Heat fatigue refers to the temporary state of discomfort and mental or psychologic strain arising from prolonged heat exposure. Works unaccustomed to the heat are particularly susceptible and can suffer, to varying degrees, a decline in task performance, coordination, alertness, and vigilance.

4.1.7 Heat Rash

Profuse tiny raised red vesicles (blister-like) on affected areas of the skin which cause a prickling sensation during heat exposure.

4.1.8 Heat Stroke

A life-threatening condition caused by rapidly rising body core temperature that occurs when the body's temperature regulating mechanisms are overwhelmed. Sweating stops and the skin is dry and hot.

4.1.9 Hyperthermia

A rise in body core temperature above 99.6 F.

4.1.10 Hypothermia

Decreased body core temperature from prolonged exposure to freezing or near-freezing temperatures. This is the most life-threatening cold injury and affects the entire body with possible localized severe cooling.

4.1.11 Superficial Frostbite

Frostbite which affects the skin and tissue just beneath the skin. The skin is firm and waxy, tissue beneath is soft and numb. The skin turns purple and may tingle and burn during warming.

4.1.12 Wet-Bulb Globe Temperature (WBGT)

Method used to measure the environmental factors (e.g., temperature, relative humidity) which impacts the body's physiological responses to heat.


4.1.13 Wind-Chill Factor or Equivalent Chill Temperature (ECT)

An index describing the effect of the cooling power of moving air on exposed flesh. The effect of wind velocity at a certain temperature is expressed as the equivalent cooling effect of a lower temperature with still air.



4.1.14 Work/Rest Regimen

The ratio of time spent working to time spent resting in an area designed to relieve heat related conditions. This ratio is expressed in one hour periods. Example: A work/rest regimen of 75% work, 25% rest corresponds to 45 minutes work, 15 minutes rest each hour.

5.0 REFERENCES

| Please Describe Your Reference Here | Place Your Link in this Column |
|---|---|
| 1. ACGIH (American Conference of Government Industrial Hygienists) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, 2005 | |
| 2. Fundamentals of Industrial Hygiene. Third Edition, 1988 | |
| 3. National Safety Council | |
| 4. NIOSH (National Institute for Occupational Safety and Health) | |
| 5. NIOSH/OSHA/EPA/USCG/EPA | |
| 6. Occupational Exposure to Hot Environments, Revised Criteria 1986 | |
| 7. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities - October 1985 | |
| 8. EHS 1-9, Recordkeeping |  |
| 9. EHS 3-2, Environmental, Health & Safety Plan(s) | |
| 10. | |

6.0 ATTACHMENTS

| Please Provide a Description of the Attachment | Place Your Attachments Here |
|--|--|
| 1. Heat and Cold Stress Information |  EHS 4-6, Attachment 1.doc |
| 2. Work/Rest Regimens and Monitoring |  EHS 4-6, Attachment 2, 9-7-05.doc |
| 3. | |
| 4. | |
| 5. | |

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ATTACHMENT 1

HEAT AND COLD STRESS INFORMATION

1.0 HEAT STRESS

Hot weather can cause physical discomfort, loss of efficiency, and personal injury. The human body strives to maintain a constant core temperature of 98.6 F (37^oC). If this temperature is to be maintained, heat loss must equal heat production. This balance is maintained by variations in the blood flow to the outer part of the body. When the core temperature rises, blood vessels beneath the skin dilate, and the blood brings increased heat to the skin, where it is dissipated by radiation and convection. This works only as long as the skin temperature is higher than the temperature of the outside environment. Heat loss by radiation convection is impossible when the temperature of the outside air approaches or exceeds the temperature of the skin. The body will now rely on dissipation through evaporation of sweat. But the sweat mechanism also has limits. The normal adult can sweat only about one liter per hour and can sweat at that rate for only a few hours at a time. In addition, sweating is effective only if the relative air humidity is low. Sweat evaporation ceases entirely when the relative humidity reaches 75 percent.

Of particular concern in heat stress monitoring is the use of personal protective clothing which decreases natural body ventilation and greatly increases the temperature and humidity to the skin. If precautions are not taken, heat stress will progress into a heat-related injury. Heat-related injuries fall into three major categories: heat cramps/fatigue, heat exhaustion, and heat stroke.

1.1 Heat Cramps

Heat cramps are the least common and least severe of heat injuries. Heat cramps occur when the electrolytic balance in the blood between water, calcium, and sodium (salt) is altered. Low blood salt level, from profuse sweating and inadequate salt consumption, is the usual cause.

1.1.1 Symptoms

- a. Severe muscle cramps and pain, especially of the upper legs, calves, and abdomen, and occasionally in the arms
- b. Faintness and dizziness
- c. Possible nausea and vomiting

1.1.2 Treatment

Emergency care will include:

- a. Remove victim from the hot environment
- b. Dilute one level tablespoon of salt in 15 quarts of water or use a commercial product with a low glucose content; allow victim to sip this solution at the rate of one-half glassful every 15 minutes
- c. To relieve pain, gently stretch the involved muscle group; gently message cramps as long as it does not increase the pain or discomfort

The victim should avoid exertion of any kind for 12 hours. A victim of heat cramps is prone to recurrence.

1.2 **Heat Fatigue**

Heat Fatigue is most likely to affect new, or un-acclimatized workers.

1.2.1 **Symptoms**

- a. Loss of energy, extreme tiredness
- b. Stumbling, staggering, or loss of balance. The loss of balance is a particular risk to workers on elevated surfaces or climbing.
- c. Excessive skin redness as body moves blood to surface
- d. Lack of judgment recognizing the onset of heat fatigue and taking action to remove themselves from the environment for cool down and hydration

1.2.2 **Treatment**

- a. Remove from the hot work environment for cool down
- b. Extend cool-down period or cessation of work for the day with extra hydration and rest
- c. Enhance observations by other workers and physiological monitoring
- d. Provide individual work/rest regimens until acclimatized

1.3 **Heat Exhaustion**

1.3.1 **Symptoms**

Heat exhaustion is the most common heat injury and usually occurs in an individual who is involved with heavy physical exertion in a hot, humid environment, and is wearing protective clothing. Heat exhaustion is a mild state of physical shock caused by the pooling of blood in the vessels just below the skin, causing blood to flow away from the major organs of the body. Due to prolonged and profuse sweating, the body also loses large amounts of salt and water.

The symptoms of heat exhaustion include:

- a. Profuse sweating
- b. Pale, cool, sweaty skin
- c. Headache and extreme weakness, fatigue
- d. Nausea and possible vomiting
- e. Dizziness and faintness
- f. Collapse and possible brief unconsciousness
- g. Body core temperature normal, may even be slightly below normal

1.3.2 Treatment

Emergency care will include:

- a. Remove victim from the hot environment and out of the exclusion zone
- b. Lie victim down with feet slightly raised
- c. Remove as much clothing as reasonable (especially personal protective clothing); loosen what cannot be removed
- d. Apply cold, wet compresses to the skin; fanning will also aid in cooling
- e. If the victim is fully alert, allow him/her to drink water or the same solution, at the same rate, that was used for the emergency care of heat cramps
- f. If the victim vomits, do not give fluids by mouth, transport him/her to a hospital immediately (dehydration is the most critical problem in heat exhaustion victim; intravenous fluids will have to be given)
- g. Take oral temperature every 10 minutes, if the victim's temperature is above 101° F (38.3 C) or shows a steady increase, transport to a hospital immediately and start sponging him/her off with cool water

1.4 Heat Stroke

Heat stroke is a true life-threatening emergency having a mortality rate of 20 to 70 percent. This condition results when the heat regulating mechanisms of the body breaks down and fail to cool the body sufficiently. The body temperature rises to between 105° F and 110° F (40.6 – 43.3° C); no sweating occurs in about 50 percent of the victims. Because no cooling takes place, the body stores increasingly more heat, and eventually brain cells are damaged, causing permanent disability or death. About 4,000 Americans die of heat stroke annually.

There are two basic kinds of heat stroke: classic heat stroke and exertional heat stroke. Classic heat stroke, in which people lose the ability to sweat, generally effects the elderly or chronically ill. Exertional heat stroke, in which victims retain the ability to sweat, is accompanied by physical exertion and muscle stress. Exertional heat stroke is the type that will be most commonly encountered on a field operation requiring strenuous physical activity.

1.4.1 Symptoms

- a. Oral temperature of 105 F (40.6 C) or higher
- b. Hot, reddish skin, skin is usually dry
- c. Headache
- d. Dry mouth
- e. Shortness of breath
- f. Nausea or vomiting
- g. Increasing dizziness and weakness

- h. Mental confusion and anxiety; victims may show unusual irritability, aggression, combative agitation, or hysterical behavior
- i. Convulsions, sudden collapse and possible unconsciousness; all heat stroke victims having varying levels of consciousness, ranging from disorientation to coma

1.4.2 Treatment

Emergency care will include:

- a. Remove the victim from the hot environment and from the exclusion zone
- b. Call for trained emergency medical personnel **immediately**
- c. Remove as much clothing as reasonable (especially personal protective clothing); cut clothing with bandage scissors, if necessary, being careful not to injure victim
- d. Pour cool water over the victim, avoiding his nose and mouth
- e. Fan the victim
- f. Place cold packs under the arms and against neck and ankles
- g. Wrap victim in a wet blanket
- h. Continue a combination of these methods until the oral temperature falls below 103 F (39.4 C) (take measures to prevent chilling, i.e., use slower cooling if the victim starts shivering)
- i. Elevate the head and shoulders slightly during cooling
- j. Never give the victim anything to drink unless fully conscious and vomiting is unlikely

Because heat stroke involves the entire body, a number of complications may result:

Brain swelling, convulsions, coma, kidney failure, liver failure, high blood pressure and heart failure.

Therefore, always transport the victim to a hospital even if the body core temperature has lowered to near normal.

1.5 Heat Stroke Verses Heat Exhaustion

The two most reliable and distinct differences between heat stroke and heat exhaustion are:

1.5.1 Heat Stroke

- a. Skin flushed (red); may be dry; hot to touch
- b. Oral temperature above 105°F (40.6 C)

1.5.2 Heat Exhaustion

- a. Skin pale; wet or clammy; cool to touch

- b. Oral temperature usually normal

2.0 COLD STRESS

Hypothermia is a drop in the core body temperature below 98.6 F (37 C). The first symptoms of hypothermia are uncontrollable shivering and the sensation of cold; this is followed by a slowed and sometimes irregular heart beat, a weakened pulse and a drop in blood pressure. Vague or slow slurred speech, memory lapses, apathy, incoherence and drowsiness can occur. Other symptoms may include cool skin, slow, irregular breathing, apparent exhaustion, and fatigue after rest.

2.1 Prevention

Hypothermia is caused by prolonged exposure to a cold environment, whether air, water, or snow and ice. Adequate dry clothing with appropriate insulating capacity must be provided to workers to prevent hypothermia, especially if work is performed in air temperatures below 40 F (4.4 C). Wind chill is a critical factor. Work at a slow but steady pace. The job should be a "no sweat" operation.

Unless there are unusual or extenuating circumstances, cold injury to other than the extremities (hands, feet, and head) is not likely to occur without the development of the initial signs of hypothermia. Older workers or workers with circulatory problems require special precautionary protection against hypothermia. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are special precautions that should be considered for these workers. The precautionary actions to be taken will depend upon the physical condition of the worker and should be determined with the advice of a physician with knowledge of the cold stress factors and the medical condition of the worker.

2.2 Treatment

First aid for mild hypothermia will be performed as follows:

- a. End the exposure - get the victim out of the cold and wet
- b. Replace wet clothing with dry or add insulation to clothing
- c. Offer warm, non-alcoholic fluids
- d. Increase exercise
- e. Seek shelter from wind, wet and cold

CAUTION: If the victim remains cold for a number of hours, chemical changes may have taken place which, on rewarming, may cause major medical problems for the victim and which could result in death. Severely hypothermic victims are best warmed in the hospital under controlled conditions. If a severely hypothermic victim cannot be transported to a hospital within a few hours, re-warming should begin in the field.

2.3 Frostbite

2.3.1 Prevention

Frostbite can be prevented by wearing sufficient protection to prevent skin from coming into prolonged contact with a freezing environment. The following steps can be taken.

- a. Wear sufficient clothing. Mittens are better than gloves. Face masks and wool stocking caps are better than hats. Wind and waterproof hoods protect the face and neck.
- b. Clothing should be loose enough to prevent constriction of blood vessels. Boots must be roomy enough to permit movement of the toes with no feeling of tightness.
- c. Do not contact conductive metals or contact gasoline or other solvents with bare skin as rapid evaporation of solvents may quickly lead to frozen tissues in a cold environment.
- d. Exercise the toes and fingers to maintain circulation.
- e. Observe the condition of your partners' face, hands and ears frequently for signs of frostbite.
- f. Avoid smoking and drinking alcoholic beverages.

2.3.2 Symptoms

Frostbite can occur either before or after the onset of hypothermia when body tissue (usually an extremity) is exposed to freezing temperatures. Frostbite occurs when the fluids surrounding tissue cells freezes. The danger of frostbite increases with increased wind chill and/or reduced temperatures below 32 F (0 C). Frostbite can also occur if tissues are in prolonged contact with a frozen material or object. Skin contact with frozen metal, for example, can result in frostbite in a short period of time, even in a warm environment.

There are three degrees of frostbite:

- a. First degree - freezing without blistering or peeling, "frostnip"
- b. Second degree - freezing with blistering and/or peeling, and
- c. Third degree - freezing resulting in the death of skin tissue and possibly the death of underlying tissues as well

Symptoms of frostbite include the following:

- a. The skin changes color to white or grayish-yellow, progresses to reddish-violet, and finally turns black as the tissue dies
- b. Pain may be felt at first, but subsides
- c. Blisters may appear, and
- d. The affected area is cold and numb

2.3.3 Treatment

First aid for superficial (first degree) frostbite is as follows:

- a. Place a warm body part next to the frozen area, applying firm, steady pressure.
- b. DO NOT RUB THE AREA. Rubbing may cause further damage to already injured skin.
- c. Protect the area from further freezing.

First aid for deep frostbite (second and third degree) is as follows:

- a. KEEP THE FROZEN PART FROZEN!
- b. Prevent further injury: avoid rubbing and further freezing of unaffected tissue.
- c. If the part has thawed, the part should NOT be allowed to refreeze or bear weight. A victim with thawed feet should be carried out.
- d. Give the victim plenty of fluids and evacuate to medical assistance as soon as possible.

2.4 Trench Foot

2.4.1 Symptoms

This condition may be caused by long, continuous exposure to cold without freezing, combined with persistent dampness or actual immersion in water. Edema (swelling), tingling, itching, and severe pain occur, and may be followed by blistering, death of skin tissue, and ulceration. When other areas of the body are affected besides the feet, the condition is known as chilblains.

2.4.2 Prevention

Trench foot and chilblains can be prevented by keeping the body as dry as possible at all times. Waterproof boots should be worn when required, but provisions must be made for preventing excessive perspiration to accumulate inside the boots. Socks should be changed at least twice daily and the boots wiped dry inside with each change of socks. The feet should also be wiped dry and foot powder applied.

2.4.3 Treatment

Affected body parts should not be rubbed or massaged, but bathed in water using plain white soap. Dry thoroughly and elevate the body part, allowing the body part to be exposed at room temperatures. If the feet are affected, do not walk during treatment.

ATTACHMENT 2

WORK/REST REGIMEN AND MONITORING

1.0 INTRODUCTION

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

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

Formal work/rest regimens are based either on 1) monitoring ambient conditions (e.g., with a Wet Bulb Globe Temperature (WBGT), estimating work loads and establishing work/rest times, 2) monitoring physiological conditions and adjusting work/rest periods, or 3) using personnel heat stress monitors.

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

This attachment includes guidance for monitoring and preventing heat stress and heat strain in accordance with the 2005 ACGIH.

2.0 WBGT-BASED WORK/REST REGIMENS

2.1 Work/Rest Regimens

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

The work/rest regimen using the WBGT procedure will be used as a guideline, as the WBGT is only an index of the environment. Table 2-A and 2-B outlines the work/rest regimen guidelines based upon WBGT temperature and workload for un-acclimatized and acclimatized workers respectively. Table 2-C identifies the correction factors. The WBGT temperature will be determined in accordance with Section 2.3 of this attachment. Table 2-D provides examples of work activity categories. Rest areas should be near the work areas, shaded, and with adequate supplies of cool water. Aids to assist in evaporative cooling such as fans or blowers should be considered.

2.2 Acclimatization

Acclimatization is a gradual physiological adaptation that improves an individual's ability to tolerate heat stress. Full heat acclimatization requires up to 3 weeks of continued physical

activity under heat-stress conditions similar to those anticipated for the work. Its loss begins when the activity under those heat-stress conditions is discontinued, and a noticeable loss occurs after 4 days. With a recent history of heat stress exposures (e.g. 5 of the last 7 days), a worker can be considered acclimatized for the purpose of using Table 2-B.

Numerous factors can affect acclimatization and a worker's ability to work in heat, including age and off-work activities (amount of sleep, consumption of alcoholic beverages, prescription and nonprescription medications (e.g. antihistamines and other medications that decrease the body's ability to carry water or reduce sweating).

WORK/REST REGIMENS AND MONITORING

Table 2-A
Examples of Permissible Heat Exposure Threshold Limit Values
For Un-acclimatized Workers
(Values are given in °F and (°C) WGBT)*

| Work - Rest Regimen | Work Load Category | | | |
|--------------------------------|--------------------|-------------|-------------|-------------|
| | Light | Moderate | Heavy | Very Heavy |
| Continuous work | 81.5 (27.5) | 77 (25.0) | 72.5 (22.5) | -- |
| 75% Work - 25% Rest, each hour | 84.2 (29.0) | 79.7 (26.5) | 76.1 (24.5) | -- |
| 50% Work - 50% Rest, each hour | 86 (30.0) | 82.4 (28.0) | 79.7 (26.5) | 77 (25.0) |
| 25% Work - 75% Rest, each hour | 87.8 (31.0) | 84 (29.0) | 82.4 (28.0) | 79.7 (26.5) |

Table 2-B
Examples of Permissible Heat Exposure Threshold Limit Values
For Acclimatized Workers
(Values are given in °F and (°C) WGBT)*

| Work - Rest Regimen | Work Load Category | | | |
|--------------------------------|--------------------|-----------|-----------|------------|
| | Light | Moderate | Heavy | Very Heavy |
| Continuous work | 85.1 (29.5) | 80 (27.5) | 77 (26) | -- |
| 75% Work - 25% Rest, each hour | 87 (30.5) | 82 (28.5) | 78 (27.5) | -- |
| 50% Work - 50% Rest, each hour | 89 (31.5) | 85 (29.5) | 82 (28.5) | 83 (27.5) |
| 25% Work - 75% Rest, each hour | 90 (32.5) | 88 (31) | 86 (30) | 85 (29.5) |

Notes on Table 2-A & 2-B:

- a. These values are for fully acclimatized workers wearing light weight pants and shirts. For conditions other than this use this table with the correction factors from Table 2-B.
- b. These values assume that workers drink frequently and have properly increased salting of food prior to exposure.
- c. These values are guidelines. Actual levels may be modified based on individual physiological response and actual work and rest conditions.
- d. These values assume that the rest location is cool enough to alleviate heat load conditions.

Table 2-C
Correction Factors for Table 2-A in °F*

| Clothing Type | WBGT Correction |
|--|-----------------|
| Summer work uniform | 0 F |
| Cotton overalls | -3.5 F |
| Double Cloth (woven material Coveralls | -5 F |
| Winter work uniform | -7 F |
| Water barrier, permeable | -11 F |

Notes on Table 2-C:

To use this table, identify the most restrictive applicable clothing type involved. Modify Table 2-A temperatures by this amount. For example, the Table 2-A TLV for continuous work, light workload is 86° F. If cotton overalls (+3.5 F) are used with acclimatized workers the Corrected Temperature is 89.5° F.

Table 2-D
Examples of Activities within Metabolic Rate Categories

| Categories | Example Activities |
|------------|---|
| Resting | Sitting quietly |
| | Sitting with moderate arm movements |
| Light | Sitting with moderate arm and leg movements |
| | Standing with light work at machine or bench while using mostly arms |
| | Using a table saw |
| | Standing with a light or moderate work at machine or bench and some walking about |
| Moderate | Scrubbing in a standing position |
| | Walking about with moderate lifting or pushing |
| | Walking on level at 3.5 mph (6 km/hr) while carrying a 6.6 lb (3 Kg) weight load |
| Heavy | Carpenter sawing by hand |
| | Shoveling dry sand |
| | Heavy assembly work on a noncontinuous basis |
| | Intermittent heavy lifting with pushing or pulling (e.g. pick and shovel work) |
| Very Heavy | Shoveling wet sand |

2.3 WBGT Determination

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

| | |
|---|-----|
| Outdoors with solar load: $WBGT = 0.7 NWB + 0.2GT + 0.1DB$ | (1) |
| Indoors or outdoors with no solar load: $WBGT = 0.7 NWB + 0.3GT$ | (2) |

Where:

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

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

- a. Through the use of a direct-reading heat stress monitor capable of measuring all of the individual factors associated with the WBGT equation. For example, the Reuter-Strokes, Metronics, or Quest heat stress monitors.
- b. By measuring the individual factors manually using the following type of equipment
 - Natural Wet-Bulb Temperature Thermometer
 - Dry-Bulb Temperature Thermometer
 - Globe Temperature Thermometer

WBGT should be operated in accordance with the manufacturer's instructions. The location of the WBGT device should be evaluated based on the work. Work inside buildings (no wind), within depressions or excavations, over asphalt or black liners (such as HPDE) would dictate that the device should be located near the area to account for the difference in the globe temperature due to radiance and reflection. Work on open soil/gravel will have a lesser affect on the readings and will allow the readings to be indicative of a large area (up to several miles). (Note WBGT readings for the area can frequently be obtained on a realtime basis from weather stations, or from the internet).

3.0 ADJUSTED TEMPERATURE BASED WORK/REST REGIMENS

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

$$T^{\circ} \text{ adjusted} = \text{ambient dry bulb temperature} + (13 \times \% \text{ sunshine})$$

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

The adjusted temperature values are then used to determine the initial work/rest regimen and physiological monitoring frequency. Table 2-E gives the work period and monitoring frequency. Initially, rest periods will be at least 15 minutes. Physiological monitoring that is normally recommended is pulse rate and body temperature. Procedures for each are described below. Initially, both should be done. Pulse rate monitoring may be discontinued with the approval of the PESM if temperature monitoring proves to be effective.

4.0 PHYSIOLOGICAL MONITORING

As the metabolic rate increases in response to work demands, the guideline values in Table 2-A & 2-B decrease to ensure that most workers will not experience a core body temperature above 100.4 F (38 C) for un-acclimatized workers or 101.3 F (38.5 C) for acclimatized workers. One or more of the following measures may mark excessive heat strain, and an individual's exposure to heat stress should be discontinued when any of the following occur.

Physiological monitoring will commence at the discretion of the ESS or when WBGT monitoring is not performed and ambient temperatures exceed 70 F (21 C). . . Physiological monitoring should be used whenever work/rest regimens are implemented to verify the effectiveness of the work/rest ratio including the cool down periods.

4.1 Pulse Rate Monitoring

Sustained (several minutes) heart rate is in excess of 180 beats per minute (bpm) minus the individual's age in years (180-age), for individuals with normal cardiac performance, or recovery heart rate greater than 110 bpm after a peak work effort.

Take the pulse immediately at the start of the rest period (P1). Take the pulse again 1 minute into the rest period. If any of the following conditions exist, shorten the next work period by a third:

P1 > 110 beats per minute (bpm)

P2 > 90 bpm

P1 - P2 < 10 bpm.

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

4.2 Body Core Temperature

Obtaining an accurate body core temperature for sustained work can be difficult, as the body will start to cool as soon as work is stopped or if protective clothing is removed and evaporation rates are increased. Monitor personnel as soon as possible to obtain an accurate temperature following the manufacturer's instructions for the particular instrument used.

Take the oral, ear or temporal temperature immediately at the start of the rest period. If the temperature exceeds 99.5 F (37.5 C) shorten the next work period by a third. Do not return the worker to hot work in semi-permeable or impermeable clothing until the body temperature is less than 99.5 F (37.5 C).

Body temperatures may be taken with disposable oral thermometers or infrared ear drum scanners, such as the Thermoscan. Note: If a Thermoscan unit is purchased, the Pro Model should be selected. The home model available through drugstores cannot be recalibrated. Temporal infrared thermometers are also available and may be considered to be less intrusive to the workers than oral or ear measurement devices.

(Note- Instruments coming in contact with skin or body fluids (sweat, saliva, etc) should either be used with disposal covers or sanitized between use.)

4.3 Removal from Exposure

If an individual requires a shortening of the work period on more than two consecutive monitoring periods, or repeatedly over a few days, they should be removed from exposure to hot environments, wearing semi-permeable impermeable protective clothing until examined and cleared for such work by the consulting physician.

Table 2-E
Initial Work Period and Physiological Monitoring Frequency

| ADJUSTED TEMPERATURES | SCHEDULE |
|-----------------------|-------------|
| 90° F or above | 15 minutes |
| 87.5° - 90° F | 30 minutes |
| 82.5° - 87.5° F | 60 minutes |
| 77.5° - 82.5° F | 90 minutes |
| 70° - 77.5° F | 120 minutes |

Notes on Table 2-E:

- a. Schedule is for fit and acclimatized workers in impermeable protective clothing.
- b. Work in impermeable protective clothing should include consideration of a buddy rule (no lone workers), particularly at higher temperatures. The observers should be watching for sudden or severe fatigue, lightheadedness, loss of balance, loss of judgment or clumsiness that may be indicative of heat fatigue or heat stress.
- c. The above temperatures should be adjusted for the % of sunshine as indicated in Section 3.0.
- d. Personnel should be permitted to self-limit exposures and encouraged to observe co-worker observation to detect signs and symptoms of heat strain in others.
- e. The monitoring frequencies may be adjusted for individuals after experience with their work in heat stress environments has been gained provided the work involved, PPE, and other factors remain the same.

Appendix E
Underground Utilities

EHS 3-15:


Underground Utilities

Purpose

This program provides requirements and recommendations relative to identification, location, avoidance, and management of underground utilities, appurtenances, and structures during intrusive activities.

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1.0 PURPOSE

This program provides requirements for identification, location, and avoidance of underground utilities, appurtenances, and structures during intrusive activities, as defined in Section 4.0. The program also addresses actions to be taken in response to encountering or contacting underground utilities.

2.0 SCOPE

These requirements are applicable to all Tetra Tech FW, Inc. (TtFW) operations. The procedures address the requirements and recommendations for identifying and locating, working around, and encountering or contacting underground utilities.

3.0 MAINTENANCE

The Director, Environmental, Safety and Quality (ESQ) Programs, is responsible for updating this procedure. Approval authority rests with TtFW's President and Chief Executive Officer. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director, Administration and Compliance.

4.0 DEFINITIONS

4.1 Aggressive Methods

The use of mechanized equipment such as excavators, backhoes, drill rigs, directional drilling, road saws, etc. Non-Aggressive methods involve the use of manual or non-mechanized methods such as hand-digging with shovels and air/hydro/vacuum methods.

4.2 Buffer Zone

As defined in this procedure, the area around a utility where only non-aggressive excavation methods may be utilized, unless specific conditions are met.

The definition cited above, and the excavation requirements and restrictions associated with it, will vary depending on the particular state regulations. TtFW requires the imposition of a four-foot Buffer Zone on all sides of the utility as measured from the outside edges of the utility, both horizontally and vertically. Since most jurisdictions recognize Buffer Zones which vary somewhere in the range of 18 to 36 inches, this distance must be verified by consulting the applicable state regulations before excavating so that adjustments to surface markings can be

made to achieve the TtFW-required four-foot buffer zone.

Referred to as the "Tolerance Zone", "Safety Zone", or "Approximate Location of Underground Utilities" in some jurisdictions.

Information relative to excavation within the buffer zone is contained in Section 5.2.2.4.

4.3 Competent Person

A Competent Person has the ability to recognize hazards associated with underground utilities and the authority to stop or direct operations to ensure the safety of personnel and conformance with this procedure. The Competent Person has an understanding of this procedure, and the "One-Call" system requirements for the jurisdiction where excavation is occurring. The Competent Person must be capable of notifying One-Call agencies and maintaining and tracking One-Call Locate Numbers. Additionally, they must have knowledge of methods and work practices for utility identification, avoidance, and protection.

4.4 De-Energize

As applicable to a utility, to physically eliminate and/or prevent the presence, transmission, flow, or release of energy or materials which may cause harm to personnel or property.

4.5 Excavation

An operation for the purpose of movement or removal of earth, rock, or the materials in the ground, including but not limited to; digging, blasting, augering, backfilling, test boring, drilling, pile driving, directional drilling, grading, plowing-in, hammering, pulling-in, jacking-in, trenching, tunneling, structural demolition, milling, scraping, tree and root removal (grubbing), fence or sign post installation. TtFW requires that the designated One-Call agency for the applicable jurisdiction be contacted any time an intrusive activity is planned.

4.6 Jurisdiction

The authority having legal jurisdiction relative to regulations and requirements for notification of excavation activities and associated identification and marking. In the United States, the states have jurisdiction, and most consider the regulations applicable when excavation is to be performed in any location, including any public or private way, any company right-of-way or easement, or any public or privately owned land or way.

4.7 Locate

To indicate the existence of a utility by establishing a mark through the use of flags, pins, stakes, paint, or some other customary manner, that approximately determines the location of a line or facility.

4.8 Locate Request

A communication between an entity performing intrusive activities and a utility marking agency (One-Call, etc).

4.9 Observer

The person assigned to visually monitor and, as needed, signal the operator during mechanized intrusive activity when the activity is occurring within four feet of the outside edge of the buffer zone. This person remains in close communication with the equipment operator(s) and will stop the activity if needed.

4.10 One-Call Agency

An entity that administers a system through which a person can notify owners/operators of underground lines or utilities of the intent to perform intrusive activities in proposed public areas.

4.11 Positive Response

Communication with the entity performing intrusive activities, prior to the activity, to ensure that all contacted (typically via the One-Call agency) owner/operators have located and marked the underground utilities.

4.12 Potholing

The practice of exposing an underground facility by safe, non-aggressive excavation methods in order to ascertain the precise horizontal and vertical position and orientation of underground lines or utilities.

4.13 Underground Utility

An underground or submerged conductor, pipe, or structure used in providing electric or

communications service (including but not limited to, traffic control loops and similar underground or submerged devices), or an underground or submerged pipe used in carrying, providing, or gathering gas, oil or oil product, sewage, storm drainage, water or other liquid service (including, but not limited to, irrigation systems), and appurtenances thereto. As used in this procedure, utility includes all underground appurtenances and structures.

The following are examples of the types of underground utilities that may be present in a given location:

- Natural gas pipelines
- High voltage electric cables
- Water pipelines
- Fiber optic telecommunications lines
- Steam pipelines
- Gasoline, oil, or other fuels
- Sewer pipelines
- Hazardous Materials
- Underground Storage Tanks (USTs)
- Abandoned underground structures containing hazardous materials, hazardous wastes, and radioactive materials

Note: Electrical and pressurized mechanical underground utilities that are not energized shall be considered as applicable to the requirements of this procedure until they are disconnected and removed or protected by a lockout/tagout system approved by TtFW (see Section 5.2.2.6)

4.14 Underground Utility Owner

Any person, utility, municipality, authority, political subdivision or other person or entity who owns, operates, or controls the operation of an underground line/facility.

4.15 White Lining

The practice whereby the entity which intends to perform intrusive activities pre-marks the site with an outline of the area where intrusive activities will occur. This involves the use of white paint, flags, stakes, or a combination thereof to mark the extent of where work is to be performed. The marking may vary depending on what intrusive activities are to be conducted. For example, for general excavation, an areal outline of the excavation shall be marked, while for drilling, the individual boreholes shall be marked. Studies have shown that pre-marking is a practice that does prevent utility contact incidents.

5.0 DISCUSSION

5.1 Responsibilities

5.1.1 Competent Person

The Competent Person shall be responsible for:

- Obtaining a copy of, and understanding the applicable regulations for the state of jurisdiction where the excavation activities are to be performed.
- Contacting the appropriate One-Call agency or private locating service, as applicable.
- Recording One-Call locate numbers.
- If necessary, renewing One-Call locate numbers before expiration.
- Ensuring that white-lining of the area to be excavated is performed.
- Ensuring that a "positive response" has been received from every utility owner/operator identified by the One-Call agency and that they have located their underground utilities and have appropriately marked any potential conflicts with the areas of planned intrusive activities.
- Completion of the *Underground Utilities Locating and Marking Checklist* (Attachment A) and the *Underground Utilities Management Checklist* (Attachment B).
- Reviewing applicable AHAs with all project members before work begins.
- Conducting training on communication protocols to be used by the excavation observer and equipment operator.
- Ensuring Implementation of appropriate work practices during intrusive activities (including maintaining the prescribed buffer zone for use of aggressive methods).
- Conducting daily inspections of the excavation area to make sure that all markings are intact.
- Maintaining required records.
- Providing the Environmental and Safety Supervisor (ESS) with all required documentation on a daily basis.

5.1.2 Observer

Whenever intrusive operations with mechanized equipment are being conducted within four feet of the outside edge of the buffer zone, horizontally and vertically, an observer must be assigned to monitor the activities. The observer is responsible for:

- Observing the operation to ensure that the operator stops operations if utilities are observed.
- Reviewing hand signals and other forms of communication with the operator.
- Properly signaling the operator.
- Stopping the operation immediately if the observer's attention must be diverted even momentarily.
- Stopping the operation immediately if a hand signal or other directive is not followed. Operations will not resume until the observer and operator mutually agree that the reason(s) for not complying with the directive(s) are/is identified and fully corrected.
- Maintaining required records, such as logbook entries, or other, as requested by line management.

5.1.3 Line Management

The Project Manager (PM) shall be responsible for:

- Ensuring compliance with this procedure.
- Providing the necessary resources for compliance with this procedure.
- Designating Competent Personnel in consultation with the Project Environmental, Health

and Safety Manager (PESM) prior to the start of work.

5.1.4 Environmental, Health and Safety Personnel

The Environmental and Safety Supervisor (ESS) shall be responsible for:

- Providing oversight on the implementation of the requirements contained in this procedure.
- Consulting with the PM and Competent Person on underground utility issues.

5.2 Procedure

The following sections provide the requirements and recommendations of this procedure, which are intended to prevent injury to personnel, damage to infrastructure, and associated indirect effects associated with encountering or contacting underground utilities during the execution of intrusive work. Underground utilities present multiple potential hazards that must be recognized before and during work which occurs near them, therefore, this procedure is divided into sections addressing underground utility identification and location, working around or near underground utilities, and actions to be taken in the event that underground utilities are encountered or contacted. Hazards that may be presented by underground utilities include explosion and fire, electrocution, toxic exposures, pathogens, and drowning.

5.2.1 Identifying and Locating Underground Utilities

The possibility of the existence of underground utilities must be evaluated as early as possible in the planning phase for any project which involves intrusive activities, as defined in Section 4.2. The Task Initiation Procedure (TIP) form should be used for documentation of the identification of this potential hazard and the procedures to be followed to address them. The following sections describe various methods for identifying and locating utilities on a site. Plans should be verified during the readiness review. The *Underground Utilities Locating and Marking Checklist* (Attachment A) and the *Underground Utilities Management Checklist* (Attachment B) must be completed before any activities meeting the definition of excavation in Section 4.2 are conducted. Attachment A is intended to be used as a guide during the process of locating and marking utilities in the area to be excavated. Attachment B is intended to be used as a guide in the overall process of underground utilities management during the course of the project.

All underground utilities on a site involving excavation as defined in Section 4.4, must be located and identified before intrusive activities commence, by one or more of the following entities:

- The Utility Owner
- A Private or Public Utility Locating Service
- An Approved TtFW Competent Person

These options are described in greater detail in the following Sub-Sections:

5.2.1.1 Pre-Planning and the Site EHSP

- The Site-Specific Environmental Health and Safety Plan (EHSP) developed for the

project must:

- Identify the location and types of underground utilities that are believed to be present on the site.
- Reference this procedure (EHS 3-15), and describe how it will be implemented on the project.
- Contain an Activity Hazard Analysis in which the hazards associated with underground utilities are identified, as well as the measures used to control them.
- Contain, as an appendix, a copy of the applicable regulations from the state of jurisdiction where excavation activities are to be performed. These can usually be obtained via the Internet.
- Contain clear and concise procedures to be followed in the event that contact with underground utilities occurs.
- Address underground utilities and potential associated scenarios in the emergency response section of the EHSP.

5.2.1.2 "One-Call" Locating and Marking Services

Every state has utility marking service programs having various names such as "One-Call", "Dig-Safe", "Call-Before-You-Dig", "Dig-Safely", and many others. These services will identify the types and locations of any utility that may exist in an area to be excavated, as long as the property is in the public domain.

- The appropriate One-Call service for the jurisdiction where the project is located must be contacted prior to beginning excavation work. The One-Call agency should be given as detailed a description of the property as possible; address, cross street, utility pole numbers, physical description, etc.
- Notification to the One-Call service shall allow sufficient lead time for the agency to mark the utilities before excavation begins. The lead times vary, but range from two to ten days, depending on the state of jurisdiction.
- A complete listing of One-Call agencies and telephone numbers for all states is available in the "Call-Before-You-Dig Call Center Directory", which can be accessed on the Internet at the WebPage (<http://underspace.com/index.htm>) sponsored by "Underground Focus" magazine.
- Once notified, the One-Call agency will provide the contractor with a unique "locate number" or "reference number". This reference number must be kept in the project files by the Competent Person or designee. Additionally, the reference numbers have expiration dates, which may vary depending on the particular One-Call agency. The valid period of the locate number and required renew notification date shall be requested from the One-Call agency.
- On a project with multiple contractors, each contractor must request a separate locate number. Under no circumstances will any other contractor or entity be allowed to "work under our locate number". Subcontractors to TtFW may excavate under the locate number secured by TtFW, provided that they are excavating within the area which was previously white-lined by TtFW and subsequently marked. **However, the One-Call agency must be contacted and notified of this arrangement so that the subcontractor can be recorded as working under the existing locate number.** If a TtFW subcontractor will be excavating in an area not white-lined by TtFW, then the TtFW subcontractor must request a new locate.
- The area where work is to be performed shall be white-lined by TtFW personnel before the locating service goes to the site.
- It is good practice to arrange a pre-excavation meeting at the project site with the personnel performing the utility location and marking. This meeting will facilitate communications, coordinate the marking with actual excavation, and assure identification of high-priority utilities.

- The One-Call agency should provide the identities of the utility owners that will be notified of the locate request. This information shall be recorded on the Underground Utility Locating and Marking Checklist (Appendix A) and maintained in the project files. The contact person and phone number for each utility owner shall also be recorded.
- The utility owners should provide a “positive response” relative to the locate request, which can consist of two types of action by the utility owner. The facility owner or operator is required to 1) mark it’s underground utilities with stakes, paint, or flags, or 2) notify the excavator that the utility owner/operator has no underground utilities in the area of the excavation.
- The positive responses shall be recorded on the Underground Utility Locating and Marking Checklist (Appendix A) and cross-checked with the list of utility owners that the One-Call agency stated that they would notify. If it is discovered that a utility owner has not provided a positive response, then the One-Call agency must be notified.
- Excavation shall not be conducted until positive responses have been received from all utility owners identified by the One-Call agency as having underground utilities on the property.
- Before beginning excavation, the excavator must verify that the location marked was correct, and the distinct, color-coded markings of all utility owners are present.
- Examine the site to check for any visible signs of underground utilities that have not been located and marked such as pedestals, risers, meters, warning signs, manholes, pull boxes, valve boxes, patched asphalt or concrete pavement, areas of subsidence, fresh sod or grass, lack of grass or vegetation, and new trench lines.
- The markings placed by the utility owners must be documented by TtFW using a still, digital, or video camera. The photo-documentation shall be maintained with the project files indefinitely.
- The markings placed by the utility owners or marking services shall follow the American Public Works Association Uniform Color Code as described in ANSI Standard Z 535.1. This code appears below.

American Public Works Association Uniform Color Code

| | | |
|--------|--|---|
| Red | | Electric Power Lines, Cables, Conduit |
| Orange | | Communications, Telephone, Cable TV |
| Yellow | | Gas, Oil, Steam, Petroleum or Gaseous Materials |
| Green | | Sewers and Drains |
| Blue | | Potable Water Systems |
| Purple | | Reclaimed Water, Irrigation, Slurry Lines |
| Pink | | Temporary Survey Markings |
| White | | Proposed Excavation |

5.2.1.3 Private Utility Locating and Marking Services

- As discussed in Section 5.2.1.1, One-Call agencies arrange for the identification and marking of underground utilities only on public property, up to the point of contact with private property. In the event that excavation activities are to be conducted on non-public properties, the presence, location, depth, and orientation of all underground utilities within the white-lined area shall be ascertained through records review, including any site plot plans, utility layout plans, and as-built drawings available from the property owner, as well as through interviews with knowledgeable personnel associated with the property. Additionally, the information gathered from these sources shall be verified by physical detection methods (non-aggressive), performance of a geophysical survey, or by procuring the services of a private utility locating and marking service. If any detection

methods are to be self-performed, the requirements of 5.2.1.4. must be followed.

The above requirements are also intended to address the potential presence of unknown or undocumented underground utilities, therefore, the area to be excavated must also be evaluated by the PM to determine if the potential for unknown or undocumented underground utilities exist. If the determination is made that the presence of these unknown or undocumented underground utilities is unlikely, then a variance should be requested to eliminate the requirement to identify them.

A list of vendors providing locating and marking services can be found in the “*Network of Underground Damage Prevention Professionals*” which can be accessed on the Internet at the “*Underspace*” WebPage (<http://underspace.com/index.htm>).

- Variance to this requirement above must be approved by the PM and PESM.

5.2.1.4 Self-Performance of Utility Locating and Marking

The techniques and instruments used to locate and characterize underground utilities can be extremely complicated and difficult to use effectively. Additionally, interpretation of the data generated by this instrumentation can be difficult. The utility marking services described in 5.2.1.1 and 5.2.1.2 are staffed by well-trained, experienced professionals who perform locating activities on a regular basis. For these reasons, it is most desirable that these professional services are used for utility location and marking on projects.

- In some instances, such as long-term projects where excavation is a primary task, and the presence of underground utilities is extensive, it may be prudent to self-perform locating and marking activities.
- If locating and marking is to be self-performed, all personnel using instrumentation will be trained on the use of the equipment that will be used, and the interpretation of the data.
- There are variety of locating methods which may be utilized for self-performance of utility locating as categorized below:
- Magnetic field-based locators or path tracers
- Buried electronic marker systems (EMS)
- Ground penetration radar-based buried –structure detectors
- Acoustics-based plastic pipe locators
- Active probes, beacons, or sondes for non-metallic pipes
- Magnetic polyethylene pipe
- Before self-performing any underground utility locating on a project, approval must be obtained from the TtFW Director, EHS Services.

5.2.2 Working Near or Around Underground Utilities

After the site has been properly evaluated for the presence of underground utilities, intrusive activities may begin. Since there is no perfect way of eliminating the hazards presented by underground utilities, an effort must be made to perform the tasks following the direction and guidance as described by the following best practices that should be implemented during the execution of the project.

5.2.2.1 Work Site Review

Before beginning intrusive activities, a meeting shall be held between all members of the project team. This shall consist of a review of the marked utility locations with the equipment operators, observers, laborers, etc.

5.2.2.2 Preservation of Marks

During excavation, efforts must be made to preserve the markings placed by the utility owners until they are no longer required. If any markings are obliterated, the One-Call agency must be contacted for re-marking. No intrusive activities are to take place if markings are not visible.

5.2.2.3 Excavation Observer

Whenever intrusive operations are being conducted within four feet of the edge of the buffer zone, an observer must be assigned to monitor the activities. The observer will be designated each day, and a review of hand signals and other forms of communication between the observer and operator will be conducted. The directives of the observer will be followed precisely and immediately by those operating equipment.

5.2.2.4 Excavation Within The Buffer Zone

Performing intrusive activities within the buffer zone requires careful adherence to proper guidelines and procedures to minimize the risk of contact with underground utilities.

The purpose of the buffer zone is to designate and define an area where careful, prudent, and reasonable excavation practices are to be used to prevent contact with underground utilities. However, there may be occasions where it is necessary to perform aggressive excavation methods in this designated area.

The boundaries of the buffer zone as defined in Section 4.1 will be observed at all times during intrusive activities. Aggressive excavation methods (excavators, backhoes, drill rigs) must be restricted to areas outside of the 4-foot buffer zone unless a special exemption to this requirement is obtained.

Consider whether the objective of the project can be completed without performing intrusive activities in the buffer zone at all. This will greatly reduce the risks presented by performing work in close proximity to underground utilities. If after consideration, the determination is made that intrusive activities in the buffer zone are necessary, then a formal exemption request shall be made to the PESH according to the guidelines below.

A request to utilize aggressive excavation methods in the buffer zone may be made if:

- There is no other appropriate and reasonable alternative to using aggressive methods in the buffer zone; and
- The utility has been de-energized (and purged if necessary), verified as de-energized, and locked-out (per Section 5.2.2.6); or

- the depth and orientation of the utility has been adequately and visually determined through the use of non-aggressive methods such as air/hydro/vacuum excavation, potholing, probing, hand-digging, or a combination thereof; and
- for utilities containing electrical energy, the depth of the existing water table is below the location of the utility; and
- application for the exemption has been submitted to the PESM via a Field Change Notification (FCN); and
- the exemption has been granted and approved in writing by the PESM on the FCN form.

The following conditions will apply to this request:

- Aggressive methods may be used in the buffer zone only to the extent allowed by the applicable state or other jurisdictional regulations.
- Appropriate physical protection measures for exposed utilities as described in Section 5.2.2.5 shall be implemented to eliminate the potential for equipment contact with utilities.
- The extent of the project excavation area to be covered by the exemption request must be specified in the FCN.
- When evaluating the use of aggressive excavation methods in the buffer zone, the PESM will consider the type of utility involved and the associated risk potential.

Based on this evaluation, the PESM may impose further conditions and requirements, which will be detailed in the FCN.

Even if the above exemption conditions are met, the PESM has authority to deny the request, the reasons for which will be described in the FCN.

Unless exempted according to the above provisions of this procedure, only non-aggressive methods may be used within the buffer zone. Non-aggressive, or non-mechanized equipment is used in order to prevent mechanical contact with underground utilities which could result in damage to the utility and create the potential for personal injury and property damage. Following are examples of non-aggressive excavation methods:

- Hand-digging
- Non-conductive hand tools must be used when digging within the buffer zone surrounding underground electrical utilities.
- If conductive hand tools must be used near electrical lines, then the PESM shall be consulted to determine additional requirements relative to safe electrical practices, procedures, and equipment.
- Hydro-excavation (water pressure).
- Air excavation (air pressure).
- Vacuum extraction (soil excavation/removal).
- Air excavation/vacuum extraction combination.
- Aggressive methods may be used for the removal of pavement over a utility, if allowed by the state regulations.

5.2.2.5 Protection of Underground Utilities

It is very important that consideration be given to the protection of underground utilities when performing adjacent intrusive activities. This is necessary not only to prevent physical damage and associated indirect effects, but also to prevent the potential for injury to employees and the

public.

- When using aggressive excavation methods within the buffer zone around exposed underground utilities, physical protection may be appropriate. Basically, this involves creation of a physical barrier between the mechanized operation and the utility. The following are some possible types of physical protective measures:
 - Heavy timbers, similar to swamp mats.
 - Sheets of plywood.
 - Blasting mats.
- Once exposed, underground utilities no longer have the support provided by surrounding soil and may need to be physically supported to prevent shifting, bending, separation, or collapse, which could result in damage to the utility, and possibly personnel. Following are suggested support methods:
 - Timber shoring underneath the utility.
 - Timbers or girders over the top of the excavation fitted with hangers that support the utility.
 - Design by a PE for complicated or large applications.
- Utilities must also be protected from objects that may fall into the excavation such as rocks and equipment. This can be accomplished by following these guidelines:
 - Cast spoils as far away from the excavation as possible. Excavated and loose materials shall be kept two feet from the edge of excavations, as required by OSHA.
 - Relocate large rocks, cobbles, and boulders away from the excavation and sloped spoils piles.
- When vehicles and machinery are operating adjacent to excavations, warning systems such as soil berms, stop logs or barricades shall be utilized to prevent vehicles from entering the excavation or trench.
- Scaling or barricades shall be used to prevent rock and soils from falling into the excavation.
- Barriers shall be provided to prevent personnel from inadvertently falling into an excavation.

5.2.2.6 De-Energizing Utilities

Utilities can carry many types of potential energy, including electricity, flowing liquids, liquids under pressure, gasses under pressure, etc. A release, such as may happen if a utility conveyance is compromised, could result in personal injury, property damage, and other indirect effects. If the white lines of the proposed excavation area overlaps or extends into the buffer zone of a known underground utility, then if at all possible, that utility shall be de-energized to physically prevent the transmission, flow, or release of energy. Conversely, if the buffer zone of the known utility lies outside of the white-lined, proposed excavation area, then de-energization is not required.

- The owner of the utility shall be contacted to determine the feasibility and methodology of de-energizing the utility. Plenty of lead-time should be provided for this since it may take utility companies weeks to de-energize some utilities.
- Depending on the utility and the material being conveyed, isolation points which may be suitable for de-energizing include but are not limited to the following:
 - Electrical circuit breakers
 - Slide gate
 - Disconnect switches
 - Piping flanges
 - Other similar devices
- When utilities are de-energized, it must be verified by demonstration. This can be

accomplished by testing equipment, switching on a machine or lighting, opening a valve, etc. For any current-carrying electrical equipment, such as cables, electrical panels, etc., successful de-energization must be certified through the use of appropriate electrical testing equipment.

- Whenever a utility is de-energized, a means of ensuring that the energy isolation device and equipment cannot be operated until the device is removed must be provided. Typically, this is achieved by utilizing a lockout device, accompanied by a written tag, that physically controls the configuration of the energy isolation point. Lockout devices include but are not limited to the following:
 - Locks
 - Chains
 - Valve covers
 - Circuit breaker hasps
 - Blind flanges
 - Slip blinds, and
 - Multiple lock hasps
- When de-energizing and locking out of utilities is practiced, the provisions of EHS 6-4 Lockout/Tagout, shall be followed, as applicable.
- In the event that a utility is de-energized, but there is no means of adequately providing a physical locking-out of the utility, then a spotter must be posted at the point of isolation to ensure that the utility is not re-energized. The spotter must be supplied with a communication device such as a site radio.

5.2.2.7 Damage Discovery

During excavation, utility damage may be discovered which is pre-existing or otherwise not related to a known contact. Disclosure to the utility owner is very important because the possibility of utility failure or endangerment of the surrounding population increases when damage has occurred. The utility may not immediately fail as a result of damage, but the utility owner or operator must be afforded the opportunity to inspect the utility and make a damage assessment and effect repairs if necessary. The following guidance applies:

- Observe and photograph the utility from a safe distance and determine if there is damage. Damage would be all breaks, leaks, nicks, dents, gouges, grooves, or other damages to utility lines, conduits, coatings, or cathodic protection systems.
- The One-Call agency or private location service must be contacted immediately.

5.2.3 Encountering or Contacting Underground Utilities

In the event that encountering or contacting an underground utility occurs, it is imperative that the appropriate actions are taken to minimize damage to the utility, prevent personal injury, and minimize indirect effects.

5.2.3.1 Encountering Underground Utilities

It is possible that underground utilities will be encountered in locations that have previously been "cleared" of having underground utilities by the locating service, or are found outside of the area which has been marked as having underground utilities. In either case, if this occurs, the following applies:

- Intrusive activities must be curtailed

- The One-Call agency or private location service must be contacted immediately
- The PM and PESM must be notified
- No further intrusive activities may be conducted until:
- The One-Call agency/private location service and/or the subject utility owner visit the site;
- Identification of the utility owner and the type of material/energy being conveyed by the utility has been made; and
- The orientation and depth of the subject utility has been determined and suitably marked.
- A TtFW Incident Report and Investigation form must be completed per EHS 1-7. The report should be accompanied by photographs clearly showing the marking(s), and the actual location, with a distance gauge to document how far off the mark the utility was encountered.

5.2.3.2 Contacting Underground Utilities

If excavation or other equipment being used for intrusive activities makes contact with an underground utility, the following guidelines apply:

- Intrusive activities must be stopped immediately.
- Observe the utility from a safe distance and determine if there is damage. Damage would be all breaks, leaks, nicks, dents, gouges, grooves, scratched coatings, cathodic protection compromise, material leakage, obvious electrical energy.
- Move all personnel to the evacuation meeting point as described in the SSHP.

EXCEPTION: If an electrical line has been contacted and it is your belief that equipment (such as an excavator) is electrically energized, do not approach the equipment. Order the operator to remain in the equipment until emergency personnel can de-energize the source (unless the equipment is on fire, at which time the operator should jump off of the vehicle and shuffle along the ground to a safe area). Shuffling is required because current flows outward through the soil in a ripple pattern called a power gradient, creating a pattern of high and low potential. Shuffling decreases the chance that these gradients could be bridged, causing current to flow through the body, resulting in electrocution.

- Secure the area to prevent the public from entering.
- Contact emergency responders as specified in the SSHP.
- The One-Call agency or if known, the utility owner must be contacted immediately.
- The PM and PESM must be notified.
- No further intrusive activities may be conducted until:
- The utility owner inspects the scene and after repairs, verifies that all danger has passed.
- The orientation and depth of the subject utility has been determined and suitably marked.
- Permission from the emergency responders to resume work has been given.
- A TtFW Incident Report and Investigation form must be completed per EHS 1-7. The report should be accompanied by photographs clearly showing the marking(s), and the actual location, with a distance gauge to document how far off the mark the utility was encountered.
- State and Local regulations must be reviewed to determine if reporting to any additional agencies is required.

5.3 Training

Competent Persons shall have adequate experience and/or training to carry out the requirements

of this procedure.

6.0 SOURCES OF INFORMATION

6.1 Organizations

- Common Ground Alliance
<http://www.commongroundalliance.com/wc.dll?cga-toppage>
- Center for Subsurface Strategic Action (CSSA)
<http://underspace.com/cs/index.htm>
- DigSafely
<http://www.digsafely.com/digsafely/default.asp>
- National Utility Contractors Association (NUCA)
<http://www.nuca.com/>
- National Utility Locating Contractors Association (NULCA)
<http://underspace.com/nu/index.htm>
- Underground Focus Magazine
<http://underspace.com/uf/index.htm>
- NUCA State Listing of One-Call centers
<http://www.nuca.com/>
- Utility Safety Magazine
<http://www.utilitysafety.com/>

6.2 Vendors and Commercial Sites

- RadioDetection, Inc. (Detection Instruments)
<http://www.radiodee.com/>
- Heath Consultants (Detection Instruments)
<http://www.heathus.com/>
- Ben Meadows Company (Detection Instruments)
<http://www.benmeadows.com/cgi-bin/SoftCart.exe/index.html?E+scstore>
- So-Deep, Inc. (Complete Utilities Services)
<http://www.sodeep.com/>
- Concept Engineering Group, Inc. (Air Excavation Equipment)
<http://www.air-spade.com/index.html>
- Rycom Instruments, Inc. (Detection Instruments)
<http://www.rycominstruments.com/>

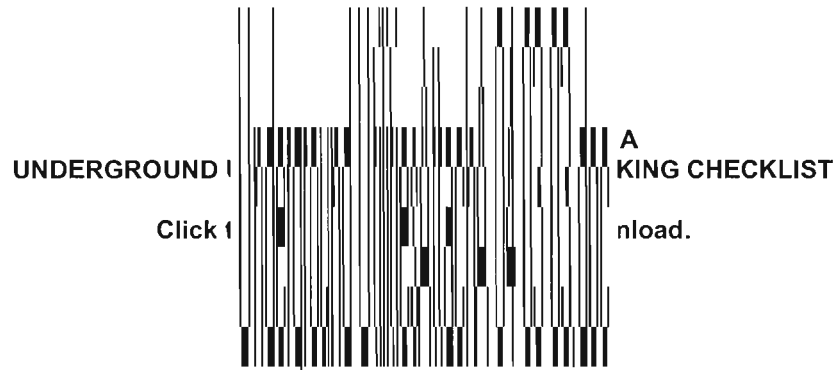
- Schonstedt Instrument Company (Detection Instruments)
<http://www.schonstedt.com/>
- Forestry Suppliers, Inc. (Fiberglass Probe – “Fiberglass Tile Probe”, Part #77543,
Approx. \$20.00, Telephone 800-647-5368)
<http://www.forestry-suppliers.com/>

7.0 REFERENCES

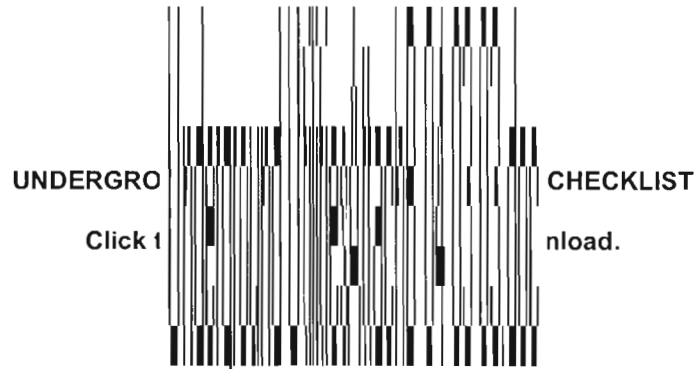
- Common Ground Study of One-Call Systems and Damage Prevention Best Practices,
August, 1999, Sponsored by US DOT.

8.0 ATTACHMENTS

Attachment A – Underground Utilities Locating and Marking Checklist
Attachment B – Underground Utilities Management Checklist



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**EHS 3-15 - ATTACHMENT A
UNDERGROUND UTILITY LOCATING AND MARKING CHECKLIST**



TETRA TECH FW, INC.

**To be Completed by PM and/or "Competent Person"
Complete Form as Location/Marking Progresses and Maintain in Site Files**

| | |
|--|---|
| PROJECT INFORMATION: | Location: |
| Project Name: | Task/Activity: |
| Tetra Tech FW Competent Person: | Start Date of Work: |
| Tetra Tech FW Subcontractor: <input type="checkbox"/> No <input type="checkbox"/> Yes: | Private Locating Service Required: <input type="checkbox"/> Yes <input type="checkbox"/> No |
| Property Owner: | If Not, Explain: |
| NOTIFICATION: | |
| Locating Service Name: | Locating Service Tel. Number: |
| Date Locating Service Notified: | Locate Ticket Number: |
| Address of Property to be Marked: | Locate Ticket Expiration Date: |
| Nearest Intersecting Street: | |
| Are There Any Utilities on the Properties That the Locating Service Will Not Contact? <input type="checkbox"/> Yes <input type="checkbox"/> No | |
| Specify: | |
| <i>Enter Utility Information in Table 1 Below. In Addition to Utility Locating Services, Consult Client, Utility Owners, Drawings, Facility Personnel, Maintenance Personnel, Municipalities, etc.</i> | |

**TABLE 1
ON-SITE UTILITY INFORMATION**

| NAME OF UTILITY COMPANY | TYPE OF UTILITY | COLOR CODE | UTILITY PRESENT ON-SITE? | EMERGENCY PHONE NUMBER | DATE MARKS COMPLETED |
|---|-----------------------------|------------|--------------------------|------------------------|----------------------|
| | Electric | RED | | | |
| | Communications, Phone, CATV | ORANGE | | | |
| | Gas, Oil, Steam, Petroleum | YELLOW | | | |
| | Sewers, Drains | GREEN | | | |
| | Potable Water | BLUE | | | |
| | Reclaimed Water, Irrigation | PURPLE | | | |
| | Temporary Survey Markings | PINK | | | |
| To be performed by excavator prior to utility mark-out. | Proposed Excavation | WHITE | | | |

White-Lining Completed? No Explain: _____ Yes: Date: _____ By Whom? _____

LOCATING AND MARKING:

Have All Utilities Identified in Table 1 Been Marked? Yes No (If Not, Contact Locating Service for Resolution)

Problem(s) With Markings?

- Yes No No Marks Incorrect Location Too Wide
 Other: _____ Not All Utilities Marked Per Table 1 (notify marking service)

Measurements Taken: Yes No

Documentation of Marks: Photos Video Other: _____

EXCAVATION:

Utilities Accurately Marked? Yes No

If no, describe: _____

Were Unmarked or Mis-Marked Utilities Encountered? Yes No

If Yes, Specify: _____

Locating Service Notified? Yes No

Will Excavation Continue Past Locate Number Expiration? Yes No

If Yes, Locate Number Renewed? Yes No New Expiration Date: _____

Any Other Problems/Concerns? Specify: _____

| | | |
|--------------------|------------|-------|
| Form Completed By: | Signature: | Date: |
|--------------------|------------|-------|

EHS 3-15 - ATTACHMENT B

UNDERGROUND UTILITIES MANAGEMENT CHECKLIST



To be Completed by PM and/or "Competent Person"
 Complete Form as Project Progresses and Maintain in Site Files.

| PHASE | TASK | Y E S | N O | N A | COMMENTS Required if Response is No or NA. (Reference Item Number) |
|---|--|---|--------|--------|--|
| Pre-Planning | 1. Excavation in Work Scope? (As defined in EHS 3-15, Section 4.4) | | | | |
| | 2. Underground Utilities Identified in TIP? | | | | |
| | 3. Competent Person Assigned? | | | | |
| | 4. Has a Copy of the Applicable State Regulations Been Obtained, Read, Understood? | | | | |
| | 5. EHS Plan Addresses Underground Utilities? (AHAs, Contingency Plan, State Regulations Appendix) | | | | |
| Identifying, Locating and Marking | 6. Locating and Marking Checklist Initiated? (Attachment A) | | | | |
| | 7. Identification and Address of Property Determined, Including Nearest Intersection? | | | | |
| | 8. One-Call Agency Contacted? | | | | |
| | 9. Additional Locating and Marking Required on Property? (One-Call agency marks to public property line only) | | | | |
| | 10. Additional Marker/Locator Identified? | | | | |
| | 11. Additional Marker/Locator Qualified? | | | | |
| | 12. TtFW Self-Performing Location and Marking? | | | | |
| | 13. If Yes to 12 Above, Approval From TtFW Director EHS Services? | | | | |
| | 14. Area of Excavation "White-Lined" by TtFW? | | | | |
| | 15. TtFW Present When Markings Completed? | | | | |
| | 16. All Utilities Marked? (Refer to Attachment A, Table 1) | | | | |
| | 17. All Markings Photo/Video Documented? | | | | |
| | 18. Area Checked for Signs of Previous Excavation? (subsidence, new grass, patching, etc) | | | | |
| | 19. All Applicable Information Recorded on Attachment A? | | | | |
| | 20. Multiple Contractors Excavating On-Site? | | | | |
| | 21. Separate Locate Requests for All Contractors? | | | | |
| | 22. TtFW Subcontractors Excavating in TtFW White-Lined Area(s)? | | | | |
| | 23. If Yes to 22 Above, One-Call Agency Contacted to Determine if TtFW Subcontractor Can be Added to Existing Locate Ticket? | | | | |
| | Excavation Activities | 24. Meeting and Site Walk-Over Conducted with Project Personnel? (Managers, Equipment Operators, Laborers, Competent Person, Excavation Observer, etc) | | | |
| 25. AHA and EHSP Review Conducted With Personnel? | | | | | |
| 26. Do Site Activities Have Potential to Obliterate Utility Markings? | | | | | |
| Excavation Activities – Cont'd | 27. If Yes to 26 Above, Have Provisions Been Made to Preserve Markings? | | | | |

EHS 3-15 - ATTACHMENT B

UNDERGROUND UTILITIES MANAGEMENT CHECKLIST

| PHASE | TASK | Y E S | N O | N A | COMMENTS Required if Response is No or NA. (Reference Item Number) |
|---|---|-------------|--------|--------|--|
| | 28. Has an Excavation Observer Been Designated to Monitor Excavation When Occurring within 4 Feet of the Buffer Zone? | | | | |
| | 29. Have Operator and Observer Reviewed Commands and Signals? | | | | |
| | 30. Has TrFW-Required 4-Foot Buffer Zone Been Marked on Either Side of Markings Placed by Locator? | | | | |
| Excavation Within Buffer Zone | 31. Is Excavation Within The Buffer Zone Absolutely Necessary? | | | | |
| | 32. If Yes to 31 Above, Can Non-Aggressive Methods Be Used For Excavation In The Buffer Zone? If Yes, Identify Appropriate Non-Aggressive Methods. | | | | |
| | 33. If No to 32 Above, Has a Buffer Zone Exemption Request (FCN) Been Approved by The PESM? If No, then Aggressive Methods May Not Be Used in The Buffer Zone. | | | | |
| | 34. If Yes to 33 Above, Has the Utility Been De-Energized, Purged, Verified/Tested, and Locked-Out? Or, Has The Depth and Orientation of the Utility Been Adequately and Visually Determined Through The Use of Non-Aggressive Methods? | | | | |
| | 35. If Yes to 34 Above, Have All of The Following Conditions Been Met? For Utilities Containing Electrical Energy, Is The Depth of The Water Table Below The Depth of The Utility? Have Regulations Been Consulted to Determine Specific State Requirements Relative to Excavating in The Buffer Zone? Have Appropriate Physical Protection Measures Been Implemented to Prevent Equipment Contact With Utilities and to Prevent Damage to Utilities? Has The FCN Requesting The Buffer Zone Exemption Been Signed by The PESM? If No to Any of The Above Conditions, Then Only Non-Aggressive Excavation Methods May Conducted in The Buffer Zone, Since The Conditions of The Exemption Have Not Been Satisfied. | | | | |
| Working Around Exposed Utilities | 36. If Necessary, Have Provisions Been Made to Support the Utility During Work Activities? | | | | |
| | 37. Have Spoils Been Placed as far Away From the Excavation as Feasible? | | | | |
| | 38. Has the Utility Been De-Energized? (If Any Portion of the 4-Foot Buffer Zone around a Utility is Inside of the White-Lined Area) | | | | |
| | 39. Has the Isolation Point for the De-Energized Utility Been Physically Locked-Out? | | | | |
| Working Around Exposed Utilities -Cont'd | 40. If No to 39 Above, Has a Spotter Been Assigned to Monitor Isolation Point? | | | | |
| | 41. If Yes to 40 Above, Does the Spotter Have Adequate Communications? (Radio, Telephone, etc) | | | | |
| | 42. Has the Isolation Point Been Tagged? | | | | |
| Damage Discovery | 43. Has Pre-Existing Damage to a Utility Been Discovered During Excavation? | | | | |
| | 44. If Yes to 43 Above, Has the One-Call Agency and/or Utility Owner Been Notified? | | | | |
| | 45. If Yes to 43 Above, Have Photographs Been taken? | | | | |

EHS 3-15 - ATTACHMENT B

UNDERGROUND UTILITIES MANAGEMENT CHECKLIST

| PHASE | TASK | Y E S | N O | N A | COMMENTS Required if Response is No or NA. (Reference Item Number) |
|--|---|-------------|--------|--------|--|
| Encountering or Contacting Underground Utilities | 46. Have Utilities Been Encountered in Locations That Have Not Been Marked? | | | | |
| | 47. If Yes to 46 Above, Has the One-Call Agency or Other Locating Service Been Contacted? | | | | |
| | 48. If Yes to 46 Above, Has the PM and PESM Been Notified? | | | | |
| | 49. If Yes to 46 Above, Has a TtFW Incident Report per EHS 1-7 Been Completed? (Include Photographs) | | | | |
| | 50. Has Excavation Equipment Come In Contact With Underground utilities? | | | | |
| | 51. If Yes to 50 Above, Were Intrusive Activities Immediately Curtailed? | | | | |
| | 52. If Yes to 50 Above, Has a Damage Determination Been Made From a Safe Distance? | | | | |
| | 53. If Yes to 50 Above, Has the Area Been Secured? | | | | |
| | 54. If Yes to 50 Above, Have Emergency Responders Been Notified? | | | | |
| | 55. If Yes to 50 Above, Has the Locating Agency and/or Utility Owner Been Notified? | | | | |
| | 56. If Yes to 50 Above, Have State and Local Reporting Requirements Been Met? | | | | |
| | 57. If Yes to 50 Above, Were Intrusive Activities Curtailed Until; Inspection From Utility Owner, Orientation and Depth of Utility Was Determined and Marked, Permission From Emergency Responders Given? | | | | |
| | 58. If Yes to 50 Above, Has a TtFW Incident Report per EHS 1-7 Been Completed? (Include Photographs) | | | | |

CHECKLIST COMPLETED BY:

| | | |
|-------|-----------|-------|
| _____ | _____ | _____ |
| NAME | SIGNATURE | DATE |
| _____ | _____ | _____ |
| NAME | SIGNATURE | DATE |


Appendix F
Excavation and Trenching

EHS 6-3:**Excavation and Trenching (Previously HS6-4)****Purpose**

This program provides the requirements for activities involving excavations in accordance with 29 CFR 1926, Subpart P - Excavations.

Version Date: 07/03/2001 -

Revised

Approved by: **Original Issue Date:** 02/01/95**Date:****Category:** Company
Procedures**Sections:** ESQ - Environmental Health &
Safety Programs**Sub Category:**

Departmental/Discipline

Document Type: Procedure**Keyword Index:** EHSCompliance/Waste
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Operational Control,
Training, Monitoring**Document Owner:** Mike McSherry

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1.0 PURPOSE

This program provides the requirements for activities involving excavations in accordance with 29 CFR 1926, Subpart P - Excavations.

2.0 SCOPE

These requirements are applicable to all Tetra Tech FW, Inc. (TtFW) operations.

3.0 MAINTENANCE

The Director, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with TtFW's President and Chief Executive Officer. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director, Administration and Compliance.

4.0 DEFINITIONS

4.1 Benching

A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

4.2 Competent Person

A competent person is one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

4.3 Excavation

Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

4.4 Hazardous Atmosphere

An atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.

4.5 Protective Systems

A method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.

4.6 Sloping

A method of protecting employees from cave-ins by forming sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

4.7 Support System

A structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

4.8 Trench

A narrow excavation made below the surface of the ground. In general the depth is greater than the width, but the width of a trench measured at the bottom is not greater than 15 feet. If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet or less, the excavation is also considered to be a trench.

5.0 DISCUSSION

5.1 Responsibilities

5.1.1 Competent Person

The competent person(s) shall be responsible for:

- Day-to-day oversight of open excavations and trenches
- Conducting soil classifications
- Selection of protective systems
- Conducting daily inspections of open excavations and trenches; and
- Providing the Environmental and Safety Supervisor (ESS) with all required documentation on a daily basis.

5.1.2 Line Management

The Project Manager (PM) shall be responsible for:

- Ensuring compliance with this procedure
- Providing the necessary resources for compliance with this procedure; and
- Designating competent personnel in consultation with the Project Environmental, Health and Safety Manager (PESM)

5.1.3 Environmental, Health and Safety Personnel

The ESS shall be responsible for:

- Providing oversight on the implementation of the requirements contained in this procedure
- Conducting periodic reviews of open trenches and excavations
- Consulting with the project manager and competent person on excavation issues; and
- Maintaining required records.

5.2 Designation of Competent Personnel

Prior to the start of any excavation work the project manager shall designate a competent person to fulfill the requirements of this procedure.

5.3 General Requirements

The following section provides general requirements governing activities in and around excavation and trenches, as well as the requirements for the selection and use of protective systems.

- Surfaces surrounding open trenches and excavations shall have all surface hazards removed.
- All utilities shall be located and cleared prior to initiating digging. Public or facility utility groups shall be utilized where possible for this purpose. In the absence of either, the ESS shall specify the procedures to be used to clear utilities in consultation with the project PESM and project manager. When the excavation is open, utilities shall be supported and protected from damage. Clearance and support methods shall be documented on the daily inspection checklist.
- Where structural ramps are used for egress they shall be installed in accordance with 29 CFR 1926.651(c)(1).
- Stairways, ladders, or ramps shall be provided as means of egress in all trenches 4 feet or more in depth. Travel distance shall be no more than 25 feet between means of exit.

- Employees exposed to vehicular traffic shall wear traffic vests.
- No employee shall be permitted under loads being lifted or under loads being unloaded from vehicles.
- When vehicles and machinery are operating adjacent to excavations warning systems such as stop logs or barricades shall be utilized to prevent vehicles from entering the excavation or trench.
- Scaling or barricades shall be used to prevent rock and soils from falling on employees.
- Excavated and loose materials should be kept at least 3 feet from the edge of excavations, but at a minimum of 2 feet from the edge of the excavation in accordance with OSHA requirements.
- Walkways or bridges with standard railing shall be provided at points employees are to cross over excavations or trenches.
- Barriers shall be provided to prevent personnel from inadvertently falling into an excavation.

5.4 Hazardous Atmospheres

Where atmospheres containing less than 19.5 percent oxygen or other types of hazardous atmospheres may exist the following requirements shall be implemented.

- Atmospheric testing shall be done prior to employees entering excavations 4 feet or greater in depth.
- Testing methods shall be listed on the daily inspection checklist and results documented daily in field logs.
- Control measures such as ventilation and personal protective equipment (PPE) shall be used to control employee exposure to hazardous atmospheres below published exposure limits.
- Ventilation shall be used to control flammable and combustible vapors to below 10 percent of their lower explosive limit.
- Testing shall be repeated as often as necessary to ensure safe levels of airborne contaminants.
- Emergency equipment shall be provided and attended when the potential for a hazardous atmosphere exists. This equipment shall include but not be limited to emergency breathing apparatus, harnesses, lifelines, and basket stretchers. Required equipment will be listed on the daily inspection checklist and reviewed daily.

5.5 Protection From Water Hazards

When water has collected or is collected in excavations and trenches the following requirements shall be applied.

- Employees shall not work in excavations in which water has, or is, accumulating without the use of additional protection such as special support systems or water removal.
- Water removal shall be monitored by a competent person.
- Barriers such as ditches and dikes shall be used to divert runoff from excavations and trenches.
- Trenches shall be reinspected prior to re-entry after water accumulation due to heavy rainfall or seepage.

5.6 Stability of Adjacent Structures

When excavating or trenching near an adjacent structure the following practices shall be implemented.

- Support systems such as shoring, bracing, or underpinning shall be provided where the stability of buildings, walls, or other structures is endangered by excavation.
- Excavation bases or footings of foundations shall be prohibited unless support systems are used, the excavation is in stable rock, a professional engineer has determined the structure is sufficiently removed from the site as to not pose a hazard, or the PE determines that the excavation shall not pose a hazard to employees due to the structure.
- Support systems shall be used when it is necessary to undermine sidewalks, pavements, and appurtenant structures.
- Surcharge load sources and adjacent encumbrances shall be listed with their evaluation date on the daily inspection checklist.

5.7 Daily Inspections

Inspections shall be performed daily on all excavations, adjacent areas, and protective systems before personnel enter the trench. The checklist provided in Attachment A or equivalent shall be used.

5.8 Soil Classification

To perform soil classification, the competent person shall use a thumb test, pocket penetrometer, or shear vane to determine the unconfined compressive strength of the soils being excavated. In soils with properties that change (i.e., one soil type mixed with another within a given area) several tests may be necessary. When different soil types are present the overall classification shall be that of the type with the lowest unconfined compressive strength. Classifications shall result in a soil rating of Stable Rock, Type A, Type B, or Type C in accordance with 29 CFR 1926.652, Appendix A. Soil classifications shall be listed on the daily inspection checklist. The

soils analysis checklist provided in Attachment B or equivalent shall be used for soil classifications.

5.9 Sloping and Benching

All sloping and benching shall be done in accordance with 29 CFR 1926.652, Appendix B. Selection of the sloping method and evaluation of surface surcharge loads shall be made by a competent person familiar with the requirements contained therein. Sloping and benching methods and specifications shall be listed on the daily inspection checklist.

5.10 Protective Systems

Protective systems are required on all excavations over 5 feet in depth or in excavations less than 5 feet when examination of the ground by a competent person reveals conditions that may result in cave-ins.

Selection and installation of protective systems shall be done in accordance with 29 CFR 1926.652, Appendices C & D, or manufacturers data for shoring and shielding systems. Selection of a protective system shall be made based upon soil classification and job requirements by a competent person. Protective systems and specifications shall be listed on the daily inspection checklist.


5.11 Training

Competent persons shall have an adequate combination of experience and training to classify soil types and select protective systems as outlined in 29 CFR 1926.652. Training and experience pertaining to qualification as a competent person shall be documented and include the following:

- General safety practices related to working in or near open excavations;
- Inspection requirements and techniques;
- Classification of soils in accordance with 29 CFR 1926.652, Appendix A; and
- Uses, limitations, and specifications of protective systems in accordance with 29 CFR 1926.652.

Training records shall be maintained in accordance with EHS 1-9, Recordkeeping.

6.0 REFERENCES

29 CFR 1926, Subpart P, Excavations.
Environmental, Health & Safety - Programs Procedure EHS 1-9, Recordkeeping 
OSHA (U.S. Department of Labor, Occupational Safety and Health Administration),

7.0 ATTACHMENTS

Attachment A - Daily Excavation Inspection Checklist
Attachment B - Soils Analysis Checklist

**EHS 6-3 ATTACHMENT A
DAILY EXCAVATION INSPECTION CHECKLIST**

Click the icon below to launch or download.



EHS 6-3 Attachment A 04-03-03.doc

Select the "Detach" button in the pop-up window to save a copy to a disk or hard drive.

**EHS 6-3 ATTACHMENT B
SOILS ANALYSIS CHECKLIST**

Click the icon below to launch or download.



EHS 6-3 Attachment B.doc

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EHS 6-3 ATTACHMENT A



TETRA TECH FW, INC.

DAILY EXCAVATION INSPECTION CHECKLIST

To be completed by a "Competent Person"

| | | | |
|--------------------------------|-------|------------------|-------|
| Site location | _____ | | |
| Date | _____ | Time | _____ |
| Competent Person | | _____ | |
| Soil Type(s) | _____ | | |
| Soil Classification(s) | _____ | Excavation depth | _____ |
| Excavation width | | _____ | |
| Type of protective system used | _____ | | |

Indicate for each item by circling: Y (Yes), N (No), - Address in Comments, Not Applicable (N/A.)

I. General Inspection of Job Site

- | | | | |
|--|---|---|-----|
| A. Surface encumbrances removed or supported | Y | N | N/A |
| B. Employees protected from loose rock or soil that could pose a hazard by falling or rolling into the excavation | Y | N | N/A |
| C. Hard hats worn by all employees | Y | N | N/A |
| D. Spoils, materials, and equipment set back at least 2 feet from the edge of the excavation | Y | N | N/A |
| E. Barriers provided at all remotely located excavations, wells, pits, shafts, etc. | Y | N | N/A |
| F. Walkways and bridges over excavations 4 feet or more in depth are equipped with standard guardrails | Y | N | N/A |
| G. Warning vests or other highly visible clothing provided and worn by all employees exposed to public vehicular traffic | Y | N | N/A |
| H. Warning system established and utilized when mobile equipment is operated near the edge of the excavation | Y | N | N/A |
| I. Employees prohibited from working on the faces of sloped or benched excavations above other employees | Y | N | N/A |

II. Utilities

- | | | | |
|--|---|---|-----|
| A. Utility companies contacted and/or utilities located | Y | N | N/A |
| B. Exact location of utilities marked when approaching the utilities | Y | N | N/A |
| C. Underground installations protected, supported or removed when excavation is open | Y | N | N/A |

III. Means of Access and Egress

- | | | | |
|---|---|---|-----|
| A. Lateral travel to means of egress no greater than 25 feet in excavations 4 feet or more in depth | Y | N | N/A |
| B. Ladders used in excavations secured and extended 3 feet above the edge of the trench | Y | N | N/A |
| C. Structural ramps used by employees designed by a competent person | Y | N | N/A |
| D. Structural ramps used for equipment designed by a registered professional engineer (RPE) | Y | N | N/A |
| E. Ramps constructed of materials of uniform thickness, cleated together on the bottom, equipped with a no-slip surface | Y | N | N/A |
| F. Employees protected from cave-ins when entering or exiting the excavation | Y | N | N/A |

**EHS 6-3 ATTACHMENT A
DAILY EXCAVATION INSPECTION CHECKLIST**

IV. Wet Conditions

- | | | | | |
|----|--|---|---|-----|
| A. | Precautions taken to protect employees from the accumulation of water | Y | N | N/A |
| B. | Water removal equipment monitored by a competent person | Y | N | N/A |
| C. | Surface water or runoff diverted or controlled to prevent accumulation in the excavation | Y | N | N/A |
| D. | Inspections made after every rainstorm or other hazard increasing occurrence | Y | N | N/A |

V. Hazardous Atmospheres

- | | | | | |
|----|--|---|---|-----|
| A. | Atmosphere within the excavation tested where there is a reasonable possibility of an oxygen deficiency, combustible or other harmful contaminant exposing employees to a hazard | Y | N | N/A |
| B. | Ventilation | Y | N | N/A |
| C. | Testing conducted often to ensure that the atmosphere remains safe | Y | N | N/A |
| D. | Emergency equipment, such as breathing apparatus, safety harness and line, and basket stretcher readily available where hazardous atmospheres could or do exist | Y | N | N/A |
| E. | Safety harness and life line used and individually attended when entering deep confined excavations | Y | N | N/A |

VI. Support Systems

- | | | | | |
|----|---|---|---|-----|
| A. | Materials and/or equipment for support systems selected based on soil analysis, trench depth and expected loads | Y | N | N/A |
| B. | Materials and equipment used for protective systems inspected and in good condition | Y | N | N/A |
| C. | Materials and equipment not in good condition have been removed from service | Y | N | N/A |
| D. | Damaged materials and equipment used for protective systems inspected by a RPE after repairs and before being placed back into service | Y | N | N/A |
| E. | Protective systems installed without exposing employees to the hazards of cave-ins, collapses or from being struck by materials or equipment | Y | N | N/A |
| F. | Members of support system securely fastened to prevent failure | Y | N | N/A |
| G. | Support systems provided to insure stability of adjacent structures, buildings, roadways, sidewalks, walls, etc. | Y | N | N/A |
| H. | Excavations below the level of the base or footing approved by an RPE | Y | N | N/A |
| I. | Removal of support systems progresses from the bottom and members are released slowly as to note any indication of possible failure | Y | N | N/A |
| J. | Backfilling progresses with removal of support system | Y | N | N/A |
| K. | Excavation of material to a level no greater than 2 feet below the bottom of the support system and only if the system is designed to support the loads calculated for the full depth | Y | N | N/A |
| L. | Shield system placed to prevent lateral movement | Y | N | N/A |
| M. | Employees are prohibited from remaining in shield system during vertical movement | Y | N | N/A |

VII. Comments

EHS 6-3 ATTACHMENT B



TETRA TECH FW, INC.

SOILS ANALYSIS CHECKLIST

This checklist must be completed when soil analysis is made to determine the soil type(s) present in the excavation. A separate analysis must be performed on each layer of soil in excavation walls. A separate analysis must also be performed if the excavation (trench) is stretched over a distance where soil type may change.

Site location: _____

Date: _____ Time: _____ Competent Person _____

Where was the sample taken from? _____

Excavation: Depth: _____ Width: _____ Length: _____

VISUAL TEST

Particle type: _____ Fine Grained (cohesive) _____ Course grained (sand or gravel)

Water conditions: _____ Wet _____ Dry _____ Surface water present _____ Submerged

Previously disturbed soils? _____ Yes _____ No

Underground utilities? _____ Yes _____ No

Layered soils? _____ Yes _____ No

Layered soil dipping into excavation? _____ Yes _____ No

Excavation exposed to vibrations: _____ Yes _____ No

Crack-like openings or spallings observed? _____ Yes _____ No

Conditions that may create a hazardous atmosphere? _____ Yes _____ No

If yes, identify condition and source: _____

Surface encumbrances: _____ Yes _____ No

Work to be performed near public vehicular traffic? _____ Yes _____ No

Possible confined space exposure? _____ Yes _____ No

MANUAL TEST

Plasticity: _____ Cohesive _____ Non-cohesive

Dry Strength: _____ Granular (crumbles easily) _____ Cohesive (broken with difficulty)

**EHS 6-3 ATTACHMENT B
SOILS ANALYSIS CHECKLIST**

NOTE: *The following unconfined compressive strength tests should be performed on undisturbed soils.*

THUMB TEST (used to estimate unconfined compressive strength of cohesive soil)

Test performed: Yes No

Type A (soil indented by thumb with very great effort)

Type B (soil indented by thumb with some effort)

Type C (soil easily penetrated several inches by thumb with little or no effort). If soil is submerged, seeping water, subjected to surface water, runoff, exposed to wetting.

PENETROMETER OR SHEARVANE (used to estimate unconfined compressive strength of cohesive soils)

Test performed: Yes No

Type A (soil with unconfined compressive strength of 1.5 tsf or greater)

Type B (soil with unconfined compressive strength of 0.5 tsf to 1.5 tsf)

Type C (soil with unconfined compressive strength of 1.5 tsf or less). If soil is submerged, seeping water, subjected to surface water, runoff, exposed to wetting.

WET SHAKING TEST (used to determine percentage of granular and cohesive materials). Compare results to soil textural classification chart to determine soil type.

Test performed Yes No

Type A (clay, silty clay, sandy clay, clay loam, and in some cases silty clay, loam and sandy clay loam)

Type B (angular gravel (similar to crushed rock), silt, silt loam, sandy loam, and in some cases, silty clay loam and sandy clay loam)

Type C (granular soil including gravel, sand and loamy sand)

% granular % cohesive % silt

NOTE: *Type A -- no soil is Type "A" if soil is fissured; subject to vibration; previously disturbed; layered dipping into the excavation on a slope of 4H:1V.*

SOIL CLASSIFICATION

Type A

Type B

Type C

SELECTION OF PROTECTIVE SYSTEM

Sloping. Specify angle:

Timber Shoring

Aluminum Hydraulic Shoring

NOTE: *Although OSHA will accept the above tests in most cases, some states will not. Check your state safety requirements for trenching regulations.*

Appendix G
Fall Protection

EHS 3-8:**Fall Protection (Previously HS3-8)****Purpose**

The purpose of this program is to prevent injuries due to falls from elevated work surfaces and to comply with Occupational, Safety and Health Administration (OSHA) fall protection standards in 29 CFR 1926, Subpart M.

Version Date: 03/12/98 - Revised**Approved by:** *SWC***Original Issue** 02/01/95**Date:****Category:** Company Procedures**Sections:** ESQ - Environmental Health & Safety Programs**Sub Category:** Departmental/Discipline**Document Type:** Procedure**Keyword Index:** Operational Control, Training**Document Owner:** Mike McSherry

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1.0 PURPOSE

The purpose of this program is to prevent injuries due to falls from elevated work surfaces and to comply with Occupational, Safety and Health Administration (OSHA) fall protection standards in 29 CFR 1926, Subpart M.

2.0 SCOPE

This program applies to all Tetra Tech FW, Inc. (TtFW) and/or TtFW subcontractor field operations.

3.0 MAINTENANCE

The Director, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with TtFW's President and Chief Executive Officer. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director, Administration and Compliance.

4.0 DEFINITIONS

4.1 Competent Person

A person possessing the skills, knowledge, experience, and judgement to perform assigned tasks or activities satisfactorily.

4.2 Dangerous Equipment

Dangerous equipment means equipment which, as a result of form or function, may be hazardous to employees who fall onto or into such equipment. Examples provided in Subpart M include tanks, degreasing units, machinery, and electrical equipment.

4.3 Hole

Hole means a gap or void 2 inches or more in its least dimension, in a floor, roof, or other walking/working surface.

4.4 Opening

An opening means a gap or void 30 inches or more high and 18 inches or more wide through which employees can fall to a lower level.

4.5 Personal Fall Arrest System

A personal fall arrest system consists of an anchorage, connectors, body harness, and may include a lanyard, deceleration device, lifeline, or suitable combination of these. Body belts are not permitted in personal fall arrest systems on TtFW projects.

4.6 Walking/Working Surface

A walking/working surface is any surface, whether horizontal or vertical, on which an employee walks or works, including but not limited to floors, roofs, ramps, bridges, runways, formwork and concrete reinforcing steel, but not including ladders, vehicles, or trailers on which employees must be to perform their job duties.

5.0 DISCUSSION

5.1 Responsibilities

5.1.1 Line Management

Site Supervisors have the responsibility to ensure that fall protection is provided as required by this program and site Environmental, Health and Safety (EHS) plans for all TtFW operations.

5.1.2 Environmental, Health and Safety Personnel

The Project Environmental and Safety Manager (PESM) will audit implementation of this program as part field inspection pursuant EHS 3-3, inspections.

The Environmental and Safety Supervisor (ESS) is responsible for providing fall protection training for all site personnel and monitoring compliance with this program.

5.2 General Requirements

Employees shall only be allowed to work on walking/working surfaces which have the strength and integrity to support employees safely. Walking/working surfaces for this requirement include the edges of trenches.

Employees performing work on a walking/working surface with an unprotected side or edge which is 6 feet or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems.

For roof work on low-slope roofs, work on steep roofs, and work near wall openings, fall protection provisions as described in 29 CFR 1926.501(b) shall be utilized.

5.3 Hoist Areas

Employees in a hoist area shall be protected from falling 6 feet or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems are removed to facilitate the hoisting operations and the employee must lean out over the edge of the platform to guide the materials being hoisted, then a personal fall arrest system shall be used.

5.4 Excavations

The edge of an excavation 6 feet or more in depth shall be demarcated by guardrail systems, fences, or barricades when the excavation is not readily seen. The measures described above or covers shall be used for wells, pits, shafts, or similar excavations.

The Site Supervisor and PESM shall determine when employees must use personal fall arrest systems at the edge of an excavation 6 feet or more in depth. The decision shall be based on the condition of the soil at the edge of the excavation, i.e., slippery, stable, etc., and the nature of the work at the edge of the excavation.

5.5 Dangerous Equipment

Each employee working 6 feet or less above dangerous equipment shall be protected by guardrail systems or by equipment guards or if working at more than 6 feet by guardrail systems, personal fall arrest systems or safety net systems.

5.6 Guardrail Systems

Guardrail systems must meet the criteria specified in 29 CFR 1926.502(b).

5.7 Personal Fall Arrest Systems

Personal fall arrest systems shall meet the criteria specified in 29 CFR 1926.502(d).

5.8 Protection From Falling Objects

Toeboards, when used as falling object protection, shall meet the criteria specified in 29 CFR 1926.502(j); shall have a minimum of 3.5 inches from their top edge to the level of the walking working surface; and no more than a 0.25 inch clearance from the bottom edge to the walking/working surface.

5.9 Other Fall Protection Requirements

Whenever a fall hazard of 6 feet or more exists on a TtFW jobsite, 29 CFR 1926, Subpart M shall be consulted for applicable requirements. If Subpart M does not specifically address the fall hazard, then the Site Supervisor and PESM shall determine if fall protection measures are required.

5.10 Training

5.10.1 General

All site personnel who might be exposed to fall hazards on a TtFW jobsite shall receive training by a competent person. The training shall be conducted at the time of the site orientation. The competent person must meet the applicable requirements of 29 CFR 1926.503(a)(2). The training shall include enabling the employee to recognize the hazards of falling and the procedures to be followed in order to minimize fall hazards.

5.10.2 Retraining

Retraining shall be conducted when changes occur in the workplace which present a new fall hazard, when fall protection systems or equipment is changed, or when it appears that the employee has not retained the requisite understanding or skill regarding the fall hazards or protective measures.

5.10.3 Certification of Training


Certification of training or retraining shall include the name of the employee, the date of the training, the content of the training, and the signature of the person who conducted the training.

Training certification shall be maintained as part of the project file.

5.10.4 Previous Training

TtFW shall not rely on fall protection training from other TtFW jobsites or other employers to meet the training requirements of this program unless the Site Supervisor or ESS prepares a new certification record which indicates the date it was determined that the prior training was adequate and why it was considered adequate.

6.0 REFERENCES

29 CFR 1926, Subpart M, Safety Standards for Fall Protection in the Construction Industry
Environmental, Health & Safety - Programs Procedure EHS 3-3, Inspections 
OSHA (U.S. Department of Labor, Occupational Safety and Health Administration)

Tetra Tech EC, Inc.

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Proprietary Information

Appendix H
PPE Selection Form

TABLE 6.1 - PPE SELECTION

ACTIVITY: _____

| TASK | HEAD | EYE/FACE | FEET | HANDS | BODY | HEARING | RESPIRATOR |
|------|------|----------|------|-------|------|---------|------------|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

SHSO _____

Appendix I

Tetra Tech EC, Inc.

MEDICAL DATA SHEET

The brief medical data sheet will be completed by all on-site personnel and will be kept in the Support Zone by the SHSO as a project record during the conduct of site operations. It accompanies any personnel when medical assistance is needed or if transport to a hospital is required.

Project: _____

Name: _____ Home Telephone: _____

Address: _____

Age: _____ Height: _____ Weight: _____ Blood Type: _____

Name and Telephone Number of Emergency Contact: _____

Drug or Other Allergies: _____

Particular Sensitivities: _____

Do You Wear Contacts? _____

Provide A Check List Of Previous Illnesses: _____

What Medications Are You Presently Using? _____

Do You Have Any Medical Restrictions? _____

Name, Address, And Phone Number Of Personal Physician: _____

Appendix J

TETRA TECH EC, INC.

GENERAL HEALTH AND SAFETY RULES

(Page 1 of 2)

1. All site personnel must attend each day's Daily Briefing.
2. Any individual taking prescribed drugs will inform the Site Health and Safety Officer (SHSO) of the type of medication. The SHSO will review the matter with the Project Environmental and Safety Manager (PESM) and the Corporate Medical Consultant (CMC), who will decide if the employee can safely work on-site while taking the medication.
3. The personal protective equipment specified by the SHSO and in the SHSP will be worn by all site personnel. This includes hard hats and safety glasses which must be worn at all times in active work areas.
4. Facial hair (beards, long sideburns or mustaches) which may interfere with a satisfactory fit of a respirator mask is not allowed on any person who may be required to wear a respirator.
5. All personnel must sign the site log and the exclusion zone log when used at the site.
6. Personnel must follow proper decontamination procedures and shower at the end of the work shift.
7. Eating, drinking, chewing tobacco or gum, smoking and any other practice that may increase the possibility of hand-to-mouth contact is prohibited in the exclusion zone or the contamination reduction zone.
8. All lighters, matches, cigarettes and other forms of tobacco are prohibited in the Exclusion Zone.
9. All signs and demarcations will be followed. Such signs and demarcation will not be removed except as authorized by the SHSO.
10. No one will enter a permit-required confined space without a permit. Confined space entry permits will be implemented as issued.
11. All personnel must follow Hot Work Permits as issued.
12. All personnel must use the Buddy System in the Exclusion Zone.
13. All personnel must follow the work-rest regimens and other practices required by the heat stress program.
14. All personnel must follow lockout/tagout procedures when working on equipment involving moving parts or hazardous energy sources.
15. No person will operate equipment unless trained and authorized. No one may enter an excavation greater than four feet deep unless authorized by the Competent Person. Excavations must be sloped or shored properly. Safe means of access and egress from excavations must be maintained.
16. Ladders and scaffolds will be solidly constructed, in good working condition and inspected prior to use. No one may use defective ladders or scaffolds.
17. Fall protection or fall arrest systems must be in place when working at elevations greater than six feet for temporary working surfaces and four feet for fixed platforms.
18. Safety belts, harnesses and lanyards must be selected by the Supervisor. The user must inspect the equipment prior to use. No defective personal fall protection equipment will be used. Personal fall protection that has been shock loaded must be discarded.

TETRA TECH EC, INC.

GENERAL HEALTH AND SAFETY RULES

(Page 2 of 2)

19. Hand and portable power tools must be inspected prior to use. Defective tools and equipment will not be used.
20. Ground fault interrupters will be used for cord and plug equipment used outdoors or in damp locations. Electrical cords will be kept out of walkways and puddles unless protected and rated for the service.
21. Improper use, mishandling or tampering with health and safety equipment and samples is prohibited.
22. Horseplay of any kind is prohibited.
23. Possession or use of alcoholic beverages, controlled substances or firearms on any site is forbidden.
24. All incidents, no matter how minor must be reported immediately to the Supervisor.
25. All personnel will be familiar with the Site Emergency Response Plan.

The above Health and Safety Rules are not all inclusive and it is your responsibility to comply with all regulations set forth by OSHA, the TtEC Health and Safety Programs, the SHSP, the client, TtEC Supervisors and the SHSO.

Monthly Health and Safety Report

PROJECT: _____ MONTH: _____

I. Descriptive Summary of Accidents/Incidents

II. Summary of Site Safety Inspections and Audits

III. Other Issues

1. Recognition and awards program:
2. Site specific training:
3. OSHA/third party inspections:
4. H&S program administration/implementation:
5. Subcontractor H&S performance:
6. Unique exposure hazards:
7. Site specific loss control programs:
8. Site management concerns:

Appendix K

Critical Lifts

CP-13:**Critical Lifts****Purpose**

The purpose of this procedure is to provide a means to ensure that critical lift operations are planned, reviewed, and conducted with specific documented instructions that identify appropriate additional, special, and/or unusual precautions, methods, and/or safety requirements that must be accounted for before or during any lifting operation.

Version Date: 10/04/99 - Revised**Approved by:** *Donald Regan***Original Issue Date:** 06/03/96**Category:** Company Procedures**Sections:** Construction**Sub Category:** Departmental/Discipline**Document Type:** Procedure**Keyword Index:** Field Activities/Environmental H&S, Critical Lifts, Field Activities/Science, Training, Operational Control, Field Activities/Const/Remed/D&D**Document Owner:** Frank Jones

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1.0 PURPOSE

The purpose of this procedure is to provide a means to ensure that critical lift operations are planned, reviewed, and conducted with specific documented instructions that identify appropriate additional, special, and/or unusual precautions, methods, and/or safety requirements that must be accounted for before or during any lifting operation.

2.0 SCOPE

2.1 This procedure applies to all Tetra Tech EC, Inc. (TtEC) projects that include a construction component, including remediation construction, that involve critical lifts, as defined in Section 4.0, Definitions. This procedure applies to lifting operations performed by TtEC's personnel and to lifting operations performed using crane operators provided with rented or leased cranes. This procedure may be applicable to work performed by subcontractors; however, the applicability shall be addressed in the subcontract agreement terms and conditions.

2.2 The terms "crane" and "lifting equipment" are used throughout this procedure. It shall be understood that these terms are inclusive of any equipment or tools utilized for lifting operations, including, but not limited to, crawler cranes and truck mounted cranes, including those with lattice booms or telescoping booms; forklifts; backhoes; excavators; loaders; derricks; chainfalls; tuggers; and come-alongs. It is the intent that the requirements or guidance set forth in this procedure are to be applied to any device used for lifting activities, with appropriate adjustment to the instructions as required to address the specific situation. (For example, when using a chainfall for a lift of more than 75% of its rated capacity, the Critical Lift Plan checklist entry for "Foundation Support Checked" would require checking the structural integrity for the supporting member to which the chainfall is attached.)

3.0 MAINTENANCE

The Vice President Remedial Construction is responsible for updating this procedure. Approval authority rests with TtEC's Chief Operating Officer. Suggestions for revision shall be submitted to both the department responsible for updating the procedure and the Executive Director Compliance and Corporate Counsel.

4.0 DEFINITIONS

4.1 Competent Person

One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. (OSHA 29 CFR 1926)

4.2 Crane Operator Aids

Devices which are used to assist a crane operator in the safe operation of a crane, including: two-block warning devices, two-block prevention devices, load and load moment indicator devices, boom angle and radius indicators, boom and jib stops, boom hoist disengaging devices, limit switches, drum rotation indicators, etc.

4.3 Critical Lift

A non-routine lift requiring additional detailed planning and additional or more than normal safety precautions. Critical lifts include lifts made when the load weight is 75% or more of the rated capacity of the lifting equipment at a specific configuration (boom angle, lift radius, swing, etc.); lifts which require the load to be lifted, swung, or placed out of the operator's view; lifts made with more than one piece of lifting equipment; lifts involving non-routine or technically difficult rigging arrangement(s); hoisting of personnel with a crane or derrick; or any lift which the lifting equipment operator believes should be considered critical. Any lift of 30,000 pounds or more should be considered a critical lift, regardless of the crane capacity. The 30,000 pound criteria should be evaluated by the Project Manager and the Project Environmental and Safety Manager (PESM) for the advisability of lowering the criteria based on project-specific factors such as capacity of the lifting equipment to be employed on the project, frequency and nature of the lifting activities, and availability of experienced personnel, among other factors. Establishment of project-specific criteria for determination of critical lifts should be documented by the Project Manager.

4.4 Critical Lift Plan

A plan prepared by the crane operator, Lift Supervisor, Project Engineer (or designee), and rigger, as applicable, prior to making a critical lift. The Critical Lift Plan shall be documented, and shall be reviewed and signed by all personnel involved with the lift.

4.5 Failure Mode

There are two generally recognized modes of failure of cranes when the rated capacity is exceeded, depending on the crane configuration: a structural failure occurs when the boom, jib, or other component of the crane suddenly fails (there is usually no advance warning of an impending structural failure); an overturning failure occurs when the crane is pulled over by the weight of the load (there may be advance warning of an impending overturning failure as weight is transferred from the outboard tires, crawler track, or outriggers, causing these to rise as the back side of the crane becomes "light").

4.6 Lift Supervisor

A competent person who has extensive knowledge and experience in lifting operations.

4.7 Qualified Operator

An operator who is qualified to operate the crane in accordance with the standards promulgated in 29 CFR 1926.550, who is licensed or certified to operate the crane, or who has extensive knowledge and experience, and who has successfully demonstrated the ability to operate the equipment and to solve or resolve problems related to operation of the equipment.

4.8 Qualified Person

One who, by possession of a recognized degree, certificate, or professional standing, or who by extensive knowledge, training, and experience, has successfully demonstrated the ability to solve or resolve problems relating to the subject matter, the work, or the project. (OSHA 29 CFR 1926)

4.9 Tailing Crane Lift

A procedure sometimes used in erecting large vessels or structural elements in which one crane (lead crane) lifts the top of the load and a second crane (tail crane), rigged to the bottom of the load, either secures the bottom of the load from movement or assists in the horizontal positioning of the load. (USACE Safety and Health Program Manual)

4.10 Tandem Crane Lift

The use of two or more cranes to lift a load. (USACE Safety and Health Program Manual)

4.11 Two-blocking

A condition which occurs when the lower load block or hook assembly comes in contact with the upper load block, or when the load block comes in contact with the boom tip. (USACE Safety and Health Program Manual)

5.0 DISCUSSION

5.1 Qualifications

5.1.1 Lift Supervisor Qualifications

5.1.1.1 The Lift Supervisor shall have the capability of determining the total weight and center of gravity of the load; selecting the appropriate lifting equipment and rigging materials rated for the load and the particular lifting configuration; evaluating the lifting configuration and conditions affecting the lift; and evaluating the condition of the equipment and rigging. The Lift Supervisor shall have demonstrated the ability to solve or resolve problems related to lifting operations through experience, certification, or other means to the satisfaction of the Vice President Remedial Construction and the Project Manager.

5.1.2 Crane Operator Qualifications

5.1.2.1 Individual states and/or municipalities may have licensing requirements for crane operators. Where there are no licensing requirements, a certification of competency is recommended. Requirements for competency certification shall be included in subcontracts or purchase orders if

this is to be a requirement of the project. The Project Manager should coordinate with the TtEC Labor Relations Representative for the project to ensure inclusion of the competency certification requirement in the Project Labor Agreement as appropriate.

- 5.1.2.2** The Lift Supervisor shall be responsible for determining the applicable qualification requirements for the crane operator in accordance with this procedure, state and local licensing agency requirements, OSHA requirements, ANSI/ASME B30 standards, Client requirements, or equipment manufacturer's recommendations. The U.S. Army Corps of Engineers (USACE), for example, requires proficiency qualification of operators, which includes a written examination and a physical examination, on USACE projects. Assistance in determining state and local licensing agency requirements may be obtained from a TtEC Regulatory Specialist.
- 5.1.2.3** Crane operators shall be physically, mentally, medically, and emotionally qualified for performing the duties required of the position. Some factors to be considered in determining qualifications of crane operators are strength, endurance, agility, coordination, and visual and hearing acuity.
- 5.1.2.4** TtEC crane operators shall be required to demonstrate to the satisfaction of the Lift Supervisor their knowledge of the following:
- Responsibilities of the operator, rigger, signalpersons, and lift supervisor;
 - Knowledge of crane safety requirements (such as required safety equipment, clearance from power lines, overhead lifts, etc.) and the crane's operator manual;
 - Ability to determine the crane configuration, to determine the weight and center of gravity of loads, and to determine the crane's capacity using the load chart;
 - Ability to determine whether the crane would be in either the structural and overturning failure mode for the crane's configuration and the lift radius, using the crane's load chart;
 - Use and limitations of the crane operator aids;
 - Crane inspection, testing and maintenance requirements;
 - Determination of ground conditions and outrigger matting requirements;
 - Crane set-up, assembly, dismantling, and demobilization procedures;
 - Signaling and communication procedures; and
 - Factors which reduce rated capacity.
- 5.1.2.5** TtEC crane operators shall pass a practical operating examination, conducted by the Lift Supervisor, which demonstrates their ability to perform the following:
- Inspecting the crane (refer to Construction Procedure CP-7, Construction Tools and Equipment, Attachment 2, for a Daily Equipment Inspection checklist);
 - Establishing a stable foundation and leveling the crane;
 - Raising, lowering, extending, retracting and swinging the boom;
 - Raising and lowering the load line;
 - Attaching the load, holding the load, and moving the load;
 - Reading and understanding the signs, load charts, signals and operating instructions in use;

and

- Reading the load, boom angle, and other indicating devices.

During the practical examination the crane operators should demonstrate the ability to operate the crane smoothly, with no sudden starts, stops or impact loading.

- 5.1.2.6 Results of crane operators' qualification examinations should be documented by the Lift Supervisor in the cranes' log books and/or other appropriate on-site project file.

5.1.3 Rigger Qualifications

- 5.1.3.1 The rigger shall demonstrate, to the satisfaction of the Lift Supervisor, a knowledge of safe rigging practices and the abilities to select the proper rigging hardware, slings and accessories of adequate capacity; to inspect the rigging and determine its condition, acceptability for use and load capacity; and to position the load in the lifting devices, assuring that the load is well secured, stable and balanced.

5.1.4 Signalperson Qualifications

- 5.1.4.1 The signalperson shall demonstrate, to the satisfaction of the Lift Supervisor, the ability to communicate, verbally and through the use of standard signals, with the crane operator, other workers, and the Lift Supervisor. The signalperson shall possess the visual and hearing acuity required for the performance of the duties associated with the position. The signalperson shall demonstrate a knowledge of the operation of any radio or other communication devices required for the lifting operation.

5.2 Responsibilities

- 5.2.1 The Vice President Remedial Construction is responsible for providing qualified personnel to support the project as requested by the Project Manager.
- 5.2.2 The Project Manager is responsible for ensuring that a qualified Lift Supervisor and Project Engineer are assigned to the project for the performance of critical lifts. The Project Engineer may delegate authority to perform functions relative to critical lifts to a qualified Field Engineer but should maintain oversight of activities. The Project Manager is responsible for communicating to the Site Superintendent and the Lift Supervisor that the Lift Supervisor is to be assigned the authority to take any actions, including but not limited to exercising Stop Work Authority, required for the safe execution of the critical lift.
- 5.2.3 The Site Superintendent is responsible for ensuring that no critical lifts are performed without the completion and approval of a Critical Lift Plan in accordance with this procedure, that no critical lifts are scheduled without the knowledge of the Lift Supervisor, and that the Lift Supervisor is assigned the authority discussed in Section 5.2.2, above.

5.2.4 The Lift Supervisor is responsible for the execution of critical lifts, including selection of appropriate equipment of sufficient capacity, selection of qualified operators, and direct supervision of the critical lift operation and all personnel involved in the critical lift, including the operator, rigger, and signalperson. The Lift Supervisor is responsible for ensuring that all personnel associated with the critical lift are aware of their responsibilities as addressed in this procedure, any applicable project procedure(s), and/or the Critical Lift Plan.

5.2.5 The crane operator is responsible for the performance of the pre-operational inspections prior to each use of a crane, safe operation of the crane, and the performance of the critical lift in accordance with the requirements of the Critical Lift Plan and the instructions of the Lift Supervisor. The crane operator is responsible for ensuring that the following documents are with the crane at all times, and that the documents are completed as required:

5.2.5.1 A copy of the operating manual developed by the manufacturer for the specific make and model of crane.

5.2.5.2 A copy of the operating manual for any crane operator aids with which the crane is equipped.

5.2.5.3 The load rating chart for the crane. The US Army Corps of Engineers (USACE) Safety and Health Requirements Manual, EM 385-1-1, requires the following information to be included on the load rating chart for lifting equipment to be used on a USACE project:

- The crane make and model, serial number and year of manufacture;
- Load ratings for all crane operating configurations, including optional equipment;
- Wire rope type, size and reeving; line pull, line speed and drum capacity; and
- Operating limits in windy or cold weather conditions.

When circumstances are encountered where all of the required information listed above is not included on the load rating chart for lifting equipment to be used on a USACE project, the USACE's project representative shall be requested to provide direction. For lifting equipment to be used on projects where the requirements of EM 385-1-1 do not apply, the Lifting Supervisor should determine the project's requirements concerning the information listed above.

5.2.5.4 The crane's log book which shall be used to record operating hours and all crane inspections, tests, maintenance and repair. The log shall be updated daily as the crane is used and shall be signed by the operator and supervisor. Service mechanics shall sign the log after conducting maintenance and repairs on the crane.

5.2.6 The Lift Supervisor is responsible for the selection of rigging slings, spreaders, shackles, and miscellaneous rigging materials in accordance with the requirements of the Critical Lift Plan. The Lift Supervisor is responsible for the arrangement and configuration of the rigging, and the attachment of the rigging to the load and to the lifting hook in accordance with safe rigging practices and the Critical Lift Plan.

5.5 Special Considerations for Critical Lifts

- 5.5.1 When two or more cranes are used to lift a load, the responsibility of the Lift Supervisor as the one person in charge of the lift shall be emphasized to all personnel involved in the lift. If the Lift Supervisor delegates any authority to a crane operator, this delegation shall be clearly communicated to all personnel involved in the lift.
- 5.5.2 When two or more cranes are used in a lift, the total capacity of the cranes shall be at least equal to or greater than the total weight to be lifted including the load, lifting beams, rigging, hooks and attachments. Particular attention shall be given to the distribution of the load between the cranes to eliminate the overloading of a crane due to unbalanced load distribution. The Lift Supervisor shall consider the rigging configuration to ensure that there is no possibility of an unacceptable load transfer between cranes, such as when one of the cranes sets the load prior to the other crane. Such a load transfer may overload a crane. For tandem lifts, no crane should be loaded to more than 75% of its net capacity.
- 5.5.3 Consideration shall be given to the possibility that the load may not be successfully placed in its intended location due to unanticipated occurrences (wind, obstacles, etc.). The Critical Lift Plan shall address contingency plans to return the load to its original or an alternate location. Refer to Section 5.6 of this procedure for additional discussion on this subject.
- 5.5.4 Consideration shall be given to the performance of a test lift to demonstrate the ability to safely perform a lift when, in the judgment of the Project Manager or the Lift Supervisor, there is a significant risk of a loss occurring during the actual lift. In evaluating the need for a test lift, consideration should be given to the complexity of the lifting operation, the value of the component being lifted, the potential impact to other installations, and potential schedule impacts, among other factors.

5.6 General Considerations for All Lifts

- 5.6.1 Cranes should be positioned as near as possible to the load, maintaining a safe operating distance, without contacting the boom and outriggers, and with consideration for minimizing the swing and the setting radii. The operator shall verify that the load line is vertical and over the load's center of gravity prior to lifting the load to ensure that the load does not drift when lifted.
- 5.6.2 The immediate area of the lift should be checked for any electrical wires. A minimum safe distance of 10 feet shall be maintained from power lines rated 50 kV or less. The USACE Safety and Health Requirements Manual, Section 11, shall be consulted for minimum safe distances from electric lines with a higher system voltage. Alternately, the minimum safe distance may be calculated as follows:

minimum safe distance = 10 ft + 0.4 in for each 1 kV of lines rated over 50 kV;

or

twice the length of the line insulator (but never less than 10 feet).

Refer to ANSI/ASME B30.5a for specific guidance concerning the operation of cranes in proximity to electrical transmission lines. Special precautions including de-energizing and grounding the lines may be required depending on the proximity and possibility of the crane, the load line, or the load becoming a conductive path.

- 5.6.3 The required bearing capacity for the ground or foundation supporting the crane should be calculated, and the actual bearing capacity should be verified to be sufficient to support the crane and the load being lifted.
- 5.6.4 The Lift Supervisor should also ensure that:
 - 5.6.4.1 The swing area of the crane is barricaded to protect personnel in the immediate area;
 - 5.6.4.2 Loads are not lifted over personnel;
 - 5.6.4.3 All loose load objects are secured or removed;
 - 5.6.4.4 Tag lines are used to control loads except where their use will create a hazard;
 - 5.6.4.5 The crane is not subjected to sudden lifting, stopping or impact loading;
 - 5.6.4.6 Riding on loads, hooks, buckets, material hoists, or other material hoisting equipment not meant for personnel use is absolutely prohibited;
 - 5.6.4.7 Rigging attachment points are as specified by the equipment vendor, if applicable, or as specified in the Critical Lift Plan; and
 - 5.6.4.8 Softeners are used at contact points between rigging and load as necessary to avoid damage to the load or the rigging.
- 5.6.5 Environmental conditions under which lifting operations should not be performed, such as wind, precipitation, reduced visibility, etc., should be established and communicated to project personnel through the Work Plan, Environmental, Health, and Safety (EHS) Plan, and by verbal instructions.
- 5.6.6 Prior to performing any lift, the Lift Supervisor should give consideration to a contingency plan should conditions prohibit the load from being placed in its intended position. Contingency plans could include placement back in its original position or an alternate temporary location, and should include ensuring that adequate cribbing, dunnage, or tie downs are provided for the alternate location.
- 5.6.7 The Lift Supervisor shall determine that the foundation or supports to receive any load have been

reviewed for stability and strength prior to performing the lift. This may be considered as a risk sensitive item, and if so, calculations performed shall be checked and have an independent verification prior to use in accordance with CP-11, Field Engineering. Temporary supports such as dunnage, cribbing, tie downs, and falsework shall be reviewed with consideration given to the load's weight, center of gravity, and resistance to overturning forces. Stability and bearing capacity of soils to support loads shall be verified.

- 5.6.8** Review and approval of permanent foundations or supports is performed as part of the design; however, there may be instances where a load is to be placed in its final, designed location prior to completion of all construction associated with support of that load. (Examples: Backfill may not have been placed against foundations, concrete may not have achieved full design strength, or structural steel framing may not be complete.) These instances shall require review and approval by the Project Engineer prior to the lift being performed.
- 5.6.9** Prior to placement of any load in storage or otherwise temporarily staged prior to placement in its final, designed location, consideration shall be given to any access requirements, maintenance activities, ability to perform future lifting or handling, and construction activities to be performed in the vicinity of the stored or staged load.

5.7 Rigging Requirements

- 5.7.1** Certification of all lift accessories, including the results of proof tests for custom designed accessories, shall be available at the on-site project offices and maintained in a file as part of the project filing system.

- 5.7.2 The total weight of the load to be lifted, including all lifting beams, rigging, hooks and attachments, shall be determined before a safe lift can be planned.
- 5.7.3 The determination of the exact location of the center of gravity of the load is critical in ensuring that the load is rigged in a stable configuration. The location of the attachments of the rigging to the load should be above the center of gravity where possible. Where the location of attachments is below the center of gravity, extreme care must be taken to ensure stability of the load. Special precautions shall be taken in the selection of sling lengths and attachment configurations to ensure that the load is stable. Rigging of loads in this configuration should only be performed by personnel with extensive experience in rigging.
- 5.7.4 Consideration shall be made in any lifting operation for the possibility of a load becoming unstable during lifts intended only to reposition a load, such as uprighting or turning a load over. The center of gravity shall be calculated for the load in all positions anticipated in order to ensure stability.
- 5.7.5 The load shall be safely rigged within the rated capacity of all rigging equipment.
- 5.7.6 Sling capacities shall be reduced from their full rated capacities based on sling configuration (vertical, choker or basket hitch) and sling leg angle, as well as based on sling condition. Only personnel with extensive experience in rigging should be given the authority to determine the capacity of slings showing signs of wear or other deterioration.
- 5.7.7 Custom designed grabs, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125% of their rated load.

5.8 Crane Inspections

- 5.8.1 Inspection Classification: Crane inspections are divided into two classifications by the ANSI/ASME B30 standards:
- 5.8.1.1 Initial Inspection: Prior to initial use, all new and altered cranes shall be inspected by a qualified person to verify compliance with the applicable provisions of the ANSI/ASME B30 standards.
- 5.8.1.2 Regular Inspection: The inspection procedure for cranes in regular service is further divided into two general classifications based on the intervals at which inspections should be performed. The intervals are dependent in turn on the nature of the critical components of the crane and the degree of their exposure to wear, deterioration, or malfunction. The two general classifications of regular inspections are designated as "frequent" and "periodic", with respective intervals between inspections defined as:

- Frequent Inspection - intervals from one to thirty days, performed by a person designated by the Lift Supervisor; and
- Periodic Inspection - intervals from one to twelve months (or as specifically recommended by the manufacturer or by a qualified person), performed by a qualified person.

5.8.1.3 Specific requirements for each of the above inspections are included in the ANSI/ASME B30 standards.

5.8.2 Implementation of the inspection requirements listed above for TtEC projects shall be in accordance with the following:

5.8.2.1 Prior to initial use, all new and altered cranes to be used by TtEC shall be inspected (initial inspection) by a certified crane inspector to ensure compliance with the applicable portions of the ANSI/ASME B30 standards, or the Power Crane and Shovel Association Standard #4 for draglines.

5.8.2.2 Cranes to be used by TtEC shall receive pre-operational inspections (frequent inspections) performed by the crane operator daily, prior to every use. Refer to the USACE Safety and Health Requirements Manual, Appendix H, Crane and Derrick Inspection, for a checklist of items to be inspected. Pre-operational inspections of rented or leased cranes, performed by a TtEC employee (e.g. either a certified crane inspector, the Lift Supervisor, or the crane operator) should not be documented or used in lieu of or as a periodic inspection.

5.8.2.3 Cranes to be used by TtEC shall receive periodic inspections conducted by a qualified person on an annual basis, or more frequently if recommended by the manufacturer. Because of liability considerations, the vendor renting or leasing the crane shall be responsible for performing and documenting the periodic inspections.

5.8.2.4 Cranes which have been idle for a period of one month or longer, but less than six months, shall be given a pre-operational inspection, conforming to the requirements for frequent crane inspections and frequent wire rope inspections, by a qualified person before being placed into service.

5.8.2.5 Cranes which have been idle for a period of over six months shall be given a complete inspection, conforming to the requirements for frequent and periodic crane inspections and for frequent and periodic wire rope inspections, by a qualified person prior to being placed into service.

5.9 Crane Performance Load Tests


5.9.1 Cranes to be used by TtEC shall receive performance load tests by a qualified person under the following circumstances:

- 5.9.1.1 Prior to initial use of cranes in which load sustaining parts have been altered, replaced, or repaired (excluding replacement of the rope);
- 5.9.1.2 Every time it is reconfigured or reassembled after disassembly; and
- 5.9.1.3 Every four years.
- 5.9.2 A crane boom stop field test shall be conducted to verify the proper setup of the boom stops and functioning of the boom hoist disengaging device. This test shall be conducted, and deficiencies noted shall be corrected, prior to initiating the load performance test. Refer to the USACE Safety and Health Program Manual, Appendix I, for a checklist for the crane boom stop field test.
- 5.9.3 Performance load tests shall be conducted in accordance with the manufacturer's recommendations. Test loads shall not exceed 100% of the manufacturer's load rating capacity chart for any configuration of the test, except where a specific requirement exists.
- 5.9.4 Written reports of the load test, showing test procedures and confirming the adequacy of repairs or alterations, shall be maintained with the crane or at the on-site project office.

5.10 Applicability to Subcontractors

- 5.10.1 Subcontractors performing work on TtEC projects are required (by subcontract addendum) to comply with the requirements of the TtEC Safety Plan(s) for the site work, or to develop and implement a Site Safety Plan in accordance with TtEC requirements (in accordance with the TtEC Health and Safety Program, Procedure HS 1-4, Subcontractor Selection and Management).
- 5.10.2 This critical lift procedure is not applicable to subcontractors unless specifically addressed in the subcontract terms and conditions. The Project Manager may provide copies of this procedure to subcontractors for their use in developing their own Critical Lift Plans; however, this should only be done with the express, written agreement that TtEC has no responsibility or liability for the acceptability and/or implementation of this procedure in the subcontractors' plans.

6.0 REFERENCES

American National Standards Institute, ANSI/ASME B30 standards, B30.1 through B30.25, including the B30.5a-1995 Addenda to ASME B30.5-1994
Health and Safety Program, Procedure EHS 1-4, Subcontractor Selection and Management 
Mobile and Locomotive Cranes
OSHA 29 CFR 1926 Subpart N - Cranes, Derricks, Hoists, Elevators, and Conveyors 7
Power Crane and Shovel Association Standard #4
USACE Safety and Health Requirements Manual, Publication EM 385-1-1, October 1992, or latest issue

7.0 ATTACHMENTS

Attachment 1 - Critical Lift Plan Forms

**ATTACHMENT 1
Tetra Tech EC, Inc.
CRITICAL LIFT PLAN FORMS**

Click the icon below to download and complete.



CP13-Att1.doc

Select the "Detach" button in the pop-up window to save a copy to a disk or hard drive.

Tetra Tech EC, Inc.

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Proprietary Information

Appendix L
Hospital Route Map

Directions to New Island Hospital

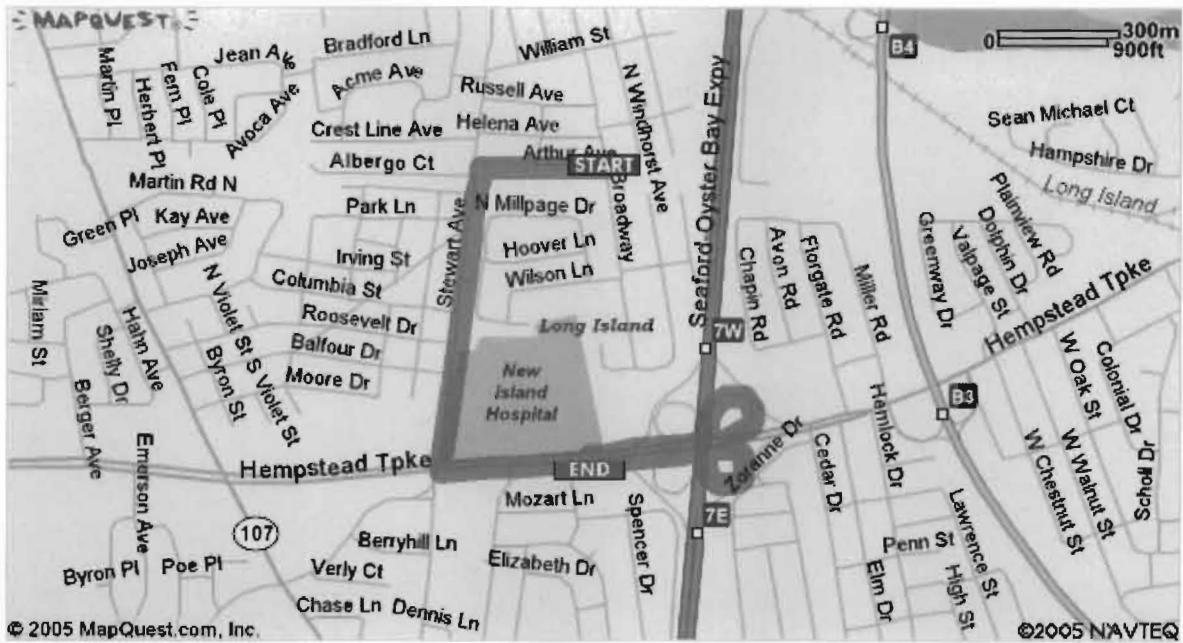
New Island Hospital
4295 Hempstead Turnpike
Bethpage, NY 11714-5713
516-579-6000

Start: Broadway & Arthur Ave
Bethpage, NY 11714, US

End: 4295 Hempstead Tpke
Bethpage, NY 11714-5713, US

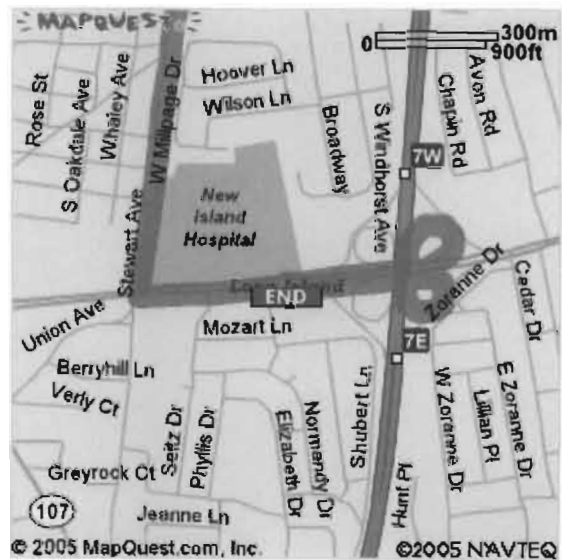
| Directions | Distance |
|---|-----------|
| Total Est. Time: 5 minutes Total Est. Distance: 1.70 miles | |
|  1: Start out going WEST on ARTHUR AVE toward LEROY AVE. | 0.1 miles |
|  2: Turn LEFT onto STEWART AVE. | 0.4 miles |
|  3: Turn LEFT onto HEMPSTEAD TURNPIKE / NY-24 E / BETHPAGE TURNPIKE. | 0.4 miles |
|  4: Merge onto SEAFORD-OYSTER BAY EXPY / NY-135 N toward OYSTER BAY. | 0.2 miles |
|  5: Merge onto HEMPSTEAD TURNPIKE / NY-24 W / BETHPAGE TURNPIKE via EXIT 7W toward HEMPSTEAD. | 0.3 miles |
|  6: End at 4295 Hempstead Tpke Bethpage, NY 11714-5713, US | |
| Total Est. Time: 5 minutes Total Est. Distance: 1.70 miles | |

Directions to New Island Hospital



Start:
Broadway & Arthur Ave
 Bethpage, NY 11714, US

End:
4295 Hempstead Tpke
 Bethpage, NY 11714-5713, US














Directions to Island Occupational Medical

Island Occupational Medical
4 Dorothy Gate
Massapequa, NY 11758-3521
516-795-5544

Start: Broadway & Arthur Ave
Bethpage, NY 11714, US

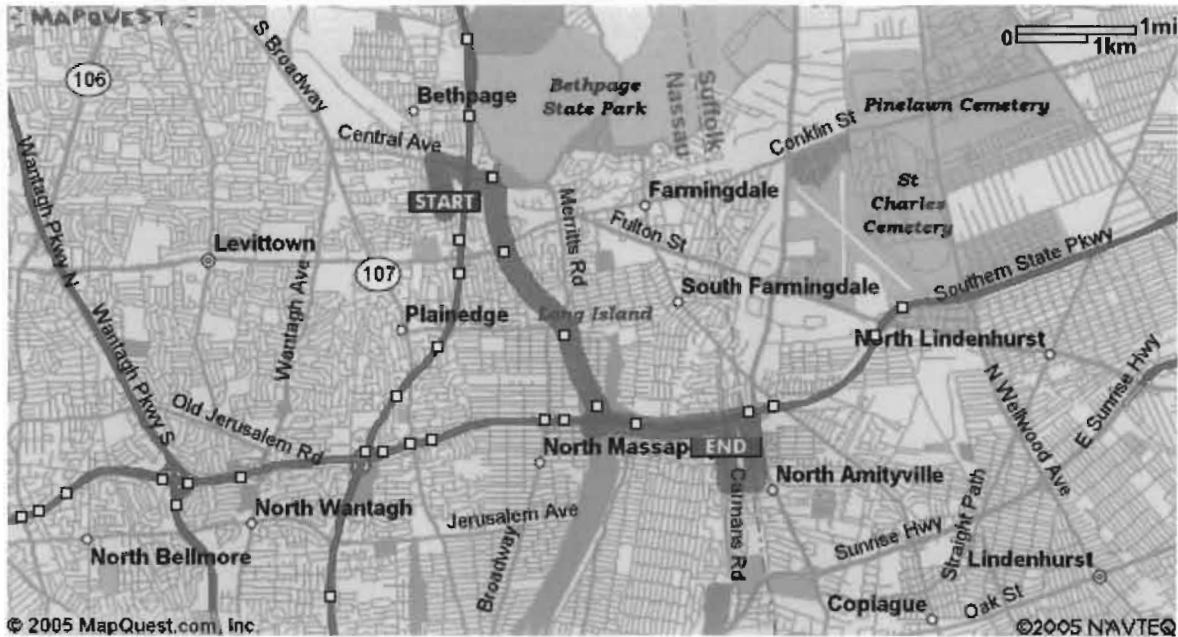
End: 4 Dorothy Gate
Massapequa, NY 11758-3521, US

| Directions | Distance |
|---|------------|
| Total Est. Time: 12 minutes Total Est. Distance: 5.99 miles | |
|  1: Start out going NORTH on BROADWAY toward HELENA AVE. | 0.4 miles |
|  2: Turn RIGHT onto CENTRAL AVE. | 0.5 miles |
|  3: Take the BETHPAGE PKWY SOUTH ramp. | 0.1 miles |
|  4: Merge onto PHILIP B HEALEY MEMORIAL PKWY / BETHPAGE PKWY / BETHPAGE STATE PKWY. | 2.1 miles |
|  5: Take the SOUTHERN STATE PKWY EAST exit- EXIT B1- on the LEFT toward BAY SHORE. | 0.3 miles |
|  6: Merge onto SOUTHERN STATE PKWY / SOUTHERN PKWY E. | 1.2 miles |
|  7: Take the RT-110 S exit- EXIT 32S. | <0.1 miles |
|  8: Turn SLIGHT RIGHT onto COUNTY LINE RD. | 0.5 miles |
|  9: Turn RIGHT onto PLYMOUTH DR. | 0.2 miles |
|  10: Turn RIGHT onto CARMANS RD. | 0.3 miles |
|  11: Turn RIGHT onto DOROTHY GATE. | <0.1 miles |

Directions to Island Occupational Medical

END 12: End at **4 Dorothy Gate**
Massapequa, NY 11758-3521, US

Total Est. Time: 12 minutes **Total Est. Distance:** 5.99 miles



Start:
Broadway & Arthur Ave
Bethpage, NY 11714, US

End:
4 Dorothy Gate
Massapequa, NY 11758-3521, US



Appendix M

Weekly/Monthly Safety Reports

TETRA TECH EC, INC.
EFANE WEEKLY HEALTH AND SAFETY REPORT

| REAL TIME AIR MONITORING | | | | | |
|--|------------------|--------------------------------|--------------------------------------|---------------------------|---------------------------------|
| Major Activity | Location(s) | Worker Occupation Monitored | FID/PID Range and Readings | CGI/02 Range and Readings | PDM Range and Readings Other |
| | | | | | |
| PERSONAL AIR MONITORING | | | | | |
| Activity Monitored | Location | Occupation | Type of Sample | Analyte | Result |
| | | | | | |
| SUBCONTRACTORS ON SITE | | | | | |
| Company Name | Task or Function | Return to Site Next Week (Y/N) | Performed Subcontractor Review (Y/N) | | |
| | | | | | |
| Site Health and Safety Officer - Signature _____ | | Date _____ | | | |

Monthly Statistical Report

| PROJECT: MONTH: | T&E MANUAL | | | T&E NON-MANUAL | | | SUBCONTRACTOR TOTALS | | | PROJECT TOTALS | | |
|-------------------------------------|------------|-----|-----|----------------|-----|-----|----------------------|-----|-----|----------------|-----|-----|
| | Month | YTD | PTD | Month | YTD | PTD | Month | YTD | PTD | Month | YTD | PTD |
| PROJECT START DATE: ___ / ___ / ___ | | | | | | | | | | | | |
| 1. First Aid Cases | | | | | | | | | | | | |
| 2. Total OSHA Recordables | | | | | | | | | | | | |
| 3. Restricted Duty Cases | | | | | | | | | | | | |
| 4. Restricted Duty Workdays | | | | | | | | | | | | |
| 5. Lost Time Cases | | | | | | | | | | | | |
| 6. Lost Time Workdays | | | | | | | | | | | | |
| 7. Hours Worked - Estimated | | | | | | | | | | | | |
| 8. Property Losses >\$500 | | | | | | | | | | | | |
| 9. High Loss Potential Incidents | | | | | | | | | | | | |
| 10. Total Incidents Investigated | | | | | | | | | | | | |

| Project Incident Rates | YTD | PTD | Nat'l Avg. |
|----------------------------|-----|-----|------------|
| Total OSHA Recordable Rate | | | 10.6 |
| Lost Workday Rate | | | 4.9 |
| Lost Workday Severity Rate | | | 39 |

OSHA Recordable Rate = $\frac{\# \text{ Recordables} \times 200,000}{\# \text{ of hours worked}}$

Lost Work Day Rate = $\frac{\text{Total \# of lost time cases and restricted duty cases} \times 200,000}{\# \text{ of hours worked}}$

Lost Work Day Severity Rate = $\frac{\text{Total \# of days lost and days restricted} \times 200,000}{\# \text{ of hours worked}}$