

NAVAL FACILITIES ENGINEERING COMMAND, ATLANTIC
REMEDIAL ACTION CONTRACT (RAC)
CONTRACT NO. N62472-99-D-0032
CONTRACT TASK ORDER NO. 0102

FINAL SITE SPECIFIC HEALTH AND SAFETY PLAN
FOR
DERECKTOR SHIPYARD
SANDBLAST GRIT-IMPACTED AREA
NEWPORT NAVAL STATION
MIDDLETOWN, RHODE ISLAND

Issued:

July 3, 2007

Prepared For:

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Revision

0

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Pages Affected

All

CONTRACT NO. N62472-99-D-0032	CONTRACT TASK ORDER NO. 0102	ACTIVITY LOCATION Naval Station Newport – Newport, RI
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PROJECT TITLE:
Derektor Shipyard – Sand Blast Grit Removal

FROM: Tetra Tech EC, Inc.: Program QC Manager George Sze	DATE July 3, 2007
TO: J. Colter (2 CD-Copies and 2 Hardcopies)	DATE July 3, 2007

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ITEM NO.	SUBMITTAL DESCRIPTION	PREPARED/ SUBMITTED BY	APPROVED	DISAPPROVED	REMARKS
1	SD-08, Statements; Final Site Specific Health and Safety Plan for Direktor Shipyard, Sandblast Grit-Impacted Area	Helene Ropars			

APPROVALS

By their signature, the undersigned hereby certify that this Site Specific Health and Safety Plan has been reviewed and approved for use during the delineation activities and the excavation of soil with lead concentrations that exceed the RIDEM Soil Direct Exposure Criteria of 150 ppm and soil with visual sandblast grit at the sandblast grit-impacted area located at the Derecktor Shipyard, which is part of the Naval Station Newport in Middletown, Rhode Island.

Dan Sullivan
PROJECT MANAGER

DATE

TBD
PROJECT SUPERINTENDENT

DATE

Grey Coppi
PROJECT ENVIRONMENTAL AND SAFETY MANAGER

DATE

TBD
SITE HEALTH AND SAFETY OFFICER

DATE

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ABBREVIATIONS AND ACRONYMS

AHA	Activity Hazard Analysis
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CRF	Change Request Form
CRZ	Contamination Reduction Zone
CPR	Cardiopulmonary Resuscitation
CSP	Certified Safety Professional
CY	Cubic Yard
EC	Emergency Coordinator
EHS	Environmental Health and Safety
EM	Engineering Manual
ESQ	Environmental, Safety, and Quality
EZ	Exclusion Zone
FFA	Federal Facilities Agreement
GPS	Global Positioning System
MILCON	Military Construction
MSDS	Material Safety Data Sheet
NAVFAC	Naval Facilities Engineering Command
NAVSTA	Naval Station
OSHA	Occupational Safety and Health Administration
PESM	Project Environmental Safety Manager
PM	Project Manager
PPE	Personal Protective Equipment
PPM	Parts Per Million
PQCM	Project Quality Control Manager
QC	Quality Control
RAC	Remedial Action Contract
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RIDEM	Rhode Island Department of Environmental Management
RIGIS	Rhode Island Geographic Information System
ROICC	Resident Officer In Charge of Construction
SHSO	Site Health and Safety Officer
SHSP	Site Health and Safety Plan
SQCM	Site Quality Control Manager
SZ	Support Zone
TPH	Total Petroleum Hydrocarbon
TtEC	Tetra Tech EC, Inc.
USACE	United States Army Corps of Engineers
USEPA	United States Environmental Protection Agency

1.0 INTRODUCTION

This Site Specific Health and Safety Plan (SHSP) for the sandblast grit-impacted area located at the Derecktor Shipyard, which is part of the Naval Station (NAVSTA) Newport in Middletown, Rhode Island addresses the health and safety practices that will be employed by all site workers participating in field operations associated with the soil excavation project. This SHSP takes into account the specific hazards inherent to the site work and presents procedures to be followed by Tetra Tech EC, Inc. (TtEC), its subcontractors, and all other on-site personnel in order to avoid and, if necessary, protect against health and/or safety hazards. Activities performed under this SHSP will comply with Occupational Safety and Health Administration (OSHA) Regulations 29 Code of Federal Regulations (CFR) Parts 1910 and 1926, United States Army Corps of Engineers (USACE) Engineering Manual (EM) 385-1-1, as well as the TtEC Health and Safety Program. Modifications to this SHSP may be made with the approval of the Project Environmental and Safety Manager (PESM) and the Navy using the Change Request Form (CRF) in Appendix A.

1.1 Scope

As presented in the Work Plan, the scope of this removal action is to perform the following tasks:

- Mobilization and site preparation. This includes acquisition of supplies, locating utilities, equipment mobilization, worker training, notifying the laboratory, and coordination with the Navy;
- Exploratory testpitting to locate the sandblast grit extents;
- Excavate soils exhibiting visual sandblast grit. This will occur; first, by hand two feet on either side of all underground utilities and structures, and then the remainder of soil will be excavated using heavy equipment. Visibly clean material will be separated from the sandblast grit;
- Collect confirmatory samples from the excavation. Samples will be collected at a frequency of one (1) confirmatory sample per 100 square feet in the base and one (1) confirmatory sample per 20-linear feet of excavated soils in the sidewall with a minimum of one (1) sample per sidewall. Samples will also be taken at the same frequency for every five (5) feet of excavated depth. All samples will be biased towards areas, which appear to be contaminated (i.e., instrument, olfactory, or visual). If evidence of contamination is not present, samples will be biased towards areas which previously exhibited contamination;
- Compare confirmatory sample results with the remedial action objective (RAOs);
- Additional excavations will be performed in areas where confirmatory sample results exceed the RAOs (Rhode Island Department of Environmental Management (RIDEM) Soil Direct Exposure Criteria of 150 parts per million (ppm)). Retake confirmatory samples to verify RAOs have been achieved;
- Collect Global Positioning System (GPS) locations of confirmatory samples and extents of the excavation (i.e., corners of the excavations);
- Transport and proper off-site disposal of contaminated soil (waste characterization sampling included). The estimated volume of contaminated soil is approximately 60 cubic yards (CY) (i.e., 90 tons assuming 1.5 tons/CY);
- After confirmatory sample results verify all sandblast grit and soil that has lead concentrations that exceed the RIDEM Soil Direct Exposure Criteria of 150 ppm has been removed, clean fill will be used to restore area to previous conditions;

- Navy inspection and acceptance; and
- Demobilization.

1.2 Application

This SHSP applies to all personnel involved in the above tasks, or 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; and
- TtEC subcontractors, who will develop activity hazard analyses (AHAs) that will be reviewed by TtEC prior to start of work.

2.0 PROJECT ORGANIZATION

This section outlines the TtEC Project Organization and responsibilities for the site activities. The field staff will consist of a Project Manager (PM), PESM, Project Superintendent, a Site Health and Safety Officer (SHSO), and site personnel (to include subcontractors and craft labor). Certain key TtEC personnel will perform multiple roles at the site for project implementation. The responsibilities of each role are discussed in the following sections.

2.1 Project Manager

The PM is Dan Sullivan. The PM will be the main point of contact with the Navy for all project-related matters and will be responsible for the overall conduct and performance of the project. The PM is responsible for the following:

- Ensures implementation of this program through coordination with the responsible;
- Conducts monthly inspections;
- Participates in major incident investigations;
- Ensures the SHSP has all of the required approvals before any site work is conducted;
- Ensures that the PESM or SHSO is informed of project changes which require modifications of the site safety plan;
- Has overall project responsibility for Project Health and Safety;
- Provide the major point of control to ensure that the program's technical, financial and scheduling objectives are achieved;
- Ensure that the program meets The Navy's objectives and TtEC quality standards; and
- Coordinate problem resolution/corrective action implementation.

2.2 Project Environmental and Safety Manager

The PESM is a senior Environmental, Health and Safety staff member 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 and his responsibilities are:

- 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 the SHSO to fulfill other project roles;
- Coordinates revisions of this SHSP with field personnel;
- Coordinates upgrading or downgrading of personal protective equipment with the SHSO;
- Oversee and approve the Emergency Response/Contingency Plan and perform audits to determine that the plan is in effect and all pre-emergency requirements are met;

- Act as a liaison to applicable regulatory agencies and notify OSHA of reportable accidents and fatalities;
- Notify OSHA if an accident/incident results in an OSHA reportable (i.e. three or more workers hospitalized, over \$10,000 in property damage, or a fatality);
- Assists in the investigation of all incidents; and
- Conducts quarterly inspections for compliance with the SHSP.

2.3 Project Superintendent (TBD)

The Project Superintendent will be responsible for 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;
- Halting or modifying any work conditions or removal of personnel from the task site if the conditions are unsafe;
- Overseeing the implementation of specified levels of PPE;
- Identifying potential problem areas and making corrective action recommendations to the PM;
- Maintaining a daily log of work activities including noting any extraordinary occurrences;
- Initiating corrective actions for observed safety violations;
- Conducts Incident Investigations;
- Conducts daily safety briefings;
- Conducting weekly and monthly inspections (health and safety) when the PM is not on-site and documentation of the inspection will be maintained by the SHSO; and
- Acts as Emergency Coordinator.

2.4 Site Health and Safety Officer (TBD)

The SHSO is a person knowledgeable in appropriate safety and health regulations with at least one year of experience or specialized training in serving in a Health and Safety staff role on hazardous waste remediation sites. The SHSO will be identified prior to mobilization and is responsible for the following:

- Working as a member of the project team to ensure implementation of the site SHSP;
- Ensuring that all health and safety activities identified in the SHSP are conducted and/or implemented;

- Identifying operational changes which require modifications to health and safety procedures and SHSP, and ensures that the procedure modifications are implemented and documented through changes to the SHSP;
- Directing and coordinating health and safety monitoring activities;
- Ensuring that site personnel are trained in the proper use of required PPE;
- Assists in conducting and documenting daily safety briefings;
- Conducting daily informal inspections, and monitoring compliance with this SHSP;
- Notifies the Project Superintendent and PESM of all accidents/incidents by email or phone call the day of occurrence;
- Coordinates with the Project Superintendent and 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;
- Acting as the alternate Emergency Coordinator;
- Inspecting, approving/rejecting, and documenting the inspection results of all heavy equipment for use on site; and
- Preparing new AHAs (as required) and periodically reviews the AHAs for accuracy, and compliance.
- The SHSO will also serve as the Site Quality Control Manager (SQCM) and will act on behalf of the Program Quality Control Manager (PQCM), Mr. George Sze. The SQCM will be responsible for all site-related quality control (QC) activities, including the enforcement of the QC Plan (Section 5.0 of the Work Plan) and tracking all field documentation and submittals.

2.5 Site Personnel

Field crew personnel include all other persons entering the site for the purpose of assisting in the completion of the project. This includes, but is not limited to client representatives, subcontractors, regulatory personnel, site workers, and craft labor. They are responsible for the following:

- Reporting any unsafe or potentially hazardous conditions to the SHSO or Project Superintendent;
- 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 as well as any revisions that are instituted;
- Notifying the SHSO or Project Superintendent of an accident/incident;
- Initiating the Incident Report when involved in an incident/accident when able to do so;

- Prevent admittance to work sites by unauthorized personnel. If the unauthorized persons refuse to leave, the field crew personnel shall cease operations and notify the Navy security who will remove these individuals;
- Inspect all tools and equipment, including PPE, daily prior to use;
- Assisting the Project Superintendent and SHSO with implementation and compliance with the SHSP; and
- Operating equipment (e.g., heavy equipment, power tools) in accordance with the manufacturer's recommendations, the SHSO, and the appropriate AHA.

3.0 SITE LOCATION AND DESCRIPTION

3.1 Site Description

NAVSTA Newport is located approximately 60 miles southwest of Boston, Massachusetts and 25 miles south of Providence, Rhode Island. It occupies approximately 1,063 acres, with portions of the facility located in the city of Newport and towns of Middletown, Rhode Island. The facility layout is long and narrow, following the western shoreline of Aquidneck Island for nearly 6 miles facing the east passage of Coddington Cove (refer to Figure 3-1).

The NAVSTA Newport facility has been in use by the Navy since the Civil War. During both World Wars I and II, military activities at the facility increased significantly and the base provided housing for military personnel. In subsequent years, uses of the on-site facilities were slowly phased out until NAVSTA Newport became headquarters of the Commander-Cruiser Destroyer Force Atlantic in 1962. In April 1973, the Shore Establishment Realignment Program resulted in the reorganization of naval forces, and activity again declined.

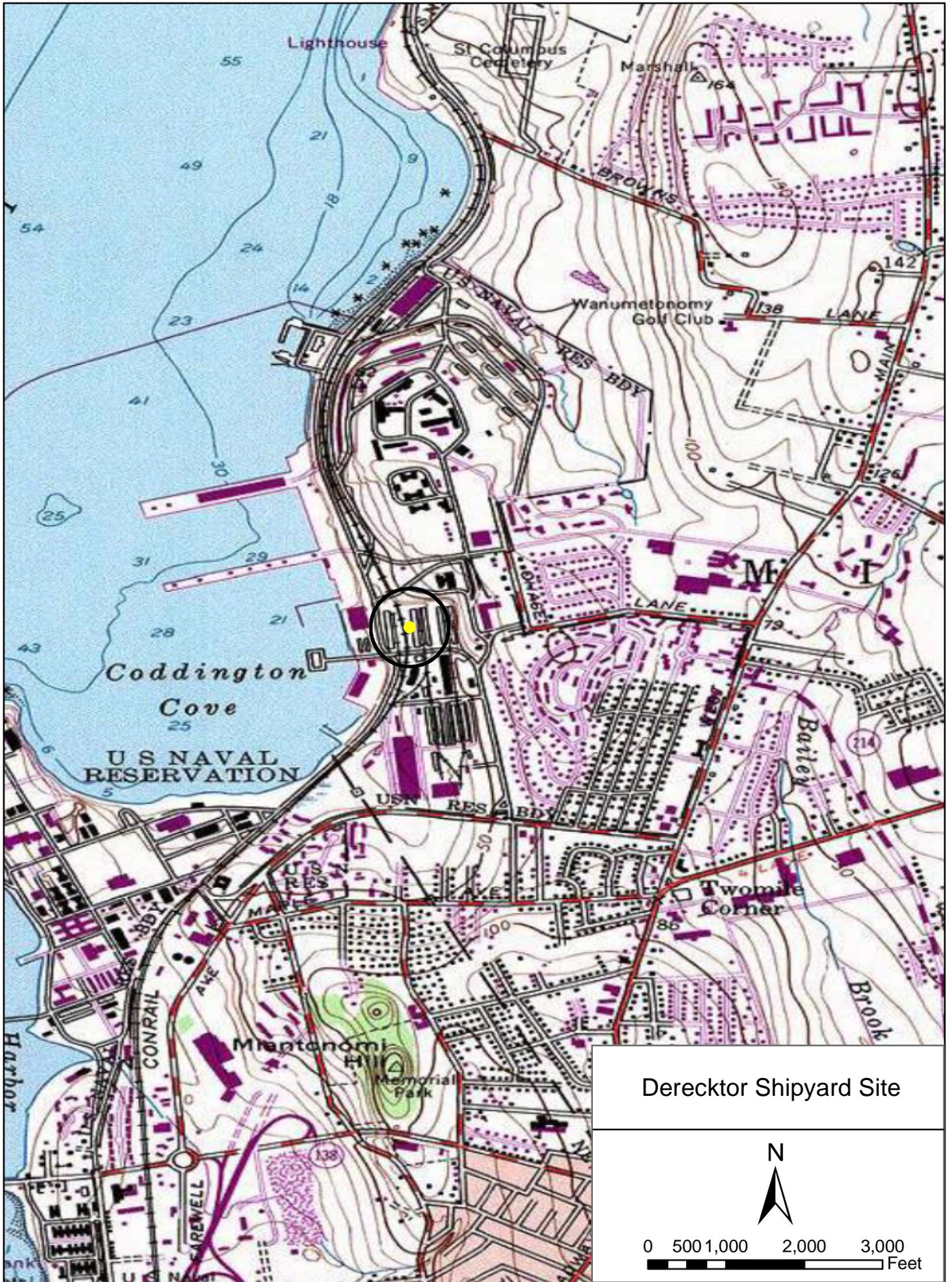
The entire NAVSTA Newport facility was listed on the United States Environmental Protection Agency (USEPA) National Priorities List of abandoned or uncontrolled hazardous waste sites in November 1989. A Federal Facilities Agreement (FFA) for NAVSTA Newport was signed by the Navy, the State of Rhode Island, and the USEPA on March 23, 1992. The FFA outlines response action requirements under the Department of Defense Installation Restoration Program at NAVSTA Newport. The FFA was developed, in part, to ensure that environmental impacts associated with past and present activities at NAVSTA Newport are thoroughly investigated and remediated, as necessary.

The site is located approximately 15-20-feet north/northwest of the northwest corner of Building 5. Generally speaking, the area where the site exists gently slopes to the west, towards Coddington Cove. Site visits indicate that the site is in the industrial area of the base. The Rhode Island Geographic Information System (RIGIS) Land Use Map indicates that the site is predominantly classified as "Other Transportation" which consists of terminals, docks, etc. The RIGIS Soils Map indicates that the site is located in an area with variable soils. The RIGIS Wetlands Maps indicate that no wetlands are located in the general vicinity of the site. The RIGIS Groundwater Classification and Well Head Protection Map show that the site is not located inside a Community or Non-Community Well Head Protection Area and the groundwater at the site is considered GB > 25 acres. During the December 2004 investigation and removal, TtEC did not encounter groundwater.

3.2 Site Background

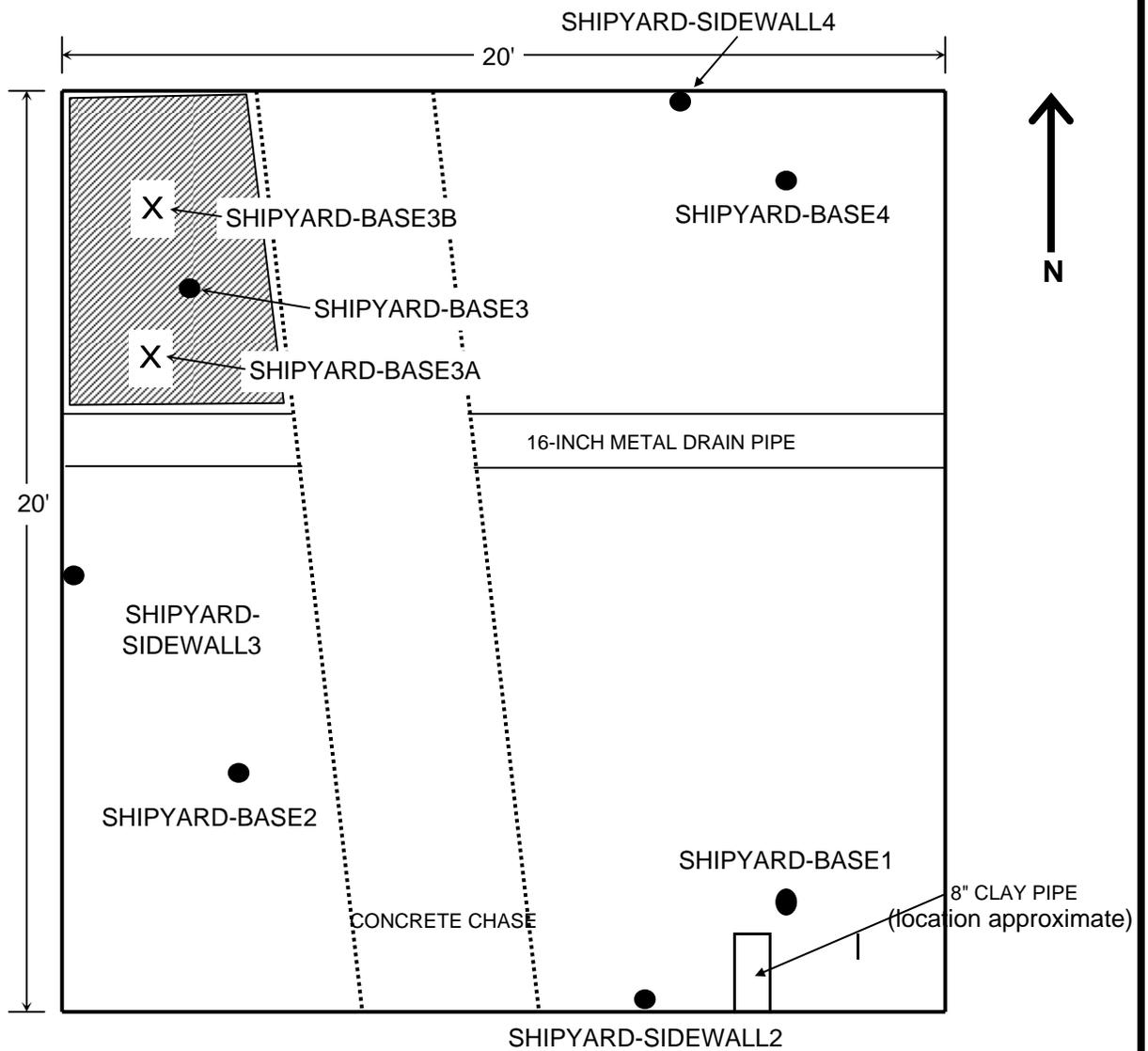
In 2004, Military Construction (MILCON) contractors encountered sandblast grit in the subsurface soil within the footprint of a watchtower they were constructing at the site during a project entitled *The New North Gate and Security Improvements*. In December 2004, TtEC removed the subsurface sandblast grit-impacted soil from the footprint of the watchtower (20-feet by 20-feet by 4.5-feet). Refer to Figure 3-2 for this footprint depiction. TtEC removed the sandblast grit from the excavation base and north, south, and western sidewalls of the excavation – the eastern sidewall still contained visual sandblast grit. The poly sheeting was left in place to demarcate the clean area from the eastern sidewall, which was visually observed to contain sand blast grit.

In early 2005, the MILCON Contractor returned to the site and erected the tower and covered a portion of the site with asphalt. However, when erecting the watchtower, the MILCON contractor inadvertently disturbed the east sidewall. The MILCON contractor ensured that the sandblast grit was not inadvertently



Derecktor Shipyard Site





- FIRST ROUND OF SAMPLING
- ▨ RE-EXCAVATED AREA
- X SECOND ROUND OF SAMPLING

NOTE: ALL SAMPLE LOCATIONS SURVEYED WITH GPS

**GATE 10 MILCON PROJECT
SAND BLAST GRIT REMOVAL
SAMPLE LOCATIONS**

FIGURE NOT TO SCALE

re-located to the footprint of the tower (the area where TtEC conducted investigation and removal operations in December 2004). The MILCON contractor excavated site soil that they placed within the tower footprint, properly disposed of the excavated material, and collected confirmatory samples to ensure that the footprint of the tower was free from sandblast grit. The MILCON contractor then constructed an asphalt pad over much of the site and constructed a retaining wall east of the watch tower. The Navy then directed TtEC to address the sandblast grit-impacted soil that may have remained at the east sidewall.

4.0 POTENTIAL HAZARDS

This section presents an assessment of the chemical, biological and physical hazards that may be encountered during the tasks specified in Section 1.0. Additional information can be found in Appendix C (Material Safety Data Sheets) or in Appendix D (Activity Hazard Analyses).

4.1 Chemical Hazards

Based on results from previous confirmatory sampling from the December 2004 Removal Action, the primary contaminants of concern are Silica, Lead, Chromium, and Barium. The routes of exposure include; inhalation, absorption, ingestion, and contact. Symptoms of exposure can be found in Table 4-1 below.

The levels of exposure to the potential site contaminants are anticipated to be very low. Table 4-1 lists the potential site contaminants and significant physical, chemical, health effects, and exposure limit data.

In addition to site contaminants potential exposure to equipment fuel and maintenance fluids (i.e., hydraulic oil, transmission fluid, etc) is also a concern. Exposure pathways for these chemicals are inhalation, ingestion, and contact. The primary exposure pathway of concern would be through contact or splashing while the equipment is being fueled and maintained.

4.2 Biological Hazards

The Activity Hazard Analyses found in Appendix D will include specific hazards and control measures for each task.

4.2.1 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)



**Table 4-1
Chemical Data**

Compound	ACGIH TLV	OSHA PEL	IDLH	Routes of Exposure	Symptoms of Exposure	Target Organs	Physical Properties
Silica	.025mg/m ³	20mppcf	3000mg/ m ³	inhalation, skin and/or eye contact	Irritation eyes, pneumoconiosis.	Eyes, respiratory system	Transparent to gray, odorless powder. LEL=NA UEL=NA Fl. P=NA IP: NA
Lead	.050mg/m ³	0.050mg/m ³	100mg/ m ³	inhalation, ingestion, skin and/or eye contact	Lassitude (weakness, exhaustion), insomnia; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; irritation eyes; hypotension	Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue	A heavy, ductile, soft, gray solid. LEL=NA UEL=NA Fl. P=NA IP: NA
Barium	0.5 mg/m ³	0.5 mg/m ³	50 mg/m ³	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse	Eyes, skin, respiratory system, heart, central nervous system	White, odorless solid. LEL=NA UEL=NA Fl. P=NA
Chromium	0.01 mg/m ³	1 mg/m ³	250 mg/m ³	inhalation, ingestion, skin and/or eye contact	Irritation eyes, skin; lung fibrosis (histologic)	Eyes, skin, respiratory system	Blue-white to steel-gray, lustrous, brittle, hard, odorless solid. LEL=NA UEL=NA Fl. P=NA IP: NA
Gasoline	300 ppm	None	Not Listed	Inhalation, Ingestion, Skin Absorption, Skin Contact	Irritate eyes, skin, mucous membranes, dermatitis; headache, fatigue, dizziness, confusion, convulsions	Eyes, skin, resp tract, CNS, liver, kidneys	Clear liquid with a characteristic odor. Class IB Flammable Liquid LEL= 1.4% UEL=7.6% Fl.P.: -45 ⁰ F
Total Petroleum Hydrocarbon (TPH)	100 ppm	None	ND	Inhalation Ingestion Skin Contact	Irritate eyes, skin, nose, throat; burning sensation in chest, headache, nausea, weakness, restless, incoherent, confusion, vomit, drowsiness, diarrhea.	Eyes, skin, resp. sys., CNS	Colorless to yellowish oily liquid with a strong characteristic odor. LEL=0.7% UEL=5% Fl. P=100-162 ⁰ F IP: ?

4.2.2 Lyme Disease

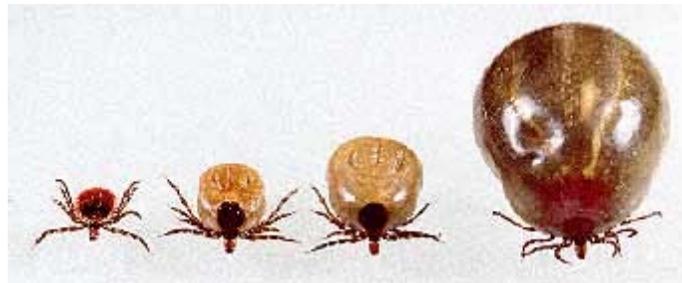
Since the site is located in the northeast, the potential for coming into contact with deer ticks exists. Lyme disease is caused by an infection from a deer tick that is about the size of the head of a pin. After a blood feeding, the tick becomes engorged and may vomit its stomach contents into the host, 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



Deer Tick Engorged Series

(The Changing Face as the Female Deer Tick Engorges)
(Left to Right: Un-Engorged, 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; and
- 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 hypostrome 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 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. PPE may be worn by employees in order 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 AHA in Appendix D for the different phases of the project. In addition to the AHAs, general work rules and other safety procedures are described in Section 10.0 of this SHSP.

4.3.1 Cold Stress

At certain times of the year, workers may be exposed to the hazards of working in cold environments. Potential hazards in cold environments include frostbite, trench foot or immersion foot, hypothermia as well as slippery surfaces, brittle equipment, poor judgment and unauthorized procedural changes. The following are the main elements of the TtEC Corporate Health and Safety Program. Refer to Appendix E (Temperature Extremes Program) for more details.

- 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 areas; and
- Employee training.

4.3.2 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 shall be so designated.

4.3.3 Underground Utilities

During the 2004 investigation, TtEC unearthed a 16-inch subsurface metal drainage pipe that was oriented in an east/west direction (refer to Figure 3-2). The drainage pipe drained water from a swale that is located east of that 2004 excavation area towards the bay, which is located west of the site. In early 2005, the MILCON contractor replaced the 16-inch pipe with a new pipe. The new pipe served the same function as the old pipe and is believed to channel subsurface water from the swale towards Coddington Cove.

Also during the 2004 investigation, an 8-inch clay pipe was found on the south sidewall of the excavation area running in a north to south direction (refer to Figure 3-2). During the 2004 excavation of impacted soil, the end of the clay pipe was hit by the teeth of the extendahoe bucket, releasing some residual drainage water in the line into the bottom of the excavation area. A Navy drawing indicated that the line was most likely a remnant of a temporary bypass line associated with a sewer repair/upgrade and the water was likely entrapped water in the line.

Striking underground utilities is a possible hazard whenever excavation is conducted. All steps will be taken to locate underground utilities as per Environmental Health and Safety (EHS) 3-15 (refer to Appendix I) including white lining the area of excavation and maintaining reference numbers in on site files. Also, prior to any intrusive activities, TtEC will contact the National Dig Safe and the NAVSTA Newport Public Works Office to identify buried obstructions and utilities in the excavation area. TtEC will also use a private utility mark-out service to locate existing subsurface utilities. The Navy is responsible for identifying facility utilities.

5.0 ACTIVITY HAZARD ANALYSES

Activity Hazard Analyses have been developed for each major phase of work during the soil excavation. The AHAs take into account the hazards discussed in Section 4.0 and lists control measures. Additional or expanded AHAs will be developed by the SHSO, or subcontractors, for all unanticipated phases of work and/or prior to working on a new task. The AHAs will be used to instruct workers on the hazards of the associated activities during an on-site safety briefing.

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

- General Site Hazards;
- Mobilization/Demobilization and Site Preparation;
- Contaminated Soil Testpitting and Excavation;
- Soil Load-Out;
- Confirmatory Sampling; and
- Site Restoration.

Subcontracted work is not anticipated. However, if it is used, subcontracted work will be evaluated for hazards in a manner consistent with self-performed work. The Project Superintendent and SHSO are responsible to obtain AHAs from subcontractors and will review subcontractor AHAs and Work Plans for accuracy or develop accurate AHAs for subcontracted work.

6.0 PERSONAL PROTECTIVE EQUIPMENT

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. Level C PPE may be required if action levels indicate the need to upgrade. For activities not covered by AHAs, the SHSO will conduct the hazard assessment and select the PPE using the form provided in Appendix F 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 upgrade or downgrade will be provided to the PESM for approval as a field change request.

Table 6-1 describes PPE for site tasks.

**Table 6-1
PERSONAL PROTECTIVE EQUIPMENT SELECTION**

TASK	HEAD	EYES/FACE	FEET	HANDS	BODY	HEARING	RESPIRATORY
Mobilization							
Mobilize equipment, supplies	HH	SG	STB	LWG	WC	EP as needed	Level D
Site Preparation							
Establish Site Zones	HH	SG	STB	LWG	WC	EP as needed	Level D
Erosion and Sediment Controls							
Soil erosion controls	HH	SG	STB	LWG	WC	EP as needed	Level D
Contaminated Soil Excavation/Disposal							
Excavation of Soil	HH	SG	STB	LWG	WC	EP as needed	Level D*
Confirmatory Sampling	HH	SG	STB	LWG	WC	EP as needed	Level D*
Site Restoration Activities							
Backfill	HH	SG	STB	LWG	WC	EP as needed	Level D
Restore site to previous condition	HH	SG	STB	LWG	WC	EP as needed	Level D
Equipment Decontamination							
Heavy Equipment	HH	SG and PFS	STB	Sur. or Nit.	WC	EP as needed	Level D
Demobilization							
Demobilization	HH	SG	STB	LWG	WC	EP as needed	Level D

*- Particulate Masks if air monitoring shows action level exceedence.

Abbreviations:

EP = Ear Plugs

HH = Hard Hat

LWG = Leather Work Gloves

Nit. = Nitrile Gloves

PFS = Plastic Face Shield

SG = Safety Glasses

STB = Steel Toe Boots

Sur. = Surgical Gloves

WC = Work Clothes

7.0 AIR MONITORING

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

7.1 Real-Time Air Monitoring

Based on real time 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.

Table 7-1 REAL TIME AIR MONITORING ACTION LEVELS				
Air Monitoring Instrument	Monitoring Location	Action Level	Site Action	Reason
Mini Ram (Respirable Dust)	Breathing Zone	0 to 1 mg/m ³	No respiratory protection required.	Below ½ action level.
		1 to 2.5 mg/m ³	Level C HEPA filter: P 100	May meet action level of some Contaminants of Concern.
		>2.5 mg/m ³	Cease activities; proceed to rally point in clean area, contact PM & PESM for further instructions	Conservative action level to prevent exposure, level C may be needed.

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

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 of contaminated soil	Mini Ram	Readings will be collected from the breathing zone during all soil excavation activities. At a minimum, readings will be collected at least every 2 hours while soil is being disturbed.
Confirmatory Sampling	Mini Ram	Readings will be taken in the breathing zone every 15 minutes during sampling.

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 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 his professional judgment. The SHSO will review the monitoring and sampling data, along with all sample documentation with the PESM to evaluate the potential for worker exposure and upgrades/downgrades in LOP. Periodically, personnel exposure results will be discussed at the daily safety briefing.

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, and documented through use of a field-change request form.

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

Support Zone - 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.

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

Exclusion Zone - All activities that may involve exposure to site contaminants, hazardous materials and/or conditions should be considered an exclusion zone (EZ). This zone will be clearly delineated by fence, 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 site SHSO allowing adequate space for the activity to be completed, field members and emergency equipment.

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 and sampling of material, it will be crucial for field personnel to adhere to the following personal hygiene guidelines:

- Wash hands and face after leaving the contamination reduction zone; and
- 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 should 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.

1. Perform dry decon if contact with contaminants occurred.
2. Remove exterior protective clothing carefully and dispose of same.
3. Remove respirator/particulate mask if applicable, clean and dry.
4. Remove gloves without touching outside surface of gloves and dispose of same.
5. Wash hands and face thoroughly.

8.2.4 Heavy Equipment and Hand Held Equipment Decontamination

Heavy equipment and hand-held equipment leaving the EZ will be thoroughly decontaminated. All tools and heavy equipment that come into contact with the sandblast grit material will be dry-brush decontaminated directly over the roll-off container prior to demobilization from the site. Used PPE will be placed in plastic bags and temporarily stored in receptacles equipped with lids.

Sampling equipment that is not disposable will need to be decontaminated with decontamination water. Decontamination of the sampling equipment will generally be conducted in accordance with the following steps:

- Alconox® (or Liquinox®) detergent and potable water scrub;
- Potable water rinse;
- Distilled and de-ionized water rinse; and
- Rinse with methanol for organic sampling equipment. For inorganic sampling equipment, rinse with 10% nitric acid in water, followed by deionized water.

Wrap or cover exposed ends with aluminum foil when not in use. Decontamination fluids will be disposed of properly.

Heavy equipment, hand-held equipment, and personnel will not be permitted to leave the EZ unless it has been thoroughly decontaminated and visually inspected by the SHSO or his designee.

8.3 Communication

The following communications equipment shall 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; and
- 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:

SIGNAL

Hand gripping throat

Grip on a partner's wrist or placement of both hands around a partner's waist.

Hands on top of head

Hands raised above head

Thumbs up

Thumbs down

MEANING

Out of air, can't breathe

Leave the area immediately, no debate.

Need general assistance

Need immediate assistance

Okay, I'm all right, I understand.

No, negative.

9.0 MEDICAL SURVEILLANCE PROCEDURES

All contractor and subcontractor personnel performing field work where potential exposure to contaminants exists at the site 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 Section 4-5 of the Health and Safety Program. The Corporate Medical Consultant is Work Care in Orange, California. Dr. Peter Greaney, the Director, is Board certified in occupational medicine.

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 exclusion zone. The examination will be taken annually at a minimum and upon termination of hazardous waste site work if the last examination was not taken within the previous six months. Additional medical testing may be required by the PESM 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 G. 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 in the TtEC Health and Safety Program, Section 3-6. These rules have been incorporated into the SHSP as Appendix H. 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 Activity Hazard Analysis and the specific TtEC Health and Safety Program.

- Heavy Equipment;
- Hand and Power Tool Usage;
- Fire Hazards;
- Electrical Equipment;
- Slips/Trips/Falls;
- Punctures/Cuts;
- Lifting/Materials Handling; and
- Handling Storage of Fuels.

10.3 High Loss Potential Hazards

Activities to be conducted at the site will involve operations that have the potential for a serious injury to occur, including the following:

- Excavation/Intrusive activities;
- Exposure to energized electric lines / underground utility lines; and
- Heavy Equipment.

10.3.1 Excavation and Trenching

Excavation will be conducted in accordance with the Excavation and Trenching Program, EHS 6-3 of the TtEC Corporation Health and Safety Program, which is in Appendix B. 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.

The Competent Person will be assisted in his duties by other TtEC technical personnel.

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 SHSO with all required documentation on a daily basis.

Competent persons shall 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 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 EHS 6-3; and
- Uses, limitations, and specifications of protective systems in accordance with EHS 6-3.

Prior to any excavation underground utilities will be identified and located following EHS 3-15 of the TtEC Health and Safety Program which requires white lining of excavation areas, maintenance and updating of reference numbers in site files and other requirements (refer to Appendix B).

10.3.2 Underground Utilities

During the 2004 investigation, TtEC unearthed a 16-inch subsurface metal drainage pipe that was oriented in an east/west direction (refer to Figure 3-2). The drainage pipe drained water from a swale that is located east of that 2004 excavation area towards the bay, which is located west of the site. In early 2005, the MILCON contractor replaced the 16-inch pipe with a new pipe. The new pipe served the same function as the old pipe and is believed to channel subsurface water from the swale towards Coddington Cove.

Also during the 2004 investigation, an 8-inch clay pipe was found on the south sidewall of the excavation area running in a north to south direction (refer to Figure 3-2). During the 2004 excavation of impacted soil, the end of the clay pipe was hit by the teeth of the extendahoe bucket, releasing some residual drainage water in the line into the bottom of the excavation area. A Navy drawing indicated that the line was most likely a remnant of a temporary bypass line associated with a sewer repair/upgrade and the water was likely entrapped water in the line.

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 (refer to Appendix I) including white lining the area of excavation and maintaining reference numbers in on site files. Also, prior to any intrusive activities, TtEC will contact the National Dig Safe and the NAVSTA Newport Public Works Office to identify buried obstructions and utilities in the excavation area. TtEC will also use a private utility mark-out service to locate existing subsurface utilities. The Navy is responsible for identifying facility utilities.

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. 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 Environmental, Safety, and Quality (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, preparation for medical emergencies, first aid for injuries incurred on site, record keeping, and emergency site evacuation procedures.

12.1 Responsibilities

12.1.1 Project Environmental Safety Manager

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

12.1.2 Site Health and Safety Officer

The SHSO will be determined prior to mobilization. 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 Emergency Coordinator.

12.1.3 Emergency Coordinator

The Emergency Coordinator will be the Site Superintendent. The emergency coordinator will make contact with Local Emergency Response personnel prior to beginning work on site. In these contacts the emergency coordinator 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 emergency coordinator will locate emergency phone numbers and identify hospital routes prior to beginning work on site. The emergency coordinator will make necessary arrangements to be prepared for any emergencies that could occur.

The Emergency Coordinator 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 Emergency Coordinator 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 exclusion zone and the Emergency Coordinator will be radio communications. Each field team within the exclusion zone will have a radio. During an emergency situation, the lines will be kept clear so that instructions can be received by all field teams.

12.2.2 Telephone Communication

A telephone will be maintained in the command post/office trailer.

12.2.3 Hand Signals

Hand signals will be employed by downrange field teams where necessary for communication during emergency situations. Hand signals are found in Section 8.3.

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 and the Work Care Facility is located in Appendix J. These maps 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. Appendix J also contains the TtEC's Zip Bulletin, Issue Number 108, *Improving Injured Worker Case Management*.

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.

**Table 12-1
Emergency Telephone Numbers**

Contact	Firm or Agency	Telephone Number
Police	Naval Station Newport Newport State	(401) 841-333
Fire	Naval Station Newport Newport	(401) 841-3333
Hospital	Newport Hospital 11 Friendship St. Newport, Rhode Island 02840-2209	(401) 846-6400
Work Care Facility	Newport Alliance 19 Friendship Street, Suite G40 Borden Carey Building Newport, Rhode Island 02840	(401) 845-1245
Ambulance	Newport Fire Department	(401) 841-3333
Project Manager – Dan Sullivan	TtEC	(617) 834-7211
Project Superintendent – TBD	TtEC	TBD
PESM – Grey Coppi, CIH,CSP	TtEC	Office: (973) 630-8101 Cell: (215) 327-0751
SHSO – TBD	TtEC	TBD
RIDEM Paul Kulpa	Rhode Island	(401) 222-2797, Ext. 7111
Emergency Line (Security)	Naval Station Newport	(401) 841-3333
NAVY Resident Officer In Charge of Construction (ROICC) - Robert Krivinskas	Naval Station Newport	(401) 841-1761
Poison Control Center	This is a national number that redirects caller to the Regional Center for Poison Control and Prevention nearest the call site.	(800) 222-1222
Environmental Department Cornelia Muller	Naval Station Newport	(401) 841-7561
Chemtrec		(800)424-9300
National Response Center*		(800)424-8802*

*Environmental Department will contact USEPA, RIDEM, and National Response Center.

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: Site Truck
- Emergency EyeWash (Meets ANSI Z.358.1-2004): Site Truck

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

TtEC will provide at least two personnel with current First Aid, Cardiopulmonary Resuscitation (CPR) and Bloodborne Pathogens training 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. For minor injuries a work care clinic should be consulted, call Work Care at 1-800-455-6155.

12.6 Emergency and Non-Emergency Response

12.6.1 Emergency Response

Some physical signs/symptoms that require emergency medical treatment and a call to the Newport Hospital (401-846-6400) include: chest pain, difficulty breathing, uncontrolled bleeding, bone fracture, loss of consciousness, severe head injury, poisoning, shock, loss of limb, and sudden and prolonged dizziness. In an emergency situation:

- Call Newport Hospital (401-846-6400) for initial employee evaluation and transport to the hospital. A designated TtEC employee shall accompany the injured worker to the hospital;
- Administer first aid to minimize the injury effects;
- Call Work Care at 1-800-455-6155 for a triage call/discussion with an Occupational Health Nurse or physician. Mention ASAP that the call is regarding an emergency injury. The Occupational Health Nurse will assist the supervisor to determine the best treatment plan;
- Provide the following information to Work Care:
 - Name of Supervisor calling;
 - Phone Number;
 - Location calling from;
 - Name of individual injured and social security number; and
 - Date and type of injury.
- During Work Care off-hours, dial the 800 number and identify yourself. A Work Care health care representative will call you back shortly. Do not delay treatment while awaiting a return phone call; and
- Call the PESM, Project Manager, and the Navy.

12.6.2 Non-Emergency Response

In a non-emergency situation:

- Administer first aid to minimize the injury effects;
- Call Work Care at 1-800-455-6155 for a triage call/discussion with an Occupational Health Nurse or physician. Mention ASAP that the call is regarding an injury. The Occupational Health Nurse will assist the supervisor to determine the best treatment plan;
- Provide the following information to Work Care:
 - Name of Supervisor calling;
 - Phone Number;
 - Location calling from;
 - Name of individual injured and social security number; and
 - Date and type of injury.
- During Work Care off-hours, dial the 800 number and identify yourself. A Work Care health care representative will call you back shortly. Do not delay treatment while awaiting a return phone call;
- Call the PESM, Project Manager, and the Navy;
- Call the local Work Care clinic at 401-845-1245 to notify them that you are bringing an injured worker to their clinic for evaluation; and
- You may transport the injured employee to the local clinic in a privately owned vehicle. A designated TtEC employee must accompany the injured worker to the local clinic.

12.6.3 After Emergency and Non-Emergency Treatment

After emergency and non-emergency treatment:

- Obtain treatment and medical release records for the injured worker and forward to Work Care;
- Contact TtEC worker's compensation carrier (ESIS at 1-800-867-3747) within 24 hours of injury;
- Seek ways to ensure the worker can work, including alternate work; and
- Regularly follow-up with Work Care and ESIS case representatives.

12.7 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 Emergency Coordinator (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 his 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.

He 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.

12.8 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). 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 exclusion zone or any work area;
- No hot work without a properly executed hot work permit;
- Shutting off engines to refuel;
- Grounding and bonding metal containers during transfer of flammable liquids;
- Use of UL approved flammable storage cans;
- Fire extinguishers rated at least 10 pounds ABC located on all heavy equipment, in all trailers and near all hot work activities; and
- Monthly inspections of all fire extinguishers.

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.

12.9 Overt Chemical Exposure

The following are standard procedures to treat chemical exposures. Other, specific procedures detailed on the

Material Safety Data Sheet or recommended by the Corporate Medical Consultant will be followed, when necessary.

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.

12.10 Decontamination During Medical Emergencies

If emergency life-saving first aid and/or medical treatment are required, normal decontamination procedures may need to be abbreviated or postponed. The 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 his/her injuries are life threatening, unless it is known that the individual has been contaminated with an extremely toxic or corrosive material which could also cause severe injury or loss of life to emergency response personnel. For minor medical problems or injuries, the normal decontamination procedures will be followed.

12.11 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:

- Project Environmental and Safety Manager - Grey Coppi, CIH, CSP (215) 327-0751;
- Project Manager – Dan Sullivan (617) 834-7211; and
- The employer of any injured worker who is not a TtEC employee.

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

12.12 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 cold stress and cold-related injuries;
- Treacherous weather-related working conditions (hail, rain, snow, ice, high winds);

- Limited visibility (fog);
- Potential for electrical storms; and
- 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.

12.13 Spill Control and Response

All small hazardous spills/environmental releases will be contained as close to the source as possible. Whenever possible, the Material Safety Data Sheets (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 exclusion zone of 50-100 feet around the spill area should be established depending on the size of the spill.

The following procedures, in order, should be taken by the Emergency Coordinator:

- 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 in consultation with the SHSO;
- 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 (such as diesel only vehicles, air operated pumps). If possible, try to stop the leak with appropriate material;
- Remove all surrounding materials that can react or compound with the spill;
- Protect storm drains and sewer manholes by surrounding them with sorbent materials or berms; and
- Attempt to divert spilled liquids from entering streams, surface waters, or drainage ditches using berms or sorbent materials.

Lee Dixon (617-457-8258) may be contacted for spill reporting information and assistance.

12.14 Emergency Equipment

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

- Industrial first aid kit;
- Burn kit;
- Portable eye washes (Meets ANSI Z.358.1-2004 for 15 minute flush);
- Air horns;

- Fire extinguishers (one per trailer/vehicle, trailers and located at hot work stations);
- Two-way radios; and
- Absorbent Material.

12.15 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; and
- Hospital route map.

12.16 Restoration and Salvage

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

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

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 activities 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 field work. The training will cover a review of 29 CFR 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 and the TtEC "Project Rules Handbook" which will be handed out to each site employee, and signature pages kept in project files. 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.

13.5 On-Site Safety Briefings

Project personnel and visitors will be given on-site health and safety briefings daily by the Project Superintendent or 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.

13.6 First Aid and CPR

TtEC will have at least two employees onsite at all times that are trained in 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.

13.7 Hazard Communication

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

14.0 LOGS, REPORTS, AND RECORDKEEPING

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

14.1 Change Request

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-training) and medical clearance for hazardous waste site work and respirator use will be maintained onsite. Records for all subcontractor employees will also be kept onsite. All employee medical records will be maintained by the Corporate Medical Consultant – Work Care in accordance with TtEC Corporation Health and Safety Program, EHS 1-9.

14.3 On-Site Log

A log of personnel on-site each day will be kept by the Project Superintendent 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 K.

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 Health and Safety Program, EHS 1-9.

14.6 Accident/Incident Reports

The incident and investigation reports will follow TtEC Health and Safety Program, EHS 1-7.

14.7 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.

14.8 Hazard Communication Program/MSDS

Material Safety Data Sheets 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 Corporation Health and Safety Program EHS 4-2.

14.9 Work Permits

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

16.0 REFERENCES

29 CFR 1910.120 Hazardous Waste Operations and Emergency Response. USDOL - OSHA.

American Conference of Governmental Industrial Hygienists, Inc., 1987, Guidelines for the Selection of Chemical Protective Clothing; Third Edition, ACGIH, Cincinnati, Ohio, February 1987.

American Conference of Governmental Industrial Hygienists, Inc., 2007 Threshold Limit Values for Chemical Substances And Physical Agents In The Work Environment And Biological

Exposure Indices; ACGIH, Cincinnati, Ohio.

Marlowe, C. Developing Action Levels to Protect Hazardous Waste Site Workers, Professional Development Course 427. @ Kansas City, MO. May 21, 1995.

OSHA Construction Industry Standards, 29 CFR 1926; and General Industry Standards, 29 CFR 1910.

Sax, N. Irving, 1992, Dangerous Properties of Industrial Materials, 8th Ed; Van Nostrand Reinhold Co. Inc., New York, NY.

Tetra Tech EC, Inc. (TtEC), 2005. Final Closeout Report for Sand Blast Grit Removal at Derecktor Shipyard, Naval Station Newport Portsmouth, Rhode Island. Prepared for the Department of the Navy, Engineering Field Activity, Northeast, Naval Facilities Engineering Command. Contract No. N62472-99-D-0032, Task Order No. 0084.

Tetra Tech EC, Inc. (TtEC), 2006. Final Engineering Evaluation and Cost Analysis for Derecktor Shipyard Sandblast Grit-Impacted Area. Prepared for the Department of the Navy, Engineering Field Activity, Northeast, Naval Facilities Engineering Command. Contract No. N62472-99-D-0032, Task Order No. 0102.

U.S. Army Corps of Engineers, 1996, Safety and Health Requirements Manual; EM 385-1-1.

APPENDIX A
CHANGE REQUEST FORM

**Foster Wheeler Environmental Corporation
Change Request Form**

Section 1 through 4 to be filled out by Foster Wheeler, Section 5 to be filled out by Navy

PROJECT: Navy RAC CTO 102	OFS No.: 2282-0102	Change Request Form: CRF - XXX Rev. X
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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)

FWENC Initiator (Signature/Title):

4. FWENC 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 (<i>signature</i>)	Date	ROICC Concurrence (<i>Signature</i>)	Date
Contracting Officer Technical Representative Approval (<i>Signature</i>)		Contracting Officer Approval (<i>Signature</i>)	Date

Engineer signs and transmits to Resident Engineer with copies to:

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

APPENDIX B
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: EHS
Compliance/Waste Management, Field Activities/Science, Operational Control, Training, Monitoring

Document Owner: Philip Bartley

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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 EC, Inc. (TtEC) operations.

3.0 MAINTENANCE

The Director, Environmental, Safety and Quality (ESQ) Programs is responsible for updating this procedure. Approval authority rests with TtEC'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 Compliance and Corporate Counsel.

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 PESH 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

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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Tetra Tech EC, Inc.

Proprietary Information

APPENDIX C
MATERIAL SAFETY DATA SHEETS



Division of Facilities Services

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

SILICA

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/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 SILICA

Product Identification: SILICA

Date of MSDS: 09/01/1997 **Technical Review Date:** 08/17/1999

FSC: 6810 **NIIN:** LIIN: 00N091863

Submitter: N NF

Status Code: A

MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: WHITTAKER CLARK AND DANIELS INC
Manufacturer's Address1: 1000 COOLIDGE ST
Manufacturer's Address2: SOUTH PLAINFIELD, NJ 07080
Manufacturer's Country: US
General Information Telephone: 908-561-6100
Emergency Telephone: 908-561-6100
Emergency Telephone: 908-561-6100
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 87775

Contractor Information

Contractor's Name: WHITTAKER CLARK AND DANIELS INC
Contractor's Address1: 1000 COOLIDGE ST
Contractor's Address2: SOUTH PLAINFIELD, NJ 07080
Contractor's Telephone: 908-561-6100/8007320562
Contractor's CAGE: 87775

Section 2 - Compositon/Information on Ingredients

SILICA

Ingredient Name: SILICA CRYSTALLINE -QUARTZ
Ingredient CAS Number: 14808-60-7 **Ingredient CAS Code:** T
RTECS Number: VV7330000 **RTECS Code:** T
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: 99.2 % Low WT Code: M
% High WT: 99.9 % High WT Code: M
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text:
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: see Table Z-3 **OSHA PEL Code:** T
OSHA STEL: N/P **OSHA STEL Code:**

ACGIH TLV: 0.1 MG/M3 **ACGIH TLV Code:** T

ACGIH STEL: NOT ESTABLISHED **ACGIH STEL Code:** T

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview

SILICA

Health Hazards Acute & Chronic: INHAL: SILICOSIS-EXPOS TO RESPIRABLE CRYSTALLINE SILICA (QUARTZ) CAN CAUSE SILICOSIS, FIBROSIS (SCARRING) OF LUNGS. SILICOSIS MAY BE PROGRESSIVE; IT MAY LEAD TO DISABILITY & DEATH. CANCER:THERE IS EVI DENCE THAT RESPIRABLE CRYSTALLINE SILICA IS A CARCIN. SCLERODERMA: THERE IS EVIDENCE THAT EXPOS TO RESPIRABLE SILICA/DISEASE SILICOSIS IS ASSOCIATED W/INCREASED INCIDENCE OF SCLERODERMA, AN IMMUNE SYS DISORDER MANIFESTED BY FIBROSIS (SCARRING) OF LUNGS, SKIN & OTHER INTERNAL ORGS. TUBERCULOSIS: INDIVIDUALS W/SILICOSIS ARE PREDISPOSED TO DEVELOP TUBERCULOSIS. NEPHROTOXICITY: THERE ARE SEVERAL RECEN T STUDIES SUGGESTING (EFTS OF OVEREXP)

Signs & Symptoms of Overexposure:

HLTH HAZ: EXPOS TO RESPIRABLE CRYSTALLINE SILICA/DISEASE SILICOSIS IS ASSOC D W/INCRD INCIDENCE OF KIDNEY LESIONS. NOTE: CRYSTALLINE SILICA EXISTS IN SEVERAL FORMS, MOST COMMON OF WHICH IS QUARTZ. IF CRYSTALLINE SILICA (QUARTZ) IS HEATED TO MORE THAN 870C IT CAN CHANGE TO FORM OF CRYSTALLINE SILICA KNOWN AS TRYDIMITE, & IF CRYSTALLINE SILICA (QUARTZ) IS HEATED TO MORE THAN 1470C, IT CAN CHANGE TO FORM A CRYSTALLINE SILICA KNOWN AS CRISTOBALITE. CRYSTALLINE SILICA AS TRYDIMITE & CRISTOBALITE ARE MORE FIBROGENIC THAN CRYSTALLINE SILICA AS QUARTZ. OSHA PEL FOR CRYSTALLINE SILICA AS TRYDIMITE & CRISTOBALITE ARE MORE FIBROGENIC (SUPDAT)

Medical Conditions Aggravated by Exposure:

THE CONDITION OF INDIVIDUALS WITH LUNG DISEASE (E.G. BRONCHITIS, EMPHYSEMA, CHRONIC OBSTRUCTIVE PULMONARY DISEASE) CAN BE AGGRAVATED BY EXPOSURE.

LD50 LC50 Mixture: N/P

Route of Entry Indicators:

Inhalation: YES

Skin: YES

Ingestion: YES

Carcenogenicity Indicators

NTP: YES
IARC: YES
OSHA: NO

Carcinogenicity Explanation: SILICA, CRYSTALLINE - QUARTZ: IARC MONOGRAPHS, VOL 68, PG 41, 1997: GRP 1. NTP 8TH ANNUAL REPORT ON CARCINOGENS, 1998: REASONABLY ANTICIPATED TO BE HUMAN CARCINOGEN.

Section 4 - First Aid Measures

SILICA

First Aid:

INHALATION: NO SPECIFIC FIRST AID NECESSARY SINCE THE ADVERSE HEALTH EFFECTS ASSOCIATED WITH EXPOSURE TO CRYSTALLINE SILICA (QUARTZ) RESULT FROM CHRONIC EXPOSURES. IF THERE IS A GROSS INHALATION OF CRYSTALLINE SILICA (QUARTZ), REMOVE THE PERSON IMMEDIATELY TO FRESH AIR, GIVE ARTIFICIAL RESPIRATION AS NEEDED, SEEK MEDICAL ATTENTION AS NEEDED. EYE CONTACT; WASH IMMEDIATELY WITH WATER FOR AT LEAST 15 MINUTES. IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION. SKIN: N/A. FLUSH WITH COPIOUS AMOUNTS OF WATER. CALL MD (FP N). INGESTION: N/A. CALL MD IMMEDIATELY (FP N).

Section 5 - Fire Fighting Measures

SILICA

Fire Fighting Procedures:

NOT APPLICABLE. USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).

Unusual Fire or Explosion Hazard:

CRYSTALLINE SILICA (QUARTZ) IS NON-FLAMMABLE AND NON-EXPLOSIVE. HMIS: HLTH: *(SEE HLTH HAZ & TOX INFO), FLAMM: 0, REACTIVITY:0, PROTECTIVE EQUIPMENT:E. NFPA: HEALTH: 0, FLAMM:0, REACTIVITY:0.

Extinguishing Media:

NONE REQUIRED. MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).

Flash Point: **Flash Point Text:** NONE

Autoignition Temperature:

Autoignition Temperature Text: N/P

Lower Limit(s): NONE

Upper Limit(s):

Section 6 - Accidental Release Measures

SILICA

Spill Release Procedures:

USE DUSTLESS METHOD (VACUUM) AND PLACE INTO CLOSABLE CONTAINER FOR DISPOSAL, OR FLUSH WITH WATER. DO NOT DRY SWEEP. WEAR

PROTECTIVE EQUIPMENT SPECIFIED IN CONTROL MEASURES.

**Section 7 - Handling and Storage
SILICA**

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

**Section 8 - Exposure Controls & Personal Protection
SILICA**

Respiratory Protection:

NIOSH APPROVED RESP APPROP FOR EXPOS OF CONCERN (FP N). FOLLOWING CHART SPECIFIES TYPES OF RESPS WHICH MAY PROVIDE RESP PROT FOR CRYSTALLINE SILICA. PARTICULATE CONC: 5 X PEL/LESS: MIN RESP PROT: ANY NIOSH APPROVED DUST RESP. FOR MORE COMPLETE INFORMATION ON RESP PROTECTION CONTACT NEHC (FP N).

Ventilation:

USE SUFFICIENT LOC EXHST TO REDUCE THE LEVEL OF RESPIRABLE CRYSTALLINE SILICA TO PEL. SEE ACGIH "INDUST VENT, A MANUAL OF RECOMMENDED PRACTICE" (LATEST EDITION)

Protective Gloves:

IMPERVIOUS GLOVES (FP N).

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

Other Protective Equipment: ANSI APPROVED EYE WASH AND DELUGE SHOWER (FP N).

Work Hygienic Practices: N/P

Supplemental Health & Safety Information: EFTS OF OVEREXP: THAN CRYSTALLINE SILICA AS QUARTZ. OSHA PEL FOR CRYSTALLINE SILICA AS TRYDIMITE & CRISTOBALITE IS ONE-HALF PEL FOR CRYSTALLINE SILICA (QUARTZ): ACGIH TLV FOR SILICA-CRYSTALLINE TRYDIMITE & CRISTOBALITE IS ONE-HALF TLV FOR SILICA-CRYSTALLINE QUARTZ. . (OTHER INFO)

**Section 9 - Physical & Chemical Properties
SILICA**

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: =2230.C, 4046.F **Boiling Point Text:**

Melting/Freezing Point: =1710.C, #####F **Melting/Freezing Text:**

Decomposition Point: Decomposition Text: N/P

Vapor Pressure: NONE **Vapor Density:** NONE

Percent Volatile Organic Content:

Specific Gravity: 2.65

Volatile Organic Content Pounds per Gallon:

pH: N/P

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: NONE

Solubility in Water: INSOLUBLE

Appearance and Odor: WHITE OR TAN SAND; GRANULAR, CRUSHED, OR GROUND;
ODOR: NONE.

Percent Volatiles by Volume: N/P

Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data

SILICA

Stability Indicator: YES

Materials to Avoid:

CONTACT WITH POWERFUL OXIDIZING AGENTS SUCH AS FLUORINE, CHLORINE TRIFLUORIDE, OXYGEN DIFLUORIDE, MAY CAUSE FIRES.

Stability Condition to Avoid:

N/P

Hazardous Decomposition Products:

OR BYPRODUCTS: SILICA WILL DISSOLVE IN HYDROFLUORIC ACID AND PRODUCE A CORROSIVE GAS - SILICON TETRAFLUORIDE.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

WILL NOT OCCUR.

Section 11 - Toxicological Information

SILICA

Toxicological Information:

SILICOSIS: MAJOR CONCERN ASSOC W/EXPOS TO RESPIRABLE CRYSTALLINE SILICA IS SILICOSIS, CAUSED BY INHAL & RETENTION OF RESPIRABLE CRYSTALLINE SILICA DUST. SILICOSIS CAN EXIST IN SEVERAL FORMS, CHRONIC/OR INARY, ACCELERATED/ACUTE. CHRONIC/ORDINARY SILICOSIS IS MOST COMMON FORM OF SILICOSIS, & CAN OCCUR AFTER MANY YEARS OF EXPOSURE TO RELATIVELY LOW LEVELS OF AIRBORNE RESPIRABLE CRYSTALLINE SILICA DUST. IT IS FURTHER DEFINED AS EITHER SIMPLE/COMPLICATED SILICOSIS. FOR MORE INFO ON TOXICOLOGICAL INFORMATION CONTACT NEHC (FP N).

Section 12 - Ecological Information

SILICA

Ecological Information:

CRYSTALLINE SILICA (QUARTZ) IS NOT ECOTOXIC, I.E., THERE IS NO DATA WHICH SUGGESTS THAT CRYSTALLINE SILICA (QUARTZ) IS TOXIC TO BIRDS,

FISH, INVERTEBRATES, MICROORGANISMS OR PLANTS. FOR ADDITIONAL INFORMATION ON CRYSTALLINE SILICA (QUARTZ) SEE SECTION 9 (PHYSICAL AND CHEMICAL PROPERTIES) AND 10 (STABILITY AND REACTIVITY) OF THIS MSDS.

Section 13 - Disposal Considerations

SILICA

Waste Disposal Methods:

GENL: PACKAGING & MATL MAY BE LANDFILLED; HOWEVER, MATL SHOULD BE COVERED TO MIN GENERATION OF AIRBORNE DUST. RCRA CRYSTALLINE SILICA (QUARTZ) IS NOT CLASSIFIED AS A HAZ WASTE UNDER RCRA/ITS REGS, 40 CFR 261N ET SEQ. DISPOSAL MUST BE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL REGULATIONS (FP N). CO NT NEHC FOR FURTHER INFO (FP N).

Section 14 - MSDS Transport Information

SILICA

Transport Information:

CRYSTALLINE SILICA (QUARTZ) IS NOT A HAZARDOUS MATERIAL FOR THE PURPOSE OF TRANSPORTATION UNDER THE U.S. DEPARTMENT OF TRANSPORTATION TABLE OF HAZARDOUS MATERIALS, 49 CFR 172.101.

Section 15 - Regulatory Information

SILICA

SARA Title III Information:

SUBSTANCE UNDER SECTION 302 AND IS NOT TOXIC CHEMICAL SUBJECT TO THE REQUIREMENTS OF SECTION 313. CLEAN AIR ACT: CRYSTALLINE SILICA (QUARTZ) DOES NOT CONTAIN ANY CLASS I OR CLASS II OZONE DEPLETING SUBSTANCES NOR ARE ANY OF THESE CHEMICALS USED IN THE MIN OR PROCESSING OF THE MATERIAL. FDA: SILICA IS INCLUDED IN THE LIST OF SUBSTANCES THAT MAY BE INCLUDED IN COATINGS USED IN FOOD CONTACT SURFACES, 21 CFR 175.300 (B)(3) (XXVI). NTP: RESPIRABLE CRYSTALLINE SILICA (QUARTZ) IS CLASSIFIED AS A PROBABLE CARCINOGEN. OSHA CARCINOGEN: CRYSTALLINE SILICA (QUARTZ) IS NOT LISTED.

Federal Regulatory Information:

TSCA #: CRYSTALLINE SILICA (QUARTZ) APPEARS ON EPA TSCA INVENTORY UNDER CAS #: 14808-60-7. RCRA: CRYSTALLINE SILICA (QUARTZ) IS NOT CLASSIFIED AS HAZARD WASTE UNDER RESOURCE CONSERVATION & RECOVERY ACT/ITS REGULATIONS, 40 CFR 261 ET. SEQ. CERCLA: CRYSTALLINE SILICA (QUARTZ) IS NOT CLASSIFIED AS HAZARD SUBSTANCE UNDER REGULATIONS OF CERCLA, 40 CFR 302. EMERGENCY PLANNING & COMMUNITY RIGHT TO KNOW ACT: CRYSTALLINE SILICA (QUARTZ) IS NOT AN EXTREMELY HAZARDOUS.

State Regulatory Information:

CALIFORNIA PROPOSITION 65: CRYSTALLINE SILICA (QUARTZ) IS CLASSIFIED AS

A SUBSTANCE KNOWN TO THE STATE OF CALIFORNIA TO BE A CARCINOGEN.

Section 16 - Other Information
SILICA

Other Information:

SUPDAT: EYE CNTCT: CRYSTALLINE SILICA (QUARTZ) MAY CAUSE ABRASION OF CORNEA. SKIN CNTCT & INGEST: N/A. CHRONIC: ADVERSE HLTH EFTS- SILICOSIS, CANCER, SCLERODERMA, & TUBERCULOSIS-ARE CHRONIC EFTS. SIGNS & SYMP OF EXPOS: THERE ARE GENERALLY NO SIGNS/SYMS OF EXPOS TO CRYSTALLINE SILICA (QUARTZ). SYMPS OF CHRONIC/ORDINARY SILICOSIS, IF PRESENT, ARE SHORTNESS OF BREATH, WHEEZING, COUGH & SPUTUM PRODUCTION. SYMPS OF ACUTE SILICOSIS ARE SAME; ADDITIONALLY, WEIGHT LOSS & FEVER ARE ASSOCD W/ACUTE SILICOSIS, SYMP OF SCLERODERMA INCL THICKNESS & STIFFNESS OF SKIN, PARTIULARLY IN FINGERS, SHORTNESS OF BRT H, DFCLT SWALLOWING & JOINT PROBLEMS.

HAZCOM Label Information

Product Identification: SILICA

CAGE: 87775

Assigned Individual: N

Company Name: WHITTAKER CLARK AND DANIELS INC

Company PO Box:

Company Street Address1: 1000 COOLIDGE ST

Company Street Address2: SOUTH PLAINFIELD, NJ 07080 US

Health Emergency Telephone: 908-561-6100

Label Required Indicator: Y

Date Label Reviewed: 10/13/1999

Status Code: A

Manufacturer's Label Number:

Date of Label:

Year Procured: N/K

Organization Code: F

Chronic Hazard Indicator: Y

Eye Protection Indicator: YES

Skin Protection Indicator: YES

Respiratory Protection Indicator: YES

Signal Word: DANGER

Health Hazard: Severe

Contact Hazard: Slight

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**

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/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
LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE**

Product Identification: LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Date of MSDS: 01/01/1987 **Technical Review Date:** 06/11/1992

FSC: 3439 **NIIN:** LIIN: 00F023852

Submitter: F BT

Status Code: C

MFN: 01

Article: N

Kit Part: N

Manufacturer's Information

Manufacturer's Name: NY SOLDER CO

Post Office Box: N/K

Manufacturer's Address1: 684 E 133 ST

Manufacturer's Address2: BRONX, NY 10454

Manufacturer's Country: US

General Information Telephone: (212)292-3740

Emergency Telephone: (212)292-3740

Emergency Telephone: (212)292-3740

MSDS Preparer's Name: N/P

Proprietary: N

Reviewed: Y

Published: Y

CAGE: NYSOL

Special Project Code: N

Preparer Information

Preparer's Name: NY SOLDER CO

Post Office Box: N/K

Preparer's Address1: 684 E 133 ST

Preparer's Address2: BRONX, NY 10454

Preparer's CAGE: NYSOL

Assigned Individual: Y

Contractor Information

Contractor's Name: NY SOLDER CO

Post Office Box: N/K

Contractor's Address1: 684 E 133 ST

Contractor's Address2: BRONX, NY 10454

Contractor's Telephone: (212)292-3740

Contractor's CAGE: NYSOL

Section 2 - Composition/Information on Ingredients

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Ingredient Name: COPPER (DUST & MIST), BRONZE POWDER

Ingredient CAS Number: 7440-50-8 **Ingredient CAS Code:** M

RTECS Number: GL5325000 **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: 1 MG(CU)/M3 (DUST)
OSHA PEL: 0.1 MG(CU)/M3 (FUME) OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.2 MG/M3 (FUME) ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Ingredient Name: LEAD, INORGANIC LEAD (SUSPECTED HUMAN CARCINOGEN BY IARC, NTP & ACGIH)

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: 99.9/WT
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.05 MG/CUM OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.15 MG/CUM 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

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Health Hazards Acute & Chronic: INHALATION: RESPIRATORY SYSTEM IRRITATION. SKIN/EYES: IRRITATION. INGESTION: ABSORBED BY THE DIGESTIVE SYSTEM.

Signs & Symptoms of Overexposure:

INHALATION: RESPIRATORY SYSTEM IRRITATION. SKIN/EYES: IRRITATION. INGESTION: ABSORBED BY THE DIGESTIVE SYSTEM.

Medical Conditions Aggravated by Exposure:

N/K

LD50 LC50 Mixture: N/K

Route of Entry Indicators:

Inhalation: YES

Skin: YES

Ingestion: YES

Carcinogenicity Indicators

NTP: NO

IARC: NO

OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

First Aid:

EYES: FLUSH/W PLENTY OF WATER. SKIN: WASH W/PLENTY OF SOAP & WATER. INHALATION: REMOVE TO FRESH AIR. INGESTION: OBTAIN MEDICAL ATTENTION ALL CASES.

Section 5 - Fire Fighting Measures

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Fire Fighting Procedures:

WEAR FULL BODY PROTECTIVE CLOTHING & FULL FACEPIECE. SELF-CONTAINED BREATHING APPARATUS OPERATED IN A POSITIVE MODE.

Unusual Fire or Explosion Hazard:

MOLTEN METALS PRODUCE FUME, VAPOR &/OR DUST THAT MAY BE TOXIC.

Extinguishing Media:

DRY CHEMICAL OR CO2, DON'T USE WATER ON FIRES.

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**LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE**

Spill Release Procedures:

DUST MATERIAL SHOULD BE VACUUMED, OR SWEEPED. PARTICULATE MATTER SHOULD BE STORED IN DRY CONTAINERS FOR LATER DISPOSAL.

Section 7 - Handling and Storage**LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE**

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

Section 8 - Exposure Controls & Personal Protection**LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE**

Respiratory Protection:

AS REQUIRED BY OSHA

Ventilation:RECOMMEND TO KEEP **Protective Gloves:**

AS REQUIRED

Eye Protection: FACESHIELD OR VENTED GOGGLES**Other Protective Equipment:** COVERALLS, OR OTHER FULL BODY CLOTHING.
HARD HAT, SAFETY BOOTS.**Work Hygienic Practices:** REMOVE/WASH CLOTHES BEFORE REUSE. USE GOOD HYGIENE. WASH HANDS, FACE & NECK BEFORE EATING OR SMOKING.**Supplemental Health & Safety Information:** N/K

Section 9 - Physical & Chemical Properties**LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE**

HCC:**NRC/State License Number:****Net Property Weight for Ammo:****Boiling Point: Boiling Point Text:** 3164F**Melting/Freezing Point: Melting/Freezing Text:** 621F**Decomposition Point: Decomposition Text:** N/R**Vapor Pressure: N/R Vapor Density:** N/R**Percent Volatile Organic Content:****Specific Gravity:** 11.3

Volatile Organic Content Pounds per Gallon:

pH: N/R

Volatile Organic Content Grams per Liter:

Viscosity: N/P

Evaporation Weight and Reference: N/R

Solubility in Water: NEGLIGIBLE

Appearance and Odor: SILVER-GRAY, METAL TARNISHES. ODORLESS

Percent Volatiles by Volume: N/R

Corrosion Rate: N/R

Section 10 - Stability & Reactivity Data

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Stability Indicator: YES

Materials to Avoid:

STRONG OXIDIZING AGENTS

Stability Condition to Avoid:

N/R

Hazardous Decomposition Products:

HYDROGEN GAS, HEAVY METAL FUMES. VAPOR & OR DUST.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

N/K

Section 11 - Toxicological Information

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Toxicological Information:

N/P

Section 12 - Ecological Information

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Ecological Information:

N/P

Section 13 - Disposal Considerations

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Waste Disposal Methods:

DISPOSE OF TOXIC SUBSTANCES & HAZARDOUS WASTES IN ACCORDANCE
W/FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information

LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Transport Information:

N/P

Section 15 - Regulatory Information
LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE

Other Information:

N/P

HAZCOM Label Information

Product Identification: LEAD BRICKS, LEAD SHEETS, LEAD PLATES, LEAD PIPE, LEAD WIRE**CAGE:** NYSOL**Assigned Individual:** Y**Company Name:** NY SOLDER CO**Company PO Box:** N/K**Company Street Address1:** 684 E 133 ST**Company Street Address2:** BRONX, NY 10454 US**Health Emergency Telephone:** (212)292-3740**Label Required Indicator:** Y**Date Label Reviewed:** 06/11/1992**Status Code:** C**Manufacturer's Label Number:** N/R**Date of Label:** 06/11/1992**Year Procured:** N/K**Organization Code:** F**Chronic Hazard Indicator:** Y**Eye Protection Indicator:** YES**Skin Protection Indicator:** N/P**Respiratory Protection Indicator:** N/P**Signal Word:** WARNING**Health Hazard:** Moderate**Contact Hazard:** Moderate**Fire Hazard:** Slight**Reactivity Hazard:** Slight

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**Material Safety
Data Sheets**

Division of Facilities Services

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

1000 PPM BARIUM

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
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**Section 1 - Product and Company Identification
1000 PPM BARIUM**

Product Identification: 1000 PPM BARIUM

Date of MSDS: 03/05/1992 **Technical Review Date:** 11/22/1994

FSC: 6550 **NIIN:** LIIN: 00F037416

Submitter: F BT

Status Code: C

MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Post Office Box: N/K
Manufacturer's Address1: 5540 MARSHALL ST
Manufacturer's Address2: ARVADA, CO 80002-3108
Manufacturer's Country: US
General Information Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
Emergency Telephone: 303-431-8454
MSDS Preparer's Name: DANIEL A GOLDSTEIN
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 1R664
Special Project Code: N

Preparer Information

Preparer's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Preparer's Address1: 5540 MARSHALL STREET
Preparer's Address2: ARVADA, CO 80002
Preparer's CAGE: 1R664
Assigned Individual: N

Contractor Information

Contractor's Name: ENVIRONMENTAL RESOURCE ASSOCIATES
Contractor's Address1: 5540 MARSHALL STREET
Contractor's Address2: ARVADA, CO 80002
Contractor's Telephone: 303-431-8454
Contractor's CAGE: 1R664

Section 2 - Compositon/Information on Ingredients 1000 PPM BARIUM

Ingredient Name: BARIUM NITRATE
Ingredient CAS Number: 10022-31-8 **Ingredient CAS Code:** M
RTECS Number: CQ9625000 **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: <1
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 0.5 MG/CUM OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 0.5 MG/CUM ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: NITRIC ACID, HYDROGEN NITRATE
Ingredient CAS Number: 7697-37-2 Ingredient CAS Code: M
RTECS Number: QU5775000 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: <5
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 2 PPM OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5.2 MG/CUM ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 1000 LBS
DOT Reporting Quantity: 1000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
1000 PPM BARIUM

Health Hazards Acute & Chronic: POISON & CORROSIVE TO SKIN, EYES, MUCUS

MEMBRANES/LUNGS. MAY BURN ANY TISSUE & CAUSE BLINDNESS. MAY CAUSE GI TRACT PERFORATION, PULMONARY EDEMA, DEATH. BARIUM NITRATE MAY CAUSE CARDIOVASCULAR COLLAPSE & DEATH.

Signs & Symptoms of Overexposure:

IRRITATION, BURNING, REDNESS, COUGH, SHORTNESS OF BREATH, PAIN, VOMITING, DIARRHEA, SALIVATION, DILATED PUPILS, IRREGULAR HEARTBEAT, METHEMOGLOBINEMIA. BARIUM NITRATE: SEVERE VOMITING/DIARRHEA & ELECTROLYTE DISTURBANCES.

Medical Conditions Aggravated by Exposure:

ASTHMA.

LD50 LC50 Mixture: N/P

Route of Entry Indicators:

Inhalation: YES

Skin: YES

Ingestion: YES

Carcinogenicity Indicators

NTP: NO

IARC: NO

OSHA: NO

Carcinogenicity Explanation: NONE

Section 4 - First Aid Measures

1000 PPM BARIUM

First Aid:

EYES/SKIN: FLUSH W/COPIOUS AMOUNTS OF WATER. INHALATION: GIVE MOIST OXYGEN. INGESTION: GIVE WATER/MILK. OBTAIN MEDICAL ATTENTION IN ALL CASES.

Section 5 - Fire Fighting Measures

1000 PPM BARIUM

Fire Fighting Procedures:

NONE

Unusual Fire or Explosion Hazard:

NONE

Extinguishing Media:

NONE

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
1000 PPM BARIUM

Spill Release Procedures:

NEUTRALIZE & FLUSH W/WATER/NETURALIZE & ABSORB. VENTILATE AREA.

Section 7 - Handling and Storage
1000 PPM BARIUM

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
1000 PPM BARIUM

Respiratory Protection:

WEAR ACID GAS TYPE DUST/MIST RESPIRATOR IF MIST PRODUCTION OCCURS.

Ventilation:

MECHANICAL/LOCAL EXHAUST: USE IN HOOD.

Protective Gloves:

ACID PROOF

Eye Protection: SPLASH GOGGLES

Other Protective Equipment: ACID PROOF APRON W/SLEEVES, LAB COAT, CLOSED SHOES, SAFETY SHOWER, EYE WASH.

Work Hygenic Practices: N/K

Supplemental Health & Safety Information: BOILING POINT (0-5% ACID): 212-212.72F.

Section 9 - Physical & Chemical Properties
1000 PPM BARIUM

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: (SEE SUPP)

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

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: 28 Vapor Density: >1

Percent Volatile Organic Content:

Specific Gravity: 1

Volatile Organic Content Pounds per Gallon:

pH: <1

Volatile Organic Content Grams per Liter:**Viscosity:** N/P**Evaporation Weight and Reference:** (WATER =1): 1**Solubility in Water:** COMPLETE**Appearance and Odor:** CLEAR LIQUID W/NO ODOR**Percent Volatiles by Volume:** N/K**Corrosion Rate:** N/K

Section 10 - Stability & Reactivity Data
1000 PPM BARIUM

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

METALS

Stability Condition to Avoid:

FREEZING

Hazardous Decomposition Products:

HYDROGEN

Hazardous Polymerization Indicator: NO**Conditions to Avoid Polymerization:**

NONE

Section 11 - Toxicological Information
1000 PPM BARIUM

Toxicological Information:

N/P

Section 12 - Ecological Information
1000 PPM BARIUM

Ecological Information:

N/P

Section 13 - Disposal Considerations
1000 PPM BARIUM

Waste Disposal Methods:

DISPOSE OF AS NON-HAZARDOUS WASTE IAW/FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
1000 PPM BARIUM

Transport Information:

N/P

Section 15 - Regulatory Information

1000 PPM BARIUM

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:N/P

Section 16 - Other Information
1000 PPM BARIUM

Other Information:

N/P

HAZCOM Label Information**Product Identification:** 1000 PPM BARIUM**CAGE:** 1R664**Assigned Individual:** N**Company Name:** ENVIRONMENTAL RESOURCE ASSOCIATES**Company PO Box:****Company Street Address1:** 5540 MARSHALL STREET**Company Street Address2:** ARVADA, CO 80002 US**Health Emergency Telephone:** 303-431-8454**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)
For Cornell University Convenience Only**

CHROMIUM

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
CHROMIUM**

Product Identification: CHROMIUM

Date of MSDS: 11/01/1993 **Technical Review Date:** 11/10/1995

FSC: 6810 **NIIN:** LIIN: 00N066370

Submitter: N EN

Status Code: C

MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: HIGH-PURITY STANDARDS
Post Office Box: 30188
Manufacturer's Address1:
Manufacturer's Address2: CHARLESTON, SC 29417
Manufacturer's Country: US
General Information Telephone: 803-556-3411
Emergency Telephone: 803-556-3411
Emergency Telephone: 803-556-3411
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: 0YZE5
Special Project Code: N

Contractor Information

Contractor's Name: HIGH-PURITY STANDARDS INC
Post Office Box: 30180
Contractor's Address1: 2040 SAVAGE RD
Contractor's Address2: CHARLESTON, SC 29417
Contractor's Telephone: 803-556-3411
Contractor's CAGE: 0YZE5

Section 2 - Composition/Information on Ingredients

CHROMIUM

Ingredient Name: CHROMIUM (III) CHLORIDE (1:3); (CHROMIUM) (SARA 302/313) (IN 10% INGREDIENT 2)
Ingredient CAS Number: 10025-73-7 **Ingredient CAS Code:** M
RTECS Number: GB5425000 **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: 1

% Environmental Weight:

Other REC Limits: N/K

OSHA PEL: 0.1 MG (CRO3)/M3 OSHA PEL Code: M

OSHA STEL: OSHA STEL Code:

ACGIH TLV: 0.05 MG(CR)/M3 ACGIH TLV Code: M

ACGIH STEL: N/P ACGIH STEL Code:

EPA Reporting Quantity:

DOT Reporting Quantity:

Ozone Depleting Chemical: N

Ingredient Name: NITRIC ACID; (HNO*3) (SARA 302/313) (CERCLA)

Ingredient CAS Number: 7697-37-2 Ingredient CAS Code: M

RTECS Number: QU5775000 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: 10

% Environmental Weight:

Other REC Limits: N/K

OSHA PEL: 2 PPM OSHA PEL Code: M

OSHA STEL: OSHA STEL Code:

ACGIH TLV: 2 PPM/4 STEL ACGIH TLV Code: M

ACGIH STEL: N/P ACGIH STEL Code:

EPA Reporting Quantity: 1000 LBS

DOT Reporting Quantity: 1000 LBS

Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview CHROMIUM

Health Hazards Acute & Chronic: LIQUID MAY CAUSE BURNS TO SKIN AND EYES.

Signs & Symptoms of Overexposure:

SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:

NONE IDENTIFIED.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

Route of Entry Indicators:

Inhalation: YES

Skin: YES

Ingestion: YES

Carcenogenicity Indicators

NTP: NO

IARC: NO

OSHA: NO

Carcinogenicity Explanation: NOT RELEVANT

Section 4 - First Aid Measures
CHROMIUM

First Aid:

INHAL:REMOVE TO FRESH AIR. SUPPORT BREATHING (GIVE O*2/ARTF RESP) (FP N). CALL A PHYSICIAN. INGESTION:DO NOT INDUCE VOMITING, IF CONSCIOUS GIVE WATER, MILK. EYES:FLUSH WITH PLENTY OF WATER FOR AT LEAS T 15 MINUTES. SKIN:FLUSH WITH PLENTY OFWATER.

Section 5 - Fire Fighting Measures
CHROMIUM

Fire Fighting Procedures:

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

Unusual Fire or Explosion Hazard:

NOT APPLICABLE. TOXIC GASES PRODUCED:NO, NO*2 GAS.

Extinguishing Media:

MEDIA SUITABLE FOR SURROUNDING FIRE (FP N).

Flash Point: Flash Point Text: NOT APPLICABLE

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): N/A

Upper Limit(s): N/A

Section 6 - Accidental Release Measures
CHROMIUM

Spill Release Procedures:

REMOVE SOURCE OF IGNITION IF HYDROGEN IS A HAZARD. PROVIDE OPTIMUM VENTILATION. FLUSH TO HOLDING AREA FOR NEUTRALIZATION.

Section 7 - Handling and Storage CHROMIUM

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection CHROMIUM

Respiratory Protection:

NIOSH/MSHA APPROVED RESPIRATOR.

Ventilation:

LOCAL EXHAUST. VENT HOOD.

Protective Gloves:

IMPERVIOUS GLOVES (FP N). PROPER GLOVES.

Eye Protection: ANSI APPROVED CHEM WORKERS GOGGS(SUPDAT)

Other Protective Equipment: ANSI APPROVED EMERGENCY EYE WASH AND DELUGE SHOWER (FP N). LAB COAT/APRON; VENT HOOD.

Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.

Supplemental Health & Safety Information: EYE PROT:AND FULL LENGTH FACE SHIELD (FP N).

Section 9 - Physical & Chemical Properties CHROMIUM

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: Boiling Point Text: 212F,100C

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

Decomposition Point: Decomposition Text: N/K

Vapor Pressure: N/A Vapor Density: N/A

Percent Volatile Organic Content:

Specific Gravity: 1 (H*2O=1)

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: COMPLETE

Appearance and Odor: DARK BLUE, ODORLESS SOLUTION.

Percent Volatiles by Volume: N/K

Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data

CHROMIUM

Stability Indicator: YES

Materials to Avoid:

STRONG REDUCING AGENTS.

Stability Condition to Avoid:

METALS, HYDROXIDES, CARBONATES, CYANIDES.

Hazardous Decomposition Products:

NO, NO*2.

Hazardous Polymerization Indicator: NO

Conditions to Avoid Polymerization:

NOT RELEVANT

Section 11 - Toxicological Information
CHROMIUM

Toxicological Information:

N/P

Section 12 - Ecological Information
CHROMIUM

Ecological Information:

N/P

Section 13 - Disposal Considerations
CHROMIUM

Waste Disposal Methods:

FOLLOW FEDERAL, STATE AND LOCAL REGULATIONS FOR ACID WASTE.

Section 14 - MSDS Transport Information
CHROMIUM

Transport Information:

N/P

Section 15 - Regulatory Information
CHROMIUM

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
CHROMIUM

Other Information:

N/P

HAZCOM Label Information**Product Identification:** CHROMIUM**CAGE:** 0YZE5**Assigned Individual:** N**Company Name:** HIGH-PURITY STANDARDS INC**Company PO Box:** 30180**Company Street Address1:** 2040 SAVAGE RD**Company Street Address2:** CHARLESTON, SC 29417 US**Health Emergency Telephone:** 803-556-3411**Label Required Indicator:** Y**Date Label Reviewed:** 11/10/1995**Status Code:** C**Manufacturer's Label Number:****Date of Label:** 11/10/1995**Year Procured:** N/K**Organization Code:** G**Chronic Hazard Indicator:** N**Eye Protection Indicator:** YES**Skin Protection Indicator:** YES**Respiratory Protection Indicator:** YES**Signal Word:** CAUTION**Health Hazard:** Slight**Contact Hazard:** Slight**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**

LEAD-FREE GASOLINE; NO-LEAD GASOLINE

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
LEAD-FREE GASOLINE; NO-LEAD GASOLINE**

Product Identification: LEAD-FREE GASOLINE; NO-LEAD GASOLINE

Date of MSDS: 02/23/1990 **Technical Review Date:** 06/18/1999

FSC: 9130 **NIIN:** 00-148-7103

Submitter: D DG

Status Code: C

MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: BELL FUELS, INC
Manufacturer's Address1: 4116 WEST PATERSON AVE
Manufacturer's Address2: CHICAGO, IL 60646
Manufacturer's Country: US
General Information Telephone: 312-286-0200
Emergency Telephone: 312-286-0200
Emergency Telephone: 312-286-0200
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: JO756
Special Project Code: N

Item Description

Item Name: GASOLINE,AUTOMOTIVE
Item Manager:
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue: GL
Unit of Issue Quantity: X
Type of Container: N/K

Contractor Information

Contractor's Name: BELL FUELS INC
Contractor's Address1: 4116 W PETERSON AVE
Contractor's Address2: CHICAGO, IL 60646-6017
Contractor's Telephone: 312-286-0200
Contractor's CAGE: 8P539

Contractor Information

Contractor's Name: BELL FUELS, INC
Contractor's Address1: 4116 WEST PATERSON AVE
Contractor's Address2: CHICAGO, IL 60646
Contractor's Telephone: 312-286-0200
Contractor's CAGE: JO756

Section 2 - Compositon/Information on Ingredients

LEAD-FREE GASOLINE; NO-LEAD GASOLINE

Ingredient Name: DYE AND OTHER ADDITIVES
Ingredient CAS Number: **Ingredient CAS Code:** X
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: 0.02
% Enviromental 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:

Ingredient Name: HYDROCARBONS, AROMATIC
Ingredient CAS Number: **Ingredient CAS Code:** X
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: 15-35
% Enviromental 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:

Ingredient Name: SATURATED HYDROCARBONS
Ingredient CAS Number: **Ingredient CAS Code:** X
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: 60-75
% 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:

Ingredient Name: UNSATURATED HYDROCARBONS
Ingredient CAS Number: **Ingredient CAS Code:** X
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: 1-15
% 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:

Section 3 - Hazards Identification, Including Emergency Overview **LEAD-FREE GASOLINE; NO-LEAD GASOLINE**

Health Hazards Acute & Chronic: ACUTE:EYE:IRRIT @ HIGH VAP LEVELS OR DIRECT CONTACT W/FLUID. SKIN:IRRIT ON PROLONG CONTACT W/LIQ, DERM RESULTING FROM DEFATTING NATURE OF LIQ. SYSTEMATIC:CNS EFFECTS (NARCOSIS) @ HIGH VAP LEVELS; MUC MEMBRANE IRRIT, PNEUMONIA. INGEST:GASTROINTESTINAL DISTURBANCES. CHRONIC:PERIPHERAL NERVOUS SY EFFECTS, BLOOD ALTERATIONS

Signs & Symptoms of Overexposure:

EYE & SKIN IRRITATION. DERMATITIS. NARCOSIS. GI DISTURBANCES:NAUSEA, DIARRHEA, STOMACH PAINS.

Medical Conditions Aggravated by Exposure:

NONE SPECIFIED BY MFG.

LD50 LC50 Mixture: UNKNOWN

Route of Entry Indicators:

Inhalation: YES

Skin: YES

Ingestion: YES

Carcinogenicity Indicators

NTP: NO

IARC: YES

OSHA: NO

Carcinogenicity Explanation: PER MSDS:NONE STATED; HOWEVER CONTAINS GASOLINE WHICH IS CONSIDERED BY IARC TO BE POTENTIAL CARCINOGEN.

Section 4 - First Aid Measures **LEAD-FREE GASOLINE; NO-LEAD GASOLINE**

First Aid:

EYE:FLUSH FOR @ LEAST 15MINS W/WATER. SKIN:THOROUGHLY WASH AREA W/SOAP & WATER. INHAL:REMOVE FROM CONTAMINATED AREA. ADMINISTER ARTIFICIAL RESP IF NECESSARY. CALL PHYSICIAN. INGEST:GIVE A VEGETABLE OIL TO RETARD ABSORPTION. DO NOT INDUCE VOMITING. CALL PHYSICIAN.

FATAL DOSE ADULT HUMAN APPROX 350G, CHILD APPROX 10-13G.

Section 5 - Fire Fighting Measures
LEAD-FREE GASOLINE; NO-LEAD GASOLINE

Fire Fighting Procedures:

NONE SPECIFIED BY MFG; HOWEVER USE APPROPRIATE PROTECTIVE EQPMT INCLUDING SELF-CONTAINED BREATHING APPARATUS.

Unusual Fire or Explosion Hazard:

NONE SPECIFIED BY MFG; HOWEVER MATL IS HEAVIER THAN AIR AND WILL TRAVEL LONG DISTANCES & FLASHBACK. EXPLOSIVE MIXTURE FORMS W/GASOLINE & AIR.

Extinguishing Media:

ANY UL APPROVED CLASS B MEDIA SUCH AS FOAM, CARBON DIOXIDE, DRY CHEMICAL.

Flash Point: Flash Point Text: -50F,-46C

Autoignition Temperature:

Autoignition Temperature Text: N/K

Lower Limit(s): 1.3

Upper Limit(s): 6

Section 6 - Accidental Release Measures
LEAD-FREE GASOLINE; NO-LEAD GASOLINE

Spill Release Procedures:

KEEP PUBLIC AWAY. SHUT OFF SOURCE W/O RISK. ADVISE POLICE & NAT RESP CENTER 800-424-8802 IF SUBSTANCE HAS ENTERED A WATER COURSE OR SEWER. CONTAIN LIQ W/EARTH, SAND. RECOVER FREE LIQ BY PPUMPING OR W/ SUITABLE ABSORBENT.

Section 7 - Handling and Storage
LEAD-FREE GASOLINE; NO-LEAD GASOLINE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
LEAD-FREE GASOLINE; NO-LEAD GASOLINE

Respiratory Protection:

FOR EXPOSURES IN EXCESS OF EXPOSURE LIMITS CHEMICAL CARTRIDGE RESPIRATOR OR AIR SUPPLIED EQUIPMENT.

Ventilation:

LOCAL EXHAUST REQUIRED & EXPLOSION PROOF EQUIPMENT.

Protective Gloves:

IMPERMEABLE GLOVES.

Eye Protection: NONE SPECIFIED HOWEVER SAF GLASSES/GOGG**Other Protective Equipment:** NONE SPECIFIED BY MFG.**Work Hygienic Practices:** WASH HANDS AFTER HANDLING & PRIOR TO EAT/DRINK/SMOKE/USE OF TOILET FACILITIES. FOLLOW GOOD WORK HYGIENE PRACTICES.**Supplemental Health & Safety Information:** N/P

Section 9 - Physical & Chemical Properties
LEAD-FREE GASOLINE; NO-LEAD GASOLINE

HCC: F1**NRC/State License Number:** N/R**Net Property Weight for Ammo:** N/R**Boiling Point: Boiling Point Text:** 90.0F,32.2C**Melting/Freezing Point: Melting/Freezing Text:** N/K**Decomposition Point: Decomposition Text:** N/K**Vapor Pressure:** 414 @100C **Vapor Density:** 3-4**Percent Volatile Organic Content:****Specific Gravity:** 0.71-0.77**Volatile Organic Content Pounds per Gallon:****pH:** N/K**Volatile Organic Content Grams per Liter:****Viscosity:** N/K**Evaporation Weight and Reference:** N/K**Solubility in Water:** NEGLIGIBLE.**Appearance and Odor:** BLUE OR CLEAR, TYPICAL HYDROCARBON ODOR.**Percent Volatiles by Volume:** N/K**Corrosion Rate:** N/K

Section 10 - Stability & Reactivity Data
LEAD-FREE GASOLINE; NO-LEAD GASOLINE

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

OXIDIZERS.

Stability Condition to Avoid:

NONE SPECIFIED BY MFG; HOWEVER AVOID OPEN FLAMES/HEAT/SPARKS/OTHER IGNITION SOURCES.

Hazardous Decomposition Products:

NONE SPECIFIED BY MFG.

Hazardous Polymerization Indicator: NO**Conditions to Avoid Polymerization:**

NOT RELEVANT.

Section 11 - Toxicological Information

LEAD-FREE GASOLINE; NO-LEAD GASOLINE

Toxicological Information:N/P

Section 12 - Ecological Information**LEAD-FREE GASOLINE; NO-LEAD GASOLINE**

Ecological Information:N/P

Section 13 - Disposal Considerations**LEAD-FREE GASOLINE; NO-LEAD GASOLINE**

Waste Disposal Methods:

UNDER MANY SPILL SITUATIONS LIQ CAN BE RECOVERED & RECLAIMED. WHERE SOLID ABSORBENTS ARE USED THEY SHOULD BE INCINERATED PER APPLICABLE STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information**LEAD-FREE GASOLINE; NO-LEAD GASOLINE**

Transport Information:N/P

Section 15 - Regulatory Information**LEAD-FREE GASOLINE; NO-LEAD GASOLINE**

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:N/P

Section 16 - Other Information**LEAD-FREE GASOLINE; NO-LEAD GASOLINE**

Other Information:

N/P

HMIS Transportation Information**Product Identification:** LEAD-FREE GASOLINE; NO-LEAD GASOLINE**Transportation ID Number:** 51100**Responsible Party CAGE:** JO756**Date MSDS Prepared:** 02/23/1990**Date MSDS Reviewed:** 10/21/1994**MFN:** 10/21/1994**Submitter:** D DG

Status Code: C

Container Information

Unit of Issue: GL

Container Quantity: X

Type of Container: N/K

Net Unit Weight:

Article without MSDS: N

Technical Entry NOS Shipping Number:

Radioactivity:

Form:

Net Explosive Weight:

Coast Guard Ammunition Code:

Magnetism: N/P

AF MMAC Code:

DOD Exemption Number:

Limited Quantity Indicator:

Multiple Kit Number: 0

Kit Indicator: N

Kit Part Indicator: N

Review Indicator: Y

Additional Data:

Department of Transportation Information

DOT Proper Shipping Name: GASOLINE

DOT PSN Code: GTN

Symbols:

DOT PSN Modifier:

Hazard Class: 3

UN ID Number: UN1203

DOT Packaging Group: II

Label: FLAMMABLE LIQUID

Special Provision(s): B33,B101,T8

Packaging Exception:

Non Bulk Packaging: 202

Bulk Packaging: 242

Maximum Quantity in Passenger Area: 5 L

Maximum Quantity in Cargo Area: 60 L

Stow in Vessel Requirements: E

Requirements Water/Sp/Other:

IMO Detail Information

IMO Proper Shipping Name: GASOLINE

IMO PSN Code: HRV

IMO PSN Modifier:

IMDG Page Number: 3141
UN Number: 1203
UN Hazard Class: 3.1
IMO Packaging Group: II
Subsidiary Risk Label: -
EMS Number: 3-07
Medical First Aid Guide Number: 311

IATA Detail Information

IATA Proper Shipping Name: GASOLINE
IATA PSN Code: MUC
IATA PSN Modifier:
IATA UN Id Number: 1203
IATA UN Class: 3
Subsidiary Risk Class:
UN Packaging Group: II
IATA Label: FLAMMABLE LIQUID
Packaging Note for Passengers: 305
Maximum Quantity for Passengers: 5L
Packaging Note for Cargo: 307
Maximum Quantity for Cargo: 60L
Exceptions: A100

AFI Detail Information

AFI Proper Shipping Name: GASOLINE
AFI Symbols:
AFI PSN Code: MUC
AFI PSN Modifier:
AFI UN Id Number: UN1203
AFI Hazard Class: 3
AFI Packing Group: II
AFI Label:
Special Provisions: P5
Back Pack Reference: A7.3

HAZCOM Label Information

Product Identification: LEAD-FREE GASOLINE; NO-LEAD GASOLINE
CAGE: JO756
Assigned Individual: Y
Company Name: BELL FUELS, INC
Company PO Box:
Company Street Address1: 4116 WEST PATERSON AVE
Company Street Address2: CHICAGO, IL 60646 US
Health Emergency Telephone: 312-286-0200
Label Required Indicator: Y
Date Label Reviewed: 10/21/1994
Status Code: C
Manufacturer's Label Number:
Date of Label: 10/21/1994

Year Procured: N/K

Organization Code: F

Chronic Hazard Indicator: N/P

Eye Protection Indicator: YES

Skin Protection Indicator: YES

Respiratory Protection Indicator: YES

Signal Word: DANGER

Health Hazard: Moderate

Contact Hazard: Moderate

Fire Hazard: Severe

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**

TPH STANDARD, 3 MG/L M-XYLENE, 26019

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/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
TPH STANDARD, 3 MG/L M-XYLENE, 26019**

Product Identification: TPH STANDARD, 3 MG/L M-XYLENE, 26019

Date of MSDS: 07/29/1996 **Technical Review Date:** 03/18/1998

FSC: 6810 **NIIN:** LIIN: 00N084112

Submitter: N EN

Status Code: C

MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: HACH INC
Post Office Box: 907
Manufacturer's Address1:
Manufacturer's Address2: AMES, IA 50010
Manufacturer's Country: US
General Information Telephone: 800-227-4224
Emergency Telephone: 303-623-5716
Emergency Telephone: 303-623-5716
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: GO847
Special Project Code: N

Contractor Information

Contractor's Name: HACH COMPANY
Post Office Box: 907
Contractor's Address1: 100 DAYTON RD.
Contractor's Address2: AMES, IA 50010
Contractor's Telephone: 800-227-4224
Contractor's CAGE: 4T252

Contractor Information

Contractor's Name: HACH INC
Post Office Box: 907
Contractor's Address1:
Contractor's Address2: AMES, IA 50010
Contractor's Telephone: 800-227-4224
Contractor's CAGE: GO847

Section 2 - Compositon/Information on Ingredients

TPH STANDARD, 3 MG/L M-XYLENE, 26019

Ingredient Name: METHANOL; (METHYL ALCOHOL) (SARA 313) (CERCLA)
Ingredient CAS Number: 67-56-1 **Ingredient CAS Code:** M
RTECS Number: PC1400000 **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: <100
% Enviromental Weight:
Other REC Limits: N/K
OSHA PEL: 200 PPM, S OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 200 PPM;250 STEL, S ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Ingredient Name: OTHER COMPONENTS
Ingredient CAS Number: Ingredient CAS Code: X
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: <0.1
% 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
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Health Hazards Acute & Chronic: THIS PRODUCT MAY BE IRRITATING TO EYES, SKIN AND RESPIRATORY TRACT. ACUTE TOXICITY:VERY TOXIC. HEADACHE, WEAKNESS, DROWSINESS, LIGHTHEADEDNESS, NAUSEA, VOMITING, DRUNKENNESS, IRRITATION OF EYES, BLURRED VISION, BLINDNESS, UNCONSCIOUSNESS, COMA, CARDIAC DEPRESSION, DEATH. CHRONIC TOXICITY:CUMULATIVE (EFFECTS OF OVEREXPOSURE)

Signs & Symptoms of Overexposure:

HEALTH HAZARD:POISON. TARGET ORGANS:CENTRAL NERVOUS SYSTEM, OPTIC NERVES.

Medical Conditions Aggravated by Exposure:

PRE-EXISTING SKIN DISORDERS & EYE DISEASES.

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

TPH STANDARD, 3 MG/L M-XYLENE, 26019

First Aid:

EYES:IMMEDIATELY FLUSH WITH WATER FOR AT LEAST 15 MINUTES. CALL MD.
SKIN:WASH WITH SOAP & PLENTY OF WATER. INGEST:INDUCE VOMITING BY STICKING FINGER DOWN THROAT. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. CALL MD. INHAL:REMOVE TO FRESH AIR. GIVE ARTIFICIAL RESPIRATION IF NECESSARY. CALL MD.

Section 5 - Fire Fighting Measures

TPH STANDARD, 3 MG/L M-XYLENE, 26019

Fire Fighting Procedures:

USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FF E).

Unusual Fire or Explosion Hazard:

DANGEROUS WHEN EXPOSED TO HEAT, FLAME OR OXIDIZERS.

Extinguishing Media:

DRY CHEMICAL, ALCOHOL FOAM OR CARBON DIOXIDE.

Flash Point: **Flash Point Text:** 55.0F,12.8C

Autoignition Temperature:

Autoignition Temperature Text: N/A

Lower Limit(s): 6.7%

Upper Limit(s): 34.5%

Section 6 - Accidental Release Measures
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Spill Release Procedures:

REMOVE ALL SOURCES OF IGNITION. ABSORB SPILL W/NON-REACTIVE ABSORBENT. DO NOT BREATHE FUMES. INCINERATE MATERIAL IN AN EPA-APPROVED FACILITY.

Section 7 - Handling and Storage
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Respiratory Protection:

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

Ventilation:

FUME HOOD.

Protective Gloves:

DISPOSABLE LATEX GLOVES.

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

Other Protective Equipment: EYE WASH FOUNTAIN & DELUGE SHOWER WHICH MEET ANSI DESIGN CRITERIA (FP N). LAB COAT.

Work Hygenic Practices: WASH THOROUGHLY AFTER HANDLING.

Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
TPH STANDARD, 3 MG/L M-XYLENE, 26019

HCC:

NRC/State License Number:

Net Property Weight for Ammo:

Boiling Point: **Boiling Point Text:** 149F,65C

Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: N/K Vapor Density: N/K
Percent Volatile Organic Content:
Specific Gravity: 0.792
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: 7.52
Solubility in Water: MISCIBLE
Appearance and Odor: CLEAR, COLORLESS LIQUID; ALCOHOLIC ODOR.
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Stability Indicator: YES
Materials to Avoid:
OXIDIZERS.
Stability Condition to Avoid:
HEAT, FLAME.
Hazardous Decomposition Products:
TOXIC FUMES OF CARBON MONOXIDE & CARBON DIOXIDE & SULFUR DIOXIDE
IN FIRE.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT

Section 11 - Toxicological Information
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Toxicological Information:
N/P

Section 12 - Ecological Information
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Ecological Information:
N/P

Section 13 - Disposal Considerations
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Waste Disposal Methods:
DISPOSE OF I/A/W ALL FEDERAL, STATE & LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Transport Information:

N/P

Section 15 - Regulatory Information
TPH STANDARD, 3 MG/L M-XYLENE, 26019

SARA Title III Information:

N/P

Federal Regulatory Information:

N/P

State Regulatory Information:

N/P

Section 16 - Other Information
TPH STANDARD, 3 MG/L M-XYLENE, 26019

Other Information:

N/P

HAZCOM Label Information

Product Identification: TPH STANDARD, 3 MG/L M-XYLENE, 26019

CAGE: GO847

Assigned Individual: Y

Company Name: HACH INC

Company PO Box: 907

Company Street Address1:

Company Street Address2: AMES, IA 50010 US

Health Emergency Telephone: 303-623-5716

Label Required Indicator: Y

Date Label Reviewed: 03/18/1998

Status Code: C

Manufacturer's Label Number:

Date of Label: 03/18/1998

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: Moderate

Fire Hazard: Severe

Reactivity Hazard: None

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APPENDIX D
ACTIVITY HAZARD ANALYSES

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. General Site Hazards	a. Back Injuries	a. 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.
	b. Slips/Trips/Falls	b. 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.
	c. Vehicular Traffic	c. Vehicular Traffic <ul style="list-style-type: none"> ◆ Spotters will be used when backing up trucks and heavy equipment and when moving equipment.
	d. Overhead Hazards	d. 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.
	e. Dropped Objects	e. Dropped Objects <ul style="list-style-type: none"> ◆ Steel toe boots meeting ANSI Standard Z41 will be worn.
	f. Noise	f. 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
	g. Eye Injuries	g. Eye Injuries <ul style="list-style-type: none"> ◆ Safety glasses meeting ANSI Standard Z87 will be worn.
	h. Heavy Equipment (overhead hazards, spills, struck by or against)	h. 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 be equipped with backup alarms.

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	i. Struck by vehicle/equipment	i. Struck 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!
	j. Struck by tools	j. Struck by tools <ul style="list-style-type: none"> ◆ Cut resistant kevlar work gloves 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
	k. Caught in/on/between	k. 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.
	l. Contact with underground utilities	l. Contact with underground utilities <ul style="list-style-type: none"> ◆ All utilities will be located and marked prior to excavation activities proceeding, follow EHS 3-15 "Underground Utilities". ◆ White line areas of potential excavation, contact "One Call" center for utility locating services on public property. ◆ Private property requires the services of a private locating service and/or a geophysical investigation.
	m. Contact with Electricity	m. Contact with Electricity <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 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.
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

Project: Derecktor Shipyard Sandblast Grit Removal

Location: Middletown, RI.

Activity: Mobilization/Demobilization and Site Preparation

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Mobilization/Demobilization of Equipment and Supplies	a. Struck by Heavy Equipment/Vehicles	a. Struck 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.
	b. Struck by Equipment/Supplies	b. 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 work space, give a verbal warning so they know you are there..
	c. Overexertion Unloading/Loading Supplies	c. 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.
	d. Caught in/on/between	d. 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.
	e. Slip/Trip/Fall	e. Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas ◆ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ◆ Drivers will check surface before stepping, not jumping down.
2. Site Preparation	a. Struck by wood splinters while placing soil erosion controls	a. Struck by wood splinters while placing soil erosion controls. <ul style="list-style-type: none"> ◆ Wear leather work gloves.
	b. Overexertion placing hay bales	b. Overexertion placing hay bales <ul style="list-style-type: none"> ◆ Instruct workers to lift with their legs not their back. ◆ Never bend and twist at the waist while lifting.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Fire Extinguishers	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.	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

Project: Derektor Shipyard Sandblast Grit Removal.

Location: Middletown, RI.

Activity: Soil Testpitting and Excavation

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Soil Testpitting and Excavation	a. Struck by Heavy Equipment/Vehicles	a. 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.
	b. Fall into Excavation	b. Fall into Excavation <ul style="list-style-type: none"> ◆ Do not leave excavations open overnight whenever possible fill them. ◆ Install open trench warning devices/barricades.
	c. Exposure to Contaminants	c. Exposure to Contaminants <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. ◆ Conduct air monitoring as per Table 7-1 and 7-2.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Mini Ram	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. Mini Ram will be inspected daily prior to use and calibrated before and after each day’s use.	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. SHSO will use Mini Ram.

Project: Derecktor Shipyard Sandblast Grit Removal.

Location: Middletown, RI.

Activity: Soil Load-Out

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Soil Load-Out	a. Heavy Equipment Operation	a. Heavy Equipment Operation <ul style="list-style-type: none">◆ Operators/Drivers will submit a copy of their valid driver's license on initial arrival for each vehicle brought on site.◆ Equipment will have rollover protective structures and seat belts. Operators shall wear seat belts when operating equipment.◆ Design the site to minimize backing operations.◆ Drivers will maintain workers on foot in sight, if you lose sight of someone, Stop!◆ Ground personnel will stay clear of all suspended loads.◆ Spills and absorbent materials will be readily available. Drip pans, polyethylene sheeting, or other means will be used for secondary containment.◆ Eye contact with operators will be made before approaching equipment. Equipment will not be approached on blind sides.◆ Avoid equipment swing areas.◆ Know hand signals.◆ All equipment will be equipped with backup alarms.◆ Personnel are not allowed to use a cellular phone while driving a vehicle on-site.◆ The use of headphones for entertainment purposes is prohibited.◆ A 15 foot minimum safe separation distance will be maintained between equipment and overhead utility lines.◆ Equipment will be shut down before and during fueling operations.◆ Use spotters for traffic control whenever there is "blind spots", backing, or where there are road hazards or unsafe road conditions.◆ Unsafe equipment will be taken out of service, tagged, and will not be used until repaired.
	b. Struck by Heavy Equipment/Vehicles	b. Struck by <ul style="list-style-type: none">◆ Speed limit for traffic is 15 mph for all areas of the site.◆ Trucks shall slow down before approaching loading area.◆ Operators will remain in truck when being loaded.◆ On-site personnel working in the loading area will not walk along the blind side of equipment and must not approach heavy equipment without making eye contact with the operator.◆ 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.◆ 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

Project: Derektor Shipyard Sandblast Grit Removal.

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Activity: Soil Load-Out

		<p>of the operator at all times.</p> <ul style="list-style-type: none">◆ 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.◆ Loaded trucks have right of way.◆ Leave ½ truck length between the truck being loaded and the next truck in line.
	c. Equipment Rollover	<p>c. Equipment Rollover</p> <ul style="list-style-type: none">◆ Equipment will have rollover protective structures and seat belts.◆ Operators will wear seat belts when operating equipment.◆ Do not operate equipment on grades which exceed the manufacturer's recommendations.◆ Be aware of weather and road conditions.◆ A spotter will be used when loading equipment in high traffic areas.◆ Do not load equipment on unstable ground.◆ Run equipment up and down slopes – not at an angle.
	d. Contact with Overhead Utilities	<p>d. Contact with Overhead Utilities</p> <ul style="list-style-type: none">◆ If equipment is being operated or loaded in an area with overhead utilities, a spotter must be used.
	e. Fall into Excavation	<p>e. Fall into Excavation</p> <ul style="list-style-type: none">◆ Do not leave excavations open overnight whenever possible fill them.◆ Install open trench warning devices/barricades.
	f. Slip/Trip/Fall	<p>f. Slip/Trip/Fall</p> <ul style="list-style-type: none">◆ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas◆ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment.◆ Drivers will check surface before stepping, not jumping down.
	g. Caught In/Between	<p>g. Caught In/Between</p> <ul style="list-style-type: none">◆ Do not allow personnel between a moving object and a stationary object.◆ Ensure all personnel within loading areas are accounted for and out of the way.
	h. Vehicular Traffic	<p>h. Vehicular Traffic</p> <ul style="list-style-type: none">◆ Employees will need to pay attention to operations around and adjacent to their work and continually evaluate the need for traffic control measures.◆ Establish one-way (if possible) traffic routes for loaded trucks, so that they can keep the same path while moving dirt.◆ Traffic control patterns may be modified based on changed conditions (as observed) due to weather or due to modified operations at the site.

Project: Derecktor Shipyard Sandblast Grit Removal.

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Activity: Soil Load-Out

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
	i. Exposure to Contaminants	i. Exposure to Contaminants <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. ◆ Conduct air monitoring as per Table 7-1 and 7-2.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Mini Ram	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. Mini Ram will be inspected daily prior to use and calibrated before and after each day's use.	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. SHSO will use Mini Ram.

Project: Derecktor Shipyard Sandblast Grit Removal.

Location: Middletown, RI.

Activity: Confirmatory Sampling

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Confirmatory Sampling	a. Fall into Excavation	a. Fall into Excavation <ul style="list-style-type: none"> ◆ Do not leave excavations open overnight whenever possible, fill them. ◆ Install open trench warning devices/barricades. ◆ Sample from bucket of excavator staying clear of the excavation.
	b. Caught on/in/between	b. 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.
	c. Exposure to Contaminated Dust	c. Exposure to Contaminated Dust <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. ◆ Conduct air monitoring as per Section 7, Table 7-1 and 7-2. Upgrade PPE as required for Table 7-1.
	d. Contact with Contaminants	d. Contact with Contaminants <ul style="list-style-type: none"> ◆ Wear proper PPE as per Table 6-1. ◆ Conduct air monitoring as per Section 7, Table 7-1 and 7-2. Upgrade PPE as required for Table 7-1.
EQUIPMENT USED	INSPECTION REQUIREMENTS	TRAINING REQUIREMENTS
1. Heavy Equipment 2. Appropriate PPE 3. First Aid Kits 4. Portable Eyewash 5. Mini Ram	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. Mini Ram will be inspected daily prior to use and calibrated at the beginning and end of each day's use.	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. SHSO shall use Mini Ram.

Project: Derecktor Shipyard Sandblast Grit Removal

Location: Middletown, RI.

Activity: Site Restoration

MAJOR STEPS	POTENTIAL HAZARDS	PROTECTIVE MEASURES/CONTROLS
1. Backfill excavated areas	a. Struck by Equipment/Vehicles	d. Struck by 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. ◆ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop!
2. Restore Site to Previous Condition	a. Slip/Trip/Fall	a. Slip/Trip/Fall <ul style="list-style-type: none"> ◆ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas ◆ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ◆ Drivers will check surface before stepping, not jumping down.
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.

APPENDIX E
TEMPERATURE EXTREMES PROGRAM

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.

Version Date: 10/13/2005 -

Approved by: 

Revised

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: EHS Compliance/Waste Management, Monitoring, Operational Control, Training

Document Owner: Philip Bartley

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 PESM 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 PESM 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^o C). 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 104° 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 104° 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, if necessary, 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 104°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 freeze. 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 PESM.

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-Stokes, 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 PESH 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 F

PERSONAL PROTECTIVE EQUIPMENT (PPE) SELECTION FORM

TABLE 6.1 - PPE SELECTION

ACTIVITY: _____

TASK	HEAD	EYE/FACE	FEET	HANDS	BODY	HEARING	RESPIRATOR

SHSO _____

APPENDIX G
MEDICAL DATA SHEET

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 H
WORK RULES

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.

APPENDIX I
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.

Version Date: 05/16/2002 -

Revised

Approved by:

Donald Rogers

Original Issue Date: 02/20/2002

Date:

Category: Company Procedures

Sections: ESQ - Environmental Health & Safety Programs

Sub Category: Departmental/Discipline

Document Type: Procedure

Keyword Index: EHS
Compliance/Waste Management, Field Activities/Science, Operational Control, Training, Monitoring

Document Owner: Philip Bartley

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	Attachment B – Underground Utilities Management Checklist

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 EC, Inc. (TtEC) 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 TtEC'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 Compliance and Corporate Counsel.

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. TtEC 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 TtEC-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. TtEC 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 TtEC (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 TtEC 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 TtEC may excavate under the locate number secured by TtEC, provided that they are excavating within the area which was previously white-lined by TtEC 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 TtEC subcontractor will be excavating in an area not white-lined by TtEC, then the TtEC subcontractor must request a new locate.
- The area where work is to be performed shall be white-lined by TtEC 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 TtEC 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 TtEC 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 TtEC 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 TtEC 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

ATTACHMENT 1
Tetra Tech EC, Inc.
EHS 3-15 - ATTACHMENT A
UNDERGROUND UTILITIES LOCATING AND MARKING CHECKLIST

Click the icon below to launch or download.



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Select the "Detach" button in the pop-up window to save a copy to a disk or hard drive.

**ATTACHMENT 2
Tetra Tech EC, Inc.
EHS 3-15 - ATTACHMENT B
UNDERGROUND UTILITIES MANAGEMENT CHECKLIST**

Click the icon below to launch or download.



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Tetra Tech EC, Inc.

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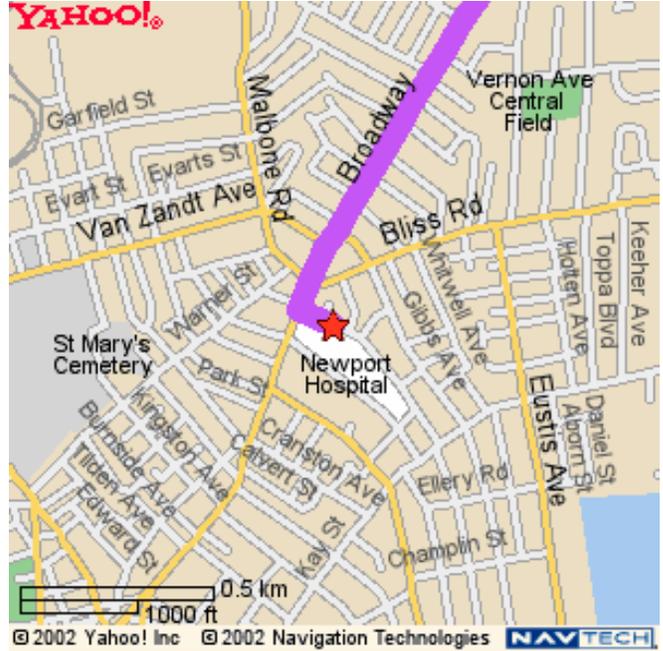
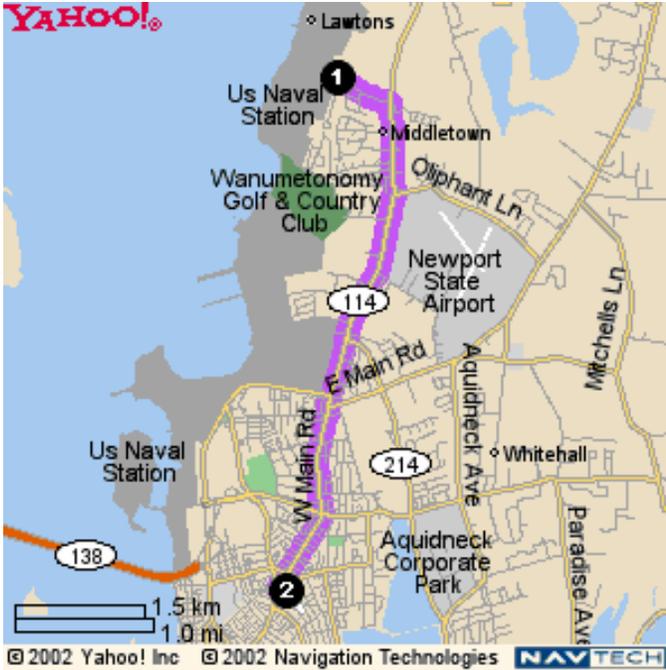
Tetra Tech EC, Inc.

Proprietary Information

APPENDIX J
HOSPITAL ROUTE

HOSPITAL ROUTE MAP

Newport Hospital
11 Friendship St., Newport, RI 02840-2209
Phone: (401) 846-6400



Directions	Miles
1. Start on GREEN LN	0.4
2. Turn Right on W MAIN RD	3.0
3. Continue on BROADWAY	0.6
4. Turn Left on FRIENDSHIP ST	0.1
Total	4.1

BLAST GRIT REMOVAL



FROM SITE:

1. SOUTH TO ANDERSON AVE, GO LEFT;
2. UP HILL TO SIMON PIETRI DRIVE
(TURN LEFT THRU GATE II, RIGHT
ONTO FLEET ACCESS ROAD)

3. — OR —
TURN RIGHT THRU GATE 10, LEFT
ONTO CODDINGTON HWY;

- RIGHT TURN,
4. SOUTH ONTO WEST MAIN RD;

ETC.

TO BROADWAY

+ ON
TO HOSPITAL

WORK CARE FACILITY ROUTE MAP
Newport Alliance
19 Friendship Street, Suite G40
Borden Carey Building
Newport, RI 02840



Directions	Miles
1. Start out going SOUTH on W MAIN RD/RI-114 toward MARSHALL LN. Continue to follow W MAIN RD	2.83
2. Stay STRAIGHT to go onto BROADWAY	0.48
3. Turn LEFT onto GIBBS AVE.	0.27
4. Turn RIGHT onto FRIENDSHIP PL.	0.03
Total	3.61

ZIP BULLETIN

Issue Number 108

Improving Injured Worker Case Management



TETRA TECH EC, INC.

ZIP BULLETIN

Issue No: 108 Improving Injured Worker Case Management

Preventing injuries is always our first priority. However, when an injury does occur, we have found that the overall severity of the injury and the amount of OSHA recordkeeping required for the injury can be greatly reduced when we implement effective case management. Injury cases are managed effectively when we consider them “life cycle” responses:

1. We are properly prepared prior to the injury to effectively respond
2. We notify and involve the right people from the moment the injury occurs. This always includes notifying our primary medical provider, WorkCare at 800-455-6155 (available 24 hrs).
3. We continue to monitor the case throughout the diagnostic and treatment process until the injured worker returns to duty or leaves the company.

This ZIP bulletin provides steps that should be taken to improve case management. All sites are asked to review the following information with their personnel, complete the *italicized* sections for their project, and post this ZIP bulletin in conspicuous locations. Applicable information from the ZIP bulletin should be included in future changes to existing plans. Future projects should include this information in applicable Health and Safety Plans, including Incident Prevention Plans.

What Actions Should We Take Before Field Work Begins?

- Contact WorkCare at the 800-455-6155, let them know you are with TtEC, and obtain the name, address, and phone number for a local WorkCare-approved clinic.
- Enter this information in to the project Health and Safety Plan.
- Post all emergency phone numbers with the route/map to hospital/clinic in vehicles and in trailers.
- Ensure that all site employees are aware of the emergency phone number listing, how to make the call, and the location of the route maps. Reinforce this message during safety briefings.
- Hold and critique site emergency notification and response drills.
- Establish a personal relationship with local clinic/hospital/local emergency response organizations by calling them and visiting their location. WorkCare recommends the following:

Prior to working, make a site visit to the clinic and discuss treatment options with the physician. A discussion with the doctor would include mention of TtEC's desire to take advantage of all potential first aid opportunities, rather than a recordable medical treatment. Mention to the physician that there is little difference between Motrin 800 or an over the counter pain medication. If the physician would keep that in mind when evaluating the injury that you would really appreciate it. Of course the Supervisor/Manager needs to reassure the physician that the physician is the one making the decisions, and is not meant to be an absolute directive.

WorkCare is developing an introduction letter that can be provided to physicians that will help in these communications.

- “Map” the route to the clinic and hospital by driving the route as part of site mobilization.

What Do I Do in an Emergency Situation?

- Call 911 or your local emergency responder for initial employee evaluation and transport to the hospital. **A designated TtEC employee should always accompany the injured worker to the hospital.**
- Administer first aid to minimize the injury effects
- Call WorkCare at 800-455-6155 for a triage call/discussion with an Occupational Health Nurse or physician. Please mention as soon as possible that the call is regarding an emergency injury. At this point, the Occupational Health Nurse/physician will assist the supervisor to determine the best treatment plan.
- Provide the following information to WorkCare:
 - Name of supervisor calling
 - Phone number
 - Location calling from
 - Name of individual injured, social security number
 - Date and type of injury
- During WorkCare off-hours, dial the 800 number and identify yourself. A WorkCare health care representative will call you back shortly. **Do not delay treatment while awaiting a return phone call.**
- Call your PESM (*fill in his/her name and phone number*)
- Call your Project Manager (*fill in his/her name and phone number*)
- Call your Program Manager (*fill in his/her name and phone number*)

What Do I Do in a Non-Emergency Situation?

- Administer first aid as soon as possible to minimize the injury effects
- Call WorkCare at 800-455-6155 for a triage call/discussion with an Occupational Health Nurse or physician. Please mention as soon as possible that the call is regarding an injury. At this point, the Occupational Health Nurse/physician will assist the supervisor to determine the best treatment plan.
- Provide the following information to WorkCare:
 - Name of supervisor calling
 - Phone number
 - Location calling from
 - Name of individual injured, social security number
 - Date and type of injury
- During WorkCare off-hours, dial the 800 number and identify yourself. A WorkCare health care representative will call you back shortly. **Do not delay treatment while awaiting a return phone call.**
- Call your PESM (*fill in his/her name and phone number*)
- Call your Project Manager (*fill in his/her name and phone number*)
- Call your Program Manager (*fill in his/her name and phone number*)
- Call your local Workcare clinic (*fill in their phone number*) to notify them that you are bringing an injured worker to their clinic for evaluation.
- You may transport the injured employee to the local clinic in a privately owned vehicle. **A designated TtEC employee must accompany the injured worker to the local clinic.**
- Encourage the clinic, with WorkCare support, to consider first aid measures first.

What is Considered an Emergency?

When deciding which of the two medical facilities (discussed above) to use for medical treatment, draw upon your first aid training/handbooks, past experience, or advice from a PESM or from a licensed health

care professional; using your best judgment may prove most valuable.

Some physical signs/symptoms that require emergency medical treatment and a call to 911/ambulance service is provided.

- Chest pain
- Difficulty breathing
- Uncontrolled bleeding
- Bone fracture
- Loss of consciousness
- Severe head injury
- Poisoning
- Shock
- Loss of limb
- Sudden and prolonged dizziness

What Actions Do I Take after an Injury?

- Obtain treatment and medical release records for the injured worker and forward to WorkCare.
- Contact TtEC worker's compensation carrier (ESIS @ 800-867-3747) within 24 hours of injury.
- Seek ways to ensure the worker can work, including alternate work. Prompt return to work is crucial for successful case management.
- Regularly follow-up with WorkCare and ESIS case representatives.

Near Miss and Quality Incident Reports are great ways to contribute to our ESQ Programs. Communicating our Lessons Learned can result in the continuous improvement necessary for achieving ZERO INCIDENT PERFORMANCESM and Client Service Quality[®] and generating Very Satisfied Clients!

"Working Toward Zero Incident Performance Through Planning , Tasking, and Error-Free Execution"

APPENDIX K
WEEKLY/MONTHLY SAFETY REPORT

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)	
<div style="display: flex; justify-content: space-between; align-items: flex-end;"> <div style="width: 45%; border-top: 1px solid black; margin-top: 10px;"> Site Health and Safety Officer - Signature </div> <div style="width: 45%; border-top: 1px solid black; margin-top: 10px;"> Date </div> </div>						

Monthly Statistical Report

PROJECT: _____	TtEC MANUAL			TtEC NON-MANUAL			SUBCONTRACTOR TOTALS			PROJECT TOTALS		
MONTH: _____	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

$$\text{OSHA Recordable Rate} = \frac{\# \text{ Recordables} \times 200,000}{\# \text{ of hours worked}}$$

$$\text{Lost Work Day Rate} = \frac{\text{Total \# of lost time cases and restricted duty cases} \times 200.0}{\# \text{ of hours worked}}$$

$$\text{Lost Work Day Severity Rate} = \frac{\text{Total \# of days lost and days restricted} \times 200,000}{\# \text{ of hours worked}}$$

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: