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FINAL HEALTH AND SAFETY PLAN SITE 8 HERBICIDE ORANGE STORAGE AREA AND
OFF BASE AREA OF CONTAMINATION NCBC GULFPORT MS
10/1/2004
ENVIRONMENTAL CHEMICAL CORPORATION



FINAL SITE HEALTH AND SAFETY PLAN

Site 8 – Herbicide Orange Storage Area and Off-Base Area of Contamination

**Naval Construction Battalion Center
Gulfport, Mississippi**

October 2004

Prepared for:

Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, SC 29406

Prepared under:

Contract Number N62467-02-D-0468
Contract Task Order 002

**FINAL
SITE HEALTH AND SAFETY PLAN**

FOR

**SITE 8 – HERBICIDE ORANGE STORAGE AREA
AND
OFF-BASE AREA OF CONTAMINATION**

**Naval Construction Battalion Center
Gulfport, Mississippi**

Submitted to:

**Southern Division
Naval Facilities Engineering Command
2155 Eagle Drive
North Charleston, SC 29406**

Submitted by:

**Environmental Chemical Corporation
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**Contract Number N62467-02-D-0468
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October 2004

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**FINAL
SITE HEALTH AND SAFETY PLAN**

**SITE 8 – HERBICIDE ORANGE STORAGE AREA
AND
OFF-BASE AREA OF CONTAMINATION**

Naval Construction Battalion Center

October 2004

I hereby certify that the enclosed Final Site Health and Safety Plan, shown and marked in this submittal, has been prepared in accordance OSHA 29 CFR 1910.120 and USACE Safety and Health Requirements Manual EM 385-1-1 (3 Nov 2003), and is proposed to be incorporated with Contract Number N62467-02-D-0468. This Site Health and Safety Plan is submitted for Government approval.

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LIST OF ACRONYMS AND ABBREVIATIONS

2,4-D	2,4-dichlorophenoxyacetic acid
2,4,5-T	2,4,5-trichlorophenoxyacetic acid
ACGIH	American Conference of Governmental Industrial Hygienists
AHA	Activity Hazard Analysis
ANSI	American National Standards Institute
AOC	Area of Contamination
CFR	Code of Federal Regulations
CIH	Certified Industrial Hygienist
CPR	cardiopulmonary resuscitation
CRZ	Contaminant Reduction Zone
CSP	Certified Safety Professional
cy	cubic yards
dBA	decibel A-weighted
DQCR	Daily Quality Control Report
ECC	Environmental Chemical Corporation
EMR	Experience Modification Rate
EPA	U.S. Environmental Protection Agency
EZ	Exclusion Zone
HAZWOPER	Hazardous waste operations
HO	Herbicide Orange
LEL	lower explosive limit
mg/m³	milligram per cubic meter
mph	miles per hour
MSDS	Material Safety Data Sheet
NAVFAC	Naval Facilities Engineering Command
NCBC	Navy Construction Battalion Center
ng/kg	nanograms per kilogram
NIOSH	National Institute of Occupational, Safety and Health
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
pg/m³	picograms per cubic meter
PHSM	Project Health and Safety Manager
PID	photoionization detector
PM	Project Manager
PPE	personal protective equipment
ppm	parts per million
QC	quality control
QCM	Quality Control Manager
RA	Remedial Action
RIR	Recordable Incident Rate
SHSP	Site Health and Safety Plan

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

SHSS	Site Health and Safety Specialist
SOP	Standard Operating Procedure
SOW	Scope of Work
SZ	Support Zone
TCDD	2,3,7,8-tetrachlorodibenzo-p-dioxin
TLV	Threshold Limit Value
TWA	Time Weighted Average
USACE	United States Army Corps of Engineers
VOC	volatile organic compound
WNV	West Nile Virus

1.0 INTRODUCTION

This Site Health and Safety Plan (SHSP) has been prepared by Environmental Chemical Corporation (ECC) for the Southern Division, Naval Facilities Engineering Command (NAVFAC), to perform remedial action at Site 8 – Herbicide Orange (HO) Storage Area and Off-Base Area of Contamination (AOC) at the Naval Construction Battalion Center (NCBC) in Gulfport, Mississippi under contract number N62467-02-D-0468. Work conducted under this contract will be performed in accordance with applicable Federal, State, and local safety and occupational health laws and regulations. In addition to other regulatory requirements, work under this plan will be conducted in accordance with Occupational Safety and Health Administration (OSHA) standards (including 29 Code of Federal Regulation (CFR) 1910 and 29 CFR 1926) and the United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual (EM 385-1-1, 3 Nov 2003). The contents of the SHSP are subject to review and revision, as new information becomes available.

1.1 Purpose

This SHSP has been developed based on known and anticipated potential hazards that may arise during performance of the Scope of Work (SOW). The SHSP applies to all project-team personnel who may be exposed to site hazards, including field personnel from ECC and site visitors. It is the responsibility of the Project Manager to make this SHSP available to all project field personnel and visitors. At least one copy of the SHSP will be located in a readily accessible on-site location during all field activities. This SHSP may be revised based on site-specific conditions or new information.

This SHSP has the following designated purposes:

- Delineate roles and responsibilities related to project safety;
- Describe known and anticipated hazards and requisite hazard control measures;
- Establish injury and illness prevention (operational risk management) procedures for fieldwork;
- Establish chemical and medical emergency contingency procedures for potential incidents;
- Establish operational and monitoring systems to prevent hazards to the public; and
- Communicate hazards, safety, and accident prevention protocol to site personnel and visitors.

1.2 Application

The requirements established by this SHSP are mandatory, and shall apply to all ECC employees, its subcontractors, and any other personnel entering designated work areas at the project site during active field operations. ECC is responsible for training all employees and subcontractors on the content of this SHSP prior to commencing fieldwork. All employees, subcontractors, and visitors shall sign-off on the SHSP Compliance Agreement Form (included in Appendix B - Project Health and Safety Forms) after receiving training on this plan and before working at the site.

At a minimum, visitors shall present proper certifications and clearances, and be instructed in the site hazards and control procedures, requirements for personal protective equipment, and emergency response procedures. In addition, ECC shall provide a copy of this plan to any authorized personnel who must enter the regulated work area, and shall maintain a copy of this plan for inspection at the site during each day of field operations.

1.3 Revisions

Changes in the scope of work, field changes or unanticipated site conditions may require SHSP modification and approval in order to retain our field safety compliance with contract requirements and OSHA regulations. All changes to the SHSP shall be prepared and/or reviewed by ECC's Site Health and Safety Specialist (SHSS), Certified Industrial Hygienist (CIH) or Certified Safety Professional (CSP), and submitted to the ECC Health and Safety Manager, Project Manager, and the designated Navy Representative for approval. Work operations affected by such proposed revisions shall not proceed unless specifically authorized by ECC's Health and Safety Manager and the designated Navy Representative. Only the Navy Representative may authorize operations to continue while changes to the SHSP are under review by the contracting agency.

2.0 BACKGROUND INFORMATION

This section provides project background information including the contractor, project name and contract number, project description, SOW, key project personnel, contractor safety information, and activity hazard analyses (AHAs) for the definable features of work.

2.1 Contractor

Environmental Chemical Corporation
Additional subcontractors as necessary for specific statement of work

2.2 Contract Number

N62467-02-D-0468, Contract Task Order 002

2.3 Project Name

Remedial Actions at Site 8 – Herbicide Orange Storage Area and
Off-Base Area of Contamination
Naval Construction Battalion Center

2.4 Project Description

The NCBC Gulfport is located in the southeastern corner of Mississippi, approximately 2 miles north of the Gulf of Mexico. The base is located in the western part of the city of Gulfport in Harrison County. Figure 2-1 shows the location of the base in relation to the city of Gulfport and the Gulf of Mexico. The off-base AOC is located north of NCBC, across 28th Street beginning at Outfall 3. The base occupies 1,100 acres with an average elevation of approximately 30 feet above sea level.

Site 8 consists of three contiguous storage areas (Areas A, B, and C), hereinafter referred to as Site 8A, Site 8B, and Site 8C. Site 8 is located in the north-central portion of NCBC Gulfport (Figure 2-2). The main former HO drum storage area, Site 8A, which encompasses approximately 13 acres, has an undulating surface due to previous remedial activities and is covered with light vegetation. The surface soil in non-stabilized areas is typically fine to medium sand.

Prior to 1968, Site 8 was used as an equipment storage and staging area. Around 1961, the surface soils were stabilized with Portland cement to provide a hardened surface for heavy equipment operation and storage. Between 1968 and 1977, Site 8 was used by the United States Air Force as a storage area for drums containing HO. In 1977, the HO drums were removed from Site 8, transported to port by railroad, and placed on a ship for destruction by incineration in the South Pacific. The release of dioxins at Site 8 was confirmed in 1977, and the site was fenced and left inactive until 1985 (TtNUS, 2003a). It was originally believed that 13 acres of Site 8 were used to store approximately 850,000 gallons of HO. This 13-acre area is currently referred to as Site 8A (HLA, 2000).

HO is a herbicide formulation used during the Vietnam War to defoliate trees and shrubbery. It is an equal mixture of two agricultural herbicides [2,4-dichlorophenoxyacetic acid (2,4-D) and 2,4,5-trichlorophenoxyacetic acid (2,4,5-T)] in diesel fuel or jet fuel. Spills and leaks of HO occurred within Site 8, contaminating the surface soil and sediment with the mixture components, 2,4,5-T and 2,4-D, as well as byproduct contaminants (dioxins and furans), primarily 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Concentrations of 2,4,5-T and 2,4-D have degraded over time; however, dioxin and furan concentrations have remained at unacceptable levels. Throughout this report, TCDD and its chemically related dioxin and furan congeners will be collectively referred to as “dioxins.” Areas designated for excavation do not exceed 2-3 feet in depth. Recent investigative studies have identified dioxin equivalents in sediments of up to 4,000 nanograms per kilogram (ng/kg) or parts per trillion.

2.5 Scope of Work

The remedial action (RA) at Site 8 includes the following tasks:

- Excavate dioxin-contaminated sediment from on-base drainage channels contiguous to Site 8, excavate dioxin-contaminated sediment from an associated off-base AOC located north of the base, and excavate soil ash located at Site 8;
- Consolidate, homogenize, and stabilize soil ash and contaminated sediment within a portion of Site 8;
- Construct a cap over the stabilized material;
- Perform verification sampling;
- Restore the on-base drainage channels and off-base AOC affected by excavation activities;
- Implement land-use controls; and
- Perform long-term monitoring.

Approximately 72,000 cubic yards (cy) of contaminated material will be removed at Site 8:

- 23,000 cy - Site 8A soil ash
- 20,000 cy - On-base drainage channels/sediments
- 29,000 cy - Off-base sediments

2.6 Key Personnel

Table 2-1 lists the individuals that have key safety responsibilities during the conduct of this project. Resumes of key safety personnel are provided in Appendix C.

Table 2-1. Safety Personnel

Name	Responsibility	Affiliation	Phone Number	Email address
	Project Manager	NAVFAC		
	Project Safety Oversight	NAVFAC		
Prashant Khanna	Project Manager	ECC	650-347-1555 (office) 650-208-0612 (cell)	pkhanna@ecc.net
Michael McSherry CIH, CSP	Site Safety and Health Manager	ECC	215-776-0108 (cell)	mmcsherry@ecc.net
Kevan McCaslin	Site Health and Safety Specialist	ECC	228-868-6636 (office) 360-271-0000 (cell)	kmccaslin@ecc.net
Robert E. Anderson	Site Superintendent	ECC	508-563-9767	BAnderson@ecc.net

2.7 Contractor Safety Information

As shown in the following table, ECC continues to maintain an excellent safety record. ECC's experience modification rate (EMR) is less than 1.0, indicative of fewer injuries and claims compared to other construction companies. The OSHA Recordable Incident Rate (RIR) is also less than the average for other construction companies.

Table 2-2. Environmental Chemical Corporation Safety Experience Rates

Year	EMR	RIR
2004	0.69	Not avail.
2003	0.68	0.31
2002	0.66	2.15
2001	0.90	2.03
2000	0.80	0.66

Copies of ECC's OSHA Form 200/300 for the above referenced years are available on request.

2.8 Activity Hazard Analyses for Work Activities

The following phases of work and hazardous activities have been identified:

- General Site Operations,
- Site Preparation,
- Sampling of Contaminated Material,
- Decontamination,
- Clearing and Grubbing Operations,
- Excavation, Trenching, and Backfilling,
- Heavy Equipment Operations,

- Slurry mixing, soil stabilization,
- Installation of Multi-Layered Cap System,
- Well Decommissioning, and
- Demobilization.

Individual AHAs were prepared for some of these specific work tasks, as well as other general site work activities, are presented in Appendix A.

Additional AHAs will be developed to address work activities, as additional subcontractors are added (if needed), and as discussion and planning sessions with the subcontractors and workers have been conducted. These activities present significant health and/or safety issues and will be thoroughly planned with the site workers involved with this work to allow for proper training prior to initiation of this work.

3.0 STATEMENT OF SAFETY AND HEALTH POLICY

It is the policy of ECC that incident and accident prevention is of primary importance in all phases of operations and administration, including subcontractor operations. ECC's management is responsible for providing a safe and healthy working environment to its employees, and to establish and insist upon safe work practices at all times.

The prevention of incidents and accidents is an objective affecting all levels of the organization and its activities. It is therefore a basic requirement that each supervisor, whether an ECC or a subcontractor employee, make the safety of workers an integral part of his or her regular management function. It is equally the duty of each employee to accept and follow established safety regulations and procedures.

ECC will provide proper training to its employees and require that its subcontractors are adequately trained. In the event that an employee is ever in doubt in how to do a job safely, it is their duty to ask a competent person for assistance and training. Employees are expected to assist and support management in accident prevention activities. Unsafe activities and incidents must be reported to management at all times.

ECC requires that managers and supervisors be held accountable for safety, not only for providing a safe work environment (through proper staffing, training, and equipment availability), but also through the example that they set. Annual performance reviews for managers and supervisors includes an assessment of project safety performance as well as the individual's demonstrated attitude toward safety.

4.0 ORGANIZATION, RESPONSIBILITIES, AND LINES OF AUTHORITY

This section describes the ECC and subcontractor personnel responsibilities for project safety and the lines of authority of these safety personnel. Resumes of key safety personnel are provided in Appendix C.

4.1 Personnel Responsible for Safety

The following ECC corporate level individuals have responsibility for safety:

- Mr. Paul Sabharwal, Owner;
- Mr. August Ochabauer, PE, Vice President of Operations; and
- Mr. Richard Gioscia, CIH, CSP, CHMM, CQM, Director, Environmental Safety and Quality Programs.

Project level individuals have direct, day-to-day responsibilities for project safety. The following individuals are associated with this project:

- Mr. Raghu Arora, Program Manager;
- Mr. Prashant Khanna, Project Manager
- Mr. Graham McMorine, Site Manager
- Mr. Kevan McCaslin, Site Health and Safety Specialist;
- Mr. Bob Anderson, Site Superintendent; and
- Mr. Michael P. McSherry, CIH, CSP, Project Health and Safety Manager.

4.2 Health and Safety Responsibilities of the Project Team

The primary health and safety responsibilities of the project team and other associated personnel are outlined below.

4.2.1 ECC Program Manager

The Program Manager (PRM) for this project will be responsible for the following:

- Overall contract conformance to Navy and NCBC requirements and specifications, including technical, cost, and schedule;
- Overall responsibility for the success and proper execution of the project;
- Review of all required submittals;
- Designation of the Project Manager (PM) and Quality Control System Manager (QCSM); and
- Allocation of sufficient resources to ensure successful completion of the project.

4.2.2 ECC Project Manager

The Project Manager (PM) represents ECC in all aspects of its work under the contract and is responsible for the following:

- Coordinating all work performed by ECC and its subcontractors for the project;
- Serving as liaison to the contracting agency and all other federal, state, and local agencies;
- Ensuring the SHSP is approved by NAVFAC prior to commencing field operations;
- Ensuring field personnel are properly trained and implement the SHSP;
- Ensuring all required personal protective equipment (PPE), other types of equipment and instruments, and other safety-related items are provided and properly utilized for the project;
- Ensuring all field personnel, including any subcontractor personnel, assigned to the project have satisfied all requirements for training and medical surveillance as specified by 29 CFR 1910.120, and that records of training and medical approval are available and maintained for each person;
- Ensuring that all personnel assigned to the project have been instructed on the work plan, operations to be performed, known and potential hazards associated with the work, SHSP requirements, proper use of required PPE, specified safe work practice, proper action in the event of medical or chemical emergencies, and related site specific safety information;
- Monitoring overall safety performance of field personnel;
- Correcting any work practices and/or conditions that may result in injury and/or exposure to hazards;
- Ensuring unplanned events, high loss potential incidents, and accidents are properly reported to NAVFAC and within ECC's health and safety reporting network;
- Immediately stopping ECC operations in the event of an emergency or serious hazard, in order to protect personnel and the environment; and
- Preparing and submitting required work progress reports.

4.2.3 ECC Project Health and Safety Manager

The Project Health and Safety Manager (PHSM) will be a CSP and/or CIH and will oversee the overall project health and safety structure and implementation. Responsibilities include:

- Review, approve and sign the SHSP prior to submittal
- Develop and/or review AHAs prepared for the project;
- Participate in quality control (QC) planning such as development of QC Plans, safety and health checklists, and perform design and system safety analyses as appropriate;
- Be available on a 24-hour basis for consultation with SHSS during on-site emergencies or as needed;
- Provide on-site consultation as needed to ensure the SHSP is fully implemented;
- Coordinate any modifications to the SHSP with the Site Health and Safety Specialist (SHSS), the ECC PM, and the designated Navy Representative;

- Provide continued support for upgrading and/or downgrading the level of personal protection;
- Evaluate air monitoring data and recommend changes to engineering controls, work practices, and PPE; and
- Assist in development of on-site training, which will be provided by the SHSS.

4.2.4 Site Superintendent

The Site Superintendent (SS) responsibilities shall include the following:

- Set an example for all site personnel through actions and words regarding the importance of proper health and safety practices on the job;
- Communicate all health and safety issues (e.g., equipment/training needs, revised work practices) and daily work plans and schedules with the SHSS;
- Ensuring all employees and subcontractors are trained on the SHSP;
- Ensuring required safety equipment is on-site and properly utilized;
- Ensuring all ECC and subcontractor personnel have satisfied training requirements and medical surveillance per 29 CFR 1910.120 and comply with 29 CFR 1926;
- Monitoring overall safety performance of field personnel;
- Correcting work practices or conditions that may result in injury and/or hazard exposure;
- Immediately stopping site operations in emergency or serious hazard exposure;
- Preparing and submitting required work progress and incident reports; and
- Ensuring proper equipment is provided, utilized, and maintained in accordance with manufacturer recommendations.

4.2.5 Site Health and Safety Specialist

The SHSS implements the task-specific SHSP. In accordance with USACE EM 385-1-1, the SHSS must have completed the 10-hour OSHA Construction Safety course (or an equivalent course applicable to the work to be performed) within the past 3 years. Responsibilities include the following:

- Overseeing and enforcing the SHSP;
- Assisting and representing the project Health and Safety Manager in on-site training and continued on-site implementation and enforcement of safety plans and procedures;
- Reporting to the site on a full-time basis for the entire duration of field activities;
- Ensuring site compliance with specified safety and health requirements and OSHA regulations;
- Serving as a member of the QC staff on matters relating to safety and health;
- Stopping work if unacceptable safety and health conditions exist, and take necessary action to re-establish and maintain safe working conditions;
- Consulting and coordinating modifications to the SHSP with the PHSM, the ECC PM, and designated Navy Representative;
- Ensuring all site personnel and visitors are properly trained on site hazards;
- Conducting air monitoring and prepare air monitoring reports; and

- Maintaining all required safety and health records (e.g., OSHA 300 Logs, incident/accident reports, training certificates and qualifications, equipment checklists, safety plans, air monitoring data and reports, etc.) throughout the life of the project.

4.2.6 Project Quality Control Manager

The Project Quality Control Manager (QCM) is responsible for establishing and ensuring compliance with site control procedures and the Project Quality Control Plan. The QCM's responsibilities shall include the following:

- Conduct and/or document daily site safety and health inspections; inspections must be documented in the daily QC log;
- Attend and conduct QC meetings and training sessions;
- Assuring all personnel on site are trained on the provisions of the safety and health plans, as well as other necessary work plans;
- Review project submittals;
- Report equipment malfunctions and deficiencies to the PM and SHSS;
- Providing QC reports to the NAVFAC; and
- Ensure the scope of work and specifications are followed and met.

4.2.7 Field Personnel

Field Personnel are responsible for understanding and abiding by the SHSP and performing their work in a safe and responsible manner. Training of field personnel will be conducted prior to starting work. Training will be documented and personnel will sign an acknowledgement of training. A safety and health compliance agreement is included in Appendix B. Specific responsibilities include the following:

- Acting in a responsible and cautious manner at all times in order to prevent incidents, accidents, injury, and/or exposure to themselves and their co-workers;
- Reporting any and all incidents, accidents, injuries, exposures and/or near misses to the SHSS and/or other site management (e.g., site superintendent, PM);
- Attending and participating in all daily health and safety tailgate meetings conducted during the project;
- Following the instructions and directions of the SHSS and the site superintendent;
- Utilizing the PPE provided and specified for use;
- Following all field safety procedures for safe work practices, e.g., the buddy system, communication, site control, decontamination, evacuations, and related emergency procedures;
- Reporting to the PM and SHSS any personal condition that they reasonably believe could affect their safety and/or the safety of co-workers (e.g., fatigue, drowsiness, severe illness, impairment by prescription medications, influence by drugs and alcohol, emotional stress, or other condition); and
- Performing only those tasks they have been instructed to perform and that they believe they are trained, qualified, and capable of performing at the time of assignment;

- Ensuring that no work tasks are performed in deviation from the SHSP and/or the initial instructions of the Site Superintendent or SHSS without the expressed authorization and additional instruction from the PM and/or SHSS.

4.2.8 Subcontractors

Subcontractors that perform work for ECC under this SHSP are responsible for the health and safety of their employees. ECC will take responsibility for the preparation of the SHSP, however, the presence of a SHSS and the implementation of a SHSP does not relieve subcontractors of their responsibilities as employers. Specific responsibilities of subcontractors include:

- Maintaining a safe and healthy work environment;
- Compliance with laws, regulations, and EM 385-1-1;
- Reviewing the SHSP to ensure that the health and safety requirements of their specific tasks are satisfied;
- Performing all work in accordance with the SHSP requirements; and
- Meeting all contract/subcontract requirements related to health and safety.

4.2.9 Site Visitors

Authorized site visitors may visit the site upon meeting the following conditions:

- Receiving site hazard and safety instructions from the SHSS;
- Reviewing and complying with the essential elements of the SHSP;
- Using their own, or provided PPE, to enter regulated work areas per the SHSP; and
- Reporting any observed unsafe act and/or condition at, or affecting, the work site.

In addition, any official visitor who seeks entry into an Exclusion Zone (EZ) or Contamination Reduction Zone (CRZ) shall present documentation of health and safety training in compliance with OSHA 29 CFR 1910.120 (or 1926.65), medical surveillance examination and certification, and respirator fit testing (if necessary). A Visitors Log shall be maintained at the site.

4.3 Lines of Authority

ECC requires a definite line of reporting for individuals tasked with health and safety responsibilities. The SHSS will be responsible for day-to-day health and safety operations and issues. All personnel are to communicate directly with the SHSS regarding safety issues. The subcontractor(s) project manager or superintendent is required to work within the project safety structure to resolve any safety issues and/or disagreements. The SHSS has a technical reporting relationship to the Project Safety and Health Manager, who reports directly to the ECC Director of Environmental, Safety, and Quality Programs. The reporting line provides for access to safety and health expertise as well as an independent reporting and line of communication. The SHSS has a functional reporting relationship to the Project Manager, providing the Project Manager and team with a resource for safety and health support for the project.

5.0 SUBCONTRACTORS AND SUPPLIERS

The following sections briefly describe the ECC subcontractors identified to work on the project, quality control of their safety-related items and supplies, and their participation in ECC's safety program.

5.1 Identification of Subcontractors and Suppliers

Subcontractors will perform various portions of the work activity, including:

- Geotechnical Testing,
- Surveying,
- Re-vegetation, and
- Tree Removal.

At the present time, specific subcontractors for these tasks have not been identified. Health and safety related supplies will be obtained from recognized safety supply vendors.

5.2 Controlling Subcontractors and Supplier

All suppliers of safety-related items are required to provide approved and/or appropriate materials for the project, as recommended by the SHSS. Materials used during the remedial activities must meet the project specifications. The subcontractor and ECC's QCM (and the subcontractor) will be responsible for verifying the quality of materials used in the specific tasks.

Subcontractor safety is critical to successful performance on projects. When the need for onsite subcontractor labor and/or services is identified, part of the selection criteria includes an evaluation of the subcontractor's safety history and program. The Subcontractor Safety Qualification Form (provided in Appendix B) will be used as part of the bid and selection process.

5.3 Safety Responsibilities of Subcontractors

Subcontractor involvement in the safety program is critical to the success of the project. ECC requires that all subcontractor(s) participate in the safety program in a variety of ways, as described below:

- Provide trained and experienced workers for the specific work activities;
- Participate in the Daily Safety Tailgate Meetings;
- Identify additional training needs for unique tasks;
- Participate in development of AHAs;
- Enforce company and project-specific rules and procedures during work activities;
- Report all incidents and participate in the investigations;
- Participate in routine site inspection activities;

- Ensure all equipment brought to the site is in a “new or like new” condition, is routinely inspected, and is maintained in safe working order; and
 - Set a positive safety example for all project staff.
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6.0 TRAINING AND MEDICAL SURVEILLANCE REQUIREMENTS

This section discusses the training and medical surveillance requirements for this project.

6.1 Project Training Requirements and Employee Safety Indoctrination

The SHSS will ensure that employees are adequately trained to safely perform the tasks required. Documentation of training will be maintained onsite. Refresher training will be conducted as necessary, and is an important part of worker information and communication. Training is required in several specific areas. In addition to the topics listed below, the SHSS, in cooperation with the site superintendent, will identify other topics and work tasks to be included in the training requirements. All required training will be documented and documentation maintained onsite.

6.1.1 Project Health and Safety Plan

The SHSS will conduct a detailed site-specific safety and health training session for all site employees assigned to the project prior to the commencement of on-site project activities. This training will include all information presented in this SHSP, and is mandatory to ensure all personnel are familiar with the site hazards present, and the requirements and responsibilities for maintaining a safe project work environment. The pre-work briefing for the field operations will include discussion of the procedures and contents of the SHSP. All field personnel assigned to the project will be required to sign the Site Specific Health and Safety Plan Compliance Agreement (Appendix B) upon completion of this training. Additional or specialized training topics as listed below may be included at this time as well.

6.1.2 Activity Hazard Analyses

AHAs have been generated for the identified work features of this project (Appendix A). AHA training will be part of the SHSP training. Personnel trained on each AHA will sign the specific AHA training documentation form. These forms will be maintained onsite. AHA retraining will occur whenever there are changes in work procedures and/or required safety practices, and whenever an incident occurs related to the task. New AHAs will be developed for unique tasks prior to initiation of task work, and employees will be trained on the AHA prior to task work.

6.1.3 Visitor Indoctrination Policy

All site visitors will be required to review the daily tailgate safety issues and sign the visitor log. At a minimum, all visitors must be informed of the anticipated hazards and PPE requirements, designated work zones, and emergency procedures.

6.2 Additional or Specialized Training Requirements

Several additional areas of training, certification, and/or qualification will be required, or are likely to be required for some or all employees. Each of the areas listed below (as well as new task/hazard-specific requirements that occur throughout the project) will be addressed when and as appropriate.

- Hazwoper annual refresher;
- Powered industrial trucks;
- Fall protection;
- Hearing conservation;
- Respirator use and the Respiratory Protection Program;
- Hazard communication; and
- Construction equipment operator.

6.3 Emergency Response Training

Emergency response training will be a part of the initial SHSP pre-work training required for all employees. Additional discussions or refreshers will take place periodically throughout the project as part of the Daily Tailgate Safety Meetings. Emergency response topics will include:

- Notification of incidents, accidents, and injuries;
- Fire, police, and medical emergency procedures;
- Procedures for severe weather (thunderstorms, lightning);
- Procedures for spill cleanup; and
- Procedures for notification of client for any of the above incidents.

6.4 Employee Safety Meetings / Daily Tailgate Safety Meetings

The SHSS will conduct a Daily Tailgate Safety Meeting with all field personnel at the beginning of every shift and when job conditions change. All field personnel are required to attend each Daily Tailgate Safety Meeting and are required to sign the Daily Tailgate Safety Meeting Form (Appendix B). A copy of each Daily Tailgate Safety Meeting form will be made available to all field personnel and site visitors, will be maintained on-site during the project, and will be provided to the NAVFAC as part of the Daily Quality Control Report (DQCR) or upon request. The following topics are considered for inclusion in each tailgate meeting:

- Work tasks and schedule;
- Site safety responsibilities;
- Work procedures designed to mitigate hazards;
- Medical surveillance program requirements;
- Review of applicable SHSP sections;
- Approved revisions to project work plans;
- Potential chemical/physical/biological hazards;
- Review of the AHA for the task(s) to be performed;
- Update on personal air monitoring results;
- PPE and/or respiratory protection required;
- Personal and equipment decontamination;

- Review of safety issues and incidents;
- Employee comments and suggestions regarding site safety;
- Review of Material Safety Data Sheets (MSDS);
- Recognition and management of heat/cold stress; and
- Emergency procedures (fire, medical, police).

6.5 Medical Surveillance Requirements

All field personnel (and management personnel onsite) are required to have a current medical exam in accordance with OSHA standards prior to entering regulated work areas. Personnel also are required to receive exposure and/or work-related examinations when appropriate. Medical examination approvals for hazardous waste work will be properly documented and maintained in each employee's personnel file. Complete results of each individual's medical examination results are maintained by the medical provider and will not to be kept onsite.

A physician's written opinion regarding the employee's ability to wear respirators is required in accordance with 29 CFR 1910.134 for all individuals who are or may be:

- Exposed to substances above permissible levels;
- Required to wear a respirator; and/or
- Exposed above permissible levels in accidents or emergency situations.

The medical surveillance program is established to document that personnel are capable of performing their assigned activities and the health of employees is not compromised by potential exposure to chemical or physical agents found at work sites. This program is designed to support and monitor the effectiveness of the primary health and safety goal of controlling worker exposure to hazardous materials.

At the present time, there are no specific pre- or post-work personal/biological monitoring requirements. ECC's Occupational Physician has indicated that pre-work body burden evaluations of dioxin concentrations is not warranted. If there are specific exposure issues, or employee complaints and symptoms related to dioxin, the necessity for dioxin-specific exams will be discussed with the physician.

Additional medical monitoring may be required for workers under other regulations (e.g., Department of Transportation drivers). The SHSS will ensure appropriate subcontractor's medical screenings are completed, documented, and these records are available at the work site.

7.0 SAFETY AND HEALTH INSPECTIONS

This section describes general and external safety and health inspections including responsibility for the inspections, their frequency, and documentation of findings.

7.1 General Inspection Procedures

This section describes the responsible parties, frequency, and contents of daily inspections, and work site safety and health inspections, as well as follow-up and deficiency tracking.

7.1.1 Daily Inspections

All personnel onsite are responsible for conducting daily inspections of their work area. This includes inspections of the work area, cleanliness, PPE, hand and power tools, electrical cords, ladders, fall protection (guard rails, harnesses when used), and general work layout and logistics. Observations and corrective measures are to be relayed to the SHSS for documentation in the daily safety log book. Daily inspection requirements will also be documented for heavy equipment operation, powered industrial trucks, scaffolds, and other operations as required.

7.1.2 Frequency and Documentation

The SHSS and/or the QCM will perform safety and health inspections of the work site. Project QC personnel shall note and document safety and health issues as part of the daily QC inspections and logs. Daily inspections will be documented in the SHSS logbook, and included in the Daily Quality Control Report (DQCR) provided to the NAVFAC. Appendix B provides a copy of the Health and Safety Site Inspection Report. This form may be modified based on additional work activities, or project-specific needs. A copy of this form will also be provided to the NAVFAC as part of the DQCR. The SHSS will ensure that all immediate hazards are corrected before work proceeds and that all other hazards and potential safety situations are corrected in a timely manner in relation to the severity of the hazard. Copies of all safety inspections will be maintained on-site and available for field personnel review. The weekly report will provide the basis for the deficiency tracking log, maintained as part of the project Safety and Health Bulletin Board.

Project management (i.e., the ECC PM or designated management alternate) will participate in the site inspection at least monthly. An ECC Corporate Health and Safety staff member will conduct a site visit and audit at least once during the project.

A competent person is required to observe and inspect work activities involving several potential hazards and tasks, including fall protection, excavation, and scaffold work. The SHSS will be qualified and designated as the competent person in these areas. Additional competent individuals will be identified in AHAs, as needed.

7.1.3 Deficiency Tracking and Follow-up System

Major safety and health deficiencies observed (i.e., those that cannot be immediately corrected) will be posted chronologically as part of the Safety and Occupational Health Deficiency Tracking System. This system will designate a target date for completion of corrective actions and indicate the person responsible for the correction.

7.2 External Inspections and/or Certifications

At this time, no external inspections or certifications are anticipated for this project.

8.0 SAFETY AND HEALTH EXPECTATIONS, INCENTIVE PROGRAMS, AND COMPLIANCE

This section describes the safety goals for this project, the safety incentive program, disciplinary procedures, and management accountability implemented to ensure the safety goals are met.

8.1 Safety Goals for this Contract

The safety objectives and goals for this task are several and include:

- Conduct all work in accordance with OSHA, NAVFAC, USACE, and other applicable safety regulations and guidelines;
- Complete the project with zero OSHA recordable injuries and illnesses;
- Complete the project with zero high loss potential incidents;
- Provide prompt identification and correction of health and safety concerns; and
- Obtain 100% participation of all employees in the maintenance of a safe work environment.

8.2 Safety Incentive Program

ECC provides a safety incentive program to all project employees working at an ECC project site. A project employee is defined as a non-exempt, hourly employee hired for the duration of the project. The Safety Incentive Program is part of ECC's Corporate Health and Safety Standard Operating Procedures (SOPs) and is included on Appendix D. Additional safety incentive programs will be evaluated and established as appropriate relative to safety participation and awareness efforts of the employees. ECC will work with subcontractors to establish an appropriate incentive plan for subcontractor employees.

8.3 Disciplinary Procedures

All employees and subcontract employees are required to comply with SHSP policies and procedures. Any noncompliance with these standards will be immediately remedied and the responsible employee will be subject to discipline. ECC expects that all subcontractors will exercise their right to discipline and/or terminate its employees at its sole discretion when justified. While ECC reserves the right to discipline and/or terminate (when justified) employees at its sole discretion, significant safety noncompliance issues will be addressed by the employee's supervisor in the following manner.

- Meet with the employee to discuss the matter.
- Inform the employee of the nature of the problem and the action necessary to correct it.
- Prepare a memorandum documenting that the meeting occurred. This memorandum will include the signatures of the SHSS, the employee's supervisor, and the employee. A copy of the memorandum will be placed in the employee's personnel file.

If there is a second infraction of safety standards, the supervisor will hold another meeting with the responsible employee and complete the following process.

- Issue a written reprimand to the employee.
- Warn the employee that a third occurrence will result in a more severe disciplinary action.
- Prepare and forward, to the appropriate person within the employee's company (including the project Health and Safety Manager), a written report describing the first and second occurrences and summarize the actions taken during the meetings with the employee. This report will include the signatures of the employee and their supervisor.

A probationary period may be invoked by the Site Superintendent and the PM if a serious problem arises regarding site safety and health policies and procedures. This period normally does not exceed ninety (90) days. This period is intended to notify the employee of a specific problem, recommend action to correct the problem, and give the employee a reasonable period of time during which sufficient identifiable improvement or correction occurs. If there are additional occurrences of unsafe behavior or actions, the Site Superintendent will:

- Issue a written reprimand or warning;
- Suspend the employee without pay for up to five working days; or
- Suspend the employee indefinitely and recommend termination.

In addition to this procedure, the Site Superintendent or the PM may immediately terminate, suspend or deny access to the site, any employee or other individual for serious safety infractions that have placed or could place others in danger.

8.4 Manager and Supervisor Accountability

ECC requires that managers and supervisors be held accountable for safety, not only for providing a safe work environment (through proper staffing, training, and equipment availability), but also through the example that they set. Annual performance reviews for managers and supervisors includes an assessment of project safety performance as well as the individual's demonstrated attitude toward safety.

9.0 INCIDENT AND ACCIDENT REPORTING

This section describes the ECC policies and procedures to be used for incident and accident reporting.

9.1 Exposure Data

The SHSS will maintain, or have available, a weekly summary of person-hours worked on the project. The SHSS will provide to NAVFAC a monthly summary including:

- Person-hours worked;
- Major incidents / accidents; and
- OSHA recordable injuries and illnesses.

9.2 Accident Investigation, Reports, Logs

All site personnel are required to promptly report incidents, injuries, illnesses, and accidents to their supervisor. All injuries/illnesses, no matter how minor they appear, are to be reported to the supervisor. The supervisor, with the assistance of the SHSS will investigate the incident and complete all necessary incident reports and logs.

All incidents, regardless of severity, require some type of investigation and corrective action. Immediate and basic causes must be identified and evaluated, and used to support the recommended corrective actions. All incidents with a high potential for loss, as well as property damage and personal injury, are reported and tracked internally within ECC's intranet system. This reporting system includes the results of the investigation as well as the corrective actions to limit or prevent a reoccurrence. Some of these incidents may also result in notification and a report to NAVFAC.

A project-specific OSHA 300 Log (Log of Work-Related Injuries and Illnesses) will be kept at the job site. In accordance with OSHA regulations, minor injuries that require first aid treatment only, such as small cuts, scrapes, and splinters will not be recorded on the 300 Log. However, they will be recorded on a project-specific First Aid Log. From February 1 through April 30 of each year, Form 300A (Summary of Work-Related Injuries and Illnesses) will be posted on the project Safety and Health Bulletin Board.

9.3 Immediate Notification of Major Accidents

The NAVFAC representative will be verbally notified immediately and will receive a written notification within 24 hours for incidents including, but not limited to, the following:

- OSHA recordable injuries and illnesses;
- Tool or equipment failure which results or could result in serious injury;
- Fire or explosion of any magnitude;
- Exposure of unprotected personnel to toxic agents;
- Vehicle accidents;
- Any injuries to authorized visitors; and
- Any damage to property in excess of \$2,000.00.

The written report will be submitted on the Contractors Significant Incident Report form.

10.0 MEDICAL SUPPORT

Medical support for this project will be provided as described below.

10.1 Onsite and Offsite Medical Support

Onsite medical support during project execution will be available from individuals who are trained in First Aid and cardiopulmonary resuscitation (CPR). Local emergency medical support is available through the 911 emergency services. Local hospital emergency rooms must be notified of the potential types of injuries and the contaminants involved. The community medical provider may make specific recommendations (e.g., notification, decontamination, transport).

Onsite first aid kits must meet the requirements of EM 385-1-1 (03.B). First aid kits shall be Type III, 16 unit kits, including one pocket mouthpiece or CPR barrier. Kits shall be checked prior to use, and at least weekly when work is in progress to ensure that contents are replaced as used.

10.2 Personnel Trained in First Aid and Cardiopulmonary Resuscitation

The SHSS will hold a current First Aid/CPR certificate. The SHSS will also be trained in universal precautions and the use of PPE as described in the Bloodborne Pathogens Standard 29 CFR 1910.1030. Two or more personnel trained in first aid/CPR and bloodborne pathogens will be available onsite for emergency care. The names of these individuals will be identified at the initial safety meeting and periodically throughout the project as part of the Daily Tailgate Safety Meetings.

10.3 Hospital and Emergency Route Map

Garden Park Medical Center has been designated as the project emergency hospital. This hospital is located at 15200 Community Road, Gulfport, Mississippi. An emergency route map is provided in Figure 10-1.

10.4 Medical Transport of Employees and Case Management

For non-emergency injuries, the Corporate Medical Consultant, Dr. Peter Greaney (Pgreaney@Workcare.com), or the Workcare Occupational Health Nurse, Marsha Locke, will be contacted at (800) 455-6155 ext 109 (Mlocke@Workcare.com) prior to transporting the injured worker to the clinic. The Workcare provider will attempt to contact the clinic ahead of the arrival of the patient to establish oversight of case management. Under no circumstances will an injured employee drive unescorted to a hospital, clinic, etc. An employee with minor injury may be transported by car after first aid treatment is given. The SHSS or other project management personnel will transport the injured person to the hospital. The employee who transports the injured person shall be trained in first aid and CPR whenever possible. When the injury is severe, or when in doubt concerning the severity of injury, the employee will be transported by ambulance.

Injured employees that require medical treatment or are taken to a doctor, hospital, clinic, etc., will not be allowed to resume work without a written return to work statement from the treating physician. This statement shall supply a medical diagnosis of the problem, the date of return to work, and work limitations. Should a return to work statement such as "light duty" be given, the treating physician will be contacted to determine the specific restriction. The treating physician will be informed of the type of work the employee normally performs and an assessment will be made whether or not the restriction interferes with the employee's normal work.

Whenever there are questions on the appropriateness of the diagnosis or prescribed course of treatment, Workcare will be contacted to arrange for a second opinion.

11.0 PERSONAL PROTECTIVE EQUIPMENT PROGRAM

The purpose of PPE and clothing is to protect individuals from chemical and physical hazards. Based on previous studies of contaminants of concern, Modified Level D PPE will be the primary level of protection. The required level of PPE may be changed by the SHSS, based on the results of additional air monitoring, or on task-specific needs.

11.1 Hazard Assessments

Specific work tasks with unique hazards and/or PPE requirements must be evaluated or reevaluated prior to beginning work. This task review will be lead by the SHSS, and will include knowledgeable individuals such as the worker(s) and the supervisor. All workers must be trained in the requirements of the SHSP and the applicable AHAs prior to beginning work.

11.2 Levels of Protection

The following sections describe the anticipated levels of protection for the project.

11.2.1 Level D PPE

Level D PPE is the minimum required PPE to be used during all work activities at the site, unless otherwise determined and documented. This specifically includes work conducted in areas not designated for remedial activities, and includes site and trailer mobilization and demobilization.

Level D PPE will include at a minimum:

- Long pants and work shirt with a minimum of four-inch sleeves;
- Safety boots approved by the American National Standards Institute (ANSI);
- Work gloves (appropriate for task, especially during manual material handling);
- ANSI-approved safety eyeglasses with side shields or goggles to guard against dust, grit, wind, etc.;
- Hard hat (hard hat may be supplemented with a hard hat liner to guard against cold, if appropriate, ball caps are not allowed under hard hats, hard hat harnesses must not be reversed within the shell);
- Hearing protection (as appropriate); and
- Red or orange high visibility vest, when working near moving equipment and/or vehicle traffic.

Level D PPE can be supplemented as necessary with additional protective equipment, including face shields, boot covers, leggings/chaps, hard hat liners, welding aprons and gloves.

11.2.2 Modified Level D PPE

Modified Level D PPE should be used based on the potential for contact with contaminated soils or materials and the nature of the work being conducted. Modified Level D PPE consists of additional protective garments, designed to keep dirt and debris off workers' clothing. These additional garments include protective coveralls (e.g., Tyvek or other disposable outer coveralls, cotton coveralls) and protective boot covers.

11.2.3 Level C PPE

Level C personal protective equipment includes the use of an air-purifying respirator. At the present time, the use of air-purifying respirators on the project is not anticipated. Protective clothing material must be compatible with the identified hazardous substances released. In an unknown situation, the material providing the highest overall protection will be utilized. Level C will be selected when the type of airborne substance is known, exposure concentrations identified or known, criteria for using air purifying respiratory equipment is met, and skin and eye exposure is unlikely. Depending on the specific work activity, the requirements of Level D (hardhat, safety shoes, safety glasses will be supplemented with:

- Half- or full-face air purifying respirator with cartridges appropriate to the contaminant and work task;
- Protective coveralls (e.g., disposable, cotton, polycoated/splash resistant);
- Chemical resistant outer gloves (e.g., nitrile, neoprene, butyl)
- Inner gloves (e.g., cotton, latex)
- Faceshield;
- Steel toed rubber boots/rubber boot covers;
- Taped wrist and ankle joints; and
- Hearing protection.

Whenever air-purifying respirators are required, the following considerations must be met:

- A site-specific Respiratory Protection Program must be prepared prior to respirator use;
- All personnel wearing respirators must have current medical approval to wear a respirator;
- All personnel wearing respirators must be trained on respirator use, inspection, and cleaning; and
- All personnel wearing respirators must successfully complete fit testing.

Proper selection of respirators will be made according to guidance provided by the OSHA Respiratory Protection Standards. No individual will enter an area where respiratory protective equipment is required unless the person is trained in the selection, use, care, and limitations of the respirator, and the proper respirator is selected for the task.

Whenever respirators are required, only equipment approved for that purpose will be used. This equipment must be approved by the National Institute for Occupational Safety and Health (NIOSH). Only parts approved for the specific respirator system are to be used for replacement. Only a person specifically trained will perform work with respirators.

11.3 Personal Protective Equipment Inspection and Care

Regular inspection of PPE will be performed. The SHSS will ensure that the following actions occur as part of the PPE program.

- All PPE will be inspected by the wearer prior to use.
- Disposable protective items may be reused during a work shift provided they are not damaged or obviously contaminated. Disposable items will be disposed of daily.
- Reusable protective items will be cleaned and inspected daily.
- Gloves and full body coveralls will be inspected and replaced promptly if a tear develops.
- Respirator cartridges will be replaced in accordance with the cartridge change-out schedule as presented in the site-specific Respiratory Protection Program. If excessive resistance or breakthrough develops, cartridges will be changed more frequently.
- Air purifying respirators (when used) will be inspected and leak-checked each time they are donned. All respiratory maintenance will be performed by a trained technician. Respirators will be cleaned daily and stored in accordance with the Respiratory Protection Program requirements. The SHSS is responsible for ensuring that respirators are cleaned and stored properly, and for monitoring the effectiveness of the respirator cleaning program.

11.4 Personal Protective Equipment Selection

The SHSS will be in charge of PPE equipment selection and inventory. The level of protection may be upgraded or downgraded by the SHSS as conditions change at the site. The project Health and Safety Manager will provide consultation and support regarding the required PPE and changes in the level of required PPE.

Reasons to upgrade may include:

- Change in work task that will increase contact or potential contact with hazardous material;
- An action level is detected during monitoring; and
- Request of the individual employee.

Reasons to downgrade may include:

- New information indicating the situation is less hazardous than originally believed and a lower level of protection is appropriate;
- Change in site conditions that decrease the site hazards; and
- Monitoring or lab analyses support a decision to downgrade.

11.5 PPE Requirements for Work Tasks

The initial minimum PPE requirements for the major tasks are listed in the following table.

Table 11-1. PPE Requirements Based on Anticipated Activities

TASKS/OPERATION	MINIMUM LEVEL OF PROTECTION
Mobilization	Level D
Construction of decontamination pad	Level D
Vegetation clearing	Level D
Site delineation	Level D
Soil stabilization	Modified Level D
Soil sampling	Modified Level D
Excavation	Modified Level D
Heavy equipment decontamination	Modified Level D
Site restoration	Level D
Site demobilization	Level D

11.6 Personnel Decontamination

All personnel, clothing and equipment leaving the established Exclusion Zone (EZ) areas will be decontaminated within the boundaries of the established Contaminant Reduction Zone (CRZ). The decontamination procedures will be an organized process, with a series of stations to provide the maximum level of decontamination. Depending on the contaminants involved, and the potential risks, the decontamination process may range from a simple removal of gross, visible debris from work clothing, to a more intensive wet rinsing of protective coveralls. All contaminated PPE, and solutions used for decontamination, will be disposed of properly.

Specific decontamination procedures will be modified as necessary following establishment of work zones and observations of the work tasks. All personnel must conduct their activities in a manner that limits the potential for contamination. All personnel must decontaminate to the fullest extent possible to limit the transfer of contaminants to clean areas and to their personal possessions and homes.

In no case will potentially contaminated coveralls/boot covers be worn out of the EZ or the CRZ. Protective clothing will be stored in a manner to avoid potential contamination of inner surfaces. Protective coveralls can be reused throughout the day, provided the garment is not torn, excessively dirty, or its integrity compromised in other ways.

The decontamination area will be clearly defined and equipped with all necessary equipment. Personnel decontamination supplies that will be provided based on specific needs include plastic sheeting, duct tape, traffic cones, barrier tape, buckets, long handled scrub brushes, respirator and/or hand and face wipes, towels, and waste collection containers (e.g., lined drums or garbage bags). The SHSS will ensure that the decontamination station is set up completely prior to beginning work each day. All field personnel exiting an EZ must pass through the decontamination station and complete the required decontamination procedure before entering the Support Zone (SZ). Personnel assigned to the decontamination process will assist workers and decontaminate equipment and reusable protective gear.

Standard personnel decontamination procedures include the following:

Level D (e.g., leaving the site or support zone):

- Ensure no gross contamination remains on work boots; and
- Wash hands, face, arms, and other exposed skin.

Modified Level D:

- Move to the designated decontamination area;
- Decontaminate small equipment if necessary (i.e., equipment is leaving the EZ);
- Remove gross debris, accumulation of soil/mud from boot covers;
- Remove protective coverall from the inside out;
- Remove boot covers;
- Remove gloves; and
- Wash hands, face, arms, and other exposed skin.

Level C:

- Move to the designated decontamination area;
- Decontaminate small equipment if necessary (i.e., equipment is leaving the EZ);
- Remove gross debris, accumulation of soil/mud from boot covers;
- Remove protective coverall from the inside out;
- Remove boot covers;
- Remove respirator;
- Remove gloves;
- Wash/clean respirator;
- Properly store respirator; and
- Wash hands, face, arms, and other exposed skin.

11.7 Respiratory Protection Program

If respirators are required for a specific project, ECC shall prepare and maintain a site-specific Respiratory Protection Program for its employees and subcontractors and train them on its contents. The program will be administered by the SHSS. All field personnel assigned to the project shall be covered under this program (or an equivalent program for subcontractor personnel).

The Respiratory Protection Program will be in compliance with 29 CFR 1910.134, EM 385-1-1 (section 05.E), ANSI Z88.2-1992, and ANSI Z88.6. Only NIOSH-approved respiratory protection equipment shall be used on this project. The program will contain the following elements:

- Purpose;
- Responsibilities of Site Personnel;
- Respirator Selection;
- Medical Evaluations;
- Fit Testing Procedures;
- Training of Employees in Respiratory Hazards and Proper use of Respirators, Including Voluntary Use;
- Cartridge Change-out Schedule;
- Procedures and Schedules for Cleaning, Inspecting, Repairing Respirators;
- Procedures to Ensure Adequate Air Quality for Atmosphere-Supplying Respirators; and
- Evaluation of the Effectiveness of the Respiratory Protection Program.

12.0 ADDITIONAL PLANS, PROGRAMS, PROCEDURES REQUIRED FOR PROJECT WORK

Additional plans, information, and training may be required during the course of the project. The following plans, and others as necessary, will be appended as part of the SHSP:

- Respiratory protection plan (05.E.01);
- Confined space (06.I);
- Hazardous energy control plan (12.A.07); and
- Night crane operations lighting plan (16.C.19.d).

13.0 CONTRACTOR INFORMATION

This SHSP contains procedures and policies that must be implemented to meet the health and safety requirements of OSHA and the NAVFAC. All necessary and additional procedures that have not been identified in this SHSP will be implemented as appropriate to ensure the health and safety of site employees. Complete implementation of this SHSP will meet the requirements for the Action Prevention Plan. The SHSS will coordinate site activities to maintain compliance with OSHA, Navy, and USACE requirements.

14.0 SITE-SPECIFIC HAZARDS AND CONTROLS

This section presents site-specific hazards and controls anticipated to exist during the project.

14.1 Chemical Hazards

The primary chemical hazard associated with this project is dioxin (2,3,7,8-tetrachlorodibenzo-p-dioxin). Although 2,4-D; 2,4,5-T; and diesel fuel/jet fuel have been identified in the past as contaminants of concern, investigations occurring since 1995 have not produced results with measurable 2,4-D or 2,4,5-T. All other analytes were not detected at concentrations exceeding established human health or ecological risks. These analytes included volatile organic compounds, semi-volatile organics compounds, total petroleum hydrocarbons, pesticides, and polychlorinated biphenyls (100% Design Report). The following table provides information regarding the dioxin contaminant.

Table 14-1. Site Contaminant Exposure Limits and Characteristics

Chemical	PEL	TLV	Route of Entry	Symptoms
Dioxins	None established	None established	Inhalation Ingestion Dermal contact	Liver and nerve damage, skin irritation/acne, cancer.

To reduce the potential for exposure to chemicals in soil, particularly dioxins, the following control methods will be implemented:

- Dust control and suppression by water and controlled equipment operation;
- Area and personal air monitoring to ensure the effectiveness of the dust control methods;
- Proper PPE use to prevent inhalation or skin exposure; and
- Implementation of engineering controls to reduce dust generation (e.g., reduction of drop height during loading of trucks; well-maintained haul roads; reduced work activities during high wind episodes).

14.2 Specific Site Hazards and Controls Addressed in Activity Hazard Analyses

The anticipated hazards, control measures, and general safety procedures for the following specific site activities and tasks are presented in Appendix A:

- Mobilization;
- Heavy Equipment Operations;
- Excavation and Trenching;
- Cutting, Burning, and Welding;
- General Dust Control;
- Hand and Power Tools;
- Ladder Use; and
- Manual Lifting.

AHAs (which will include PPE requirements) for the following tasks (and others as necessary) will be developed following site mobilization, and discussion and planning sessions with subcontractors and workers. These activities present significant health and safety issues and must be thoroughly planned with the individuals involved to allow for proper training prior to initiation of this work.

- Installation of Multi-Layered Cap System;
- Clearing and Grubbing Operations;
- Sampling of Contaminated Material;
- Slurry Mixing, Soil Stabilization; and
- Well Decommissioning.

In addition, ECC's Corporate Health and Safety SOPs will be utilized to assist in the identification and implementation of appropriate hazard control measures. The Table of Contents for these SOPs is presented in Appendix D.

14.3 General Site Hazards and Controls

In addition to the task-specific hazards and controls presented in AHAs in Appendix A, the following additional hazard controls are applicable to project activities.

14.3.1 General Site Safety Requirements

- Eat, drink, use gum or tobacco products, or apply cosmetics in designated areas only;
- Do not smoke in government buildings and near sources of ignition. Smoking is not allowed within the EZ or CRZ. Areas shall be marked where smoking is permitted;
- Wash hands, face, and any exposed skin during decontamination, before eating, drinking or using tobacco products, and at the end of each shift;
- Participate in Tailgate Safety Meetings;
- Continually observe work location and be alert to changes that may affect safety;
- Plan and prioritize tasks prior to donning PPE and entering a designated EZ;
- Only enter regulated work areas as instructed by the SS, only at designated control points;
- Avoid direct contact with contamination by not purposefully walking, touching, or contacting any obviously contaminated surfaces;
- Immediately report incidents, accidents, near misses, or unusual situations to SHSS or the Site Superintendent;
- Use PPE provided, and as instructed by the SHSS;
- Do not wear or carry personal items into regulated work area;
- Avoid hand-to-mouth or hand-to-face activities;
- Instruments and safety equipment/vehicles and construction equipment shall be inspected prior to use;
- Minimize the number of personnel in a work area to reduce potential exposures;
- Use the buddy system when entering an EZ and be continually be aware of each other's location;
- Work purposefully and as a team;

- Work within physical and mental limits;
- Take adequate rest breaks and replace body fluids (water and electrolyte) continuously;
- At all times follow the instructions of the Site Superintendent;
- Do not deviate from the SHSP or the instruction of the SHSS;
- Avoid rushing and/or taking short cuts;
- Handle and dispose all waste generated from decontamination procedures per contract requirements, although no waste shall be disposed without the direction of the Site Superintendent;
- Conduct visual checks on machinery and equipment prior to use, and complete the daily inspection form;
- Avoid contact with potentially contaminated substances; do not walk through puddles, pools, etc.;
- Avoid kneeling, leaning, or sitting on equipment or the ground; do not place monitoring equipment on a potentially contaminated surface;
- Take precautions to prevent spillage and splashing. Contain spilled liquid if possible;
- Alert your senses to potentially dangerous situations (e.g., strong, irritating, or nauseating odors);
- Familiarize yourself with the physical characteristics of the site;
- Keep a minimum number of personnel and equipment in the contaminated area, consistent with the requirements of safe site operations;
- Dispose of all wastes generated during activities as directed by the NAVFAC PM; and
- Employees will not work alone; a buddy system is required.

14.3.2 Fire Prevention, Flammable and Combustible Material

All flammable and combustible materials will be properly used and stored onsite. Combustible waste material and residues in the work area will be kept to a minimum; trash must be placed in proper receptacles. Flammable storage cabinets will be used when required, and when feasible at other times. The following provides information regarding the classification and storage requirements for flammables and combustibles.

Table 14-2. Flammable and Combustible Liquids Defined

FLAMMABLE		
<i>Flashpoint less than 100 F</i>		
Class	Flashpoint	Boiling Point
IA	<73 F	<100 F
IB	<73 F	at or above 100 F
IC	73 – <100 F	–
COMBUSTIBLE		
<i>Flashpoint at or above 100 F</i>		
Class	Flashpoint	Boiling Point
II	100 – <140 F	–
IIIA	140 – <200 F	–
IIIB	at or above 200 F	–

Requirements for storage of flammable and combustible liquids include:

- A suitable portable fire extinguisher will be available at the location where flammable or combustible liquids are stored.
- “No Smoking” signs will be posted in the storage area.
- Flammable liquids shall be stored in closed containers. Type I or Type II metal safety cans (not greater than 5 gallons capacity) will be used for small quantities. Plastic storage containers are not allowed.
- Not more than 60 gallons of Class I or Class II liquids, or more than 120 gallons of Class III liquids may be stored in a storage cabinet.
- Containers of flammable and combustible liquids will be stored properly when not in use.
- The grounds around the storage area will be kept free of weeds, trash, and other unnecessary combustible materials.
- Spills will be cleaned up promptly.

All project personnel will be responsible for observing and reporting fires and conditions that could lead to fires. During all on-site activities, the following practices will be used for fire prevention and protection:

- Smoking on-site is prohibited in designated work areas, exclusion zones, and contamination reduction zones, and other areas where smoking may create a fire hazard (e.g., dry fields).
- A designated smoking area will be established as necessary by the SHSS when operations on site begin.
- Accumulations of combustible scrap and debris on-site will be promptly removed and properly disposed.
- Care will be taken with all equipment to reduce the possibility of sparks or open flames.
- Inspect all electrical cords and plugs prior to use; keep cords away from water and moisture.
- Fire extinguishers (minimum 2A:10B:C) will be available at the work area and support area.
- A fire extinguisher will be available on all pieces of heavy equipment.
- Fire extinguishers will be inspected monthly.
- Defective fire fighting equipment will be replaced immediately.
- Fires or open flame devices are prohibited, unless authorized by the SHSS in accordance with a Hot Work Permit.

14.3.3 USACE Perimeter Protection for Trenches / Excavations

Definitions:

Class I perimeter protection meets the following requirements:

- (1) When Class I perimeter protection guards against personnel falling into an excavation it shall meet the following: (See Section 21.B of EM 385-1-1)
 - (a) Have the strength, height, and maximum deflection requirements for guardrails;
 - (b) Provide fall protection equivalent to that provided by a toprail, midrail, and toeboard; and
 - (c) Have post spacing equivalent to a standard guardrail.
- (2) When Class I perimeter protection guards against traffic (vehicles and/or equipment) falling into an excavation it shall be designed, by a qualified person, to withstand the potential forces and bending moments due to impact by traffic. If the area adjacent to the barricade will be used by both personnel and vehicles or equipment, provisions shall be made for physically dividing the excavation, personnel, and traffic areas from one another.

Class II perimeter protection consists of warning barricades or flagging placed at a distance not closer than 6 feet (1.8 meters) from the edge of the excavation. Warning barricades or flagging do not have to meet the requirements for Class I perimeter protection but do need to display an adequate warning at an elevation of 3 feet (0.9 meter) to 4 feet (1.2 meters) above ground level.

Class III perimeter protection warning barricades or flagging placed a distance not closer than 6 inches (15.2 centimeters) nor more than 6 feet (1.8 meters) from the edge of the excavation. Warning barricades or flagging do not have to meet the requirements for Class I perimeter protection but do need to display an adequate warning at an elevation of 3 feet (0.9 meter) to 4 feet (1.2 meters) above ground level.

Protection Requirements

Class I Perimeter Protection is Required if the excavation is exposed to members of the public (e.g., other than those individuals engaged in project-specific work at the site) or vehicles or equipment.

Class II Perimeter Protection is Required if the excavation does not meet the requirements for Class I perimeter protection, but is:

- (1) routinely exposed to employees, and
- (2) either is deeper than 6 ft (1.8 m) or contains hazards (e.g., impalement hazards, hazardous substances).

When workers are in the zone between the warning barricades/flagging and the excavation, they shall be provided with fall protection as specified in Section 21 (EM 385-1-1)

Class III Perimeter Protection is Required if the excavation does not meet the requirements for either Class I or Class II perimeter protection.

14.3.4 Walking and Working Surfaces

- Aisles and passageways will be marked as appropriate and kept clear.
- Wet surfaces will be covered with non-slip materials.
- Holes in the floor, sidewalk or other walking surface will be repaired properly, covered or otherwise made safe.
- Materials and equipment will be stored in such a way that sharp projections will not interfere with the walkway.
- Aisles or walkways that pass near moving or operating machinery, welding operations, or similar operations will be arranged so employees will not be subjected to potential hazards.
- Standard guardrails will be provided wherever aisle or walkway surfaces are elevated more than 30 inches above any adjacent floor or the ground.
- Floor openings will be guarded by a cover, a guardrail, or equivalent on all sides.
- Standard stair rails or handrails will be provided on all stairways having four or more risers. All stairways will be at least 22 inches wide.
- Step risers on stairs will be uniform from top to bottom.
- Where doors or gates open directly on a stairway, a platform will be provided so the swing of the door does not reduce the width of the platform to less than 21 inches.
- Where stairs or stairways exit directly into any area where vehicles may be operated, adequate barriers and warnings will be provided to prevent employees stepping into the path of traffic.
- Material on elevated surfaces will be piled, stacked, or racked in a manner to prevent it from tipping, falling, collapsing, rolling or spreading.

14.3.5 Motor Vehicle Operations

- All motor vehicle operators will have a valid driver's license, issued by one of the United States of America.
- Posted speed limits will be observed at all times. Site-specific speed limits will be established at each project site.
- All vehicles in use will be equipped with at least two headlights, two taillights, and two brake lights in operable condition.
- All vehicles will be equipped with windshields and powered wipers. Cracked and broken glass will be replaced if it interferes with the visibility of the operator. Vehicles operating in areas or under conditions that cause fogging or frosting of the windshields will be equipped with operable defogging or defrosting devices.

- Tools and material will be secured to prevent movement when transported 1) in the same compartment with employees, or 2) separate from the employees (e.g., trailers, bed of pickup).
- All employees will use seat belts when the vehicle is in motion.
- Each employee shall ensure that no obstructions are present prior to operating their vehicle either forward or reverse. If visibility is poor, the vehicle driver will have a spotter monitor and direct the vehicle movement.

14.3.6 Housekeeping

- Worksites will be maintained in a clean, sanitary, and orderly condition.
- Work surfaces will be kept dry or appropriate means taken to assure the surfaces are slip-resistant. Work areas and floors will be kept free of dirt, grease, and slippery materials.
- All spilled hazardous materials or liquids, including blood and other potentially infectious materials, will be cleaned up immediately and according to proper procedures.
- Combustible scrap, debris, and waste will be stored safely or removed from the worksite.
- Covered metal waste cans shall be used for oily and paint-soaked waste.
- Nails that are protruding from shoring, lumber, fencing, or other materials in the work area will be rendered harmless or removed from the work area.
- Garbage and trash will be stored and disposed in approved refuse containers.
- Tools and accessories will be properly maintained and stored.
- Materials will be stored to allow clear access to aisles, pathways, and travel routes.
- Field vehicles will be kept clean and orderly (i.e., cab, truck beds, tool boxes, trunk, and camper shells).

14.3.7 Materials Handling

- When mechanical handling equipment is used (e.g., drum handlers, forklifts), sufficient safe clearance will be allowed for aisles, at loading docks, through doorways, and wherever turns or passage must be made.
- Aisles and passageways will be kept clear and in good repair, with no obstruction across or in aisles that could create a hazard.
- A spotter will be utilized, as needed, when transporting materials to or from tight, difficult areas.
- Permanent aisles and passageways will be appropriately marked.
- Storage of material will not create a hazard.
- All drums will be labeled regarding their contents, or labeled as “empty.”
- Bags, containers, bundles, etc., stored in tiers will be stacked, blocked, interlocked and limited in height so that they are stable and secure against sliding or collapse.
- Storage areas will be kept free from accumulation of materials that constituent hazards from tripping, fire, explosion, or pest harborage. Vegetation control will be exercised when necessary.
- Clearance signs to warn of clearance limits will be provided.
- Covers and/or guardrails will be provided to protect personnel from the hazards of open pits, tanks, vats, ditches, etc.

- Whenever possible, mechanical assistance will be utilized for lifting and moving materials (e.g., dolly, forklift, lift gate). Manual lifting requires back safety training and proper lifting technique. Lift with your legs, not your back.
- Always secure the load prior to movement. Assure the path is clear prior to transporting items. Maintain good housekeeping. Keep hands and feet clear of moving/suspended materials and equipment.
- All personnel associated with drum or container movement and transfer will be warned of the potential hazards associated with the contents of the drums or containers. Use a drum dolly or forklift to move drums.
- All drums and materials will be inspected prior to movement and their integrity will be assured prior to being moved. Be aware of the contents of the load and utilize appropriate PPE. Be prepared to contain and properly clean up spills.
- Do not move bulging or leaking drums.
- All personnel operating powered industrial trucks (forklifts) will be trained, certified, and documented in accordance with 29 CFR 1910.178(l). Retraining is required every 3 years, or after incidents, accidents, or observation of unsafe behavior.

14.3.8 Location of Utilities

The OSHA regulation regarding underground utilities and excavations is as follows:

“The estimated location of utility installations, such as sewer, telephone, fuel, electric, water lines, or any other underground installation that reasonably may be expected to be encountered during excavation work, shall be determined prior to opening an excavation.”

(29 CFR 1926.651(b): Underground Installations)

- The Project Manager and/or Supervisor will be responsible for determining whether utilities “reasonably may be expected to be encountered.”
- All known utilities will be identified and marked prior to excavation/trenching activities. Potential utilities requiring evaluation include electric, gas, oil, chemical lines, pipelines, sewers, telephone/communications, fiber optic, cable TV. Every effort will be made to identify, trace, and mark utility lines. Unknown underground utilities may exist at many projects, in many areas.
- ECC and the Subcontractor(s) are responsible for ensuring that safe work practices are used to identify and avoid contact with underground utilities.
- All utility locate activities will be coordinated with the Project Manager, NAVFAC infrastructure groups, and/or local utility locate businesses.
- Identified utilities will be marked with stakes, flags, paint, chalk, offsets, or other visible means of identification.

- Intrusive soil activities conducted within a five foot “Buffer Zone” (horizontal or vertical, as measured from the outside edge of the utility) of any utility (electric, gas, high pressure, chemical storage tanks, pipelines, sewers, etc.) may require the use of non-aggressive excavation methods such as hand excavation using non-conductive hand tools, use of an air spade, hydro-excavation, or similar means.
- If a previously unknown utility line is identified, uncovered, or disturbed during excavation/trenching activities, the excavation activity shall stop immediately and project management notified. Excavation shall not recommence until the line has been evaluated, identified, traced, and/or safe work practices have been developed and implemented to limit or prevent associated hazards.
- Excavation spoil piles should not be placed atop surface features or ground markings identifying the locations of underground utilities.
- Utilities exposed during excavation or potholing will be protected. Utilities can shift or sag when the soil that was supporting and protecting the utility is removed. Utilities that are unsupported will be temporarily supported by shoring or other means as excavation continues.

Uniform Color Code of the American Public Works Association:

- Red – Electric power distribution and transmission lines, cables, conduit, and lighting cables
- Yellow – Gas and oil distribution systems, steam, petroleum, or other hazardous liquid or gaseous materials
- Orange – Telephone, video, cable TV, other telecommunications, alarm or signal lines, cable or conduit
- Blue – Water, irrigation, and slurry lines
- Green – Sewers, storm sewer facilities, other drain lines
- Pink – Temporary survey markings
- Purple – Slurry and reclaimed water (also used for Cable TV)
- White – Proposed excavation limits, centerline and width of proposed lineal installations

14.3.9 Noise

- A Hearing Conservation Program will be in place whenever employees are exposed to 85 dBA (slow) averaged over an 8-hour workday.
- Employees will be trained on the contents and purpose of the Hearing Conservation Program when the program is established. Training will also include the proper use and care of various types of hearing protection.
- Annual audiograms will be provided for employees exposed to 85 dBA (slow) averaged over an 8-hour work day.
- Noise surveys and noise dosimetry will be conducted to evaluate the potential and existing noise exposures at the work place.
- Sound level meters and noise dosimetry instrumentation will be calibrated before use. Individuals using the equipment will be properly trained in the care, operation, and maintenance of the instruments.

- Workers will be informed in writing of the results of personal noise dosimetry monitoring.
- All employees will wear hearing protection when exposed to 90 dBA (slow) averaged over an 8-hour workday.
- Employees who have not had an annual audiogram, or who currently have a threshold shift are required to wear hearing protection at 85 dBA.
- Hearing protection will be made available to employees who voluntarily choose to use it even though it is not required. Proper training in the use of hearing protection is still required for voluntary use.
- Employees will be informed of high noise areas where hearing protection is required and these areas marked.
- Exposure to impulse or impact noise will not exceed 140 dBA peak sound levels.
- Use engineering controls (i.e., guards, mufflers, distance) to reduce worker exposure.
- As a rule of thumb, reduce the Noise Reduction Rating of earplugs by 50% to estimate actual effectiveness.
- The use of double protection (plugs and muffs) is recommended over 120 dBA.

14.3.10 Precautions Near Overhead Utility Lines

- Best Safety Practice: Never get closer than 10 feet to an overhead power line.
- Before you begin work, survey the site for overhead power lines. LOOK UP!
- All overhead wires will be considered to be energized unless and until the person owning such line or the electrical utility authorities indicate that it is not an energized line or it has been visibly disconnected.
- If overhead lines are present, call the utility company/owner and find out what voltage is on the lines. Ask if the lines can be de-energized while work is performed near the lines.
- If lines cannot be shut down and/or line insulation is applied, a minimum safe distance of 10 feet must be established. Conduct a pre-work briefing to discuss the planned work. Include discussion of all equipment that could come in contact with the power lines (dump trucks, excavators, back hoes, cranes, etc.).
- For lines rated 50 kiloVolts or below, the minimum clearance between the lines and any part of the equipment (e.g., excavator, loader, crane) or load will be 10 feet. For lines rated over 50kV, minimum clearance between the lines and any part of the equipment or load will be 10 feet plus 4 inches for each 10kV over 50 kV. Or, follow the ANSI guidelines for operating cranes (and other equipment) near overhead power lines (ANSI Standard B30.5-1994, 5-3.4.5)[ANSI 1994]:

Table 14-3. Equipment and Powerline Safe Distances

Power line voltage phase to phase (kiloVolts)	Minimum safe clearance (feet)
50 or below	10
Above 50 to 200	15
Above 200 to 350	20
Above 350 to 500	25
Above 500 to 750	35
Above 750 to 1,000	45

- An observer/spotter will be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. This will be the ONLY job the observer is performing when an observer is required.
- Notify line owners before work is performed near power lines.
- Post warnings on equipment cautioning the operators to maintain safe clearance between energized power lines and their equipment.
- Operate all equipment at a slower-than-normal rate in the vicinity of power lines.
- Exercise caution near long spans of overhead power lines, since wind can cause the power lines to sway laterally and reduce the clearance between equipment and the power line.
- Mark safe routes where equipment must travel beneath power lines.
- Exercise caution when traveling over uneven ground that could cause the equipment to weave or bob into power lines.
- Keep all personnel well away from the equipment whenever it is close to power lines.
- Prohibit persons from touching the equipment or loads until a signal person indicates that it is safe to do so.

Procedures to Follow If Contact With Overhead Power line Occurs:

To protect against electrical shock injury in the event of contact between a piece of equipment and an energized line, the following procedures are recommended:

- The equipment operator will remain inside the cab.
- All other personnel will keep away from the equipment, crane, ropes, and/or load, as the ground around the equipment might be energized.
- The equipment operator should try to remove the equipment from contact by moving it in the reverse direction from that which caused the contact.
- If the equipment cannot be moved away from contact, the operator will remain inside cab until the lines have been de-energized.

14.3.11 Aerial Lifts

Before operating the aerial lifts (*cherry pickers, man lifts etc.*), the employee will:

- Survey the work area for loose or soft ground, ditches, drop-offs or holes, bumps and floor obstructions, debris, overhead obstructions, ground and elevated energy sources, and other possible hazards;
- Evaluate potential hazards from recent weather events (rain, snow);
- Ensure the lift is on a firm, level surface;
- Ensure the work platform is loaded in accordance with the manufacturer's specifications;
- Ensure that outriggers and/or stabilizers are used if required by the manufacturer;
- Ensure that, if the vehicle is on wheels, the wheels are locked or chocked; and
- Ensure that fall protection systems are in place.

Additional hazard control measures include:

- Only authorized personnel will operate an aerial lift. All operators will be trained and familiar with the performance and controls of the specific aerial lift in use.
- Equipment will be inspected daily. Lift controls will be tested each day prior to use.
- Fall protection training is required for all workers in the lift basket. Individuals in the lift basket will wear a full body harness and lanyard attached to the boom or basket. Use only manufacturer's approved and designated anchor points. Attachment to an adjacent pole, structure, or equipment while working from an aerial lift is not permitted.
- Employees will always stand firmly on the floor of the basket, and will not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position. The aerial lift will not be moved when the boom is elevated in a working position with workers on the basket unless equipment was manufactured to perform these functions.
- Boom and basket load limits will not exceed the manufacturer's recommendations.
- Wheel chocks will be installed before using an aerial lift on an incline, provided they can be safely installed.
- Aerial lifts will not be moved when the boom is elevated in a working position with workers in the basket, except for equipment which is specifically designed for this type of operation.
- Ensure adequate supervision is available for the specific task.

14.3.12 Biological Hazards

Insect Bites/Stings

An insect bite or sting can cause pain, disease, and inflammation. If not treated correctly, some bites and stings may cause serious illness or even death. Bites from deer ticks can cause Lyme Disease, which can be fatal. During seasons of the year when insects are prevalent, the first line of defense is the use of an insect repellent, applied at two to three hour intervals.

If an insect bite occurs, employees should be aware of the following symptoms. A ring may form around the bite indicating that the tick may be carrying the Lyme Disease. This is not always true however, and crewmembers that have received a tick bite should seek appropriate medical treatment if soreness, swelling, or other effects occur.

Personnel will take precautionary measures by wearing proper clothing, use of repellants, use of good work practices, and recognizing symptoms early. Individuals that develop a rash or experience other early symptoms of Lyme disease (i.e., fatigue, headache, muscle aches, neck stiffness, fever, and swollen glands) should notify the SHSS promptly for referral to a physician for evaluation.



From left to right: The deer tick (*Ixodes scapularis*) adult female, adult male, nymph, and larva on a centimeter scale.

General guidelines for prevention of exposure to ticks and tick-borne diseases include:

- Limit work in tick infested areas;
- Wear light-colored clothing to allow for easy visibility of ticks on clothing;
- Apply repellants (e.g., permethrin to boots and clothing, DEET to exposed skin); and
- Conduct a body check upon return from potentially tick-infested areas.

Embedded ticks should be removed using the following guidelines:

- Use a fine-tipped tweezers or shield your fingers with rubber gloves;
- Grasp tick as close to the skin surface as possible and pull upward with a steady, even pressure;
- Do not twist or jerk the tick, or squeeze, crush, or puncture the body of the tick;
- After removing the tick, thoroughly disinfect the bite site and wash your hands with soap and water; and
- Save the tick for identification in case you become ill.

DO NOT use petroleum jelly, hot matches, nail polish, or other products to assist in tick removal.

West Nile Virus

Symptoms usually develop between 3 and 14 days after being bitten by an infected mosquito. Approximately 80 percent of people who are infected with West Nile Virus (WNV) will not show any symptoms at all. Up to 20 percent of the people who become infected with WNV will display mild symptoms, including fever, headache, and body aches, nausea, vomiting, and sometimes swollen lymph glands or a skin rash on the chest, stomach and back. Symptoms typically last a few days.

About one in 150 people infected with WNV will develop severe illness. The severe symptoms can include high fever, headache, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, vision loss, numbness and paralysis. These symptoms may last several weeks, and neurological effects may be permanent.

Mild WNV illness improves on its own, and medical attention is not necessary. If symptoms of severe WNV illness are present, such as unusually severe headaches, notify the SHSS immediately for medical evaluation.

General guidelines for prevention of exposure to mosquitoes and WNV include the following.

- Wear long-sleeved shirts.
- Spray exposed skin with an insect repellent containing 15-30% DEET.
- Spray clothing with products containing DEET or permethrin, as mosquitoes may bite through thin clothing. Permethrin should only be used on clothing; do not apply it directly to skin. Wash treated clothing before wearing it again.
- Do not apply repellent to skin that is under clothing.
- Wash treated skin with soap and water after returning indoors.

Stray animals – cats, raccoons

Animal bites (both wild and domestic) can result in both infection and disease. Tetanus, rabies, and various types of fevers can follow an untreated animal bite. Never approach or harass wild animals. Notify the SHSS of any animals observed onsite. If the animal does not exit the work area voluntarily, appropriate animal control officials will be contacted to assist in the removal. Any individual bitten by an animal will be evaluated promptly by medical personnel. In the interim:

- Clean the wound thoroughly with soap or detergent solution;
- Flush it well with water;
- Cover with a sterile dressing;
- Immobilize an injured extremity; and
- If unable to capture or kill the animal, provide medical personnel with any information possible to help identify the animal so that they can provide appropriate treatment.

Snakes

All personnel should be aware that site activities have the potential for encountering or disturbing snakes. Areas with heavy undergrowth or shrubs are of special concern. Prompt first aid measures are extremely important.

If an individual is bitten by a snake, the basic rule is -- TREAT ALL SNAKEBITES AS POISONOUS. A probability exists that all snakes may be potential carriers of tetanus (lockjaw); if bitten by any snake, whether poisonous or not, seek medical attention immediately. If bitten, identify and/or kill the snake (if it can be done quickly and safely) and take it to the hospital for identification. This information is valuable to medical personnel when treating snakebites.

The following first-aid steps should be taken if bitten by a snake:

Seek medical help immediately.

- In the interim, remain calm, but act swiftly.
- Immobilize the affected area in a position horizontal to the heart, or in a gravity-neutral position.
- Do not attempt to cut open the bite or suck out venom. If venom should seep through any damaged or lacerated tissues in the mouth, it could cause immediate unconsciousness and/or death.
- Do not drink alcohol or use medication. Do not apply hot or cold packs. Do not use a tourniquet such as a belt, necktie, or cord. Do not waste time trying to capture, kill, or bring in the offending snake unless it can be done quickly and safely for use in identification of the proper treatment.

Poison Ivy, Poison Oak, Poison Sumac

Poison ivy and poison oak have poisonous sap (urushiol) in their roots, stems, leaves and fruits. The sap is released when the plant is bruised, and is especially hazardous in the early spring and summer when the leaves are tender. The sap may be deposited on the skin by direct contact with the plant or by contact with contaminated objects, such as clothing, shoes, tools, and animals.

Poison Ivy grows everywhere in United States except Hawaii and Alaska. In the East, Midwest, and the South, it grows as a vine. In the Northern and Western United States, it grows as a shrub. Each leaf has three leaflets. (*Leaves of three, let it be!*) Leaves are green in the summer and red in the fall. In the late summer and fall, white berries may grow from the stems. Poison Oak has oak-like fuzzy leaves in clusters of three. It has two distinct kinds: Eastern poison oak (New Jersey to Texas) grows as a low shrub. Western poison oak (Pacific Coast) grows to six-foot-tall clumps or vines up to 30 feet long and may have clusters of yellow berries.

Signs and symptoms of poisoning include itching, redness, burning sensation, swelling, blisters, and a rash. Symptoms may develop within a few hours or may take three to five days to develop. If left untreated, the rash may last several weeks.

Preventive measures include wearing long-sleeved shirts and long pants, and cloth or leather gloves. Barrier creams should be applied to exposed skin. Calamine lotion over affected area will also help relieve itching and promote healing. Rubbing alcohol can be used to remove the oily resin up to 30 minutes after exposure.

Hazardous Plants

	<p>Poison Ivy: A woody shrub or vine. The vine climbs by aerial rootlets that cling readily to trees. Three leaflets borne on a single petiole make up the leaf. Each leaflet can be up to four inches long and is a dark waxy, shiny green above and lighter green and fuzzy beneath. The flowers grow like berries on very thin stems. During the summer, the flowers are lost and the leaves turn fire-engine red. All parts of the plant are poisonous.</p>
	<p>Poison Oak: In the West, poison oak may grow as a vine or a shrub. In the East, it grows as a shrub. Hair grows on the fruit, trunk and leaves. Leaves have three leaflets like poison ivy. The flowers of poison oak are glossy, white-green and grow like berries. In the fall, poison oak is yellowish red and in the winter it is bare. When bare, poison oak can be distinguished by its three branches. All parts of the plant are poisonous.</p>
	<p>Poison Sumac: This plant can be a tree or shrub, it can grow up to 25 feet in height with a trunk up to 6 inches in diameter. It is limited to swampy lands but ranges from Maine to Florida and west to Minnesota, Missouri and Louisiana. The leaves alternate, can be 15 inches or more long made up of 7 to 13 alternating thin oval to pointed leaflets. The whole plant is very poisonous.</p>

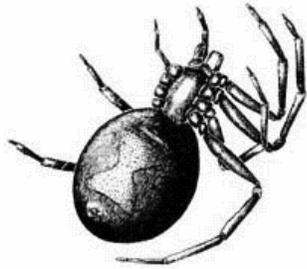
Spiders

Spiders in the United States are generally harmless, with two notable exceptions – the black widow spider (*Latrodectus mactans*) and the brown recluse or violin spider (*Lox osceles reclusa*). Field workers must exercise caution when lifting covers off manholes or sumps or rummaging through wood, rock, or brush piles, etc. Both the black widow and brown recluse spiders are typically found in these locations. The following describes the symptoms and treatment for spider bites.

Black Widow

Black widow spiders spin tangled webs of coarse silk in dark places, usually outdoors. Webs are usually built near the ground normally in trash, rubble piles, under or around houses and outbuildings such as privies, sheds, and garages. The bite feels like a pinprick or is not even felt. At first, there may be only slight local swelling and two faint red spots surrounded by local redness at the bite. Pain becomes intense in one to three hours and may continue up to 48 hours. Pain usually progresses from the bitten member up or down the arm or leg, finally localizing in the abdomen and back. The abdominal muscles may become rigid and board-like with severe cramps (resembles appendicitis). There may be pain in the muscles and soles of the feet, and eyelids may become swollen. Other symptoms may be nausea, profuse perspiration, tremors, labored breathing and speech, and vomiting. During this time, a feeble pulse, cold clammy skin, unconsciousness, convulsions and even death may result if the victim does not receive medical attention immediately. Additional complications may occur due to the infection of the bite. Bites are uncommon and serious long-term complications or death is rare. If bitten, remain calm, collect the spider (if possible) for positive identification, and get medical attention immediately. First aid is of limited help. Application of a mild antiseptic such as iodine or hydrogen peroxide prevents infection.

Black Widow



Brown Recluse

The brown recluse spider, or violin spider, is about 1 inch long. The most distinguishing mark is the violin like dark patch on their head and thorax with the skinny part of violin pointing toward the abdomen. It is not an aggressive spider, but will attack if trapped or held against the skin. No deaths have been reported in the US from a brown recluse bite.

Venom from the brown recluse spider usually causes local tissue damage. The most common symptoms of a bite from a brown recluse spider bite include: burning, pain, itching, or redness at the site which is usually delayed and may develop within several hours or days of the bite; a deep blue or purple area around the bite, surrounded by a whitish ring and large red outer ring similar to a "bull's eye"; an ulcer or blister that turns black; headache, body aches; rash; fever; nausea or vomiting. These symptoms of a brown recluse spider bite may resemble other conditions or medical problems.

First Aid: Seek immediate medical attention. In the interim, the following should be done:

- Wash the area well with soap and water.
- Apply a cold or ice pack wrapped in a cloth to reduce swelling and redness.
- Apply an antibiotic lotion or cream to protect against infection.
- Give acetaminophen for pain.
- Elevate the site if the bite occurred on an arm or leg (to help prevent swelling).
- Seek immediate emergency care for further treatment. Hospitalization may be needed.

14.4 Required Facilities and Equipment

The following facilities and equipment are required for safe completion of site work.

Table 14-4. Facilities and Equipment

Facility/Equipment	Type	Location
Restrooms	Portapotty	At least one at the project area; two if 40 workers are onsite.
Supplementary Illumination	A portable light cart or additional temporary lights as needed.	Minimum 5 foot-candles required in work area.
Emergency eyewash	32 ounce personal eyewash stations will be available for use. Additional emergency eyewash systems will be provided as required.	At general work area.
First aid supplies	Type III, 16 unit kits will be available	First aid kit will be located at the office trailer and accessible to all employees.
Fire extinguishers	2A:10B:C minimum; 20# ABC required during all hot work	Each piece of motorized heavy equipment, and by each exterior exit at the office trailer, inspected monthly.
Hazardous Materials Storage	Safety cans for storage of fuels onsite, 5 gal maximum individual size	Portable fuel cans, if used, will be stored in a designated and labeled storage area, or in an approved flammable materials storage cabinet.
Spill Containment, Cleanup	As necessary. Sorbent material/pads, shovels, bags, PPE	At general work locations; to be used as necessary for material spills.

15.0 SITE MONITORING

This section describes the SHSP project monitoring required to protect site workers' health.

15.1 Site Monitoring Strategy and Approach

Based on the chemical and physical hazards anticipated during this project, appropriate exposure monitoring will be conducted to identify and evaluate hazards, guide field decisions related to personnel safety and operations, assist in PPE upgrade/downgrade decisions, and maintain compliance with regulations. This program will include both real-time, direct monitoring equipment, and chemical-specific personal air monitoring as appropriate. The primary contaminants of concern are total dust, respirable dust, and dioxins.

Records will include the date, time, contaminants or hazards monitored, person conducting monitoring, calibration date and method, operations and location of monitoring, and results. An air monitoring data sheet will be completed for each day of operations at the site.

All air monitoring instrumentation will be maintained and calibrated by ECC personnel according to the applicable NIOSH/OSHA analytical methods and the manufacturer's recommendations.

15.2 Direct Reading Exposure Monitoring

Of primary concern is the monitoring and control of dust generated during various activities. Use of engineering controls to reduce and limit dust generation is the primary method in controlling personal exposure to site contaminants. During project operations, dust abatement measures, such as spraying water, will be implemented to reduce the spread of dust. The effectiveness of the dust control will be evaluated and monitored visually. Water will be used sparingly to prevent the creation of puddles or runoff. On-site dust will be assumed to contain site contaminants, and ambient dust concentrations will be monitored by the on-site SHSS during work activities. The SHSS and the Site Superintendent will be responsible for immediately addressing the presence of visible dust emissions and modifying work practices to minimize the generation of dust.

Area ambient dust monitoring will be conducted in real time with an aerosol/particulate meter, such as the MIE pDR-1000 with datalogger, or equivalent. This monitor will be used to evaluate area-specific dust concentrations at areas of soil disturbance and soil handling. All activities will be conducted to limit and control the generation of dust to the greatest extent possible. A goal of zero visible dust will be in effect for the project. An action level of 0.5 milligrams per cubic meter (mg/m^3) dust in ambient air will require an evaluation of the need for additional dust control measures.

Table 15-1 presents the direct reading monitoring to be conducted during work activities. A sufficient number of observations will be recorded to document baseline conditions. Additional monitoring will be conducted periodically or when conditions change. All monitoring results will be documented and remain part of the daily health and safety project record.

Table 15-1. Real Time and Direct Reading Exposure Monitoring

Activity	Target Analyte	Instrument	Action Level	Response
General work area	Total Dust	Visual Observation	Visible Dust	Initiate Dust Suppression Activities
General work area	Total Dust	pDR-1000 Particulate Monitor	A. >0.5 milligram per cubic meter (mg/m ³) B. >1.5 mg/m ³	A. Initiate Dust Suppression. Notify Project Manager. Evaluate additional dust control measures; strive for zero visible dust. Suspend operations if wind speed > 30 miles per hour B. Site Action Level. Stop work until the reason for excess dust can be determined. Additional/different dust control methods/techniques may be necessary.
General work area	Light	Light meter	< 5 foot-candles	Provide supplementary illumination
Sitewide	Noise	Noise dosimeter	> 85 decibel A-weighted (dBA)	Use hearing protection; institute hearing conservation program.
Sitewide	Temperature extremes/heat stress	Wet Bulb Globe Temperature	Variable depending on the individual and work activity	Participate in heat or cold stress monitoring program, take breaks in the shade/warm areas, drink fluids as allowed
Confined Space Entry	Oxygen (O ₂), Carbon Monoxide (CO), VOCs, Hydrogen Sulfide (H ₂ S), Lower Explosive Limit (LEL)	Multigas monitor plus Photoionization Detector (PID)	O ₂ < 19.5 %; CO > 25 parts per million (ppm); H ₂ S > 5 ppm; LEL >10%; or PID > background	Do not enter. Ventilate workspace until levels meet these criteria.

15.3 Integrated Personal Exposure Monitoring

For this project, dust (and the contaminants adsorbed to dust particles) is of primary concern. The very low levels of dioxin expected to be in air will preclude quantification on personal samples. ECC will collect and analyze eight-hour, Time Weighted Average (TWA) air monitoring samples of total dust as a surrogate indicator of exposure assuming 4,000 nanograms per kilograms (ng/kg) maximum dioxin concentration in the soil. At the 1.5 mg/m³ action level for dust (particulate not otherwise classified), dioxin exposures should be less than 6 picograms per cubic meter (pg/m³), given the same proportion in the airborne dust.

$$\text{Concentration (dioxin)} = (1.5 \text{ mg/m}^3 \times 0.004 \text{ mg/kg}) / 10^6 \text{ mg/kg}$$

$$= 6 \text{ pg/m}^3$$

Assuming an exposure of 10 hours per day, 5 days per week for one year, this represents an increased cancer risk of about 9×10^{-6} using the draft Dioxin Reassessment proposed slope factor of 0.001. The average U.S. background cancer risk for dioxin-like compounds is 1.4×10^{-4} ; therefore, this increase is considered to be of minimal concern.¹

Samples will be collected in the breathing zone of personnel who can be expected to have the highest exposure or maximum risk. Potential high exposure activities include soil excavation and soil stabilization. Additional personnel sampling will be required if the monitoring results indicate the maximum risk to personnel are at or above the site Action Level of 1.5 mg/m^3 . The ECC SHSS will assist as necessary in the collection of these samples and review the exposure monitoring results.

To evaluate potential exposure, at least three full-shift samples, representative of worst-case exposure conditions will be collected during the initial phases of activities, selected at various times to represent the highest risk operations. If results exceed 50% of the site Action Level, monitoring will continue at a minimum on a weekly basis. When results are below 50% of the Action Level, monitoring will occur as changing conditions warrant.

In addition to total dust (PNOC), samples for respirable dust will be collected and analyzed for free silica. The Material Safety Data Sheet for the stabilization reagent will be reviewed and any additional monitoring for constituents in the reagent will be determined by the SSHO and PHSM.

The results of this sampling will be used to support the proper selection of PPE and the effectiveness of the PPE for specific tasks. Sample analyses will be conducted by an American Industrial Hygiene Association accredited analytical laboratory. The results of the personal exposure sampling will be provided to both the individual worker as well as to NAVFAC.

Table 15-2 summarizes the integrated personnel exposure monitoring sampling methods.

Table 15-2. Integrated Personal Exposure Monitoring

Analyte	Analytical Method	OSHA PEL (mg/m ³)	ACGIH TLV (mg/m ³)
Respirable Dust (PNOC)	NIOSH 0600	5.0	3.0
Crystalline Silica	NIOSH 7500	10 / (% Silica + 2)	0.05
Total Dust (PNOC)	NIOSH 0500	15	10
TCDD	None established. Total particulate used as surrogate	None established	None established

¹ "Exposure and Human Health Evaluation of Airborne Pollution from the World Trade Center Disaster" Section IV.d. National Center for Environmental Assessment, Office of Research and Development. U.S. EPA October, 2002.

TCCD = 2,3,7,8-tetrachlorodibenzo-p-dioxin

16.0 SITE CONTROL

Site control procedures for this project will include the establishment of work zones at each work location to provide site security by avoiding unauthorized access and to secure work locations between shifts.

Site security will be established by clearly marking all work zones at normal locations of possible entry by unauthorized personnel in order to minimize and prevent public exposure to hazards created by site activities. In addition, the SHSS as well as employees will stay alert for any unauthorized entry and take necessary actions to control the work area.

16.1 Exclusion Zone

An EZ will be established around the immediate work area, and will be clearly marked by a combination of traffic cones, barricades and/or high visibility barrier tape. Entry into the EZ will be limited to only those personnel necessary to the conduct of the work task. The EZ will mark the area where direct handling operations are occurring and where field personnel may be exposed to chemical and physical hazards. Entry into the EZ will be regulated by the SHSS and the Site Superintendent. No person will enter an EZ if they are not wearing the required PPE. All personnel exiting the EZ will comply with personal decontamination procedures. Specific PPE requirements for entry into the EZ will be defined in the task-specific SHSP.

The size and shape of the EZ will be based on known and anticipated hazards, type of operation being performed, physical and topographical features, potential for site emergencies affecting surrounding areas, etc. Prior to the beginning of each day's operations, the SHSS will observe site conditions and determine the location and boundaries of the EZ. This work zone will be reasonably large enough to accommodate equipment operations, yet small enough to maintain adequate control of operations and personnel. The SHSP will re-evaluate the location and boundaries of the EZ as frequently as necessary in order to ensure that the EZ incorporates all areas as described above.

The EZ will be limited to trained and authorized ECC personnel. Other agency personnel requesting entrance must strictly adhere to all established safety and health requirements, including training and required PPE. The zone will be delimited by red DANGER barricade tape, yellow CAUTION tape, barricades, traffic cones, or other suitable means of identification. All personnel will be instructed regarding the identification and meaning of the EZ demarcation. Signs will be posted identifying the potential hazards and the entry restrictions (e.g., AUTHORIZED PERSONNEL, PPE requirements).

16.2 Contamination Reduction Zone

The CRZ is the transition area between the contaminated area and the clean area. The zone is designed to reduce the probability that the clean SZ will become contaminated or affected by other site hazards. The path of entry for all persons entering and exiting the EZ will be through the CRZ. The CRZ will contain personnel and equipment decontamination supplies, tables, chairs, fire extinguisher, and other supplies required by the EZ workers. The CRZ will be demarcated to distinguish it from the clean, support zone. As best possible, the CRZ will be positioned upwind from the work area to reduce the potential for employee contamination while in the CRZ.

16.3 Support Zone

The SZ will include all areas not identified as requiring active remediation activities. Work zones will be reviewed daily before beginning operations. Site control requirements will be discussed during daily health and safety tailgate meetings. All site personnel will be informed of changes in the identified site control boundaries.

At the commencement of operations and periodically through the day, the boundary between the EZ and the SZ will be monitored both visually and with direct reading instrumentation (e.g., dust monitors). Boundaries will be adjusted, as necessary, to limit potential personnel exposure in the SZ.

The support zone includes all general work areas. Minimum PPE required includes hard hat, eye protection, and steel-toe shoes. All non-routine personnel entering the SZ must receive site safety briefing by the ECC PM, SS, or SHSS, sign the visitor log, and sign an SHSP Compliance Agreement Form (Appendix B).

16.4 Site Security

Specific site security issues may be applicable to work areas, depending on the designated work location, and the Naval facility operating procedures. These security issues may include facility background clearances, facility badges, escorts, and/or vehicle passes. ECC will provide fencing and project signs as necessary to identify project area restrictions and hazards. Security issues will be identified and addressed during mobilization activities.

17.0 SAFETY AND HEALTH BULLETIN BOARD

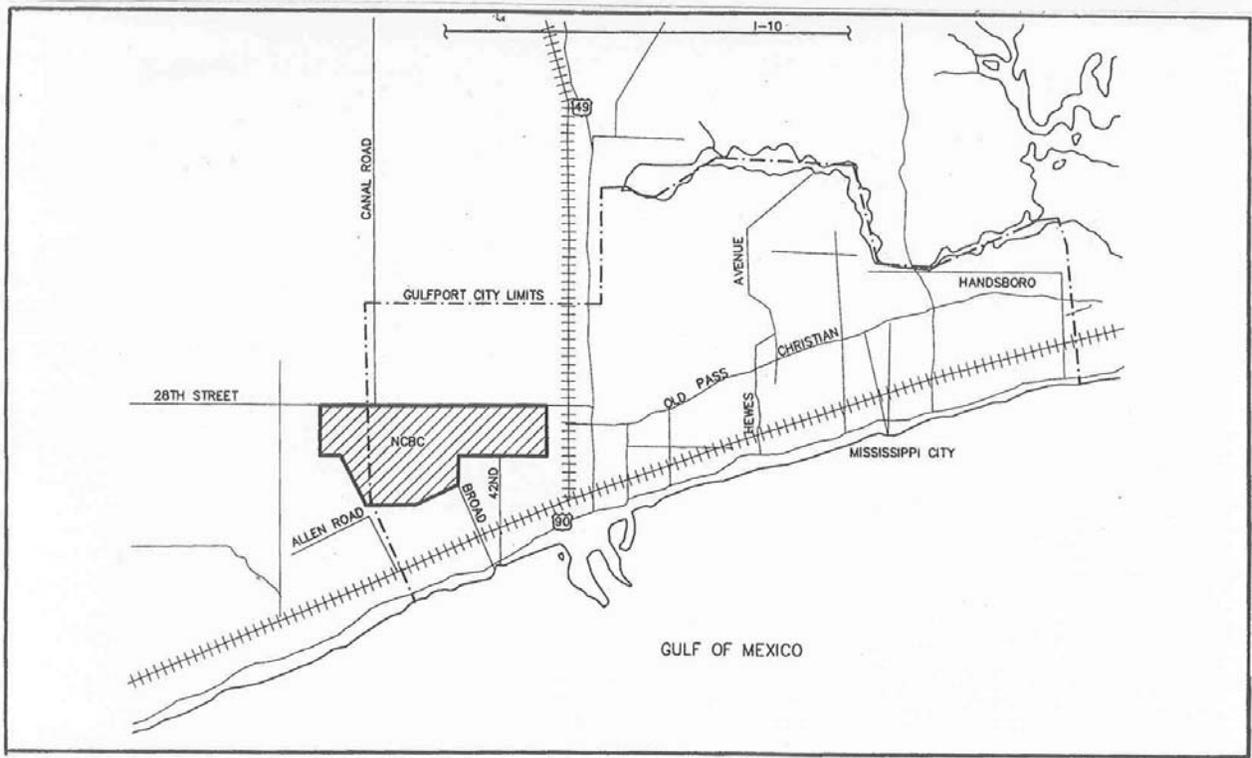
ECC will erect and maintain a safety and health bulletin board in an area commonly accessed by workers. The bulletin board will be maintained current, in clear view of onsite workers, and protected against the elements and unauthorized removal. It will contain at least the following safety and health information:

- Map denoting the route to the nearest emergency care facility;
- Emergency phone numbers;
- Copy of the current Health and Safety Program Plan and the task-specific SHSP will be mounted on or adjacent to the bulletin board or state the location, which will be accessible on the site by all workers;
- Copy of current AHAs mounted on or adjacent to the bulletin board or state the location, which will be accessible on the site by all workers;
- OSHA Form 300A will be posted from February 1 through April 30 of each year; the form will be mounted on or adjacent to the bulletin board;
- Safety and Health promotional posters;
- Date of last lost workday injury;
- OSHA Safety and Health Poster; and
- Copy of Safety and Occupational Health Deficiency Tracking Log shall be mounted on or adjacent to the bulletin board or state the location where it will be accessible by all workers upon request (see below for required content).

The Safety and Occupational Health Deficiency Tracking Log shall list the status of safety and health deficiencies in chronological order. The list will be updated daily, and include:

- Date deficiency identified;
- Description of deficiency;
- Name of person responsible for correcting deficiency;
- Projected resolution date; and
- Date actually resolved.

FIGURES



**Figure 2-1. Naval Construction Battalion Center - Location
Gulfport, Mississippi**

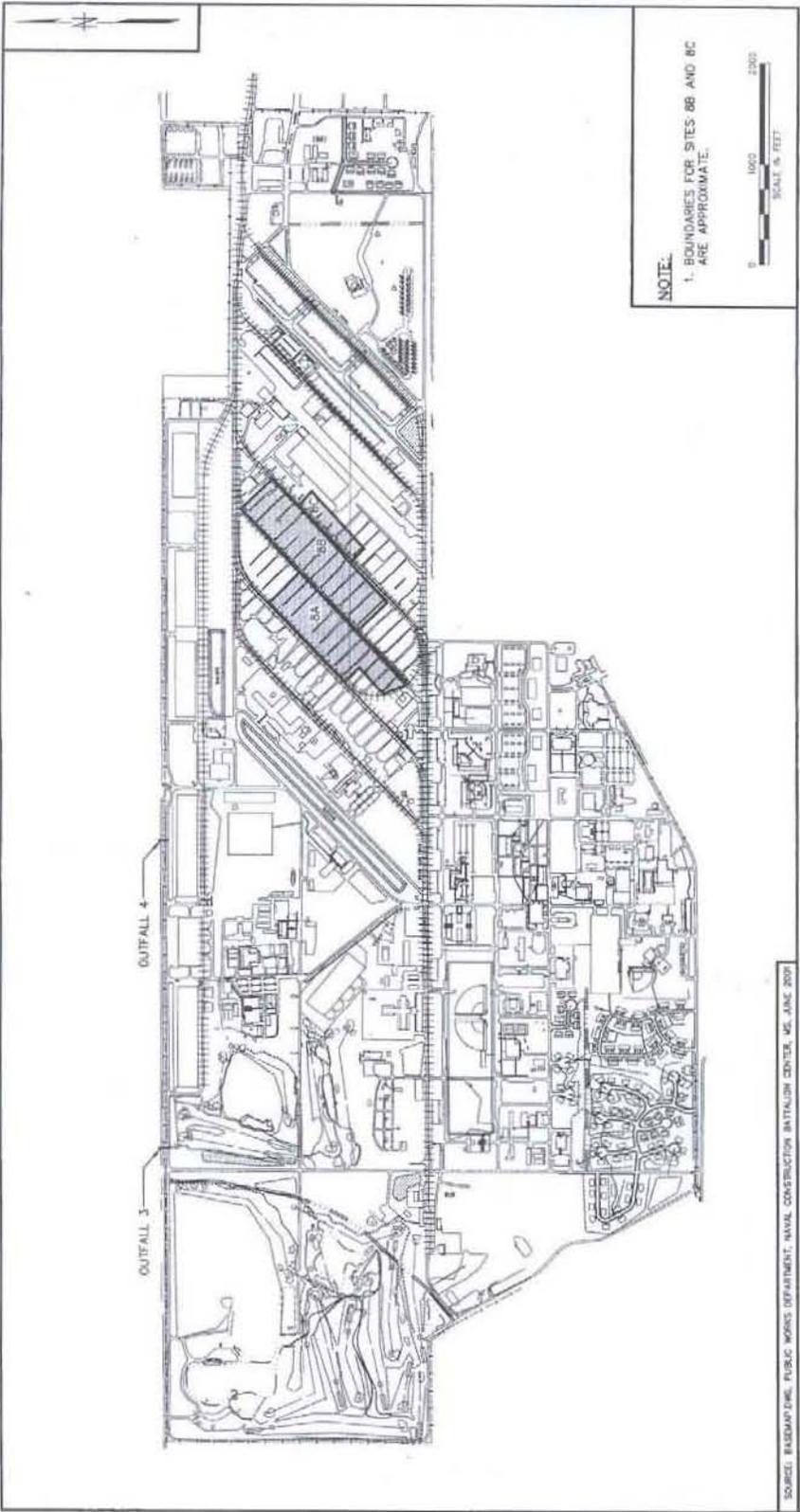


Figure 2-2. Naval Construction Battalion Center - Detail

APPENDICES

APPENDIX A

Activity Hazard Analyses

Activity Hazard Analysis

Site 8 – Herbicide Orange Storage Area and Off-Base Area of Contamination

Naval Construction Battalion Center

Gulfport, Mississippi

Prepared by: Marcus Johnshoy, CIH, CSP July 2004

Work Tasks / Steps	Hazards, Concerns	Controls, Preventive Measures	
CUTTING, BURNING, WELDING			
	General	<ul style="list-style-type: none"> • Work area shall be cleared of combustible materials for 50 feet, or additional controls established (e.g., water truck at work location). • A Hot Work Permit shall be completed. • Fire extinguisher(s) (ABC) shall be available in the work area. • Pre-wet the work area with water as necessary. • A designated fire watch shall be established and remain on-duty for 30 minutes after completion of activity. • Hot work activities shall not begin after 3pm in the afternoon. • Ensure adequate ventilation is available. Conduct air monitoring for gases/particulates as necessary to support PPE selection. • Always secure cylinders to prevent tipping and damage. 	
		<p>Cutting/Burning</p> <ul style="list-style-type: none"> • A Hot Work Permit shall be requested, filled out, and followed. Proper PPE for protection of burns is required. • Hoses shall be kept out of walkways. • Flashback flame arrestors shall be installed. • Areas shall be checked for possible fire hazards. • Gauges shall be removed at the end of the shift and caps shall be replaced on cylinders. Tool boxes used to store hose and gauges shall be ventilated. • Soapy water (or equivalent leak check solution) shall be used when checking for leaks. • Before using fuel gas cylinders, the cylinder valve shall be cracked before connecting gauges, to clean out any dirt or debris. • Cylinder valves shall be opened slowly and the wrench shall be left in position while the cylinder is in use. • A regulator shall always be used on fuel gas cylinders. • The cylinder valve shall always be closed before removing the regulator. • When fuel gas cylinders connected to gauges have a leak, either the leak will be repaired or the cylinder shall be removed from service. • Always close cylinder valves and bleed hoses when leaving torch sets unattended for any length of time. • Segregate and properly store fuel and oxygen cylinders. 	
		<p>Welding</p> <ul style="list-style-type: none"> • Leads shall be kept out of walkways. • Arcs shall be shielded to protect others from receiving flash burns. • The rod shall be removed from an electrode holder before laying it down. Rod butts shall be put in a container, not on the floor or ground. • Welding machines shall be turned off at the end of the shift. 	
Equipment to be used: Torches, welders	Inspection requirements: Daily equipment and work area inspections Daily hand tool inspections	Training Requirements: Proper operation of equipment; cylinder safety Designated fire watch responsibilities	

Activity Hazard Analysis

Site 8 – Herbicide Orange Storage Area and Off-Base Area of Contamination

Naval Construction Battalion Center

Gulfport, Mississippi

Prepared by: Marcus Johnshoy, CIH, CSP July 2004

Work Tasks / Steps	Hazards, Concerns	Controls, Preventive Measures
EXCAVATION		
All excavation areas	Unauthorized soil excavation activities	<ul style="list-style-type: none"> • Obtain necessary excavation permits as required by the Naval Construction Battalion Center prior to any excavation activities.
	Competent Person Designation	<ul style="list-style-type: none"> • The competent person for Excavation and Trenching Activities is Todd Savko, Site Health and Safety Specialist.
	Inadequate supervision / unqualified operators	<ul style="list-style-type: none"> • A Competent Person shall be present during all excavation/trenching/shoring activities. Employees shall be supervised at ALL times. The Competent Person shall have the appropriate knowledge and training to identify existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees. The Competent Person shall have the authorization to take prompt corrective measures (including cessation of work) to correct or eliminate hazards.
	Exposure to contaminants in soil	<ul style="list-style-type: none"> • Evaluate available data, conduct exposure monitoring in accordance with the Site Health and Safety Plan requirements. • Utilize appropriate dust/emission control measures (e.g., engineering controls, water spray). • Use appropriate PPE to control exposure to contaminants.
	Improper use, unmaintained equipment, equipment failure	<ul style="list-style-type: none"> • Only authorized personnel who are qualified and trained shall operate heavy equipment. • A documented Daily Inspection is required of all heavy equipment. Spill containment supplies will be readily available at the work location. • Fire extinguishers present on all heavy equipment (2A:10B:C minimum).
	Personnel too close to excavation edges or equipment	<ul style="list-style-type: none"> • The number of workers on the ground in the vicinity of excavation/trenching activities shall be limited to those necessary for the job. Workers shall maintain eye contact with equipment operators. • PPE: high-visibility traffic vests in addition to task-specific requirements (Level D minimum). • Appropriate fencing and warning signs will be implemented on site (See specific EM-385-1-1 Requirements, 25.B). • Operators shall maintain a constant awareness of personnel and equipment in the work areas. • Moving heavy equipment must have properly functioning back-up alarms. • Spotters on the ground will assist operators in manipulating vehicles and equipment into tight or confined spaces. • Institute fall protection controls (Controlled Access Zone, fall restraint systems) for elevated surfaces (6 feet or more).

Activity Hazard Analysis

Site 8 – Herbicide Orange Storage Area and Off-Base Area of Contamination

Naval Construction Battalion Center

Gulfport, Mississippi

Prepared by: Marcus Johnshoy, CIH, CSP July 2004

Work Tasks / Steps	Hazards, Concerns	Controls, Preventive Measures
	Unrecognized/ unknown hazards at excavation site	<ul style="list-style-type: none"> • Daily and periodic inspection of the active excavation/trench area is required by Competent Person prior to initiating work, or after any event (e.g., rain, sleet, snow) or activity that may compromise the integrity of the sidewalls and/or protective systems. • Spotters will assist the operator in the identification of unknown conditions during excavation.
	Personal injury from unprotected sidewall/sidew all collapse	<ul style="list-style-type: none"> • NO ENTRY is permitted into excavations/trenches without approval from the Competent Person. Authorization for entry shall only occur when a proper protective system is in place (i.e., shoring, sloping/benching, or other protective means approved by OSHA). • If spoils piles are used, excavated soil shall be a minimum of 2 feet from the excavation. • Personnel and supporting heavy equipment (e.g., loaders, haul trucks) shall be kept an adequate distance away from the excavation boundary (as determined by the Competent Person).
	Contact with underground utilities	<ul style="list-style-type: none"> • Intrusive soil activities conducted within a five foot "Buffer Zone" (horizontal or vertical, as measured from the outside edge of the utility) of any utility (electric, gas, high pressure, chemical storage tanks, pipelines, sewers, etc.) may require the use of non-aggressive excavation methods such as hand excavation using non-conductive hand tools, use of an air spade, hydro-excavation, or similar means. • Spotter will assist the operator/workers to identify unknown conditions during excavation. • If a previously unknown utility line is identified, uncovered, or disturbed during excavation/trenching activities, the excavation activity shall stop immediately and project management notified. Excavation shall not recommence until the line has been evaluated, identified, traced, and work procedures revised as appropriate. • Excavation spoil piles should not be placed atop surface features or ground markings identifying the locations of underground utilities.
	Contact with overhead utility lines	<ul style="list-style-type: none"> • Before you begin work, survey the site for overhead power lines. LOOK UP! Never get closer than 10 feet to an overhead power line. • All overhead wires shall be considered to be energized unless and until the person owning such line or the electrical utility authorities indicate IN WRITING that it is not an energized line. • If energized overhead lines are present close to the work area, contact the Tooele Project Coordinator to determine if the lines can be de-energized while work is performed near the lines. • If lines cannot be shut down and/or line insulation is applied, a minimum safe distance of 10 feet between any part of the equipment and the line must be established. Conduct a pre-work briefing to discuss the planned work. Include discussion of all equipment that could come in contact with the power lines (dump trucks, excavators, back hoes, cranes, etc.). • An observer/spotter shall be designated to observe clearance of the equipment and give timely warning for all operations where it is difficult for the operator to maintain the desired clearance by visual means. This shall be the ONLY job the observer is performing when an observer is required. • Posting warnings on equipment cautioning the operators to maintain safe clearance between energized power lines and their equipment.

Activity Hazard Analysis

Site 8 – Herbicide Orange Storage Area and Off-Base Area of Contamination

Naval Construction Battalion Center

Gulfport, Mississippi

Prepared by: Marcus Johnshoy, CIH, CSP July 2004

Work Tasks / Steps	Hazards, Concerns	Controls, Preventive Measures	
	Contact with overhead utility lines (cont.)	<ul style="list-style-type: none"> • Operate all equipment at a slower-than-normal rate in the vicinity of power lines. • Exercise caution near long spans of overhead power lines, since wind can cause the power lines to sway laterally and reduce the clearance between equipment and the power line. • Mark safe routes where equipment must travel beneath power lines. • Exercise caution when traveling over uneven ground that could cause the equipment to weave or bob into power lines. • Keep all personnel well away from the equipment whenever it is close to power lines. • Prohibit persons from touching the equipment or loads until a signal person indicates that it is safe to do so. 	
	Failure to recognize utility color coding system	<ul style="list-style-type: none"> • <u>Red</u> – Electric power distribution and transmission lines, cables, conduit, and lighting cables • <u>Yellow</u> – Gas and oil distribution systems, steam, petroleum, or other hazardous liquid or gaseous materials • <u>Orange</u> – Telephone, video, cable TV, other telecommunications, alarm or signal lines, cable or conduit • <u>Blue</u> – Water, irrigation, and slurry lines • <u>Green</u> – Sewers, storm sewer facilities, other drain lines • <u>Pink</u> – Temporary survey markings • <u>Purple</u> – Slurry and reclaimed water (also used for Cable TV) • <u>White</u> – Proposed excavation limits, centerline and width of proposed lineal installations • <u>NOTE</u>: Color coding may not be correct for all occurrences. Confirm that utilities have been identified and de-energized prior to proceeding. 	
Equipment to be used: Earth moving equipment Site control methods		Inspection requirements: Daily equipment inspections Daily hand tool inspections	Training Requirements: Excavation hazard awareness and hazard control Qualified equipment operators Operation of air monitoring equipment

Activity Hazard Analysis
 Site 8 – Herbicide Orange Storage Area and Off-Base Area of Contamination
 Naval Construction Battalion Center
 Gulfport, Mississippi

Prepared by: Marcus Johnshoy, CIH, CSP July 2004

Work Tasks/Steps	Hazards, Concerns	Controls, Preventive Measures	
DUST CONTROL DURING SOIL EXCAVATION AND HANDLING			
Excavation, soil handling	Exposure of workers to contaminants in dust from soil	<ul style="list-style-type: none"> • Conduct personal exposure monitoring for respirable dust, respirable silica, lead, and other contaminants as recommended by the Site Health and Safety Specialist, and in accordance with the Site Health and Safety Plan. • NOTE: exposure above the occupational exposure limit (either TLV or PEL) is NOT PERMITTED without additional controls (e.g., respiratory protection, training). • Establish a controlled work area. Limit the number of workers in the work area. • Institute appropriate dust/emission control measures (e.g., engineering controls, water spray). See below. 	
	Exposure to contaminants during excavation, loading, transport, and handling of soils	<p>The following dust control measures shall be implemented as necessary:</p> <ul style="list-style-type: none"> • Condition surfaces by applying moisture and seal by rolling/compacting. • Utilize client-approved dust suppressants or surface treatments. • Minimize material drop heights during dumping, loading, unloading, and material transfer operations. • At stationary material transfer points, such as stockpiles, use water spray to control dust emissions. Apply a fine mist water spray, where possible, into dust plumes generated by material handling activities. • Condition surfaces by applying moisture (deep watering as distinguished from surface dust suppression) prior to excavation. • Minimize amount of uncontrolled surface area (disturbed and exposed) at any time. Control disturbed surfaces by sealing, mulching, watering, as appropriate. • Restrict or suspend operations anytime weather conditions are such that dust cannot be adequately controlled at the source. • Reduce speed limits for haul trucks as necessary to facilitate dust control. Prevent or minimize dust emissions when traveling on unpaved roads. • Minimize generation of dust by controlling the operation of equipment (tempo and method of operation). 	
<u>Equipment to be used:</u> Excavation equipment, earthmoving equipment, loaders, haul trucks, water trucks	<u>Inspection Requirements:</u> Daily equipment inspections Daily inspections of work area by competent person	<u>Training Requirements:</u> General worker awareness of dust control principles and procedures Respiratory protection (as needed)	

Activity Hazard Analysis

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Naval Construction Battalion Center

Gulfport, Mississippi

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Work Tasks / Steps	Hazards, Concerns	Controls, Preventive Measures
HAND AND POWER TOOLS		
	General Safety Precautions for Hand Tools	<ul style="list-style-type: none">• The employer is responsible for the safe condition of tools and equipment used by employees but the employees also have the responsibility for daily inspections and properly using and maintaining tools.• All employees shall inspect each tool prior to use for evidence of damage, improper function, or repair needs. Do not use damaged tools.• Appropriate personal protective equipment (e.g., safety glasses/goggles, gloves) must be worn due to hazards that may be encountered while using portable power tools and hand tools.• All tools shall be operated in accordance to the manufacturers' instructions.• Floors and walking surfaces shall be kept as clean and dry as possible to prevent accidental slips with or around dangerous hand tools.• All tools and equipment are to be maintained in good condition.• Tools such as chisels and punches, which develop mushroomed heads during use, shall be reconditioned or replaced as necessary.• Broken or fractured handles on hammers, axes and similar equipment shall be promptly replaced, repaired, or removed from service. Applying tape to a broken handle is not an allowed repair procedure.• Non-sparking tools shall be used around flammable substances, or where the tool may present a dangerous ignition source.• Worn or bent wrenches shall be replaced.• Safety glasses, face shields, etc. shall be used while using hand tools or equipment which might produce flying materials or be subject to breakage.• Tool handles shall be wedged tightly in the head of all tools.• Tools shall be stored in a dry, secure location.

Activity Hazard Analysis

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Work Tasks / Steps	Hazards, Concerns	Controls, Preventive Measures
	General Safety Precautions for Power Tools	<ul style="list-style-type: none"> • Never carry a tool by the cord or hose. When working at elevation (e.g., on ladders, scaffolds), do not raise or lower power tools using the cord; this method may put unnecessary strain on the power cord and cause it to come lose from the anchorage point. • Never yank the cord or the hose to disconnect it from the receptacle. • Keep cords and hoses away from heat, oil, and sharp edges. • Disconnect tools when not in use, before servicing, and when changing accessories such as blades, bits and cutters. • All observers should be kept at a safe distance away from the work area. • Secure work with clamps or a vise, freeing both hands to operate the tool. • Avoid accidental starting. The worker should not hold a finger on the switch button while carrying a plugged-in tool. • Tools should be maintained with care. They should be kept sharp and clean for the best performance. Follow instructions in the user's manual for lubricating and changing accessories. • Be sure to keep good footing and maintain good balance. • The proper apparel should be worn. Loose clothing, ties, or jewelry can become caught in moving parts. • All portable electric tools that are damaged shall be removed from use and tagged "Do Not Use." • Tools must either have a three-wire cord with ground and be grounded, be double insulated, or be powered by a low-voltage isolation transformer. • Ground Fault Circuit Interrupters (GFCI) are required. • Electric tools should be operated within their design limitations. • Safety glasses are required during use of electric tools. • When not in use, tools should be stored in a dry place. • Electric tools should not be used in damp or wet locations. • Work areas should be well lighted. • Keep power cords neat; cords should be elevated off the floor/ground as necessary to prevent trip hazards and contact with ponded rain/precipitation. • Do not use power tools during heavy precipitation events. • Inspect extension cords prior to use. Damaged cords must be repaired, replaced, or removed from service.

Activity Hazard Analysis

Site 8 – Herbicide Orange Storage Area and Off-Base Area of Contamination

Naval Construction Battalion Center

Gulfport, Mississippi

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Work Tasks / Steps	Hazards, Concerns	Controls, Preventive Measures	
	Use of Powder Actuated Tools	<ul style="list-style-type: none"> • Tools should not be used in an explosive or flammable atmosphere. • Before using the tool, the worker should inspect it to determine that it is clean, that all moving parts operate freely, and that the barrel is free from obstructions. • The tool should never be pointed at anybody. • The tool should not be loaded unless it is to be used immediately. A loaded tool should not be left unattended, especially where it would be available to unauthorized persons. • Hands should be kept clear of the barrel end. To prevent the tool from firing accidentally, two separate motions are required for firing: one to bring the tool into position, and another to pull the trigger. The tools must not be able to operate until they are pressed against the work surface with a force of at least 5 pounds greater than the total weight of the tool. • Only authorized and properly trained personnel shall operate powder actuated tools. • Review manufacturer's recommended procedures for clearing a misfire. 	
Equipment to be used: Hand tools, power tools	Inspection requirements: Daily equipment inspections	Training Requirements: Proper use and care of hand tools Proper electrical cord inspection procedures Power actuated tool training as necessary	

Activity Hazard Analysis

Site 8 – Herbicide Orange Storage Area and Off-Base Area of Contamination

Naval Construction Battalion Center

Gulfport, Mississippi

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Work Tasks/Steps	Hazards, Concerns.	Controls, Preventive Measures	
LADDERS (See 29 CFR 1910.26 and 1910.27)			
All areas, all tasks	General ladder safety considerations	<ul style="list-style-type: none"> • Position portable ladders so the side rails extend at least 3 feet above the landing. • Secure side rails at the top to a rigid support when 3 foot extension is not possible. • The top or top step of a stepladder shall not be used as a step. • Make sure that the weight on the ladder will not cause it to slip off its support. • Before each use inspect ladders for cracked or broken parts such as rungs, steps, side rails, feet and locking components. • Do not apply more weight on the ladder than it is designed to support. • Use only ladders that comply with OSHA design standards. • Self-supporting (foldout) and non-self-supporting (leaning) portable ladders must be able to support at least four times the maximum intended load. • Non-self-supporting ladders, which must lean against a wall or other support, are to be positioned at such an angle that the horizontal distance from the top support to the foot of the ladder is about 1/4 the working length of the ladder. • Ladder rungs, cleats, or steps must be parallel, level, and uniformly spaced when the ladder is in position for use. Rungs must be spaced between 10 and 14 inches apart. • Ladders are to be kept free of oil, grease, wet paint, and other slipping hazards. • Wood ladders must not be coated with any opaque covering, except identification or warning labels on one face only of a side rail. • Foldout or stepladders must have a metal spreader or locking device to hold the front and back sections in an open position when in use. • When two or more ladders are used to reach a work area, they must be offset with a landing or platform between the ladders. • The area around the top and bottom of ladder must be kept clear. • Ladders must not be tied or fastened together to provide longer sections, unless they are specifically designed for such use. • Never use a ladder for any purpose other than the one for which it was designed. • Never use an aluminum ladder near electrical lines. • Keep two feet on the ladder at all times during conduct of work. • Do not lean excessively to the side of the ladder to conduct work. Observe the Belt Buckle Rule: Always keep your belt buckle between the rails of the ladder. 	
Equipment to be used: Ladders	Inspection Requirements: Daily inspection of ladders	Training Requirements: Ladder safety Fall protection as needed Fall Protection Competent Person is Todd Savko, Site Health and Safety Specialist	

Activity Hazard Analysis

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Work Tasks/Steps	Hazards, Concerns	Controls, Preventive Measures	
MANUAL LIFTING, MATERIALS HANDLING			
All Areas, All Tasks	Overexertion, back strain, back injury	<ul style="list-style-type: none"> • Size up the load. Test it to see if you can lift it safely; however, do not lift more than 60 pounds without assistance. Can you grasp it securely? Good handholds (cut-outs, handles) will make the load easier to lift. Make sure the load is balanced in your hands. • Get as close to the load as possible before lifting it, and keep it close once you've lifted it. If possible, slide the load towards you before picking it up. • Keep the load as close to your body as possible. If the load is large and cannot be placed between your knees as they are bent, get another person to help you. A better solution is to use mechanical assistance (hand trucks, carts) to avoid lifting altogether. • Make sure your footing is secure. Do not lift objects that obscure vision and footing. Plan ahead and make sure that your travel path is clear of obstructions and that there are no slip hazards such as a wet floor. • Lift smoothly and slowly. Do not jerk the load. Lift gradually using leg, abdominal, and butt muscles. Keep your chin tucked in, back straight. • Do not twist while lifting! Move your feet so that they point in the direction of the lift as you turn. Move your whole body. • Organize the work so as to avoid lifting from the floor or above shoulder level. Items to be handled should be between knee and shoulder height. • If you have a lot of lifting to do during the day, try not to do it all at once. Alternate lifting tasks with lighter work to give your body a chance to recover. Mechanical assistance is just as important for repetitive lifting as it is for heavy lifting. Use the same principles when lowering or placing the load after lifting. • Try to avoid carrying a load for long distances without getting mechanical assistance. Use a dolly or cart. • Use of back belts to prevent or reduce injury is not recommended. 	
<u>Equipment to be used</u> Hand trucks, dollies, carts		<u>Inspection Requirements</u> Daily equipment inspections	<u>Training Requirements</u> Proper lifting techniques Proper use of mechanical assistance devices

Activity Hazard Analysis

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Naval Construction Battalion Center

Gulfport, Mississippi

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Work Tasks/Steps	Hazards, Concerns	Controls, Preventive Measures
MOBILIZATION OF EQUIPMENT AND SUPPLIES		
Operation of Heavy Equipment and Construction Vehicles	Contact with overhead power lines, personnel struck by equipment	<ul style="list-style-type: none"> Evaluate the area for clearance from overhead power lines. De-energize and/or use spotter on the ground to avoid contact with live wires. Ensure at least 10 feet clearance from power lines during moving of trailer and other equipment. Spotter shall be available to identify other potential ground hazards during placement of trailer and keep unnecessary people and equipment out of the work area. All heavy equipment and construction vehicles shall have an operating backup alarm.
Temporary electrical power hookup	Electrical shock, refueling hazards	<ul style="list-style-type: none"> All electrical connections shall be made by a qualified electrician in accordance with all applicable national and state electrical codes during hookup. All circuits, extension cords, and power sources shall be grounded and have GFCI. Appropriate provisions shall be made for safe refueling of generators, including adequate spill prevention and cleanup. Electrical hand tools used during installation shall be powered through a ground fault circuit interrupter and shall be in good condition.
General Site Hazards	Slip Trip Fall	<ul style="list-style-type: none"> Examine the area prior to moving the equipment/trailers into place to identify slip/trip/fall hazards, uneven/unlevel ground. Repair, mark, identify, or otherwise make visible so personnel may avoid the hazard.
	Personal Injury / PPE	<ul style="list-style-type: none"> PPE: Minimum PPE for all individuals installing (and demobing) trailers and associated support equipment is Level D and shall include hard hat, safety glasses with side shields, orange reflective vests, hard-toed ANSI approved safety boots, and gloves (as necessary and appropriate for task-specific hand protection. e.g., cutting with tools, handling materials with sharp edges, installation of trailer skirt). Orange traffic warning cones will be used to identify the work area/potential hazards as necessary. Unnecessary traffic shall not be allowed into the work area. Utilize proper lifting techniques (legs, not back; no twisting) to lift/move heavy awkward items. Get help. PPE: wear heavy gloves when using hand tools to install anchors for trailer. Be aware of location of other workers when using hand tools.
Excavation/Soil Disturbance	Unauthorized soil excavation activities	<ul style="list-style-type: none"> Obtain excavation permit as necessary prior to conducting excavation activities. Locate underground utilities prior to excavation activities.
<u>Equipment to be used:</u> Hand tools, electrical cords/generators	<u>Inspection Requirements:</u> Daily equipment inspections, including hand tools and PPE.	<u>Training Requirements:</u> Qualified Electrician, Electrical safety awareness PPE proper use and maintenance General employee excavation hazard awareness and hazard control Safe lifting techniques, Thermal Stress

Work Tasks/Steps	Hazards, Concerns.	Controls, Preventive Measures
HEAVY EQUIPMENT OPERATIONS		
	GENERAL SAFETY	<ul style="list-style-type: none"> • Only authorized personnel who are qualified and trained shall operate heavy equipment. • Follow all manufacturers' recommendations regarding safe operation and maintenance. • Machinery or equipment shall not run unattended unless secured by the operator. No equipment shall be left running beyond a shift's end. • Blade, bucket, etc. will be fully lowered or blocked (at "zero energy") when not in use or being repaired. • Machinery or equipment shall not be operated in a manner that will endanger persons or property nor shall the safe operating speeds or loads be exceeded. • Equipment operated on roads shall be equipped with headlights, taillights, brake lights, back-up lights, and turn signals visible from the front and rear. Headlights are required to be ON while operating. • All mobile equipment and the areas in which they are operated shall be adequately illuminated. • Mechanized equipment shall be shut down prior to and during fueling operations. • Whenever equipment is parked, the parking brake shall be set. • The rated capacity on lift trucks and cranes shall be posted on the vehicle so as to be clearly visible. • The load capacity ratings shall not be exceeded at any time. • Heavy equipment operators shall inform their Supervisor(s) of any prescribed medication that they are taking that would impair their judgment. • Follow directions of loader/spotter personnel when moving into position to load or unload. • Set parking brakes during dry/wet decontamination, unless directed otherwise.
	STRUCK BY EQUIPMENT	<ul style="list-style-type: none"> • Moving heavy equipment must have properly functioning back-up alarms. • High visibility traffic safety vest required for all personnel working near heavy equipment. • Spotters on the ground will assist operators in manipulating vehicles and equipment into tight or confined spaces. • Operators shall maintain a constant awareness of personnel and equipment in the work areas. • Never walk or work directly in back of or to the side of heavy equipment without the operator's knowledge and approval.
	FAULTY SAFETY DEVICES	<ul style="list-style-type: none"> • Daily, documented, preshift inspections shall be performed on all equipment prior to use. • When any machinery or equipment is found to be unsafe as a deficiency is noted, the equipment shall immediately be taken out of service and its use prohibited until unsafe conditions have been corrected. • Guards and other safety devices shall not be tampered with or overridden.
	EJECTED FROM / FALLING OFF EQUIPMENT	<ul style="list-style-type: none"> • Getting off or on any equipment while it is in motion is prohibited. • Use 3-points of contact with entering/exiting equipment. Do not jump to ground. • Rollover protection shall be used when conditions call for such use. • The operator shall use safety belts while equipment is in use.
	FALL FROM ELEVATION	<ul style="list-style-type: none"> • Personnel are not allowed to work off of machinery or to use them as ladders. Fall protection required at heights greater than 6 feet.
Equipment to be used: Haul trucks, excavators, loaders, water trucks, graders, dozers, and other heavy equipment	Inspection Requirements: Daily inspection of equipment	Training Requirements: Documented Qualifications for equipment operation Equipment-specific inspection procedures Fall protection / ladder use as needed

APPENDIX B

Example Project Health and Safety Forms



Environmental Chemical Corporation
Subcontractor Profile
Environmental Health and Safety Program Areas

Company Name:	Primary NAICS Code:
Project Name/Location/Dates (if available):	Previous SIC Code(s):
	Purchase Order No. (if available):

Loss History	Current Year	Last Year	Previous Year	Previous Year
Experience Modification Rate (EMR) <i>(Attach verification letter from your workers' comp carrier)</i>				
Number of Fatalities <i>(Including those of subcontractors under your control)</i>				
Recordable Injury/Illness Incidence Rate <i>(Attach an OSHA 300 Form for each year listed)</i>				
Lost Workday Incidence Rate				
Lost Time Incidence Rate				
Total Employee Hours Worked by Year				

Note: If any EMR rate listed is greater than 1.0, if you have experienced any fatalities, or if incidence rates are above the average rates for your industry classification (NAISC/SIC Code), you must attach a corrective action plan that addresses reduction of the EMR, prevention of another fatality, and/or reduction of the incidence rates.

Environmental Health and Safety Program Elements (check all that apply)

<p>Written Health and Safety Programs <i>(Attach a listing of the written programs or a copy of the table of contents for the programs)</i></p> <ul style="list-style-type: none"> <input type="checkbox"/> EHS Policy Statement <input type="checkbox"/> Company Health and Safety Program Manual <input type="checkbox"/> Safe Operating Procedures for high hazard operations <input type="checkbox"/> Written Respiratory Protection Program <input type="checkbox"/> Written Hearing Conservation Program <input type="checkbox"/> Written Hazard Communication Program <input type="checkbox"/> Written Fall Protection Program <input type="checkbox"/> Written Medical Surveillance Program <input type="checkbox"/> Written Lockout/Tagout Procedures <input type="checkbox"/> Written Confined Space Entry Procedures 	<p>Environmental Health and Safety Training and Awareness Programs</p> <ul style="list-style-type: none"> <input type="checkbox"/> Safety training and orientation for new hires <input type="checkbox"/> Safety training and orientation for line management <input type="checkbox"/> Safety training and orientation for site supervisors/foremen <input type="checkbox"/> Safety training and orientation for subcontractors <input type="checkbox"/> Periodic employee/supervisor safety training <input type="checkbox"/> DOT Hazardous Materials (49 CFR 772, Subpart G) trained workers <input type="checkbox"/> Hazardous Waste (29 CFR 1910.120) trained workers <input type="checkbox"/> RCRA facility (40 CFR 264.16 or 265.16) trained workers
<p>Worksite Evaluation and Analysis</p> <ul style="list-style-type: none"> <input type="checkbox"/> Formalized methods to identify and control high hazard operations <input type="checkbox"/> Job or Task Hazard Analysis developed for hazardous operations <input type="checkbox"/> Formalized accident/incident reporting and investigation process <input type="checkbox"/> Documented "lessons learned" program 	<p>Safety Committees and Meetings</p> <ul style="list-style-type: none"> <input type="checkbox"/> Active company or organization health and safety committee <input type="checkbox"/> Active site health and safety committee <input type="checkbox"/> Employee and labor inclusion in site committee <input type="checkbox"/> Daily "toolbox" site safety meeting requirement <input type="checkbox"/> Weekly site safety meeting requirement <input type="checkbox"/> Monthly site safety meeting requirement <input type="checkbox"/> All employees required to attend site safety meetings <input type="checkbox"/> Subcontractors required to attend safety meetings
<p>Environmental Programs</p> <ul style="list-style-type: none"> <input type="checkbox"/> Written program for environmental compliance or management <input type="checkbox"/> Procedures for prevention and reporting of spills or releases <input type="checkbox"/> Procedures for reporting permit exceedances <input type="checkbox"/> Procedures for review/approval of waste management and/or transporter vendors or subcontractors 	<p>Environmental Health and Safety Inspections/Audits</p> <ul style="list-style-type: none"> <input type="checkbox"/> Line management participation in site EHS inspections/audits Frequency _____ <input type="checkbox"/> EHS specialist participation in site EHS inspections Frequency _____ <input type="checkbox"/> Requirement for independent audits of site EHS program By Whom? _____ <input type="checkbox"/> Written documentation of EHS inspection/audit findings and corrective actions



Environmental Chemical Corporation
Subcontractor Profile
Environmental Health and Safety Program Areas

Environmental Health and Safety Compliance History

The following compliance questions relate to your company and operations over the past 5-year period. The term company is inclusive of all operations nationwide, all companies and operating divisions, and all company names currently and previously used.

- Has OSHA (federal or state) issued any citation(s) to your company? Yes No
- Has OSHA (federal or state) issued any citation(s) to subcontractors working on projects or sites managed by your company? Yes No
- Are there any past or pending environmental enforcement actions or environmental compliance violations for your company? Yes No
- For projects, subcontractors, or sites managed or operated by your company, are there any past or pending environmental enforcement actions or environmental compliance violations for any other related organization? Yes No
(Note: Related organizations would include subcontractors, site owners, other companies or government organizations. This question is limited to the time period when your company was in management or operational control of the project or site.)

If yes to one of the above questions, attach a copy of the violation, citation, or enforcement action description, including an explanation of the circumstances and resolution(s) with the agency. Please provide a discussion of what corrective action(s) have been implemented to prevent reoccurrence at other locations, and demonstrate how these actions have been effective.

Substance Abuse Programs

- Does your company have a substance abuse program which includes pre-employment, "for cause", and post accident employee drug and alcohol testing? Yes No
- If not, will you implement a program for work subcontracted to your company? Yes No
- Does your company have a program in place that complies with the Federal Drug-Free Workplace Act? Yes No
- If not, will you implement a Drug-Free Workplace Program that complies with federal requirements (DFAR Clause 252.223-7004) for work subcontracted to your company? Yes No

Certification and Signature

I certify and declare under penalty of law that the foregoing environmental health and safety compliance history is true and correct, and that I am a duly authorized representative of the company.

_____ Printed Name

_____ Title

_____ Signature

_____ Date

Company contact for additional program information:

_____ Printed Name

_____ Phone Number

Required Attachments:

- Workers' Comp Insurance carrier documentation of EMR rates for current and past three years
- OSHA 300 Forms for current and past three years
- Corrective action plan (only if EMR or incidence rates are above average or if fatalities have been noted)
- Listing or table of contents from health and safety and/or environmental compliance program manual(s)
- OSHA citation information, if applicable
- Environmental enforcement or violation information, if applicable

ECC's Site Inspection Form shall be used as a guide to identify and correct potential hazards before an incident occurs. This will, in turn, lead to increased quality, efficiency, and profitability. This form should be modified to reflect additional project-specific requirements. The completed inspection form, with corrective actions completed, shall be kept at the job site, and a copy shall be provided to ECC's Director of Environmental Safety and Health. Project Managers are required to participate in each Monthly Inspection.

		ENVIRONMENTAL CHEMICAL CORPORATION		HEALTH AND SAFETY SITE INSPECTION FORM	
Project:			Date:		
Area(s) Inspected:					
Inspection Type: <input type="checkbox"/> Daily <input type="checkbox"/> Weekly <input type="checkbox"/> Monthly <input type="checkbox"/> Corporate <input type="checkbox"/> Other: _____					
Inspector's Name		Affiliation		Inspector's Name	

CATEGORY	Freq.	Observations / Recommendations (N/A if not applicable)	Corrective Action Completed (Name/Date)
EQUIPMENT			
Daily Inspection Checklists (Heavy Equipment)	W		
Hand Portable Tools Inspections	W		
Machine/Equipment Guarding	W		
GFCI in use	W		
3-prong ext. cords, not damaged	W		
FALL PROTECTION/SCAFFOLDING Must be inspected daily when activity is ongoing.			
Anchorage, body belt, lanyard	D		
Less than 6 feet of freefall	D		
Guardrails	D		
Protection from falling objects	D		
Daily scaffold inspections	D		
HOISTING & RIGGING Must be inspected daily when activity is ongoing.			
Ordinary/Critical Lift Forms Used	D		
Competent Person Signoff	D		
Condition of Chains / Slings	D		
Properly Rated Chains / Slings	D		
EXCAVATION & TRENCHING ACTIVITIES Must be inspected daily when activity is ongoing. See detailed "Trench/Excavation Inspection"			
Excavation Control Measures	D		
Inspections by Competent Person	D		
Entrance / Exit / Ladders	D		
Air Monitoring	D		
Warning Signs / Fences in place	D		
Shoring / Shielding	D		
Spoil Piles 2 Feet from Edge	D		

**ENVIRONMENTAL CHEMICAL
CORPORATION****HEALTH AND SAFETY
SITE INSPECTION FORM**

CATEGORY	Freq.	Observations / Recommendations (N/A if not applicable)	Corrective Action Completed (Name/Date)
HAZARD CONTROLS			
Lockout/Tagout Systems	As needed		
Site Control (EZ, CRZ, SZ)	D		
Decontamination Procedures (equip and personnel)	W		
Safety Awareness/Warning Signage	M		
Site Security	M		
PERSONAL PROTECTIVE EQUIPMENT			
Hearing Protection	D		
Respiratory Protection / Storage	D		
Head Protection	D		
Foot Protection	D		
Eye Protection	D		
Hand Protection	D		
Body Protection	D		
MATERIALS			
Storing of Compressed Gases	W		
Storing of Flammable Liquids	W		
Area Free of Combustibles	W		
Housekeeping of Storage Room	W		
EMERGENCY SYSTEMS			
Fire Extinguisher Availability / Inspections	M		
Eye Wash & Shower	W		
First Aid Kits, First Aid Log	W		
Spill Containment Supplies	M		
Emergency Instructions	M		
Appropriate Communications Available	W		
GENERAL WORKPLACE			
Housekeeping	W		
Noise Exposure	W		
Lighting/Illumination	M		
Field/Office Ergonomics	M		
Roadways / Traffic Control	W		
Sanitation / Toilet / Wash Facilities	M		
HAZARD COMMUNICATION			
List of Hazardous Materials	M		
Hazardous Materials Labeling	M		
Material Safety Data Sheets	M		

APPENDIX C

Resumes of Key Safety and Health Personnel, Competent Persons



Environmental Chemical Corporation

ROBERT W. ANDERSON

SUMMARY OF EXPERIENCE

Mr. Anderson has 12½ years in the environmental remediation field. He has had experience in various job positions, including SSHO, QC, Supervisor, Thermal Lead and Maintenance Supervisor. As SSHO he has helped in the development and implementation of various safety and health programs, directed overall worker H&S planning, incentive, and enforcement, and ensured OSHA regulatory compliance training and enforcement. Supervised QA/QC of air/water sampling, water treatment and lab processing. Has trained and supervised Site Emergency Response Teams and responded to site medical emergencies. Has instructed 40-hour HAZWOPER and 8hour refresher training. Conduct daily safety meetings, inspections, oversees Accident/Incident/Near-Miss investigations, reporting, tracking and prevention. Performs site, corporate and OSHA reporting requirements, inspects, issues and supervises special operations permits for Confined Space Entry, Hot Work, Lock-out/Tag-out. He has completed the USACE Construction Quality Management for Contractors and been CQCS alternate on several job assignments since his training in 1998. As Supervisor/Thermal Lead he has supervised a 24/7 operation with a knowledge usually acquired over years of working in this field of remediation. He completed the STS certification in 2003. With his diverse knowledge of construction and maintenance he has saved, ECC and it's clients, contract costs on several cost reducing projects, including negative air rooms, site setups and pump and small engine repairs.

PROFESSIONAL EXPERIENCE

Thermal Treatment Plant- Former NAS Barbers Point, Oahu, HI (6/2003-Current). Supervisor/Lead Thermal operator for indirect thermal treatment of PCB contaminated soil. SSHO alternate. Implemented work plans and ensured safe operation of indirect thermal treatment system. Maintain all components of thermal unit. Oversee metal debris segregation and removal and maintain programmable logic controller to ensure optimal run time.

USACE Nashville, Tanapag Village, Saipan (3/2002-6/2003). Supervisor/Lead Thermal operator for indirect thermal treatment of PCB contaminated soil. SSHO/CQCS alternate. Implemented work plans and helped ensure safe operation of indirect thermal treatment system. Maintain all components of thermal unit. Oversee metal debris segregation and removal and maintain programmable logic controller to ensure optimal run time. SSHO or CQCS when necessary.

USACE Kansas City/Omaha, Nebraska Ordnance Plant, Nebraska (2000-2002). As SSHO/CQCS alternate, implemented and enforced SSHP during O&M of a ground water treatment plant for cleanup of RDX and TCE. Coordinated with project manager and CIH to ensure health and safety of personnel and environment and proper installation of security and safety facilities.

USACE Kansas City/Philadelphia, Industrial Latex Superfund Site, New Jersey and Togonoxie, Kansas (1998-2000). As SSHO/CQCS alternate, supervised system O&M and monitoring of water and LTDD treatment systems; work performed in levels B and C PPE. Coordinated with project managers and plant operators to ensure project complied with USACE, EPA Region II, and NJDEP regulatory requirements. Supervised proper disposal of IDW, decommissioning of monitoring wells, and installation of safety facilities including fencing and warning signs. Supervised workers logging 135,000 work hours with no lost-time accidents. Project received consecutive safety awards from USACE Philadelphia and letter of commendation from the office of the mayor.

USBR Hazardous Waste Support Contract, Benton Harbor Warehouse Superfund Site, Benton Harbor, Michigan (1997-1998). As SSHO, oversaw worker H&S planning and enforcement at site contaminated with radium from WWII aircraft gauges. Conducted daily safety meetings and inspections. Designed and constructed temporary structures.



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USBR Hazardous Waste Support Contract, Belding Warehouse Superfund Site, Belding, Michigan (1996-1997). As Field Technician, operated, maintained and repaired shredder used to reduce items for disposal. Designed and constructed temporary negative air structures for 6000 sqft warehouse facility, HEPA filter system, field lab tables at a savings of 90% of purchase price. Substituted as SSHO when needed.

USBR, Mammoth Mills Superfund Site, Pinos Altos, New Mexico (1996). As SSHO/Field Supervisor, supervised Subcontractor and 12 employees. Supervised all H&S on project involving remediation of abandoned mine site tailings. Conducted daily safety meetings, inspections, and records. Performed site, corporate and OSHA reporting requirements. Inspected, issued, and supervised special operations permits.

US Bureau of Reclamation Hazardous Waste Support Contract, Summitville Mine Superfund Site, Del Norte, Colorado (1993-1996). As SSHO/QA/QC Officer, responded to site medical emergencies on an abandoned mine site remediation project. Instructed HAZWOPER and refresher training. Conducted daily safety meetings and inspections. Managed site, personnel, and specific event air monitoring. Supervised QA/QC of sampling, water treatment, and lab processing. As Retrofit, Pump, and PM Mechanic, worked on large pump maintenance, water treatment operations, equipment maintenance on forklifts, 905 loaders, dump trucks and boom trucks.

USACE Los Angeles District, Tierrasanta/Mission Trails Unexploded Ordnance Project, San Diego, California (1992). As a Magnetometer Technician, located metal objects to identify and evaluate on UXO project.

Anderson Aviation, Inyokern, California (1985-1992). Owned and operated full-service aircraft maintenance and repair facility. Certified Aircraft Mechanics Inspector.

School Teacher and Principal, Seventh Day Adventist School System (1968-1985).

EDUCATION AND TRAINING

BS, Math/Science Teaching Credentials, Southwestern Union College, 1976
40-hour and 8-hour Certified Instructors for HAZWOPER
40-hour HAZWOPER Training, 1993; Refresher, 2004
Confined Space Entry Rescue Team – Summitville, Colorado
32-hour Health Physics for Waste Management Certification, 1997
USACE Quality Management for Contractors, 1998
Safety Trained Supervisor (STS) Certification, 2003

PROFESSIONAL REGISTRATIONS AND AFFILIATIONS

Colorado registered Emergency Medical Technician, 1995
U.S.-F.A.A. registered Private Pilot, 1974-Current
U.S.-F.A.A. registered Aircraft Mechanic, 1988-Current
U.S.-F.A.A. registered Aircraft Mechanic/Inspection Authorization, 1991-Current

EMPLOYMENT HISTORY

1992 - Present: Environmental Chemical Corporation, Denver, Colorado, SSHO, CQCS, Supervisor/Lead Thermal
1985 - 1992: Anderson Aviation, Inyokern, California, Owner and Operator
1968 - 1985: Seventh Day Adventist School System, Texas and California



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PRASHANT KHANNA, EIT

SUMMARY OF EXPERIENCE

Mr. Khanna has 9 years of LTO/LTM project management experience, and 9 years of HTRW treatment experience. He received two commendation letters from USACE Omaha for outstanding performance on Iowa AAP and one commendation letter from Department of the Army, Kansas Army Ammunition Plant. He manages development and implementation of all project plans for CR and FFP LTO/LTM projects; ensures that all work complies with applicable Federal, state, and local laws and regulations. Works closely with regulators to expedite progress. Responsible for technical quality, cost and schedule control, safety and health, regulatory compliance, and resource allocation. Enforces coordination between the CIH and SSHO to ensure that all site activities are performed safely. Prepares monthly progress and detailed cost reports.

PROFESSIONAL EXPERIENCE

USACE Kansas City, PRAC, New Brunswick FUSRAP Site, New Jersey (8/03-present). As Project Manager, managing a Final Status Survey (FSS) at a 5.6-acre FUSRAP site located in an industrial area less than 1.6 miles from downtown New Brunswick, New Jersey, contaminated with thorium, uranium, high-purity plutonium, americium, and enriched uranium. Led discussions with NJ Bureau of Environmental Remediation for approval of laboratory in accordance with NJDEP guidelines and with USACE Kansas City and St. Louis District Radionuclide Data Quality Evaluation Guidance for Alpha and Gamma Spectroscopy. Managed the development of work plans in accordance with approved SOW, including the SSHP and SAP consisting of a field sampling plan and a QAPP. FSS field work includes two MARSSIM Class 1 Survey Units, surface and subsurface soil sampling, testing and geotechnical analysis, drilling, installing, and developing groundwater monitoring wells, groundwater sampling and subsequent well abandonment in accordance with all applicable NJDEP regulations.

USACE Kansas City, PRAC, Kansas Army Ammunition Plant (10/01-9/03). As Project Manager for this \$4.0 million project, ensures quality of work for 10 to 15 field and technical personnel during interim removal and treatment of soil contaminated with metals and explosives; stabilization of metal-contaminated soils and LTTD of 5,300 tons of explosive-contaminated soil. Conducts daily meetings to review QC, H&S, and project progress to minimize rework and non-conformance issues. Oversaw technique during XRF screening for metals and field test kits for explosives to ensure contract and regulatory compliance. Prepared and reviewed project work plans, including QC plan to ensure compliance with approved work plans and corporate SOPs.

NAVFAC PACDIV, Concord NWS, California (8/02-8/03). As Project Manager, managed and implemented MEC explosive risk reduction measures at Pier 2 by conducting an underwater geophysical survey, investigation, and removal of MEC and other related materials prior to the scheduled structural repairs to the pier.

NAVFAC SWDIV, Munitions Debris Site Survey, Naval Amphibious Base Habitat Enhancement Site, Coronado, California (5/01-10/01). As Project Manager, managed site investigations and surveys for the detection and removal of munitions and related debris. Implemented plans and supervised UXO



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specialists for the removal of anomalies. Conducted UXO surveys. Oversaw removal and transportation of UXO/OE. Utilized ECC's MIS to monitor costs and schedule and prepare client reports, meeting all contract requirements.

USACE Omaha, PRAC, Iowa Army Ammunition Plant, Iowa (8/95-6/01). As Project Manager, managed three large, complex TOs with 30 modifications for a broad range of HTRW removal/remedial action investigations, studies, designs, and technology assessments. Oversaw multi-media cleanup using innovative treatment technologies and best-value approaches to include water treatment; bioremediation; landfill construction; asbestos abatement; groundwater extraction/dewatering; demolition; debris removal; treatment/disposal of IDW; POL, heavy metal disposal/treatment; and natural attenuation. Allocated and scheduled on-site labor, equipment, and material resources, balancing work surges for 38 field and technical personnel. Procured, selected, and managed 20 subcontractors performing \$8 million in subcontract work in 100 percent contract compliance. Developed contract management procedures to include an approved property management system. Directed treatment process selection, system construction, and monitoring activities for remediation of explosive-contaminated pinkwater lagoons, ultimately treating more than 80 million gallons of water. Supervised clearing and grubbing activities to ensure minimal disturbance with an endangered Indiana Bat habitat. Managed the installation, field monitoring, and abandonment of more than 20 monitoring wells and gas vents. Selected, procured, installed, and managed O&M of three portable water treatment units to prevent potential uncontrolled release of contaminated water resulting from torrential rains. Oversaw the collected and analysis of 627 groundwater, 4,720 soil, and 177 air samples from 20 sites with no rework or discrepancy issues. Led Value Engineering to replace SVE with LTTD, saving \$2 million in costs, and accelerating cleanup by 1 year. Assisted USACE Omaha in preparing an action memorandum for Explanation of Significant Difference to modify the ROD for LTTD soil treatment. Held monthly meetings with the USEPA Region 7, Iowa AAP, and USACE; interfaced with the Iowa DNR, USFWS, and other Iowa state regulators. Completed 140,000 labor hours with no safety incidents in 4 years. Received three letters of commendation for technical and management performance, including one from USACE Omaha. Project Team was awarded the 2000 USACE Omaha District Safety Award and HTRW Project Team of the Year.

USACE Sacramento, PRAC, Vandenberg Air Force Base, Lompoc, California (1995). Served as the QC Manager and SSHO for the transportation and off-site disposal of USTs. Managed, administered, and supervised on-site QC and S&H activities for six field and subcontractor personnel at an active Air Force Base. Inspected and ensured quality and safety of work practices that adhered to applicable regulations, SSHP, approved project plans and SOPs, client and base requirements, and the SOW.

University of Kansas, Lawrence, Kansas (7/91-4/95). As Associate Research Engineer, conducted basic research on enhanced oil recovery processes. Developed an environmentally friendly biopolymer to enhance oil recovery from reservoirs. Performed geological and core-flooding experiments to determine the optimal processes and conditions for recovery and to identify parameters controlling efficiency of the process. Findings were implemented in the field in actual reservoirs to determine the efficiency of the new system.

National Organic Chemical Industries, Ltd, Bombay, India (6/90-6/91). As Chemical Engineer, managed optimization of solvent and alcohol production from cracked naphtha and monitored operation of the unit. As team leader, was responsible for installation and commissioning of a distillation unit.



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EDUCATION AND TRAINING

MS, Chemical Engineering, University of Kansas, 1994
BS, Chemical Engineering, Institute of Technology, Banaras Hindu University, Varanasi, India, 1990
Registered Environmental Professional, (#5759), 1995
Engineer-in-Training, (XE105598), California, 1998
40-hour HAZWOPER Training, 1996; Refresher, 2003
8-hour HAZWOPER Supervisor Training, 1996
American Heart Association First-Aid/CPR Training, 1995
Introduction to Environmental Sampling, 1995
Safety Trained Supervisor, 2003

PROFESSIONAL REGISTRATIONS AND AFFILIATIONS

Certified USACE CQCM, 1998

EMPLOYMENT HISTORY

1995 – Present: Environmental Chemical Corporation, Burlingame, California, Project Manager
1991 – 1995: University of Kansas, Lawrence, Kansas, Associate Research Engineer
1990 – 1991: National Organic Chemical Industries, Ltd., Mumbai, India, Chemical Engineer

CLIENT REFERENCES

Debra Wallin, On-Site Construction Representative, USACE Omaha District, 319-753-7846
Kevin Howe, Project Manager, USACE Omaha District, 402-221-7185
Patricia A. vanBleisem, Contracting Officer, USACE Kansas City District, 816-983-3823



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MICHAEL P. McSHERRY, CIH, CSP

SUMMARY OF EXPERIENCE

Mr. McSherry has 25 years of experience in occupational safety and industrial hygiene. He has strong technical competence with multiple professional certifications. He has program leadership and resource management skills, developed through progressive career growth. He also has excellent communication skills, critical to program development, training, and internal/external client relations. He has analytical thinking necessary to develop performance metrics, and use metrics and “lessons learned” to formulate objectives and action plans. He also has positive working relationships maintained by value-driven decision-making. He has staff development and mentoring to increase technical competence and integration of organization’s operating principles.

PROFESSIONAL EXPERIENCE

Tetra Tech FW, Inc. (formerly Foster Wheeler Environmental), Langhorne, Pennsylvania (1993-2004). Director, EHS Services. Injury and illness incident rates and severity rates reduced. Workers Compensation losses reduced, resulting in approximate savings of over \$2,000,000 in last four years. Numerous client and National Safety Council awards for health and safety performance on projects. Developed Corporate Incident Tracking System. Took over safety management on a project that had sixty written deficiency notices from the client. Project eventually reduced workers comp claims and incident rates; received safety award from client, and internal President’s Award for Health and Safety Excellence. Facilitate Executive Safety Review Board and provide leadership in Zero Incident Performance. Developed corporate-wide health and safety communication systems on Lotus Notes Intranet. Developed and managed corporate-wide training programs using participative methods including case studies, team problem-solving, games and demonstrations. Managed Health and Safety Program at large Superfund Sites. Managed large staff, from entry level through senior technical and management professionals. Developed program to address behavioral aspects of safety performance. Initiated Process Safety Evaluations for several environmental remedial processes. Integrated Health and Safety Program into ISO 14001 Certified Management System.

US Navy, EFA Northwest RAC 3, Poulsbo, Washington (3/03-6/04). As Program Safety and Health Manager, managed the cost reimbursable ID/IQ, \$100 million Navy RAC safety program. Responsible for S&H of 32 remediation task orders that included cleaning and repairing of storm sewers; excavation, capping and replacement of storm sewers; shoreline improvements; UXO investigation and removals; DEW Line facility demolition and site restoration; analysis of revised EM 385-1-1 changes for integration into current contract; and various other cost reimbursable projects.

USACE New England District, TERC, New England (8/94-6/04). As CIH and Program S&H Manager on this cost reimbursable remediation contract, responsible for overseeing the S&H program and approving SSHPs. Managed a staff of up to 10 S&H professionals that provided safety and industrial hygiene services during remedial action phases. Projects included the NBH “Hot Spot” sediment treatment and disposal; Boatyard Demolition; North of Wood Street sediment removal and site restoration; and Bulkhead Construction. Visited remediation sites regularly during construction activities to conduct site inspections, assist with hazard analysis development, track safety performance, and meet



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with client representatives. Three of the major TERC sites involved remediation of significant PCB contamination. Stratford and Silresim received awards from the National Safety Council for working 340,000 and 200,000 man-hours respectively, without a lost time incident. The Raymark demolition project at Stratford received the NAE Contractor Safety Award.

USACE Baltimore District, Aberdeen Proving Ground RAC (6/99-9/01). S&H Manager on this \$26 million cost reimbursable ID/IQ remediation project that included removal of potential UXO including chemical warfare materials from the Lauderick Creek site. The site is a quarter mile wide and three miles long. Agents of concern included phosgene and mustard. Oversaw establishment of the personnel decontamination station, and construction safety issues.

USACE Philadelphia District, BROS Superfund Site, New Jersey (6/93-10/96). As CIH, was responsible for S&H for the FFP \$175 million remedial, removal, and thermal destruction of PCB contaminated sludges and sediments from a 13-acre lagoon. Work activities occurred in protection levels D, C, and B. Managed a S&H staff of 11 during a 24-hour per day process operation. Prepared and approved SSHPs in accordance with project specifications and USACE EM385-1-1; various site-specific procedures including confined space entry, lockout/tagout, and fall protection; and project safety awareness and recognition programs. Managed an air-monitoring program and reviewed air monitoring and accident reports on a weekly basis. Managed the medical surveillance and biological monitoring program. Project was the first recipient of the District Engineers Quarterly Safety Award for Large Contractors. Received an "Excellent" safety rating from the Contracting Officer.

Chevron/Chevron Alliance Contract, Berkeley Heights, Perth Amboy and South Plainfield Sites, New Jersey (1/94-11/01). As CIH, responsible for \$22 million of T&M and FFP remediation projects that required bank stabilization using a sheet pile structure, excavation of PCBs and VOC contaminated soils, drum removal, and groundwater collection and treatment. Reviewed and/or approved SSHPs of TtFW and other Chevron contractors. Developed exposure monitoring and PPE strategies, and conducted Loss Control Management and excavation safety training. The Berkeley Heights project earned the National Safety Council President's Award for exceeding 200,000 hours without a lost time incident, and the other sites earned similar NSC awards. The Berkeley Heights project was the first recipient of the annual TtFW President's S&H Excellence Award.

Agribusiness Technologies, Inc., Times Beach Remediation Project, Missouri (6/93-10/98). CIH on this \$107 million cost reimbursable project, managed S&H for excavation and thermal treatment of dioxin-contaminated soils. Over 200,000 cy of contaminated soils and debris were treated. Managed exposure monitoring and control programs to maintain employee exposure below a risk-based occupational exposure limit for contaminated soil, which was developed specifically for this site. Approved S&H Plans of FFP remedial subcontractors and modifications to the TtFW plan. Developed a Safety Sampling program as a tool for promoting safety awareness and positive reinforcement for employees' recognized safe behavior that included subcontractors.

AlliedSignal, Sumitomo Remediation, Teterboro, New Jersey (6/93-5/96). As CIH, managed all S&H activities occurring on-site on this \$14 million remediation project. The project involved NORM and mixed waste remediation. S&H Plans were written and implemented to excavate soils contaminated with PCBs, VOCs, metals, and radium and thorium at activities as high as 12,000 pCi/gm. Soils were treated in an on-site, low-temperature thermal desorption (LTTD) system to remove organics, allowing RCRA declassification and disposal as NORM waste. Managed an on-site staff who conducted air and radioactive exposure monitoring; developed site safety procedures; conducted S&H training and routine



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safety inspections. Facilitated process hazard assessments of LTTD system, which resulted in modifying the fire prevention and protection systems and developing or modifying standard operating procedures.

Chemical Waste Management, Princeton, New Jersey (1988-1991). Health and Safety Manager – ENRAC East. Workers compensation and incident rates reduced by 50%. Managed H&S program for remediation division. Improved 40-hour initial HAZWOPER and 45-hour Site Safety Officer Training. Developed the H&S program manual for the Division. Hired, trained and managed project H&S support staff.

Pennwalt Corporation, King of Prussia, Pennsylvania (1986-1988). As Corporate Industrial Hygienist, developed corporate industrial hygiene manual and asbestos management procedures. Trained plant personnel in industrial hygiene monitoring methods. Implemented multi-plant exposure monitoring plans using insurance company and plant resources. Coordinated medical surveillance programs using consulting physicians and local providers.

US Department of Labor – OSHA, Allentown, Pennsylvania (1977-1986). As Industrial Hygienist, led team inspections, supervising work of other compliance officers. Conducted inspections of workplaces for health and safety hazards, recommending controls and preparing reports for legal sufficiency. Provided technical and regulatory outreach services to regulated community, labor organizations and academic programs.

EDUCATION AND TRAINING

MS, Industrial Hygiene, Temple University, 1981
BS, Biology, St. Francis College, 1976

PROFESSIONAL REGISTRATIONS AND AFFILIATIONS

Certified Industrial Hygienist (#3454)
Certified Safety Professional (#SN10844)

EMPLOYMENT HISTORY

2004 – Present: Environmental Chemical Corporation,
1993 – 2004: Tetra Tech FW, Inc., Langhorne, Pennsylvania, Director, EHS Services
1991 – 1993: The Advent Group, Inc., Malvern, Pennsylvania, Director of Health and Safety Services
1988 – 1991: Chemical Waste Management, Princeton, New Jersey, Health and Safety Manager
1986 – 1988: Pennwalt Corporation, King of Prussia, Pennsylvania, Corporate Industrial Hygienist
1977 – 1986: US Department of Labor – OSHA, Allentown, Pennsylvania, Industrial Hygienist

CLIENT REFERENCES (3)



Environmental Chemical Corporation

KEVAN D. McCASLIN

SUMMARY OF EXPERIENCE

Mr. McCaslin has more than 19 years of experience in the following environmental fields: Quality Control (QC) for environmental and geotechnical investigations, remediation and construction; Health and Safety for environmental and construction projects, and hazardous waste management.

PROFESSIONAL EXPERIENCE

Environmental Chemical Corporation, Denver, Colorado (10/04-Present).

Tetra Tech FW, Colorado, Alaska, and Washington (5/93-10/04). Site QA/QC, Field Health and Safety, Quality Control, and Geotechnical Support for Construction/Environmental Remediation Projects.

EFA-NW RAC (12/01-10/04). As Project QC Manager, developed and reviewed project QC plans, ensuring compliance with all approved plans, procedures, and state and local requirements, along with completion of project documentation. Oversight of all field personnel and subcontractors on multiple RAC 3 construction/remediation projects simultaneously, ensuring that all field activities are in compliance with all applicable state, local, and Puget Sound Naval Shipyard requirements and procedures, along with approved project plans and procedure; documentation of field activities through the use of daily QC reports, daily inspections, and field activity checklists; ensuring that all approved changes to project plans are documented and followed.

EFA-NW RAC II,(4/01-12/01). As Field QC Manager, ensured compliance with approved plans and procedures, and generation of surveillance reports and monthly documentation to EFA-NW. Provided senior QC support to multiple RAC construction/remediation projects simultaneously; development and review of project QC plans, ensuring that assigned construction sites are adequately staffed with qualified personnel; daily inspections and evaluations of active construction sites; ensuring thorough completion of daily reports; and oversight of subcontractor work to ensure compliance with Tetra Tech FW, Inc. plans, specifications, and policies.

Rocky Mountain Arsenal, Commerce City, Colorado (6/98-04/01). As a QC Supervisor/Field Lead, provided senior QC support to multiple construction projects simultaneously at Rocky Mountain Arsenal. Duties and responsibilities include supervision, support, and mentoring of junior field personnel in their daily tasks; ensuring that assigned construction sites are adequately staffed with qualified personnel; daily inspections and evaluations of active construction sites, ensuring thorough completion of daily reports; and oversight of subcontractor work to ensure compliance with Tetra Tech FW, Inc. and Remediation Venture Office (RVO) plans, specifications, and policies.

Continental Airlines, Level II Site Assessment, Stapleton International Airport, Denver, Colorado (3/97). As Site Geoscientist, Site Health and Safety, developed and sampled monitoring wells to determine presence of petroleum products in the groundwater. Additional duties included verification of well parameters; completion of log books, data sheets, and COCs; and packing and shipment of samples. Provided site health and safety involving compliance with site-specific health and safety plans.



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Rocky Mountain Arsenal, Comprehensive Air Quality and Meteorological Monitoring Program, (CAQMMP) Commerce City, Colorado (2/95-10/96). As Site Health and Safety Officer, provided health and safety support by implementing the health and safety plan, maintaining personnel records, and completing health and safety reports. Assisted in real-time air monitoring using a photo ionization detector (PID), flame ionization detector (FID), hydrogen sulfide (H₂S) meter, and an ammonia monitor. Also assisted in sampling media installation, recovery, and reclamation; periodic calibrations, and sampler equipment operation and maintenance. Program consisted of three meteorological monitoring stations, eight air sampling sites, and one air quality site; the air quality site is monitored for NO, NO₂, NOX, SO₂; the air sampling sites are sampled for total particulates, particulate smaller than 10 microns (respirable particulates), volatile and semi-volatile organics, organochlorine pesticides, and metals including arsenic and mercury.

Rocky Mountain Arsenal, Underground Storage Tank Removal Program, Commerce City, Colorado (1/96-5/96). As Sample Coordination, Field Health and Safety, monitored health and safety at several underground storage tank removal sites, including implementing and ensuring compliance with the health and safety plan, maintaining personnel records, and ensuring the proper use of PPE. Duties included real-time air monitoring using a PID and a combustible gas indicator (CGI); and performing sampling activities to determine levels of contamination and define plume size, shape, location, and direction of contaminant migration. Responsible for sample coordination including ensuring that the proper number of samples were collected and the method of analyses met contract requirements; sample collection, packaging, shipping, tracking, and associated paperwork including chain-of-custody. Waste management activities included removal and disposal to an approved disposal facility of petroleum-contaminated soil and petroleum products removed from USTs and associated piping. Completed waste profiles and waste manifests, coordinating with RMA's waste management contractor for clearance to remove waste and oversight during the hauling process.

Rocky Mountain Arsenal, In situ Biotreatability Study, Commerce City, Colorado (1/95-12/95). As Field Health and Safety, Systems Operations, responsible for daily operations, maintenance, and modifications to the water treatment system that treated benzene-contaminated water by introducing dissolved oxygen and nutrients into a water-bearing zone to promote bacterial growth. Responsibilities included manual water and dissolved oxygen measurements, setup of data logger and pressure transducers for data collection, preparation of nutrient solution, sample collection, processing, and tracking, data base management, and timely preparation of daily and weekly reports and sample chain-of-custody.

Phillips Petroleum, Geophysical Survey, Borger, Texas (10/94). As Field Technician, utilized shallow seismic surveying to determine the depth of bedrock for eventual installation of groundwater monitoring wells. Duties included layout of recorder phones, operations of the truck-mounted vibrator, and monitoring of seismic tracings.

EFA Northwest Navy RAC, Cape Prince of Wales, Alaska (7/94-9/94). As Site Health and Safety Officer, provided health and safety support during the excavation, removal, and disposal of drums and other debris from this WWII site. Implemented the health and safety plan, providing proper PPE for the task being performed, monitoring the site using a PID, CGI, and Mini Ram dust monitors. Completed weekly health and safety reports, maintained personnel records and monitored personnel for cold stress. Supervised local hire laborers, assisted in soil, water, and chemical sample collection, and equipment maintenance, and assisted in a comprehensive geophysical survey of the site that took place prior to any remedial action.



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Kennecott Copper RI/FS, Salt Lake City, Utah (9/93-10/93). As Geoscientist/Field Health and Safety, provided health and safety support and assisted in sample collection, logging of bore-hole cuttings, sample processing and delivery, and QA/QC. Implemented the site sampling plan to ensure contract compliance for sampling technologies, sampling handling, and waste management and disposal. QA/QC samples were collected periodically to confirm lab analytical results. Implemented health and safety plan; monitored the site, bore hole, and cutting with a CGI, PID, and sound level meter. Performed personnel sampling for lead and total respirable dust. Also collected, classified, and characterized soil samples, and assisted in the installation and operation of groundwater monitoring wells.

Rocky Mountain Arsenal, Soil Volume Refinement Program, Commerce City, Colorado (5/93-7/93). As Field Health and Safety Officer, responsible for field health and safety activities during the collection of soil borings and soil samples at locations confirmed to be or suspected of being contaminated with army chemical agent. Drilling activities were performed in level B PPE using supplied air, and cuttings were monitored using a portable gas chromatograph. Implemented the site health and safety plan, monitored the bore-hole and cuttings with a PID and CGI during drilling operations, selected proper PPE for site conditions, monitored personnel on site for signs of heat or cold stress, and performed pre- and post-calibration of monitoring equipment and personal air sampling. Also assisted in soil sample collection, personnel decontamination, and sample packaging and shipment.

US Army, Total Environmental Support Program, Dugway Proving Ground, Utah (5/93-9/93). As Site Health and Safety Officer, provided field health and safety support during soil boring and soil sampling operations including drilling and installation of groundwater samples. Implemented the site health and safety plan, pre- and post-calibration of real-time monitoring equipment such as CGI and performing ambient air monitoring during drilling and sampling activities. Other duties included sample collection and equipment maintenance.

Geotechnical Services, Denver, Colorado (5/90-5/93). As Senior Engineering Technician, supervised junior level technicians, reviewed field reports prior to engineer review, performed field laboratory QA/QC tests on construction materials such as soil, concrete, aggregates, and asphalt, and ensured compliance with plan specifications. Conducted soil compaction and suitability tests on the soil and materials placed on a ACOE dam project to ensure that materials met specifications prior to placement; construction QA/QC for a CERCLA water treatment facility, administrative records facility, and laboratory support division facility at RMA; and construction QA/QC testing on UST sites at an FAA tower facility in Colorado to confirm compliance with project specifications and construction standards.

Self Employed, Sidney, Nebraska (7/89-5/90). As Independent Oil and Gas Contractor, performed maintenance and operations for independent oil and gas clients of pumping equipment used for oil and gas production including oil pumping units, water injection systems, and oil/water separators. Monitored oil and gas production to evaluate and verify well and equipment performance and needs, and to calculate future production.

Panhandle Drilling and Testing, Scottsbluff, Nebraska (5/85-7/89). As Engineering Technician/Driller, specialized in UST investigation. Responsible for the installation of groundwater monitoring wells and the collection of soil samples to help determine the volume and extent of contamination plumes.



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EDUCATION AND TRAINING

ASQ Certified Quality Auditor (CQA) – in progress (expected December 2004)
Various Coursework, Engineering Studies, University of Nebraska
40-hour HAZWOPER Training, 1990; Refresher, 2004
8-hour HAZWOPER Supervisory Training, 1994
OSHA Hazardous Waste Health and Safety Training – 1990, annual updates 1991 - present
Project Management Training – PM 201, 2004
Construction Quality Management (USACE), 2001
Auditor Training, 2001
Construction Superintendent Training, 2001
Construction Safety Standards (29 CFR 1926), 1998
Radiation Safety Training, 1990
Confined Space Training, 1997
Competent Person – Excavating and Trenching, 1998
Health and Safety Officer Cross Training, 1993
American Concrete Institute, 1992
EPA-AHERA Asbestos Supervisor Training, 1994
Industrial Electricity, 1998
Emergency Medical Technician, 1985
First Aid and CPR

PROFESSIONAL REGISTRATIONS AND AFFILIATIONS

EMPLOYMENT HISTORY

10/04 – Present: Environmental Chemical Corporation, city, state, title
5/93 – 10/04: Tetra Tech FW, Colorado, Alaska, and Washington, Site QA/QC
5/90 – 5/93: Geotechnical Services, Denver, Colorado, Senior Engineering Technician
7/89 – 5/90: Self-employed, Sidney, Nebraska
5/85 – 7/89: Panhandle Drilling and Testing, Scottsbluff, Nebraska, Engineering Technician/Driller

CLIENT REFERENCES (3)



Environmental Chemical Corporation

GRAHAM MCMORINE

SUMMARY OF EXPERIENCE

Mr. McMorine has over 13 years in the environmental/construction field, 8 of these as a Project Manager for several large environmental companies both in the United States and in Europe. He has managed large multi million dollar projects for both the US Government and also private sector companies. He oversees, coordinates and directs team personnel and subcontractors involved in executing multiple, concurrent task orders. He allocates equipment and personnel resources to estimate, negotiate, mobilize and operate large, complex remediation projects. Mr. McMorine is responsible for cost, schedule control and regulatory compliance and prepares status reports and holds regular status meetings to apprise the client of project progress and to ensure project is meeting expected goals. Mr. McMorine implements approved policies and procedures to ensure compliance.

PROFESSIONAL EXPERIENCE

Storm water Basin Project, Lemont, Illinois PRIVATE SECTOR: Mr. McMorine served as project foremen for the dewatering and solidification of primary sludge containing volatile and semi-volatile organic compounds. Approximately 120,000 cubic yard of sludge containing 27,000 tons of dry solids were dredged and dewatered producing 52,350 tons of filter-cake for disposal. The client was operating under a consent-order; therefore heavy emphasis was placed upon safe, timely completion. Four Seasons utilized up to 40 onsite personnel working 24 hours during a 6-month period. The project deadline was met allowing the client to comply with the regulatory consent order. Over 60,000man hours were worked, completing this project on schedule and with zero OSHA recordable injuries.

Warner Robins Air Force Base, Georgia, USAF: Mr. McMorine was involved in the oversight and QA/QC of the placement of a Dual –Walled; HDPE force main that ran and collected contaminated water from a landfill. The water was then delivered to a WWT plant on the base. The wastewater plant had the capability of treating between 350,000 and 400,000 gallons of water/day. The system utilized 4 pressure filters; these 4 units are sand filters with a pea gravel bed and require Back-washing on a regular basis. The water is then passed through a series of UV filters for cleaning prior to discharge

Indepence, Mississippi, TRANSCO: Mr. McMorine was involved in the excavation of over 200,000 cubic yards of PCB contaminated soils from hillsides surrounding a Gas plant close to a small town in Mississippi, In addition to excavation, an extensive water treatment and holding system was designed and utilized, prior to discharging processed water into the plants discharge canal. Technology included a holding system which utilized a filtration and water treatment plant that reduced the contaminant to an acceptable standard.

Pascagoula, Mississippi, EPA & USCG: Mr. McMorine supervised a team of 10; the project involved the decontamination of Methyl Parathion contaminated houses within the Pascagoula and Moss Point areas of Mississippi. It involved the removal of practically all of household wares such as carpets, flooring, walls, ceiling, doors, all woodwork, curtains, clothes, food items and electrical appliances from approximately 750 homes. The project was hampered by the fact that the residents had to be evacuated to Hotels and apartments first before work could begin. The EPA, Coast Guard, Corps of Engineering and local



Environmental Chemical Corporation

government also played a major role in the strict adherence to legislation regarding pesticides such as Methyl Parathion. The project realized a cost of \$70 million before a cost was budgeted for remodeling.

Jacksonville, Florida, EPA: This project was EPA funded, that included the remediation of PCP and Dioxin contaminated dirt. The dirt was placed into a Thermal Disorption Unit, there the volatiles were removed with heat and the dirt placed back into the ground as back fill. Any contaminated free product ground water and TDU process water was ran through the on site Waste Water Treatment plant; this plant was erected and commissioned with the assistance of Mr. McMorine. The operating capability of the plant is limited because of the turn around time for Dioxin testing of the effluent. The system consists of two 282,000gallon effluent storage tanks and one influent storage tank. From the effluent tanks the water passed through an Oil/ Water separator. The WWT plant was to operate in a batch discharge mode with a minimum of operational requirement. The discharge rate from the plant exceeded 100 gallons / hour. Before discharge to storm water channels, the water passed through a series of filters containing both sand and gravel.

Tannersville, PA, BOR: The project involved the construction of a water treatment plant that was designed to treat TCE contaminated water from the local Landfill. The project deadline was not met due to severe weather conditions, however the budget and projected cost was. Our subcontractor experienced a great deal of financial difficulty, which meant that cost control was of my utmost concern during the project.

All schedules set for the construction of the plant itself were met but the schedules for the actual trenching and pipe lying did run over and behind schedule. Overall, my client was happy with the outcome of the job and highly pleased with the safety program that was developed for the project.

Houston, TX, EXXON Mr. McMorine was involved in the project management of a large soil remediation project at the EXXON Oil Refinery facility in Baytown, TX. This project involved the removal of 80,000 tons of organic compound contaminated dirt utilizing heavy equipment and then to backfill with cleans dirt. The project lasted until May 02, by that time, all hazardous dirt had been removed to landfill and clean dirt placed and compacted to 90%.

The Exxon Company plans to construct a large Low Sulfur MOGAS unit on site, this project will take 2 years to complete and cost in the region of \$200m.

Freemont, CA, DTSC Mr. McMorines duties included the management of a large environmental project in the city if Freemont, CA. He was employed to manage the remediation of a large parcel of land for a private sector company that had filed Chapter 11 bankruptcy. The area of land in question was around 65 acre's; most of it was contaminated with low levels of PCB's and relatively high levels of TPH comprising of Diesel and Motor Oils. All dirt excavated from the parcel was placed under a WCA (Waste Containment Area) the cell was eventually capped and seeded. Mr. McMorines duties were, in general, to control all costs, to ensure that the project kept to schedule and to liaise with the client. The project lasted for some 18 months and managed to keep on schedule even after very severe winter weather caused some concern. The agency overseeing this project was the DTSC (Department of Toxic Control Substances).

Oahu, HI, USN Mr. McMorine has already completed a large LTTD (Low Temperature Thermal Disorption) project for the company. The project, on the island of Oahu, Hawaii, consisted of the Thermal Treatment of over 40,000 tons of PCB contaminated dirt. This dirt was excavated from 82 sites around the island and transported to a remote site by truck to be thermally treated. The project received several commendations from the Navy for its attitude to safety and also for the team's ability to engineer into the project cost saving schemes that would save money. Once the dirt had been treated and samples taken to



Environmental Chemical Corporation

prove it clean, it was placed back into the excavations as backfill. All 82 sites were cleaned to acceptable standards and excavated areas were eventually 'hydro-seeded' and re-planted with saplings and shrubs.

EDUCATION AND TRAINING

Carlette Park College, Merseyside, South Wirral.

City & Guilds Mechanical Engineering Craft (Parts 1, 2, 3, 4) 1975 - 1980

Manchester University

Diploma, Mechanical Engineering (Associate Degree) 1980

Chester College, Cheshire.

Diploma in Managerial Skills and Business Studies (NEBBS) National Education Board of Business Studies. 1984

OSHA Safety training (40 hours) **1993**

OHSO Refresher Course (8 hours) **2004**

Certified Safety Trained Supervisor, Construction. **2004**

NAVFAC Orientation & Contractors Safety course for Contractors (10 hours). **2004**

Supervisory Training **2004**

Red Cross CPR, First Responder **2004**

Confined Space Training 2004

Member Emergency Response Team **2003**

EMPLOYMENT HISTORY

May 2004 – Present. Environmental Chemical Corporation. Burlingame, CA. Project Manager.

May 2003 – May 2004. Envirocon Inc. Missoula, MT. Project Manager.

February 2002. RECON. Houston, TX. Project Manager

September 99 – February 2002. Koester Companies. Evansville, IN. Project Manager

March 98 – September 99. Onyx Waste Management. UK. Operations Manager.

September 97 – March 98. Leigh Environmental. UK. Operations Manager.

December 93 – August 97. Four Seasons Environmental. Baton Rouge, LA. Supervisor.

APPENDIX D

ECC Corporate Health and Safety Standard Operating Procedures

ECC CORPORATE HEALTH & SAFETY PROGRAM STANDARD OPERATING PROCEDURES

- SOP HS-001 – Safety Policy
- SOP HS-002 – Acknowledgements
- SOP HS-003 – Injury & Illness Prevention Program
- SOP HS-004 – General Information and Responsibility
- SOP HS-005 – Hazard Evaluation Analysis
- SOP HS-006 – Air Monitoring Program
- SOP HS-007 – Hazard Communication Program
- SOP HS-008 – Employee Safety Training Program
- SOP HS-009 – Medical Surveillance Program
- SOP HS-010 – Site Control Program
- SOP HS-011 – Respiratory Protection Program
- SOP HS-012 – Personal Protective Equipment Program
- SOP HS-013 – Decontamination Program
- SOP HS-014 – Hearing Conservation Program
- SOP HS-015 – Cold Stress Monitoring Program
- SOP HS-016 – Heat Stress Monitoring Program
- SOP HS-017 – Confined Space Entry Program
- SOP HS-018 – Excavation and Trenching Safety Program
- SOP HS-019 – UST and AST Removal Program
- SOP HS-020 – Electrical Safety Program
- SOP HS-021 – Lockout and Tagout Program
- SOP HS-022 – Vehicle and Heavy Equipment Safety Program
- SOP HS-023 – Hoisting and Crane Operation Program
- SOP HS-024 – Fall Protection Program
- SOP HS-025 – Emergency Response and Contingency Program
- SOP HS-026 – Spill and Discharge Control Program
- SOP HS-027 – Fire Protection Program
- SOP HS-028 – Unexploded Ordnance (UXO) Safety Program
- SOP HS-029 – Asbestos Abatement Program
- SOP HS-030 – Radiation Protection Program
- SOP HS-031 – Chemical Hygiene Program
- SOP HS-032 – Diving Management Plan
- SOP HS-033 – Driver Fleet Safety Program
- SOP HS-034 – Biological Hazard Program
- SOP HS-035 – Blood Borne Pathogen Program
- SOP HS-036 – Drug and Alcohol Program
- SOP HS-037 – OSHA Record Keeping Program
- SOP HS-038 – Employee Safety Incentive Program
- SOP HS-039 – Hand and Power Tools Safety Program
- SOP HS-040 – Back Injury Prevention Program
- SOP HS-041 – Lead Remediation Operating Procedures
- SOP HS-042 – Disciplinary Procedures
- SOP HS-043 – Near Miss Reporting
- SOP HS-044 – Repeat Vehicle Accident Offender Program
- SOP HS-045 – Accident Investigation Reporting

SOP HS-001 SAFETY POLICY STATEMENT

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to establish a safety policy statement to all ECC employees. It is ECC policy that accident prevention shall be considered of primary importance in all phases of operations and administration. ECC is committed to assuring the health & safety of its most important asset: its employees.

2.0 BACKGROUND

It is ECC's policy to maintain open communication between management and staff on matters pertaining to safety. ECC encourages all workers to report all hazards, and incidents/accidents to their supervisor without the fear of reprisal. Employee thoughts regarding safety are considered important, and we encourage active employee participation in company safety meetings, individually to the supervisor, or in writing. Be assured that all safety suggestions will be given serious consideration, and that each will receive a response.

3.0 GOAL

It is the goal of the company's top management to provide a safe and healthy working environment to its employees, and to establish and insist upon safe work practices at all times. The ECC safety culture begins with zero incident performance as an expectation, and promotes continuous improvement in safety performance. Zero incident performance means error-free project execution, no injuries, property damage, adverse community or environmental impacts. The culture is only achievable through dedicated management and individual commitment and dedication. ECC believes all accidents are preventable.

The prevention of accidents is an objective affecting all levels of the organization and its activities. It is therefore a basic requirement that each supervisor make the safety of employees an integral part of his or her regular management function. It is equally the duty of each employee to accept and follow established safety regulations and procedures.

It is ECC's goal to provide proper training to its employees. In the event that an employee is ever in doubt in how to do a job safely, it is their duty to ask a competent person for assistance. Employees are expected to assist and support management in accident prevention activities. Unsafe activities and accidents must be reported to management at all times.

Dean K. Osaki, CSP, CHCM, CHST
Corporate Health & Safety Manager

*Environmental Chemical Corporation
SOP HS-001 Safety Policy Statement
Revised: December 2000*

August Ochabauer, MS, CHMM
Executive Vice President, Operations

Manjiv S. Vohra, P.E., R.E.P.
President

**SOP HS-002
ACKNOWLEDGMENTS/EMPLOYEE SIGN-OFF**

The Corporate Health & Safety Program (Injury and Illness Prevention Program (IIPP) and General Health & Safety Requirements) has been prepared, reviewed and approved by Environmental Chemical Corporation (ECC) personnel in accordance with California Code of Regulations and the Code of Federal Regulations.

Prepared By: Dean K. Osaki, CSP, CHCM, CHST
Corporate Health & Safety Manager

Approved By: August Ochabauer, MS, CHMM
Executive Vice President

***CORPORATE HEALTH & SAFETY PROGRAM
(IIPP AND GENERAL HEALTH & SAFETY REQUIREMENTS) SIGN-OFF***

I understand that I am responsible for understanding and complying with the requirements that are covered in ECC's Corporate Health & Safety Program (Injury & Illness Prevention Program (IIPP) and General Health and Safety Requirements). I also had the opportunity to discuss the information presented and to ask any questions about the information that I wanted clarified or repeated.

I understand that this record will become a permanent part of my safety employee file.

Employee Signature

Date

SOP HS-003 INJURY & ILLNESS PREVENTION PROGRAM (IIPP)

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to meet the requirements under Section 3203 of Title 8 of the California Code of Regulations (CCR). Section 3203 states that every California employer must have in writing an effective Injury & Illness Prevention Program (IIPP). The IIPP must contain the following (at a minimum):

- A policy naming the person or persons who have the authority and responsibility for carrying out the health/safety program.
- A system for ensuring that employees comply with safe and healthful work practices, and which includes disciplinary action as well as recognition of safe work habits.
- A system for communicating with employees on matters relating to occupational safety and health, and which includes provisions for encouraging employees to inform the employer of worksite hazards without fear of reprisal.
- A procedure for identifying and evaluating workplace hazards, and which includes scheduled periodic inspections.
- A procedure for investigating an occupational injury or illness.
- A procedure for correcting, in a timely manner, unsafe or unhealthful conditions or work practices.
- Safety and health training for employees and supervisors.
- A system for documenting with records the scheduled, periodic inspections and the employee safety and health training – these records must be kept for three years.

2.0 CORPORATE HEALTH AND SAFETY (AUTHORITY AND RESPONSIBILITY)

Two safety professionals manage ECC's health and safety program: **Mr. Dean Osaki, C.S.P., CHCM, CHST** (loss prevention/development of H&S policies and procedures), and **Mr. Marcus Johnshoy, C.I.H.**, (industrial hygiene/environmental health & safety). Mr. Osaki and Mr. Johnshoy are responsible for the planning, implementation and monitoring of ECC's Corporate Health and Safety Program/Standard Operating Procedures.

ECC's organization also employs the following safety professionals:

- Corporate Health Physicist **Mr. Keith Anderson C.H.P.**, oversees ECC's Radiation Protection Program (RPP), and provides radioactive safety training for ECC personnel.
- Chemical Hygiene Officer **Mr. Bhupender Sabharwal** provides implementation of ECC's Chemical Hygiene Plan (CHP) at ECC's Cincinnati Laboratory. The CHP is prepared in accordance with 29 CFR 1910.1450 (Laboratory Standard).

Additional information is located in **SOP HS-004 "General Information & Responsibility."**

3.0 DISCIPLINARY ACTIONS & RECOGNITION OF SAFE WORK PRACTICES

ECC's disciplinary action procedures for employees are conveyed in our Health/Safety Program - **SOP HS-042 "Disciplinary Procedures."**

ECC recognizes safe work practices with the implementation of employee safety incentive programs and near miss reporting. These programs are conveyed through the following Standard Operating Procedures: **SOP HS-038 "Employee Safety Incentive Program"** and **SOP HS-043 "Near Miss Reporting."**

4.0 SAFETY POLICY

As stated in **SOP HS-001**: It is ECC's policy to maintain open communication between management and staff on matters pertaining to safety. ECC encourages all workers to report all hazards, and incidents/accidents to their supervisor without the fear of reprisal. Employee thoughts regarding safety are considered important, and we encourage active employee participation in company safety meetings, individually to the supervisor, or in writing. Be assured that all safety suggestions will be given serious consideration, and that each will receive a response.

5.0 IDENTIFICATION & EVALUATION OF WORKPLACE HAZARDS

The Employee Hazard Analysis is written in accordance with 8 CCR (California Code of Regulations) 3203 - "Injury and Illness Prevention Program". Employees shall review and understand all applicable Hazard Analysis/SOPs prior to starting all hazardous operations.

The Employee Hazard Analysis is a tool to inform employees on the following: job description/principle steps; potential occupational health and safety hazards in their work environment; and preventive safe working conditions, safe work practices and implementation of personal protective equipment (PPE).

Hazard evaluations have been conducted for the following general and specific job safety classes: office administrators, program/project managers, H&S officers, environmental engineers, QA/QC officers, environmental field chemists, lab chemists, UXO technicians, heavy equipment operators and maintenance support.

A detailed hazard evaluation on each job safety class can be located in **SOP HS-005 "Hazard Evaluation Analysis."**

5.1 Site Safety Inspections/Audits

The Site Safety & Health Officer (SSHO) shall perform periodic safety inspection of the work site. The safety inspections shall be documented using ECC's Safety Inspection form or an equivalent form obtained from the client. The SSHO shall ensure that all immediate hazards are corrected before work proceeds and that all other hazards and potential safety situations are corrected in a timely manner in relation to this project (i.e., one to three days).

In addition, the SSHO shall perform a specific safety inspection of each piece of construction equipment to be used on the project (i.e., backhoe, loader, etc.). The equipment inspection shall be documented using a Safety Inspection Check List for Construction Equipment. The Project Manager before the commencement of work shall correct any defective items or conditions.

Copies of all safety inspections (i.e., work site and construction equipment) shall be available for field personnel review, shall be maintained on-site during the project, and shall be provided to the client representative upon request.

Environmental Chemical Corporation's (ECC's) Environmental Health & Safety Department conducts monthly safety audits at ECC project sites and offices. The purpose of the safety audit is to evaluate the effectiveness of ECC's Health & Safety Program and to record any safety deficiencies at the facility. This can be accomplished by the following: Review of OSHA training programs and filing requirements; physical survey of the facility/office; review of loss experience; interview with the Project QC/Safety Officer. Health & safety recommendations are then provided to the project staff for consideration. The recommendations are designed to assist in implementing a more effective health and safety program for the project site and offices.

5.2 Procedures for Correcting Unsafe or Unhealthful Conditions/Work Practices

Safety deficiencies that our observed via inspections or audits shall be corrected in a timely manner. ECC is committed to assuring a safe workplace for our employees and at no time shall jeopardize the health and safety of its employees.

6.0 ACCIDENT INVESTIGATION

In the event of an injury, illness or near miss, the incident shall be immediately reported to the Project Manager, SSHO, or Corporate Health & Safety Manager. If required, emergency medical care or first aid shall be rendered. At NO time during the initial incident/accident shall an injured employee seek medical attention without supervision. In the event that the injured employee needs medical attention, it is important that a management staff employee (Project Manager, QC/Safety Officer) escort the injured employee to the nearest occupational health clinic in order to maintain control of the incident. The SSHO or Corporate H&S Manager shall initiate the following filing requirements within the first 24 hours:

Accident Investigation Report;
Employers Report of Injury to AIG **(877-366-8423)**; for monopolistic states (North Dakota, Ohio, West Virginia, Washington, Alaska, and Nevada) please contact the applicable State Workers Compensation Department.

State Employee Claim Form (if applicable). In California: DWC Form 1.

As soon as possible after the occurrence of an occupational accident, the SSHO shall initiate an Accident Investigation. The accident investigation shall be documented on an Accident Investigation form (e.g., accident description, cause of accident and corrective action). The purpose of the accident investigation is to identify the causes of the incident in order to take corrective action to prevent future occurrences.

Finally, the SSHO shall maintain a project log of all-recordable injuries and illnesses and report them to the Corporate Health & Safety Manager.

7.0 EMPLOYEE & SUPERVISOR SAFETY TRAINING

ECC's employee training requirements can be located in **SOP HS-008 "Employee Safety Training Requirements."** The objective of this Standard Operating Procedure (SOP) is to meet all training requirements for employees engaging in the following activities: hazardous waste site operations/remedial activities, lead and asbestos related activities, unexploded ordnance operations, and radiation activities. Employees shall meet the Federal/state/government training requirements, and/or Environmental Chemical Corporation (ECC) safety training policies and procedures prior to conducting work activities. ECC will not permit employees or subcontractors to participate in field activities until they have been adequately trained.

8.0 DOCUMENTATION OF RECORDS

ECC's Corporate H&S Manager and Project Site-Safety and Health Officers are responsible for the documentation of employee training records and site inspections. All records have been maintained for a minimum of three years as required by Section 3203.

SOP HS-004 GENERAL INFORMATION AND RESPONSIBILITY

1.0 POLICY

The procedures and programs provided in the Environmental Chemical Corporation (ECC) Corporate Health & Safety Program (Injury & Illness Prevention Program (IIPP) and General Health & Safety Requirements) shall be implemented at all ECC project sites and offices as required by Section 3203 of Title 8 California Code of Regulation, and in accordance with 29 CFR 1910 and 29 CFR 1926. In addition to the Corporate Health & Safety Program, a Site-Specific Safety & Health Plan (SSHP) will be required on all ECC project sites. A Chemical Hygiene Plan (CHP) in accordance with OSHA's Laboratory Standard 29 CFR 1910.1450 is currently being implemented for our laboratory employees (ECC - Cincinnati).

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to comply with 29 CFR 1910.120, 29 CFR 1926.65, and 8 CCR 5192. All ECC employees and subcontractors working for ECC are expected to work responsibly and comply with both the SSHP and the Corporate Health & Safety Program. A copy of both plans shall be available to all employees at each project work site.

3.0 CORPORATE HEALTH AND SAFETY ORGANIZATION

ECC's Corporate Health and Safety Organization is managed by two safety professionals: **Mr. Dean Osaki, C.S.P.**, (loss prevention/development of H&S policies and procedures), and **Mr. Marcus Johnshoy, C.I.H.**, (industrial hygiene/environmental safety). Mr. Osaki and Mr. Johnshoy are responsible for the planning, implementation and monitoring of ECC's Corporate Health and Safety Program.

ECC's organization also employs the following safety professionals:

- Corporate Health Physicist **Mr. Keith Anderson C.H.P.**, oversees ECC's Radiation Protection Program, and provides radioactive safety training for ECC personnel.
- Chemical Hygiene Officer **Mr. Bhupender Sabharwal** provides implementation of ECC's Chemical Hygiene Plan (CHP) prepared in accordance with 29 CFR 1910.1450 (Laboratory Standard).

4.0 SITE SAFETY & HEALTH OFFICERS (SSHOs)

ECC provides competent Site Safety & Health Officers (SSHOs) at all ECC project sites. The SSHOs are responsible for the review and implementation of the Site Safety & Health Plan (SSHP) and oversight of initial site-specific training. The SSHO is responsible for inspecting work sites and equipment for accordance with safety and health regulations, identification and

documentation of violations, upgrading and downgrading of personal protection levels, OSHA record keeping, and conducting daily safety meetings.

ECC evaluates each site specific work plan and ensures that the SSHO has the necessary experience and training to qualify them to act as a competent person for activities performed on that site in accordance with applicable sections of 29 CFR 1926. As defined in OSHA regulation 29 CFR 1926.32(f), a competent person means one who is capable of identifying existing and predictable hazards in the surroundings or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them. If the SSHO is not qualified for a particular specialized task that requires regulatory competent person oversight, ECC will provide for a safety professional with specialized expertise to be on-site before commencing work on the particular task.

The SSHO coordinates with, but does not report to the Project Manager, and has the responsibility and authority to shut a job down if conditions or work performed are unsafe or an endangerment to the health of any person.

4.1 SSHO Qualifications

ECC's SSHOs have successfully completed and are knowledgeable in the Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard, along with all applicable OSHA regulations. ECC's SSHOs have extensive experience working at a variety of government project sites. ECC SSHOs shall possess additional skills/experience in the following:

- Knowledgeable with EM 385-1-1;
- Experience with accident prevention methods;
- Knowledgeable with ECC's Health & Safety Program;
- HAZWOPER Certified.

**SOP-HS 005
HAZARD EVALUATION AND ANALYSIS
(Prevention of Injuries and Illnesses)**

1.0 Policy

Is prepared in accordance with CCR 3203 - "Injury and Illness Prevention Program". In addition to all other regulatory requirements, all work activities shall be performed in compliance with COE's "Safety and Health Manual," EM 385-1-1; OSHA - Title 29 of the Code of Federal Regulations, Part 1910 and 1926; FAR 52.236-13 - Accident Prevention; and FAR 52.223-3 - Hazardous Materials Identification and Material Safety Data.

2.0 Purpose

It is ECC's belief that injuries and illnesses can be prevented. The following are "General Safe Work Practices" that shall apply to ECC personnel while conducting work activities at ECC project sites. The full cooperation of each employee is required to achieve an injury and illness free site.

- Eating, drinking, use of gum or tobacco products or the applying of cosmetics shall only be allowed in designated areas in the Support Zone (SZ);
- Smoking and any other sources of ignition shall be prohibited within 50 feet of any work area and sources of flammable/combustible chemicals. "No Smoking" signs will be posted at the entrances to the Exclusion Zones (EZ) and Contaminant Reduction Zones (CRZ). Areas will be marked where smoking is permitted;
- Personnel shall wash their hands, face and any exposed skin when completing decontamination, before eating, drinking or using tobacco product, and at the end of each shift;
- Personnel shall participate in Tailgate Safety Meetings (daily, or whenever new activity is started);
- Personnel shall continually observe their work location and be alert to changes in the environment that may affect safety;
- Personnel shall plan and prioritize their tasks prior to donning protective clothing and entering a designated Exclusion Zone;
- Personnel shall only enter regulated work areas (exclusion zone and contamination reduction zone) when instructed by the Field Supervisor, and shall only enter through designated control points;
- Personnel shall exit regulated work areas through the decontamination station, and shall follow the decontamination procedures;
- Personnel shall act to avoid direct contact with contamination by not purposefully walking, touching, or contacting any obviously contaminated surfaces. Instruments and tools shall not be placed directly on the ground;

- Personnel shall report any accident, near miss or unusual situations to the Site Safety and Health Officer and/or Field Supervisor immediately;
- Personnel shall use the personal protective equipment provided and as instructed by the Field Supervisor;
- Personnel shall not wear or carry personal items (i.e., jewelry, watches, gum, tobacco products, etc.) into regulated work areas;
- Personnel shall avoid hand-to-mouth or hand-to-face activities;
- All instruments and safety equipment shall be inspected prior to use;
- All vehicles and construction equipment shall be inspected prior to use;
- The number of personnel in a work area shall be minimized in order to reduce potential exposures;
- The buddy system should be used for all personnel entering an Exclusion Zone;
- Personnel working together (i.e., buddy system) shall continually be aware of their partner, and shall make integrity checks of their partner;
- Personnel shall work purposefully and as a team;
- Personnel shall work within their own physical and mental limits;
- Personnel shall take adequate rest breaks and replace body fluids (water and electrolytes) continuously;
- Personnel shall at all times follow the instructions of the Field Supervisor;
- Personnel shall not deviate from the project SSHP or the instructions of the Field Supervisor;
- Personnel shall avoid rushing and/or taking short cuts;
- All waste generated from decontamination procedures shall be handled and disposed of as per the contract requirements. No waste shall be disposed of without the direction of the Field Supervisor; and
- Personnel will do visual checks on machinery and equipment prior to its use;
- Employees shall read all applicable SOPs for hazardous operations prior to conducting work activities.

3.0 Site Safety Inspections/Audits

The Site Safety & Health Officer (SSHO) shall perform periodic safety inspection of the work site. The safety inspections shall be documented using ECC's Safety Inspection form or an equivalent form obtained from the client. The SSHO shall ensure that all immediate hazards are corrected before work proceeds and that all other hazards and potential safety situations are corrected in a timely manner in relation to this project (i.e., one to three days).

In addition, the SSHO shall perform a specific safety inspection of each piece of construction equipment to be used on the project (i.e., backhoe, loader, etc.). The equipment inspection shall be documented using a Safety Inspection Check List for Construction Equipment. The Project Manager before the commencement of work shall correct any defective items or conditions.

Copies of all safety inspections (i.e., work site and construction equipment) shall be available for field personnel review, shall be maintained on-site during the project, and shall be provided to the client representative upon request.

Environmental Chemical Corporation's (ECC's) Environmental Health & Safety Department conducts monthly safety audits at ECC project sites and offices. The purpose of the safety audit is to evaluate the effectiveness of ECC's Health & Safety Program and to record any safety deficiencies at the facility. This can be accomplished by the following: Review of OSHA training programs and filing requirements; physical survey of the facility/office; review of loss experience; interview with the Project QC/Safety Officer. Health & safety recommendations are then provided to the project staff for consideration. The recommendations are designed to assist in implementing a more effective health and safety program for the project site and offices.

4.0 Accident Investigations

In the event of an injury, illness or near miss, the incident shall be immediately reported to the Project Manager, SSHO, or Corporate Health & Safety Manager. If required, emergency medical care or first aid shall be rendered. At NO time during the initial incident/accident shall an injured employee seek medical attention on their own. In the event that the injured employee needs medical attention, it is important that a management staff employee (Project Manager, QC/Safety Officer) escort the injured employee to the nearest occupational health clinic in order to maintain control of the incident. The SSHO or Corporate H&S Manager shall initiate the following filing requirements within the first 24 hours:

Accident Investigation Report;

Employers Report of Injury (medical treatment services only) to AIG (**877-366-8423**); for monopolistic states (North Dakota, Ohio, West Virginia, Washington, Nevada, and Wyoming) please contact the applicable State Workers Compensation Department.

Alaska (Adak Project only) – Please contact Alaska National Insurance @ (907-266-9227).

As soon as possible after the occurrence of an occupational accident, the SSHO shall initiate an Accident Investigation. The accident investigation shall be documented on an Accident Investigation form (e.g., accident description, cause of accident and corrective action). The purpose of the accident investigation is to identify the causes of the incident in order to take corrective action to prevent future occurrences.

Finally, the SSHO shall maintain a project log of all-recordable injuries and illnesses and report them to the Corporate Health & Safety Manager.

5.0 Tailgate Safety Meetings

ECC's SSHO shall conduct daily tailgate safety with all field personnel, including subcontractor personnel, at the beginning of every shift and activity. Tailgate meetings should include and be held in conjunction of daily operation plans and specific

operations related to safety issues and events. Tailgate Safety meeting forms shall be maintained at the immediate work site and shall be available for field personnel and site visitor review. All site visitors are to be briefed on the operations and daily Tailgate Safety Meeting information prior to entering a designated Exclusion Zone. Copies of all Tailgate Safety Meetings shall be maintained on-site during the project, and shall be provided to the client representative upon request.

6.0 Employee Hazard Analysis

The Employee Hazard Analysis is written in accordance with 8 CCR (California Code of Regulations) 3203 - "Injury and Illness Prevention Program". Employees shall review and understand all applicable Hazard Analysis/SOPs prior to starting all hazardous operations.

The Employee Hazard Analysis is a tool to inform employees on the following: job description/principle steps; potential occupational health and safety hazards in their work environment; and preventive safe working conditions, safe work practices and implementation of personal protective equipment (PPE).

Hazard evaluations have been conducted for the following general and specific job safety classes:

- Office Administrators;
- Program/Project Managers;
- Health & Safety Officers;
- Environmental Engineers;
- QA/QC Officers;
- Environmental Field Chemists;
- Lab Chemists;
- UXO Technicians;
- Heavy Equipment Operators;
- Maintenance Support; and
- Hazardous Waste Workers.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Office Administrator

Description of Job

1. General office work.
2. Occasional lifting and carrying.
3. Video display terminal (VDT) operation.

Potential Occupational Safety/Health Hazard

1. Tripping and falls associated with office furniture.
Bumping edges of desks, drawers.
Pinching fingers and body parts in file cabinets.
File cabinets tipping over onto employees.
2. Back and extremity strains and sprains.
3. Visual stress due to improper lighting and workstation design.

Carpal tunnel syndrome (CTS) resulting from the use of a computer terminal keyboard. The carpal tunnel is a narrow passage in the wrist, where both tendons that operate the fingers and nerves pass through, to connect with muscles and ganglia in the arm. Repetitive use of the fingers (an unnatural action - hands are designed for grasping) can cause their associated tendons to swell. CTS occur when these tendons swell, pinching the adjacent nerves. This can result in severe pain the wrist and forearm, numbness, and loss of mobility in the hands and fingers.

Preventive Safe Work Conditions and Safe Work Practices

1. Keep work areas clear of debris, floor storage and electrical cords.
Assure adequate aisle space.
Use care in closing drawers, assuring that all hands are clear.
2. Use proper lifting/reaching technique. Procure assistance as necessary or use handcarts for heavy loads.
3. Adjust background lighting and screen lighting so that contrast between the two is minimized. As necessary, take breaks to rest eyes.
Department managers can help prevent CTS by establishing new work patterns and procedures, then following up to ensure that these patterns and procedures become routine. Basic prevention should include: ensure even distribution of the

work load; where practical, distribute typing/data entry duties as evenly as possible, to avoid overloading a minority of users.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Program Managers/Project Managers

Description of Job

1. General office work-report writing and review project administration.
2. Video display terminal (VDT) operation.
3. Consulting oversight of hazardous waste site activities.
4. Driving to sites for inspections, bid walks, and schedule verification.

Potential Occupational Safety/Health Hazard

1. Tripping and falls associated with office furniture.
 Bumping edges of desks, drawers.
 Pinching fingers and body parts in file cabinets.
 File cabinets tipping over onto employees.
2. Visual stress due to improper lighting and workstation design.
 Carpal tunnel syndrome (CTS) resulting from use of a computer terminal keyboard.
3. Exposure to contaminated soil, groundwater, and air.
 Physical contact accidents associated with working near heavy equipment.
 Hearing loss due to noise at construction sites.
 Fall hazards associated with excavations.
 Slipping and tripping in cluttered area of the work site.
4. Vehicle accidents resulting in injury.

Preventive Safe Work Conditions, Safe Work Practices and Personal Protective Equipment.

1. Keep work areas clear of debris, floor storage and electrical cords.
 Assure adequate aisle space.
 Use care in closing drawers, assuring that all hands are clear.
 Open only one drawer of a file cabinet at a time. Evenly distribute files from top to bottom.
2. Adjust background lighting and screen lighting so that contrast between the two is minimized. As necessary, take breaks to rest eyes.

Audit workstation environment - Wrists should be held above the level of the keyboard, with back of hand in-line with forearm. Keyboards that are too high cause the user's wrists to bend, and the shoulders to hunch. Make

recommendations for changes, that may include lower or adjustable keyboard supports, change in chair height, etc. Allow regular, brief rest periods.

3. Understand the hazards of the contaminants so that proper personal protective equipment may be selected before going out to the site.

Familiarize yourself with the site specific safety plan that describes hazards anticipated at the site, personal protective equipment to be used, safe work practices, and what to do in case of an emergency.

Strive to keep a safe distance from heavy machinery such that you would not be in the path of a moving part if it were to swing suddenly. Strive always to be aware of the movement of heavy machinery around you. Approach vehicles on the drivers side. It is important that the vehicle operator sees you.

Follow "Hearing Conservation" program.

Follow "Safe Work Around Excavations".

There will be no running, eating, smoking, or horseplay allowed in the working zones or riding on parts of equipment not intended for riders anywhere, anytime. At a minimum, level "D" safety equipment will be worn at all times when in the working zones. Stay away from traffic. Be aware of tripping hazards. Watch for overhead obstructions. Every assertive movement should be thought about ahead of time, leaving yourself an out. Anticipate your actions as well as others' actions.

4. Wear seatbelt/shoulder harness at all times.
Do not exceed speed limits for conditions.
Practice defensive driving.
Park in legal spaces/not obstructing traffic.
Consumption of alcoholic beverages or use of other intoxicants, including all medications that may affect the individual's ability to safely operate equipment, prior to or during work is prohibited.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Health and Safety Officer

Description of Job

1. Inspections and audits.
2. Video display terminal (VDT) operations.
3. Industrial hygiene monitoring.
4. Training.

Potential Occupational Safety/Health Hazard

1. Slips, trips and falls associated with physical hazards on-site (i.e., trenches, excavation equipment).
2. Visual stress due to improper lighting and workstation design.
3. Chemical exposure.
4. Stress and back pain.

Preventive Safe Work Conditions and Safe Work Practices

1. Site security around all excavation sites.
2. Adjust background lighting and screen lighting so that contrast between the two is minimized.
3. Wear the appropriate level of personal protective equipment.
4. Take necessary breaks; implement stretching exercises to relieve stress and back pain.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Environmental Engineers

Description of Job

4. Designing remediation system and performing remediation technology tests; reviewing contract specifications and interfacing with regulators, contractors, and suppliers; conducting technical design evaluation and data analysis; performing cost analysis; preparing technical and cost proposals, permits, and health and safety plans.
2. Managing hazardous waste site activities; conducting site investigation and site assessment; implementing QA/QC process.
3. Driving to sites.
4. Video display terminal (VDT) operations.

Potential Occupational Health/Safety Hazard

1. Tripping and falling associated with office furniture.
Bumping edges of desks, drawers, and other objects.
Pinching fingers and body parts in file cabinets.
File cabinets tipping over onto employees.
2. Exposure to hazardous chemicals, contaminated soil, and/or groundwater.
Physical contact accidents associated with working near heavy equipment.
Hearing deterioration due to noise at construction sites.
Falling hazards associated with excavations.
Slipping and tripping in cluttered area of the work site.
Hazards associated with cave-ins in excavations and trenches.
3. Injury resulting from vehicle accidents.
4. Visual stress due to improper lighting and work station design.
Carpal tunnel syndrome (CTS) resulting from the use of a computer terminal keyboard.

Preventive Safe Work Conditions, Safe Work Practices, and Personal Protective Equipment

1. Keep work areas clear of debris, floor storage, and electrical cords.
Assure adequate aisle space.
Close drawers with caution, assuring that all hands are clear.
Open only one drawer of a file cabinet at a time. Evenly distribute files from top to bottom.

2. Understand the hazards of the dangerous constituents so that proper personal protective equipment may be selected before going out to the site.

Familiarize yourself with the site-specific safety & health plan that describes hazards anticipated at the site, personal protective equipment to be used, safe work practices, and what to do in case of an emergency.

Strive to keep a safe distance from heavy machinery such that you would not be in the path of a moving part if it were swing suddenly. Strive always to be aware of the movement of heavy machinery around you. Approach vehicles on the driver's side. It is important that you maintain eye contact with the operator.

Follow "Safe Work Around Excavations." There will be no running, eating, smoking, or horseplay allowed in the working zones or riding on parts of equipment not intended for riders anywhere, anytime. At a minimum, level "D" safety equipment will be worn at all times when in the working zones.

Stay away from traffic. Be aware of tripping hazards. Watch for overhead obstructions. Every assertive movement should be thought about ahead of time, leaving yourself an out. Anticipate your actions as well as others' actions.

3. Wear seatbelt/shoulder harness at all times.
Do not exceed speed limits for conditions.
Practice defensive driving.
Park in legal spaces/not obstructing traffic.
Consumption of alcoholic beverages or use of other intoxicants, including all medications that may affect the individual's ability to safely operate equipment, prior to or during work is prohibited.
4. Adjust background lighting and screen lighting so that contrast between two is minimized.
As necessary, take breaks to rest eyes.
Audit workstation environment--Wrists should be held above the level of the keyboard, with

back of hand in-line with forearm. Keyboards that are too high cause the user's wrists to bend, and the shoulders to hunch. Make recommendations for changes, that may include lower or adjustable keyboard supports, change in chair height, etc. Allow regular brief rest periods.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Quality Assurance/Quality Control Officer

Description of Job

1. Report writing, performing document review, and interacting with regulators.
2. Video display terminal (VDT) operation.
3. Visually inspecting sites where hazardous materials may be used or hazardous waste may be present.
4. Climbing ladders during site assessments and compliance audits.
5. Lifting and carrying as part of site assessments, compliance audits, and training.
6. Collecting soil, water, and air samples for site investigations at sites potentially contaminated with hazardous waste.
7. Driving to sites.

Potential Occupational Safety/Health Hazard

1. Tripping and falls associated with office furniture.
Bumping edges of desks, drawers.
Pinching fingers and body parts in file cabinets.
File cabinets tipping over onto employees.
2. Visual stress due to improper lighting and workstation design.
Carpal tunnel syndrome (CTS) resulting from use of a computer terminal keyboard.
3. Hazardous material exposures.
4. Falls causing injuries.
5. Strains and sprains, back injuries due to improper lifting.
6. Inhalation of air contaminants resulting in contaminant specific ailments. Inhalation, absorption, and/or contact with soil contaminants resulting in contaminant specific ailments.
7. Vehicle accidents resulting in personal injuries.

Preventive Safe Work Conditions, Safe Work Practices and Personal Protective Equipment

1. Keep work areas clear of debris, floor storage and electrical cords.
Assure adequate aisle space.
Use care in closing drawers, assuring that all hands are clear.
Open only one drawer of a file cabinet at a time. Evenly distribute files from top to bottom.
2. Adjust background lighting and screen lighting so that contrast between the two is minimized.

As necessary, take breaks to rest eyes.

Audit workstation environment. Wrists should be held above the level of the keyboard, with back of hand in-line with forearm. Keyboards that are too high cause the user's wrists to bend, and the shoulders to hunch. Make recommendations for changes, that may include lower or adjustable keyboard supports, change in chair height, etc. Allow regular, brief rest periods.

3. Use proper personal protective equipment for potential exposures, or physical hazards.
4. Follow "General Safe Work Practices for Ladders"
5. Follow "General Safe Work Practices for Lifting and Carrying."
6. Understand the hazards of the contaminants so that proper personal protective equipment may be selected before going out to the site. Familiarize yourself with the site specific safety plan that describes hazards anticipated at the site, personal protective equipment to be used, safe work practices, and what to do in case of an emergency.
7. Wear seatbelt/shoulder harness at all times.
Do not exceed speed limits for conditions.
Practice defensive driving.
Park in legal spaces/not obstructing traffic.
Consumption of alcoholic beverages or use of other intoxicants, including all medications that may affect the individual's ability to safely operate equipment, prior to or during work is prohibited.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Environmental Field Chemist

Description of Job

1. Handling and moving containers by hand, by drum dolly, by pallet jack, or by forklift during segregation and packaging of hazardous materials and hazardous wastes and during loading of trucks in preparation for transportation of the hazardous material/waste containers.
2. Sampling of hazardous materials and wastes from drums, tanks, vats, and soil. On-site hazard categorization and fingerprinting of various unknown chemicals. Pouring compatible chemicals together to consolidate waste streams.
3. Working in Level C or higher personal protective equipment.
4. Driving to sites and transportation of hazardous material/waste.

Potential Occupational Safety/Health Hazard

1. Slips and falls due to tripping or slippery floors.
Foot injuries from falling inventory.
Physical injuries resulting from working on or near equipment.
Back strain from moving containers.
Rollover of forklift.
Movement of unmanned forklift.
Hearing loss due to noise of forklift.
Physical contact accidents associated with use of the forklift.
Inventory falling off forklift resulting in spilled materials.
2. Exposure to hazardous chemicals during sampling, Hazcating, handling or because of accidental spillage resulting from dropping chemical containers, improper loading of truck or overloading of or improper distribution on lift-gate.
3. Heat stress due to working in personal protective gear.
Physiological stress due to respirator use.
4. Vehicle accidents resulting in injuries.

Preventive Safe Work Conditions, Safe Work Practices and Personal Protective Equipment

1. There will be no running, eating, smoking, or horseplay allowed in the working zones or riding on parts of equipment not intended for riders anywhere, anytime. At a minimum level “D” safety equipment that includes steel-toed safety boots, eye protection, and hard hat will be worn at all times when in the working zones.

Stay away from traffic. Be aware of tripping hazards. Watch for overhead obstructions. Every assertive movement should be thought about ahead of time, leaving yourself an out. Anticipate your actions as well as others’ actions. Follow “General Safe Work Practices for Lifting and Carrying”.

When working on equipment be aware of all personnel, structures and obstructions and anticipate where you will be to make sure that someone or something won’t also be there. Conversely, when not working on equipment be aware of the equipment and anticipate its movements and give it a wide berth. Never sneak around equipment; make sure you are seen by the operator, whenever you have to be near it. Make eye contact!

Follow safety procedures for “Operating Forklifts.”

2. Level C personal protective equipment with appropriate cartridges or a higher level of personal protective equipment if warranted, is prescribed during packaging operations as a precaution in case of chemical spillage. Level “C” PPE will be worn whenever wastes or materials are handled directly, during the sampling of wastes, during the identification of the wastes and materials, during packaging of wastes or materials, and in general, whenever the seal of a container is broken. Level “C” consists of full or half face respirator with appropriate filter cartridges, eye protection, chemical resistant gloves with latex under gloves, chemical resistant steel-toed rubber boots, and Tyvek suit with the poly coating. All glove and boot interfaces with the tyvek will be taped with duct tape. An apron will also be worn when handling liquids.

Level “D” PPE will be worn at all other times when on the job-site or moving packed containers. Level “D” for lab pack projects will consist of steel-toed boots, safety glasses or goggles, ECC uniform, paper tyvek and chemical resistant gloves.

Don’t work around chemical hazards without at least one other individual aware of your intentions and on-site to offer assistance in order to handle the job safely. Safety is a primary concern. The individual’s ability is not to be superseded at anytime in order to do the job.

A spill response kit, fire extinguisher, and first aid kit must remain on-site or in the company

vehicle during packaging operations.

All personnel doing lab-packing should have 29 CFR 1910.120 training and be respirator fitted.

3. Follow “Heat Stress” policy.

Physician approval is necessary to wear a respirator. Users experiencing difficulty breathing or substantially increased pulse or breathing rates should take a work break, and change the respirator cartridge (if applicable).

4. Wear seatbelt/shoulder harness at all times.

Do not exceed speed limits for conditions.

Practice defensive driving.

Park in legal spaces/not obstructing traffic.

Consumption of alcoholic beverages or use of other intoxicants, including all medications that may affect the individual’s ability to safely operate equipment, prior to or during work is prohibited.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Lab Chemist

Description of Job

Sample analysis.

Potential Occupational Safety/Health Hazard

Chemical exposure due to chemical spills, fire and explosions.

Preventive Safe Work Conditions and Safe Work Practices

Remember chemical compatibility when storing chemicals.

Recognize the potential hazards that exists when working around chemicals.

Wear the appropriate personal protective equipment in the lab: Eye goggles, lab coat and leather shoes.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: UXO Technician

Description of Job

1. Locate, access, diagnose, and dispose of UXO and explosive waste.
2. Perform field testing of suspected explosive, and/or contaminated soils.
3. Perform exploratory boreholing and trenching in OEW environments.
4. Provide UXO avoidance escort to non-UXO personnel.

Potential Occupational Safety/Health Hazard

1. Explosions, fire or burns; repetitive motion injuries.
2. Chemical contamination.
3. Slips, trips, falls.
4. Insect, snakes, rodent bites, and other biological hazards.

Preventive Safe Work Conditions, Safe Work Practices and Personal Protective Equipment

1. Use of buddy system (2 rule) during field operations.
Follow CEHNC's basic considerations (corporate requirements) and safety concepts for UXO operations.
Ensure adequate training of UXO personnel.
2. Provide thorough decontamination procedures.
3. Practice good housekeeping.
4. Implement snake leggings, insect repellent along with Level D protection.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Heavy Equipment Operator

Description of Job

1. Operate various pieces of equipment ranging from skid-steer loaders to excavators and loaders.
2. Verification of serviceability of equipment (checking fluids, operation of safety equipment; backup lights, flashers, etc.).

Potential Occupational Safety/Health Hazard

1. Hearing loss, eye damage, exposure to contents of buried/overhead utilities (electricity, natural gas, water, sewer, etc.), and crushed limbs/extremities.
2. Damaging of equipment from maintenance neglect.

Preventive Safe Work Conditions, Safe Work Practices and Personal Protective Equipment

1. Survey site prior to work.
Use ear plugs/eye protection when operating heavy machinery.
Use hand signals, spotters, and mirrors.
Always operate at safe speed limits.
Always have clean windows.
2. Have daily inspections.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Maintenance (Building Support)

Description of Job

1. Driving.
2. Lifting/moving office supplies and furniture.
3. General construction work (support).

Potential Occupational Safety/Health Hazard

1. Vehicle accidents resulting in personal injuries.
2. Back strain due to improper lifting techniques.
3. Tripping and slipping hazards.

Preventive Safe Work Conditions, Safe Work Practices and Personal Protective Equipment

1. Wear seatbelt/shoulder harness at all times.
Do not exceed speed limits for conditions.
Practice defensive driving.
Park in legal spaces. Do not obstruct traffic.
Consumption of alcoholic beverages or use of other intoxicants, including all medications that may affect the individual's ability to safely operate equipment, prior to or during work is prohibited.
2. Follow "Proper Lifting Technique Guidelines" implemented by Corporate Health and Safety Specialist. Procure assistance as necessary or use hand carts for heavy loads.
3. Be aware of tripping hazards. Every assertive movement should be thought about ahead of time. Anticipate your actions as well as others' actions.

EMPLOYEE HAZARD ANALYSIS

Job Safety Class: Hazardous Waste Workers

Description of Job

1. Use of saw-cutters, jack hammers, and other power tools.
2. Lifting heavy equipment.
3. Trenching and excavation work.
4. Coming in contact with contaminated materials.
5. General construction work.
6. Working in Level C and higher personal protective equipment.
7. Driving to sites.
8. Working near and/or operating heavy machinery.

Potential Occupational Safety/Health Hazard

1. Cuts, puncture wounds, eye and foot injuries.
2. Back strain due to improper lifting techniques.
3. Cave-ins, equipment or spoils collapsing into trench onto workers.
4. Exposure to hazardous chemicals resulting in health impairment.
Fire or explosion during operations involving ignitable materials.
5. Tripping and slipping hazards.
6. Heat stress.
Decreased mobility, visibility, and hearing that increases the likelihood of physical injury.
Physiological stress due to respirator use.
7. Vehicle accidents resulting in personal injuries.
8. Hearing loss.
Physical contact accidents associated with working near heavy equipment.
Rollover of equipment.
Movement of unmanned vehicle.
Getting caught in gears and chains.
Hearing loss due to noise.
Electrocution/shock.
Fire and explosion during refueling.

Preventive Safe Work Conditions, Safe Work Practices and Personal Protective Equipment

1. Follow “Equipment Safety Procedures Power Tools.”
2. Follow “General Safety Work Practices for Lifting and Carrying.”
3. Follow “Safety Procedures for trenching and excavation work.”

4. Understand the hazards of the contaminants so that proper personal protective equipment may be selected before going out to the site.
5. There will be no running, eating, smoking or horseplay allowed in the working zones or riding on parts of equipment not intended for riders anywhere anytime.
6. Follow “Heat Stress” policy.
7. Wear seat/shoulder harness at all times.
Do not exceed speed limits for conditions.
Practice defensive driving.
Park in legal spaces. Do not obstruct traffic.
Consumption of alcoholic beverages or use of other intoxicants, including all medications that may affect the individual’s ability to safely operate equipment, prior to or during work is prohibited.
8. Wear the appropriate hearing protection (ear muffs, ear plugs).

SOP HS-006 AIR MONITORING PROGRAM

1.0 POLICY

Environmental Chemical Corporation's (ECC's) Air Monitoring Program is prepared in accordance with 29 CFR 1910.1000 and 8 CCR 5155 - *Air Contaminants*.

2.0 OBJECTIVE

Airborne contamination at work sites can present a risk to the health and safety of field personnel. The objective of this Standard Operating Procedure (SOP) is to help identify and measure various airborne chemical hazards and can provide critical information necessary for:

- Selecting personal protective clothing and equipment
- Specifying safe work practices
- Assessing the potential health effects of exposure
- Determining actions to mitigate the hazards

3.0 METHODS

Air monitoring data can be obtained using two different methods.

1. **Field Monitoring** - This method involves sampling the air and obtaining instantaneous results (real time) using portable field instruments. These instruments are referred to as "direct reading".
2. **Air Sampling** - This method involves collecting air samples for laboratory analysis, usually by sampling a known volume of air through a sample collection device media. Laboratory analysis delays results from hours to weeks.

4.0 REQUIREMENTS

To obtain and interpret useful information, care must be taken to:

- Select the appropriate instrument.
- Consider the limitations of the instrument selected.
- Use the instrument as specified by the manufacturer.
- Use only properly calibrated instruments.
- Consider any interference that may influence the results.
- Take representative samples.
- Consider uncertainty and error when making conclusions or interpretations.

5.0 PRINCIPLES OF DATA COLLECTION AND MEASUREMENT

5.1 Types of Data

Field monitoring instruments do not all collect the same type of data. Knowledge of the type of data obtained is important to interpreting the data.

1. *Qualitative Data* - This data identifies whether a hazard (i.e., contaminant) is present.
2. *Quantitative Data* - This data specifies the quantity of concentration of an identified hazard (contaminant) measured.

5.2 Characteristics

1. *Accuracy* - Describes how close measured results are to actual conditions.
2. *Precision* - Describes how close repeated measurements are of the same condition.
3. *Representative* - Describes samples for which the results describe conditions adjacent to where the samples were taken.
4. *Error* - Describes conditions that can affect the accuracy and/or precision of data. There are numerous sources of errors that exist whenever a field-monitoring instrument is used. Some sources of error are inherent in the instrument and cannot be altered. Other sources of error are dependent on the use and condition of the instrument.

6.0 CHARACTERISTICS OF AIR MONITORING EQUIPMENT

The following characteristics should be considered when selecting/evaluating an instrument:

6.1 Portability - A portable instrument should be:

1. Able to withstand shock from transportation, moving and handling.
2. Able to withstand damage or interference from environmental conditions (temperature, humidity, heat, weather and dust).
3. Light weight, self-powered (no AC requirement), easy to carry, set up and operate.

6.2 Useful Results

1. *Response Time* - The interval between sensing and indicating. The shorter the response time, the faster data can be obtained.
2. *Direct Reading* - The instrument response should be readable with little or no manipulation.

6.3 Selectivity

The ability to identify specific contaminants.

6.4 Sensitivity

The lowest concentration of a contaminant/hazard an instrument can accurately and repeatedly analyze.

6.5 Inherent Safety

1. Instruments that are inherently safe can be used in hazardous environments such as flammable and explosive atmosphere, without adversely interacting with the environment.

Almost all field monitoring instruments are electrical devices and therefore can provide a source of ignition to a flammable explosive environment. Inherently safe instruments are designed to prevent a potential ignition source from igniting a flammable or explosive atmosphere.

2. The National Fire Protection Association (NFPA) established definitions of hazardous atmospheres and minimum standards for equipment safety, as published in the National Electrical Code (NEC).
3. Controls
 - a. Explosion-proof designed to internally contain an explosion.
 - b. Intrinsically safe - designed to reduce the potential for arcing among components.
 - c. Purged - designed to isolate the ignition source from the atmosphere with an inert gas.
4. Certifications - By agreement, several national groups have developed test protocols for attesting equipment as inherently safe (i.e. meeting minimum standards of acceptance). A certified device carries a permanently affixed plate with laboratory type and Classes, Divisions and Groups tested against.
 - a. Certification Organizations
Factory Mutual (FM)
Underwriters Laboratories (UL)

7.0 FIELD INSTRUMENTS

Portable field instruments can be grouped into four categories based on the type of atmosphere of hazard of interest. Instruments are available to sample and analyze for:

1. Explosive atmospheres - percentage of the lower explosive limit (LEL) or a vapor or gas in air.
2. Oxygen deficient atmosphere - percentage (concentration) of oxygen in air.

3. Toxic atmosphere - Concentration (PPM or mg/m³) of toxic vapors or gas in air.
4. Radioactive hazards - (see section 30.0).

7.1 Types of Instruments

1. Combustible Gas Indicators (CGI)

CGIs measure the concentration of flammable vapor or gas in air and indicate the results as a percentage of the LEL. Many chemical materials, including solvents and hydrocarbon liquids, produce combustible or flammable vapors or gases. When sufficient gas or vapor has mixed with air, a flammable atmosphere occurs. The lowest concentration of a gas or vapor by volume in air that will burn or ignite is called the Lower Flammable Limit (LFL). The highest concentration of as gas or vapor, by volume that will burn or ignite, is called the Upper Flammable Limit (UFL). Often a distinction can be made between unconfined environments defining explosive atmospheres (LEL, UEL). The range from lower to upper limit is called the flammable or explosive range.

Most CGIs operate on the “hot wire” principle. Gases and vapors sampled by the instruments are burned after passing over a heated platinum filament in the instrument combustion chamber. As the gas or vapor burns, the temperature of the filament increases, changing its resistance. The change in resistance results in an instrument indication.

CGI meters usually indicate in percent (%) LEL. Thus, the meter indicates a potential flammable or explosive environment before exposure in the flammable or explosive range. When an instrument meter indicates past 100% LEL, the ambient atmosphere is readily flammable. For many instruments operated in the flammable range, the meter will rise to 100% LEL and then rapidly return to 0% LEL, indicating saturation of the sensor (atmosphere too rich to burn).

Advantages

Portable, rugged, simple to operate and fast response.

Some instruments can switch to read in PPM.

Extension hoses and probes are available that allow for “remote” sampling.

Can be continuously operated.

Disadvantages/Limitations

The reaction is temperature dependent.

Most CGIs are calibrated to pentane or methane, but not all combustible or flammable gases or vapors give the same response.

A charcoal pre-filter is required to differentiate between petroleum vapors and combustible gases.

Oxygen enriched and deficient atmospheres will give false readings.

Chemical materials, including leaded gasoline, halogens and sulfur compounds, will contaminate the filament and decrease its sensitivity.

Field Application

Identify flammable or explosive environments

Identify flammable liquids

Identify potential hazards associated with confined spaces and poorly ventilated areas.

2. Oxygen Meters

Oxygen meters measure the percent concentration of oxygen (O₂) in air. At sea level, ambient air contains approximately 21,0% (20.8%) oxygen. Both oxygen deficient and enriched atmospheres can be hazardous to human physiological functioning. In addition, changes in oxygen concentration can affect the flammability range of materials.

Oxygen meters usually indicate % oxygen in a range from 0-25%.

Ambient air is sampled (pump or diffusion) across an electrochemical sensor. Oxygen diffusing into the sensor establishes an electric current resulting in a needle deflection.

Advantages

Same as for CGIs

Disadvantages/Limitations

The meter operation is dependent on the partial pressure of oxygen. A meter calibrated at sea level and used at high elevations will falsely indicate an oxygen deficient atmosphere.

Oxygen sensors (cells) have a short shelf life (6 months) that can be shortened further by exposure to high concentrations of carbon dioxide (CO₂).

Field Application

Identify oxygen deficient or enriched atmospheres.

Identify poorly ventilated areas.

3. Combination Instruments

Many units combine a CGI and an Oxygen Meter into one instrument. Some newer models also incorporate a toxic gas sensor (carbon monoxide or hydrogen sulfide). Combination meters use the same technology for gas and vapor detection, as do individual sensing instruments.

Advantages

Single meters allow fast measurement of two interdependent hazards (oxygen deficiency and flammable atmosphere).

Disadvantages/Limitations

Same as for individual instruments.

Field Operations

Combination meters consider “work horse” for many field situations.

Combines application for oxygen meters and CGIs.

4. Direct Reading Colorimetric Indicator Tubes

Colorimetric indicator tubes are used to measure the presence and concentration of specific chemical hazards. Individual types of tubes are manufactured for testing for individual chemicals or groups of chemicals. Tubes are calibrated in PPM, % concentration or mg/m³.

Color indicator tubes consists of a glass tube filled with one or more sections of indicator chemicals. Chemical contaminants in the air react with the indicator chemicals resulting in a color change called a stain.

The length of stain is proportional to the concentration of the contaminant.

Advantages

Portable, lightweight and simple to use following training.

Allows qualitative and semi-quantitative field/measurements for a variety of chemical contaminants or groups of materials. Over 100 types of tubes available.

Relatively rapid response, convenient to use.

Durable and rugged.

Disadvantages/Limitations

Colorimetric indicator tubes should be used with caution because there may be as much as 25% error associated with the results. Indicator tubes are useful as an initial screening device. The sources of error include:

- Chemical interference from other material
- Limited shelf life
- Temperature (high temperature above 85F will limit shelf life)
- Variations in volume and flow rate of air sampled
- Operator's ability to correctly "read" the length of stain

Colorimetric indicator tubes should be refrigerated during storage.

The pump should be leak tested before use.

The tube should be "read" in good lighting. Avoid fluorescent and mercury vapor lighting.

The leading edge of a stain should be "read".

Field Applications

Determination of presence of a contaminant (present or not present).

Determination of concentration (semi-quantitative) of identified contaminants.

Rapid screening for various suspected field chemical hazards.

Limited confirmation test for materials preliminarily identified by other means.

5. Photo Ionization Detector (PID)

The Photo ionization instrument measures the electric current created by electrons removed from chemical contaminants exposed to an UV source. Air samples are pumped past an UV lamp having a specified energy output.

Advantages

Portable, rugged, easy to use instruments.
Instant warm up time and direct read (PPM)

Use no flame or fuel source

Useful operating ranges (0-2000 PPM).

Interchangeable probe.

Can be calibrated to direct read for individual species.

Disadvantages/Limitations

Significant differences in relative response for many materials.

Differentiation of chemical species not practical for most field work.

Sensitive to high humidity conditions.

Subject interference by nearby power sources.

UV lamp sources are easily damaged or contaminated.

Field use and interpretation of results requires training and experience.

Field Applications

Provides quantitative measurements for total ionizing materials, several orders of magnitude less than that indicated by a CGI.

Useful for field surveys after identifying no flammable atmosphere hazard.

Can detect materials not responsive to a CGI detection.

6. Flame Ionization Detector (FID)

The FID works similar to a Photo ionization instrument except a hydrogen flame provides the source of energy to ionize sample contaminants.

Advantages

Portable and rugged.

Wide operating range.

Fast response.

Audible alarms available.

Responds to most organics.

Field Application

Similar to a Photo ionization instrument.

8.0 INSTRUMENTATION PROGRAM

Air monitoring instruments used for direct-read field sampling application should be selected based on data need and use.

8.1 Types of Monitoring

1. Continuous - In some situations, it may be desirable to monitor for potentially changing hazards throughout the duration of an activity. Instruments used for continuous monitoring may be set up in a specific or carried by field personnel during work. In most applications, an audible alarm is highly desirable when using an instrument for continuous monitoring.
2. Periodic - In most field applications, instruments are operated for short periods of time to collect data. The battery life of instruments can be extended when conducting periodic monitoring.

8.2 Field Applications

Instruments used for field applications should be lightweight, rugged, weather resistant, operable without external power, easy to read and capable of being protected by contamination before use.

1. Site Survey - Site surveying is the process of evaluating the general ambient air condition at a location. For simple situations, the operator may walk the perimeter of the site and then tour the site while taking air samples, continuously evaluating the instrument's response as compared.
2. Hazard Identification and Evaluation

This type of instrument use includes: Hazard categorization of samples; evaluation of suspected leading containers; hazard assessment of spilled materials.
3. Operations Monitoring - Direct-read instruments can also be used to assess changes in various hazards caused by on-site activities (sampling, drum handling, on-site treatment, spill clean-up, etc).

8.3 Maintenance

Proper maintenance and storage of instruments cannot be over emphasized. After properly selecting an appropriate instrument for field use, proper maintenance and calibration ultimately affects field usability.

1. Instrument maintenance usually includes:

- Case, exterior and accessories cleaning after each use.
- Alarm and meter checks after each use.
- Battery checks under load after each use. Replacement/recharge as needed.
- Check general instrument operation (turn on and test) after each use.
- Periodic replacement of hoses, filters and sensors as needed.
- Periodic manufacturer check-up (cleaning, inspection, calibration, etc.)
- Documentation of all repair and maintenance work.

8.4 Calibration

All instruments must be calibrated periodically to verify and ensure accuracy within manufacturer's specifications. The factory calibrates some instruments and "calibration check" by the user, while the user calibrates others.

Calibration refers to sampling a known concentration of a chemical and comparing the instrument response to the expected response. An instrument's response must be within a specified range to be considered calibrated.

In general, calibration procedures shall be conducted before and after each period of use. All calibrations' work should be documented and properly checked or calibrated instruments tagged.

8.5 Field Use

The following general instructions on proper instrument use apply to all field instruments:

- All operators must be trained in instrument use.
- All instruments must be protected from damage, weather and contamination.
- Instruments should be allowed to warm up and be checked before use.
- Instruments should be initially cleaned in the field after each use.
- Instrument sensors must never be saturated.

9.0 MONITORING AND INTERPRETATION

9.1 Field Application

Because air-monitoring data is useful in identifying and assessing hazards, selecting personal protective equipment and specifying safe work practices, air monitoring is routinely conducted during hazardous waste management operations.

Examples of operations requiring monitoring:

Confined Space Work - Sample before entry and periodically during work for oxygen deficiency, flammable and toxic atmospheres. Use of CGI and specific color indicator tubes.

Tank Cutting/Hot Work - Sample prior to cutting for flammable atmospheres. Use a CGI

Emergency Response - Sample during hazard assessment phase (i.e. initial scene evaluation, hazard categorization testing, etc.). Use a CGI, specific color indicator tubes and/or a PID.

Handling Unknown Materials - Sample during hazard assessment (container handling, opening and sample testing).

Use a CGI, specific color indicator tubes and/or a PID.

Soil Excavation - Sample to determine the need for further excavation and to assess hazards. Use a CGI, specific color indicator tubes and/or a PID.

Hazard Categorization - Sample during HAZCAT testing. Use a CGI.

9.2 Responsibility

The SSHO, Lead Supervisor or the Project Manager normally performs monitoring.

9.3 Timing/Duration

Monitoring is performed at a variety of different times:

Prior to beginning work to assess a hazard (i.e. flammable or toxic atmosphere).
Example - confined space entry, tank cutting, hot work, waste site entry, sampling unknowns, etc.

During the operation to identify any changes in the environment. Example - during tank cleaning, after ventilating an area, while cleaning up a spill, etc.

After an operation is complete to determine satisfactory results. Example - after ventilating and dry icing a tank, after excavating visible contaminated soils, etc.

9.4 Air Monitoring Results

Employees will be informed of field monitoring results (“real time”) on a daily basis. All results shall be posted in a conspicuous location as required by OSHA. Air sampling results (lab

analysis) shall be forwarded to an ACGIH accredited laboratory. All results from the laboratory shall be posted in a conspicuous location.

**ENVIRONMENTAL CHEMICAL CORPORATION
 CALIBRATION LOG AND INSTRUMENT CHECKLIST**

Instrument _____ Manufacturer _____

Serial No. _____ Calibration Gas _____

Project Site _____ Calibration Reading _____

Date/Time _____ SSHO _____

Instrument Checklist

Items	Yes	No	Not Applicable	Comment
Inspect the instrument: housing, hoses, probe, gaskets, pre-filter, etc., all items clean and in good condition				
Battery check				
Check for system leaks				
Zeroed adjustments				
Alarm check				

SOP HS-007 HAZARD COMMUNICATION PROGRAM

1.0 POLICY

This program is prepared in accordance with Title 29 of the Code of Federal Regulations (CFR) Part 1910.1200 titled Hazard Communication “*Right to Know*”. This written program will be readily available at all ECC offices and project sites.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to inform and train Environmental Chemical Corporation (ECC) employees on the potential hazards of the materials that they may be exposed to while performing their work duties. ECC will communicate the “Hazard Communication Program” to their employees and provide information about chemical hazards and controls through labeling, chemical inventory, Material Safety Data Sheets (MSDS), and training programs as detailed in this written hazard communication program. This program applies to all known hazardous substances in the workplace that employees may be exposed to under normal conditions of use or in a foreseeable emergency resulting from workplace operations. Emergencies may include equipment failure or rupture of containers.

This program does not apply to:

- C Hazardous Waste (as defined by the Solid Waste Disposal Act, as amended by the Resource Conservation and Recovery Act of 1976);
- C Tobacco and tobacco products;
- C Wood and wood products;
- C Foods, drugs, or cosmetics intended for personal consumption by employees while in the work place;
- C Consumer products packaged for distribution to and use by, the general public, provided that employee exposure to the product is not significantly greater than the consumer exposure occurring during the principal consumer use of the product.

3.0 DEFINITIONS

Chemical - Means any element, chemical compound or mixture of elements and/or compounds.

Chemical manufacturer - Means an employer with a workplace where chemical(s) are produced for use or distribution.

Container - Means any bag, barrel, bottle, box, can, cylinder, drum, reaction vessel, storage tank, or the like that contains a hazardous chemical. For the purposes of this

section, pipes or piping systems, and engines, fuel tanks, or other operating systems in a vehicle, are not considered to be containers.

Distributor - Means a business, other than a chemical manufacturer or importer, that supplies hazardous chemicals to other distributors or to employers.

Employee - Means a worker who may be exposed to hazardous chemicals under normal operating conditions or in foreseeable emergencies. Workers such as office workers and bank tellers who encounter hazardous chemicals only in non-routine, isolated instances are not covered.

Exposure or exposed - Means that an employee is subjected in the course of employment to a chemical that is a physical or health hazard, and includes potential exposure.

Flammable - Means a chemical that falls into one of the following categories: aerosol flammable, gas flammable, liquid flammable or solid flammable.

Hazardous chemical - Means any chemical that is a physical hazard or a health hazard.

Label - Means any written, printed, or graphic material displayed on or affixed to containers of hazardous chemicals.

Material Safety Data Sheet (MSDS) - Means written or printed material concerning a hazardous chemical that is prepared in accordance with paragraph (g) of 1910.1200.

Mixture - Means any combination of two or more chemicals if the combination is not, in whole or in part, the result of a chemical reaction.

Physical hazard - Means a chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

Water-reactive - Means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

Work Area - Means a chemical that reacts with water to release a gas that is either flammable or presents a health hazard.

Workplace - Means an establishment, job site, or project, at one geographical location containing one or more work areas.

4.0 HAZARD DETERMINATION

Manufacturers, distributors and importers of chemicals are required to assess the physical and health hazards associated with each chemical they manufacture or import. This information must be conveyed to the employer by means of Material Safety Data Sheets

(MSDS) and container labels. Hazardous substances are any materials listed in any one or more of the following lists:

- C 29 CFR Part 1910, Subpart Z, Toxic & Hazardous Substances (OSHA);
- C Threshold Limit Values (American Conference of Gov. Industrial Hygienists);
- C National Toxicology Program (NTP);
- C International Agency for Research on Cancer (IARC);
- C Any scientific study providing evidence that a material has physical or health hazards;
- C Mixture containing 1% or more of a hazardous substance; or
- C Mixtures containing 0.1% or more of a carcinogen.

Consumer products used under normal conditions are exempt from federal hazard communication regulation.

No chemicals shall be used in the work place without reading the MSDS for safety measures regarding ventilation and/or use of respirators, and proper exposure monitoring. Chemicals are not to be stored except in secured ventilated rooms designed for such purposes. Unused portions of chemical bottles are to be placed in the storage room after use.

5.0 MATERIAL SAFETY DATA SHEETS (MSDS)

Manufacturers and importers of chemicals are required to develop an MSDS for each chemical based upon the information they obtained during the hazard determination process. A copy of the MSDS supplied by the manufacturer or distributor of the chemical shall be kept at each ECC project site and office. The Corporate Health & Safety Manager, Chemical Hygiene Officer (Cincinnati Lab) or Project SSHO will be responsible for obtaining an MSDS for all chemicals present at each site or office. These individuals shall review incoming MSDSs for new and important health and safety information. All supervisors and employees will be informed of the new MSDSs within 30 days of the Health & Safety Officer receiving the new MSDS from the manufacturer.

The ECC SSHO will review all MSDSs for completeness. If an MSDS is missing, a new MSDS shall be requested in writing from the manufacturer within 7 days. The MSDS must contain the following information: *chemical identity; chemical ingredients; physical and chemical characteristics; fire and explosion hazard data; reactivity hazard data; health hazard data; control and protective measures; precautions for safe handling and special hazards.*

Upon receiving the MSDS from the first shipment of a chemical, the original will be sent to the SSHO. The MSDS will be reviewed by the SSHO and will be placed in the MSDS binder. ECC will not accept chemicals from the manufacturer or distributor unless a copy of the MSDS has already been obtained from a previous shipment or the shipment is accompanied by an MSDS. MSDS are available to all employees and contractors in the

work area for review during each work shift. MSDSs shall be kept in a conspicuous location (ECC job trailer) at all times.

6.0 LABELING

ECC will not accept or release hazardous chemicals for use unless the original container is clearly labeled with at least the following information: identity of the hazardous chemical(s); appropriate hazard warning statement; and name and address of the manufacturer. If the hazardous substance is transferred to a secondary container, the secondary container must be clearly labeled with at least the following information: identity of the hazardous chemical and the appropriate hazard warning statement.

All labels must be legible, in English, and prominently displayed on the container. Labels shall not be defaced or removed unless the container is immediately marked with the required information. Unlabeled chemical containers should be immediately reported to the area supervisor or the Health and Safety Officer. The name of the material that appears on the manufacturer's label shall be the same as the name that appears in the area chemical inventory as well as the MSDS. Neither this program nor 29 CFR 1910.1200 require labeling of the following substances: pesticides; distilled spirits (beverage alcohol) for non-industrial use; and any consumer product.

7.0 EMPLOYEE TRAINING

Employees shall be trained on the hazardous substances in their work area: at the time of their initial assignment; whenever a new hazard is introduced into their area; and within 30 days of the employer receiving an updated MSDS containing new information indicating significant increased risk or changes in the use of personal protective equipment.

ECC employees will be trained in the following:

- C Overview of the Hazard Communication regulation (29 CFR 1910.1200);
- C Operations involving hazardous chemicals in their work area;
- C Location and availability of the MSDS and written hazard communication program;
- C How to read an MSDS and container labels;
- C Physical and health effects of hazardous chemicals and measures to be taken by the employee to protect themselves;
- C Use of engineering controls, personal protective equipment and work practices to prevent or lessen exposure to hazardous chemicals;
- C Emergency and first aid procedures to follow in case of exposure to hazardous chemicals.

The employees shall be informed of their rights to:

- C Personally receive information on the hazardous substances to which they may be exposed;
- C Have their physician receive information regarding hazardous substances to which they may be exposed; and
- C Incur no disciplinary action, including discharge or discrimination, against the employee due to the employee's exercise of the rights given to them under 29 CFR 1910.1200 and this written hazard communication program.

8.0 CHEMICAL INVENTORY

Each ECC office and project site containing hazardous chemicals must have a Chemical Inventory list. The inventory shall be placed with the MSDS binder in a conspicuous location at all times. An MSDS shall be available for each chemical listed in the inventory. The SSHO is responsible for updating the chemical inventory list whenever a new chemical is introduced into the area or a chemical is deleted from the area.

9.0 TRADE SECRETS

ECC recognizes trade secrets may be withheld from disclosure under 29 CFR 1910.1200 (i). At this time, however, ECC is not aware of any chemicals in our inventory for which there is not full and open disclosure of hazard communication.

SOP-HS 008 EMPLOYEE SAFETY TRAINING REQUIREMENTS

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to meet all training requirements for employees engaging in the following activities: hazardous waste site operations/remedial activities, lead and asbestos related activities, unexploded ordnance operations, and radiation activities. Employees shall meet the Federal/state/government training requirements, and/or Environmental Chemical Corporation (ECC) safety training policies and procedures prior to conducting work activities. ECC will not permit employees or subcontractors to participate in field activities until they have been adequately trained.

1.1 CPR/First Aid Training

When a medical facility or physician is not accessible within five minutes of an injury to a group of two or more employees for the treatment of injuries, at least two employees on each shift shall be qualified to administer first aid and CPR (in accordance with EM 385-1-1.03.A.02(a)).

2.0 ENVIRONMENTAL TRAINING REQUIREMENTS

2.1 HAZWOPER Requirements

All personnel engaging in work activities involving hazardous waste site operations and remedial activities shall satisfy safety training requirements in accordance with *29 CFR 1910.120 (e) and 29 CFR 1926.65*. It is ECC policy that persons under the HAZWOPER standard have successfully completed the following, at a minimum:

- OSHA 40-Hour Hazardous Waste Operations Training with a minimum of three days of supervised hazardous waste work;
- OSHA 8-Hour Refresher Training, for personnel who completed OSHA 40-Hour training more than 12 months previously;
- OSHA 8-Hour Supervisor Training, for the Field Supervisor and any other field personnel assigned supervisory duties;

2.2 Lead-Related Work Employee Training

The following are the minimal Fed OSHA training requirements for lead-related work. Many States have their own lead standards which will be more stringent than Fed OSHA. The Fed-OSHA standard applies where States have not enacted lead in construction standards.

2.2.1 General Training Requirements

ECC's general training requirements for Lead-related construction work can be found in *29 CFR 1926.59--Hazard Communication or Employee Right to Know (RTK) standard*. ECC's employee RTK program has been established and maintained and serves as an "employee awareness program" for each job site. The RTK program is comprised of four elements: general employee information about the chemicals expected to be encountered on the job site; a Material Safety Data Sheet binder of all chemicals on the job site; a warning label/sign system for hazardous chemicals on the job site; and employee training requirements about the RTK program.

2.2.2 Lead in Construction Training Requirements

In accordance with 29 CFR 1926.62, ECC's requires all employees who may be exposed to lead at or above the Action Level on any day, or who may be subject to exposure to a lead compound which can cause eye and skin irritation, to be trained for lead remediation. The frequency of the training is annually for any employee exposed at or above the Action Level for any day.

2.3 Asbestos Training Requirements

In 1987 the U.S. EPA wrote regulations for the Asbestos Hazard Emergency Response Act (AHERA) that specified training requirements for persons doing asbestos work in schools. On November 1992, the AHERA training requirements were extended to all public and commercial facilities. This means that all-asbestos inspection, design, supervision, and removal work done in the U.S. must be done by AHERA-accredited individuals. In addition, since July 1992, Cal/OSHA must certify asbestos consultants (site supervisors) and site surveillance technicians working in California. Cal/OSHA requires various AHERA accreditations.

Table 2-3 Asbestos Training and Experience

Position	Training Required	Job Description
Certified Asbestos Consultant/Site Supervisor	Building Inspection and Management Planning for Asbestos (5 day course) + annual refresher	Provide direct supervision for on-site asbestos abatement operations
	Project Design Class (5 day course) + annual refresher	Coordination with PGM regarding project status
	Practice and Procedures in Asbestos Control (5 day course) + annual refresher	Direct field labor and subcontractor activities
	Cal-OSHA certification (examination + experience) CA only	Coordination with site safety and quality control personnel
		Preparation of government reports

Position	Training Required	Job Description
Site Surveillance Technician	Building Inspection for Asbestos (3 day course) + annual refresher Practice and Procedures in Asbestos Control (5 day course) + annual refresher Cal-OSHA certification (examination + experience) CA only	Responsible for the inspection, monitoring and oversight of asbestos abatement work. Specific duties include: Project oversight Building inspections Monitoring for asbestos levels
Asbestos Removal Laborer	40 Hour AHERA Training Course	Responsible for the removal of asbestos material. Specific duties include the following: Removal of asbestos material Disposal of asbestos material in proper containment

3.0 UNEXPLODED ORDNANCE (UXO) TRAINING REQUIREMENTS

Due to the special training and experience requirements for UXO technicians at all levels; the UXO Division must be involved in the selection and hiring of UXO personnel. Final hiring authority must reside with the UXO Division Director.

Table 3-1 UXO Training and Experience

Position Description	Training Required (Note 1, 2, & 3)	Minimum Years Experience Necessary	Special Requirements
UXO Technician I	1,2, or 3	0	Successful completion of an approved course
UXO Technician II	1,2 or 3	N/A 3 years	Prior military EOD Experience in UXO remediation/range clearance
UXO Technician III	1,2 or 3	6 years 8 years	Prior military EOD Plus documented supervisory experience/training
Senior UXO Supervisor	1,2, or 3	10 years	Experienced in all aspects of UXO operations. Five years experience in supervisory positions
UXO QC Specialist	1,2, or 3	8 years	Experienced in all aspects of UXO operations. Documented QC training/experience
UXO Safety Officer	1,2, or 3	8 years	Experienced in all aspects of UXO operations. Documented safety training/experience

Note: 1. Graduate of the Army Bomb Disposal School at Aberdeen, MD
 2. Graduate of the Naval EOD School Indianhead, MD or Eglin AFB
 3. Graduate of a Department of Defense certified UXO training program

4.0 GENERAL RADIATION WORKER TRAINING REQUIREMENTS

4.1 Level 1 Radiation Worker Training

Level 1 Radiation Worker Training is required for all employees who come into direct contact with radioactive material or contamination and will receive, or have the potential to receive, or enter into an area where there is the potential to receive a Total Effective Dose Equivalent of 100 mrem in a calendar year. Level 1 personnel shall receive training as required by 10 CFR 19.12, Instructions to Workers. Personnel assigned to USACE sites must also meet the training requirements of EM 385-1-1.06.E.03(b). The training shall consist of a minimum of 8 hr classroom or computer-based training (i.e. Level 1 Core Training). Level 1 training shall include a minimum of 16 hours of on-the-job training in radiation safety practices. Annual refresher training is required for all personnel assigned to the ECC Analytical Laboratory Division. All other personnel shall receive refresher training on a biannual basis.

4.2 Level 2 Radiation Worker Training

Level 2 Radiation Worker Training is required for employees who are responsible for the oversight of Level 1 Radiation Workers, but will not receive, or have the potential to receive, or enter an area where there is a potential to receive a TEDE of 100 mrem in a calendar year. Level 2 shall receive training as required by 10 CFR 19.12, Instruction to Workers. Level 2 personnel assigned to USACE site must also meet the training requirements of EM 385-1-1.06.E.03(b). The training shall consist of a minimum of 8 hr classroom or computer-based training (i.e. Level 1 Core Training). Annual refresher training is required for all personnel assigned to the ECC Analytical Laboratory Division. All other personnel shall receive refresher training on a biannual basis.

4.3 Ancillary Employees

This classification applies only to the ECC Analytical Laboratory Division. Ancillary employees are defined as personnel who do not encounter radioactive materials, however they may handle sample containers or work near area where radioactive materials are stored. Ancillary employees shall receive a brief orientation that discusses the general concerns and controls related to radioactive materials.

4.4 Visitors

Visitors are defined as management personnel, auditors, subcontractors, and similar individuals performing periodic, non-intrusive maintenance, media representatives, members of the public, elected and appointed officials. Visitors who enter a radiological restricted area will receive a site-specific briefing and must be escorted by personnel who have received radiological training. Visitors shall enter Radiation Areas, Contamination Areas, High Radiation Areas, or Airborne Radioactive Material Areas.

SOP HS-009 MEDICAL SURVEILLANCE PROGRAM

1.0 POLICY

All ECC Environmental/Operational Division employees working in accordance with the HAZWOPER Standard (29 CFR 1910.120/1926.65) shall receive an extensive pre-employment/annual/exit medical screenings. Additional medical screening/tests may be required for specific areas of work (i.e., asbestos, radiation, lead, etc.). Personnel shall also receive periodic and follow-up examinations when appropriate. All medical monitoring information is properly documented and is maintained in each employee's personnel file.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to ensure that personnel are capable of performing their assigned activities and the health of employees is not compromised by potential exposure to chemical or physical agents found at work sites. This program is designed to support and monitor the effectiveness of the primary Health and Safety goal of controlling worker exposure to hazardous materials.

This procedure describes the ECC medical surveillance program requirements.

A medical surveillance program is required for employees who are or may be:

- Exposed to substances above permissible levels;
- Required to wear a respirator; and
- Exposed above permissible levels in accidents or emergency situations.

Employees who have a potential site exposure risk, work with potentially hazardous materials, are required to wear respiratory devices, or are required to be monitored under other regulations (e.g., DOT drivers) will be monitored. All employees who enter the exclusion or contamination reduction zone must participate in the medical surveillance program. Other personnel may be monitored on a case-by-case basis. All employees designated to participate in this program are required to do so as a condition of employment. Employees who do not fall within the above categories will not be included in the program.

The medical surveillance program consists of four parts: *a pre-employment medical examination, annual medical examination, project specific monitoring and/or medical examination (periodic), and exit medical examination.*

ECC's Corporate Health and Safety Manager or Project SSHO is responsible for providing the physician with the following:

- A copy of the OSHA regulation relating to hazardous waste site workers and its appendices (29 CFR 1910.120);
- Description of employee duties as they relate to exposures;
- Description of the personal protective equipment to be used;
- Information from previous examinations that may not be readily available to the physician; and
- A copy of the ECC Medical Surveillance Program.

Documentation of employee participation in the medical surveillance program and physician determination that the employees can wear PPE and respirators will be documented for OSHA record keeping purposes.

3.0 PRE-EMPLOYMENT MEDICAL EXAMINATIONS

The purpose of a pre-employment examination is three-fold. First, the examination shall identify any pre-existing illness or medical problem that may exclude a prospective applicant from employment. Secondly, the examination should determine if a candidate possesses sufficient physical capabilities to wear respiratory and personal protective equipment, work at heights, work in climatic extremes (heat and cold), and perform strenuous physical labor. Thirdly, the medical information (physical exam, spirometry, EKG, drug screening, chest x-ray (if applicable), urinalysis, audiogram) will serve as a baseline (pre-exposure) against the yearly or project specific monitoring can be compared, providing a mechanism for early detection of toxic substance exposure, and determine the employee's general fitness for potential exposure to chemicals and physical agents. ECC will fill out the Physical Examination Request Form while sending an employee for medical examination. It describes the nature of the tests to be performed. The Medical Clearance and Employee Medical Notification Form will be completed by the occupational physician and sent to ECC after the examination is completed.

During the performance of this pre-employment exam, the employee will prepare a pre-employment medical history.

In the pre-employment examination, the examining physician will determine if the prospective employee is capable of safely performing the job for that he/she is applying. At the conclusion of the pre-employment examination, the examining physician will carefully review the medical history and result of the physical examination along with laboratory reports, and then determine if the prospective employee is physically capable of safely performing the intended tasks.

4.0 ANNUAL MEDICAL EXAMINATIONS

The annual examination will include an updated medical history, including any occupational exposure from the previous year, and a detailed physical exam featuring components similar to the pre-employment examination. The physician will pay particular attention when comparing the bio-chemical parameters to help ensure that symptoms of toxic exposure that may have developed during the past year are recognized. The physician will complete and sign the medical certification/rejection section. A written report of the occupational and medical history, physical exam, and all lab work is required.

5.0 DRIVERS' MEDICAL EXAMINATION

ECC personnel do not transport hazardous materials; therefore U.S. Department of Transportation (DOT) physicals is not required. DOT physicals shall be checked for all subcontractors transporting hazardous materials for ECC. Driver physicals will consist of a short history and physical examination.

6.0 PROJECT SPECIFIC MONITORING AND/OR MEDICAL EXAMINATION

The project's treating physician will determine the contents of the project medical surveillance program. Any time an actual exposure occurs, the employee may be tested for that material and the advice of the consultant toxicologist sought. Mills-Peninsula Health Services serves as ECC's occupational medical consultant.

7.0 EXIT MEDICAL EXAMINATION

An exit medical examination is required at termination of employment or reassignment to an area where the employee would not be covered. The physician should pay particular attention to the condition of skin and document employee comments as to state of health. A written report of the occupational and medical history, physical exam, and all lab work is required.

In the event an individual leaves ECC without the required exit exam, ECC shall send a registered letter to the employee requesting a baseline physical at ECC's expense.

8.0 BOARD CERTIFIED OCCUPATIONAL MEDICAL PHYSICIAN

A Board Certified Occupational Medicine Physician shall conduct all medical surveillance examinations.

ENVIRONMENTAL CHEMICAL CORPORATION

PHYSICAL EXAM REQUISITION

Employee Name _____ Date of Exam _____

As required by 29 CFR 1910.120 (f) and 1926.65 (f), Environmental Chemical Corporation's (ECC's) Medical Surveillance Program shall be instituted by ECC for the following employees:

- All employees exposed to hazardous substances or health hazards above the PEL or published exposure levels for 30 days or more
- All employees who wear a respirator as required by 29 CFR 1910.139
- All employees who are injured/ill or develop symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation
- Members of HAZMAT Teams

The contents of ECC's medical examination shall consist of the following tests:

- _____ Basic exam (medical/occupational history, blood pressure, height, weight, Vision, CBC, SMAC 23, muscle skeletal exam)
- _____ Audiogram
- _____ Spirometry
- _____ Chest x-ray & "B" Reader (required if spirometry readings are abnormal)
- _____ EKG, resting, mounted and interpreted
- _____ Drug screening test (minimum 8 panel + alcohol)
- _____ Additional testing requirements _____

Person Requesting Exam _____

MEDICAL SURVEILLANCE AND EMPLOYEE MEDICAL NOTIFICATION

Employee Name _____ Date _____

Type of exam: Initial Annual Exit
Protocol: Hazardous Worker Administrator

Based upon my examination as per the OSHA Respirator Standard (29 CFR 1910.134), I attest that this employee (please check one):

- Has no medical contraindication to the use of supplied air, self contained breathing apparatus and air-purifying respirators
- Has medical restriction in the use of respiratory equipment. _____

As per OSHA HAZWOPER Standard (29 CFR 1910.120/1926.65), I have examined the individual above for medical conditions that would place him/her an increased risk of material impairment of health from work involving hazardous waste operations or emergency response (please check one):

- Has no medical contraindications to full participation in hazardous waste site work; when conducted under the conditions of adequate training and a health and safety plan.
- Has medical limitations that restrict full participation in hazardous waste site work. _____

Hearing Classifications:

- Normal
- Hearing loss Standard Threshold Shift (10 dB or more at 2000, 3000 and 4000Hz in either ear).

Employee Medical Notification:

Medical History	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal _____
Physical Exam	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal _____
Chest X-rays	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal _____
Spirometry	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal _____
EKG	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal _____
Laboratory Tests	<input type="checkbox"/> Normal	<input type="checkbox"/> Abnormal _____

Comments _____

- Your examination was normal
- The abnormalities noted above have resulted in restrictions in your work duties or in your use of personal protective equipment as described in the accompanying medical evaluation form.

Name of Physician / Telephone Numbers Signature of Examining Physician Date

SOP HS-010 SITE CONTROL PROGRAM

1.0 POLICY

ECC's Site Control Program is prepared in accordance with 29 CFR 1910.120 (d), 29 CFR 1926.65 (d), and 8 CCR 5192. A site control program shall be part of ECC's site safety and health program.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to minimize potential contamination of workers, protect the public from the site's chemical and physical hazards, and facilitate work activities prior to clean-up activities. Site control shall be established by artificial and/or physical barriers that isolate various hazards from potential targets.

3.0 SITE CONTROL PLANNING

Site control should be established in the planning stage of any job. The degree of site control is dependent on individual site characteristics, and must be flexible.

Variables Affecting Site Control

- Chemical and physical hazards
- Site characteristics
- Work activities
- Environmental factors

4.0 SITE CONTROL IMPLEMENTATION

Effective site control is contingent on good organization (equipment, people and tasks).

Procedures/Components

- Site map
- Site preparation
- Work zones
- Buddy system
- Site security
- Communication system

- Safe work practices
- Exposure minimization
- Nearest medical facility/route map

5.0 WORK ZONES

To reduce the accidental spread of hazardous substances by workers from the contaminated area to the clean area, work zones must be set up. The establishment of work zones will help to assure that personnel are properly protected against the hazards present where they are working. Uncontrolled hazardous waste substances sites are generally divided into three zones: Exclusion Zone (EZ) Contamination Reduction Zone (CRZ), and the Support Zone (SZ).

5.1 Exclusion Zone

An Exclusion Zone will be established around the immediate work area, and shall be clearly marked by a combination of traffic cones, barricades and/or high visibility barrier tape. The Exclusion Zone shall mark the area where direct handling operations are occurring and where field personnel may be exposed to chemical and physical hazards. The SSHO and the Field Supervisor shall regulate entry into the Exclusion Zone. No person shall enter an Exclusion Zone if they are not wearing the required protective clothing and equipment. All personnel exiting an Exclusion Zone must pass through the Contamination Reduction Zone, following the required decontamination procedure.

The size and shape of the Exclusion Zone shall be based on known and anticipated hazards, type of operation being performed, physical and topographical features, potential for site emergencies affecting surrounding areas, etc. Prior to the beginning of each day's operations, the SSHO shall observe site conditions and determine the location and boundaries of the exclusion zone. This work zone shall be reasonably large enough to accommodate equipment operations (i.e. 25 to 50 feet in all directions, etc.). The SSHO shall re-evaluate the location and boundaries of the Exclusion Zone as frequently as necessary, each day at minimum, to ensure that the Exclusion Zone incorporates all areas as described immediately above.

5.2 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) is the transition area between the contaminated area and the clean area. This zone is designed to reduce the probability that the clean Support Zone will become contaminated or affected by other site hazards. Decontamination procedures begin at the boundary between the Exclusion Zone and the CRZ, called the hotline.

5.3 Support Zone

The Support Zone is the location of the administrative and other support functions needed to keep the operations in the Exclusion Zone and CRZ running smoothly. Individuals entering the Support Zone shall be free of contamination.

All work zones shall be established daily before beginning operations. Site control requirements shall be reviewed during daily Tailgate Safety Meetings. A copy of the site map showing any adjustments to the work zone boundary shall be attached to the daily Tailgate Safety Meeting form whenever work zones are adjusted based on-site conditions.

6.0 SITE SECURITY

Site security shall be established by clearly marking all work zones at all possible locations of entry by unauthorized personnel in order to minimize and prevent public exposure to hazards created by site activities. In addition, the SSHO as well as ECC employees shall observe for pedestrian and vehicle traffic that may unknowingly enter designated work areas, and take action to stop their unauthorized entry. When necessary, field personnel may be assigned as security in order to warn persons or vehicles of the adjacent operation.

SOP HS-011 RESPIRATORY PROTECTION PROGRAM

1.0 POLICY

ECC's Respiratory Protection Program is prepared in accordance with 29 CFR 1910.134.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to protect the health of the employee from the control of occupational diseases caused by breathing contaminated air and the exposure to explosive/explosive contaminated airborne dust and explosive byproducts. The primary objective shall be to prevent atmospheric contamination by engineering controls. Respirators shall be provided by ECC that are applicable for the purpose intended.

3.0 DEFINITIONS

The following definitions are important terms used in the respiratory protection standard in this section.

Air-purifying respirator means a respirator with an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

Atmosphere-supplying respirator means a respirator that supplies the respirator user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARs) and self-contained breathing apparatus (SCBA) units.

Canister or cartridge means a container with a filter, sorbent, or catalyst, or combination of these items, that removes specific contaminants from the air passed through the container.

Demand respirator means an atmosphere-supplying respirator that admits breathing air to the face piece only when a negative pressure is created inside the face piece by inhalation.

Emergency situation means any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

Employee exposure means exposure to a concentration of an airborne contaminant that would occur if the employee were not using respiratory protection.

End-of-service-life indicator (ESLI) means a system that warns the respirator user of the approach of the end of adequate respiratory protection, for example, that the sorbent is approaching saturation or is no longer effective.

Escape-only respirator means a respirator intended to be used only for emergency exit.

Filter or air-purifying element means a component used in respirators to remove solid or liquid aerosols from the inspired air.

Filtering face piece (dust mask) means a negative pressure particulate respirator with a filter as an integral part of the face piece or with the entire face piece composed of the filtering medium.

Fit factor means a quantitative estimate of the fit of a particular respirator to a specific individual and typically estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator when worn.

Fit test means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator on an individual. (See also Qualitative fit test QLFT and Quantitative fit test QNFT.)

Helmet means a rigid respiratory inlet covering that also provides head protection against impact and penetration.

High efficiency particulate air (HEPA) filter means a filter that is at least 99.97% efficient in removing monodisperse particles of 0.3 micrometers in diameter. The equivalent NIOSH 42 CFR 84 particulate filters are the N100, R100, and P100 filters.

Hood means a respiratory inlet covering that completely covers the head and neck and may also cover portions of the shoulders and torso.

Immediately dangerous to life or health (IDLH) means an atmosphere that poses an immediate threat to life, would cause irreversible adverse health effects, or would impair an individual's ability to escape from a dangerous atmosphere.

Interior structural firefighting means the physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures that are involved in a fire situation beyond the incipient stage. (See 29 CFR 1910.155).

Loose-fitting face piece means a respiratory inlet covering that is designed to form a partial seal with the face.

Negative pressure respirator (tight fitting) means a respirator in which the air pressure inside the face piece is negative during inhalation with respect to the ambient air pressure outside the respirator.

Oxygen deficient atmosphere means an atmosphere with oxygen content below 19.5% by volume.

Physician or other licensed health care professional (PLHCP) means an individual whose legally permitted scope of practice (i.e., license, registration, or certification) allows him or her to independently provide, or be delegated the responsibility to provide, some or all of the health care services required by paragraph (e) of this section.

Positive pressure respirator means a respirator in which the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

Powered air-purifying respirator (PAPR) means an air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

Pressure demand respirator means a positive pressure atmosphere-supplying respirator that admits breathing air to the face piece when the positive pressure is reduced inside the face piece by inhalation.

Qualitative fit test (QLFT) means a pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to the test agent.

Quantitative fit test (QNFT) means an assessment of the adequacy of respirator fit by numerically measuring the amount of leakage into the respirator.

Respiratory inlet covering means that portion of a respirator that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both. It may be a face piece, helmet, hood, suit, or a mouthpiece respirator with nose clamp.

Self-contained breathing apparatus (SCBA) means an atmosphere-supplying respirator for which the breathing air source is designed to be carried by the user.

Service life means the period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection to the wearer.

Supplied-air respirator (SAR) or airline respirator means an atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

Tight-fitting face piece means a respiratory inlet covering that forms a complete seal with the face.

4.0 RESPIRATORY PROTECTION PROGRAM REQUIREMENTS

Where respirators are necessary to protect employee health or are required by ECC, ECC shall establish and implement a written respiratory protection program included in the SSHP with work site specific procedures for respirator use. The program shall be administered by ECC's Certified Safety Professional (C.S.P.), Certified Industrial Hygienist (C.I.H.), or a Competent Person trained in Respiratory Protection. The program shall include the following topics:

- C Procedures for selecting respirators;
- C Medical evaluations of respirator users;
- C Fit testing for tight-fitting respirators;
- C Procedures for routine and foreseeable emergency respirator use;
- C Maintenance procedures and schedules;
- C Procedures for adequate quality, quantity and flow of breathing air for atmosphere-supplying respirators;
- C Employee training in the respiratory hazards during routine and emergency situations;
- C Employee training in the use, limitations and maintenance of respirators;
- C Procedures for regular evaluation of program effectiveness.

Where respirators use is not required:

- C ECC may provide respirators at the request of employees if respirator use will not create a hazard.
- C ECC must establish and implement elements of a written respiratory protection program to ensure that any employee using a respirator voluntarily is medically able to use the respirator, and the respirator is cleaned, stored, and maintained so that use does not present a health hazard. Exception: voluntary use of filtering face pieces (dusk masks).

5.0 SELECTION AND USE OF RESPIRATORY PROTECTION EQUIPMENT

5.1 General Requirements

ECC shall select and provide respirators based on hazard(s) and user factors that affect respirator performance. ECC shall select NIOSH-certified respirators. Respirators shall be used in accordance with NIOSH certification. ECC shall identify and evaluate hazard(s). Evaluation shall include an estimate of employee exposures and an identification of each contaminant's chemical state and physical form. If employee exposure cannot be estimated, the atmosphere shall be considered IDLH. ECC shall select respirators from a number of models and sizes.

5.2 Respirators for IDLH Atmospheres

Due to the potential hazards existing in ECC employees shall not be permitted in IDLH atmospheres without the use of supplied air respirators. ECC shall provide the following respirators in IDLH atmospheres:

- C Full-face pressure demand SCBA certified for a minimum of 30 minutes, or
- C Combination full-face pressure demand supplied-air respirator with auxiliary self-contained air supply.

Respirators provided only for escape from IDLH atmospheres shall be NIOSH-certified for escape. All oxygen-deficient atmospheres shall be considered IDLH. Exception: If under all foreseeable conditions the oxygen concentration can be maintained within the ranges specified in Table 1.

Table 1.

Altitude (ft.)	Oxygen-deficient Atmospheres (%O₂) for which the employer may rely on atmosphere-supplying respirators
Less than 3,001	16.0 - 19.5
3,001 - 4,000	16.4 - 19.5
4,001 - 5,000	17.1 - 19.5
5,001 - 6,000	17.8 - 19.5
6,001 - 7,000	18.5 - 19.5

7,001 - 8,000	19.3 - 19.5
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5.3 Respirators For Atmospheres That Are Not IDLH

ECC shall provide a respirator adequate to protect the employee and ensure accordance with OSHA requirements under routine and reasonably foreseeable emergency situations. The respirator shall be appropriate for the chemical state and for the contaminant. For protection against gases and vapors, ECC shall provide:

- C An atmosphere-supplying respirator, or
- C An air-purifying respirator, provided that it is equipped with an end-of-service-life indicator (ESLI) certified by NIOSH; or implement a change schedule for canisters and cartridges based on information or data that will ensure canisters and cartridges are changed before the end of their service life. ECC shall describe in the respirator program the information and data basis for canister and cartridge change schedule.

For protection against particulates, ECC shall provide the following:

- C An atmosphere-supplying respirator; or
- C An air-purifying respirator with a filter certified by NIOSH
- C For contaminants with mass median aerodynamic diameters (MMAD) of at least 2 micrometers, an air-purifying respirator with any filter certified for particulates by NIOSH.

6.0 MEDICAL EVALUATIONS

ECC shall provide an annual medical evaluation before the employee is fit tested or required to use the respirator. Medical evaluations shall be conducted by a physician or other licensed health care professionals to determine if the employee is physically fit to wear a respirator. ECC's medical testing requirements and employee medical forms can be located in Section 9.0 - *Medical Surveillance Program*.

The following information must be provided to the physician during the medical examination:

- C The type and weight of the respirator to be used;

- C The duration and frequency of respirator use (including rescue and escape);
- C The expected physical work effort;
- C Additional protective clothing and equipment to be worn;
- C Temperature and humidity extremes that may be encountered.

Any supplemental information provided previously need not be provided for a subsequent evaluation if the information remains the same.

ECC shall provide the physician with a copy of the written respiratory protection program and the OSHA Standard.

6.1 Medical Determination

In determining the employee's ability to use a respirator, ECC shall:

- C Obtain a written recommendation regarding the employee's ability to use the respirator from the Board Certified Occupational Medicine Physician. The recommendation shall provide only the following information:
 - C Any limitations on respirator use related to the medical condition of the employee, or relating to the workplace conditions in which the respirator will be used, including whether or not the employee is medically able to use the respirator;
 - C The need, if any, for follow-up medical evaluations; and
 - C A statement that the PLHCP has provided the employee with a copy of the PLHCP's written recommendation.

If the respirator is a negative pressure respirator and the PLHCP finds a medical condition that may place the employee's health at increased risk if the respirator is used, ECC shall provide a Powered Air Purifying Respirator (PAPR) if the PLHCP's medical evaluation finds that the employee can use such a respirator; if a subsequent medical evaluation finds that the employee is medically able to use a negative pressure respirator, then ECC is no longer required to provide a PAPR.

6.2 Additional Medical Evaluations

At a minimum, ECC shall provide additional medical evaluations that comply with the requirements of this section if:

- C An employee reports medical signs or symptoms that are related to ability to use a respirator;
- C A PLHCP, supervisor, or the respirator program administrator informs ECC that an employee needs to be reevaluated;
- C Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- C A change occurs in workplace conditions (e.g., physical work effort, protective clothing, and temperature) that may result in a substantial increase in the physiological burden placed on an employee.

7.0 RESPIRATOR FIT-TESTING

- C Employees using tight-fitting face piece respirators shall pass a fit test;
- C Employees shall be fit tested prior to initial respirator use, whenever a different respirator face piece is used, and annually;
- C Additional fit tests shall be conducted whenever changes in the employee's physical condition are observed that could affect respirator fit.
- C If after fit testing the employee notifies ECC that the fit is unacceptable, the employee shall select a different respirator and be retested.
- C Qualitative fit test (QLFT) may only be used to fit test negative pressure air purifying respirators that must achieve a fit factor of 100 or less.
- C If the fit factor, through Quantitative fit test (QNFT) protocol, is equal to or greater than 100 for half face pieces, or equal to or greater than 500 for full face pieces, the QNFT has been passed.
- C Fit testing of tight-fitting atmosphere-supplying respirators and tight-fitting powered air-purifying respirators shall be accomplished by performing quantitative or qualitative fit testing in the negative pressure mode, regardless of the mode of operation (negative or positive pressure) that is used for respiratory protection.
- C Qualitative fit testing of these respirators shall be accomplished by temporarily converting the respirator user's actual face piece into a negative pressure respirator with appropriate filters, or by using an identical negative pressure air-purifying respirator face piece with the same sealing surfaces as a surrogate for the atmosphere-supplying or powered air-purifying respirator face piece.
- C Quantitative fit testing of these respirators shall be accomplished by modifying the face piece to allow sampling inside the face piece in the breathing zone of the user, midway between the nose and mouth. This requirement shall be accomplished by installing a permanent sampling probe onto a surrogate face piece, or by using a sampling adapter designed to temporarily provide a means of sampling air from inside the face piece.
- C Any modifications to the respirator face piece for fit testing shall be completely removed, and the face piece restored to NIOSH-approved configuration, before that face piece can

be used in the workplace.

8.0 USE OF RESPIRATORS

This section requires ECC to establish and implement procedures for the proper use of respirators. These requirements include prohibiting conditions that may result in face piece seal leakage, preventing employees from removing respirators in hazardous environments, taking actions to ensure continued effective respirator operation throughout the work shift, and establishing procedures for the use of respirators in IDLH atmospheres or in interior structural firefighting situations.

8.1 Face Piece Seal Protection

ECC shall not permit respirators with tight-fitting face pieces to be worn by employees who have:

- C *Facial hair that comes between the sealing surface of the face piece and the face or that interferes with valve function; or*
- C *Any condition that interferes with the face-to-face piece seal or valve function.*

If an employee wears corrective glasses or goggles or other personal protective equipment, ECC shall ensure that such equipment is worn in a manner that does not interfere with the seal of the face piece to the face of the user. Employees shall perform a user seal check each time the respirator is used.

8.2 Continuing Respirator Effectiveness

Appropriate surveillance shall be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, ECC shall reevaluate the continued effectiveness of the respirator.

ECC shall ensure that employees leave the respirator use area:

- C To wash their faces and respirator face pieces as necessary to prevent eye or skin irritation associated with respirator use; or
- C If they detect vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece; or
- C To replace the respirator or the filter, cartridge, or canister elements.

If the employee detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the face piece, ECC must replace or repair the respirator before allowing the employee to return to the work area.

8.3 Procedures for IDLH Atmospheres

For all IDLH atmospheres, ECC shall ensure that:

- C One employee or, when needed, more than one employee is located outside the IDLH atmosphere;
- C Visual, voice, or signal line communication is maintained between the employee(s) in the IDLH atmosphere and the employee(s) located outside the IDLH atmosphere;
- C The employee(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue;
- C ECC is notified before the employee(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue;
- C ECC or designee provides necessary assistance appropriate to the situation;
- C Employee(s) located outside the IDLH atmospheres are equipped with: Pressure demand or other positive pressure SCBAs, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either Appropriate retrieval equipment for removing the employee(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue of the employee(s) and would not increase the overall risk resulting from entry; or Equivalent means for rescue.

8.4 Procedures for Interior Structural Firefighting

In addition to the requirements set forth under paragraph (g)(3), in interior structural fires, ECC shall ensure that:

- C At least two employees enter the IDLH atmosphere and remain in visual or voice contact with one another at all times;
- C At least two employees are located outside the IDLH atmosphere; and
- C All employees engaged in interior structural firefighting use SCBAs.

9.0 MAINTENANCE AND CARE OF RESPIRATORS

This section requires ECC to provide for the cleaning and disinfecting, storage, inspection, and repair of respirators used by employees.

9.1 Cleaning and Disinfecting

ECC's Project Safety Officer shall provide each respirator user with a respirator that is clean, sanitary, and in good working order. The Project Safety Officer shall ensure that respirators are cleaned and disinfected or procedures recommended by the respirator manufacturer, provided that such procedures are of equivalent effectiveness. The respirators shall be cleaned and disinfected at the following intervals:

- C Respirators issued for the exclusive use of an employee shall be cleaned by the employee and disinfected as often as necessary to be maintained in a sanitary condition;
- C Respirators issued to more than one employee shall be cleaned and disinfected by the employee before being worn by different individuals;
- C Respirators maintained for emergency use shall be cleaned and disinfected by the employee after each use; and
- C Respirators used in fit testing and training shall be cleaned and disinfected by the employee after each use.

9.2 Storage

ECC shall ensure that respirators are stored as follows:

- C All respirators shall be stored in ECC's project trailer to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they shall be packed or stored to prevent deformation of the face piece and exhalation valve.

Emergency respirators shall be:

- C Kept accessible to the work area;
- C Stored in compartments or in covers that are clearly marked as containing emergency respirators; and
- C Stored in accordance with any applicable manufacturer instructions.

9.3 Inspection

ECC shall ensure that respirators are inspected as follows:

- C All respirators used in routine situations shall be inspected before each use and during cleaning by the Project Safety Officer;
- C All respirators maintained for use in emergency situations shall be inspected at least

monthly and in accordance with the manufacturer's recommendations, and shall be checked for proper function before and after each use by the Project Safety Officer; and

- C Emergency escape-only respirators shall be inspected before being carried into the workplace for use by the project safety officer.

ECC's Project Safety Officer shall ensure that respirator inspections include the following:

- C A check of respirator function, tightness of connections, and the condition of the various parts including, but not limited to, the face piece, head straps, valves, connecting tube, and cartridges, canisters or filters; and
- C A check of elastomeric parts for pliability and signs of deterioration.

Self-contained breathing apparatus shall be inspected monthly by the Project Safety Officer. Air and oxygen cylinders shall be maintained in a fully charged state and shall be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. ECC's Project Safety Officer shall determine that the regulator and warning devices function properly.

For respirators maintained for emergency use, ECC's Project Safety Officer shall:

- C Attest the respirator by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator; and provide this information on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

9.4 Repairs

ECC shall ensure that respirators that fail an inspection or are otherwise found to be defective are removed from service, and are discarded or repaired or adjusted in accordance with the following procedures:

- C Repairs or adjustments to respirators are to be made only by persons appropriately trained to perform such operations and shall use only the respirator manufacturer's NIOSH-approved parts designed for the respirator;
- C Repairs shall be made according to the manufacturer's recommendations and specifications for the type and extent of repairs to be performed; and
- C Reducing and admission valves, regulators, and alarms shall be adjusted or repaired only by the manufacturer or a technician trained by the manufacturer.

10.0 BREATHING AIR QUALITY AND USE

This section requires ECC to provide employees using atmosphere-supplying respirators (supplied-air and SCBA) with breathing gases of high purity.

ECC shall ensure that compressed air, compressed oxygen, liquid air, and liquid oxygen used for respiration accords with the following specifications:

Compressed and liquid oxygen shall meet the United States Pharmacopoeia requirements for medical or breathing oxygen; and

Compressed breathing air shall meet at least the requirements for Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:

- C Oxygen content (v/v) of 19.5-23.5%;
- C Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less;
- C Carbon monoxide (CO) content of 10 PPM or less;
- C Carbon dioxide content of 1,000 PPM or less; and
- C Lack of noticeable odor.

ECC shall ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.

ECC shall ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.

ECC shall ensure that cylinders used to supply breathing air to respirators meet the following requirements:

- C Cylinders are tested and maintained as prescribed in the Shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178);
- C Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Grade D breathing air; and
- C The moisture content in the cylinder does not exceed a dew point of -50 deg.F (-45.6 deg.C) at 1 atmosphere pressure.

ECC shall ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:

- C Prevent entry of contaminated air into the air-supply system;
- C Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F

(5.56 deg.C) below the ambient temperature;

- C Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically by the Project Safety Officer following the manufacturer's instructions.
- C Have a tag containing the most recent change date and the signature of the person authorized by ECC to perform the change. The tag shall be maintained at the compressor.
- C For compressors that are not oil-lubricated, ECC shall ensure that carbon monoxide levels in the breathing air do not exceed 10 PPM.
- C For oil-lubricated compressors, ECC shall use a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 PPM.
- C ECC shall ensure that breathing air couplings are incompatible with outlets for nonrespirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing airlines.
- C ECC shall use breathing gas containers marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84.

11.0 IDENTIFICATION OF FILTERS, CARTRIDGES AND CANISTERS

ECC shall ensure that all filters, cartridges and canisters used in the workplace are labeled and color coded with the NIOSH approval label and that the label is not removed and remains legible.

12.0 TRAINING AND INFORMATION

This section requires ECC to provide effective training to employees who are required to use respirators. The training must be comprehensive, understandable, and recur annually, and more often if necessary.

ECC shall ensure that each employee can demonstrate knowledge of at least the following:

- C Why the respirator is necessary and how improper fit, usage, or maintenance can compromise the protective effect of the respirator;
- C What the limitations and capabilities of the respirator are;
- C How to use the respirator effectively in emergency situations, including situations in which the respirator malfunctions;
- C How to inspect, put on and remove, use, and check the seals of the respirator;

- C What the procedures are for maintenance and storage of the respirator;
- C How to recognize medical signs and symptoms that may limit or prevent the effective use of respirators; and
- C The general requirements of this section.
- C The training shall be conducted in a manner that is understandable to the employee.
- C ECC shall provide the training prior to requiring the employee to use a respirator in the workplace.

12.1 Retraining

Retraining shall be administered annually, and when the following situations occur:

- C Changes in the workplace or the type of respirator render previous training obsolete;
- C Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
- C Any other situation arises in which retraining appears necessary to ensure safe respirator use.

13.0 PROGRAM EVALUATION

This section requires ECC to conduct evaluations of the workplace to ensure that the written respiratory protection program is being properly implemented, and to consult employees to ensure that they are using the respirators properly. ECC shall conduct evaluations of the workplace as necessary to ensure that the provisions of the current written program are being effectively implemented and that it continues to be effective. ECC shall regularly consult employees required to use respirators to assess the employees' views on program effectiveness and to identify any problems. Any problems that are identified during this assessment shall be corrected. Factors to be assessed include, but are not limited to:

- C Respirator fit (including the ability to use the respirator without interfering with effective workplace performance);
- C Appropriate respirator selection for the hazards to which the employee is exposed;
- C Proper respirator use under the workplace conditions the employee encounters; and
- C Proper respirator maintenance.

14.0 RECORD KEEPING

This section requires ECC to establish and retain written information regarding medical evaluations, fit testing, and the respirator program. This information will facilitate employee involvement in the respirator program, assist ECC in auditing the adequacy of the program, and provide a record for accordance determinations by OSHA.

14.1 Medical Evaluations

Records of medical evaluations required by this section must be retained and made available in accordance with 29 CFR 1910.1020.

14.2 Fit testing

ECC shall establish a record of the qualitative and quantitative fit tests administered to an employee including:

- C The name or identification of the employee tested;
- C Type of fit test performed;
- C Specific make, model, style, and size of respirator tested;
- C Date of test; and
- C The pass/fail results for QLFTs or the fit factor and strip chart recording or other recording of the test results for QNFTs.

Fit test records shall be retained for respirator users until the next fit test is administered. A written copy of the current respirator program shall be retained by ECC.

RESPIRATOR FIT TEST AND TRAINING ACKNOWLEDGMENT

29 CFR 1910.134 requires that a medical evaluation be conducted before an employee is fit tested or required to use a respirator. Medical evaluations shall be conducted by a physician or other licensed health care professionals to determine if the employee is physically fit to wear a respirator.

Employee _____ Date _____

Employer _____

Address _____

Respirator(s) Tested

Make & Model _____ Size _____
Make & Model _____ Size _____

Type of Test

_____ Isoamyl Acetate
_____ Irritant Smoke
_____ Saccharin Mist

Test Exercise (It is recommended that all tests be conducted in a well-ventilated area without the use of a respirator fit test bag).

_____ Positive/Negative Pressure Test
_____ Normal Breathing
_____ Deep Breathing
_____ Turn head side to side
_____ Nod head up and down
_____ Reading (Rainbow Passage)
_____ Grimace
_____ Bend over and touch toes
_____ Jogging in place

This certifies that the above name test subject has been informed of the hazard involved in working at a hazardous waste site, and has been given instructions in the use and care of the respirator selected.

Instructor Signature _____ Date _____

I certify that I understand the exercise which have been shown to me today are for properly fitting my respirator, and how to field test and inspect the respirator.

Employee Signature _____ Date _____

SOP HS-012 PERSONAL PROTECTIVE EQUIPMENT PROGRAM

1.0 POLICY

ECC's Personal Protective Equipment Program is prepared in accordance with 29 CFR 1910 Subpart I - Personal Protective Equipment (1910.132 to 1910.139) and Appendix B to 29 CFR 1910.120 and 29 CFR 1926.65.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to isolate individuals from chemical and physical hazards. ECC shall provide PPE to authorized site visitors and field personnel who require access to the Exclusion Zone and Contamination Reduction Zone. All visitors and employees shall be trained in the donning of PPE. Level of protection at any site will be selected on a site specific/task specific basis; however Level D will be worn as minimum for all site activities. The equipment list given below includes information on all levels of protection. ECC Personal Protective Equipment Program is in accordance with 29 CFR 1910 Subpart I PPE (1910.132 to 1910.139) and Appendix B to 29 CFR 1910.120 and 29 CFR 1926.65.

3.0 HAZARD ASSESSMENT AND PERSONAL PROTECTIVE EQUIPMENT SELECTION

ECC shall assess the workplace to determine if hazards are present, or are likely to be present that necessitates the use of personal protective equipment (PPE). If such hazards are present, or likely to be present, ECC shall:

- Select, and have each affected employee use, the types of PPE that will protect the affected employee from the hazards identified in the hazard assessment;
- Communicate selection decisions to each affected employee; and,
- Select PPE that properly fits each affected employee.

The level of protection may be upgraded or downgraded by the Project SSHO as condition changes at the site. Decisions for downgrading PPE requirements shall be approved by the client representative prior to implementation. The client representative should be notified by the SSHO of decisions for upgrading PPE requirements.

Reasons to upgrade include:

- Change in task that will increase contact or potential contact with hazardous materials;

- Action level is detected during monitoring; and
- Request of the individual employee.

Reasons to downgrade include:

- New information indicated the situation is less hazardous than originally believed;
- Change in site conditions that decreases the hazards; and
- Monitoring or lab analysis supports a decision to downgrade.

4.0 PERSONAL PROTECTIVE EQUIPMENT (LEVELS OF PROTECTION)

4.1 OSHA Level D

This is primarily a work uniform. Level D PPE is worn when no contaminants are reported on the site. Level D provides only minimal protection. The following PPE is required for Level D:

- Hard hat;
- Boots (steel toed);
- General work clothes;
- Safety glasses or safety goggles;
- High visibility vests; and
- Ear Protection (heavy equipment operations).

4.2 OSHA Modified Level D

Same as Level D with an increase protection level for splash hazards. No air purifying respirator.

- Insulated coveralls that shall be oversized to allow several layers of wool or pile or polypropylene clothing inside (optional);
- Disposable overalls (tyvek and saranex);
- Chemically resistant boots with steel toe and shank (ANSI Z41-1983, Safety Toe Footwear, Classification 75). Boots shall be equipped with deep traction sole and be oversized to allow two to three layers of woolen or similar socks inside; and

- Chemical gloves (PVC, Neoprene, Nitrile) that shall be oversized to allow two to three layers of wool or similar gloves inside;
- Safety glasses or goggles to guard against wind; and
- Hardhat (ANSI Z89.1-1986, Class A, B, and C) supplemented with a hard hat liner.

4.3 OSHA Level C

This is to be selected when the type of airborne substance is known, concentration measured, criteria for using air purifying respiratory met, and skin and eye exposure unlikely. Please note that all the requirements for hard hat, coveralls, and boots apply here.

- Half-face/full-face air purifying respirator;
- Tyvek/saranex coveralls - refer to Modified Level D;
- Neoprene outer gloves - refer to Modified Level D;
- Cotton inner gloves - refer to Modified Level D;
- Hardhat with face shield - refer to Modified Level D;
- Steel toed rubber boots - refer to Modified Level D;
- Rubber boot covers (where applicable);
- Taped wrist and ankle joints;
- Chemical goggles (where applicable);
- Hearing protection (where applicable); and
- Safety glasses (where applicable).

Protective clothing material must be compatible with the identified hazardous substances released. In an unknown situation the material providing the highest overall protection will be utilized. No individual will enter an area where respiratory protective equipment is required unless the person has been trained in the selection, use, care and limitations of the respirator, and the proper respirator has been selected for the task.

Whenever respirators are required, only equipment approved for that purpose will be used. The National Institute for Occupational Safety and Health (NIOSH) must approve this equipment. Only parts approved for the specific respirator system are to be used for replacement. Only a person specifically trained should perform work with respirators.

Proper selection of respirators is to be made according to guidance provided by ANSI standard Z88.2 -1980. The correct respirator is to be specified for each job.

4.4 OSHA Level B

Should be used when the type and atmospheric concentrations of substances have been identified or are estimated to be within tolerance parameters of PPE. Level B requires a high level of respiratory protection, but less skin protection. This involves atmospheres:

- With IDLH concentrations of specific substances that do not represent a severe skin hazard;
- That do not meet the criteria for use of air-purifying respirators; and
- That contain less than 19.5 percent oxygen.

The PPE required for Level B work is the same as Level C except a higher level of respiratory protection (supplied air) is required:

- Polytyvek or saranex suit;
- Gloves (inner and outer);
- Chemical boots (steel toed);
- Hard hat;
- Supplied air (SCBA or airline).

4.5 OSHA Level A

Should be used when the chemical substance has been identified and requires the highest level of protection for skin, eyes, and the respiratory system based on either:

- Measured (or potential for) high concentrations of atmospheric vapors, gases, or particulates;
- Site operations and work functions involving a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates of materials that are harmful to skin or capable of being absorbed through the intact skin; and
- Substances with a high degree of hazard to the skin are known or suspected to be present, and skin contact is possible.

Level A offers the highest level of respiratory, skin and eye protection. The following PPE is required:

- Fully encapsulated suit;
- Level B PPE/SCBA; and
- Two-way radio communication.

5.0 PPE INSPECTION PROGRAM

Regular inspection of PPE, together with respiratory protective equipment, shall be performed. ECC's SSHO shall ensure the following during PPE inspection:

- The wearer prior to use shall inspect all equipment;
- Respirator cartridges shall be disposed of daily (i.e., not reused);
- Respirator cartridges shall be changed during a work shift if the wearer experiences breakthrough, resistance, or uncomfortably warm inhaled air, or if the respirator/cartridges become wet or grossly contaminated;
- Disposable protective items may be reused during a work shift provided they are not damaged or obviously contaminated. Disposable items shall be disposed of daily;
- Reusable protective items shall be cleaned and inspected daily.

6.0 CARE OF EQUIPMENT

Personal protective equipment offers a high degree of protection, yet the equipment must be maintained and inspected on a regular basis.

Gloves and full body coveralls - Gloves and full body coveralls will be inspected and replaced promptly if a tear develops.

Respirators - Respirators will be inspected and leak-checked each time they are put on. Respirator cartridges will be replaced daily or more frequently if excessive resistance or breakthrough develops. A trained technician will perform all respiratory maintenance. Respirators will be cleaned daily. Each individual will be assigned exclusive use of a respirator. These respirators will be stored in separate plastic storage boxes with individual names on them.

Where employees provide their own protective equipment, ECC shall be responsible to assure its adequacy, including proper maintenance, and sanitation of such equipment.

All personal protective equipment shall be of safe design and construction for the work to be performed.

Defective or damaged personal protective equipment shall not be used.

7.0 TRAINING

ECC shall provide training to each employee who is required by this section to use PPE. Each such employee shall be trained to know at least the following:

- When PPE is necessary;
- What PPE is necessary;
- How to properly don, doff, adjust, and wear PPE;
- The limitations of the PPE; and,
- The proper care, maintenance, useful life and disposal of the PPE.

Each affected employee shall demonstrate an understanding of the training specified in this section, and the ability to use PPE properly, before being allowed to perform work requiring the use of PPE.

Should ECC have reason to believe that any affected employee who has already been trained does not have the understanding and skill required of this section, ECC shall retrain each such employee. Circumstances where retraining is required include, but are not limited to, situations where:

- Changes in the workplace render previous training obsolete; or
- Changes in the types of PPE to be used render previous training obsolete; or
- Inadequacies in an affected employee's knowledge or use of assigned PPE indicate that the employee has not retained the requisite understanding or skill.

ECC shall verify that each affected employee has received and understood the required training through a written certification that contains the name of each employee trained, the date(s) of training, and that identifies the subject of the certification.

SOP HS-013 DECONTAMINATION PROGRAM

1.0 POLICY

ECC's Decontamination Program is prepared in accordance with 29 CFR 1910 and 1926 - specifically 1910.120 and 1926.65 (HAZWOPER).

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to control the cross contamination of potentially hazardous chemicals to employees, equipment, and the environment. A Decontamination Program shall be mandatory for all Level A, B, and C work activities.

3.0 EXITING

3.1 Temporary Exit

The following decontamination procedures will occur when the employee departs the EZ for breaks, lunches, end of shift or if protective clothing has been damaged or torn.

- ECC shall provide a change room for changing into and out of protective clothing. A container will be made available for contaminated clothing;
- Remove PPE prior to entering support zone;
- Rinse gloves with soap and water to remove excess contamination;
- Gloves, protective suits, and booties will be removed;
- Thorough washing of the entire body is required as soon as possible after doffing of protective outer garments;
- In no case will contaminated clothing be worn out of the EZ or the CRZ; and
- Protective clothing will be stored in a manner to avoid potential contamination of inner surfaces.

Employees leaving the Exclusion Zone to pick up or drop off tools or instruments and immediately returning will not require decontamination but will not be permitted past the first station.

3.2 Exit from Site

Exit from the site requires procedures as described below:

- Remove PPE before entering support zone;

- All suits, gloves, booties used during the day must be removed at the end of the day's work or prior to leaving the site;
- Protective clothing will be stored in a manner to avoid potential contamination of inner surfaces; and
- Thorough washing of the entire body is required as soon as possible after doffing of protective outer garments.

4.0 MEANS OF DECONTAMINATION

All personnel, clothing and equipment leaving the contaminated area of the site may require decontamination to remove any harmful chemicals. The decontamination facilities will be located in the Contamination Reduction Zone. The decontamination procedures will be an organized process, with a series of stations to provide the maximum level of decontamination. The decontamination area will be clearly defined and equipped with all necessary equipment. All equipment/solutions used for decontamination will also be decontaminated and/or disposed of properly.

The procedure will vary from site to site but will always include the following steps:

- Equipment drop;
- Outer boots and gloves wash/rinse (step off);
- Outer boots and gloves removal;
- Suit wash/rinse/removal;
- Inner glove wash/rinse;
- Face piece removal, wash/rinse;
- Inner glove removal; and
- Field wash (face, hands).

Personnel assigned to the decontamination process will assist workers and decontaminate equipment and reusable protective gear. All field equipment such as probes, tools, etc., will be decontaminated with a solution of Alconox and water and rinsed with water before the equipment is stored for future use. Rinsate will be placed in 55-gallon drums.

For the decontamination of heavy equipment a bermed decontamination stage will be set up with a double layer of visqueen. The equipment will be brought to this area and washed with water and Alconox. The decontamination fluids/wastes may be solidified using floor-dry and placed in 55-gallon drums.

In an emergency situation, in which personnel may need to be transported off-site for immediate medical attention, individuals shall be covered (i.e., blanket, wrapping) to control the spread of contamination.

5.0 DISPOSAL OF DECONTAMINATION MATERIALS

Materials such as liquids, rinsate, sludge, and personal protective gear resulting from decontamination activities, will be placed in 55-gallon drums or other suitable containers. Decontamination materials shall be disposed of at an appropriate disposal facility, with the other contaminated waste materials. In the event of any accident during this process, emergency decontamination procedures shall be performed.

6.0 DECONTAMINATION STATION SET-UP

A decontamination station and appropriate decontamination procedures shall be established by the SSHO prior to the beginning of operations each day. The decontamination station shall be situated up-wind and up-gradient from the Exclusion Zone, be clearly marked, and provide a controlled access point for movement between the Exclusion Zone and Support Zone. Decontamination requirements shall be reviewed with field personnel during daily Tailgate Safety Meetings. The following decontamination procedures shall be implemented:

Level D:

- Move to the designated Decontamination area;
- Clean work boots of any accumulation of soil or mud;
- Remove leather work gloves; and
- Wash hands and face.

Level C:

- Move to the designated Decontamination area;
- Wash gloves, boots and any taped areas;
- Remove tape;
- Remove outer gloves;
- Remove suit from the inside out;
- Remove respirator face piece;
- Remove inner gloves; and
- Wash hands, face and any exposed skin.

Level B:

- Move to the designated Decontamination area;
- Wash gloves, airline hose/tanks, boots and any taped areas;
- Remove tape;
- Remove outer gloves;

- Remove/disconnect airline hose/tank;
- Remove suit from the inside out;
- Remove respirator face piece;
- Remove inner gloves; and
- Wash hands, face and any exposed skin.

*Level A:

- Move to the designated Decontamination area;
- Wash gloves, boots, encapsulated suit and any taped areas;
- Remove tape;
- Remove outer gloves;
- Remove encapsulated suit;
- Remove SCBA;
- Remove inner gloves; and
- Wash hands, face and any exposed skin.

**Due to the extreme hazards involved in Level A field activities, Level A work shall only be conducted by certified emergency response personnel.*

7.0 DECONTAMINATION EQUIPMENT/SUPPLIES

Decontamination supplies to be provided at the work site by Environmental Chemical Corporation include visqueen plastic, duct tape, traffic cones, barrier tape, a wading pool or large plastic wash tube (large enough to stand in with both feet), bucket, long handled scrub brush, waste collection containers (open-top 55 gallon drum with drum liner, or several lawn size garbage bags and Tri Sodium Phosphate (TSP) or equivalent soap/decontamination solution.

The decontamination solution shall be made by mixing approximately 1/8 cup of TSP with one to two gallons of water (in a bucket), and shall be made daily for use. The SSHO shall ensure that the decontamination station is set up completely prior to beginning work each day. All field personnel exiting an Exclusion Zone must pass through the decontamination station and complete the required decontamination procedure before entering the Support Zone. All waste generated from decontamination shall be properly packaged and managed as a regulated hazardous waste, if appropriate.

8.0 EQUIPMENT DECONTAMINATION

In addition to personnel, all equipment and hand tools used in the Exclusion Zone shall be decontaminated in the CRZ prior to entering the Support Zone. Equipment decontamination will consist of the following: wiping down with lint free rags moistened with decontamination

solution prior to entering the Support Zone; tires and bucket/blade shall be cleaned with a wire brush and all soils collected and placed with excavated spoils. ECC's SSHO shall be responsible for monitoring all vehicle decontamination prior to exiting the site. Personnel engaged in vehicle decontamination shall wear protective equipment including disposable clothing and respiratory protection consistent with the requirements of this specification and the SSHP.

A clean area shall be established by ECC for performing equipment maintenance. This area shall be used when personnel are required by normal practices to expose themselves to contact with ground soil and crawling under a vehicle to change engine oil. All equipment shall be decontaminated by wash down in the CRZ prior to maintenance work.

Maintenance work such as greasing heavy equipment will not require decontamination unless the job requires body contact with the ground soil within the EZ or CRZ. Seats of equipment and vehicles used in the EZ will not be covered with cloth material. They will be free from cracks or holes that would allow dust to enter seat padding or shall be covered with a temporary sheet vinyl covering.

SOP HS-014 HEARING CONSERVATION PROGRAM

1.0 POLICY

Environmental Chemical Corporation's (ECC's) Hearing Protection Program is prepared in accordance with 29 CFR 1910.95 and 29 CFR 1926.

2.0 OBJECTIVE

The objective of this standard operating procedure (SOP) is to protect the hearing of employees who may be exposed from noise levels exceeding the permissible exposure levels (PELs) set by OSHA.

3.0 HEARING CONSERVATION PROGRAM REQUIREMENTS

ECC shall administer a continuing, effective hearing conservation program whenever employee noise exposures equal or exceed an 8-hour time-weighted average sound level (TWA) of 85 decibels measured on the A scale (slow response) or, equivalently, a dose of fifty percent.

3.1 Action Level

An 8-hour time-weighted average of 85 decibels or a dose of fifty percent shall also be referred to as the action level.

4.0 MONITORING

When information indicates that any employee's exposure may equal or exceed an 8-hour time-weighted average of 85 decibels, ECC shall develop and implement a monitoring program.

Where circumstances such as high worker mobility, significant variations in sound level, or a significant component of impulse noise make area monitoring generally inappropriate, ECC shall use representative personal sampling to comply with the monitoring requirements of this paragraph unless ECC can show that area sampling produces equivalent results.

All continuous, intermittent and impulsive sound levels from 80 decibels to 130 decibels shall be integrated into the noise measurements.

Instruments used to measure employee noise exposure shall be calibrated to ensure measurement accuracy.

Monitoring shall be repeated whenever a change in production, process, equipment or controls increases noise exposures to the extent that:

Additional employees may be exposed at or above the action level; or

The attenuation provided by hearing protectors being used by employees might be rendered inadequate to meet the requirements of paragraph (j) of this section.

Protection against the effects of noise exposure shall be provided when the sound levels exceed those shown in Table 1.0 when measured on the A scale of a standard sound level meter at slow response.

When employees are subjected to sound exceeding those listed in Table 1.0, feasible administrative or engineering controls shall be utilized. If such controls fail to reduce sound levels within the levels of Table 1.0, personal protective equipment shall be provided and used to reduce sound levels within the levels of the table.

If the variations in noise level involve maximum at intervals of 1 second or less, it is to be considered continuous.

TABLE 1.0 - PERMISSIBLE NOISE EXPOSURES (1)

Duration per day, hours | Sound level dBA slow response

8.....	90
6.....	92
4.....	95
3.....	97
2.....	100
1 1/2.....	102
1.....	105
2	110
1/4 or less.....	115

Footnote (1) when the daily noise exposure is composed of two or more periods of noise exposure of different levels, their combined effect should be considered, rather than the individual effect of each. If the sum of the following fractions: $C(1)/T(1) + C(2)/T(2) + \dots + C(n)/T(n)$ exceeds unity, then, the mixed exposure should be considered to exceed the limit value. C_n indicates the total time of exposure at a specified noise level, and T_n indicates the total time of

exposure permitted at that level. Exposure to impulsive or impact noise should not exceed **140 dB** peak sound pressure level.

5.0 EMPLOYEE NOTIFICATION

ECC shall notify each employee exposed at or above an 8-hour time-weighted average of 85 decibels of the results of the monitoring.

6.0 AUDIOMETRIC TESTING PROGRAM

ECC shall establish and maintain an audiometric testing program as provided in this paragraph by making audiometric testing available to all employees whose exposures equal or exceed an 8-hour time-weighted average of 85 decibels. The program shall be provided at no cost to employees.

Hearing measurements (audiograms) made periodically are the best way to determine whether a hearing conservation program is preventing noise-induced hearing loss. Hearing measurements are made at least annually. For very high noise exposures, measurements shall be made more often, until the noise exposure is reduced to safe levels.

Hearing measurements also help to accomplish the following:

- C Document hearing-threshold changes that may occur during employment;
- C Determine the ability to hear (communicate) effectively at work, i.e., direction, warning signals;
- C Assist in proper job placement; and
- C Diagnose pre-existing hearing loss prior to employment and establish A baseline hearing ability.

Audiometric tests shall be performed by a licensed or certified audiologist, otolaryngologist, or other physician, or by a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation, or who has satisfactorily demonstrated competence in administering audiometric examinations, obtaining valid audiograms, and properly using, maintaining and checking calibration and proper functioning of the audiometers being used. A technician who operates microprocessor audiometers does not need to be certified. A technician who performs audiometric tests must be responsible to an audiologist, otolaryngologist or physician.

6.1 Baseline Audiogram

Within 6 months of an employee's first exposure at or above the action level, ECC shall establish a valid baseline audiogram against which subsequent audiograms can be compared.

6.2 Annual Audiogram

At least annually after obtaining the baseline audiogram, ECC shall obtain a new audiogram for each employee exposed at or above an 8-hour time-weighted average of 85 decibels.

6.3 Evaluation of Audiogram

Each employee's annual audiogram shall be compared to that employee's baseline audiogram to determine if the audiogram is valid and if a standard threshold shift has occurred. A technician may do this comparison.

If the annual audiogram shows that an employee has suffered a standard threshold shift, ECC may obtain a retest within 30 days and consider the results of the retest as the annual audiogram.

The audiologist, otolaryngologist, or physician shall review problem audiograms and shall determine whether there is a need for further evaluation. ECC shall provide to the person performing this evaluation the following information:

- C A copy of the requirements for hearing conservation;
- C The baseline audiogram and most recent audiogram of the employee to be evaluated;
- C Measurements of background sound pressure levels in the audiometric test room.

Records of audiometer calibrations required by paragraph (h)(5) of this section.

6.4 Follow-up Procedures

If a comparison of the annual audiogram to the baseline audiogram indicates a standard threshold shift, the employee shall be informed of this fact in writing, within 21 days of the determination.

Unless a physician determines that the standard threshold shift is not work related or aggravated by occupational noise exposure, ECC shall ensure that the following steps are taken when a standard threshold shift occurs:

- C Employees not using hearing protectors shall be fitted with hearing protectors, trained in their use and care, and required to use them.
- C Employees already using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation if necessary.
- C The employee shall be referred for a clinical audiological evaluation or an otological examination, as appropriate, if additional testing is necessary or if ECC suspects that a

medical pathology of the ear is caused or aggravated by the wearing of hearing protectors.

- C The employee is informed of the need for an otological examination if a medical pathology of the ear that is unrelated to the use of hearing protectors is suspected.

If subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 decibels indicates that a standard threshold shift is not persistent, ECC:

- C Shall inform the employee of the new audiometric interpretation; and
- C May discontinue the required use of hearing protectors for that employee.

6.5 Standard Threshold Shift

As used in this section, a standard threshold shift is a change in hearing threshold relative to the baseline audiogram of an average of 10 dB or more at 2000, 3000, and 4000 Hz in either ear.

In determining whether a standard threshold shift has occurred, allowance may be made for the contribution of aging (presbycusis) to the change in hearing level by correcting the annual audiogram according to the procedure described in Appendix F: "Calculation and Application of Age Correction to Audiograms."

6.6 Audiometric Test Requirements

Audiometric tests shall be pure tone, air conduction, hearing threshold examinations, with test frequencies including as a minimum 500, 1000, 2000, 3000, 4000, and 6000 Hz. Tests at each frequency shall be taken separately for each ear.

Audiometric tests shall be conducted with audiometers (including microprocessor audiometers) that meet the specifications of, and are maintained and used in accordance with, American National Standard Specification for Audiometers, S3.6-1969, which is incorporated by reference as specified in Sec. 1910.6.

6.7 Audiometer Calibration

The functional operation of the audiometer shall be checked before each day's use by testing a person with known, stable hearing thresholds, and by listening to the audiometer's output to make sure that the output is free from distorted or unwanted sounds. Deviations of 10 decibels or greater require an acoustic calibration.

Audiometer calibration shall be checked acoustically at least annually. Test frequencies below 500 Hz and above 6000 Hz may be omitted from this check. Deviations of 15 decibels or greater require an exhaustive calibration.

7.0 HEARING PROTECTORS

ECC shall make hearing protectors available to all employees exposed to an 8-hour time-weighted average of 85 decibels or greater at no cost to the employees. Hearing protectors shall be replaced as necessary.

ECC shall ensure that hearing protectors are worn:

- C For all explosive blasts. Due to the potential of blasts exceeding 115 dBA, personal ear protection equivalent to the combination of earplugs and earmuffs shall be required;
- C By an employee who is required to wear personal protective equipment; and
- C By any employee who is exposed to an 8-hour time-weighted average of 85 decibels or greater, and who:
- C Has not yet had a baseline audiogram established pursuant to paragraph (g)(5)(ii); or

Has experienced a standard threshold shift.

Employees shall be given the opportunity to select their hearing protectors from a variety of suitable hearing protectors provided by ECC.

ECC shall provide training in the use and care of all hearing protectors provided to employees.

ECC shall ensure proper initial fitting and supervise the correct use of all hearing protectors.

8.0 HEARING PROTECTOR ATTENUATION

ECC shall evaluate hearing protector attenuation for the specific noise environments in which the protector will be used.

Hearing protectors must attenuate employee exposure to at least to an 8-hour time-weighted average of 90 decibels.

For employees who have experienced a standard threshold shift, hearing protectors must attenuate employee exposure to an 8-hour time-weighted average of 85 decibels or below.

The adequacy of hearing protector attenuation shall be re-evaluated whenever employee noise exposures increase to the extent that the hearing protectors provided may no longer provide adequate attenuation. ECC shall provide more effective hearing protectors where necessary.

9.0 TRAINING PROGRAMS

ECC shall institute a training program for all employees who are exposed to noise at or above an 8-hour time-weighted average of 85 decibels, and shall ensure employee participation in such program.

The training program shall be repeated annually for each employee included in the hearing conservation program. Information provided in the training program shall be updated to be consistent with changes in protective equipment and work processes.

ECC shall ensure that each employee is informed of the following:

- C The effects of noise on hearing;
- C The purpose of hearing protectors, the advantages, disadvantages, and attenuation of various types, and instructions on selection, fitting, use, and care; and
- C The purpose of audiometric testing, and an explanation of the test procedures.

10.0 ACCESS TO INFORMATION AND TRAINING MATERIALS

ECC shall make available to affected employees or their representatives' copies of this standard and shall also post a copy in the workplace.

ECC shall provide to affected employees any informational materials pertaining to the standard that are supplied to ECC by the Assistant Secretary.

ECC shall provide, upon request, all materials related to ECC's training and education program pertaining to this standard to the Assistant Secretary and the Director.

11.0 RECORD KEEPING

ECC shall maintain an accurate record of all employee exposure measurements required by 29 CFR 191.95.

11.1 Audiometric tests

ECC shall retain all employee audiometric test records. This record shall include:

- C Name and job classification of the employee;
- C Date of the audiogram;
- C The examiner's name;
- C Date of the last acoustic or exhaustive calibration of the audiometer; and
- C Employee's most recent noise exposure assessment.

- C ECC shall maintain accurate records of the measurements of the background sound pressure levels in audiometric test rooms.

11.2 Record Retention

ECC shall retain records required in this paragraph (m) for at least the following periods.

- C Noise exposure measurement records shall be retained for two years.
- C Audiometric test records shall be retained for the duration of the affected employee's employment at ECC.

11.3 Access to Records

All records required by this section shall be provided upon request to employees, former employees, representatives designated by the individual employee, and the Assistant Secretary. The provisions of 29 CFR 1910.20.

11.4 Transfer of Records

If ECC ceases to do business, ECC shall transfer to the successor employer all records required to be maintained by this section, and the successor employer shall retain them for the remainder of the period as required by this standard.

SOP HS-015 COLD STRESS MONITORING PROGRAM

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to implement cold stress monitoring and preventative measures to control employee cold disorders.

2.0 COLD DISORDERS

Cold injury is classified as either localized, as in frostbite or generalized as in hypothermia. The main factors contributing to cold injury are exposure to humidity and high winds, contact with wetness or metal, inadequate clothing, age and general health. Physical conditions that worsen the effect of cold include allergies, vascular disease, excessive smoking and drinking and specific drugs and medicines.

2.1 Hypothermia

Air temperature alone is not enough to judge the cold hazard of a particular environment. Most cases of hypothermia develop in air temperatures between 2-10 C (30-50 degrees F). However, by the time you consider a factor such as the wind-chill, the effective temperature could be significantly lower.

Symptoms of hypothermia include the following: uncontrollable shivering and the sensation of cold, the heartbeat slows and sometimes becomes irregular, pulse weakens and the blood pressure changes. Other symptoms that can be seen before complete collapse are cool skin, slow, irregular breathing, low blood pressure, apparent exhaustion, fatigue, confusion and inappropriate behavior.

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

2.2 Frostbite

Frostbite can occur without hypothermia when extremities do not receive sufficient heat from the central body stores. This can occur because of inadequate circulation and/or because of inadequate insulation. Frostbite occurs when there is freezing of the fluids around the cells of the body tissues. This freezing is from exposure to extremely low temperatures. The condition results in damage to and loss of tissue. The most vulnerable parts of the body are the extremities (nose, cheeks, ears and fingers).

2.2.1. Degrees of Frostbite

First degree: freezing without blistering or peeling;

Second degree: freezing with peeling and blistering;

Third degree: freezing with death of skin tissues and possibly of the deepest tissues.

2.2.2. Symptoms of Frostbite

- 1.) Skin discoloration;
- 2.) Pain may be felt at first, but subsides;
- 3.) Blisters may appear;
- 4.) The affected part is cold and numb.

2.3 Trench Foot

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 pains occur, and may be followed by blistering, death of skin tissue, and ulceration. When other areas of the body are affected, the condition is known as chilblains.

2.4 Frostnip

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

3.0 EVALUATING COLD ENVIRONMENTS

Indices for evaluating cold environments include Threshold Limit Values (TLVs) for cold stress and wind-chill index (Table 3-1). The cold stress TLVs are intended to protect workers from the severest effects of cold stress (hypothermia) and cold injury and to describe exposures to cold working conditions under which it is believed that nearly all workers can be repeatedly exposed without adverse health effects.

The TLV objective is to prevent the deep body temperature from falling below 36 degrees C (96.8 degrees F) and to prevent cold injury to body extremities (deep body temperature is the core temperature of the body determined by conventional methods for rectal temperature measurements). For a single, occasional exposure to a cold environment, a drop in core temperature to no lower than 35 degrees C (95 degrees F) should be permitted. In addition to provisions for total body protection, the TLV objective is to protect all parts of the body with emphasis on hands, feet, and head from cold injury.

The wind-chill factor is a cooling effect of any combination of temperature and wind velocity or air movement. Everyone facing exposure to low temperatures and wind should consult the wind-chill index. The wind-chill temperature has no significance other than that expressed - the effect on the body.

The wind-chill index does not take into account the following:

- 1.) The body part exposed to cold;
- 2.) The level of activity with its effect on body heat production;
- 3.) The amount of clothing worn.

Table 3-1 Wind-chill Index

Cooling Power of Wind on Exposed Flesh Expressed as Equivalent Temperature (under calm conditions)

Estimated Wind Speed (in mph)	Actual Temperature Readings (F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature (F)											
Calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	31	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
Wind speed greater than 40 mph have little additional effect	LITTLE DANGER In < hr with dry skin. Maximum danger of false sense of security			INCREASING DANGER Danger from freezing of exposed flesh within one minute				GREAT DANGER Flesh may freeze within 30 seconds				
Trench foot and immersion foot may occur at any point on this chart												

Blue, yellow and green hi-lights: Equivalent chill temperature requiring dry clothing to maintain core body temperature above 36°C (96.8°F) per cold stress TLV.

4.0 COLD STRESS PREVENTION

In preventing cold stress one must consider factors relating both to the individual and the environment.

Acclimatization, water and salt replacement, medical screening, continuing medical supervision, proper work clothing, and training and education will contribute to the prevention of cold stress and injury related to working in a cold environment.

Control of the environment involves engineering controls (i.e. heaters, warm air jets, spot heating, heated warming shelters), administrative work practice controls (i.e. rest breaks, assigning extra workers, enforcing frequent intake of warm drinks - no caffeine or alcohol, allowing new employees time to adjust to conditions before they work full-time in cold environments), work-rest schedules, environmental monitoring, and consideration of the wind-chill temperature. The buddy system is highly recommended while conducting work activities in cold environments.

4.1 Engineering Controls

- Spot heating should be used to increase temperature at the workplace.
- If fine work is to be performed with bare hands for 10 or 20 minutes or more, special provisions should be made to keep the worker's hands warm.
- Shield work area if increased air velocity (wind, draft, and ventilating equipment).
- Unprotected metal chairs should not be used.
- Implement heated warm shelters and make available for workers.
- At temperatures below -1C (30F), metal handles of tools and control bars should be covered with thermal insulating material.

4.2 Administrative Work Practices Controls

- A work-rest schedule to reduce the peak of cold stress.
- Enforce frequent intake of warm, sweet caffeine-free, non-alcoholic drinks or soup.
- Moving work to warmer areas whenever possible.
- Assigning extra workers to highly demanding tasks.
- Allowing new employees time to adjust to conditions before they work full-time in cold environments
- Arranging work to minimize sitting still or standing for long periods of time.
- Teaching workers the basic principles of preventing cold stress and emergency response to cold stress.

5.0 A Control Program For Cold Stress

A control program for cold stress should include the following elements:

- Medical supervision of workers;
- Employee orientation and training on cold stress;
- Employee acclimation to cold temperatures.
- Work-rest regimens, with heated rest areas and enforced rest breaks;
- Scheduled drink breaks for recommended fluids;
- Environmental monitoring to determine wind chill;
- Reduction of cold stress through engineering and administrative controls, and the use of personal protective equipment.

SOP HS-016 HEAT STRESS MONITORING PROGRAM

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to control heat exposure to employees by conducting effective monitoring. The hazards of exposure to hot environments may cause a variety of illnesses including heat rash, muscle cramps, heat exhaustion and heat stroke. Onset of signs and symptoms of exposure can occur rapidly, and may progress to a medical emergency (i.e., heat stroke) without early intervention.

2.0 HEAT STRESS

Heat stress is a hazard during warm weather or when personnel are wearing PPE, that aggravates the heat stress hazard. Heat stress can occur even when temperatures are moderate if the body's physiological processes fail to maintain a normal body temperature. The resulting physical reactions that occur are fatigue, irritability, anxiety, and a decrease in concentration, dexterity, and/or movement. Onset of signs and symptoms of exposure can occur rapidly, and may progress to a medical emergency (i.e. heat stroke) without early intervention. In extreme cases, death can result if the patient is not given immediate treatment.

2.1 Symptoms of Heat Exhaustion

Heat exhaustion occurs when your body cannot sweat enough to cool you off. It generally happens when you are working or exercising in hot weather. Symptoms include:

- Fatigue, weakness, dizziness, or nausea
- Cool, clammy, pale, red, or flushed skin

2.2 Symptoms of Heat Stroke

Heat exhaustion can sometimes lead to heat stroke. Heat stroke requires emergency treatment. It happens when your body stops sweating but the body temperature continues to rise, often to 105 degrees or higher. Symptoms include the following:

- Confusion, delirium, or unconsciousness
- Hot, dry, red or flushed skin, even under the armpits

3.0 CONTROL MEASURES

To control the exposure to heat stress during any site activity, the following safety procedures shall be implemented:

- All employees shall be monitored for heat stress;
- Potable drinking water shall be available at all times;
- Frequent rest breaks shall be taken;
- A buddy system shall be utilized;
- Shade (i.e., fixed or portable canopy) shall be provided;
- Employees shall be encouraged to eat a normal diet and get proper rest; and
- Employees shall be encouraged to refrain from consuming diuretics, including caffeine from coffee and tea beverages, or any form of alcohol. (Note: Consumption of alcohol is prohibited during work hours).
- To control exposure to heat stress hazard, monitoring shall commence when personnel are required to wear personal protective equipment greater than Level D. The American Conference Government of Governmental Hygienists (ACGIH) has set TLVs for heat extremes (presented in Table 16.1). This table presents levels for fully acclimatized, fully clothed (e.g., lightweight pants and shirt) workers and for workers wearing low permeability personal protective equipment (PPE).

Table 16.1 Heat Threshold Limit Values for Different Work Schedules

WORKLOAD						
Work/Rest Regimen	<u>Light</u> Street Clothing	<u>Light</u> PPE Clothing	<u>Moderate</u> Street Clothing	<u>Moderate</u> PPE Clothing	<u>Heavy</u> Street Clothing	<u>Heavy</u> PPE Clothing
Continuous Work	86° F	80° F	80° F	72° F	77° F	71° F
75% Work 25% Rest each hour	88° F	82° F	82° F	76° F	79° F	73° F
50% Work 50% Rest each hour	90° F	84° F	85° F	79° F	81° F	75° F
25% Work 75% Rest each hour	92° F	86° F	88° F	82° F	86° F	80° F

Note: Light moderate work includes operating heavy equipment. Heavy work includes hand shoveling or other manual labor activities.

4.0 MONITORING

Heat stress monitoring shall begin when ambient conditions exceed 85 °F when working in Level D and 70°F when working in Modified Level C (see Table 16.2). For clear weather

conditions (i.e. 100 percent sunshine) ambient temperatures shall be decreased by 5 °F (i.e., 65 °F and 80 °F respectively) to determine when to begin monitoring. Ambient conditions shall be determined by maintaining a properly calibrated outdoor thermometer in the shade at each work station, or by monitoring local weather reports throughout each work shift.

4.1 Heart Rate

Heat stress exposure shall be evaluated by monitoring the heart rate. The radial pulse shall be taken for 30 seconds immediately upon beginning to rest (i.e., at the beginning of a rest break). This rate shall be multiplied by two to determine the heart rate at initial rest. This rate should not exceed 110 beats per minute (bpm). Following three minutes of rest, the heart rate shall be taken again (same procedure). The difference between the initial and third minute heart rate should be greater than 10 bpm.

If the initial rate exceeds 110 bpm OR the difference between the initial and third minute rate is less than 10 bpm, then the work period shall be shortened by 33 percent and the rest period increased by 33 percent.

Table 16.2 Heat Stress Monitoring Frequency

Temperature	Modified Level D	Modified Level C	Level C or B
> 90°F	every 45 minutes	every 30 minutes	every 20 minutes
85-90 °F	every 60 minutes	every 45 minutes	every 30 minutes
80-85 °F	every 90 minutes	every 75 minutes	every 60 minutes
70-80 °F	every 120 minutes	every 105 minutes	every 90 minutes

The SSHO shall be responsible for taking all heart rates. All heart rate monitoring shall be recorded on an Exposure Monitoring Log. Monitoring shall begin at the first rest break. The first rest break shall be taken within the first hour of work when ambient conditions exceed 85°F if working in Level D, and within the first 30 minutes if ambient conditions exceed 70 °F if working in Modified Level C.

4.2 Oral Temperature

Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

If oral temperature exceeds 99.6EF (37.6EC), shorten the next work cycle by one-third without changing the rest period.

*Environmental Chemical Corporation
SOP HS-016 Heat Stress Monitoring Program
Revised: December 2000*

If oral temperature still exceeds 99.6EF (37.6EC) at the beginning of the next rest period, shorten the following work cycle by one-third.

Do not permit a worker to wear semipermeable or impermeable garment when his/her oral temperature exceeds 100.6EF (38.1EC)

SOP HS-017 CONFINED SPACE ENTRY PROGRAM

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to prep ECC employees to function in the capacity of Authorized Entrant, Entry Supervisor and/or Attendant during permit required confined space entry operations.

State and federal safety regulations require that each employer generate and implement a written confined space entry program. Confined space entry programs shall at a minimum meet the requirements of the following regulations:

- Confined Space, Title 8 General Industry Safety Orders Section 5156, 5157 and 5158: Permit Required confined spaces.
- Permit Required Confined Space Entry, 29 CFR 1910.146, Federal OSHA regulation.

2.0 DEFINITION

2.1 Confined Space

According to OSHA a confined space is defined as a space that has:

- Limited and restricted means of entry and exit;
- Not designed for continuous employee occupancy; and
- Individual is physically capable of entering.

Examples of confined spaces include (but not limited to): vaults, pits, tunnels, manholes, and trenches.

2.2 Permit Required Confined Space

Permit-required confined spaces have one or more of the following characteristics:

- The entrant could be entrapped;
- The entrant could be engulfed;
- The entrant could be exposed to a dangerous atmosphere; and
- The entrant could be exposed to any other serious health hazard.

3.0 HAZARDS

Confined spaces may contain the following hazards:

- Atmospheric hazards such as:

- oxygen deficiency (less than 19.5%) or enrichment (more than 23.5%)
 - Explosive conditions (more than 10% of the Lower Explosive Limit)
 - Toxics at levels that are greater than the PEL or IDLH
-
- Engulfment
 - Safety hazards such as: falling objects and animals (snakes and spiders)
 - Falls
 - Entrapment in converged areas
 - Electrocution
 - Temperature extremes
 - Noise and vibration

3.1 Oxygen Deficiency

The most common and hazardous condition in confined spaces is atmospheric hazards. Oxygen deficiency is the leading single cause of death in confined spaces. Any oxygen level below 19.5% is considered to be oxygen deficient, and can occur in spaces with little or no natural ventilation.

3.1.1 Symptoms of Oxygen Deficiency

Symptoms of oxygen deficiency appear when the level drops below 19.5%. They worsen as the oxygen level decreases.

- Loss of coordination
- Increase in pulse and respiration
- Impaired judgement

3.2 Hazardous Atmosphere

A hazardous atmosphere is one that will burn or explode if exposed to a source of ignition. The Lower Explosive Limit (LEL) is a concentration of a material below that it will not explode. The lower the LEL, the more dangerous the chemical because it will reach its LEL quickly.

A combustible particulate hazardous atmosphere usually exists when the concentration of airborne combustible dust obscures vision at a distance of 5 feet.

3.3 Toxic Atmosphere

There are many possible sources of toxic atmospheres including:

- Bacterial action (decay) of material within the confined space.
- Chemicals that were (or are) stored in the confined space.
- Substances (e.g. cleaners, solvents) brought into the confined space.

- Work being performed, such as cleaning, welding, sandblasting, and painting can release toxins.
- Areas next to the confined space.

4.0 CONFINED SPACE WRITTEN PROGRAM

ECC is required by OSHA to evaluate the workplace to determine if there are any permit-required spaces. If permit spaces exist, exposed employees have to be informed of the existences and location of and dangers posed by the permit spaces. At no time shall ECC employees or subcontractors enter a confined space without the proper training and safety equipment.

If ECC decides that its employees will enter the permit space, it shall develop and implement a written permit required confined space entry program if not already implemented in the site safety & health plan.

5.0 RESPONSIBILITIES

5.1 Authorized Entrant

Is the person that will enter the confined space to perform the work tasks listed in the permit and is required to:

- Communicate with the Attendant as necessary to enable the Attendant to monitor Entrant status and to enable the Attendant to alert Entrants of the need to evacuate.
- Alert the Attendant whenever the Entrant recognizes any signs and symptoms of exposure, or presence of prohibited condition.
- Evacuate the space when: an evacuation order is given by the attendant or entry supervisor, the Entrant recognizes any signs and symptoms of exposure, presence of prohibited condition, and an evacuation alarm is sounded.

5.2 Entry Supervisor

The following are the responsibilities of the Entry Supervisor:

- Requesting technical assistance from the Project Manager in identifying and evaluating spaces that are defined as confined spaces.
- Requesting training of new employees who will be affected by the confined space program.
- Verifying that proper entries have been made in the Confined Space Entry Permit.

- Verifying that proper testing specified by the permit have been completed.
- Verifying that all equipment and procedures specified by the permit have been completed.
- Verifying that the Emergency Response Team (ERT), is available and the method of summoning help, is entered on the Permit and it is operational.
- Providing contractors with specific information such as assessment forms and MSDSs on hazards that may potentially impact the entry.
- Providing contractors with a radio/telephone to contact security post, to initiate rescue services, in the event that emergency response is needed.
- Termination of the entry and the entry permit.

5.3 Attendant

- The Attendant shall perform and record confined space monitoring inside and outside of the space until work is completed.
- Must be current in First Aid and CPR training.
- Must be present at all times and have constant visual communication with the Authorized Entrants. If Attendant cannot maintain visual contact with the Authorized Entrant, they must stay in verbal contact.
- Shall not leave confined space without a qualified backup standby.
- Shall report an emergency, if necessary; and in the event of a fire, earthquake, injury/illness, etc., shall order employee(s) in the confined space to exit.
- Managing any lifelines and/or airlines to prevent fowling.
- Refraining from performing any other duties that may interfere with their primary duty which is to monitor and protect the Entrant.

6.0 EQUIPMENT

The following equipment must be provided as necessary:

- Monitoring equipment (LEL/Oxygen/Toxic Meter),
- Ventilating equipment needed to obtain acceptable entry conditions,

- Communications equipment,
- Personal Protective Equipment,
- Lighting equipment (explosion proof),
- Barriers and shields,
- Ladders and similar equipment required for safe entry and exit,
- Retrieval system (full-body harness and tripod),
- Rescue and emergency equipment.

It is important that employees know how to use the equipment properly and make sure that the equipment is being used properly during the entry.

7.0 MONITORING REQUIREMENTS

The equipment used to test for atmospheric hazards should have sufficient sensitivity and specificity to identify and evaluate any hazardous atmosphere that may exist or arise during entry.

The Entry Supervisor is required to perform, or witness, the initial testing of the atmosphere within the confined space.

The Attendant is required to perform the subsequent atmosphere testing within the confined space while the Entrant occupies the space.

The results of the atmospheric testing must be entered on the Entry Permit.

Confined space shall be tested in the following order as required by OSHA:

- 1.) Oxygen percent
- 2.) Explosive atmosphere
- 3.) Toxic atmosphere

7.1 Monitoring of Oxygen

The Attendant must test for the oxygen concentration in the space before performing other tests. Atmospheres with less than 19.5% oxygen are deemed oxygen deficient and concentrations above 23.5% are deemed oxygen enriched. It is ECC policy that no entries are made in oxygen deficient or oxygen enriched atmospheres.

7.2 Lower Explosive Limit

Atmospheres with greater than 10% of the LEL are deemed to pose an explosion hazard. Entry into confined spaces above 10% of the LEL shall be prohibited.

7.3 Monitoring of Toxics

It must be known what toxic chemicals are present prior to monitoring. Asphyxiates such as Hydrogen Sulfide (H₂S) and Carbon Monoxide (CO) are two of the more common toxic chemicals.

7.4 Monitoring Procedures

- Due to the differences in specific gravities of chemicals, it is important that testing be conducted at all levels (top, middle and bottom).
- If the space being descended into has a stratified atmosphere, readings must be taken at every 4 feet of descent and to each side.
- If the space is being ventilated do not take the sample near the outlet of the ventilation duct.
- Interconnected spaces that are blinded off as one unit shall be tested individually and the results recorded for each cell.
- If dangerous air contamination and/or oxygen deficiency does not exist within the confined space; entry and work within the space requires that testing shall be conducted with sufficient frequency to ensure that dangerous air contamination and/or oxygen deficiency does not occur during the operation. If space is vacated for a period of time (30 or more minutes), monitor the space before allowing re-entry. If the space cannot be isolated or if conditions can change quickly, continuous air monitoring is required.
- A written record of the monitoring performed prior to and during confined space entry shall be maintained on the Entry Permit. Employees shall have access to the monitoring records.
- It is important that monitoring equipment be properly calibrated and is functioning correctly. Calibration shall be conducted to manufacturer's recommendation at a minimum.

8.0 VENTILATION PROCEDURES

- Confined spaces shall be emptied, flushed, ventilated or otherwise purged of flammable or hazardous substances to eliminate or control atmospheric hazards.

- It is recommended to provide positive ventilation before and during all confined space entries.
- Where no fixed ventilation system exists, use a portable explosion proof mechanical blower to blow air into the confined space. This can be accomplished by placing the discharge end of an explosion proof fan inside the confined space.
- Place the blower intake line so that the air exhausted from the confined space is not pulled back into the space being ventilated causing recirculation of the contaminated air.
- Extend the end of the discharge hose as far into the space as possible to prevent short circuiting the ventilation efficiency.
- To ventilate large spaces blowers may have to be used in tandem to push the air into the space and blow air out of the space simultaneously to increase the efficiency of the ventilation systems.
- If the work inside the space can affect the quality of the air within the space; ventilation must be continuous throughout the entry operations. Special ventilation must be provided for oxygen consuming equipment that are to be used in confined spaces. Special precautions have to be taken to prevent the buildup of toxic gases such as carbon monoxide emitted by certain equipment operated in the confined space.

9.0 PERSONAL PROTECTIVE EQUIPMENT

Entry into confined spaces requires the use of PPE. The selection of the PPE is dependent upon the hazards of the space as well as the tasks to be performed in the space. The minimum standard of PPE for entry into confined spaces is Level D PPE. Level D PPE includes: hard hat, steel toed boots, hand protection, and safety glasses.

Some confined spaces require the use of additional PPE such as respiratory protection. (air purifying respirators and SCBA/airline). Supplied air (SCBA/airline) shall be used as a precautionary measure. It is ECC Policy that oxygen deficient or oxygen enriched atmospheres NOT be entered until normal atmospheres are obtained.

10.0 ENTRY PERMIT

An entry permit shall have the following information:

- Location and description of the confined space;
- Permit issued by;
- Permit number/date/time;

- Hazard identification;
- List of personnel for entry;
- PPE required;
- Emergency equipment required;
- Atmospheric test results (oxygen, combustible gas, toxic);
- Special procedures (ventilation, lockout/tagout, chemical cleaners, decontamination);
- Other requirements;
- Signature approval.

Prior to entry the Entry Supervisor shall complete a checklist to ensure that all requirements of the permit have been met and that the permit has been signed.

11.0 PRE-ENTRY

- Remove ignition sources (e.g., welding equipment, lighters, vehicles);
- Lockout, blockout and/or tagout mechanical, electrical, and liquid gas systems;
- Test and document the atmosphere for oxygen level, flammable vapors and toxic vapors;
- No entry if less than 19.5% oxygen (ECC Policy);
- No welding, cutting or sparks if LEL is above zero on the test unit;
- Introduce a constant source of fresh air to ensure complete air exchange;
- Attendant must be present until everyone is out;
- Full body rescue harness must be worn whenever in a confined space. A tri-pod will be required for all vertical entries;
- Ladder must be secured and must not be removed while workers are in the confined space;
- Adequate, low voltage (24 volts), protected illumination must be used; and
- All electrical equipment must be properly grounded.

12.0 ENTRY PROCEDURES

- Even the act of placing your face through the opening of a permit entry confined space is considered an ENTRY.
- Provide at least one Attendant outside the space for the duration of the entry.
- The Entry Supervisor should sign the permit and post it outside the space near the entrance preferably and authorize entry after all acceptable entry conditions have been verified.
- The Attendant shall conduct the following: ensure that the proper PPE and retrieval equipment is being worn by the Entrants; ensure communication between Entrants and Attendant is maintained; and check to make sure that communication is established in case of an emergency.

13.0 TRANSFERRING AUTHORITY

- The entry permit is valid for one shift only. At the end of the shift, the permit must be cancelled by the Entry Supervisor.
- The Entry Supervisor should comply with the following items at the termination of a confined space operation: debrief and cancel permit.

14.0 EMERGENCY PROCEDURES

Any occurrence (including any failure of hazard control or monitoring equipment) or event internal or external to the permit space that could endanger entrants is considered an emergency.

The following are conditions requiring an evacuation:

- Fire,
- Attendant not being able to monitor the space,
- Chemical spill,
- Entrant showing signs or symptoms of exposure.

If the Attendant determines that the Entrant requires rescue from the space:

- The Attendant communicates the emergency to the Standby or contacts the emergency number,
- Attempts non-entry rescue of the Entrant by using the hoist or retrieval line,
- Ventilates the space to provide fresh air to the Entrant,
- Performs continuous monitoring;
- Does not allow rescue attempts by unauthorized personnel,
- Debriefs the rescue team as to the conditions within the space, nature of emergency and location number of Entrants within the space.

14.1 Standby Person

At least one Standby Person at the site shall be trained and immediately available to perform rescue and emergency services. A Standby is different than an Attendant. The Standby is only for emergency response.

14.2 Employer Responsibilities

ECC shall develop and implement procedures for: rescuing entrants from permit spaces; providing emergency services (first aid and CPR) for rescued entrants; summoning additional rescue and emergency services; and preventing unauthorized personnel from attempting a rescue.

ECC shall use one of the following three choices to perform rescue and emergency services:

- 1.) Use an internal rescue team, or
- 2.) Use an outside agency such as the local fire department
- 3.) Hire a contractor to standby.

14.3 Retrieval System

The retrieval system shall:

- Use a full-body harness.
- Attach to the harness with a retrieval line attached at the suitable point.
- The Entrant shall not disconnect from the retrieval line when in the confined space.
- The retrieval line shall be attached to a mechanical device (manual operating only) or fixed point outside the space.
- A mechanical device shall be available to retrieve personnel from vertical type spaces more than 5 feet deep.

15.0 RECORDKEEPING

The following documentation shall be kept:

- Training records (3 years)
- Monitoring equipment calibration logs (minimum one year)
- Entry Permits (30 years from the date of entry)

SOP HS-018 EXCAVATION AND TRENCHING SAFETY PROGRAM

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to eliminate employees from serious hazards associated with excavation and trenching activities. All work shall be performed in accordance with 29 CFR 1926 Subpart P – Excavations (1926.650 – 1926.652).

1.1 Definitions

Excavation

Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Trench

A narrow excavation made below the surface of the ground. In general, the depth is greater than the width, but the width of the trench (measured at the bottom) is not greater than 15 feet (4.6 m).

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 (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

Competent Person

A Competent Person is defined as 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.

2.0 PURPOSE

Working in and around excavations poses a serious risk to workers. To reduce the likelihood of OSHA violations, specific procedures must be followed.

2.1 Notification Procedures

A line locating company (i.e., Underground Service Alert) is to be notified at least two days prior to the start of any excavation/trenching activities.

Certain states (i.e., California) require that notification from OSHA be given at any time a worker descends into an excavation/trench 5 feet or deeper.

3.0 GENERAL REQUIREMENTS

A “competent person” must be present during excavation/trenching activities.

The Competent Person is to classify the soil type, select protective systems and perform daily inspections.

Notify Cal-OSHA (California) if workers will be entering excavations/trenches 5 feet or deeper. ECC does have an annual excavation/trenching permit with Cal-OSHA.

4.0 PROTECTION

Workers entering an excavation/trench 5 feet or deeper shall be protected by one of the following:

- Shoring
- Sloping
- Benching
- Other protective systems

Once the protection method is selected, the specific requirements for each type of protection is dependent on the soil type.

5.0 SOIL CLASSIFICATION

Soil shall be classified by a competent person as stable rock, type A, B or C soil.

Type A = Very cohesive (indented by thumb with great effort).

Type B = Semi cohesive

Type C = Non cohesive (easily penetrated by the thumb).

6.0 SLOPING REQUIREMENTS

A short-term (24 hours or less) maximum allowable slope of ½ H:1V (63 degrees) is allowed in excavations in Type A soil 12 feet or less in depth.

Simple slope excavations 20 feet or less in type A soil shall have a maximum slope of ¾ H:1V (53 degrees)

Simple slope excavations 20 feet or less in type B soil shall have a maximum slope of 1H:1V (45 degrees)

Excavations shall be sloped at an angle not steeper than 1 ½ H:1V (34 degrees) measured from the horizontal if the soil type is classified as type C or is unknown.

A registered professional engineer shall design sloping or benching when excavations are greater than 20 feet in depth.

7.0 HAZARDOUS ATMOSPHERE

The atmosphere in the excavation shall be tested before workers enter excavations/trenches greater than 4 feet.

Precautions shall be taken to prevent employee exposure to atmospheres with less than 19.5% oxygen.

Precautions shall be taken to prevent employee exposure to an atmosphere containing a concentration of a flammable gas in excess of 20 % LFL/LEL.

When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing shall be conducted as often as necessary to ensure that the atmosphere remains safe.

8.0 STRUCTURES

Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations, support systems such as shoring bracing, or underpinning shall be provided to ensure the stability of such structures for the protection of employees.

- The “rule of thumb” is that if a structure is located within distance equal to or less than the depth of the excavation, it is considered hazardous. When in doubt, or if the competent person determines that the structure poses a hazard, a registered civil engineer must be consulted.

Sidewalks, pavements, and appurtenant structure shall not be undermined unless a support system or another method of protection is provided to protect employees from the possible collapse of such structures.

9.0 EXCAVATION SAFE WORK PRACTICES

Employees who are conducting work activities at depths greater than 4 feet must provide a ladder, runway, or an approved escape route.

Ladders shall extend 36 inches above the ground.

Excavated soil shall be a minimum of 2 feet from the excavation.

Established entry and egress routes from the excavation/trench; routes shall not be more than 25 feet (lateral) apart.

No employees shall be permitted underneath loads handled by lifting or digging equipment.

Employees shall not work in excavations in which there is accumulated water.

Vibration from heavy equipment, railroads, etc., shall be considered a hazardous increasing condition.

Walkways/bridges with standard guardrails shall be provided when employees or equipment are required or permitted to cross over excavations.

10.0 INSPECTIONS

Daily inspections of excavations, the adjacent areas, and protective systems shall be made by a competent person for:

- Indication of failure of protective systems,
- Evidence of a situation that could result in possible cave-in,
- Hazardous atmosphere, or
- Other hazardous conditions.

An inspection shall be conducted by the competent person prior to the start of work and as needed throughout the shift. Inspections shall also be made after every rainstorm or other hazard increasing occurrences.

SOP HS-019
UNDERGROUND STORAGE TANK (UST) AND ABOVEGROUND STORAGE TANK
(AST) REMOVAL PROGRAM

1.0 POLICY

ECC's Underground Storage Tank (UST) and Aboveground Storage Tank (AST) Removal Program will be performed in accordance with American National Standards Institute (ANSI), American Petroleum Institute (API), American Society of Mechanical Engineers (ASME), American Society for Testing and Materials (ASTM), and National Fire Protection Association (NFPA) standards; and other local regulations. ECC personnel shall also comply with all applicable safety standards under 29 CFR 1910 and 1926.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to establish safe UST and AST removal procedures.

3.0 LOCATION OF UST/AST

The accurate location of the UST/AST and underground utilities will substantially reduce subsequent risks. ECC will use local underground service alert to mark underground utilities. In the event that heavy equipment operations (i.e., cranes) are located near overhead utilities, extreme caution will be enforced. The table below indicates the minimum safe clearance in regards to power line voltage.

Overhead Clearance

POWER LINE VOLTAGE (kV)	MINIMUM SAFE CLEARANCE (feet)
0-50 kV	10
51 to 100 kV	12
101 to 200 kV	15
201 to 300 kV	20
301 to 500 kV	25
501 to 750 kV	35
751 to 1000 kV	45

4.0 MOBILIZATION

All required work zones and necessary equipment will be mobilized on-site. All specified safety and emergency equipment will be staged on site. Sanitary facilities will be provided at each work area, as well as drinking water and a potable water supply for washing hands and face.

5.0 REMOVAL AND DISPOSAL OF TANK CONTENTS

Hazards associated with the removal of the tank contents are minimal, as removal will be done by pneumatic pump or vacuum truck. The tank and any venting apparatus as well as the vacuum truck will be appropriately grounded per API RP 1604 during content evacuation and inerting of the UST/AST. Possible inhalation or dermal exposure may occur if spill happens during the hook-up of the hose to the tank or breathing of vapors from the hose or piping during the removal of the tank contents.

During sampling of the tank contents, care must be taken for inhalation and dermal exposures. Respiratory and eye protection will be implemented during these operations. Care will be taken to ensure that a proper connection is obtained before opening the drain valve.

6.0 EXCAVATION AND EXPOSURE OF UST

The major hazards associated with excavation to expose the UST include hitting underground utility lines, flying debris during saw-cutting of the concrete or asphalt surface, inhalation of hydrocarbon vapor if the UST is cut or punctured during excavation or from soil contamination, caving of the excavation, and general physical hazards of working with heavy equipment such as backhoes and trucks. UST and underground utilities will be located prior to excavation. Excavations will be sloped to prevent caving. No person shall be allowed to enter any excavation greater than five feet deep without the proper shoring requirements.

Hazards associated with operation of heavy equipment will be controlled by the use of trained operators and minimizing the personnel and the number of different activities at the site during the operation of the equipment. While excavating the soils around the perimeter of the tanks, precautions will be taken to prevent mixing of contaminated soil with uncontaminated soil.

7.0 PREPARATION OF TANK FOR REMOVAL

Before removal of the tank, ECC will demonstrate to the satisfaction of the local and federal authorities that the tank has been sufficiently inerted. Under no circumstance will a tank be removed without the prior approval of the fire/health departments. The tank will be excavated approximately 3/4 of tank depth, making checks for contamination periodically. If no contamination is encountered, the soil will be stockpiled a minimum of 2 feet from the edge of

the excavation, or at a distance equal to half the depth of the excavation, whichever is greater. If contamination is encountered, it will be segregated and placed on 6-mil polyethylene liner.

The tank will be removed using equipment and methods that will ensure safe removal. Hazards associated with this activity include inhalation of hydrocarbon vapor or contact with organic products during inerting or rinsing of the tank. Additional hazards include: static charge generation, fire hazards during disconnecting of piping associated with the tank, collapse of the tank, and general physical hazards of falling, tripping, slipping, and working around heavy equipment.

The tank will be bonded and grounded before the removal of any flammable liquids in order to eliminate any static charge build-up. A proper grounding rod is three-fourths by ten feet long copper driven into the ground to eight feet. The NEC specifications further add that it may slant up to forty-five degrees or be buried in the trench of specified depth. Bolted connectors can be used conforming to UL 467. Static charge protection serves to inhibit charge generation, inhibit charge storage, minimize ignitable material, inhibit the creation of a spark gap, and inhibit the buildup of sufficient energy to create a spark. Initial and regular air monitoring should be conducted to ensure that proper personnel protective equipment is employed. The atmosphere inside the tank and associated piping, when tested with a combustible gas meter will have a reading less than 10 percent of the lower explosive limit (LEL) during excavation activities. Prior to removing each tank from the excavation and site, the tank will be inerted so that the atmosphere is less 5 percent of the lower explosive limit (LEL).

Personnel required to work around the tank will not stand on top of the tank or near excavation face that leans against the tank. If work has to be conducted from these locations, a lifeline will be provided and a dedicated person will attend the lifeline and will be ready to retrieve the person.

8.0 REMOVAL AND DISPOSAL OF UST/AST PIPING

Hazards associated with this activity include inhalation of hydrocarbon vapors and contact with organic products if the tank is not adequately inerted or there are spills when removing the UST/AST from the excavation. Other hazards include fire hazards of a potentially explosive atmosphere inside the tank, caving-in of the excavation when the tank is removed and general physical hazards of falling, tripping, and working around heavy equipment. Care will be taken to ensure that the tank is adequately inerted. This can be done by measuring the atmosphere inside the tank immediately before removing the tank.

The SSHO will obtain tank removal clearance from the local authorities. The excavation will be enlarged on one side of the tank to allow the tank to roll out from its original position slightly before being lifted to minimize the disturbance to the surrounding soil. Inspection of all chains, slings and hooks will be done prior to tank removal. Any defective chains, slings or hooks will

be replaced. The tank will be lifted slowly to prevent rupture of the tank. Field personnel should maintain as much clearance as possible from air borne loads at all times to avoid being struck by a falling load. Guideline will be used so employees can maintain a greater distance from the load. All unauthorized personnel shall remain outside the Exclusion Zone. Hazards associated with operation of heavy equipment will be controlled by the use of trained operators and minimize the personnel and the number of different activities at the site during the operation of the equipment. Good housekeeping practice will be stressed in the daily Tailgate Safety Meeting to minimize the physical hazards.

SOP HS-020 ELECTRICAL SAFETY PROGRAM

1.0 POLICY

OSHA's Electrical Standards address the government's concern that electricity has long been recognized as a serious workplace hazard, exposing employees to such dangers as electric shock, electrocutions, fires and explosions. The objective of the standards is to minimize such potential hazards by specifying design characteristics of safety in use of electrical equipment and systems. ECC's Electrical Safety Program complies with OSHA Standards 29 CFR 1926 (Construction) Subpart K - Electrical (1926.400 to 1926.449); 29 CFR 1910 (General Industry) Subpart S - Electrical (1910.301 - 1910.399).

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to control potential electrical hazards that may exist while conducting work activities at ECC project sites.

3.0 SAFE WORK PRACTICES

- Always call an electrician in case of need of electrical work except for changing 110-volt A.C. light bulbs, resetting breakers or working on automotive type circuits.
- All electrical wiring of equipment must be considered "live" and dangerous. A shock from 110 volts can be fatal.
- All permanent electrical wires must be hung on insulators, messengers, in conduit or trays. All temporary electrical wires must be hung so they are not in mud or water. GFCIs will be used on all electrical wiring.
- Never handle electrical wires that are "hot" while standing or sitting in a wet place without taking extra precautions to obtain insulation from the ground. Be sure conditions are safe before starting work.
- Do not place electric bulbs where drops of water can hit them. Do not spray down electrical equipment.
- Electricians shall not touch, install, or attempt to repair any electrical equipment unless they are fully familiar with it; until it is locked and tagged out; and until they are positive it is safe. Never take your first chance with electricity.
- Always do your work so that you do not become a conductive path.

- Do not open a manual switch to disconnect power from a running motor except in cases of extreme emergency where the regular starter is not functioning.
- Cultivate the habit of turning your face away when opening or closing switched on circuit breakers or when doing anything that could cause an arc or flash. Never turn your face and then grope for a switch handle.
 - Never close an electrical switch slowly or hesitatingly. Close it quickly and positively;
 - Remember that arc burns may be severe; and
 - Do not remove a fuse from any circuit until the switch has first been opened.
- In case of a blown fuse or tripped circuit breakers, do not restore power until a thorough check has been made of the equipment to prevent closing into a fault.
- All electrical equipment shall be installed in such a manner so as to be readily and safely accessible to authorized employees to maintain and repair. Rails, wooden platforms, insulating mats or electrically non-conductive material shall guard such equipment wherever necessary.
- Only qualified electricians shall perform all repairs or adjustments or other work on any type of electrical equipment.
- Electrical equipment and wiring shall be inspected systematically and documented at regular intervals to ensure a safe operating condition. Defective equipment shall be repaired or replaced at once.
- Fuses or equivalent protective devices of the correct type and capacity shall be installed on all electrical equipment to protect against excessive overloads or other failures.
- Switches and circuit breakers shall be installed so that they are readily accessible and can be operated without danger of contact with moving or "live" parts.
- Switchboard shall be well lighted for personnel operating in front of board and for maintenance and repair. The rear of the switchboards shall be so guarded as to prevent anyone getting near them and, if possible, shall be enclosed.
- All rooms or building that contain switchboards or control equipment shall be kept free of debris and refuse at all times.
- All junctions on switch boxes must have covers in place before starting operation.

- When repairs are finished or before an employee closes the switch, he shall make certain that the closing will not start a fire or endanger a fellow employee.
- Wire, pieces of wire, or other conducting materials shall not be used as a substitute for properly designed fuses. Where circuit breakers are used, they shall be maintained in proper operating condition and be properly adjusted.
- No employee working in an elevated position on electrical equipment shall do so without using an approved safety belt and lifeline, unless there are proper guardrails around such elevated positions.
- Hand held electric tools should not be operated at high potential voltages.
- All electrical installations, temporary or permanent shall comply with the applicable provisions of the national electrical safety code.
- Electrical wire, conduit, apparatus, and components of equipment shall be approved or listed by the Underwriters Laboratories, Inc., or factory mutual laboratories, for the specific application. Extension cords shall be 3-wire grounded types listed by the Underwriters Labs, Inc. The rated load shall not be exceeded.
- A ground-fault interrupter (GFI) program shall protect all 115-, 120-, and 220-volt, single-phase receptacle outlets used for construction operations. This requirement includes receptacles on stationary and portable systems.
- Always use a fiberglass or non-conductive ladder when doing electrical work.

4.0 GROUNDING

- "Grounding" means making an intentional permanent connection to the general mass of earth in such a manner as will insure at all times the immediate discharge of electric energy to the earth without danger.
- All equipment that may become accidentally charged with electric current shall be effectively grounded.
- Ground wire connections to the apparatus shall be made by means of an approved clamp or terminal soldered or welded to the ground wire and securely bolted to the apparatus, where its removal will be unnecessary for inspection or repairs.
- Wherever possible, ground wires shall be installed in such a manner that they may be inspected for continuity and be protected from mechanical injury.

- All fence enclosures surrounding switchgear, transformers, etc. shall be effectively grounded. Three feet clearance shall be provided between transformer and fence.
- Installation of electrical equipment is not to be considered complete until it has been properly and effectively grounded.

5.0 ELECTRICAL LOCKOUT PROCEDURES

This section is prepared in accordance with 29 CFR 1926.417 **ALockout and tagging of circuits@**

All electrical equipment must be locked out according to the following procedure prior to maintenance activities:

- Inform operator and/or foreman of intent to shutdown equipment;
- Turn off equipment;
- Lockout equipment with lock, lockout hasp, and tag. Sign and date tag. Keep key;
- Attempt to start equipment; if equipment remains energized, report to foreman or electrician and do not proceed with maintenance activity. If equipment is de-energized, proceed with maintenance as planned;
- When maintenance is finished, clear area of tools and debris;
- Inform operator and/or foreman of intent to start equipment;
- Make sure personnel are clear of equipment;
- Test run;
- Replace tag and lockout on lockout board.

SOP HS-021 LOCKOUT/TAGOUT PROGRAM

1.0 POLICY

ECC's Lockout/Tagout Program is in accordance with all applicable federal, state and local regulations including the following:

- GISO Section 3314 – Cleaning, Repairing, Servicing & Adjusting Prime Movers, Machinery and Equipment;
- GISO Section 2320.4 – De-Energized Equipment or Systems; and
- 29 CFR 1910.147 – The Control of Hazardous Energy (Lockout/Tagout).

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to prevent injuries and accidents from energized electrical sources and other types of stored energy during the installation, maintenance and removal of electrical equipment and machinery. This program covers the servicing and maintenance of machinery and equipment in which the unexpected energization or start-up of the machine or equipment, or release of stored energy could injure employees. This energy can be in the form of electricity, air pressure, water pressure, spring pressure or potential energy of position. The program establishes the procedures for affixing appropriate lockout devices or tagout devices to energy isolating devices, and to disable machines or equipment to prevent the unexpected energization, start-up or release of stored energy.

An energy control procedure shall be developed and utilized by the employer when employees are engaged in the cleaning, repairing, servicing or adjusting of prime movers, machinery and equipment.

3.0 RESPONSIBILITIES

Supervisory personnel are responsible for:

- C Ensuring only authorized workers are assigned to work on energized systems; and
- C Ensuring that the provisions for the written program are implemented and that all employees follow the requirements of the written program. Disciplinary action may be taken against any employee who fails to follow or enforce the program.

Employees are responsible for:

- C Accordance with the Lockout/Tagout Program; and
- C Upon observing a machine or piece of equipment that is locked out, to not attempt

to start, energize, or use the machinery or equipment.

4.0 TRAINING

All authorized employees shall receive on-site training in the recognition of applicable hazardous energy source, the type and magnitude of the energy available in the workplace, and the methods and means necessary for energy isolation and control. All affected employees shall be instructed in the purpose and use of the energy control procedure.

All employees whose work areas are or may be in an area where energy control procedures may be utilized, shall be instructed about the procedures, and about the prohibitions relating to attempts to restart or energize machinery or equipment that is locked out or tagged out.

Retraining shall be provided for all authorized and affected employees whenever:

- C There is a change in job assignments;
- C There is a change in machines, equipment or processes that present new hazards;
and
- C Whenever inspections reveal or the employer believes there are deviations or inadequacies in the program.

5.0 LOCKOUT/TAGOUT PROCEDURES

5.1 Preparation for Lockout

Authorized employees shall determine which switch, valve or other energy isolating devices shall be used. More than one energy source (electrical, mechanical, and pneumatic) may be involved. Before lockout commences, job authorization shall be obtained.

5.2 Sequences of Lockout Procedures

Notify all affected employees that a lockout is required and the reason. If the equipment is operating shut it down following normal procedures. Operate the switch, valve or other energy isolating devices so that the energy source is disconnected or isolated from the equipment. Stored energy must also be dissipated or restrained by methods such as grounding, repositioning, blocking, bleeding, etc. Lockout energy isolating devices with an individually assigned lock. After ensuring that no personnel are exposed, ensure that the equipment will not operate by engaging the power button or normal operating controls.

5.3 Procedures Involving More Than One Person

If more than one individual is required to lockout equipment, each shall place his/her own lock on the energy-isolating device. One designated individual or supervisor, with knowledge of the work crew, may lockout/tagout for the entire crew. No member of the work crew shall start work until advised by the designated individual that the lockout is complete and it is safe to begin. The designated individual is responsible for carrying out all the steps of the lockout procedures. The designated individual shall not remove any lock or tag until personally verifying that all members of the crew are clear of the equipment.

5.4 Procedures Involving Personnel Changes During the Job

Employees being replaced or exchanged on a job during a shift shall ensure that the lock and tag of his/her replacement are substituted for his/her own before leaving the job. Employees being replaced on a job at the end of a shift shall ensure that the locks and tags of the replacement employee are substituted for his/her own before leaving the job.

5.5 Procedures When Work is Left Unfinished

Locks, tags and all other safety warning devices shall be left in place during all short absences such as breaks or trips for parts. When work is incomplete and temporarily suspended, all locks, tags and other safety warning devices shall be left in place.

5.6 Actions When Physical Locking is Impossible

When it is impossible to use a lock, another means of disconnecting the equipment or machinery must be used. Other means include unplugging the equipment, disconnecting the conductors, fuse brackets or removing fuses. All steps of the process are the same as Lockout. A tag must be placed on the plug, conductor, fuse bracket or other means.

5.7 Restoring the Equipment to Service

Close and secure all cover panels and doors. If all cannot be closed, place barricades or rope off a safety zone. Advise all affected employees that the system is to be re-energized. Ensure that all persons are clear of the equipment. Remove all locks and tags. Only the person who placed the locks and tags may remove them. If the person is unavailable, only the supervisor may remove the locks and tags after personally ensuring it is safe to do so. Energize the equipment thereafter.

SOP HS-022 VEHICLE AND HEAVY EQUIPMENT OPERATIONS

1.0 POLICY

ECC shall follow all heavy equipment operations in accordance with 29 CFR 1926.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to provide operators/drivers safety guidelines when operating/driving ECC vehicles and heavy equipment.

Physical hazards during mobilization and demobilization can arise from activities including off-loading heavy equipment or safety equipment from tractor-trailers and locating equipment to designated areas of use. Avoiding close proximity to or becoming situated between moving equipment or other immovable objects will mitigate hazards. Field personnel may be exposed to a variety of other physical injury hazards associated with equipment operations during field activities. These hazards include noise, struck-by injuries, eye hazards, hand and foot injuries and related hazards. The following minimum measures shall be implemented for equipment operations at all ECC project sites:

- The minimum required work uniform for all field personnel (i.e., Level D protection) shall be general work clothes, steel-toed construction boots (ANSI approved), safety goggles or glasses, work gloves, high visibility vests, ear protection and a hard hat (ANSI approved);
- Good housekeeping and adequate work space shall be established before operation of any equipment, and shall be maintained throughout the duration of the operation;
- Equipment shall be inspected for condition and operation prior to use. A Safety Inspection Checklist for Construction Equipment shall be completed;
- Field personnel shall only approach operating equipment from the operator's angle of view, and only after making eye contact;
- Only trained and qualified persons shall be assigned to operate individual equipment;
- Operators shall follow the 3-point mount and dismount rule when getting into or out of heavy equipment;

- Spotters shall be required when maneuvering heavy equipment in tight spaces;
- Flag personnel and/or traffic signs shall be posted when operating heavy equipment on roadways.

3.0 VEHICLE TRAFFIC

Employees may be exposed to vehicle accident hazards associated with the operation of vehicles on site. To control these hazards, the following safety requirements shall be enforced.

- Seat belts shall be worn ANYTIME a vehicle is in motion, regardless of speed or distance to be traveled. Seat belt requirements also apply to the operation of backhoe and other construction equipment;
- The basic speed law shall be followed at all times. Vehicles shall never be operated at a speed that is safe for the conditions (i.e., road surface, traffic, visibility, weather, etc.).

Additional vehicle safety procedures for ECC authorized drivers can be located in SOP HS-033 “Driver Fleet Safety Program.”

**SOP HS-023
HOISTING/RIGGING AND CRANE OPERATIONS PROGRAM**

1.0 POLICY

ECC's Hoisting/Rigging and Crane Operations Program shall comply with 29 CFR 1926 and USACE's EM-385-1-1.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to provide safe guidelines for hoisting and rigging operations. Hoisting apparatus is used to raise, lower, and transport heavy loads for limited distances. Hoists can be either rigid suspended or hook suspended and include electric, air, and hand-operated chain hoists. This equipment must never be overloaded or used to transport people. Operators should examine hoists regularly and repair or replace any damaged or malfunctioning parts.

Cranes raise, lower, and shift objects through use of a long moveable arm. All operating handles should be within easy reach of the operator and be marked clearly to indicate which way they control the crane. Cranes should have adequate safeguards to provide safe footing and access ways for the operator to prevent injuries and to limit the action of the crane arm and hoisting devices.

All hoisting ropes must be appropriate for the weight the crane is bearing. Sheaves and drums should be inspected for wear and replaced to avoid loss of rope strength. Crane movements should always be governed by a standard code of signals transmitted by the crane director to the crane operator. Only properly trained and supervised operators should be allowed to work on cranes.

Potential hazards involved with crane operations include:

- Personnel injury to operator and workers;
- Property damage; and
- Equipment damage.

Inspection requirements include:

- Inspection by the operator prior to each lift;
- Check brakes and all required safety devices;
- Load capacity rating of crane; and
- Monthly Equipment Inspection.

Training requirements include:

- Qualified crane operator(s).

3.0 SAFE OPERATING PROCEDURES

- Use qualified and trained crane operators;
- An inspection of the crane shall be conducted prior to each lift;
- Ground personnel shall not be allowed to work under suspended loads;
- The operator shall not exceed 75% of the load capacity rating for the crane;
- The load capacity shall be posted and clearly visible on the crane;
- The crane jacks must be placed on firm ground before picking up a load;
- Loads shall be lifted to the minimum height necessary to accomplish the task;
- The load shall be well secured and balanced in the sling or hook before being lifted more than a few feet;
- Crane operators shall inform their Supervisor(s) of any prescribed medication that they are taking that would impair their judgment;
- Personnel shall not be lifted with cranes unless designed specifically for that purpose;
- The hoist rope or cable shall not be wrapped around the load;
- Cranes, derricks, drill rigs, booms or similar equipment shall have a minimum 10 feet clearance from overhead electrical power lines;
- Loads shall never be carried over personnel;
- Riding on loads, hooks, hammers, buckets, material hoists, or other hoisting equipment not meant for personnel handling is prohibited.
- The rated capacity on lift trucks and cranes shall be posted on the vehicle so as to be clearly visible;
- The load capacity ratings shall not be exceeded at any time;
- The operator shall pre-inspect/assess for safe access to the given work site;
- The operator and crew shall wear required PPE at all times when crane is in operation in the Exclusion Zone;
- Maintain good housekeeping in rig vicinity to prevent slip, trip, fall hazards; and
- Be aware of possible thunderstorm activity; shut down and disperse from mast area if thunderstorm is in vicinity.

4.0 RIGGING

Rigging equipment for material handling shall be inspected as specified by the manufacturer, by a qualified person, before use on each shift and as necessary during its use to ensure that it is safe.

The use of maintenance of rigging equipment shall be in accordance with recommendations of the rigging manufacturer and the equipment manufacturer: rigging equipment shall not be loaded in excess of its recommended safe working load.

Rigging equipment when not in use shall be removed from the immediate area and properly stored and maintained in a safe condition.

Hoist rope shall not be wrapped around the load.

Running lines located within 2 m (6 ft. – 6 in) of the ground or working level shall be guarded or the area restricted.

All eye splices shall be made in an approved manner; rope thimbles of proper size shall be fitted in the eye, except that in slings the use of thimbles shall be optional.

When hoisting loads, a positive latching device shall be used to secure the load and rigging.

Hooks, shackles, rings, pad eyes, and other fittings that show excessive wear or that have been bent, twisted, or otherwise damaged shall be removed from service.

Custom designed grabs, hooks, clamps, or other fitting accessories for such units as modular panels, prefabricated structures, and similar materials shall be marked to indicate the safe working loads and shall be proof-tested, before use, to 125% of the rated load.

4.1 Wire Rope

When two wires are broken or rust or corrosion is found adjacent to a socket or end fitting, the wire rope shall be removed from service or resocketed.

Wire rope removed from service due to defects shall be cut up or plainly marked as unfit for further use as rigging.

Wire rope clips attached with U-bolts shall have the U-bolts on the dead or short end of the rope: the clip nuts shall be retighten immediately after initial load carrying use and at frequent intervals thereafter.

Protruding ends of strands in splices on slings and bridles shall be covered or blunted.

Except for eye splices in the ends of wires and for endless wire rope slings, wire rope used in hoisting, lowering, or pulling loads, shall consist of one continuous piece without knot or splice.

Wire rope shall not be secured by knots except on haul back lines on scrappers.

Eyes in wire rope bridles, slings, or bull wires shall not be formed by wire rope clips or knots.

Wire rope clips shall not be used to splice rope.

4.2 Chains

Only alloyed chain shall be used in rigging.

Chain shall be inspected before initial use and weekly thereafter.

When used with alloy steel chains, hooks, rings, oblong links, or other attachments shall have a rated capacity at least equal to that of the chain.

Job or shop hooks and links, makeshift fasteners formed from bolts and rods, and other similar attachment shall not be used.

4.3 Fiber Rope (Natural and Synthetic)

Fiber rope shall not be used if it is frozen or if it has been subjected to acids or excessive heat.

Fiber rope shall be protected from abrasion by padding where it is fastened or drawn over square corners or sharp or rough surfaces.

All splices in rope slings provided by ECC shall be made in accordance with fiber rope manufacturer's recommendations.

5.0 ENVIRONMENTAL CONDITIONS

Cranes shall not be operated when wind speeds at the top of the crane approach the maximum wind velocity recommendations of the manufacturer.

Operations undertaken during weather conditions that produce icing of the crane structure or reduced visibility should be performed at reduced functional speeds and with signaling means appropriate to the situation.

When conditions are such that lightning could occur, all crane operations should cease.

For night operations, lighting shall be adequate to illuminate the working areas while not interfering with the operator's vision.

6.0 MAINTENANCE AND REPAIRS

Maintenance and repairs of cranes shall be conducted in accordance with the manufacturer's procedures and precautions.

Replacement parts or repairs shall have at least the original design factor; replacement parts for load bearing and other critical parts shall be either obtained from or certified by the original equipment manufacturer (OEM).

7.0 COMMUNICATIONS

A standard signal system shall be used on all cranes and derricks (preview section 8 of USACE's Safety & Health Manual (EM-385-1-1)).

In situations where the operator cannot see the load, audio (radio) communications shall be used (note that this does not preclude the use of hand signals in addition to audio): in all other operations, audio communications should be used.

8.0 INSPECTIONS

Inspection of cranes and derricks shall be in accordance with the manufacturer's recommendations. A qualified person shall conduct inspections.

8.1 Start-up Inspection

The operator before every operation (shift) of the crane shall conduct inspections. If checklists are used for pre-operational inspections, a copy of the checklist shall be maintained at the project site; if checklists are not used, the operator shall indicate the successful completion of the inspection – in accordance with the manufacturer's recommendations – in the operator's log.

A crane which has been idle for 30 days or more, but less than 180 days, shall be given an inspection, confirming to the requirements for frequent crane inspections and frequent wire rope inspections, by a qualified person before placed in service.

Standby cranes shall be inspected by a qualified person at least semiannually and before placed in service. Inspection requirements depend on the length of time since the previous inspection, in accordance with paragraphs (1) and (2) above; standby cranes that are exposed to adverse environmental conditions shall be inspected more frequently, as determined by the designated authority.

8.2 Performance Tests

Performance tests shall be conducted by a qualified person, in accordance with the manufacturer's recommendations. Tests loads shall not exceed 100% of the manufacturer's load rating capacity chart at the configuration of the test except for manufacturer testing of new cranes, which shall be conducted in accordance with the ASME B30 standard appropriate for the crane.

Written reports of the performance test, showing test procedures and confirming the adequacy of repairs or alterations shall be maintained with the crane or derrick or at the on-site project office.

Under the following circumstances, cranes shall be given an operational performance test: 1.) Before initial use of cranes in which a load bearing (excluding the rope) or load controlling part or component, brake, travel component, or clutch have been altered, replaced, or repaired; 2) every time it is configured or reassembled after disassembly; and 3.) every year.

Under the following circumstances, cranes shall be given a load performance test: 1.) Before initial use of cranes in which a load bearing (excluding the rope) or load controlling part or component, brake, travel component, or clutch have been altered, replaced, or repaired; 2) every time the crane is configured or reassembled after disassembly; and 3.) every four years.

9.0 OVERHEAD CLEARANCE

In the event that heavy equipment operations (i.e., cranes) are located near overhead utilities, extreme caution will be enforced. The table below indicates the minimum safe clearance in regards to power line voltage.

Minimum Clearance from Energized Overhead Electric Lines

NOMINAL SYSTEM VOLTAGE	MINIMUM Rated Clearance (meters)
0-50 kV	3 m
51 to 200 kV	4.5 m
201 to 300 kV	6 m
301 to 500 kV	7.5 m
501 to 750 kV	105 m
751 to 1000 kV	135 m

10.0 OPERATOR QUALIFICATIONS AND TRAINING

Each operator shall be instructed in and qualified for each type of crane or derrick he/she is to operate.

Qualification shall be by written (or oral) and practical operating examination unless the operator is licensed by a state or city licensing agency for the particular type of crane or derrick.

Qualification for operation of a particular type of crane or derrick on a USACE project shall be valid for three years. Please review Appendix G of EM-385-1-1 for examination and qualification for crane operators.

Operators shall meet the following physical qualifications:

- 1.) vision of at least 20/30 in one eye and 20/50 in the other, without corrective lenses;
- 2.) normal depth perception and field vision;
- 3.) ability to distinguish colors, regardless of position;
- 4.) adequate hearing, with or without hearing aid, for the specific operation;
- 5.) sufficient strength, endurance, agility, coordination, manual dexterity, and speed of reaction to meet the demands of equipment operations; and
- 6.) no tendencies to dizziness or similar undesirable characteristics;

Evidence of physical defects, emotional instability which could render a hazard to the operator, others, or safe operation of the crane, or evidence that the operator is subject to seizures or loss of physical control shall be sufficient reason for disqualification. In such cases, specialized medical tests may be required to determine these conditions and their effects.

11.0 CRITICAL LIFT

A critical lift is a non-routine crane lift required detail planning and additional or unusual safety precautions. Critical lifts include lifts made when the load weight is 75% of the rated capacity of the crane; lifts which require the load will be lifted, swung, or placed out of the operator's view; of lifts made with more than one crane; lifts involving non-routine or technically difficult rigging arrangement; hoisting personnel with a crane or derrick; or any lift which the lift or crane operator believe should be considered critical.

11.1 Critical Lift Plans

Before making a critical lift, a critical lift plan shall be prepared by the crane operator, lift supervisor, and rigger. The plan shall be documented and a copy provided to the designated authority: the plan shall be reviewed and signed by all personnel involved with the lift.

The plan shall specify the exact size and weight of the load to be lifted and all crane and rigging components that add to the weight. The manufacturer's maximum load limits for the entire range of the lift, as listed in the load charts, shall also be specified.

The plan shall specify the lift geometry and procedures, including the crane position, height of the lift, the load radius, and the boom length and angle, for the entire range of the lift.

The plan shall designate the crane operator, lift supervisor and rigger and state their qualifications.

The plan will include a rigging plan that shows the lift points and describes rigging procedures and hardware requirements.

The plan will describe the ground conditions, outrigger or crawler track requirements, and, if necessary, the design of mats, necessary to achieve a level, stable foundation of sufficient bearing capacity for the lift. For floating cranes or derricks, the plan shall describe the operating base (platform) condition and any potential list.

The plan will list environmental conditions under which lift operations are to be stopped.

The plan will specify coordination and communication requirements for the lift operation.

For tandem or tailing crane lifts, the plan will specify the make and model of the cranes, the line, boom, and swing speeds, requirements for an equalizer beam.

12.0 SAFE WORKING LOADS

The manufacturer's recommendations shall be followed in determining the safe working loads of the various sizes and types of specific and identifiable hooks. All hooks for which no applicable manufacturer's recommendations are available shall be tested to twice the intended safe working load before they are initially put into use. The employer shall maintain a record of the dates and results of such tests.

TABLE H - 1. -- RATED CAPACITY (WORKING LOAD LIMIT),
 FOR ALLOY STEEL CHAIN SLINGS (1)

Rated Capacity (Working Load Limit), Pounds
 [Horizontal angles shown in parentheses](2)

Chain	Single branch	Double sling vertical angle (1)

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size, inches	sling--			
	90 deg. loading	30 deg. (60 deg.)	45 deg. (45 deg.)	60 deg. (30 deg.)
1/4.....	3,250	5,560	4,550	3,250
3/8.....	6,600	11,400	9,300	6,600
1/2.....	11,250	19,500	15,900	11,250
5/8.....	16,500	28,500	23,300	16,500
3/4.....	23,000	39,800	32,500	23,000
7/8.....	28,750	49,800	40,600	28,750
1.....	38,750	67,100	54,800	38,750
1 1/8...	44,500	77,000	63,000	44,500
1 1/4...	57,500	99,500	81,000	57,500
1 3/8...	67,000	116,000	94,000	67,000
1 1/2...	80,000	138,000	112,900	80,000
1 3/4...	100,000	172,000	140,000	100,000

TABLE H - 1. -- RATED CAPACITY (WORKING LOAD LIMIT),
 FOR ALLOY STEEL CHAIN SLINGS(1)

(CONTINUED)

Rated Capacity (Working Load Limit), Pounds
 [Horizontal angles shown in parentheses](2)

Chain size, inches	Triple and quadruple sling vertical angle (1)		
	30 deg. (60 deg.)	45 deg. (45 deg.)	60 deg. (30 deg.)
1/4.....	8,400	6,800	4,900
3/8.....	17,000	14,000	9,900
1/2.....	29,000	24,000	17,000
5/8.....	43,000	35,000	24,500
3/4.....	59,500	48,500	34,500
7/8.....	74,500	61,000	43,000
1.....	101,000	82,000	58,000
1 1/8...	115,500	94,500	66,500
1 1/4...	149,000	121,500	86,000
1 3/8...	174,000	141,000	100,500
1 1/2...	207,000	169,000	119,500
1 3/4...	258,000	210,000	150,000

Footnote(1) Other grades of proof tested
 steel chain include Proof Coil, BBB Coil and

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Hi-Test Chain. These grades are not recommended for overhead lifting and therefore are not covered by this code

Footnote(1) Rating of multileg slings adjusted for angle of loading measured as the included angle between the inclined leg and the vertical.

Footnote(2) Rating of multileg slings adjusted for angle of loading between the inclined leg and the horizontal plane of the load.

TABLE H - 2. -- MAXIMUM ALLOWABLE WEAR AT ANY POINT OF LINK

Chain size, (inches)	Maximum allowable wear (inch)
1/4	3/64
3/8	5/64
1/2	7/64
5/8	9/64
3/4	5/32
7/8	11/64
1	3/16
1 1/8	7/32
1 1/4	1/4
1 3/8	9/32
1 1/2	5/16
1 3/4	11/32

TABLE H - 3. -- RATED CAPACITIES FOR SINGLE LEG SLINGS

6x19 and 6x37 Classification Improved Plow Steel Grade Rope
 With Fiber Core (FC)

Rope		Rated capacities, tons (2,000 lb)					
Dia (inches)	Constr	Vertical			Choker		
		HT	MS	S	HT	MS	S

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1/4	6x19	0.49	0.51	0.55	0.37	0.38	0.41
5/16	6x19	0.76	0.79	0.85	0.57	0.59	0.64
3/8	6x19	1.1	1.1	1.2	0.80	0.85	0.91
7/16	6x19	1.4	1.5	1.6	1.1	1.1	1.2
1/2	6x19	1.8	2.0	2.1	1.4	1.5	1.6
9/16	6x19	2.3	2.5	2.7	1.7	1.9	2.0
5/8	6x19	2.8	3.1	3.3	2.1	2.3	2.5
3/4	6x19	3.9	4.4	4.8	2.9	3.3	3.6
7/8	6x19	5.1	5.9	6.4	3.9	4.5	4.8
1	6x19	6.7	7.7	8.4	5.0	5.8	6.3
1 1/8	6x19	8.4	9.5	10.0	6.3	7.1	7.9
1 1/4	6x37	9.8	11.0	12.0	7.4	8.3	9.2
1 3/8	6x37	12.0	13.0	15.0	8.9	10.0	11.0
1 1/2	6x37	14.0	16.0	17.0	10.0	12.0	13.0
1 5/8	6x37	16.0	18.0	21.0	12.0	14.0	15.0
1 3/4	6x37	19.0	21.0	24.0	14.0	16.0	18.0
2	6x37	25.0	28.0	31.0	18.0	21.0	23.0

TABLE H - 3. -- RATED CAPACITIES FOR SINGLE LEG SLINGS

(CONTINUED)

6x19 and 6x37 Classification Improved Plow Steel Grade Rope
 With Fiber Core (FC)

Rope		Rated capacities, tons (2,000 lb)		
Dia (inches)	Constr	Vertical Basket(1)		
		HT	MS	S
1/4	6x19	0.99	1.0	1.1
5/16	6x19	1.5	1.6	1.7
3/8	6x19	2.1	2.2	2.4
7/16	6x19	2.9	3.0	3.3
1/2	6x19	3.7	3.9	4.3
9/16	6x19	4.6	5.0	5.4
5/8	6x19	5.6	6.2	6.7
3/4	6x19	7.8	8.8	9.5
7/8	6x19	10.0	12.0	13.0
1	6x19	13.0	15.0	17.0
1 1/8	6x19	17.0	19.0	21.0
1 1/4	6x37	20.0	22.0	25.0
1 3/8	6x37	24.0	27.0	30.0

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1 1/2	6x37	28.0	32.0	35.0
1 5/8	6x37	33.0	27.0	41.0
1 3/4	6x37	38.0	43.0	48.0
2	6x37	49.0	55.0	62.0

Footnote(1) These values only apply when the D/d ratio for HT slings is 10 or greater, and for MS and S Slings is 20 or greater where:
D=Diameter of curvature around which the body of the sling is bent; d=Diameter of rope.
HT = Hand Tucked Splice and Hidden Tuck Splice.
For hidden tuck splice (IWRC) use values in HT columns.
MS = Mechanical Splice.
S = Swaged or Zinc Poured Socket.

TABLE H - 4. -- RATED CAPACITIES FOR SINGLE LEG SLINGS

6x19 and 6x37 Classification Improved Plow Steel Grade Rope
With Independent Wire Rope Core (IWRC)

Rope		Rated capacities, tons (2,000 lb)					
Dia (inches)	Constr	Vertical			Choker		
		HT	MS	S	HT	MS	S
1/4	6x19	0.53	0.56	0.59	0.40	0.42	0.44
5/16	6x19	0.81	0.87	0.92	0.61	0.65	0.69
3/8	6x19	1.1	1.2	1.3	0.86	0.93	0.98
7/16	6x19	1.5	1.7	1.8	1.2	1.3	1.3
1/2	6x19	2.0	2.2	2.3	1.5	1.6	1.7
9/16	6x19	2.5	2.7	2.9	1.8	2.1	2.2
5/8	6x19	3.0	3.4	3.6	2.2	2.5	2.7
3/4	6x19	4.2	4.9	5.1	3.1	3.6	3.8
7/8	6x19	5.5	6.6	6.9	4.1	4.9	5.2
1	6x19	7.2	8.5	9.0	5.4	6.4	6.7
1 1/8	6x19	9.0	10.0	11.0	6.8	7.8	8.5
1 1/4	6x37	10.0	12.0	13.0	7.9	9.2	9.9
1 3/8	6x37	13.0	15.0	16.0	9.6	11.0	12.0
1 1/2	6x37	15.0	17.0	19.0	11.0	13.0	14.0
1 5/8	6x37	18.0	20.0	22.0	13.0	15.0	17.0
1 3/4	6x37	20.0	24.0	26.0	15.0	18.0	19.0
2	6x37	26.0	30.0	33.0	20.0	23.0	25.0

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TABLE H - 4. -- RATED CAPACITIES FOR SINGLE LEG SLINGS

(CONTINUED)

6x19 and 6x37 Classification Improved Plow Steel Grade Rope
 With Independent Wire Rope Core (IWRC)

Rope		Rated capacities, tons (2,000 lb)			
Dia (inches)	Constr	Vertical Basket(1)			
		HT	MS	S	
1/4	6x19	1.0	1.1	1.2	
5/16	6x19	1.6	1.7	1.8	
3/8	6x19	2.3	2.5	2.6	
7/16	6x19	3.1	3.4	3.5	
1/2	6x19	3.9	4.4	4.6	
9/16	6x19	4.9	5.5	5.8	
5/8	6x19	6.0	6.8	7.2	
3/4	6x19	8.4	9.7	10.0	
7/8	6x19	11.0	13.0	14.0	
1	6x19	14.0	17.0	18.0	
1 1/8	6x19	18.0	21.0	23.0	
1 1/4	6x37	21.0	24.0	26.0	
1 3/8	6x37	25.0	29.0	32.0	
1 1/2	6x37	30.0	35.0	38.0	
1 5/8	6x37	35.0	41.0	44.0	
1 3/4	6x37	41.0	47.0	51.0	
2	6x37	53.0	61.0	66.0	

Footnote(1) These values only apply when the D/d ratio for HT slings is 10 or greater, and for MS and S slings is 20 or greater where:
 D=Diameter of curvature around which the body of the sling is bent; d=Diameter of rope.
 HT = Hand Tucked Splice. For hidden tuck splice (IWRC) use Table H-3 values in HT column.
 MS = Mechanical Splice.
 S = Swaged or Zinc Poured Socket.

TABLE H - 5. -- RATED CAPACITIES FOR SINGLE LEG SLINGS

Cable Laid Rope -- Mechanical Splice Only

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7x7x7 & 7X7X19 Constructions Galvanized Aircraft Grade Rope
 7x6x19 IWRC Construction Improved Plow Steel Grade Rope

Rope		Rated capacities, tons (2,000 lb.)		
Dia (inches)	Constr	Vertical	Choker	Vertical basket(1)
1/4	7x7x7.....	0.50	0.38	1.0
3/8	7x7x7.....	1.1	0.81	2.2
1/2	7x7x7.....	1.8	1.4	3.7
5/8	7x7x7.....	2.8	2.1	5.5
3/4	7x7x7.....	3.8	2.9	7.6
5/8	7x7x19.....	2.9	2.2	5.8
3/4	7x7x19.....	4.1	3.0	8.1
7/8	7x7x19.....	5.4	4.0	11.0
1	7x7x19.....	6.9	5.1	14.0
1 1/8	7x7x19.....	8.2	6.2	16.0
1 1/4	7x7x19.....	9.9	7.4	20.0
3/4	(2)7x6x19	3.8	2.8	7.6
7/8	(2)7x6x19	5.0	3.8	10.0
1	(2)7x6x19	6.4	4.8	13.0
1 1/8	(2)7x6x19	7.7	5.8	15.0
1 1/4	(2)7x6x19	9.2	6.9	18.0
1 5/16	(2)7x6x19	10.0	7.5	20.0
1 3/8	(2)7x6x19	11.0	8.2	22.0
1 1/2	(2)7x6x19	13.0	9.6	26.0

Footnote(1) These values only apply when the D/d ratio is 10 or greater where: D=Diameter of curvature around which the body of the sling is bent; d=Diameter of rope.

Footnote(2) IWRC.

TABLE H - 6. -- RATED CAPACITIES FOR SINGLE LEG SLINGS

8-Part and 6-Part Braided Rope

6x7 and 6x19 Construction Improved Plow Steel Grade Rope
 7x7 Construction Galvanized Aircraft Grade Rope

Component ropes		Rated capacities, tons (2,000 lb)		
Diameter (inches)	Constr	Vertical	Choker	Basket vertical to 30 deg.(1)

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		8-Part		6-Part		8-Part		6-Part	
3/32.....	6x7	0.42	0.32	0.32	0.24	0.74	0.55		
1/8.....	6x7	0.76	0.57	0.57	0.42	1.3	0.98		
3/16.....	6x7	1.7	1.3	1.3	0.94	2.9	2.2		
3/32.....	7x7	0.51	0.39	0.38	0.29	0.89	0.67		
1/8.....	7x7	0.95	0.71	0.71	0.53	1.6	1.2		
3/16.....	7x7	2.1	1.5	1.5	1.2	3.6	2.7		
3/16.....	6x19	1.7	1.3	1.3	0.98	3.0	2.2		
1/4.....	6x19	3.1	2.3	2.3	1.7	5.3	4.0		
5/16.....	6x19	4.8	3.6	3.6	2.7	8.3	6.2		
3/8.....	6x19	6.8	5.1	5.1	3.8	12.0	8.9		
7/16.....	6x19	9.3	6.9	6.9	5.2	16.0	12.0		
1/2.....	6x19	12.0	9.0	9.0	6.7	21.0	15.0		
9/16.....	6x19	15.0	11.0	11.0	8.5	26.0	20.0		
5/8.....	6x19	19.0	14.0	14.0	10.0	32.0	24.0		
3/4.....	6x19	27.0	20.0	20.0	15.0	46.0	35.0		
7/8.....	6x19	36.0	27.0	27.0	20.0	62.0	47.0		
1.....	6x19	47.0	35.0	35.0	26.0	81.0	61.0		

Footnote(1) These values only apply when the D/d ratio is 20 or greater where: D=Diameter of curvature around which the body of the sling is bent; d=Diameter of component rope.

TABLE H - 7. -- RATED CAPACITIES FOR 2-LEG AND 3-LEG BRIDLE SLINGS

6x19 and 6x37 Classification Improved Plow Steel
 Grade Rope With Fiber Core (FC)

Rope		Rated capacities, tons (2,000 lb)					
Dia [inches]	Constr	2-Leg bridle slings					
		30 deg(1) (60 deg)(2)		45 deg. angle		60 deg(1) (30 deg)(2)	
		HT	MS	HT	MS	HT	MS
1/4	6x19	0.85	0.88	0.70	0.72	0.49	0.51
5/16	6x19	1.3	1.4	1.1	1.1	0.76	0.79

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3/8	6x19	1.8	1.9	1.5	1.6	1.1	1.1
7/16	6x19	2.5	2.6	2.0	2.2	1.4	1.5
1/2	6x19	3.2	3.4	2.6	2.8	1.8	2.0
9/16	6x19	4.0	4.3	3.2	3.5	2.3	2.5
5/8	6x19	4.8	5.3	4.0	4.4	2.8	3.1
3/4	6x19	6.8	7.6	5.5	6.2	3.9	4.4
7/8	6x19	8.9	10.0	7.3	8.4	5.1	5.9
1	6x19	11.0	13.0	9.4	11.0	6.7	7.7
1 1/8	6x19	14.0	16.0	12.0	13.0	8.4	9.5
1 1/4	6x37	17.0	19.0	14.0	16.0	9.8	11.0
1 3/8	6x37	20.0	23.0	17.0	19.0	12.0	13.0
1 1/2	6x37	24.0	27.0	20.0	22.0	14.0	16.0
1 5/8	6x37	28.0	32.0	23.0	26.0	16.0	18.0
1 3/4	6x37	33.0	37.0	27.0	30.0	19.0	21.0
2	6x37	43.0	48.0	35.0	39.0	25.0	28.0

TABLE H - 7. -- RATED CAPACITIES FOR 2-LEG
 AND 3-LEG BRIDLE SLINGS

[Continued]

6x19 and 6x37 Classification Improved Plow Steel
 Grade Rope With Fiber Core (FC)

Rope		Rated capacities, tons (2,000 lb)					
Dia [inches]	Constr	3-Leg bridle slings					
		30 deg(1) (60 deg)(2)		45 deg. angle		60 deg(1) (30 deg)(2)	
		HT	MS	HT	MS	HT	MS
1/4	6x19	1.3	1.3	1.0	1.1	0.74	0.76
5/16	6x19	2.0	2.0	1.6	1.7	1.1	1.2
3/8	6x19	2.8	2.9	2.3	2.4	1.6	1.7
7/16	6x19	3.7	4.0	3.0	3.2	2.1	2.3
1/2	6x19	4.8	5.1	3.9	4.2	2.8	3.0
9/16	6x19	6.0	6.5	4.9	5.3	3.4	3.7
5/8	6x19	7.3	8.0	5.9	6.5	4.2	4.6
3/4	6x19	10.0	11.0	8.3	9.3	5.8	6.6
7/8	6x19	13.0	15.0	11.0	13.0	7.7	8.9
1	6x19	17.0	20.0	14.0	16.0	10.0	11.0
1 1/8	6x19	22.0	24.0	18.0	20.0	13.0	14.0

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1 1/4	6x37	25.0	29.0	21.0	23.0	15.0	17.0
1 3/8	6x37	31.0	35.0	25.0	28.0	18.0	20.0
1 1/2	6x37	36.0	41.0	30.0	33.0	21.0	24.0
1 5/8	6x37	43.0	48.0	35.0	39.0	25.0	28.0
1 3/4	6x37	49.0	56.0	40.0	45.0	28.0	32.0
2	6x37	64.0	72.0	52.0	59.0	37.0	41.0

HT = Hand Tucked Splice.

MS = Mechanical Splice.

Footnote(1) Vertical angles.

Footnote(2) Horizontal angles.

TABLE H - 8. -- RATED CAPACITIES FOR 2-LEG
 AND 3-LEG BRIDLE SLINGS

6x19 and 6x37 Classification Improved Plow Steel
 Grade Rope With Independent Wire Rope Core (IWRC)

Rope		Rated capacities, tons (2,000 lb)					
Dia (inches)	Constr	2-Leg bridle slings					
		30 deg.(1) (60 deg.)(2)		45 deg. angle		60 deg.(1) (30 deg.)(2)	
		HT	MS	HT	MS	HT	MS
1/4	6x19	0.92	0.97	0.75	0.79	0.53	0.56
5/16	6x19	1.4	1.5	1.1	1.2	0.81	0.87
3/8	6x19	2.0	2.1	1.6	1.8	1.1	1.2
7/16	6x19	2.7	2.9	2.2	2.4	1.5	1.7
1/2	6x19	3.4	3.8	2.8	3.1	2.0	2.2
9/16	6x19	4.3	4.8	3.5	3.9	2.5	2.7
5/8	6x19	5.2	5.9	4.2	4.8	3.0	3.4
3/4	6x19	7.3	8.4	5.9	6.9	4.2	4.9
7/8	6x19	9.6	11.0	7.8	9.3	5.5	6.6
1	6x19	12.0	15.0	10.0	12.0	7.2	8.5
1 1/8	6x19	16.0	18.0	13.0	15.0	9.0	10.0
1 1/4	6x37	18.0	21.0	15.0	17.0	10.0	12.0
1 3/8	6x37	22.0	25.0	18.0	21.0	13.0	15.0
1 1/2	6x37	26.0	30.0	21.0	25.0	15.0	17.0
1 5/8	6x37	31.0	35.0	25.0	29.0	18.0	20.0
1 3/4	6x37	35.0	41.0	29.0	33.0	20.0	24.0
2	6x37	46.0	53.0	37.0	43.0	26.0	30.0

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TABLE H - 8. -- RATED CAPACITIES FOR 2-LEG
 AND 3-LEG BRIDLE SLINGS

[Continued]

6x19 and 6x37 Classification Improved Plow Steel
 Grade Rope With Independent Wire Rope Core (IWRC)

Rope		Rated capacities, tons (2,000 lb)					
Dia (inches)	Constr	3-Leg bridle slings					
		30 deg.(1) (60 deg.)(2)		45 deg. angle		60 deg.(1) (30 deg.)(2)	
		HT	MS	HT	MS	HT	MS
1/4	6x19	1.4	1.4	1.1	1.2	0.79	0.84
5/16	6x19	2.1	2.3	1.7	1.8	1.2	1.3
3/8	6x19	3.0	3.2	2.4	2.6	1.7	1.9
7/16	6x19	4.0	4.4	3.3	3.6	2.3	2.5
1/2	6x19	5.1	5.7	4.2	4.6	3.0	3.3
9/16	6x19	6.4	7.1	5.2	5.8	3.7	4.1
5/8	6x19	7.8	8.8	6.4	7.2	4.5	5.1
3/4	6x19	11.0	13.0	8.9	10.0	6.3	7.3
7/8	6x19	14.0	17.0	12.0	14.0	8.3	9.9
1	6x19	19.0	22.0	15.0	18.0	11.0	13.0
1 1/8	6x19	23.0	27.0	19.0	22.0	13.0	16.0
1 1/4	6x37	27.0	32.0	22.0	26.0	16.0	18.0
1 3/8	6x37	33.0	38.0	27.0	31.0	19.0	22.0
1 1/2	6x37	39.0	45.0	32.0	37.0	23.0	26.0
1 5/8	6x37	46.0	53.0	38.0	43.0	27.0	31.0
1 3/4	6x37	53.0	61.0	43.0	50.0	31.0	35.0
2	6x37	68.0	79.0	56.0	65.0	40.0	46.0

HT = Hand Tucked Splice.

MS = Mechanical Splice.

Footnote(1) Vertical angles.

Footnote(2) Horizontal angles.

TABLE H - 9. -- RATED CAPACITIES FOR 2-LEG
 AND 3-LEG BRIDLE SLINGS

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Cable Laid Rope - Mechanical Splice Only
 7x7x7 and 7x7x19 Construction Galvanized Aircraft Grade Rope
 7x6x19 IWRC Construction Improved Plow Steel Grade Rope

Rope		Rated capacities, tons (2,000 lb)		
Dia (inches)	Constr	2-Leg bridle slings		
		30 deg.(1) (60 deg.)(2)	45 deg. angle	60 deg.(1) (30 deg.)(2)
1/4.....	7x7x7.....	0.87	0.71	0.50
3/8.....	7x7x7.....	1.9	1.5	1.1
1/2.....	7x7x7.....	3.2	2.6	1.8
5/8.....	7x7x7.....	4.8	3.9	2.8
3/4.....	7x7x7.....	6.6	5.4	3.8
5/8.....	7x7x19.....	5.0	4.1	2.9
3/4.....	7x7x19.....	7.0	5.7	4.1
7/8.....	7x7x19.....	9.3	7.6	5.4
1.....	7x7x19.....	12.0	9.7	6.9
1 1/8....	7x7x19.....	14.0	12.0	8.2
1 1/4....	7x7x19.....	17.0	14.0	9.9
3/4.....	7x6x19 IWRC.	6.6	5.4	3.8
7/8.....	7x6x19 IWRC.	8.7	7.1	5.0
1.....	7x6x19 IWRC.	11.0	9.0	6.4
1 1/8....	7x6x19 IWRC.	13.0	11.0	7.7
1 1/4....	7x6x19 IWRC.	16.0	13.0	9.2
1 5/16...	7x6x19 IWRC.	17.0	14.0	10.0
1 3/8....	7x6x19 IWRC.	19.0	15.0	11.0
1 1/2....	7x6x19 IWRC.	22.0	18.0	13.0

TABLE H - 9. -- RATED CAPACITIES FOR 2-LEG
 AND 3-LEG BRIDLE SLINGS

[Continued]

Cable Laid Rope - Mechanical Splice Only
 7x7x7 and 7x7x19 Construction Galvanized Aircraft Grade Rope
 7x6x19 IWRC Construction Improved Plow Steel Grade Rope

Rope	Rated capacities, tons (2,000 lb)
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Dia (inches)	Constr	3-Leg bridle slings		
		30 deg.(1)	45 deg.	60 deg.(1)
		(60 deg.)(2)	angle	(30 deg.)(2)
1/4.....	7x7x7	1.3	1.1	0.75
3/8.....	7x7x7.....	2.8	2.3	1.6
1/2.....	7x7x7.....	4.8	3.9	2.8
5/8.....	7x7x7.....	7.2	5.9	4.2
3/4.....	7x7x7.....	9.9	8.1	5.7
5/8.....	7x7x19.....	7.5	6.1	4.3
3/4.....	7x7x19.....	10.0	8.6	6.1
7/8.....	7x7x19.....	14.0	11.0	8.1
1.....	7x7x19.....	18.0	14.0	10.0
1 1/8....	7x7x19.....	21.0	17.0	12.0
1 1/4....	7x7x19.....	26.0	21.0	15.0
3/4.....	7x6x19 IWRC.	9.9	8.0	5.7
7/8.....	7x6x19 IWRC.	13.0	11.0	7.5
1.....	7x6x19 IWRC.	17.0	13.0	9.6
1 1/8....	7x6x19 IWRC.	20.0	16.0	11.0
1 1/4....	7x6x19 IWRC.	24.0	20.0	14.0
1 5/16...	7x6x19 IWRC.	26.0	21.0	15.0
1 3/8....	7x6x19 IWRC.	28.0	23.0	16.0
1 1/2....	7x6x19 IWRC.	33.0	27.0	19.0

Footnote(1) Vertical angles.
 Footnote(2) Horizontal angles.

TABLE H- 10. -- RATED CAPACITIES FOR 2-LEG AND
 3-LEG BRIDLE SLINGS

8-Part and 6-Part Braided Rope
 6x7 and 6x19 Construction Improved Plow Steel Grade Rope
 7x7 Construction Galvanized Aircraft Grade Rope

Rope		Rated capacities, tons (2,000 lb)		
		2-Leg bridle sling		
Dia (in.)	Constr	30 deg(1)	45 deg angle	60 deg (1)
		(60 deg)(2)		(30 deg)(2)

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		8-Part	6-Part	8-Part	6-Part	8-Part	6-Part
3/32	6x7	0.74	0.55	0.60	0.45	0.42	0.32
1/8	6x7	1.3	0.98	1.1	0.80	0.76	0.57
3/16	6x7	2.9	2.2	2.4	1.8	1.7	1.3
3/32	7x7	0.89	0.67	0.72	0.55	0.51	0.39
1/8	7x7	1.6	1.2	1.3	1.0	0.95	0.71
3/16	7x7	3.6	2.7	2.9	2.2	2.1	1.5
3/16	6x19	3.0	2.2	2.4	1.8	1.7	1.3
1/4	6x19	5.3	4.0	4.3	3.2	3.1	2.3
5/16	6x19	8.3	6.2	6.7	5.0	4.8	3.6
3/8	6x19	12.0	8.9	9.7	7.2	6.8	5.1
7/16	6x19	16.0	12.0	13.0	9.8	9.3	6.9
1/2	6x19	21.0	15.0	17.0	13.0	12.0	9.0
9/16	6x19	26.0	20.0	21.0	16.0	15.0	11.0
5/8	6x19	32.0	24.0	26.0	20.0	19.0	14.0
3/4	6x19	46.0	35.0	38.0	28.0	27.0	20.0
7/8	6x19	62.0	47.0	51.0	38.0	36.0	27.0
1	6x19	81.0	61.0	66.0	50.0	47.0	35.0

TABLE H- 10. -- RATED CAPACITIES FOR 2-LEG AND 3-LEG BRIDLE SLINGS

[Continued]

8-Part and 6-Part Braided Rope
 6x7 and 6x19 Construction Improved Plow Steel Grade Rope
 7x7 Construction Galvanized Aircraft Grade Rope

Rope		Rated capacities, tons (2,000 lb)					
		3-Leg bridle sling					
Dia (in.)	Constr	30 deg(1) (60 deg)(2)		45 deg angle		60 deg(1) (30 deg)(2)	
		8-Part	6-Part	8-Part	6-Part	8-Part	6-Part
3/32	6x7	1.1	0.83	0.90	0.68	0.64	0.48
1/8	6x7	2.0	1.5	1.6	1.2	1.1	0.85

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3/16	6x7	4.4	3.3	3.6	2.7	2.5	1.9
3/32	7x7	1.3	1.0	1.1	0.82	0.77	0.58
1/8	7x7	2.5	1.8	2.0	1.5	1.4	1.1
3/16	7x7	5.4	4.0	4.4	3.3	3.1	2.3
3/16	6x19	4.5	3.4	3.7	2.8	2.6	1.9
1/4	6x19	8.0	6.0	6.5	4.9	4.6	3.4
5/16	6x19	12.0	9.3	10.0	7.6	7.1	5.4
3/8	6x19	18.0	13.0	14.0	11.0	10.0	7.7
7/16	6x19	24.0	18.0	20.0	15.0	14.0	10.0
1/2	6x19	31.0	23.0	25.0	19.0	18.0	13.0
9/16	6x19	39.0	29.0	32.0	24.0	23.0	17.0
5/8	6x19	48.0	36.0	40.0	30.0	28.0	21.0
3/4	6x19	69.0	52.0	56.0	42.0	40.0	30.0
7/8	6x19	94.0	70.0	76.0	57.0	54.0	40.0
1	6x19	22.0	91.0	99.0	74.0	70.0	53.0

Footnote(1) Vertical angles.

Footnote(2) Horizontal angles.

TABLE H - 11. -- RATED CAPACITIES FOR STRAND LAID GROMMET
 -- HAND TUCKED

Improved Plow Steel Grade Rope

Rope body		Rated capacities, tons (2,000 lb)		
Dia (inches)	Constr	Vertical	Choker	Vertical basket(1)
1/4	7x19	0.85	0.64	1.7
5/16	7x19	1.3	1.0	2.6
3/8	7x19	1.9	1.4	3.8
7/16	7x19	2.6	1.9	5.2
1/2	7x19	3.3	2.5	6.7
9/16	7x19	4.2	3.1	8.4
5/8	7x19	5.2	3.9	10.0
3/4	7x19	7.4	5.6	15.0
7/8	7x19	10.0	7.5	20.0
1	7x19	13.0	9.7	26.0
1 1/8	7x19	16.0	12.0	32.0
1 1/4	7x37	18.0	14.0	37.0
1 3/8	7x37	22.0	16.0	44.0
1 1/2	7x37	26.0	19.0	52.0

Footnote(1) These values only apply when the D/d ratio is 5 or greater where: D=Diameter of curvature around which

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rope is bent. d=Diameter of rope body.

TABLE H - 12. -- RATED CAPACITIES FOR CABLE LAID GROMMET
 -- HAND TUCKED

7x6x7 and 7x6x19 Constructions Improved Plow Steel Grade Rope
 7x7x7 Construction Galvanized Aircraft Grade Rope

Cable body		Rated capacities, tons (2,000 lb)		
Dia (inches)	Constr	Vertical	Choker	Vertical basket(1)
3/8	7x6x7	1.3	0.95	2.5
9/16	7x6x7	2.8	2.1	5.6
5/8	7x6x7	3.8	2.8	7.6
3/8	7x7x7	1.6	1.2	3.2
9/16	7x7x7	3.5	2.6	6.9
5/8	7x7x7	4.5	3.4	9.0
5/8	7x6x19	3.9	3.0	7.9
3/4	7x6x19	5.1	3.8	10.0
15/16	7x6x19	7.9	5.9	16.0
1 1/8	7x6x19	11.0	8.4	22.0
1 5/16	7x6x19	15.0	11.0	30.0
1 1/2	7x6x19	19.0	14.0	39.0
1 11/16	7x6x19	24.0	18.0	49.0
1 7/8	7x6x19	30.0	22.0	60.0
2 1/4	7x6x19	42.0	31.0	84.0
2 5/8	7x6x19	56.0	42.0	112.0

Footnote(1) These values only apply when the D/d ratio is 5 or greater where: D=Diameter of curvature around which cable body is bent., d=Diameter of cable body.

TABLE H - 13. -- RATED CAPACITIES FOR STRAND LAID
 ENDLESS SLINGS
 -- MECHANICAL JOINT

Improved Plow Steel Grade Rope

Rope body		Rated capacities, tons (2,000 lb)		
Dia (inches)	Constr	Vertical	Choker	Vertical basket(1)

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1/4	(2)6x19	0.92	0.69	1.8
3/8	(2)6x19	2.0	1.5	4.1
1/2	(2)6x19	3.6	2.7	7.2
5/8	(2)6x19	5.6	4.2	11.0
3/4	(2)6x19	8.0	6.0	16.0
7/8	(2)6x19	11.0	8.1	21.0
1	(2)6x19	14.0	10.0	28.0
1 1/8	(2)6x19	18.0	13.0	35.0
1 1/4	(2)6x37	21.0	15.0	41.0
1 3/8	(2)6x37	25.0	19.0	50.0
1 1/2	(2)6x37	29.0	22.0	59.0

Footnote(1) These values only apply when the D/d ratio is 5 or greater where: D=Diameter of curvature around which rope is bent. d=Diameter of rope body.

Footnote(2) IWRC.

TABLE H - 14. -- RATED CAPACITIES FOR CABLE LAID
 ENDLESS SLINGS
 -- MECHANICAL JOINT

7x7x7 and 7x7x19 Constructions Galvanized Aircraft Grade Rope
 7x6x19 Construction Improved Plow Steel Grade Rope

Cable body		Rated capacities, tons (2,000 lb)		
Dia (inches)	Constr	Vertical	Choker	Vertical basket(1)
1/4	7x7x7	0.83	0.62	1.6
3/8	7x7x7	1.8	1.3	3.5
1/2	7x7x7	3.0	2.3	6.1
5/8	7x7x7	4.5	3.4	9.1
3/4	7x7x7	6.3	4.7	12.0
5/8	7x7x19	4.7	3.5	9.5
3/4	7x7x19	6.7	5.0	13.0
7/8	7x7x19	8.9	6.6	18.0
1	7x7x19	11.0	8.5	22.0
1 1/8	7x7x19	14.0	10.0	28.0
1 1/4	7x7x19	17.0	12.0	33.0
3/4	(2)7x6x19	6.2	4.7	12.0
7/8	(2)7x6x19	8.3	6.2	16.0
1	(2)7x6x19	10.0	7.9	21.0
1 1/8	(2)7x6x19	13.0	9.7	26.0
1 1/4	(2)7x6x19	16.0	12.0	31.0
1 3/8	(2)7x6x19	18.0	14.0	37.0

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1 1/2 | (2)7x6x19 | 22.0 | 16.0 | 43.0

Footnote(1) These values only apply when the D/d value is 5 or greater where: D=Diameter of curvature around which cable body is bent. d=Diameter of cable body.
 Footnote(2) IWRC.

TABLE H -15. -- MANILA ROPE SLINGS

[Angle of rope to vertical shown in parentheses]

Rated capacity in pounds (safety factor=5)									
Eye and eye sling									
Rope dia. nomi- in inches	Nomi- nal weight per 100 ft in pounds	Mini- mum break- ing stren- gth in pounds	Verti- cal hitch	Choker hitch	Basket hitch; Angel of rope to horizontal				
					90 deg (0 deg)	60 deg (30 deg)	45 deg (45 deg)	30 deg (60 deg)	
1/2	7.5	2,650	550	250	1,100	900	750	550	
9/16	10.4	3,450	700	350	1,400	1,200	1,000	700	
5/8	13.3	4,400	900	450	1,800	1,500	1,200	900	
3/4	16.7	5,400	1,100	550	2,200	1,900	1,500	1,100	
13/16	19.5	6,500	1,300	650	2,600	2,300	1,800	1,300	
7/8	22.5	7,700	1,500	750	3,100	2,700	2,200	1,500	
1	27.0	9,000	1,800	900	3,600	3,100	2,600	1,800	
1 1/16	31.3	10,500	2,100	1,100	4,200	3,600	3,000	2,100	
1 1/8	36.0	12,000	2,400	1,200	4,800	4,200	3,400	2,400	
1 1/4	41.7	13,500	2,700	1,400	5,400	4,700	3,800	2,700	
1 5/16	47.9	15,000	3,000	1,500	6,000	5,200	4,300	3,000	
1 1/2	59.9	18,500	3,700	1,850	7,400	6,400	5,200	3,700	
1 5/8	74.6	22,500	4,500	2,300	9,000	7,800	6,400	4,500	
1 3/4	89.3	26,500	5,300	2,700	10,500	9,260	7,500	5,300	
2	107.5	31,000	6,200	3,100	12,500	10,500	8,800	6,200	
2 1/3	125.0	36,000	7,200	3,600	14,500	12,500	10,000	7,200	
2 1/4	146.0	41,000	8,200	4,100	16,500	14,000	11,500	8,200	
2 1/2	166.7	46,500	9,300	4,700	18,500	16,000	13,000	9,300	
2 5/8	190.8	52,000	10,500	5,200	21,000	18,000	14,500	10,500	

TABLE H - 15. -- MANILA ROPE SLINGS

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[Continued]

[Angle of rope to vertical shown in parentheses]

Rated capacity in pounds (safety factor=5)									
Endless sling									
Rope dia. nomi- nal in inches	Nomi- nal weight per 100 ft in pounds	Mini- mum break- ing stren- gth in pounds	Verti- cal hitch	Choker hitch	Basket hitch; Angel of rope to horizontal				
					90 deg (0 deg)	60 deg (30 deg)	45 deg (45 deg)	30 deg (60 deg)	
1/2	7.5	2,650	950	500	1,900	1,700	1,400	950	
9/16	10.4	3,450	1,200	600	2,500	2,200	1,800	1,200	
5/8	13.3	4,400	1,600	800	3,200	2,700	2,200	1,600	
3/4	16.7	5,400	2,000	950	3,900	3,400	2,800	2,000	
13/16	19.5	6,500	2,300	1,200	4,700	4,100	3,300	2,300	
7/8	22.5	7,700	2,800	1,400	5,600	4,800	3,900	2,800	
1	27.0	9,000	3,200	1,600	6,500	5,600	4,600	3,200	
1 1/16	31.3	10,500	3,800	1,900	7,600	6,600	5,400	3,800	
1 1/8	36.0	12,000	4,300	2,200	8,600	7,500	6,100	4,300	
1 1/4	41.7	13,500	4,900	2,400	9,700	8,400	6,900	4,900	
1 5/16	47.9	15,000	5,400	2,700	11,000	9,400	7,700	5,400	
1 1/2	59.9	18,500	6,700	3,300	13,500	11,500	9,400	6,700	
1 5/8	74.6	22,500	8,100	4,100	16,000	14,000	11,500	8,000	
1 3/4	89.3	26,500	9,500	4,800	19,000	16,500	13,500	9,500	
2	107.5	31,000	11,000	5,600	22,500	19,500	16,000	11,000	
2 1/3	125.0	36,000	13,000	6,500	26,000	22,500	18,500	13,000	
2 1/4	146.0	41,000	15,000	7,400	29,500	25,500	21,000	15,000	
2 1/2	166.7	46,500	16,500	8,400	33,500	29,000	23,500	16,500	
2 5/8	190.8	52,000	18,500	9,500	37,500	32,500	26,500	18,500	

TABLE H - 16. -- NYLON ROPE SLINGS

[Angle of rope to vertical shown in parentheses]

Rated capacity in pounds (safety factor=9)									
--	--	--	--	--	--	--	--	--	--

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Eye and eye sling									
Rope dia. nomi- nal in inches	Nomi- nal weight per 100 ft in pounds	Mini- mum break- ing stren- gth in pounds	Verti- cal hitch	Choker hitch	Basket hitch; Angel of rope to horizontal				
					(0 deg)	(30 deg)	(45 deg)	(60 deg)	
1/2	6.5	6,080	700	350	1,400	1,200	950	700	
9/16	8.3	7,600	850	400	1,700	1,500	1,200	850	
5/8	10.5	9,880	1,100	550	2,200	1,900	1,600	1,100	
3/4	14.5	13,490	1,500	750	3,000	2,600	2,100	1,500	
13/16	17.0	16,150	1,800	900	3,600	3,100	2,600	1,800	
7/8	20.0	19,000	2,100	1,100	4,200	3,700	3,000	2,100	
1	26.0	23,750	2,600	1,300	5,300	4,600	3,700	2,600	
1 1/16	29.0	27,360	3,000	1,500	6,100	5,300	4,300	3,000	
1 1/8	34.0	31,350	3,500	1,700	7,000	6,000	5,000	3,500	
1 1/4	40.0	35,625	4,000	2,000	7,900	6,900	5,600	4,000	
1 5/16	45.0	40,850	4,500	2,300	9,100	7,900	6,400	4,500	
1 1/2	55.0	50,350	5,600	2,800	11,000	9,700	7,900	5,600	
1 5/8	68.0	61,750	6,900	3,400	13,500	12,000	9,700	6,900	
1 3/4	83.0	74,100	8,200	4,100	16,500	14,500	11,500	8,200	
2	95.0	87,400	9,700	4,900	19,500	17,000	13,500	9,700	
2 1/8	109.0	100,700	11,000	5,600	22,500	19,500	16,000	11,000	
2 1/4	129.0	118,750	13,000	6,600	26,500	23,000	18,500	13,000	
2 1/2	149.0	133,000	15,000	7,400	29,500	25,500	21,000	15,000	
2 5/8	168.0	153,900	17,100	8,600	34,000	29,500	24,000	17,000	

TABLE H - 16. -- NYLON ROPE SLINGS

[Continued]

[Angle of rope to vertical shown in parentheses]

Rated capacity in pounds (safety factor=9)									
Endless sling									
Rope dia. nomi- nal in	Nomi- nal weight per 100 ft in pounds	Mini- mum break- ing stren- gth in pounds	Verti- cal hitch	Choker hitch	Basket hitch; Angel of rope to horizontal				
					(0 deg)	(30 deg)	(45 deg)	(60 deg)	

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inches	pounds	in pounds			90 deg (0 deg)	60 deg (30 deg)	45 deg (45 deg)	30 deg (60 deg)
1/2	6.5	6,080	1,200	600	2,400	2,100	1,700	1,200
9/16	8.3	7,600	1,500	750	3,000	2,600	2,200	1,500
5/8	10.5	9,880	2,000	1,100	4,000	3,400	2,800	2,000
3/4	14.5	13,490	2,700	1,400	5,400	4,700	3,800	2,700
13/16	17.0	16,150	3,200	1,600	6,400	5,600	4,600	3,200
7/8	20.0	19,000	3,800	1,900	7,600	6,600	5,400	3,800
1	26.0	23,750	4,800	2,400	9,500	8,200	6,700	4,800
1 1/16	29.0	27,360	5,500	2,700	11,000	9,500	7,700	5,500
1 1/8	34.0	31,350	6,300	3,100	12,500	11,000	8,900	6,300
1 1/4	40.0	35,625	7,100	3,600	14,500	12,500	10,000	7,100
1 5/16	45.0	40,850	8,200	4,100	16,500	14,000	12,000	8,200
1 1/2	55.0	50,350	10,000	5,000	20,000	17,500	14,000	10,000
1 5/8	68.0	61,750	12,500	6,200	24,500	21,500	17,500	12,500
1 3/4	83.0	74,100	15,000	7,400	29,500	27,500	21,000	15,000
2	95.0	87,400	17,500	8,700	35,000	30,500	24,500	17,500
2 1/8	109.0	100,700	20,000	10,000	40,500	35,000	28,500	20,000
2 1/4	129.0	118,750	24,000	12,000	47,500	41,000	33,500	24,000
2 1/2	149.0	133,000	26,500	13,500	53,000	46,000	37,500	26,500
2 5/8	168.0	153,900	31,000	15,500	61,500	53,500	43,500	31,000

TABLE H - 17. -- POLYESTER ROPE SLINGS

[Angle of rope to vertical shown in parentheses]

Rated capacity in pounds (safety factor=9)									
Eye and eye sling									
Rope dia. nomi- in	Nomi- weight per 100 ft in	Mini- mum break- ing stren- gth in	Verti- cal hitch	Choker hitch	Basket hitch; Angel of rope to horizontal				
					90 deg (0 deg)	60 deg (30 deg)	45 deg (45 deg)	30 deg (60 deg)	
1/2	8.0	6,080	700	350	1,400	1,200	950	700	
9/16	10.2	7,600	850	400	1,700	1,500	1,200	850	
5/8	13.0	9,500	1,100	550	2,100	1,800	1,500	1,100	
3/4	17.5	11,875	1,300	650	2,600	2,300	1,900	1,300	
13/16	21.0	14,725	1,600	800	3,300	2,800	2,300	1,600	

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7/8	25.0	17,100	1,900	950	3,800	3,300	2,700	1,900
1	30.5	20,900	2,300	1,200	4,600	4,000	3,300	2,300
1 1/16	34.5	24,225	2,700	1,300	5,400	4,700	3,800	2,700
1 1/8	40.0	28,025	3,100	1,600	6,200	5,400	4,400	3,100
1 1/4	46.3	31,540	3,500	1,800	7,000	6,100	5,000	3,500
1 5/16	52.5	35,625	4,000	2,000	7,900	6,900	5,600	4,000
1 1/2	66.8	44,460	4,900	2,500	9,900	8,600	7,000	4,900
1 5/8	82.0	54,150	6,000	3,000	12,000	10,400	8,500	6,000
1 3/4	98.0	64,410	7,200	3,600	14,500	12,500	10,000	7,200
2	118.0	76,000	8,400	4,200	17,000	14,500	12,000	8,400
2 1/8	135.0	87,400	9,700	4,900	19,500	17,000	13,500	9,700
2 1/4	157.0	101,650	11,500	5,700	22,500	19,500	16,000	11,500
2 1/2	181.0	115,900	13,000	6,400	26,000	22,500	18,000	13,000
2 5/8	205.0	130,150	14,500	7,200	29,000	25,000	20,500	14,500

TABLE H - 17. -- POLYESTER ROPE SLINGS

[Continued]

[Angle of rope to vertical shown in parentheses]

Rope dia. nomi- in inches	Nomi- weight per 100 ft in pounds	Mini- break- ing stren- gth in pounds	Rated capacity in pounds (safety factor=9)						
			Endless sling						
			Verti- cal hitch	Choker hitch	Basket hitch; Angel of rope to horizontal				
					90 deg (0 deg)	60 deg (30 deg)	45 deg (45 deg)	30 deg (60 deg)	
1/2	8.0	6,080	1,200	600	2,400	2,100	1,700	1,200	
9/16	10.2	7,600	1,500	750	3,000	2,600	2,200	1,500	
5/8	13.0	9,500	1,900	950	3,800	3,300	2,700	1,900	
3/4	17.5	11,875	2,400	1,200	4,800	4,100	3,400	2,400	
13/16	21.0	14,725	2,900	1,500	5,900	5,100	4,200	2,900	
7/8	25.0	17,100	3,400	1,700	6,800	5,900	4,800	3,400	
1	30.5	20,900	4,200	2,100	8,400	7,200	5,900	4,200	
1 1/16	34.5	24,225	4,800	2,400	9,700	8,400	6,900	4,800	
1 1/8	40.0	28,025	5,600	2,800	11,000	9,700	7,900	5,600	
1 1/4	46.3	31,540	6,300	3,200	12,500	11,000	8,900	6,300	
1 5/16	52.5	35,625	7,100	3,600	14,500	12,500	10,000	7,100	
1 1/2	66.8	44,460	8,900	4,400	18,000	15,500	12,500	8,900	
1 5/8	82.0	54,150	11,000	5,500	21,500	19,000	15,500	11,000	

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1 3/4	98.0	64,410	13,000	6,400	26,000	22,500	18,000	13,000
2	118.0	76,000	15,000	7,600	30,500	26,500	21,500	15,000
2 1/8	135.0	87,400	17,500	8,700	35,000	30,500	24,500	17,500
2 1/4	157.0	101,650	20,500	10,000	40,500	35,000	29,000	20,500
2 1/2	181.0	115,900	23,000	11,500	46,500	40,000	33,000	23,000
2 5/8	205.0	130,150	26,000	13,000	52,000	45,000	37,000	26,000

TABLE H - 18. -- POLYPROPYLENE ROPE SLINGS

[Angle of rope to vertical shown in parentheses]

Rated capacity in pounds (safety factor=6)									
Eye and eye sling									
Rope dia. nomi- nal in inches	Nomi- nal weight per 100 ft in pounds	Mini- mum break- ing stren- gth in pounds	Verti- cal hitch	Choker hitch	Basket hitch; Angel of rope to horizontal				
					(0 deg)	(30 deg)	(45 deg)	(60 deg)	
1/2	4.7	3,990	650	350	1,300	1,200	950	650	
9/16	6.1	4,845	800	400	1,600	1,400	1,100	800	
5/8	7.5	5,890	1,000	500	2,000	1,700	1,400	1,000	
3/4	10.7	8,075	1,300	700	2,700	2,300	1,900	1,300	
13/16	12.7	9,405	1,600	800	3,100	2,700	2,200	1,600	
7/8	15.0	10,925	1,800	900	3,600	3,200	2,600	1,800	
1	18.0	13,300	2,200	1,100	4,400	3,800	3,100	2,200	
1 1/16	20.4	15,200	2,500	1,300	5,100	4,400	3,600	2,500	
1 1/8	23.7	17,385	2,900	1,500	5,800	5,000	4,100	2,900	
1 1/4	27.0	19,950	3,300	1,700	6,700	5,800	4,700	3,300	
1 5/16	30.5	22,325	3,700	1,900	7,400	6,400	5,300	3,700	
1 1/2	38.5	28,215	4,700	2,400	9,400	8,100	6,700	4,700	
1 5/8	47.5	34,200	5,700	2,900	11,500	9,900	8,100	5,700	
1 3/4	57.0	40,850	6,800	3,400	13,500	12,000	9,600	6,800	
2	69.0	49,400	8,200	4,100	16,500	14,500	11,500	8,200	
2 1/8	80.0	57,950	9,700	4,800	19,500	16,500	13,500	9,700	
2 1/4	92.0	65,550	11,000	5,500	22,000	19,000	15,500	11,000	
2 1/2	107.0	76,000	12,500	6,300	25,500	22,000	18,000	12,500	
2 5/8	120.0	85,500	14,500	7,100	28,500	24,500	20,000	14,500	

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TABLE H - 18. -- POLYPROPYLENE ROPE SLINGS

[Continued]

[Angle of rope to vertical shown in parentheses]

			Rated capacity in pounds (safety factor=6)						
			Endless sling						
Rope dia. nomi- nal in inches	Nomi- nal weight per 100 ft in pounds	Mini- mum break- ing stren- gth in pounds	Verti- cal hitch	Choker hitch	Basket hitch; Angel of rope to horizontal				
					90 deg (0 deg)	60 deg (30 deg)	45 deg (45 deg)	30 deg (60 deg)	
1/2	4.7	3,990	1,200	600	2,400	2,100	1,700	1,200	
9/16	6.1	4,845	1,500	750	2,900	2,500	2,100	1,500	
5/8	7.5	5,890	1,800	900	3,500	3,100	2,500	1,800	
3/4	10.7	8,075	2,400	1,200	4,900	4,200	3,400	2,400	
13/16	12.7	9,405	2,800	1,400	5,600	4,900	4,000	2,800	
7/8	15.0	10,925	3,300	1,600	6,600	5,700	4,600	3,300	
1	18.0	13,300	4,000	2,000	8,000	6,900	5,600	4,000	
1 1/16	20.4	15,200	4,600	2,300	9,100	7,900	6,500	4,600	
1 1/8	23.7	17,385	5,200	2,600	10,500	9,000	7,400	5,200	
1 1/4	27.0	19,950	6,000	3,000	12,000	10,500	8,500	6,000	
1 5/16	30.5	22,325	6,700	3,400	13,500	11,500	9,500	6,700	
1 1/2	38.5	28,215	8,500	4,200	17,000	14,500	12,000	8,500	
1 5/8	47.5	34,200	10,500	5,100	20,500	18,000	14,500	10,500	
1 3/4	57.0	40,850	12,500	6,100	24,500	21,000	17,500	12,500	
2	69.0	49,400	15,000	7,400	29,500	25,500	21,000	15,000	
2 1/8	80.0	57,950	17,500	8,700	35,000	30,100	24,500	17,500	
2 1/4	92.0	65,550	19,500	9,900	39,500	34,000	28,000	19,500	
2 1/2	107.0	76,000	23,000	11,500	45,500	39,500	32,500	23,000	
2 5/8	120.0	85,500	25,500	13,000	51,500	44,500	36,500	25,500	

TABLE H - 19. -- SAFE WORKING LOADS FOR SHACKLES

(In tons of 2,000 pounds)

Material size (inches)	Pin diameter (inches)	Safe working load

1/2	5/8	1.4
5/8	3/4	2.2
3/4	7/8	3.2
7/8	1	4.3
1	1 1/8	5.6
1 1/8	1 1/4	6.7
1 1/4	1 3/8	8.2
1 3/8	1 1/2	10.0
1 1/2	1 5/8	11.9
1 3/4	2	16.2
2	2 1/4	21.2

TABLE H - 20. -- NUMBER AND SPACING OF
 U-BOLT WIRE ROPE CLIPS

Improved plow steel, rope diameter (inches)	Number of clips		Minimum spacing (inches)
	Drop forged	Other material	
1/2	3	4	3
5/8	3	4	3 3/4
3/4	4	5	4 1/2
7/8	4	5	5 1/4
1	5	6	6
1 1/8	6	6	6 3/4
1 1/4	6	7	7 1/2
1 3/8	7	7	8 1/4
1 1/2	7	8	9

[44 FR 8577, Feb. 9, 1979; 44 FR 20940, Apr. 6, 1979, as amended at 58 FR 35173; June 30, 1993]

[/OshStd toc/OSHA Std toc.html/OshStd toc/OSHA Std toc.html](#) OSHA Regulations (Standards - 29 CFR) -
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SOP HS-024 FALL PROTECTION PROGRAM

1.0 POLICY

Each employee on a walking/working surface (horizontal and vertical surface) with an unprotected side or edge that is 6 feet (1.8 m) or more above a lower level shall be protected from falling by the use of guardrail systems, safety net systems, or personal fall arrest systems as required by Subpart M of 29 CFR 1926 - *Fall Protection* (1926.500 to 1926.503).

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to establish safety guidelines to control potential falls and to comply with Federal OSHA standards.

In the event fall protection is required, ECC shall comply with Federal OSHA standards and client requirements. In general, employees shall be protected by standard guardrail, catch platforms, temporary floors, safety nets, or personal fall protection devices in the following situations:

- On access ways (excluding ladders) or work platforms from which they may fall 6 feet or more;
- On access ways or work platforms over water, machinery, or dangerous operations; and
- On runways from which they may fall 4 feet or more.

All employees will be trained by the Site Safety and Health Officer (SSHO) and/or ECC's Corporate Health and Safety Manager in the safe use of access ways and fall protection systems and the recognition of hazards related to their use, including:

- Nature of access and fall hazards in the work area;
- Correct procedures for constructing, erecting, maintaining, using, and dismantling access ways and fall protection systems;
- Maximum intended load-carrying capacities of access ways and fall protection systems; and
- All applicable requirements from this section.

3.0 HOIST AREAS

Each employee in a hoist area shall be protected from falling 6 feet (1.8 m) or more to lower levels by guardrail systems or personal fall arrest systems. If guardrail systems or portions thereof, are removed to facilitate the hoisting operations, and an employee must lean through the access opening or out over the edge of the access opening, that employee shall be protected from fall hazards by a personal fall arrest system.

4.0 WORK AREAS/ACTIVITIES

4.1 Excavations

Each employee at the edge of an excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, or barricades when the excavations are not readily seen because of plant growth or other visual barrier.

Each employee at the edge of a well, pit, shaft, and similar excavation 6 feet (1.8 m) or more in depth shall be protected from falling by guardrail systems, fences, barricades, or covers.

4.2 Dangerous Equipment

Each employee less than 6 feet (1.8 m) above dangerous equipment shall be protected from falling into or onto the dangerous equipment by guardrail systems or by equipment guards.

Each employee 6 feet (1.8 m) or more above dangerous equipment shall be protected from fall hazards by guardrail systems or by equipment guards.

4.3 Low Slope Roofs

Employees engaged in roofing activities on low-slope roofs (a roof having a slope less than or equal to 4 in12 (vertical to horizontal) with unprotected sides and edges 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems, safety net systems, personal fall arrest system, or a combination of warning line system and guardrail system, warning line system and safety net system and safety monitoring system (a competent person who is responsible for recognizing and warning employees of fall hazards).

4.4 Steep Roofs

Employees on a steep roof with unprotected sides and edge 6 feet (1.8 m) or more above lower levels shall be protected from falling by guardrail systems with toeboards, safety net systems, or personal arrest systems.

5.0 TRAINING REQUIREMENTS

ECC shall provide a training program for each employee who might be exposed to fall hazards. The employee shall be able to recognize the hazards of falling and shall be trained in the correct working procedures in order to minimize the hazards. An Activity Hazard Analysis and SSHP shall incorporate fall protection procedures should fall hazards exist on the project site.

5.1 Trainers (Competent Person)

A Competent Person is defined as one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

A competent person who is qualified in the following areas shall conduct training:

- The nature of the fall hazards in the work area;
- The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used;
- The use and operation of guardrail systems, personal fall arrest systems (OSHA only recognizes full-body harnesses when using a personal fall arrest system), safety net systems, warning line systems, safety monitoring systems, controlled access zones, and other protection to be used;
- The role of each employee in the safety monitoring system when this system is used;
- The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs;
- The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection; and
- The role of employees in fall protection plans;
- The Fall Protection Standard.

5.2 Certification of Training

Certification of training shall be documented in ECC's Tailgate Safety Meeting Form and in ECC's SSHP.

5.3 Retraining

Retraining is required during the following situations:

- Changes in the workplace render previous training obsolete;
- Changes in the types of fall protection systems or equipment to be used render previous training obsolete; or
- Inadequacies in an affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

**SOP HS-025
EMERGENCY RESPONSE AND CONTINGENCY PROGRAM**

1.0 POLICY

ECC's Emergency Response and Contingency Program is prepared in accordance with 29 CFR 1910.120/ 29 CFR 1926.65 - *HAZWOPER Standard*, and 8 CCR 5192. All ECC Site Safety & Health Plans are required to include an "Emergency Response and Contingency Program."

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to establish ER and contingency guidelines for emergency conditions. Emergency conditions that may be anticipated during work activities include:

- Fire involving combustible materials;
- Medical emergency due to heat stress, physical accident or exposure to toxic materials;
- Release of hazardous materials.

In the event of a release of hazardous materials or fire during transferring/repacking procedures, ECC's project manager will be the response manager and will determine the appropriate level of response. MEDEVAC notification and response may be required for explosive incidents.

3.0 EMERGENCY SUPPLIES

At a minimum, the following supplies shall be immediately available for on-site use:

- First aid equipment and supplies;
- Emergency eyewash station and shower as per ANSI Z-358.1;
- Emergency use respiratory equipment (SCBAs);
- Spill Control material and equipment;
- Type ABC fire extinguisher, 10 lb. capacity, minimum of two; and
- An emergency vehicle parked at exit from the cleared area.
- All first aid practices/supplies shall comply at a minimum with 29 CFR 1910.151 and 1926.50.

4.0 CONTINGENCY PLAN EXECUTION

In the event an emergency situation should arise while performing site activities, ECC employees shall follow client procedures. Be prepared to give the following information when calling the client representative:

- Your name;
- Description of the emergency;
- Exact location of the emergency; and
- Any other pertinent information;

Upon discovering an emergency the following series of events will occur:

- Notification of personnel;
- Stop work activities if necessary;
- Lower background noises; and
- Begin emergency procedures (not in order, depending on the situation):
- Survey casualties;
- Assess existing and potential hazards to site personnel and off-site populations;
- Request aid if necessary;
- Allocate resources;
- Extricate and stabilize victims;
- Bring the hazardous substance under control; and
- Evacuate if necessary.

5.0 EMERGENCY NUMBERS

Emergency telephone numbers (i.e. police, fire, hospital, ECC project contact, and client contact) will be posted in a conspicuous location.

6.0 COMMUNICATIONS

Communications will be verbal within the visual range, but may be amended if use of PPE and equipment prevents verbal communication. A 9-1-1 emergency air horn or equivalent shall be implemented in accordance with CFR 29 Part 1910.165. One solid blast shall alert employees to evacuate from the site as part of ECC's non-verbal communication. A designated meeting point shall be established prior to work activities.

Additional internal communication among personnel on-site and off-site personnel shall be implemented. Internal communication will be used to:

- Alert team members to emergencies;
- Maintain site control;
- Communicate changes in work to be accomplished to an emergency situation; and
- Pass along safety information, such as air change, amount of airtime left before break, etc.

7.0 EMERGENCY RECOGNITION AND PREVENTION

Emergency recognition and prevention training will be included in the daily tailgate safety meetings. By discussing the tasks to be performed, time constraints, emergency procedures, and hazards that may be encountered, personnel should be alert to the dangers and potential emergencies.

8.0 SITE EVACUATIONS

Safe distances will be determined at the time of the emergency. The following factors that influence safe distances will be taken into consideration:

- Toxicological properties of the substance;
- Physical state of the substance;
- Quantity released;
- Rate of release;
- Method of release;
- Vapor density relative to air;
- Wind and speed direction; and
- Local topography.

On-site safety stations will be located in the Support Zone. The safety station will include first aid equipment, fire extinguisher, eye wash station, hand tools, extra monitoring devices, PPE, and communication system.

SOP HS-026 SPILL AND DISCHARGE CONTROL PROGRAM

1.0 POLICY

A spill containment program shall be implemented in ECC's Site Safety & Health Plans in accordance with 29 CFR 1910.120 (b)(4), 29 CFR 1926.65 (b)(4) and 8 CCR 5192.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to establish guidelines for providing contingency measures for potential spills and discharge from trucks handling off-site transportation and any other potentially hazardous materials on-site. ECC will:

- Provide methods, means, and facilities to prevent contamination of soil, water, air, structures, equipment, or material from a release due to ECC's operations;
- Provide equipment and personnel to perform emergency measures to mitigate spills and control their spreading;
- Dispose of contaminated materials; and
- Provide a decontamination program to clean previously uncontaminated areas.

3.0 EQUIPMENT AND SUPPLIES

ECC will have the following equipment on-site at all times in order to handle hazardous material releases:

- Non-combustible absorbent;
- Front-end loader (to be available for emergency response-not necessarily on-site);
- PPE;
- Fire Extinguisher;
- 55 gallon drums (DOT 17-E or 17-H); and
- Shovels.

4.0 CONTINGENCY PLAN

As per client instructions the following requirements will be met during a spill response action:

- Notify the client contact immediately;
- Take immediate measures to control and contain the spill;
- Isolate and contain hazardous spill areas;
- Deny entry to unauthorized personnel;

- Do not allow anyone to touch spilled material;
- Stay upwind; keep out of low areas;
- Keep combustibles away from the spilled material;
- Use water spray to reduce vapors and dust, as needed;
- Take samples for analysis to determine that cleanup is adequate;
- If released from tanks, prevent discharge beyond site boundaries; and
- Caution should be given (opening, sampling, and over-packing) when handling drums and containers.

5.0 NOTIFICATION OF SPILLS AND DISCHARGES

ECC will present a report no later than two days after a release to include the following items:

- Description of material spilled, including identity, quantity, and a copy of the waste disposal manifest;
- Exact time and location of the spill, and the description of the area involved;
- Containment procedures utilized;
- Description of the cleanup procedures employed at the site, including disposal of spill residue;
- Summary of the communications ECC had with other agencies; and
- Determination if the spill is reported to the EPA and/or reportable, and the date upon which the report to the appropriate agency was made, as well as the name of the agency representative who accepted the report.

SOP HS-027 FIRE PROTECTION PROGRAM

1.0 POLICY

ECC's Fire Protection Program is prepared in accordance with 29 CFR 1910 Subpart L Fire Protection (1910.155 to 1910.165) and 1926 Subpart F - Fire Protection and Prevention (1926.150 to 1926.159).

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to protect and prevent fire in the workplace. All fires including extinguished fires and regardless of size, must be reported immediately after they occur to the client contact.

ECC and subcontractor vehicles MUST yield right of way to emergency vehicles with flashing lights on. No vehicle or equipment shall be parked or stored within 15 feet of a fire hydrant.

3.0 FLAMMABLE AND COMBUSTIBLE LIQUIDS

Fuel (flammable vapor and gases) air (oxygen) and heat (a source of ignition) are necessary for a fire. Fires and explosions cannot occur without the presence of all three of these elements.

ECC shall incorporate the following control methods:

- All flammable liquids shall be stored in suitable metal containers only;
- Paint brushes, empty paint cans, rags, paint cloths, drop cloths, etc. shall be removed from the building at the end of the workday and stored in an approved location;
- Gasoline or any other low flash point flammable liquid shall not be used for cleaning purposes or to start fire; and
- Smoking or the use of spark or flame producing equipment in areas where flammable liquids are being used or stored is strictly prohibited.

Flammable mixtures may be ignited by many ignition sources, including open flames, gasoline engines, diesel engines, lighting, electrical lamps, power tools, fixtures, switches, nonexplosion-proof appliances, welding, and static electricity discharges. Because of the possibility of fire and explosion at the site, portable fire extinguishers (A:B:C) will be readily available to field personnel.

4.0 HOT WORK

Before any hot work is performed on the project site, ECC personnel shall obtain a Hot Work Permit from the local authorities. A hot work site shall have a designated fire watch. This person's sole responsibility shall be to monitor the hot work and have immediate access to the fire extinguisher located at each hot work site (a portable fire extinguisher (A:B:C) will be readily available). The fire watch shall remain at his/her designated watch for 30 minutes from the conclusion of hot work activities.

5.0 FIRE EXTINGUISHERS

ECC is responsible for providing an adequate number of fire extinguishers. Extinguishers shall be suitably placed, distinctly marked, readily accessible and maintained in a fully charged and operable condition. It is important that fire extinguisher training be conducted for all field personnel. At no time shall fires of any size be fought should human life be at risk.

**SOP HS-028
UNEXPLODED ORDNANCE (UXO) SAFETY PROGRAM
(General Guidelines)**

1.0 OBJECTIVE

ECC recognizes that there are no "safe" procedures for dealing with UXO, merely procedures that are considered least dangerous. The objective of this Standard Operating Procedure (SOP) is to establish guidelines for maximum safety in all UXO operation. This can be achieved through strict adherence to applicable safety precautions, a planned approach and intensive supervision. Only those personnel absolutely essential to the operation are allowed in the restricted/exclusion area during UXO operations. Safety is a firmly established habit when working with UXO. Safety is the leading edge of quality.

ECC's UXO Division has established several specific Standard Operating Procedures (SOPs) for UXO work activities.

2.0 UXO TRAINING

ECC requires that all UXO qualified personnel be US citizens who have graduated from the following schools: U.S. Army Bomb Disposal School, Aberdeen, MD, or the U.S. Naval Explosive Ordnance Disposal (EOD) School, Indianhead, MD. Graduates of the EOD Assistant Course, Redstone Arsenal, AL, or Elgin AFB, FL.

3.0 UXO/EXPLOSIVE HAZARD RECOGNITION

Before starting work, all field personnel will attend Site-Specific UXO/Explosive Hazard recognition and safety briefing, provided by the UXO Supervisor. Any additional UXO information gained during work on the site is incorporated into daily tailgate safety briefings, and given to all site personnel. Prior to the start of any work, zones will be established and clearly identified to delineate work activities. As zones are identified, UXO clearance activities will begin.

4.0 BASIC SAFETY PRECAUTIONS

a. ECC UXO operations are not conducted until a complete UXO safety plan for the operation involved is prepared and approved. This site-specific plan is based upon limiting exposure to a minimum number of personnel, for a minimum time, to the minimum amount of UXO consistent with safe and efficient operations.

b. Only UXO qualified personnel are involved in UXO procedures. Non-UXO qualified personnel are utilized to perform UXO related procedures only when supervised by UXO

qualified personnel. All ECC personnel engaged in operations are thoroughly trained in explosive safety and is capable of recognizing hazardous explosive exposures.

c. When operations involving UXO containing electro explosive devices (EEDs) are being accomplished in a suspect electromagnetic radiation (EMR) field insure proper (EMR) precautions are taken. In addition; do not wear outer or undergarments made of materials that have high static generating characteristics when working on UXOs. Materials of 100 percent polyester, nylon, silk, or wool are highly static-producing, and insure any person handling a UXO suspected of containing EEDs ground themselves prior to touching the UXO.

The following safety precautions are applicable to all UXO personnel:

- Suspend all operations immediately upon approach of an electrical storm;
- Observe the hazards of electromagnetic radiation (EMR) precautions and grounding procedures when working with, or on, electrically initiated or susceptible OE;
- Chemical munitions will not be disturbed, handled or disposed of. ECC personnel will only provide assistance to the client, if required;
- Do not dismantle, strip, or handle any UXO unnecessarily;
- Avoid inhalation and skin contact with smoke, fumes, dust and vapors of detonations and OE residue;
- Do not attempt to extinguish burning explosives or any fire that might involve explosive materials;
- Do not manipulate external features of ordnance items unless specifically called for in UXO procedures;
- Incorporate appropriate property and personnel protective measures for shock and fragmentation when conducting OE operations;
- Do not subject OE to rough handling or transportation. Sand bag, chock and block appropriately;
- Carry explosives in an appropriate container;
- Hand carry no more than two items (one in each hand) at a time and then only as required by the operation being performed;
- Destroy shaped charge munitions by crushing the cone to prevent formation of the explosive jet;
- The preferred method for disposing of white phosphorous (WP) is to blow the munitions in a manner that disperses the WP into the air versus down into the ground;
- Do not transport damaged WP munitions unless fully submerged in water;
- Avoid unnecessary movement of armed or damaged UXOs;
- Avoid the forward portions of munitions employing proximity fusing;
- Assume unknown fuses contain cocked strikers or anti-disturbance features; and
- Non-UXO personnel will not perform any activities on the sites without a UXO qualified individual with them.

5.0 GENERAL SAFETY PRECAUTIONS BY ORDNANCE TYPE

The following sub-paragraphs describe safety precautions for various types of munitions/disposal operations. As a general safety precaution, It is important that ordnance not be disturbed or moved without a positive identification.

5.1 Bombs

- Ensure fuze wells do not contain fuze components;
- Exercise caution when packing fuze wells of bombs;
- Bombs that have are considered to have mechanical or electrical impact/impact inertia tail fusing will be blown in place only;
- Igniters for fire bombs could possibly contain sodium and will not be allowed to come in contact with water; and
- Igniters for Firebombs will not be subjected to any shock due to the all ways acting fusing employed.

5.2 Clusters, Dispensers, and Launchers

- Approach and work from the sides of a dispenser;
- Consider an intact dispenser as fully or partially loaded;
- Consider any payloads outside the container or dislodged inside as armed; and
- Take precautions for the most hazardous payloads until positively identified.

5.3 Projectiles

- Determine if the projectile has been fired and, if so, consider it armed;
- Check for the presence of unburned tracers;
- Avoid the rear and front of rocket assisted projectiles;
- Handle projectile components such as powder increments, cartridges, and primers with caution; and
- Seal the open ends of projectiles or sheared projectile components with tape or other suitable material before transporting.

5.4 Grenades

- Do not attempt to re-install safety pins in dud fired grenades;
- Do not attempt to withdraw impinged firing pins from the fuze of a dud fired grenade; and
- Do not dispose of grenades by functioning them as designed.

5.5 Rockets

- Approach and work on rockets from the side;
- Do not dismantle or strip dud fired rockets or rocket motors;
- Do not expose electrically fired munitions to radio transmissions within 25 feet;
- Do not transport an unfired rocket motor until having shielded the motor igniter from EMR; and
- Dispose of unfired rocket motors, with or without warheads, in such a manner as to prevent them from becoming propulsive.

5.6 Guided Missiles

- When found, restrict vehicular movement in the area of a guided missile;
- Avoid entanglement with guidance wires of wire guided missiles;
- Restrict radio communications in the vicinity of a dud fired missile;
- Approach and work on missiles from the side and rear quarter;
- Do not dismantle or strip dud fired missiles or missile motors;
- Do not transport an unfired missile motor until having shielded the motor igniter from EMR; and
- Dispose of unfired missile motors, with or without warheads, in such a manner as to prevent them from becoming propulsive.

5.7 Submunitions

- Positive identification of submunitions must be obtained prior to entering the range.
- Obtain safety precautions pertaining to the specific submunition.
- Only approach those submunitions that are known to be safe to approach.
- Fused submunitions shall not be picked up, moved or touched.
- Fused submunitions shall be Blown in Place by countercharging.
- Only one person should be within the known frag radius of any submunition.

6.0 UXO SAFETY PRECAUTIONS FOR SITE CHARACTERIZATION

a. Make every effort to identify the UXO. Visually examine the item for markings and other identifying features such as shape, size, and external fittings. However, do not move the item to inspect it. If an unknown UXO is encountered, proper authorities must be notified.

b. Any time a suspected chemical munition is encountered, all personnel will withdraw upwind from the munition to a safe area, and the proper authorities will be notified

- c. Avoid inhalation of, and skin contact with smoke, fumes, and vapors of explosives and related hazardous materials.
- d. Consider UXO that has been exposed to fire and detonation as extremely hazardous. Chemical and physical changes may have occurred to the contents that render it much more sensitive than it was in its original state.
- e. Do not rely on the color coding of UXO for positive identification of contents. Munitions having incomplete or improper color-coding have been encountered.
- f. Avoid the area forward of the nose of a munition until it can be ascertained the item does not contain a shaped charge. The explosive jet can be fatal at great distances forward of the longitudinal axis of the item. Assume any shaped charge munitions to contain a piezoelectric (PZ) fusing system until the fusing system is positively identified. A PZ fuze is extremely sensitive, can function at the slightest physical change, and may remain hazardous for an indefinite period of time.
- g. Approach an unfired rocket motor from the side. Ignition will create a missile hazard and hot exhaust.
 - (1) Do not expose rocket motors to any EMR source.
 - (2) If an unfired rocket motor must be transported, it shall be positioned in the direction that offers the least exposure to personnel in the event of an accidental ignition.
- h. Assume practice UXO contain live charges until determined otherwise. Expended pyrotechnic/practice devices may contain red/white phosphorus residue.
- I. Do not approach smoking white phosphorus (WP) UXO. Burning WP may detonate the burster or dispersal explosive charge at any time.

7.0 ORDNANCE AVOIDANCE FOR HTRW ACTIVITIES

- a. Investigative activities on potential ordnance contaminated sites are accomplished using approved ECC ordnance avoidance procedures.

8.0 RESTRICTED/EXCLUSION UXO AREA OPERATIONS

- a. On Ordnance and Explosives sites, ECC's site safety personnel shall establish a restricted/exclusion area for each UXO team operating on the site. Default safety distances (EZ) shall be initially set to the worst case (or most expected item) default frag distance as a starting point, then to the actual distance for the specific item as it is exhumed. The purpose of the area is

for the protection of the public and other personnel from the blast and fragmentation hazards of an accidental detonation. The area is established based on the following minimum factors:

- (1) Previous site use that caused the contamination: impact area, open burn/ open detonation, burial, etc.
- (2) Project type: surface clearance, subsurface clearance, sifting operation, sampling, etc.
- (3) Known ordnance contamination, distances to public exposure, terrain, etc.

b. When multiple UXO teams are operating on a site, the restricted/exclusion area and team separation distances shall never be less than 200 feet.

c. During the time frame that UXO operations are being accomplished, only personnel necessary for the UXO operation shall be within the restricted/exclusion area. When non-essential personnel enter the restricted/exclusion area, all UXO operations must cease. ECC;

- (1) Plans for, provides, and knows the measures to be taken in the event of an accident.
- (2) Provides a designated emergency vehicle in the area in case of an accident or other emergency.
- (3) Coordinates with the appropriate airspace representative and assure appropriate notification procedures are arranged.
- (4) When non-essential personnel must enter the restricted/exclusion area, the following are accomplished:
 - a) The individual/individuals receive a safety briefing,
 - b) Are escorted by a ECC UXO qualified individual; and
 - c) All UXO operations must cease within the established restricted/exclusion area.

d. Before any movement of a UXO, the fuze condition must be ascertained. If the condition is questionable, consider the fuze to be armed. The fuze is considered the most hazardous component of a UXO, regardless of type or condition.

- (1) Do not dismantle or strip any UXO.
- (2) Do not depress plungers, turn vanes, or rotate spindle, levers, setting rings, or other external fittings on UXOs.
- (3) Do not subject mechanical time fuses to any unnecessary movement.
- (4) Do not remove fuses from UXO.
- (5) Positively identify and review all safety precautions prior to handling any ordnance.

e. All ECC personnel working within the restricted/exclusion area shall comply with the following:

- (1) Do not conduct operations without an approved Site Specific Safety and Health Plan and an approved Work Plan.
- (2) Do not smoke, except in authorized areas.

- (3) Do not have fires for heating or cooking, except in authorized areas.
- (4) Do not conduct explosive operations during electrical, sand, dust, or snow storms.
- (5) Explosive operations are conducted during daylight hours only.
- (6) During magnetometer operations, UXO teams shall not wear safety shoes or other footwear that would cause the magnetometer to present a false indication.

f. If records search indicated WP munitions were fired or destroyed in the area, extra care shall be taken when uncovering a buried UXO.

9.0 EXCAVATION OPERATIONS

a. Hand excavation is the most reliable method for un-covering UXO. Hand excavation will be accomplished only by UXO qualified personnel.

b. Earth moving machinery (EMM) may be used to excavate buried UXO, if the UXO is deeper than 12 inches. EMM shall not be used to excavate within 12 inches of a UXO. When excavation gets within approximately 12 inches of a UXO, hand excavation shall be used to uncover the UXO. Non-UXO personnel, under the direct supervision of UXO personnel may operate EMM.

- (1) If more than one EMM will be used on the same site, the same separation distances required for multiple teams on that site will separate them.
- (2) During excavation operations, only those personnel absolutely necessary for the operation shall be within the restricted area/exclusion zone.
- (3) Excavation and trenching shall comply with the provisions of 29 CFR 1926 subpart P.

10.0 DISPOSAL OPERATIONS

The following sub-paragraphs outline the procedure ECC personnel will use to perform both electric and non-electric demolition operations.

a. As a general rule, UXO will be detonated in place when the situation allows. All detonation-in-place operations are conducted by electrical means to assure maximum control of the site, except in situations where static electricity or EMR hazards are present, in this case non-electrical means can be used.

- (1) The Two-man rule is in effect during and ECC disposal operation.
- (2) Exercise extreme care in handling and preparing high explosives for detonation. They are subject to detonation by heat, shock, and friction.
- (3) Do not pack bomb fuze wells with explosives unless it can be positively confirmed that the fuze well does not contain any fuze components.
- (4) WP UXO shall not be detonated into the ground. The UXO shall be counter-charged bottom centerline when possible.

b. The following safety rules will be adhered to at all times:

- (1) Carry blasting caps in approved containers, out of the direct rays of the sun, and located at least 25 feet from other explosives, until they are needed for priming.
- (2) During the approach or progress of an electrical storm all operations will cease and All personnel will retire to a place of safety.
- (3) Do not use any explosives or accessory equipment that is obviously deteriorated or damaged.
- (4) Always point the explosive end of blasting caps, detonators, and explosive devices away from the body during handling.

- (5) Use only the equivalent of a commercial No. 8 blasting cap or greater
- (6) When using more than one cap in a demolition operation insure they are of the same manufacturer.
- (7) Do not bury blasting caps.
- (8) Test electric-blasting caps for continuity at least 25 feet from any other explosives prior to connecting them to the firing circuit. The wires will remain shunted until ready to be connected to the firing circuit.

c. In the event of a misfire, do not approach the disposal site for at least thirty minutes after the expected detonation time, When conducting non-electric procedures, the wait time shall be thirty minutes plus the fuse burn time.

d. A post-search of the detonation site shall be conducted to assure a complete disposal was accomplished.

e. If the situation dictates, protective measures to reduce shock, blast, and fragmentation shall be taken.

f. Inert ordnance will not be disposed of or sold for scrap until the internal fillers have been exposed and unconfined. Venting or exposure may be accomplished in any way necessary.

11.0 UXO SWEEP OPERATIONS

Before sampling operations or non-UXO personnel entering the site, the UXO team will perform visual and magnetometer sweeps of the work areas ensuring they are free of UXO or that all UXO encountered is clearly marked. Non-UXO personnel will remain off-site until completion of the initial visual and magnetometer sweep.

Magnetometer

An appropriate detector will be used to quickly screen surface and near-surface areas for OE hazards. An audio signal is provided to the operator when a ferrous metal object is encountered. During magnetometer sweeps the UXO team will wear work boots with lug soles to eliminate interference with the magnetometer's sensitivity.

During sweep operations, the UXO personnel may investigate magnetic anomalies. If the anomaly is located in a non-critical area the UXO Supervisor may choose to clearly mark the anomaly and Only minor excavations, one foot or less, may be accomplished to identify or confirm UXO. If the anomaly is more than one foot deep, it is considered to be UXO and is clearly marked.

12.0 TRANSPORTATION

If UXO must be transported off-site for disposal, the provisions of 49 CFR 100-199, DA Pam 385-64, state and local laws shall be followed.

29.0 ASBESTOS ABATEMENT STANDARD OPERATING PROCEDURES

1.0 OBJECTIVE

The objective of this Standard Operating Procedure is to establish, manage, and enforce ECC's asbestos abatement standard operating policies and procedures in accordance with the following regulation:

- 29 CFR 1910; Occupational Safety and Health Standards;
- 29 CFR 1926 Safety and Health Regulations for Construction;
- 29 CFR 1926.1101 Asbestos;
- 40 CFR 61 NESHAPS;
- 40 CFR 763 Asbestos;
- EPA 340/1-90-018 (1990) Asbestos/NESHAPS Regulated Asbestos Containing Materials Guidance;
- EPA 340/1-90-019 (1990) Asbestos/NESHAPS Adequately Wet Guidance;
- NIOSH-01 (1991) Manual of Analytical Methods;

2.0 SCOPE

The scope of these standard operating procedures encompasses those who are involved with indoor/outdoor renovation and demolition asbestos abatement projects that are subject to Federal, state, and local regulations. Friable asbestos containing material (ACM) shall be removed prior to any activity which would cause disturbance to the friable ACM or which would prevent access to them for subsequent removal. In addition, non-friable ACM that may become friable during renovation or demolition activities shall be removed prior to such activities. Friable ACM is not required to be removed if 1) the ACM is incased in concrete or similar material 2) if the structure is being demolished under order of a state or local governmental agency. In the event that ACM remains in the building during demolition, adequate amounts of water must be used during the demolition of the structure and consequential handling and disposal activities of the construction debris.

3.0 PROGRAM ADMINISTRATOR

ECC's Project Manager/competent person is/are responsible for the implementation and enforcement of these standard operating procedures. In addition, the competent person shall be adequately trained and is responsible for the planning, training, and inspection of asbestos projects performed in the field. It is also the responsibility of the competent person to ensure that all asbestos abatement supplies and materials are present and accounted for until the completion of project. The onsite competent person shall maintain an inventory list of these abatement supplies at all times.

4.0 ESTABLISHING A REGULATED WORK AREA

The OSHA regulated work is constructed prior to the beginning of any OSHA Class I, II, and III asbestos activity. The regulated area shall remain intact for the duration of the asbestos work. The regulated work area is established by:

- (1) posting of asbestos warning signs and asbestos barrier tape to entry ways,
- (2) restrict entry to area to authorized personnel,
- (3) remove all moveable objects from the proposed work area (preclean with HEPA vacuum or wet wiping if necessary),
- (4) shut down, lock-out, and tag-out any heating, ventilation, and air conditioning (HVAC), and power supply systems,
- (5) establish a temporary power supply, and
- (6) if needed, pre-clean contaminated work area,
- (7) practice good housekeeping.

The work area is demarcated with asbestos warning signs and barrier tape to limit access to authorized personnel only. Asbestos warning signs are posted at all work area entries/exits. Asbestos barrier tape cordons off the work area(s). Only authorized personnel wearing appropriate respirator (half-face with HEPA filters) and personal protective equipment (full body coverall, eye protection, hard hat, etc.), are allowed to enter the work area. Posted in the clean room of the decontamination unit are the sign-in/sign-out form to be signed by workers and authorized personnel who enter and exit the regulated area. Once inside the work area, all personnel follow the safe working procedures, as described herein and in ECC's site specific, Site Safety and Health Plan (SSHP). If the work area requires no pre-cleaning, workers mobilize equipment and materials into the work area and begin the work area preparation. If pre-cleaning is required, the work team commences with the pre-cleaning wearing the appropriate Level C PPE with, at a minimum, air purifying (HEPA filter) respirator.

The PM/competent person supervise the de-energizing of the work area. All electricity, HVAC systems, etc., is locked out and tagged out. A gas powered generator, located outside the work area, is used to supply the needed electricity inside the work area. All electrical equipment is grounded with a Ground Fault Circuit Interrupter. The PM/competent person performs the lockout and tag-out procedure prior to the preabatement visual inspection. Power is turned off at the main electrical box supplying the work area and is pad locked closed. A sign is affixed denoting the following:

DO NOT BREAK SEAL

MEN AT WORK

CONTACT PM/competent person, ECC

PHONE NUMBER

The PM/competent person confirms the lockouts by testing the outlets, lights, and HVAC inside the work area. In addition, HVAC systems running through a work area surfacing other areas of a structure must also be locked and tagged out, and thoroughly sealed with six mil poly sheeting. The PM/competent person documents all of the above procedures in the daily log.

In addition, outside the work area, the job board is constructed and shall contain the following information:

- emergency phone numbers,
- client contact numbers,
- regulatory notifications/permits,
- hazard communications procedures,
- asbestos work plan,
- personal air sampling results,
- material safety data sheets,
- Name of Contractor
- Asbestos Contractor's License
- CSLB license
- OSHA Notification
- Site Safety Health Plan.

4.1 Background Exposure Monitoring

The competent (or third party licensed consultant) performs the background exposure monitoring inside the proposed work area. Plus, he/she verify locations and quantities of asbestos to be removed. Background air monitoring is usually performed one day prior to the set up of the work area. Air samples are sent to an accredited laboratory for analysis via phase contrast microscopy (PCM) . The airborne fiber concentration obtained during this initial air monitoring (static) serve as the regulated areas baseline airborne fiber concentration not to be exceeded during any phase of the asbestos remediation. If baseline levels are monitored at or above the PEL, ECC employees must don Level C PPE (See ECC's SOP regarding respirators) when entering the work area. At this point, ECC's exposure monitoring shall begin.

4.2 Asbestos Abatement Control Systems

OHSA Class I, II, and III abatement projects incorporate several types of containment systems designed to control the migration of airborne contaminants to the outside environment. ECC uses negative pressure enclosures, glovebags, and miniencllosures to accomplish this.

4.2.1. Negative Pressure Enclosures

A negative pressure enclosure (NPE) shall be constructed, where feasible, when performing OSHA Class I and II removal actions. The NPE shall be constructed by:

- construct critical barriers over windows, unused doorways, HVAC vents, electrical conduits, and all other openings inside the regulated work area with two layers of six mil polyethylene sheeting, spray glue and waterproof duct tape;
- walls shall be covered with two layers of 4 mil poly sheeting or equivalent and shall be sized to minimize seams. Wall poly sheeting shall overlap with floor at least 12 inches. No seams shall be located at the floor/wall joint. Water proof duct shall be used to secure poly sheeting;
- floors shall be covered with two layers of six mil poly sheeting or equivalent. Floor poly sheeting shall extend up walls at least 12 inches and shall be sized to minimize seams. No seams shall be located at the wall/floor joint. Waterproof duct tape shall be used to secure poly sheeting;
- cover all other surfaces (e.g. vents, holes, electrical fixtures, HVAC exhaust and intake vents etc.) inside the work area with two layers of six mil poly sheeting or equivalent making sure to minimize seams. Only waterproof duct shall be used to secure poly sheeting;
- cover immovable objects left inside the work area with six mil polyethylene sheeting,
- establish three or five stage decontamination chamber contiguous to the regulated work area with shower unit located in the middle of the unit;
- Setup pressure differential units (PDUs) inside the work area to provide the required negative pressure, minimum negative 0.02 to the containment (change in work area air volume every 15 minutes). A sufficient number of PDUs are placed inside the work area in strategic locations to ensure a continuous flow of outside air to the work environment. Clean air is forced through the decontamination unit (and make-up air ports for large containments) and drawn across the work area. The PDU must be in operation and produce at least four (4) air changes per hour for the duration of the asbestos abatement project. Exhaust from the PDUs is fed via flexible duct to the outside air environment;
- Workers shall secure drop-poly underneath removal areas to facilitate removal activities. In addition, at least one fire extinguisher are placed inside the work area or one within 50 feet of any point in the containment, and one fire extinguisher outside the work area. Exit signs and arrows are posted throughout the work area.
- mobilizes equipment and materials to the work area. All equipment and materials (HEPA vacuums, airless sprayer, hand-held prayers, amended water, encapsulant, disposable towels, waste bags, fire extinguishers, flashlights, scaffolding, etc.) are mobilized into the work area before starting any remediation.

4.2.2. Glovebag Systems

Glove bags (positive or negative) made from six mil ploy sheeting material are impermeable to air and water and shall be used where it is not feasible to remove asbestos inside a negative pressure enclosure or intact on a structural component (e.g. pipe, elbow, tee fixture). The following operating procedures apply to glove bag work:

- the glove bag shall be seamless;
- appropriate labels shall be affixed to the glove bag;
- each glove bag is smoke tested prior to use;
- glove bags shall be used for one removal activity;
- upon completion of the removal, the glove bag shall be deflated using a HEPA vacuum to suck out the air inside the bag;
- two workers shall be utilized on each glove bag during removal;
- any loose material adjacent the glove bag shall be adequately wetted prior to setting attaching the glove bag to the pipe;

4.2.3. Minienclosure Systems

ECC shall employ minienclosures when large areas of TSI or block insulation material is to be removed. The minienclosure shall accommodate two workers and be kept under negative pressure, via HEPA vacuums, for the entirety of the asbestos abatement. The minienclosures shall have a dry, two stage decontamination chamber attached to the enclosure using spray adhesive and duct tape. The minienclosure shall be smoke tested before it is used and air movement shall be directed away from worker, whenever possible.

4.2.4. Outdoor Removal Work

All of the standard operating procedures discussed in section 5.2 above apply to work outdoors with the exception of the following:

- < construction of isolation barriers are not required if wet methods are performed before, during, and after removal activities. A poly sheet drop cloth shall be secured underneath all asbestos work areas;
- < in lieu of constructing a three or five stage decontamination unit for personnel decontamination, workers may doff contaminated coverall in the work area after HEPA vacuuming and wet wiping coverall, respirator, and exposed skin.
- < disposable and non-disposable PPE shall be placed (while in the work area) in approved, labeled sealed disposal containers for proper disposal or cleaning.
- < Access to work area shall be restricted with physical barrier, signs and barrier tape to limit traffic to authorized personnel only.

5.0 REMEDIATION PROCEDURES INSIDE A REGULATED WORK AREA

Where feasible, project personnel work in teams of two and follow the standard operating procedures listed below.

5.1 Standard Work Practices

- workers begin remediation work at a location that is furthest away from the three or five stage decontamination chamber;
- work progresses towards the decontamination unit;
- adequately wet (with amended water) material prior to disturbing and removing ACM;
- remove in manageable sections;
- place in disposal containers as soon as practical;
- adequately wet (with amended water) material with prior to placing in disposal container;
- where feasible, remove structural components containing asbestos intact (wetted with amended water) and carefully lower to the ground to be wrapped with six mil poly sheeting;
- ACM shall be lowered to the disposal container and wetted (amended water) prior to disposing. ACM removed and dropped ACM at or above 10 feet shall be done so on inclined chutes into the approved disposal container. At or above 50 feet, ACM shall be dropped via an enclosed, leak-tight chute into approved disposal container;
- mist work area as needed with amended water--ensure that there is no visible emissions of any kind;
- use HEPA vacuums to collect debris and dust;
- use wet rags to clean up debris and dust;
- use of proper respirator--at a minimum, half-face air purifying respirator equipped with HEPA filter/cartridges;
- maintain level C PPE;

5.2 Prohibited Work Practices

- high-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air;
- compressed air
- dry sweeping, shoveling, or other dry clean up of dust and debris;
- Allowing removed ACM to accumulate (and become dry) anywhere in the work area.
- employee rotation as a means of reducing employee exposures to asbestos.

5.3 Pre-Work Visual Inspection

The pre-work visual inspection is conducted by the PM/competent person and ensures that the control area complies with applicable Federal, state, and local regulations. The inspection covers the following:

- ensure that the asbestos warning signs and barrier tape demarcate the planned work area,
- ensure that the necessary critical barriers are secure and intact,
- ensure that the decontamination chamber is secure,
- ensure that the polyethylene sheeting is properly placed under work sites,
- ensure the integrity of the containment system (repair all rips, tears, and breeches);
- ensure that the negative pressure differential of minus 0.02 exist between the inside and outside of the containment area.
- ensure that all safety equipment is on site, such as, fire extinguishers, first aid, flashlight, emergency exit signs and arrows.

After the inspection, workers correct any deficiencies found during the inspection. The PM/competent person documents that the work area has been set-up for accordance with applicable regulations and project specifications.

5.4 Daily Monitoring of Work Area

Monitoring work practices and engineering controls of the controlled area(s) shall be performed daily by the competent persons and shall consist, at minimum, of the following:

- Proper work practices are followed;
- Personnel are wearing appropriate PPE;
- Integrity of containment barriers are intact. Any breach or compromise to the containment shall be addressed immediately;
- Required amount of negative pressure is maintained (minus 0.02 inch of water). Manometer readings shall be recorded in the competent person's note book;
- Daily inspection of the PDU(s) shall be performed. In addition, the pressure gauge reading shall be recorded immediately after any filter change. In the event that the pressure gauge reads less than the initial reading, the PDU shall be turned off and checked for leakage, tears, or a rupture of the HEPA filter inside the unit. In such a case, ECC will employ a back-up PDU during maintenance of the original PDU. All documentation shall be recorded in the competent person's note book.

5.5 Daily Clean Up Procedures

At the end of each shift, workers shall HEPA vacuuming and wet wipe clean equipment and containment barriers so that no visible debris is present. Workers use duct tape to seal the ends

of the HEPA vacuum hoses. At the end of each day, the PM/competent person ensures that the work area is free from any visible dirt, dust, or debris and that all engineering controls are functioning prior to existing the containment. All personnel must decontaminate in the decontamination unit before leaving the work site. Prior to encapsulation and clearance sampling, all horizontal and vertical surfaces shall be HEPA vacuuming/wet wipe/HEPA vacuum/wet wipe cleaned to remove all dust and debris.

5.5.1. Personal Decontamination

In the clean room, workers and authorized visitors shall:

- < Remove street clothing and places personal belongings in locker;
- < don nylon swim suit(optional);
- < don overalls and foot coverings;
- < apply tape around ankles, wrists, etc. to secure protective wear;
- < inspects, dons, and performs negative and positive pressure checks for seal of respirator;
- < don hood over respirator head straps;
- < enters equipment room.

In the equipment room, workers and authorized visitors shall:

- < Put on any additional clothing (deck shoes, hard hat, etc.) and collect necessary tools and materials, and proceeds to the work area.

Workers exiting the work area shall use the following exiting procedures:

In the equipment room, workers and authorized visitors shall:

- < Remove all clothing (including gloves, goggles, and boots) except respirator;
- < place disposable protective clothing and equipment in labeled, impermeable asbestos waste bags;
- < place cleaned non-disposable equipment in labeled, impermeable plastic bags, or equivalent;
- < proceed to shower or walk-off pan.

Once in the shower, workers and authorized visitors shall:

- < Wash entire head and body with soap and water including respirator and cartridges (without removing);
- < remove respirator and wash covered face area with soap and water and exit shower. Waste water is periodically filtered through a five (5) micron filter prior

to discharging into the sanitary sewer system.

In the clean room, workers and authorized visitors shall:

- < Dry off, don street clothes;
- < Clean and dry respirator, replaces filters(if applicable)

5.6 Final Clearance and Tear Down Procedures for a Regulated Area

The following standard operating procedures for the final clearance visual inspection, clearance monitoring, and tear down of a non-pressurized control area is conducted as per ASTM E 1368, 40 CFR 763, 29 CFR 1926.1101, and State regulations where applicable.

5.6.1. Pre-Clearance Visual Inspection

The PM/competent person conducts the pre-clearance visual inspection prior to the final clearance air monitoring and inspects for:

- (1) integrity of encapsulated material,
- (2) ensure that the entire work area is free from dust, dirt, or debris and,
- (3) ensure that the entire area has been sprayed with lock-down encapsulant.

Once the work area passes the final clearance visual inspection, the area is ready for final clearance air monitoring.

5.6.2. Final Clearance Visual Inspection for a Crawl Space Area

The PM/competent person performs the final clearance visual inspection in the crawl space area

using a screw driver and a strong light (75 watt minimum) to search for asbestos debris. If excessive debris material is found, the area is recleaned until it passes final

inspection. In addition, the PM wears a personal air sampling pump for the duration of the inspection to monitor crawl space air during the inspection. After the work area passes the final clearance visual inspection, the soil in the work area is encapsulated with a penetrating encapsulant designed for soil.

5.6.3. Final Clearance Air Monitoring

The PM/competent person (or third party licensed consultant) sets up a high flow air monitoring pumps w/stands throughout the work area. Where work areas consist of multiple floors, the pumps are distributed, accordingly. Final clearance samples are collected in accordance with applicable regulations and Section 12.0 below. After collecting a minimum of 1200 liters of air, the final clearance air sampling is terminated and samples shipped to the approved laboratory for PCM or TEM analysis. Clearance levels for airborne fiber concentrations inside the work area are, depending on the project specifications, 0.01f/cc or 0.005 f/cc.

5.6.4 Containment Tear Down Procedures

The PM/competent person ensures that the following procedures are performed during the tear down or removal of the regulated area:

- < decontaminate and demobilize all equipment, tools, and safety equipment

- < remaining inside the regulated area;
- < ensure that all HVAC filters (adjacent work area) have been removed and disposed of as asbestos contaminated and wet wipe HVAC duct when necessary;
- < remove all asbestos signs and barrier tape;
- < tear down decontamination unit;
- < clean up floor and drop poly by rolling poly inward and placing in double, properly labeled disposal bag, seal, and cart to dumpster;
- < PM inspects previous work area(s) for any debris, tools, equipment, and materials.

6.0 Security Guard Interface

Where applicable, each day before leaving the work site, the PM/competent person ensures that the job site is secure.

7.0 Asbestos Containing Material Repair and Encapsulation Procedures

Encapsulation materials used during the repair of ACM includes the following: bridging, penetrating, lock-down, ground-sealer, and insulation cement. All encapsulating procedures complies strictly with federal, state, industry, and contract standards. ECC follows the manufactures recommended thinning and application procedures when working with encapsulants. Encapsulants are applied using an airless sprayer. Level C PPE with negative pressure APR (minimum) is worn during the encapsulation of the regulated area. The following standard operating procedures shall be used when encapsulating ACM:

- < In the event that ACM material is encapsulated, remove any loose or hanging ACM prior to encapsulating;
- < Any filler material applied to gaps in existing material shall contain no asbestos, adhere well to the substrate, and provide an adequate base for encapsulating agent;
- < use airless sprayer, with nozzle pressure adjusted to minimize disturbance of the friable ACM;
- < do not apply encapsulating materials to ACM which is has water damage or is structurally deteriorating, that show poor adhesion to the surface to which they are applied, or which are in locations subject to frequent physical damage;
- < apply a coating of encapsulating agent to friable ACM exposed, but not removed, during renovation, and to porous surfaces that have been stripped of ACM;
- < after encapsulation, use signs, labels, or other marking device to indicate the presence of encapsulated friable ACM.

8.0 Disposal and Transportation of Asbestos Containing Waste

The intent of this waste disposal program is to establish and enforce standard operating procedures in the disposal and transportation of regulated and non-regulated ACM. Applicable

regulations include, in part, the following: 40 CFR 61 subpart M, 49 CFR 171-179, 29 CFR 1926. 1101, and State regulations.

8.1 General

The disposal program mandates proper procedures for the disposal, labeling, storage, and documentation of ACM.

8.2 Containerization of ACM and ACM debris

The containerization of regulated and non-regulated ACM and associated debris waste is accomplished by placing ACM (adequately wetted with amended water) in leak-tight six mil polyethylene bags, wrap in six mil polyethylene sheeting, or equivalent container(s). Each container shall not be overfilled and sealed shut to prevent the accidental opening and/or leaking. Wire or cord ties is never used when securing waste bag. Large components removed intact and wet may be wrapped in two layers of six mil polyethylene sheeting. The wrap is made leak-tight using spray glue and duct tape for transport to the landfill. To avoid rips and tears in polyethylene sheeting, ACM consisting of sharp-edged components, such as, nails, screws, metal lath, tin sheeting, and the like, shall be placed in approved waste drums for transport to the landfill. The accumulation of water inside the waste bags or polyethylene sheeting is prohibited.

8.3 Waste Container Removal Procedures

All disposal waste bags and wrapped sheeting is decontaminated using HEPA vacuuming and wet-cleaning methods before leaving the regulated work area. Bagged waste is transported out of the work area through either the decontamination unit or a waste pass-out airlock chamber. Waste bag-out procedures utilizes two teams of workers: the workers outside the containment, and the workers inside the containment. The "inside" team HEPA vacuums and wet wipes labeled bagged waste immediately before transporting it into the decontamination or pass-out air lock chamber. The "outside" team member(s), wearing Level C personal protective equipment (a different color or markings to distinguish from inside workers), places the bagged waste in a clean, properly labeled second container (bag, wrap, or drum) and removes it from the decontamination chamber and places in the approved staging area outside the work area. The outside team member ensures that the second container is properly sealed.

8.4 Labeling Requirements of ACM Containers

Each container of *regulated* asbestos waste shall have the following labels affixed:

- (a) Danger label:

DANGER

CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST
CANCER AND LUNG DISEASE HAZARD

(b) Generator's label:

STATE AND FEDERAL LAW
PROHIBITS IMPROPER DISPOSAL
IF FOUND, CONTACT THE NEAREST
POLICE OR PUBLIC SAFETY
AUTHORITY OR THE _____(State) DEPARTMENT
OF ENVIRONMENTAL

NAME OF GENERATOR

LOCATION OF WASTE GENERATED(address)

MANIFEST NUMBER

(c) DOT placard:

(Diamond placard with Black zebra stripe on top half)

RQ, Asbestos
CLASS 9 NA2212

Attach permanent asbestos hazard warning label, as shown above, to salvaged structural components or members which are covered or coated with friable ACM.

To label non-regulated ACM containers, affix asbestos warning labels and generator=s labels (Aa@ and Ab@ above) only.

8.5 Temporary Storage of ACM

Labeled ACM containers are stored in a approved temporary storage area until ready to transport to the approved landfill. The temporary storage areas shall be lined with six mil polyethylene sheeting. The ACM containers are covered with six mil polyethylene sheeting. All entries/exit are locked when not in use and the appropriate signs shall be posted. Roll-a-way bins are used for the transport of ACM to the disposal facility. Inside the bin, floor sheeting is installed first and extends twelve inches up the sidewall of the bin. Wall sheeting is secured down overlapping the floor sheeting. The dumpster is locked with a pad lock when not in use and has the following asbestos warning signs, or equivalent, posted on two sides of the bin:

DANGER

CONTAINS ASBESTOS FIBERS
AVOID CREATING DUST

CANCER AND LUNG DISEASE HAZARD

BREATHING ASBESTOS DUST MAY CAUSE SERIOUS BODILY HARM

In addition, asbestos barrier tape is secured around the storage bin which reads :

ASBESTOS

CANCER AND LUNG DISEASE HAZARD

AUTHORIZED PERSONNEL ONLY

RESPIRATORS AND PROTECTIVE CLOTHING

ARE REQUIRED IN THIS AREA

8.6 Contingency Planning

If at any time during the disposal of asbestos containing waste a leak, tear, rip, or hole appears in the bag, personnel immediately seal the leakage off with duct tape and decontaminate the exposed area using HEPA vacuuming and/or wet methods. The affected bag is enclosed in a clean, properly labeled container (waste bag, wrap, or drum).

In the event there is a liquid spill in the waste bin, employees contain spills with cotton rags, towels, or sheeting and then remove affected bags. The bags and the sheeting is decontaminated using HEPA vacuuming and wet-cleaning techniques. Personnel spray area(s) with lock-down encapsulant before placing containers back into the waste bin.

8.7 Transporter and Disposal Site

The collection, hauling, and disposal procedures of asbestos waste comply with applicable regulations. ECC contracts with licensed and registered asbestos waste transporters and disposal facilities who transport in a manner that ensures the containment of asbestos fibers. Collectors, haulers, and disposal facilities provide ECC with all required license, permits, and registration forms before commencement of the project. In addition, all dump receipts, trip tickets, transportation manifest or other documentation of disposal delivered to the generator for his records. ECC ensures that hazardous waste manifest are complete, accurate and updated

when issued to the waste hauler. Asbestos waste are landfilled only at environmental protection agency (EPA) and/or state approved asbestos landfills. Vehicles containing ACM shall be clearly marked with asbestos warning signs (see above) when loading and unloading the ACM waste. In the event that friable ACM is not containerized in accordance with Federal and state regulations, the ACM shall be buried immediately upon deposit at the disposal site.

9.0 Interface with Trades Involved with Construction

ECC conforms to 29 CFR 1926.1101, State regulations, where applicable, and notify employers of other trades working adjacent any of the regulated work areas for asbestos remediation.

Project Manager appraises other employers or his representatives:

- < Integrity of the containment,
- < measures taken to ensure safety of the asbestos remediation work; and
- < measures being taken to ensure that employees outside the work area are not exposed to airborne fibers.

In addition, any employer of other trades working adjacent to asbestos regulated area(s) are obliged to examine the integrity of all enclosures barriers, and inquire of methods of containment and effectiveness of controlling airborne fibers from entering to the outside environment.

10.0 Safety Precautions

Asbestos abatement projects have become increasingly sophisticated as the body of knowledge grows regarding effective control methods. A great deal of attention has been given to protecting workers and confining fibers. The extra burden of dealing with the asbestos hazard can easily create situations where the basic and more immediate safety hazards can be overlooked. Safety hazards can manifest if good work practices are not followed. Potential hazards include: electrical considerations, ladders and scaffolding, working surfaces, fire consideration, heat related disorders and body protection. The methods used in an abatement project (sealing the work area, using wet methods, working at heights on ladders and scaffolding, and shutting down normal building systems) add new dimensions to the task of providing a safe working environment.

10.1 Personal Protective Equipment and Working Procedures

ECC provides, require the use of, and maintain in sanitary and reliable condition protective equipment necessary to protect any employee from any hazard which could cause injury or illness. The PM/competent person ensures that all personnel at the work site follow all personal protective equipment requirements and working procedures listed below.

10.1.1 Personal Protective Equipment

< Provide, and require the use of, respirators at all times when in the regulated area;
< Provide, and require the use of, special whole body clothing, including shoes, for any employee exposed to airborne concentrations of asbestos;

< Provide work gloves as part of whole body protection to employees exposed to asbestos. This is particularly important when metal lath, suspended ceiling grids, and other materials are being removed in the work area;

< Supply protective hard hats to be

worn on job sites where there is exposure to falling objects, electric shock, or burn;

- < Wear non-fogging face shields or goggles for operations involving potential eye injury. Full face respirators are most effective (if non-fogging);
- < Where feasible, arrange work so that workers are not having to reach up, and look directly into their work site. Employees are elevated so that they are not directly under the work site;
- < Employees are instructed in the use of proper lifting methods. ECC uses the "buddy system" for lifting and moving heavy objects.

10.1.2. Materials Used on Asbestos Abatement Projects

- < Use hand carts or rolling pallets whenever possible. Keep manual material handling to a minimum.
- < Scrapers, package knives, wire cutters, chisels, and other sorts of bladed tools are frequently used. Always cut away from the body. Provide tools with insulated handles.
- < Many puncture and cut wounds occur when removing metal lath or cutting duct work. Use care and have a good first aid kit available.
- < Check with material supplier on irritant properties of material used. (Always have a material safety data sheet on all of materials and familiarize workers with any cautions or special considerations for their safe use.)

10.2 Fire Considerations

ECC considers fire prevention/control a high priority during all stages of asbestos-related work. Pertaining to are exits, travel distances, emergency lighting, and alarm systems.

No entry/exit areas are not sealed or blocked with immovable object which conflict with OSHA, NFPA and local fire code requirements. ECC establishes the means of exiting the containment as well as develop emergency plans to include alternative exits in emergency situations. All personnel are kept abreast of all emergency fire plans as the work sites change.

ECC conducts a pre-work survey to determine potential fire hazards, sources of ignition, hot-spots, and location of exits. Coordinate this with the number of workers to be in the area, the square footage and the types and amount of combustible/flammable materials that remains on site.

Some protective clothing burns and/or melts quickly. It can shrink, adhere to skin and drip as it burns. Heavy black smoke is a combustion by-product. Polyethylene starts to burn slowly and pick up speed as more heat is generated. It gives off heavy smoke as the fire progresses. Flame spread is slow and steady. Poly also produces toxic gases during thermal decomposition. Workers would not be adequately protected from smoke with respirators used for asbestos work. Sheeting is kept away from heat sources such as transformers, steam pipes, boilers, etc., that heats up during removal. Polyethylene should not be allowed to contact surfaces above 150°F.

To avoid fire problems in asbestos control area, ECC ensures that each employee adheres to the following fire prevention activities:

- < Ensure all sources of ignition are removed. Be sure that gas and other fuel sources are cut off and that pilot lights in boilers, heaters, hot water tanks, compressors, etc., are extinguished;
- < Locate "hot spots" . Quite often you will have to drape equipment instead of sealing off to prevent overheating (i.e., computers, terminal boards, switch panels, transformers);
- < Cut off supply to steam lines, electric and steam heaters, and radiators. Do not permit the polyethylene to lay against hot surfaces;
- < Do not allow lighters, matches, etc., into the work area. Strictly enforce no smoking, eating, chewing or drinking inside the work area;
- < When using an oxygen/acetylene torch to cut pipe, etc., post a fire watch with an appropriate fire extinguisher or a charged hose. Do not use CO2 extinguisher in confined or enclosed spaces. Multi-purpose Dry Chemical fire extinguisher are recommended in most instances;
- < When using a cutting torch, know what is on the other side of the wall and below the floor. Use sheet metal or a treated tarp to catch sparks;
- < Reduce the amount of flammable/combustible materials inside a space to minimum prior to hanging plastic. This includes removal of any chemicals, flammable liquids, heat sensitive materials, etc.;
- < Mark exits from work area and post directional arrows when exits are not visible from remote work areas. This can easily be done using duct tape on the polyethylene walls and barriers. It is recommended that these directional arrows be placed close to the ground to assist workers who may be crawling in smokey conditions to escape a fire;
- < Keep trash and debris to a minimum (i.e., tape, poly, bags, lumber, etc.);
- < If the work area is large and many workers are present, several emergency exits may be needed. Choose exits that are locked from outside but can be opened from the inside. A daily inspection should be conducted to insure secondary exits are not blocked;
- < Lighting of exits and exit routes should be provided;

- < In case of fire, the fire hazard becomes more immediate than the asbestos hazard and workers may need to violate the plastic barriers. This should be discussed with workers in the emergency action plan for the job site;
- < Be alert for flammable vapors in industrial areas (solvents such as naphtha, toluene, xylol, etc.). This is especially critical in industrial vacuuming operations where vacuuming motors are not explosion proof;
- < A telephone should be available at all times for notification of authorities in an emergency;
- < Post local Fire Department and Rescue Squad phone numbers. Advise them of the operations in progress;
- < Ensure that you have a monitor outside at all times trained in emergency procedures;
- < Do not interfere with the building's fire protection system. If sprinkler systems are disabled, fire officials may require a fire watch with charged fire hoses at all times.

10.3 Electrical Considerations

ECC employs many electrical devices on their remediation projects that include, but are not limited to: Lights, HEPA vacuum cleaners, negative air systems, sump pumps, and the like. ECC inspects the electrical equipment used for any damage, proper grounding, and integrity of insulation on a regular basis. The inspection is performed regularly by the PM/competent person and documented on the Equipment Safety Inspection Form.

With the above mentioned items in place, there are still several basic items that should not be overlooked. All metal tools have insulated handles. Where practical, wood or fiberglass ladders are used to reduce or eliminate a ground path if a worker contacts an energized circuit.

10.4 Electrical Safety Review

The use of wet methods increases the potential for electrical shock when working around electrical panels, conduit, light fixtures, alarm systems, junction boxes, computers, transformers, etc.

De-energize as much equipment to the extent possible. Use portable flood-light systems for lighting and regularly check the system and wiring for damage.

- < Use non-conductive scrapers and vacuum attachments (wood, plastic, rubber);
- < Supply workers with heavy insulated rubber boots and/or gloves when working around energized wiring or equipment (lighting, panel boxes, transformers);
- < Ensure all electrical equipment in use is properly grounded before the job starts. This means checking outlets, wiring, extension cords and power pickups. Check

- for the ground-pin on plugs. These checks should also be made while setting up and periodically during the job. Use care not to violate insulated coverings with scrapers, scaffolding wheels, etc. Rolling a heavy cart or scaffold over a extension can easily cause internal damage;
- < Avoid stringing electrical wiring across floors. Elevate wiring if possible to keep it away from water on the floor and damage from foot traffic and moving scaffolds. Duct tape is used for this;
- < Do not allow water to accumulate in puddles on work area floors. NESHAP regulations require damp conditions, not standing water.
- < Ensure electrical outlets are tightly sealed and taped to avoid water spray;
- < Always perform a pre-work walk through to identify potential sources of electrical hazards to abatement workers, or equipment that may be damaged by wet removal methods;
- < Determine operating voltages of equipment and line before working on or near energized parts. De-energize and lock out when possible;
- < Electrical equipment and lines should be considered energized unless tested and determine otherwise. A "Tic Tracer" instrument checks cords, flexible conductors, and outlets;
- < Energized parts must be insulated or guarded from employee contact and any other conductive object;
- < Extension cords used with portable electric tools and appliances must be the three-wire grounded type and connected to a Ground Fault Interrupter (GFI) circuit.

Extension cords:

- < Should be protected from accidental damage;
- < Should not be fastened with staples, hung from nails, or suspended by wire (tape is an acceptable alternative).

Portable electric hand tools should meet the following requirements:

- < Should be equipped with 3-wire cord having a ground wire permanently fixed to the tool frame; or
- < Should be of double-insulated type and labeled as such;
- < For circuits over 600 volts, if electrical disconnects are not visible and open or locked out, the following requirements should be met;
- < Circuits to be de-energized are clearly identified and isolated from all energy sources;
- < Notification received from a designated employee that all switches and connections that could supply energy have been de-energized, locked out and plainly tagged to show men at work;

- < Visual inspections and tests made to assure de-energizing of lines and equipment;
- < Protective grounds applied to disconnected lines or equipment;
- < Separate tag and lockout attached for each crew requiring de-energizing of same line or equipment;
- < Tags should not be removed from completed work until designated employees report that crew members are clear and protective grounds they installed are removed.

10.4.1. Ladders/Scaffolding

During the remediation of asbestos-containing material scaffolding and ladders are used by ECC employees. All scaffolding and ladder used during the project complies with 29 CFR 1926.451 and 1910.25; ANSI 14.1, 14.2.

10.4.2. Ladders

The following items on a ladder are checked on a regular basis:

- < Ladders are always maintained in good condition;
- < Complete inspections are done periodically;
- < No unauthorized repairs are made;
- < Defective ladders are not used;
- < Safety feet spreaders and other components of ladders are in good condition. (Missing safety feet create sharp edges that cut the polyethylene floor covers.;
- < Movable parts operate freely without binding or undue play;
- < Rungs are kept free of grease or oil;
- < Ladders are not used for other than their intended purpose. (Ladders should not be used as a platform or wallboard.;
- < Extension-type ladders should be used with a 12 lean ratio (1 foot out for every 4 feet of elevation);
- < Step ladders should only be used when fully open;
- < The user faces the ladder while going up and down;
- < Tops are not used as steps. If needed, get a longer ladder;
- < Bracing on the back legs is not used for climbing. Double sided ladders with steps on the back are available for this purpose;
- < Portable ladders are used by one person at a time;
- < Ladders are secured to prevent displacement during use;
- < All ladders have well designed safety shoes;
- < Hook or other type ladders used in structures are positively secured;
- < Wood or fiberglass ladders should be selected to avoid electrical hazards of metal ladders.

10.4.3. Scaffolding

Most asbestos remediation projects involve the use of scaffolding. Proper set up, regular inspection and basic maintenance should not be overlooked. In many removal projects, manually propelled mobile scaffolding provides a convenient and efficient work platform. OSHA standards require that when free standing mobile scaffolding is used, the height does not exceed four times the minimum base dimension. This requirement is based on the fact that scaffolding is easily turned over. Since relatively little force is required to tip a scaffold, it becomes important to make sure that wheels on mobile scaffolds move freely and are in good repair. If rented scaffolding is used, all components should be inspected prior to accepting it. Wheels should turn freely and be lubricated. All components such as cross bracing, railings, pin connectors, planking or scaffold grade lumber should be available before the units are assembled.

When workers are riding mobile scaffolding, the base dimension should be at least one half of the height. The force to move a mobile scaffolding must always be applied to the base. Workers on the top must never try to move the scaffold. Workers should be careful to keep debris bagged and obstacles off the floor where mobile scaffolds are used. If a wheel catches on debris on the floor when the unit is moved, additional force are required to move it. This additional force may be all that is needed to turn the unit over.

Guard rails should always be installed on scaffolding used for abatement projects. Workers are usually looking up while working and can easily step off the edge of an unprotected scaffold. OSHA requires that Guard rails be used when scaffolding is from 4 to 10 feet tall and less than 45 inches wide. Scaffolding 10 feet or higher should always have Guard rails.

Planking used on a scaffold should not extend farther than 12" over the edges and should always be secured to the frame.

10.4.4. Slips, Trips, and Falls

Because areas sealed with polyethylene sheeting inside the work area are kept damp to reduce airborne fibers, they become very slick. Disposable booties are a also potential trip hazard as are air and electrical lines. All of these conditions create potential worker hazards even before remediation. ECC complies with CFR 1910 subpart D as guidelines to mitigate slips, trips, and falls. ECC enacts the following work practices to this end:

When asbestos and other debris are removed, the accumulations is bagged and removed from the floor as soon as possible. This simple step, which may require more initial effort, makes cleanup easier and the overall job far safer.

- < Consider the height of the work, equipment in use, and numerous trip hazards. Take a look at your "walking surfaces";

- < The use of disposable booties may be impractical in many removal situations. They may come apart and create a serious trip hazard. Seamless rubber boots, slip-on shoes or safety shoes with non-skid soles may be an alternative depending on the job;
- < Inspect ladders and scaffolding for condition. Ensure railings are adequate on scaffolds;
- < Minimize water on floors. Wet polyethylene is very slick and water increases the risk of electrical shock;
- < Use care around air lines and electrical cords;
- < Suspend electrical lines and cords when possible using tape;
- < No running, jumping or horseplay in work area should ever be allowed;
- < Minimize debris on floors;
- < Pick up tools, scrapers, etc.

11.0 Emergency Response And Contingency

Emergency conditions that may be anticipated during work activities include:

- < Fire involving combustible materials;
- < Medical emergency due to heat stress, physical accident or exposure to toxic materials;
- < Release of hazardous materials.

In the event of a release of hazardous materials during transferring/repacking procedures, ECC's PM/competent person determine the appropriate level of response.

11.1 Emergency Supplies

At a minimum, the following supplies are immediately available for on-site use:

- < First aid equipment and supplies;
- < Emergency eyewash station and shower as per ANSI Z-358.1;
- < Spill Control material and equipment; and
- < Type ABC fire extinguisher, 10 lb. capacity, minimum of four.

11.2 Contingency Plan Execution

In the event an emergency situation should arise while performing site activities, employees follow regulatory procedures. Be prepared to give the following information when calling the Government Officer In-Charge:

- < Your name
- < Description of the emergency

- < Exact location of the emergency
- < Any other pertinent information

Upon discovering an emergency the following series of events occur:

1. Notification of personnel
2. Stop work activities if necessary
3. Lower background noises
4. Begin emergency procedures (not in order, depending on the situation)
 - Survey casualties
 - Assess existing and potential hazards to site personnel and offsite populations
 - Request aid if necessary
 - Allocate resources
 - Extricate and stabilize victims
 - Bring the hazardous substance under control
 - Evacuate if necessary.

11.3 Emergency Numbers

Table 11.1 lists important numbers on-site personnel may need to call in the event of an emergency.

Table 11.1 Emergency Numbers

ORGANIZATION	TELEPHONE NUMBER
Health Department Chemtrec	
Poison Control Center	911
State Police	911
Fire Department	911
Chemical Spills	1-800-424-8802
Ambulance	911
Client	

11.4 Communications

Two sets of communication systems are established; internal communication among personnel on site, and external communication among on-site and offsite personnel. Internal communication are used:

- < Alert team members to emergencies. Maintain site control;
- < Communicate changes in work to be accomplished to an emergency situation;
- < Pass along safety information, such as air change, amount of air time left before break, etc.

< Radios and visual signals are used for communication during operations.

11.5 Emergency Recognition and Prevention

Emergency recognition and prevention training includes daily tailgate safety meetings. By discussing the tasks to be performed, time constraints, emergency procedures, and hazards that may be encountered, personnel should be alert to the dangers and potential emergencies.

11.6 Site Mapping

A site map highlighting the following items, are used to predict potential areas of concern as well as evacuation routes from the site, and are kept in the ECC site office as well as in all project vehicles.

- < Hazard areas;
- < Site terrain, topography, buildings, barriers;
- < Evacuation routes;
- < Work crew locations;
- < Site accessibility by land, sea, and air;
- < Offsite populations or environments at risk.

A full size map is kept in the field office.

11.7 Site Evacuations/Refugees

Safe distances are determined at the time of the emergency. The following factors which influence safe distances are taken into consideration:

- < Toxicological properties of the substance;
- < Physical state of the substance;
- < Quantity released;
- < Rate of release;
- < Method of release;
- < Vapor density relative to air;
- < Wind and speed direction;
- < Local topography.

On-site safety stations are located in the Support Zone. The safety station include first aid equipment, fire extinguisher, hand tools, extra monitoring devices, oxygen, and communication system.

11.8 Decontamination and Medical Treatment

Whether or not to decontaminate a victim is based on the type and severity of the illness or injury and the nature of the contaminant. If decontamination cannot be done the victim is wrapped in blankets, plastic, or rubber to reduce the possibility of contamination to other personnel. The medical facility is informed of the potential contamination and a site representative accompanies the victim.

11.9 Documentation and Review

After the response ECC prepares an Emergency Response Report. It includes such things as a chronological history of the emergency, facts, actions, personnel present, sample results (if taken), summary of injuries, and possible exposures. This Report is given to the client within 2 days of the incident and following immediate verbal notification.

12.0 Air Monitoring Strategies

ECC's exposure monitoring program and strategies shall be established and maintained for the duration of asbestos remediation projects. Asbestos air monitoring include both employee and area exposure monitoring which meet EPA re-occupancy standards for a controlled work area, and provide analytical data (29 CFR 1926, 40 CFR 763, and job specifications). An

independent industrial hygiene (IIH) firm is employed to perform project air monitoring. ECC reserves the right to collect personnel air samples. ECC's exposure monitoring plan shall be under the review of a Certified Industrial Hygienist for the duration of the project.

ECC's exposure monitoring program shall provide statistical, objective data of employee and environmental exposure to airborne fibers through the analysis of baseline, process, personal, and final clearance air monitoring. Air samples shall be collected in a 8 micrometer porosity cassette mounted in an open-face filter holder.

The IIH will be responsible for collecting air samples:

- < the starting and stopping of the pumps
- < the setting and recording of air flow rates using a calibrated rotameter at the beginning and at the end of the sampling period
- < periodic inspection of cassette for overloading; and
- < ensuring that all the record keeping of the sampling process is accurate and complete. At the end of the day, all air monitoring cassettes will be delivered over to the approved laboratory for the approved analysis.

The IIH shall employ one of two types of sampling forms in terms of cassette distribution: Full-period Continuous Single Sampling or the Full-Period Consecutive Sampling. The former strategy uses one cassette throughout the sampling period while the second form uses two cassettes consecutively in conducting the sampling. The latter strategy is employed when the IIH has reason to believe that the cassette is, or may become overloaded in work areas where dust and particulate matter may be found in high concentrations, i.e. crawl space, basements, and boiler rooms.

12.1 Initial Baseline or Background Monitoring

These air monitoring and resultant exposure assessment determinations shall be conducted immediately before the work site preparation begins. The assessment will be used to justify and verify ECC's proposed accordance measure for a particular regulated area. ECC's work plan shall be flexible enough to adjust to such assessment demands.

12.2 Periodic Exposure Monitoring

The IIH shall conduct time weighted averages (TWA) and 30 minute ceiling concentration, or excursion limit (EL) in the breathing zone of employee's which will be a representative of employees exposure to airborne fiber concentrations in a particular work area. The TWA and the EL monitoring shall be for the determination of eight hour time weighted average and thirty minute ceiling concentrations, respectively. Personnel sampling should run continuously for the duration of the sampling period stopping only for lunch and breaks (outside the work area). At

air monitoring termination, the IIH shall check the air flow with a calibrated rotameter, mark the time cassette was terminated, and assist the employee in removing the pump assembly from their waist.

The IIH shall record the following information on the air sampling form for all exposure monitoring: test number, name of person conducting test, name of person tested, date, time, place of tests, conditions during the test, and volume of air collected. The IIH shall follow the check list below when performing 8-hr TWA personal air monitoring:

- , Turn personal air monitoring pump on and secure pump mechanism around employees waist. The cassette shall be secured at the employee's breathing zone (employees lapel or collar),
- , record air flow with calibrated rotameter and time cassette was started,
- , periodically inspect cassette's filter for overloading,
- , at break times, mark time off/on,.
- , at lunch, record air flow and time cassette was stopped, take off of employee. Check for overloading and decide whether or not to use second cassette for the afternoon work period.
- , At the end of the shift, record air flow with a calibrated rotameter, mark time cassette was stopped, and remove the pump assembly from employee,
- , Decontaminate personal pump using wet-cleaning techniques.

Thirty minute EL personal air monitoring will be conducted daily to represent employee ceiling concentration to airborne fibers. The test should run for thirty minutes during the day's most invasive work procedure or process. Procedures for the 30-minute EL shall be the following:

- , Turn personal air monitoring pump on and secure pump mechanism around employees waste. The cassette shall be secured at the employee's breathing zone (employees lapel or collar),
- , record air flow with calibrated rotameter and time the cassette was started,
- , at thirty minutes, note air flow with a calibrated rotameter, mark time the cassette was stopped, and remove pump assembly from the employee.

12.3 Area Exposure Monitoring

Representative 8-hr area exposure monitoring shall be conducted by the IHH on a daily basis both outside and inside the work area. Sampling points shall be set up, at a minimum:

- < entrance to the decon (outside work area);
- < at the pressure differential unit exhaust (outside work area);
- < occupied areas adjacent work area (outside work area);
- < random locations (outside work area); and
- < two samples inside the work area.

All of the standard operating procedures pertaining to air monitoring techniques shall apply for area exposure monitoring.

12.4 Final Clearance Monitoring

Aggressive final clearance monitoring, where required, shall be performed by the IHH after the abatement work and final visual inspections have been completed. In lieu of final clearance monitoring, area process samples shall be used as clearance monitoring data as long as analytical results from the process samples are within the airborne fiber concentration limits of clearance sampling criteria. Final clearance air monitoring shall consist of the following:

- , Place five (minimum three) pumps and tripod stands inside the work area,
- , blow the exhaust from a one horsepower leaf blower on walls, ceilings, floors, ledges, and other surfaces throughout the work area,
- , Place a 20" fan in the center of the work area; where work areas consist of multiple sites, use additional fans,
- , attach cassette to tubing and record flow rate with calibrated rotameter,
- , leave the work area (decontaminate) and leave the fan(s) on, and
- , turn off pumps, check air flow with calibrated rotameter and record time, turn off fans.

Cassettes shall be delivered to the approved laboratory on a daily basis. When work area airborne fiber concentrations, as determined by laboratory analysis, do not exceed 0.01 f/cc or background concentrations (whichever is greater), the work area's containment barriers shall be torn down and the work area cleaned up.

12.5 Termination of Exposure Monitoring

ECC shall implement a negative exposure assessment program, as per 29 CFR 1926.1101 (f) (2) (iii). The criteria below will be used to justify the termination of exposure monitoring:

- , Produce objective data showing that the product or material containing asbestos or the activity involved in the repair, removal, and encapsulation of the material will produce asbestos fiber levels above the TWA and EL limits under conditions having the greatest potential for releasing asbestos.

- , Produce evidence that the job now proposed closely resembles a previous job performed within the last twelve months, conducted in accordance, and is similar with regards to: types of materials worked on, kinds of engineering controls used, standard working procedures followed, and experience of employees.

- , The results of initial exposure monitoring of the current job made from breathing zone air samples that are representative of the 8 hour TWA and 30-minute EL of each employee covering operations which are most likely during the performance of the entire asbestos job to result in exposures over the PELs

12.6 Notifications of Exposure Monitoring

ECC's exposure monitoring program discloses all exposure monitoring (background, personal, environmental, clearance) results to the contracting officer or his representative, the NQP, and employee on a daily basis as per specifications, section 02081.

The QCM shall submit fiber counts and airborne concentration results to the client within sixteen (16) hours after termination of exposure monitoring. The QCM shall notify the contracting officer immediately if any airborne fiber concentration exceeds 0.01f/cc.

The QCM shall notify employee three (3) days after sampling has been terminated. TWA and EL results will be made available to employee, in writing, by posting laboratory results on the project board located in ECC's on-site office. The results of employees exposures will be filed in the individuals' file.

13.0 Medical Monitoring Plan

The purpose of this medical surveillance program is to establish and enforce standard operating procedures for medical monitoring and employee access to all medical records of the employee(s), who are, or may reasonably be expected to be, exposed to asbestos at or above the permissible exposure level and who are required to wear respirators. Accordance with these requirements will meet the minimum requirements in 29 CFR 1926.1101, and 40 CFR 763.121 (m).

13.1 Scope of Medical Monitoring Plan

This program applies to all employees of Environmental Chemical Corporation who perform asbestos related services.

13.2 Program Administrator

Project Manager and/or competent person is responsible to implement and enforce this program.

13.3 Medical Examination-General

ECC shall provide or make available at no cost to the employee, medical examinations relative to exposure to asbestos as required by Federal and state regulations. ECC shall ensure that all medical examinations or procedures are performed by or under the supervision of a licensed physician.

13.4 Preplacement

ECC shall provide or make available to its employees, within 30 calendar days following employment in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination, which shall include:

1. A medical and work history
2. A complete physical examination with emphasis on the respiratory system, the cardiovascular system and the gastrointestinal system
3. Completion of the Initial Medical Questionnaire in Appendix D
4. A chest X-ray according to Table 2 of
5. Pulmonary function tests to include forced vital capacity (FVC) and forced expiratory volume at 1 second (FEV₁)
6. Any additional tests deemed appropriate or necessary by the examining physician or the physician interpreting the chest x-ray.
7. A chest roentgenogram at the discretion of the physician

13.4.1. Annual examination

ECC shall provide or make available a comprehensive medical examination annually, similar to the protocol of the initial medical examination to all of its employees engaged in occupations exposed to airborne concentrations of asbestos fibers.

13.4.2. Termination of employment

ECC shall provide or make available, within 30 calendar days before or after the

termination of employment to its employee engaged in an occupation exposed to airborne concentrations of asbestos fibers, a comprehensive medical examination similar to the preplacement examination.

13.4.3. Recent Examinations

No medical examinations shall be provided, if adequate records show that the employee has been examined in accordance with the 29 CFR 1926.1101 where applicable. within the past one year.

13.5 Physician's Recommendation

Upon completion of the medical examination the physician shall furnish to ECC the following information:

1. Any recommended limitations on the employee and upon the use of personal protective equipment such as clothing or respirators
2. The physician's opinion as to whether the employee has any detected medical conditions that could place the employee at an increased risk of material health impairment from exposure to asbestos
3. A statement that the employee has been informed by the physician of the results of the examination and of any medical conditions that may result from asbestos exposure.

Upon receipt of the copy of the physician's written opinion, ECC shall provide a copy to the affected employee within 30 days.

13.6 Medical Records

ECC shall retain complete and accurate medical records of its employees for the length of employment plus 30 years.

13.6.1. Access to Records

The contents of the records of the medical examination shall be made available to the EPA, the Assistant Secretary of Labor for Occupational Safety and Health, to the Director of NIOSH, to authorized physicians and medical consultants, and upon request by the employee, to his or her physician. Any physician who conducts a medical examination required as per 29 CFR 1926.1101, where applicable. shall furnish to ECC all the information specifically required by

this section, and any other medical information related to occupational exposure to asbestos fibers.

13.7 Exempted Operations

When ECC relies on objective data that demonstrates that products made from or containing asbestos are not capable of releasing fiber of asbestos or a combination of these minerals, in concentrations at or above the permissible exposure limit under the expected conditions of processing, use, or handling, such operations shall be exempt from initial monitoring requirements as per 40 CFR 763.121 (f) (2). ECC shall establish and maintain an accurate record of objective data reasonably relied upon in support of exemption

13.8 Transfer of Records

Whenever ECC ceases to operate in asbestos remediation, and if there is no successor to receive and retain the records for the prescribed period, ECC will notify the EPA Administrator at least 90 days prior to disposal and upon request, shall transmit them to the administrator.

*Environmental Chemical Corporation
SOP HS-030 Radiation Protection Program
Revised: November 1998*

SOP HS-030 RADIATION PROTECTION PROGRAM

A separate manual is dedicated to Environmental Chemical Corporation's Radiation Protection Program. Please contact Mr. Marc Mizrahi for more information. The following sections are included in ECC's Radiation Protection Program.

Radiation Protection Program

- 1.0 Introduction
 - 2.0 Organization & Responsibilities
 - 3.0 Project Related Activities
 - 4.0 Records and Reports
 - 5.0 Standard Operating Procedures
 - 5.1 Radiation Protection Procedures
 - 5.2 Portable Instrument Operating Procedures
 - 5.3 Transportation
- New SOPs



Environmental Chemical Corporation

CHEMICAL HYGIENE PLAN



**CHEMICAL HYGIENE PLAN
FOR
ENVIRONMENTAL CHEMICAL CORPORATION**

**Implementation Date:
December 1991**

**Regulation Statute:
29CFR.1910.1450**

Rodney Smith,
Laboratory Manager

Signature

Date

Bhupender Sabharwal,
Chemical Hygiene Officer Signature

Date



STATEMENT OF POLICY:

Safety in the Laboratory

ECC strives to provide a safe working environment. Management is committed to continually improve safety performance and will implement necessary programs to achieve this objective. **ECC** expects each employee's full participation and effort.

The hazardous chemicals used by employees can all be used safely. **ECC's** Chemical Hygiene Plan and associated training programs provide you with the information you need to work in the laboratory safely and effectively.



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in Laboratories Appendix I

Appendix II Fire Prevention and Emergency Action Plan..... Appendix II



1.0 PURPOSE

The purpose of this plan is to limit chemical exposures and to protect the health of laboratory employees.

1.1_ ECC has developed and carried out the provisions of a written Chemical Hygiene Plan (CHP).

- C Capable of protecting employees from health hazards associated with hazardous chemicals in the laboratory.
- C Capable of keeping exposures below the permissible exposure limits.
- C The chemical hygiene plan is readily available to employees.

1.2 This plan applies to all employees engaged in the laboratory use of hazardous chemicals. This plan does not apply to the use of hazardous chemicals which do not meet the definition of laboratory use. In such cases, the employee complies with the relevant standard in 29 CFR part 1910, subpart Z, even if such use occurs in a laboratory.

1.3 The plan is formulated to conform with the requirements of OSHA regulation 29 Code of Federal Regulations (CFR) 1910.1450. The plan specifically addresses:

- C Designation of personnel responsible for implementation of the CHP, including the assignment of a Chemical Hygiene Officer (CHO).
- C Criteria to determine and implement control measures to reduce employee exposure to hazardous chemicals including engineering controls, the use of personal protective equipment, and hygiene practices.
- C Provisions for employee information and training regarding the handling of hazardous chemicals.
- C Procedures to be followed in the event of an emergency, including the location and proper use of available emergency equipment.



2.0 RESPONSIBILITIES

2.1 Laboratory Manager, has the ultimate responsibility for health and safety of all employees and provides the staff ongoing support for the CHP.

2.2 Chemical Hygiene Officer (CHO), Bhupender Sabharwal, is the designated person qualified by training and experience to do the following:

- C Develop, administer, and update the laboratory CHP.
- C Assist management with CHP implementation.
- C Monitor procurement, use, and disposal of chemicals in the laboratory.
- C Ensure the appropriate personal protective equipment (PPE) is available as needed.
- C Gather and maintain Material Safety Data Sheets (MSDS).
- C Know the legal requirements concerning regulatory substances.

2.3 Supervisors are responsible for ensuring that all employees follow all elements of the CHP and other safety procedures including disciplinary action.

2.4 Laboratory Employees

Laboratory employees will:

- C Review the information on MSDS for the chemicals.
- C Minimize all chemical exposure.
- C Conduct all activities in a safe and healthful manner following the CHP.
- C Use the appropriate Personal Protective Equipment.
- C Exercise prudent practices to ensure the safety of all workers.
- C Stop any task that jeopardizes health and safety.
- C Notify supervisors of any potential health or safety hazards that are observed in the laboratory.
- C Ensure that all chemical containers are properly labeled identifying the chemical and its hazards.

2.5 Chemical Hygiene Committee, comprising members of management/supervisors and other select personnel. The committee consists of the following employees:



CHEMICAL HYGIENE COMMITTEE	
Member	Title
Rodney Smith	Laboratory Manager
Jim Burns	Inorganic Supervisor
Konstantin Povod	Radiation Safety Officer
Bhupender Sabharwal	Safety Officer
Eric Balow	Group Leader

Principle responsibilities of the Chemical Hygiene Committee:

- C Assemble on a weekly basis to conduct meetings.
- C Review Chemical Hygiene Plan once a year.
- C Review accident/injury reports to determine program deficiencies and discuss corrective actions.
- C Discuss and report any unfinished business from previous meetings.
- C Discuss new business.



3.0 BASIC RULES AND PROCEDURES FOR WORKING WITH CHEMICALS

3.1 Material Safety Data Sheets (MSDS): all chemists are responsible for reading the MSDS of any chemical they use in the lab.

- C The hazards of each chemical are determined in the MSDS or on the container label: all chemists are responsible for reading them and follow their safety recommendations.
- C All chemists are responsible for following the appropriate safeguards for using the chemical, including personal protective equipment.
- C All chemists are responsible for knowing the location and proper use of emergency equipment.

3.2 Emergency Procedures: every person working in a lab is responsible for learning and knowing the emergency procedures following:

- C Appropriate procedures for emergencies including evacuation routes, spill clean-up procedures, and proper waste disposal.
- C Know the location of the nearest telephone and the emergency telephone numbers.
- C Know the location of all items of safety equipment (eyewash station, fire extinguisher, safety showers, first-aid kit) and how to use them.

3.3 Laboratory Hygiene Practices: every person working in a lab should follow the minimum safety regulations that follow:

- C Do not smell or taste chemicals.
- C No smoking is allowed in the laboratory area.
- C No eating, drinking, chewing gum or tobacco products, or application of cosmetics is permitted in areas where laboratory chemicals are present.
- C Wash hands before leaving the laboratory.

3.4 Glassware

- C Use a pipette bulb for all pipetting. Mouth pipetting is prohibited.
- C Handle and store laboratory glassware with care to avoid injury.
- C Do not use damaged glassware. Glassware which is chipped, cracked, or stressed will be repaired or disposed of appropriately.
- C Follow proper procedures when utilizing glassware for specialized tasks. Seek appropriate instruction when unsure or before performing a task for the first time.



3.5 Personal Protective Equipment (PPE): every person working in a lab should wear appropriate protective equipment:

- C Wear shoes at all times in the laboratory. Do not wear sandals, perforated shoes, or cloth shoes or cloth sneakers as these may not provide adequate protection to the entire foot.
- C Wear safety glasses at all times in the lab.
- C Visitors or employees entering the lab should wear safety glasses at all times.
- C Wear appropriate gloves when working with chemicals.
- C Lab coats are required when working in the lab.
- C Lab workers are not allowed to wear shorts or other skimpy clothing.

3.6 Professional Conduct: every person should follow a code of safe work in the lab:

- C Avoid practical jokes, horseplay, or other behavior which may confuse, startle, or distract another worker.
- C Immediately inform management of unsafe conditions in the laboratory.
- C Avoid working alone in the laboratory. Do not work alone in the laboratory if the procedures being conducted are hazardous or involve hazardous substances.
- C All accidents, no matter how minor, should be reported to the safety officer.
- C Know the exits from the laboratory.
- C Chemical spill kits are available in the laboratory. Chemists should be familiar with their location, and the proper use of its contents.

3.7 Hoods

- C Confirm adequate hood performance before use.
- C Do not use laboratory hoods for materials storage.
- C Do not allow materials to block vents or air flow.

3.8 Compressed Gas

- \$ Cylinders of compressed gases will be strapped (above mid-point) or chained to wall or bench top and will be capped when not in use. They will be stored on a clean dry surface. No ignition source will be allowed in the vicinity of compressed gas cylinders. They will be maintained free of combustible debris.

3.9 Laboratory Standard

- 3.9.1** Appendix II contains a copy of the Laboratory Standard Occupational Exposures to Hazardous Chemicals in Laboratories (1910.1450).



4.0 CHEMICAL PROCUREMENT, DISTRIBUTION, AND STORAGE

4.1 Procurement

Prior to the purchase of new chemicals by laboratory employees, the purchase must be approved by laboratory management according to the following procedure.

4.1.1 Prior to the purchase of new chemicals by laboratory employees, a review concerning the properties and hazards of the substance is conducted by the CHO and at least one of the following persons:

- C Laboratory Manager
- C Supervisor

4.1.2 *The review covers:*

- C The specific hazards associated with the substance.
- C The necessity of the purchase.
- C Safety precautions and protective equipment necessary to the safe handling of the substance currently in place.
- C Additional safety measures and/or personnel training necessary for safe handling of the substance.

4.1.3 Prior to arrival of the new substance at the laboratory, the CHO or his/her designee trains laboratory employees in the safe handling and use of the new substance.

4.2 Storage

4.2.1 All chemicals are to be stored in specified areas. Bench top, laboratory hoods, or desks are not to be used to store chemicals unless specifically designated as storage areas.

4.2.2 Chemicals are stored with chemicals of similar properties and hazards.

4.2.3 Chemicals are not to be stored with or near chemicals which are incompatible or could potentially produce severe hazards (e.g., explosions, production of toxic gases, etc.) when combined.

4.2.4 Stored chemicals are to be examined, a minimum of annually, to determine if:

- C The substances have exceeded the expiration date.
- C The substances have deteriorated.
- C They have been stored properly.
- C The containers have deteriorated.



4.3 Distribution

4.3.1 Chemicals are only to be used by laboratory employees trained in their appropriate handling and use of such chemicals.

4.3.2 Chemicals are only to be taken from storage for use in laboratory procedures.

4.3.3 Chemicals are to be used in the laboratory area. Chemicals are not to be taken into private offices or other areas not specifically designated for chemical use.

4.4 Material Safety Data Sheets (MSDSs)

4.4.1 MSDSs are useful in the initial recognition of chemical hazards in the work place. Based on the information they contain, one can perform a preliminary survey to insure that the proper controls are in place for safe handling of the chemicals. The MSDSs also assist in conducting hazard assessment. Based on this assessment, proper protective equipment is provided for each worker.

4.4.2 MSDSs are readily available in each department and also can be obtained from the CHO.

4.5 Inventory

4.5.1 The CHO maintains an inventory of all laboratory chemicals.

4.5.2 Inventory is updated annually.

4.5.3 Unneeded, expired, or deteriorated materials will be discarded.



5.0 ENVIRONMENTAL MONITORING

ECC does not perform regular monitoring of airborne concentrations of hazardous substances in the laboratory due to the type of work normally conducted. If necessary, ECC will provide environmental or employee exposure monitoring outlined by the following program:

5.1 Initial Monitoring

ECC will measure employee exposure to any regulated substance if the following conditions exist:

5.1.1 There is reason to believe that employee exposure is near or exceeds the action limit or Permissible Exposure Limit (PEL) for a substance.

5.1.2 An employee exhibits health hazard symptoms such as headache, rash, nausea, dizziness, coughing, irritation of the nose or throat, or eye irritation.

5.1.3 A complaint is received from one or more employees in a work area.

5.1.4 There is reason to believe that engineering controls (e.g., laboratory hoods) are not functioning adequately to protect employees.

5.2 Periodic Monitoring

If initial monitoring discloses employee exposure over the action level or PEL, ECC will immediately comply with the exposure monitoring provisions of the relevant standard.

5.3 Termination of Monitoring

Monitoring is only terminated in accordance with the relevant standard (OSHA PEL).

5.4 Employee Notification of Monitoring Results

ECC will notify employees of monitoring results within 15 working days after receiving the monitoring results.



6.0 HOUSEKEEPING, MAINTENANCE, AND INSPECTIONS

6.1 Housekeeping

Good housekeeping practices make for a safe environment. Secure all gas cylinders and appropriately label all chemicals.

Common housekeeping practices contribute greatly toward chemical hygiene and safety. A clean work area is much safer than one which is cluttered or dirty. All chemists and ECC staff are responsible for the following:

- C Keep all aisles, hallways, and stairs clear of chemicals and other materials.
- C Keep all work areas and, especially, workbenches clear of clutter and obstructions.
- C All working surfaces and floors should be cleaned regularly.
- C Access to emergency equipment, showers, eyewashes, and exits should never be blocked.
- C Wastes should be placed in the proper containers and correctly labeled.
- C Any unlabeled containers are considered waste by the end of each workday. All chemicals are placed in proper storage areas by the end of each workday.
- C All chemical containers are labeled with both the identity of the chemical and its hazards.
- C All spills are promptly cleaned up, and the spilled waste is disposed of properly.

6.2 Maintenance

Proper maintenance and inspection of safety equipment are essential to insuring a safe working environment for laboratory employees. ECC has instituted the following schedule for preventive maintenance and inspection of safety equipment. Performance of the maintenance and inspection of safety equipment is the responsibility of the Supervisor of the area in which the equipment is located, with oversight by the CHO.

6.2.1 Safety Showers

All safety showers are tested and inspected on a monthly basis.

6.2.2 Eyewash Fountains

All eyewash fountains are tested and inspected on a monthly basis.

6.2.3 Laboratory Hoods

All laboratory fume hoods are to be inspected every 6 months by Agape to insure proper operation.

6.2.4 First Aid Supplies



First aid supplies in each area are to be inspected on a monthly basis to insure that adequate supplies exist for most anticipated routine instances.

6.2.5 Other Safety Equipment and Supplies

Any equipment which is deemed inoperable must be removed from service immediately, either physically or by tagging. Any procedures which require this equipment for safe performance are to be halted until the equipment is restored to good working order.

6.3 Inspections

In order to insure that all safety equipment is properly functioning and that good housekeeping practices are being maintained, personnel will perform inspections to assess laboratory safety.

Inspections are to be carried out on a monthly basis by laboratory personnel. These inspections are to identify and correct the following:

- C Cleanliness and orderliness of the work area.
- C Unsafe conditions or practices.
- C Condition of emergency and safety equipment.



7.0 MEDICAL PROGRAM

7.1 Medical Consultation

7.1.1 In the event that an ECC employee is suspected or known to have been exposed to a hazardous substance, the employee will receive prompt and appropriate medical attention. This decision will be based on following conditions:

- C Whenever an employee develops signs or symptoms associated with a hazardous chemical to which the employee may have been exposed in the laboratory.
- C Whenever an event takes place in the work area such as a spill, leak, explosion, or other occurrence resulting in the likelihood of a hazardous exposure.
- C Whenever exposure monitoring reveals an exposure level routinely above the action level or PEL for an OSHA regulated substance for which there are exposure monitoring and medical surveillance requirements.

7.1.2 ECC will provide to physicians the following information:

- C The identity of the hazardous chemical(s) to which the employee may have been exposed.
- C A description of the condition under which the exposure occurred including quantitative exposure data, if available.
- C A description of the signs and symptoms of exposure that the employee is experiencing, if any.

7.1.3 The CHO will receive the medical report from the attending physician(s). The CHO is responsible for distributing this information to all involved parties.

7.1.4 The CHO is responsible for notifying the employee of the results of any medical examination or consultation regarding their exposure to hazardous substances.

7.1.5 It is the responsibility of the CHO or supervisor to escort the exposed/injured employee to the medical center.



8.0 PROTECTIVE APPAREL AND EQUIPMENT

8.1 Ventilation

8.1.1 Laboratory ventilation should not be turbulent and should be relatively uniform throughout the laboratory, with no high velocity or static areas.

8.1.2 General laboratory ventilation should not be solely relied upon for protection from toxic substances released into the laboratory.

8.2 Laboratory Hoods

8.2.1 Laboratory exhaust hoods provide the primary engineering control for reducing employee exposure to airborne contaminants. Laboratory hoods are to be used when working with substances which are known to produce airborne contamination (e.g., particulates, vapors, etc.). Laboratory hoods are also to be utilized when working with substances of unknown toxicity.

8.2.2 Laboratory hoods will be maintained in good working order and maintain an average of 80-120 linear feet per minute.

8.3 Safety Shower

A drench type safety shower is to be located and clearly marked in each laboratory area in which hazardous chemicals are handled.

8.4 Eyewash Stations

Eyewash fountains are to be located and clearly marked in each laboratory area in which hazardous chemicals are handled.

8.5 Fire Extinguishers

Fire extinguishers are to be located and clearly marked in each laboratory area.

8.6 Chemical Safety Cabinets

Chemical safety cabinets (acid/basic solvents) will be inspected regularly.



8.7 Personal Protective Equipment

Each laboratory employee will be furnished with:

- C Laboratory coat.
- C Safety glasses.
- C Protective gloves.

These should be appropriate protection for most laboratory procedures performed by ECC. Other protective equipment (e.g., respirators, face shields, etc.) are provided to laboratory employees on an "as-needed" basis as determined by the CHO and supervisory personnel.



9.0 RECORDS

9.1 All accidents and injuries must be reported to the CHO to be investigated.

9.2 The CHO maintains records of all chemical inventories.

9.3 The CHO maintains an accurate record of any measurements taken to monitor employee exposures to hazardous substances.

9.4 The table below lists the recording policies of the facility:

RECORD KEEPING PROCEDURES	
Record	Responsibility
Training Records	CHO
Hood Performance	CHO
Accident Records	CHO
OSHA Log 200	CHO
Waste Disposal	CHO
Monthly Laboratory Safety Inspection	CHO
Medical Examinations	CHO
Respirator Fit Test Records	CHO
Incident Reports	CHO



10.0 SIGNS AND LABELS

ECC has posted prominent signs and labels of the following types:

10.1 Emergency telephone numbers of:

- C Emergency personnel.
- C Emergency facilities.
- C Supervisors.
- C Laboratory employees.

10.2 Identity labels showing contents of containers, waste receptacles, and associated hazards.

10.3 Signs identifying the locations of safety showers, eyewash stations, fire extinguishers, and first aid.

10.4 Areas where food and beverage consumption and storage are permitted.

10.5 Warnings for areas or equipment where special or unusual hazards exist.



11.0 SPILLS AND ACCIDENTS

11.1 ECC has established a written emergency plan and has communicated its contents to all laboratory employees. The plan includes procedures for:

- C Ventilation failure.
- C Prevention, containment, and cleanup of spills.
- C Evacuation.
- C Reporting.
- C Fire Prevention and Emergency Action Plan (See Appendix II).

11.2 All accidents or near accidents are to be carefully analyzed with the results distributed to laboratory management and employees in an effort to prevent their recurrence.

11.3 See Rad Hygiene Plan for all issues related to rad spills, etc.

- C See Appendix I - SOP GEN19.



12.0 EMPLOYEE INFORMATION AND TRAINING

12.1 Employer Responsibility

ECC is responsible, under the Chemical Hygiene Plan, for employee training. The form and format of this training are discretionary. The following sections outline the contents of the training programs.

12.2 Employee Information

The employer must provide employees with information and training to ensure that they are aware of the hazards of the chemicals present in their work area. This information must be provided at the time of an employee's initial assignment to a work area where hazardous chemicals are present and prior to assignments involving new exposure situations.

Employees must be informed of:

- C The contents of this standard must be made available to them.
- C The location and availability of the employer's Chemical Hygiene Plan.
- C The permissible exposure limits for OSHA regulated substances or recommended exposure limits for other hazardous chemicals where there is no applicable OSHA standard.
- C Signs and symptoms associated with exposures to hazardous chemicals used in the laboratory.
- C The location and availability of known reference material on the hazards, safe handling, storage, and disposal of hazardous chemicals found in the laboratory including, but not limited to Material Safety Data Sheets (MSDS) received from chemical suppliers.

12.3 Employee Training

All employees who have the potential of being exposed to a substance in the course of their work are trained about the chemical hazards including:

- C Chemical detection methods, if available.
- C The chemical's physical and health hazards.
- C Appropriate protective measures, including ventilation and PPE.
- C Details on labeling system used.
- C How to read and interpret a MSDS and label warnings.



12.4 Chemical Hygiene Plan Training

All laboratory employees receive training regarding the ECC Chemical Hygiene Plan. As a portion of this training, each laboratory employee receives copies of the ECC CHP, 29 CFR 1910.1450 (Occupational Exposures to Hazardous Chemicals in Laboratories), and the Emergency Plan. This training includes:

- C The contents of the ECC CHP.
- C The contents of the OSHA Laboratory Standard (29 CFR 1910.1450).
- C The contents of the ECC Emergency Plan.
- C The location and availability of Material Safety Data Sheets.



13.0 WASTE DISPOSAL PROGRAM

ECC has instituted a program to insure that laboratory wastes are disposed of in a safe manner, compliant with all pertinent regulations. The laboratory manager, in concert with the CHO, is responsible for development and implementation of these procedures. ECC's waste disposal program has the following elements:

- C Waste collection and segregation.
- C Waste storage.
- C Waste disposal.
- C Hazardous Waste Management Plan.

13.1 Waste Collection and Segregation

13.1.1 Wastes are collected in containers in or near the area in which the waste is generated.

13.1.2 The contents of this container should be transferred to the appropriate storage container in the designated storage area.

13.1.3 The person adding chemicals to the container will wear the minimum required PPE: safety glasses, gloves, and lab coat.

13.1.4 Any spill or leaks from the satellite container will be cleaned promptly.

13.1.5 Separate containers must be provided for different types of waste streams generated in each laboratory area.

13.1.6 Each container must be labeled to reflect the type of waste and its hazards.

13.1.7 The container must be made of a material compatible with the waste types it is used to contain.

13.2 Hazardous Waste Accumulation Area (180 days)

13.2.1 Waste storage containers are larger containers used to accumulate waste materials collected in containers. These containers should be no larger than a 55-gallon drum and be manufactured from materials compatible with the wastes to be stored inside. The container will meet Department of Transportation (DOT) specifications for the waste stream it is being used to contain.

13.2.2 Each container must be labeled to reflect the hazard class (e.g., corrosive, flammable, etc.), the safety precautions required, and the date the waste accumulation was begun in that container.

13.2.3 At least two people should be present as a safety precaution when waste is being transferred from



satellite accumulation point to 180 days area.

13.2.4 The person emptying the contents of the container wears the protective clothing required for the type of waste being handled. At a minimum, the employee utilizes safety glasses, appropriated gloves, and a laboratory coat.

13.3 Waste Disposal

13.3.1 ECC tracks the length of time over which waste is accumulated in a drum to insure compliance with appropriate regulations.

13.3.2 ECC disposes of all wastes in a manner consistent with all applicable regulations utilizing licensed facilities and transporters. ECC has selected Environmental Enterprises, Inc. for transport, storage, and disposal of laboratory waste.



14.0 DEFINITIONS

14.1 Action Level

The concentration designated in 29 CFR Part 1910 for a specific substance, calculated as an eight-hour, time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance.

14.2 Carcinogen

A carcinogen is any substance which meets one of the following criteria:

- C It is regulated by OSHA as a carcinogen.
- C It is listed under the category "known to be carcinogens" in the Annual Report on Carcinogens published by the National Toxicity Program (NTP).
- C Listed under Group 1, "carcinogenic to humans," by the International Agency for Research on Cancer Monographs (IARC).
- C Listed as Group 2A or 2B by IARC or as "reasonably anticipated to be carcinogens" by NTP and causes statistically significant tumor incidences in animals.

14.3 Hazardous Chemical

A chemical for which there is statistically significant evidence, based on at least one study conducted in accordance with established scientific principles, that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic systems, and agents.

14.4 Laboratory

A facility where the "laboratory use of hazardous chemicals" occurs. It is a work place where relatively small quantities of hazardous chemicals are used on a nonproduction basis.

14.5 Laboratory-Type Hood

A device located in a laboratory, enclosed on five sides with a moveable sash or fixed partial enclosure on the remaining side; constructed and maintained to draw air from the laboratory and to prevent or minimize the escape of air contaminants into the laboratory; and allows chemical manipulations to be conducted in the enclosure without insertion of any portion of the employee's body other than hands and arms.



14.6 Laboratory Use of Hazardous Chemicals

Handling or use of chemicals in which all of the following conditions are met:

- C Chemical manipulations are carried out on a "laboratory scale."
- C Multiple chemical procedures or chemicals are used.
- C The procedures involved are not part of a production process, nor in any way simulate a production process.
- C "Protective laboratory practices and equipment" are available and in common use to minimize the potential for employee exposure to hazardous chemicals.

14.7 Medical Consultation

A consultation which takes place between an employee and a licensed physician for the purpose of determining what medical examinations or procedures, if any, is appropriate in cases where a significant exposure to a hazardous chemical may have taken place.

14.8 Protective Laboratory Practices and Equipment

Those laboratory procedures, practices, and equipment accepted by laboratory health and safety experts as effective, or that the employer can show to be effective, in minimizing the potential for employee exposure to hazardous chemicals.

14.9 Reproductive Toxin

Chemicals which affect the reproductive capabilities including chromosomal damage (mutations) and effects on fetuses (teratogenesis).



15.0 REFERENCES

15.1 American Conference of Governmental Industrial Hygienists, Threshold Limit Values for Chemical Substances and Physical Agents in the Workroom Environment with Intended Changes, P.O. Box 1937, Cincinnati, Ohio 45201 (latest edition).

15.2 American Conference of Governmental Industrial Hygienists, Industrial Ventilation (latest edition).

15.3 Annual Report on Carcinogens, National Toxicity Program, Department of Health and Human Services, Public Health Service.

15.4 IARC Monograph on the Evaluation of the Carcinogenic Risk of Chemicals to Man.

15.5 National Research Council, Prudent Practices for Handling Hazardous Chemicals in Laboratories, National Academy Press, Washington, D.C., 1981.

15.6 OSHA Standard, Air Contaminants - Permissible Exposure Limits, Title 29 Code of Federal Regulations, Part 1910.1000, March 1, 1989.

15.7 OSHA Standard, Occupational Exposures to Hazardous Chemicals in Laboratories; Final Rule Title 29, Code of Federal Regulations Part 1910.1450 (1990).



**APPENDIX I:
LABORATORY STANDARD
OCCUPATIONAL EXPOSURES TO HAZARDOUS
CHEMICALS IN LABORATORIES**



**APPENDIX II:
FIRE PREVENTION &
EMERGENCY ACTION PLAN**

32.0 DIVING MANAGEMENT PROGRAM

1.0 Policy

Environmental Chemical Corporation's Diving Management has been prepared in accordance with requirements of the following references:

OSHA (Occupational Safety and Health Administration) 29 CFR 1910 Subpart T
NAVSHIPS 0994-001-9010 (U. S. Navy Diving Manual) Volume 1
NAVSHIPS 0994-009-6010 (U. S. Navy Diving Operations Handbook)
OPNAVINST 9940.1 (Series) (U. S. Navy Diving Program)
OPNAVINST 3150.28 (Series) (Combined Diving Log-Accident/Injury Report)

All employees and subcontractors who participate in diving operations for ECC must read the Diving Management Program and attest in writing that they have read and understand the policies and procedures set forth therein. Questions concerning the information and procedures contained herein should be submitted to the Project Diving Supervisor. Subject to the approval of the Project Manager, the Project Diving Supervisor can initiate local modifications to accommodate deviations necessitated by local conditions and regulations, provided they do not violate the references listed above. Where documents are conflicting in policy, OSHA regulations take precedence.

2.0 Purpose

Environmental Chemical Corporation has established policies and procedures for the safe and efficient conduct of diving. The mode of diving operations is scuba. The procedures contained or referenced in this program are not intended to change or supersede the provisions of the regulations outlined in the foreword of this program. The Occupational Safety and Health Administration (OSHA), Department of Labor, has established a standard which regulates occupational safety and health requirements for commercial diving.

OSHA has established safety and health criteria for personnel to include medical requirements recommended physical examination, operations procedures, equipment procedures, and requirements for record keeping. The standard applies to all diving operations conducted in connection with all types of work and employment within OSHA's jurisdiction unless specifically exempted. Because of the interrelated nature of every diving operation, it is necessary to include requirements that address personnel qualifications, assignments, medical fitness, operational procedures, generally and by diving mode, equipment, and record keeping. The approach has been to develop a standard which, based on the record, promotes employee safety and health by providing for safe and healthful working conditions, so far as possible, which are technically correct, technologically, and economically feasible.

3.0 Definitions and Terms

As used in the procedure, the listed terms are defined as follows:

TERM	DEFINITION
acfm	Actual cubic feet per minute.
Alternate Diving Supervisor	Alternate designated, in writing, by the Project Manager to act on behalf of the Project Diving Supervisor.
ASME or equivalent	Code ASME (American Society of Mechanical Engineers) Boiler and Pressure Vessel Code, Section VIII, or an equivalent code which the employer can demonstrate to be equally effective.
ATA	Atmosphere absolute.
Bell	An enclosed compartment, pressurized (closed or open bell), which allows the diver to be transported to and from the underwater work areas and which may be used as a temporary refuge during diving operations.
Bottom time	The total elapsed time measured in minutes from the time the diver leaves the surface in descent to the time that the diver begins ascent.
Bursting pressure	The pressure at which a pressure containment device would fail structurally.
Circle line search	Descending line leading to a clump with a second line attached used by divers to rapidly search small areas.
Cylinder	A pressure vessel for the storage of gases.
Decompression table	A profile or set of profiles of depth-time relationships for ascent rates and breathing mixtures to be followed after a specific depth-time exposure or exposures.
Dive location	A surface or vessel from which a diving operation is conducted.
Dive-location breathing gas	reserve A supply system of air or mixed-gas (as appropriate) at the dive location which is independent of the primary supply system and sufficient to support divers during the planned decompression.
Dive team	For U.S. Navy contract diving operations, a dive team will consist of a minimum of four ECC personnel, including a Project Diving Supervisor, who are assigned to diving duty in writing by the cognizant Group Director. The dive team members are required to be graduates of an approved U.S. Navy or Commercial Diving Course of Instruction. The Project Diving Supervisor must be knowledgeable of diving and the diving assignment involved.
Diving Supervisor	Person in charge of diving operations. May be the Project Diving Supervisor or the Alternate Diving Supervisor.
Diving Time/Water Time	Time spent in or underwater while engaged in a diving operation. Diving time shall start at the time the diver enters the water and ends when the diver exits the water and returns to the pier, diving boat, or diving platform.
Diving Training	Diver training prescribed by the Project Diving Supervisor in order to maintain diver proficiency.
Diver Orientation	Diver orientation shall be scheduled by the Project Diving Supervisor in order to familiarize or train diver personnel on new or unfamiliar technical functions to be performed by the dive team.
Diving Mode	A type of diving requiring specific equipment, procedures and techniques (SCUBA,

TERM	DEFINITION
	surface-supplied air).
ECC	Environmental Chemical Corporation
fsw	Feet of sea water (or equivalent static pressure head).
Heavy gear	Diver-worn deep-sea dress including helmet, breastplate, dry suit, and weighted shoes.
Hyperbaric condition	Pressure conditions in excess of surface pressure.
Jack-stay search	Two clumps with descending lines and a line of a specified length connecting the clumps used by divers to systematically and thoroughly search large areas.
Live boating	The practice of supporting a surface-supplied air or mixed-gas diver from a vessel which is underway.
Mixed-gas diving	a diving mode in which the diver is supplied in the water with a breathing gas other than air.
No-decompression limits	The depth-time limits of the "no-decompression limits and repetitive diving group designation table for no-decompression air dives", U. S. Navy Diving Manual or equivalent limits which the employer can demonstrate to be equally effective.
Post-Dive preparation time	Time spent in the breakdown, cleaning, preservation, and maintenance of diving equipment upon completion of a diving operation.
Pre-Dive preparation time	Time spent by diver personnel preparing diving equipment for a diving operation.
psi(g)	pounds per square inch (gauge).
Recompression chamber	A pressure vessel for human occupancy such as a surface recompression chamber, closed bell, or deep diving system used to decompress divers and to treat decompression sickness.
SCUBA diving	A diving mode independent of surface supply in which the diver uses open circuit self-contained underwater breathing apparatus.
Standby diver	A diver at the dive location available to assist a diver in the water.
Project Diving Supervisor	The Project Diving Supervisor must be knowledgeable of diving operations in general and all specific diving assignments involved. He is assigned in writing by the ECC and is responsible for the safe and efficient operation of all diving functions at the location to which he is assigned.
Surface-supplied air diving	A diving mode in which the diver in the water is supplied from the dive location with compressed air for breathing.
Treatment table	A depth-time and breathing gas profile designed to treat decompression sickness.
Umbilical	The composite hose bundle between a dive location and a diver which supplies the diver with breathing air, communications, power, or heat as appropriate to the diving mode or conditions, and includes safety line between the diver and the dive location.
Underwater stage	A suspended underwater work platform which supports a diver in the water.
Volume tank	A pressure vessel connected to the outlet of a compressor and used as air reservoir.
Working pressure	The maximum pressure to which a pressure containment device may be exposed under standard operating conditions.

4.0 Personal Qualifications

In the diving industry, employee qualifications are critical to safety and health. Lack of adequate training and experience has been one of the most frequent contributing causes to diving accidents and injuries.

Establishing basic criteria for experience and training of participants in diving operations can maximize employee safety and health.

All ECC diving team members (i.e., divers and support employees involved in diving operations, including the designated person-in-charge), must have experience or training in the use of tools, equipment, systems, techniques, operations and emergency procedures which pertain to their assigned tasks and diving mode (SCUBA). In addition, dive team members who are exposed to or control the exposure of others to hyperbaric conditions must be trained in diving-related physics and physiology. An understanding of the effects of pressure on gases and the physiological effects of diving on humans are equally important to an understanding of diving related physics and the safety requirements involved. Training in diving related physics is therefore specifically required and mandatory for ECC personnel assigned to diving functions.

The level of experience or training required for ECC diving personnel depends upon the particular function an employee fulfills on the dive team and the diving mode to which the employee is assigned. For example, a tender employed in shallow air diving would be required to have an understanding of the breathing air system, the operating procedures, the emergency procedures that pertain to this mode and the associated equipment.

For the purposes of this SOP, ECC personnel who perform diving operations must be graduates of a formal military or commercial diving school and, as a minimum, be certified in SCUBA. Military certification is self-evident; civilian certification will be according to national organizations such as PADI or NAUI. All divers will be trained to the specific level required by the task.

Additionally, OSHA has determined that requiring all dive team members to be trained to handle basic trauma and breathing emergencies offers the broadest possible protection to the greatest number of personnel. An approved CPR/First aid standard course or equivalent training is specified, with re-certification as a requirement.

5.0 Personnel Requirements and Qualification of Dive Team

The Diving Team organization shall be established in writing and approved by the ECC Program Manager.

5.1 General

Each dive team member shall be a graduate of an approved military or commercial diving course of instruction and, as a minimum, certified in SCUBA and/or surface supplied air systems and have the experience or training necessary to perform this assigned tasks. If commercially trained, the diver will be certified according to national organizations such as PADI or NAUI. This experience training shall include:

- C If engaged in UXO operations, divers shall also be a graduate of the U. S. Navy Explosive Ordnance Disposal School.
- C The use of tools, and operation and maintenance of equipment and systems relevant to assigned tasks
- C Techniques of the assigned diving mode
- C Diving operations and emergency procedures
- C Task to be accomplished (to include purpose and function)

All dive team members shall be trained and maintain qualification in cardiopulmonary resuscitation (CPR), mechanical resuscitation, and first aid as defined by OSHA.

The SSHO shall establish a medical file for each ECC diver.

5.2 Assignments

Each dive team member shall be assigned tasks in accordance with the employee's experience or training, except that limited additional tasks may be assigned to an employee undergoing job orientation; provided that these tasks are performed under the direct supervision of an experienced dive team member. The employer shall not require a dive team member to be exposed to hyperbaric conditions against the employee's will, except when necessary to complete decompression or treatment procedures.

The Project Dive Supervisor shall not permit a dive team member to dive or be otherwise exposed to hyperbaric conditions for the duration of any temporary physical impairment or condition which is known to the employer and is likely to affect adversely the safety or health of a dive team member.

5.3 Project Diving Supervisor/Alternate Diving Supervisor

The Project Manager shall assign the Project Diving Supervisor and Alternate Diving Supervisor in writing.

The Project Diving Supervisor is responsible for ensuring accordance with the provisions of this SOP, the SSHP, and the Work Plan. The Alternate Diving Supervisor is in charge of all aspects of the diving operation affecting the safety and health of dive team members when it is necessary for the Project Diving Supervisor to leave the site for any reason or to dive in order to resolve a project problem or perform a QC function and will have similar qualifications as the Dive Supervisor.

The Project Diving Supervisor/Alternate Diving Supervisor shall be responsible for all diving operations, described herein, and shall terminate any operation when, in his opinion, it is considered unsafe to continue.

The Diving Supervisor shall:

- C Schedule required job orientation training for each new diving task, SCUBA, equipment maintenance and preventative maintenance on all diving equipment.
- C Ensure that all safety precautions are carried out by direct observation and inspection of diving equipment, maintenance and diving procedures.
- C Determine the qualifications and proficiency of all personnel and permit NO dive to be made by any person not qualified to make such a dive.
- C Determine the equipment requirements for all diving operations and ensure that adequate means are taken to make such equipment available at the scene.
- C Plan the diving operation considering the job requirements, equipment and personnel available, and condition of the diving operation area.
- C Ensure that the Diving Supervisor's Checklists, are completed and adhered to for all diving operations including training.
- C Shall act as timekeeper and maintain the dive log.
- C Establish emergency procedures

5.4 UXO Diving Specialists

The project UXO Diving Specialists will be both qualified divers and qualified UXO specialists. Their training in both technical proficiencies will be commensurate with the specific task and/or tasks that they have been assigned. Their project responsibilities include:

- \$ Shall be experienced and capable enough to perform diving UXO tasks in the environment they encounter with all reasonable degrees of safety.
- \$ Shall be adequately trained and briefed on all common communication methods, emergency procedures, and general dive procedures.
- C Will be a graduate of a military diving school or graduate of a commercial diving school. They will have current certification, either military or civilian through an appropriate national organization such as PADI or NAUI.
- C May act as tender for other divers
- C Notify the Diving Supervisor of any symptoms that may be construed as diving sickness
- C Maintain a personal dive log
- C Maintain personal diving equipment.
- C Shall have the knowledge and experience to perform the task at hand

6.0 Pre-Dive Procedures

6.1 General

The Project Diving Supervisor will ensure that all UXO Diving Specialists comply with the contents of this SOP to include attachments, local instructions, and the following requirements prior to each dive operation, unless otherwise specified. All dive equipment, personal and company-provided, will be approved for use prior to any diving operation. Training required for the use of specific equipment, such as Dry Suits or full-face mask communications, will be provided. Specific standards and commonality that is safety related will be maintained at all times.

6.2 Emergency Aid

A list shall be kept at the dive location of the telephone or call numbers of the following:

- C An operational recompression chamber (if not at the dive location).
- C Accessible hospitals.
- C Available physician.
- C Available means of transportation.
- C First Aid Supplies (available at the dive site)
- C A first aid kit appropriate for the diving operation.
- C An emergency oxygen kit
- C An American Red Cross standard first aid handbook or equivalent.
- C A bag-type manual/mechanical resuscitator with transparent mask and tubing shall be available at the dive location.

6.3 Planning and Assessment

Planning of a dive operation shall include an assessment of the safety and health aspects of the following:

- C Planned operation and diving mode.
- C Surface and underwater conditions and hazards.
- C Breathing air supply (including reserves).
- C Thermal protection.
- C Diving equipment and systems.
- C Dive team assignment and physical fitness of dive team members (including any impairment known to the employer).
- C Repetitive dive designation or residual air status of dive team members.
- C Decompression and treatment procedures (including altitude corrections).
- C Emergency procedures.

6.4 Hazardous Activities

To minimize hazards to the dive team, diving operations shall be coordinated with other near by activities. UXO diving operations will be conducted in accordance with the work plan and the SSHP.

6.5 Employee Briefing by Diving Supervisor

Dive team members shall be briefed on:

- C The tasks to be undertaken.
- C Safety procedures for the diving mode.
- C Any unusual hazards or environmental conditions likely to affect the safety of the diving operation.
- C Any modifications to operating procedures necessitated by the specific diving operation

Prior to making individual dive team member assignments, the Project Diving Supervisor shall inquire into the dive team member's current state of physical fitness, and indicate to the dive team members the procedure for reporting physical problems or adverse physiological effects during and after the dive.

6.6 Equipment Inspection

All equipment will be checked by the divers for proper working order. Any equipment not working as required will be tagged for repair.

6.7 Warning Signal

When diving from surfaces other than vessels in areas capable of supporting marine traffic, a rigid replica of the international code flag "A," at least one meter in height, shall be displayed at the dive location in a manner which allows all-around visibility.

7.0 Procedures During Diving Operations

7.1 General

The Project Diving Supervisor will ensure that UXO Diving Specialists comply with the contents of this SOP to include Appendices, local instructions, and the following requirements prior to each dive operation, unless otherwise specified. The normal depth limit for SCUBA is 130 fsw. All SCUBA divers will observe no-decompression dive limits. A recompression chamber is required on scene for dives, which exceed 100 fsw.

Additional Requirements:

- C A Diving Supervisor will be on the scene for all diving operations.
- C A life jacket will be worn on all SCUBA dives. The "buddy" system will be used for all SCUBA dives. The only exception to this policy will be when a diver is surface tended by a safety line.
- C Prior to the beginning of any diving operation, the location of the nearest recompression chamber will be ascertained and arrangements made for its use in case of an emergency. A recompression chamber shall be immediately available if, in the opinion of the Diving Supervisor, the depth of the dive and/or working conditions are such as to require it.
- C The Diving Supervisor shall ensure that adequate communications (radio or telephone) are established and maintained for emergency assistance. When, in the opinion of the on-scene Diving Supervisor, adequate communications do not exist, diving operations will be secured.
- C A portable oxygen (O₂) resuscitator shall be present and in proper working order prior to the commencement of any diving operation.
- C A means for emergency diver recall will be devised by the Project Diving Supervisor. It must be a distinct, sure method and every diver must be made aware of the system being used. Only Navy approved line pull and hand signals will be employed during diving operations.
- C A standby diver will be utilized on all diving operations. He shall be dressed to the point that immediate action can be taken in case of an emergency. OSHA interpretation states that tanks, weight belts, mask or fins need not be worn while standing by. Gear must be ready for immediate donning i.e. harnesses adjusted, regulators attached and air on etc.
- C Only standard, Navy-approved diving equipment shall be used on dives conducted by ECC personnel.

The following shall be provided for water entry and exit:

- C A diver will never dive without first determining the decompression schedule for the expected depth and bottom time. (See Dive tables in the Navy Diving Manual, Reference 2). Divers will not exceed the limits established by the Diving Supervisor; except in case of emergency as determined by the Diving Supervisor. Dives requiring decompression will be absolutely avoided. Decompression, repetitive, and no-decompression tables (as appropriate) shall be at the dive location. A depth-time profile shall be maintained for each diver during the dive including decompression.
- C Pneumatic powered hand-held tools are authorized for use by UXO Diving Specialists in conjunction with underwater operations.

- C Water washout or airlift device may be used by UXO Diving Specialists for excavation.
- C Electrically powered hand-held underwater camera equipment, hand held locators, communications and underwater lights are the only electrical hand-held equipment authorized for use underwater by UXO Diving Specialists without prior approval.
- C Hand-held power tools and equipment shall be de-energized before being placed into or retrieved from the water.
- C Hand-held power tools shall not be supplied with power from the dive location until requested by the diver.
- C Personnel involved in diving operations should not hesitate to ditch, abandon or destroy gear or equipment if, at any time, such action would, in the divers mind, be the proper course of action for his own safety or the safety of others.

7.2 Termination of Dive

The working interval of a dive shall be terminated when:

- C A diver requests termination.
- C A diver fails to respond correctly to communications or signals from a dive team member.
- C Communications are lost and cannot be quickly re-established between the diver and a dive team member at the dive locations, and between the designated person-in-charge and the person controlling the vessel in live boating operations.
- C A diver begins to use diver-carried reserve breathing or the dive location reserve breathing air.

8.0 Diving Emergencies

8.1 Emergencies

In every diving operation, the possibility of an accident occurring must be considered. The need for a prompt, decisive plan of action in an emergency is essential for the safety of all diving personnel. In order to ensure prompt, decisive, and correct emergency response actions, the Diving Supervisor shall have a clear plan of action for each anticipated emergency. Accordingly, prior to proceeding to the dive site, he/she will review, revise, and write out the emergency response plan in explicit detail. All outside agencies (e.g., hospitals, waterborne security, port operations, etc.) that would be contacted if an emergency occurs, will be contacted. The emergency response plan will then be briefed to all personnel involved with diving operations that particular day prior to commencing any operations.

8.2 Missing Diver

- C Mark the last known position of the diver with a buoy to establish a reference point about which searches may be centered. (Lower clump slowly to the bottom)
- C Request emergency medical help. Report situation to ECC.
- C Initiate diver recall
- C Conduct an orderly and thorough circle line search expanding outward from the marker buoy.
- C Ensure that any diver recovered from the water in an unconscious state is given prompt, effective treatment.

9.0 Post Dive Procedures

The Project Diving Supervisor shall comply with the following requirements, which are applicable after each diving operation, unless otherwise specified.

9.1 Precautions

Check the physical condition of each diver and take the following action:

- C Instruct each diver to report any physical problems or adverse physiological effects including symptoms of decompression sickness.
- C Advise each diver of the location of a recompression chamber, which is ready for use.
- C Alert each diver to the potential hazards of flying after diving.

9.2 Record of Dive

The following information shall be recorded by the Diving Supervisor and maintained for each diving operation in permanent project files.

- C Names of dive team members including designated person-in-charge.
- C Date, time, and location.
- C Diving modes used.
- C General nature of work performed and remarks.
- C Approximate underwater and surface conditions (visibility, water temperature, and current)
- C Maximum depth and bottom time for each diver.

9.3 No Decompression Requirement

Divers involved in diving operations shall not be authorized to make any dives to a depth outside the no-decompression limit without prior approval of the Project Diving Supervisor. For each dive outside the no-decompression limits, deeper than 100 fsw, the following additional information shall be recorded and

maintained:

- 1.) Depth-time profiles.
- 2.) Decompression table designation (including modification).
- 3.) Elapsed time since last pressure exposure if less than 24 hours

For each dive in which decompression sickness is suspected or symptoms are evident, the following additional information shall be recorded and maintained:

- C Description and results of treatment.
- C Description of decompression sickness symptoms (including depth and time of onset).

9.4 Decompression Procedure Assessment

The Project Diving Supervisor shall:

- C Investigate and evaluate each incident of decompression sickness based on the recorded information, consideration of the past performance of decompression table used and individual susceptibility.
- C Take appropriate corrective action to reduce the probability of recurrence of decompression sickness.
- C Prepare a written evaluation of the decompression procedure assessment, including any corrective action taken, within 45 days of the incident of decompression sickness. Written evaluations shall be retained by ECC for a period of five years and then forwarded to OSHA.

10.0 Scuba Diving

10.1 General

SCUBA diving shall **NOT** be conducted under the following conditions:

- C Against currents exceeding one knot unless line-tended.
- C In enclosed or confined spaces.
- C Dives requiring decompression stops.
- C To depths deeper than 100 fsw, without prior approval.

10.2 Procedures

A standby (same as Aopen@position) diver shall be available while a diver is in the water. A diver shall be line-tended from the surface or accompanied by another diver in the water in continuous visual contact during the diving operation. A diver-carried reserve breathing air supply shall be provided for each diver consisting of one of the following:

- C A manual reserve.
- C An independent reserve cylinder with a separate regulator or connected to the underwater breathing apparatus.

The valve of the reserve breathing gas supply shall be in the standby position prior to the dive.

10.3 Buoyancy Control

- C A dry suit or other buoyancy changing equipment not directly connected to a helmet or mask shall be equipped with an exhaust valve.
- C When used for SCUBA diving, a buoyancy compensator shall have an emergency inflation source separate from the breathing air supply.
- C An inflatable flotation device capable of maintaining the diver at the surface in a face-up position, having a manually activated inflation source independent of the breathing supply, an oral inflation device and an exhaust valve shall be used for SCUBA diving.

10.4 Weight Belts

- C Divers shall be equipped with an approved weight belt or assembly capable of quick release. The weight belt will be worn over any harnesses so that quick release is not encumbered.

10.5 Other Equipment

- C A cylinder pressure gauge capable of being monitored by the diver during the dive shall be worn by each SCUBA diver.
- C A time keeping device shall be available at each dive location.

11.0 Search Methods

Two search methods will be used. They are:

11.1 Jack-tar

This is the primary search method used to cover large areas. The jack-tar will normally employ two clumps

connected to the surface by lines and buoys. The two clumps are connected by a third line, which runs along the bottom. Divers follow this line during the search. Depending on the severity of the current and the equipment carried by the diver(s) the jack-tar may be used cross current or parallel to the current. The diver(s) enter the water and follow the buoy line to the clump. The diver(s) follow the bottom line to the other clump. Upon reaching the clump the diver(s) move the clump, raising the line clear of the bottom while keeping taut, and reposition it in the direction of search;

The diver(s) reverse course and return to the first clump repeating the above procedures. This method gives an overlap that ensures totally coverage. Diver(s) location is known by USBL diver positioning system.

11.2 Circle Line

This search method is used to located items underwater when the item can be pin pointed on the surface. A single clump attached to a buoy line is lowered to the bottom. A second line of a specified length is attached to the clump. The divers use this line to circle around the clump at increasing or decreasing radii while searching. This method can be utilized to reacquire single targets previously electronically positioned.

12.0 Record Keeping Requirements

12.1 Recording and Reporting

The SSHO will record and report occupational injuries and illnesses

12.2 Availability of Records

ECC shall make available for inspection and copying any record or document required by Reference 1. Upon request of any employee, former employee or authorized representative, ECC shall make available for inspection and copying any record or document required by Reference 1, which pertains to the individual employee or former employee.

Records and documents required shall be retained by ECC for the following period:

Dive team member medical records
(physician's reports) - 5 years.

Safe Practices Manual - current document only.

Depth-time profile - until completion of the recording of dive, or until completion of decompression procedure assessment where there has been an incident of decompression sickness.

Recording of dive - 1 year, except 5 years where there has been an incident of decompression

sickness.

Decompression procedure assessment evaluations -years.

Equipment inspections and testing records - current entry or tag, or until equipment is withdrawn from service.

Records of hospitalization - 5 years.

After the expiration of the retention period of any record required for 5 years ECC shall forward such records to the National Institute for Occupational Safety and Health, Department of Health and Human Services.

GENERAL PLANNING CHECKLIST

1. STEPS IN PLANNING DIVING OPERATIONS

- a. Analyze the mission for safety.

Advanced planning is the greatest single safety precaution that can be taken. The

- (1) Objective definition
- (2) Environmental conditions
- (3) Emergency assistance (Recompression chamber and medical assistance)
- (4) Route familiarization for all personnel
- (5) Relevant instructions

- b. Pin-point potential hazards.

- c. Natural hazards.

- (1) Atmospheric
 - _____ Extreme exposure of personnel to elements
 - _____ Adverse exposure of equipment and supplies to elements
 - _____ Delays or disruption caused by weather
- (2) Surface
 - _____ Sea sickness
 - _____ Water entry and exit
 - _____ Handling of heavy equipment in rough seas
 - _____ Maintaining location in tides and current
 - _____ Ice, flotsam, kelp, petroleum disrupting operations
 - _____ Delays or disruption caused by sea state
- (3) Underwater and Bottom
 - _____ Depth exceeds diving limits or limits of available equipment (see paragraph 9.4)
 - _____ Exposure to cold temperatures
 - _____ Bottom obstructions
 - _____ Dangerous bottom conditions (mud, drop-offs, sewer outfalls, etc.)

- (4) "On-site" Hazards
 - _____ Local marine traffic
 - _____ High powered, active sonar
 - _____ Other conflicting marine operations
 - _____ Radiation contamination
 - _____ Pollution
 - _____ Low/Zero Visibility diving
 - _____ Excessive Current

- (5) Mission Hazards
 - _____ Decompression sickness
 - _____ Communications problems
 - _____ Drowning
 - _____ Other trauma (injuries)

- (6) Other Hazards
 - _____ Entrapment
 - _____ Entanglement
 - _____ Pollution, toxic
 - _____ Explosives or other ordnance
 - _____ Shifting or "working" of object

d. Minimize hazards and plan for emergencies.

- (1) Diving Personnel
 - (a) _____ Assign a complete and properly qualified Diving Team
 - (b) _____ Assign the right man to the right task
 - (c) _____ Verify that each member of the Diving Team is properly trained and qualified for the equipment and depths involved.
 - (d) _____ Determine that each man is physically fit to dive, paying attention to:
 - _____ General condition
 - _____ Last record of medical exam
 - _____ Ears and sinuses
 - _____ Severe cold or flu
 - _____ Use of stimulants or intoxicants
 - _____ Fatigue
 - (e) _____ Determine each man's emotional fitness to dive (as far as possible):

- _____ Motivation (willingness)
- _____ Stability

(2) Diving Equipment

- (a) _____ Verify that the type of diving gear chosen (and diving technique) is adequate for the mission and particular task
- (b) _____ Verify that the type of equipment and diving technique is proper for the depth involved
- (c) _____ Verify that all equipment has been tested and approved
- (d) _____ Determine that all necessary support equipment and tools (i.e., underwater pneumatic tools) are readily available and are the best for accomplishing the job efficiently and safely
- (e) _____ Determine that all related support equipment such as winches, boats, cranes, floats, etc., are operable, safe, and under the control of trained personnel
- (f) _____ Check that all diving equipment has been properly maintained with appropriate records, and is in full operating condition
- (g) _____ Hang bottles: Additional compressed gas bottles (air, nitrox, oxygen, mixed gasses) which may be needed for decompression stops. In technical (decompression) diving these are either suspended at various depths, or may be carried by the divers.
- (h) _____ Hang bar: bar or other marker which is suspended at various decompression stop levels or at a final safety stop level. This is not absolutely required under either the Navy or NOAA diving standards, but is helpful in low vis environments for decompression stops.)

(3) Provide for Emergency Equipment

- (a) _____ Obtain suitable communications equipment with sufficient capability to reach "outside help". Check all communications for proper functioning
- (b) _____ Verify that a recompression chamber is ready for use, or notify the nearest command having one that its use may be required within a given time frame
- (c) _____ Verify that a First Aid Kit is near at hand, and is completely stocked
- (d) _____ If oxygen will be used as standby first aid, verify that the tank is

- full, properly pressurized, and that all masks, valves and other accessories are fully operable
 - (e) _____ If a resuscitator will be used, check the apparatus for function
 - (f) _____ Check that all fire-fighting equipment is readily available and in full operating condition
 - (g) _____ Verify that Emergency transportation is either standing by, or on immediate call
- (4) Establish Emergency Procedures
- (a) _____ Know how to obtain medical assistance immediately
 - (b) _____ Assign specific tasks to the Diving Team and support personnel for different emergencies
 - (c) _____ Develop and post the emergency assistance checklist, and ensure that all personnel are familiar with it
 - (d) _____ Verify that a copy of the U. S. Navy Decompression Tables is available and up-to-date
 - (e) _____ Be sure that all divers, boat crews, and other support personnel understand all diver hand signals
 - (f) _____ Pre-determine distress signals and call-signs with all members of the diving team, boat crews, and other activities
 - (g) _____ Be sure that all divers have removed anything from their mouths which might choke them during a dive (gum, dentures, tobacco)
 - (h) _____ Thoroughly drill and train all personnel in Emergency Procedures, with particular attention to cross-training. Drills should include:
 - Emergency Recompression
 - Fire
 - First Aid
 - Rapid Dressing
 - Embolism
 - Restoration of Breathing
 - Drowning
 - Electric Shock
 - Entrapment
- e. Establish Safe Diving Operational Procedures.
- (1) _____ Determine that all other means of accomplishing the mission have been considered before deciding to use divers.

- (2) _____ Be sure that emergency contingency planning has been conducted.
- (3) _____ Carefully state the goals of each mission, and develop a flexible plan of operations.
- (4) _____ Completely brief the Diving Team and support personnel.
- (5) _____ Designate a properly qualified Diving Supervisor to be in charge of the mission.
- (6) _____ Designate a timekeeper and verify that he understands his duties and responsibilities.
- (7) _____ Determine the exact depth at the job-site through the use of a lead line or fathometer.
- (8) _____ Verify the existence of an adequate supply of compressed air available for all planned diving operations plus an adequate reserve for emergencies.
- (9) _____ Be sure that operations or action on the part of the Diving Team, support personnel, boat crews, technicians, winch/crane operators, etc., do not start without the knowledge and direct command of the Diving Supervisor.
- (10) _____ All efforts must be made through proper planning, briefings, training, organization and other preparations to minimize "bottom-time". Remember in all cases, water depth and the condition of the diver (especially fatigue) rather than amount of work to be done shall govern the diver's bottom time.
- (11) _____ Decompression tables shall be on hand, be up-to-date, and be used in all planning and scheduling of diving operations. NOTE: ECC will not plan any decompression diving. The tables are solely on-hand to be used in case of an emergency.
- (12) _____ Instruct all divers and support personnel not to cut any lines until that action is approved by the Diving Supervisor.
- (13) _____ Be sure that the ship, boat, or diving craft is securely moored and in position to permit the safest and most efficient operation (except in the case of emergency and critical ship repairs).
- (14) _____ Verify that, when using surface-supplied techniques, that the ship, boat, or diving craft is in at least a two-point moor.
- (15) _____ Ensure that, when conducting SCUBA operations, the boat can be quickly cast off and moved to a diver in distress.
- (16) _____ Ensure that each diver checks his own equipment in addition to checks made by tenders, technicians, or other support personnel.
- (17) _____ Designate a standby diver for all surface-supplied operations, and check that the standby diver is dressed and ready to enter the water if needed.
- (18) _____ Assign buddy divers for all SCUBA operations.

- (19) _____ All efforts should be made to prevent divers from being fouled on the bottom. If work is to be conducted inside a wreck or similar underwater structure, designate a team of divers to accomplish the task. One diver will enter the wreck, the other shall tend his lines from the point of entry.
- (20) _____ When using explosives, take appropriate measures to ensure that no charge will be fired while divers are in the water.
- (21) _____ Brief all divers on the planned decompression schedules for each particular dive. Check provisions made for decompressing diver.
- (22) _____ Verify that the ship, boat or diving craft is displaying the proper signals, flags, or lights to indicate diving operations are in progress.
- (23) _____ Ensure that proper protection against harmful marine life has been provided. If marksmen are used to protect against sharks, verify that they do not have automatic weapons.
- (24) _____ Check that the quality of diver's air supply is periodically and thoroughly tested to ensure purity.
- (25) _____ Thoroughly brief the boat crew using the Diving Boat Operations Checklist.
- (26) _____ Verify that proper safety and operational equipment is aboard small diving boats or craft.

f. Notify proper parties that dive operations are ready to commence.

- (1) Area personnel to be notified if applicable.
 - (a) _____ Port Operations/Port Authority
 - (b) _____ Commanding Officer or Master of ship
 - (c) _____ Ships Officer of the Deck/Day (if the ship is military)
 - (d) _____ Ships Diving Officer (if the ship is military)
 - (e) _____ Commanding Officers/Masters of ships alongside
- (2) If diving on or near a ship, notify ship's bridge to ensure that ship's personnel do not:
 - (a) _____ Turn propeller or thrusters
 - (b) _____ Get underway
 - (c) _____ Drop heavy items overboard
 - (d) _____ Shift the moor
 - (e) _____ Operate rudder or control mechanisms
 - (f) _____ Activate sea discharge or suction
- (3) Notify other interested parties:
 - (a) _____ Local Dock master, military or civilian

- (b) _____ Cognizant Navy Organizations
 - (c) _____ U. S. Coast Guard
 - (d) _____ Army Corps of Engineers (if applicable)
 - (e) _____ Issue a Notice to Mariners, if appropriate
 - (f) _____ Other civilian/military agencies as appropriate
- (5) _____ The Project Diving Supervisor shall, prior to every diving operation, notify emergency facilities having recompression chambers, as well as sources of Emergency Transportation that Diving Operations are under way and their assistance may be needed.

Visibility_____

Current_____

Sunset_____

Wind Speed_____

Low Tide_____

8. Ensure that equipment listed below is readily available at diving site:

- a. Depth Gauges (Each Diver) _____
- b. Bottle Gauges _____
- c. Stop Watch _____
- d. Compass _____
- e. Recall Device _____
- f. Pencils and Paper _____
- g. Flares _____
- h. Diving Manual _____
- i. Rough Dive Log _____
- j. CO² Cartridges _____
- k. Charts of Area _____
- l. Watches (each Diver) _____
- m. First Aid Kit _____

n. Stretcher _____

o. Blankets _____

p. Portable O2 Resuscitator

Diving Supervisor

DIVING SUPERVISOR'S CHECKLIST FOR DIVING BOAT OPERATIONS

All personnel involved in the operation of diving boats, launches, barges, floats, and other types of secondary small craft shall be briefed and must understand the following safety precautions.

1. Inspect the specified boat or craft and determine its suitability for the intended mission and operating environment; ensure that:
 - _____ Boat (craft) is sound, and seaworthy.
 - _____ Power plant is running well and fully tested.
 - _____ Required safety and running equipment is onboard and in workable condition.
 - _____ Proper gear for diving operation is onboard and operational.
 - _____ The assigned boat crew is fully qualified to operate that particular craft.
2. Know the details of the Emergency Assistance Checklist. Make sure it is completely filled out for small craft operations, with a legible copy placed onboard.
3. Inspect all communications gear, radios, CB units, underwater communications, power sources, walkie-talkies and ensure that they have been fully tested and are operational.
4. Determine that all non-powered communication equipment (flags, sounds signals, flares, etc.) are onboard, are complete and are operational.
5. Know all pre-determined signals, proper call signs, etc.
6. Know all routine and emergency signals (for divers).
7. Determine that adequate and safe mooring equipment is onboard and personnel are familiar with proper mooring techniques.
8. Know who is in charge of the boat and responsible for giving orders to "Stop" and "Start". Orders to commence boat operations that affect divers are given only by the Diving Supervisor.
9. Before getting underway, check with the Diving Supervisor for:
 - _____ An "all aboard" head count
 - _____ His approval that all diving equipment lines, safety equipment, etc., are onboard.
10. Plans for various Boat Handling Procedures during Diving Operations to include:
 - _____ Dropping off of divers (On small drop off both sides

- _____ Boat Tool Box
- _____ Binoculars
- _____ SCUBA Bottles
- _____ Standby Bottle
- _____ Water Jug
- _____ First Aid Kit
- _____ Portable O2 Resuscitator
- _____ Stretcher
- _____ Blankets
- _____ Tools required for job
- _____ Bullhorn
- _____ Circle Line/Snaphooks
- _____ Anchors & lines
- _____ Descent Line & Clumps
- _____ Radio _____ Frequency
- _____ Diving flags
- _____ U/W Dive lights
- _____ Ladder
- _____ Outboard Motor oil
- _____ Emergency motor
- _____ Gas Cans
- _____ Paddles
- _____ Marker Buoy & Line

14. The Diving Supervisor shall ensure that the information contained in a through d below is recorded in the Diving Log:
- a. Time Departed Pier _____
 - b. Time Commenced Dive _____
 - c. Time Completed Dive _____
 - d. Time Returned Pier _____
 - e. Notify Local Dockmaster Upon Completion _____(if appropriate)

EMERGENCY ASSISTANCE CHECKLIST

This enclosure will be filled out with the appropriate information prior at the start of any diving operation conducted by **ECC** personnel.

RECOMPRESSION CHAMBER

LOCATION

CONTACT

RESPONSE TIME

AIR TRANSPORTATION

LOCATION

CONTACT

RESPONSE TIME

SEA TRANSPORTATION

LOCATION

CONTACT

RESPONSE TIME

HOSPITALS

LOCATION

CONTACT

FIRST AID KIT

LOCATION

CONTACT

RESPONSE TIME

LAND TRANSPORTATION

LOCATION

CONTACT

RESPONSE TIME

DIVING UNITS

LOCATION

CONTACT

RESPONSE TIME

LOCATION

CONTACT

*Environmental Chemical Corporation
Corporate Health & Safety Program
IIPP/General Health & Safety Requirements*

Prepared Nov. '98

RESPONSE TIME

RESPONSE TIME

DIVING MEDICAL OFFICER

LOCATION

CONTACT

RESPONSE TIME

The following organization is qualified to answer questions and give advice 24 hours a day on diving related medical problems.

- a.. Divers Alert Network (D.A.N.)
Duke University, Durham, North Carolina
Commercial 919-684-8111 or 919-684-2948.

PERSONAL DIVE EQUIPMENT

SCUBA

1. Wet suit, if required
2. Booties/coral shoes
3. Gloves
4. Hood
5. Fins
6. Spare Fin Straps
7. Face mask
8. Spare Mask Strap
9. Buddy line
10. Weight belt
11. Work gloves
12. Whistle
13. Life Jacket - weigh CO2 cylinders (report status to the Diving Supervisor)
14. Regulator
15. Knife
16. Gauge - SCUBA bottles (report psig to the Diving Supervisor)
17. Protective clothing
18. Depth Gauge
19. Wristwatch

APPROVED LINE PULL SIGNALS

LINE PULL SIGNALS - Line Pull Signals should be distinct pulls on the line which are strong enough to be felt by the diver but not strong enough to pull the diver away from the work. Acknowledgment consists of replying with the same signal. If a signal is not acknowledged, the signal should be re-sent. Continued absence of confirmation must be assumed to mean one of three things:

- The line is fouled.
- Too much slack.
- Diver in Trouble.

If communication is lost, the Diving Supervisor will take immediate steps to identify the problem.

From Tender to Diver:

- | | |
|-----------|---|
| 1 Pull | "Are you Alright?"
When diver is descending, one pull means "STOP". |
| 2 Pulls | "Going down"
During ascent, 2 Pulls means "You have come up too far, go back down until we stop you" |
| 3 Pulls | "Standby to come up" |
| 4 Pulls | "Come up" |
| 2-1 Pulls | "I understand" or "Answer the telephone" |
| 3-2 Pulls | "Ventilate" |
| 4-3 Pulls | "Circulate" |

From Diver to Tender:

- | | |
|-----------|---|
| 1 Pull | "I am Alright"
When diver is descending, one pull means "STOP" or "I am on the bottom" |
| 2 Pulls | "Lower" or "Give me Slack" |
| 3 Pulls | "Take up my slack" |
| 4 Pulls | "Haul me up" |
| 2-1 Pulls | "I understand" or "Answer the telephone" |
| 3-2 Pulls | "More Air" |
| 4-3 Pulls | "Less Air" |

Special Signals from the Diver:

1-2-3 Pulls	"Send me a square mark"
5 Pulls	"Send me a line"
2-1-2 Pulls	"Send me a slate"

Searching Signals - Without Circling Line:

7 Pulls	"Same"
1 Pull	"Same"
2 Pulls	"Move away from the weight"
3 Pulls	"Face the weight and go right"
4 Pulls	"Face the weight and go left"

Emergency Signals from the Diver:

2-2-2 Pulls	"I am fouled and need the assistance of another diver"
3-3-3 Pulls	"I am fouled but can clear myself"
4-4-4 Pulls	"Haul me up immediately"

All Emergency Signals will be answered as given, EXCEPT 4-4-4.

DIVE LOG SHEET ___ OF ___

DATE: _____ LOCATION _____

DIVE SUPERVISOR:

MODE:

DIVE #

S B DIVER						

REMARKS: _____ **DIV**

E #

S B DIVER						

REMARKS: _____ **DIVE**

#

S B DIVER						

REMARKS:

DIVE # _____

First Aid for Injuries Requiring Immediate Transport to a Chamber Facility

AIR EMBOLISM

Recognition - Usually occurs during or immediately after surfacing

Symptoms (one or more of the following)

- Disorientation
- Chest Pain
- Paralysis or Weakness
- Dizziness
- Blurred Vision
- Personality Change

Signs (one or more of the following)

- Bloody froth from nose or mouth
- Paralysis or Weakness
- Unconsciousness
- Convulsions
- Stopped Breathing
- Apparent Death

Early Management

- CPR, if required
- Open airway, prevent aspiration, incubate if trained person available
- Give O², remove only to open airway or if convulsion ensue
- If conscious, give nonalcoholic liquids
- Place in horizontal, neutral position
- Restrain convulsing person loosely and resume O² as soon as airway is open
- Protect from excessive cold, heat, water, or fumes

DECOMPRESSION SICKNESS

Recognition - Symptoms usually appear 15 minutes to 12 hours after surfacing

Signs

- Blotchy Rash
- Paralysis or weakness anywhere in the body
- Coughing Spasms
- Staggering or instability
- Unconsciousness
- Personality change

Symptoms

Tired Feeling
Itching
Pain, arms, legs or trunk
Dizziness
Numbness, tingling or paralysis
Chest compression or shortness of breath
Anything unusual after the dive

Early Management

Stabilize patient the same way as for Air Embolism
Contact David Grant Medical Center, Travis AFB, CA for transport, send diver's profile with the diver, and send all diving equipment for examination or have it examined locally
Immediate oxygen breathing, continue even if person improves markedly

First Aid for Injuries Requiring Transport to a Hospital Facility

PNEUMOTHORAX

Symptoms

Pains in the chest
Shortness of breath

Signs

Shallow Rapid Breathing
Cyanosis (blue skin, lips, fingernails)
Possible crackling under the skin of the neck
Possible mediastinal shift (heart sounds not in the usual place)

Treatment

Call for help and immediate transport

MEDIASTINAL EMPHYSEMA (Lung over pressure accident)

Recognition - Always associated with pneumothorax

Symptoms

Pain in the chest (beneath the breastbone)
Faintness
Shortness of breath

Signs

Obvious difficulty breathing
Brassy change in voice

Treatment

Oxygen (O²)

Transport to medical facility for evaluation

Should be seen by physician and observed for 24 hours

No chamber recompression needed unless associated with air embolism or DCS

DROWNING - NEAR DROWNING

Recognition

Unconsciousness

Lack of respirations

Cyanosis (blue skin, lips, fingernails)

Management

Try to identify the time the victim was last seen breathing

Start CPR, removal of gear and in water transport to the boat or shore

Immediate call for help and transport to facility

Assess ABC=s airway, breathing and circulation

Clear airway

Chest compression if no carotid pulse felt

Continue rescue breathing begun in the water

Oxygen

Consider the possibility of concurrent hypothermia (low body core temperature)

Call for help (911) and immediate transport

OXYGEN TOXICITY (WITH CONVULSIONS)

Signs

Decreased or loss of consciousness; followed by

Convulsions

Symptoms

Nausea

Dizziness

Ring in the ears

Abnormal Vision

Confusion

Prevention

Avoidance of gases with high O² concentrations (as in Nitrox at inappropriate depth)

Avoid CO² retention which can precipitate O² convulsions at any depth

If convulsions occur at depth, be prepared to treat near drowning and/or air embolism

TREATMENT - Call for help and immediate transport

SEVERE TRAUMA OR LARGE PREDATOR INJURY (Head Injury, Limb Injury due to falls, Equipment Crush, Prop Injuries)

- Call for help and immediate transport
- Open Airway
- Treat for shock on site and stabilize before evacuation
- Face up neutral position
- Direct pressure over bleeding wounds
- CPR if no pulse or respiration
- Keep warm
- Be mindful of the possibility of neck injury
- O² if any question of hypoxemia (Low oxygen in the blood)
- Splint limb injuries
- Call for help and immediate transport

SUSPECTED HEART ATTACK OR STROKE

- Call for help and immediate transport
- Treat for shock
- CPR if no pulse or respirations
- Keep warm
- Oxygen
- Call for help and immediate transport

SEVERE ALLERGIC REACTION

- Remove any remnant of allergen (i.e., jellyfish tentacles, foreign material)
- Wash out wounds of injury with alcohol, vinegar, or sea water
- Call for help and immediate transport
- Treat for shock
- CPR if no pulse or respiration
- Keep warm
- Oxygen
- Pain Relief, if available
- Transport to medical facility for evaluation

STINGING FISHES (Stingrays, Scorpionfish)

- Immobilize
- Remove spine and debride (scrub the wound)
- Irrigate wound
- Soak in hot water (thermolabile toxin) 50° C, for 30-90 minutes

Call for help and immediate transport
Treat for shock, hydrate

HYPOTHERMIA

Keep core temperature above 95° F
Keep airway open
Immobilize
Wrap in blankets, preferably next to another person
Basic life support, CPR, if needed
Warm liquids, if alert, unless very cold - then avoid due to possibility of ventricular tachycardia
(rapid, useless fluttering of the heart)
Avoid O² due to the cooling effect, unless the O² is humidified and warm
Call for help and immediate transport

HYPERTHERMIA (Heat Exhaustion due to excessive fluid loss)

Remove from source of heat
Lower temperature (cool compresses at arterial points and head)
Keep calm
Keep airway open
Give salt (1 tsp/8 oz. water)
If stable, transport to medical facility for evaluation
Call for help and immediate transport if unstable

HEAT STROKE

Remove all clothing
Cover with cool wet sheet
Place in air-conditioned area
Oxygen
Cold packs to neck, scalp, groin and armpits
Treat convulsions if they occur
Call for help and immediate transport

First Aid for Injuries That Can Be Treated On Board

NITROGEN NARCOSIS

Signs

Inappropriate behavior at depth
Ignoring hand signals and instructions
Stupor or coma

Symptoms

- Inflexible thinking and attitude
- < Decrease or loss of judgement
- < False sense of security
- < Lack of concern for safety
- < Inability to think through problems
- < Panic
- Near unconsciousness or loss of consciousness at depth

Treatment

- Ascend until free of symptoms
- Surface with controlled ascent
- Transport to medical facility for evaluation

CARBON DIOXIDE POISONING

Symptoms

- Rapid breathing
- Feeling of suffocation or shortness of breath
- Headache, nausea, dizziness
- Rapid heartbeat
- Confusion and unclear thinking

Signs

- Slowed responses
- Muscle irritability (twitching)
- Loss of consciousness

Treatment

- Remove the cause (over-exertion, equipment failure, rebreathers, etc.)
- Stop and rest during early symptoms to avoid loss of consciousness
- Surface, Transport to medical facility for evaluation

EAR DISORDERS

Middle Ear Barotrauma

- Keep quiet and calm
- Without dcs or rupture of the round or oval windows, give Benadryl 25 mg po
- Transport to medical facility for evaluation
- Discontinue diving until cleared by EMT

Inner Ear Barotrauma

Recognize round or oval window damage (loss balance, ataxia, tinnitus, deafness)
Keep head up and affected ear elevated
Discourage straining
Transport to medical facility for evaluation
EMT evaluation, no more diving until cleared by EMT

SEA SICKNESS

The best medications have been found to be AMeclizine@, ABonine,@ Dramamine and Trans-derm Scope. There are pharmacists who will make your Ascope@ patches.
Keep your eyes on the horizon
Stay on deck
Keep yourself well hydrated with non-alcoholic beverages
Try antacid tablets or lemon drops
If diving, try to be the first diver in from a heaving boat

Hazardous Marine Life Injuries Not Requiring Immediate Transport

CORAL AND BARNACLE CUTS

Stop bleeding
Clean well with a brush, soap and water
Alcohol or vinegar flush
Scrub and debride foreign particles
Bed rest, elevation, antibiotics for severe cuts
Be aware of danger of anaerobic infection and clostridial infection
Transport to medical facility for evaluation

COELENTERATE INJURY (fire coral, hydroids, jellyfish, sea wasps, sea anemones)

Injury all caused by nematocysts
Flush with alcohol or vinegar or dilute household ammonia (1:3 water)
Flush with saline or sea water, no fresh water
Meat tenderizer
Transport to medical facility for evaluation
Be aware of possible severe systemic reactions

ECHINODERMS (Sea Urchins)

The small black dots may not be the tips of the spines but dye and will eventually be absorbed by the body
Hot water for 30 minutes

*Environmental Chemical Corporation
Corporate Health & Safety Program
IIPP/General Health & Safety Requirements*

Prepared Nov. '98

Do not beat or pound the part to Acrush@ the spines
Transport to medical facility for evaluation

**SOP HS-033
DRIVER FLEET SAFETY PROGRAM
(ECC Authorized Vehicle Drivers)**

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to implement safety guidelines to ECC's authorized vehicle drivers.

2.0 REQUEST FOR A VEHICLE

Should there be a need for a new vehicle at a site or office, the following steps should be taken:

- A) Assess the situation to determine if a vehicle is needed. A vehicle may be traded with another type of vehicle should requirements or tasks change. The Corporate Property Manager may be of assistance with your vehicle needs.
- B) The Corporate Property Manager will assess the situation and conclude if a vehicle can be taken from another ECC project, or if a vehicle purchase is required. ECC upper management shall authorize/approve all vehicle purchases.
- C) When approvals are made, it will then be conveyed to the Corporate Property Manager for acquisition of a vehicle. Should an individual have any questions regarding delivery time of their vehicle, please contact the Corporate Property Manager.

3.0 TRANSFERRING A VEHICLE

- A) If there is a reason to transfer a vehicle from one site to another please document any damages to the vehicle, and any potential problems or repairs that are needed. It is important to note the last time the vehicle was serviced and had its tires rotated.
- B) Advise the Corporate Property Manager of drivers, routes and any special requirements to be performed prior to shipping the vehicle. If an individual from the current site is planning to transport the vehicle, checks on road and weather conditions are recommended. Schedules will be modified due to dangerous conditions. During the winter season, chains or cables must be included on the trip unless the vehicle is designed to drive in extreme conditions. Consult the Corporate Property Manager prior to transporting a vehicle in extreme conditions. Please consult with the Corporate Property Manager prior to transporting a vehicle in extreme conditions.

- C) Please coordinate with the Corporate Property Manager and receiving party for date, time and location drop-off instructions.
- D) Prior to the release of a vehicle the following items shall be checked/approved: current registration and any renewal registration, first aid kit, fire extinguisher, keys to all locking compartments or tool boxes, and duplicate keys. If the vehicle has bins, toolboxes or storage areas outside the cab check to ensure the locks are in proper working order.

4.0 RECEIPT OF A VEHICLE

- A) Upon receipt of a vehicle, any physical damage or items missing should be communicated to the Corporate Property Manager.
- 2) The receiving site is held responsible for the maintenance, safekeeping, and proper usage of the vehicle.

5.0 STORAGE OF VEHICLES

- A) Vehicles are to be kept locked at all times. They are to be parked in a secure and well-lit area if being left over night. A vehicle that has equipment mounted or stored outside the cab should be kept in a locked garage or secure area when not in use.
- B) Any vehicle(s) being left on a site for an extended period, are to be kept in a locked garage or a secured area. In the event of transferring the vehicle to another project site, please contact the Corporate Property Manager for approval.
- C) Vehicles with equipment inside the cab area should be kept in a locked garage or secure fenced area when not in operation. Any vehicle containing large amounts of equipment may be considered to have an alarm system installed. Please contact the Corporate Property Manager for consideration.

6.0 TRANSPORTING A VEHICLE

- A) Individuals driving a company vehicle must be added to our list of authorized drivers prior to operating a vehicle. A prospective driver must allow at least one week for a driver's record to be run and approved by our insurance company (AIG).
- B) Prior to transporting any vehicle, driver(s) should communicate their itinerary with their

supervisor in the event of an emergency.

- C) Drivers are to check for extreme weather conditions and make necessary alterations. When driving through areas of ice and/or snow, chains or cables should always be carried unless the vehicle is designed to operate in extreme conditions.

7.0 VEHICLE MAINTENANCE

- A) Any vehicle assigned to a site must be maintained on a regular basis by the site.
- B) Regular maintenance includes replacement of tires, oil changes, regularly scheduled tune-ups, etc.
- C) At the beginning of winter, project sites should check their vehicles for worn tires and wiper blades.
- D) Vehicles signed up with the USL Maintenance Management Program should be serviced according to the dates or mileage milestones noted in their coupon booklets. Included in the maintenance packets will be a list of all authorized service centers. Operators of these vehicles are allowed a \$60.00 maintenance expense without prior authorization from USL.
- E) Any vehicle more than three - five years old with consistent maintenance needs may be liquidated. The maintenance costs and frequency of problems for the last six months should be referred to for further evaluation. Please contact the Corporate Property Manager for consideration.
- F) Copies of all maintenance records are to be forwarded to the Corporate Property Manager at the end of each month. The Corporate Property Manager will obtain vehicle maintenance records for each vehicle.
- G) Most of ECC vehicles come with a three-year or 36 thousand-mile bumper to bumper warranty. If a vehicle has less than 36 thousand miles on the odometer and is less than three years old consult the appropriate dealership in your area about warranty items. Things like oil changes; tune-ups and brakes are not covered under warranty, unless the brakes are faulty. Warranties do not cover normal wear and tear. If a vehicle is having the same problem over and over, refer to the original invoice from the first shop that serviced the problem. There is a chance that there will be a warranty on the serviced item. If a shop did not fix the problem the first time, in most cases the vehicle should be taken back for a second free repair. For more information please contact the Corporate Property Manager.

8.0 NORMAL USAGE

- A) ECC vehicles may be used on ECC sites and as assigned vehicles for individuals.
- B) Smoking is prohibited in any ECC vehicle at any time.
- C) Consumption and or any open container of alcohol are prohibited in any ECC vehicle at any time. Consumption of any illegal narcotic is strictly prohibited. Anyone convicted of driving under the influence of drugs or alcohol will no longer be able to operate a company vehicle on public or private property.
- D) Persons previously approved by their immediate supervisor and the Corporate Property Manager may only drive ECC vehicles. Individuals needing to drive a vehicle must submit a copy of their driver's license to the Corporate Property Manager at least one week prior to release of any vehicle. Anyone needing to use a vehicle who is already approved by our insurance company should give at least two - three days advanced notice to the vehicles custodian. Persons with vehicles assigned directly to them should not allow other employees to drive their vehicles without prior authorization from the Corporate Property Manager. Operation of ECC vehicles by non-employees is prohibited unless written permission is received from the Controller or President.
- E) When driving ECC vehicles all state and federal laws apply. Individuals showing carelessness or reckless driving may lose their privileges in driving company vehicles on public or private property. Our insurance carrier and ECC's Controller will review individual cases.
- F) Every driver and passenger must wear a seat belt.
- G) Periodic safety inspections on the vehicle should be conducted. Items to check should include blinkers, hazard flashers, windshield wipers, tires/correct tire pressure, horn, brake lights, etc. Notify the Corporate Property Manager for any deficient item(s).

9.0 AUTOMOBILE CLAIMS GENERAL INSTRUCTIONS (ACCIDENT REPORTING)

- A.) It is important that traffic clearance is observed prior to exiting a vehicle.
- B.) Take the necessary steps to protect life and property. Contact all appropriate emergency agencies and personnel (i.e., police fire appropriate government agency, etc.).

- C.) Aid and assist any injured parties but ***DO NOT admit liability or commit to any payments or settlements.***
 - D.) Obtain names, addresses, and telephone numbers of any witnesses and/or passengers especially in incidents involving bodily injury.
 - E.) If possible take photos of the area where the accident occurred. Include the date, time and name of the person taking the photos. Retain these in your records until contacted by ECC's insurance adjuster (AIG).
 - F.) Within 24 hours after the incident, complete a full report of the incident to your supervisor, and the Corporate Property Manager (Bob Gentry). This report must contain the following:
 - C Date and time of the incident or loss;
 - C Location where the incident occurred;
 - C Description of what happened;
 - C Names of parties/individuals involved;
- DO NOT DELAY or WITHHOLD REPORTING an accident or loss because you think the incident is not insured, too trivial, is incomplete because you have not obtained a repair estimate, police report, or other data. Claims involving major injuries or death should be immediately reported to both the Corporate Property Manager (B. Gentry) and the Corporate Health & Safety Manager (D. Osaki).*
- G.) If applicable, include in your report the name, address, and telephone number of lienholder or leasing company of your vehicle or property that was damaged.
 - H.) Report to the Dept. Of Motor Vehicles any automobile accident involving bodily injury or property damage over \$500, to comply with State Financial Responsibility Statutes.
 - I.) Obtain estimates for a damaged vehicle.
 - J.) Losses to your property involving theft of auto, broken windshield, collision with an animal, vandalism, fire, hail damage, single vehicle accident not involving injury (i.e., rollover, striking obstruction), etc. should also be reported to the Corporate Property Manager.

10.0 DRUG TESTING

ECC has implemented a pre-employment and for cause drug testing of all employees. The Human Resource Dept. and the Health/Safety Dept. will maintain all records of drug testing for a period of five years.

10.0 DRIVING RECORDS (DMV PULL PROGRAM)

Periodic inspections of driving records from all assigned drivers will be reviewed by the Corporate Property Manager and the Corporate Health & Safety Manager. DRIVERS WITH MORE THAN 3 MOVING VIOLATION POINTS OR A DUI (DRIVING UNDER THE INFLUENCE) WITHIN THE LAST THREE YEARS MAY HAVE THEIR COMPANY VEHICLE DRIVING PRIVILEGES SUSPENDED UNTIL THE COMPLETION OF A DRIVER SAFETY COURSE OR A SUBSTANCE ABUSE COUNSELING PROGRAM (DUI). ECC Management may allow employees to drive company vehicles on their assigned project site (if applicable) during working hours only.

**Environmental Chemical Corporation
Vehicle Use Agreement**

I hereby agree to the following conditions regarding the use of ECC vehicles (cited below as company vehicles).

- C Only myself or other ECC employees who have signed this agreement may operate company vehicles. Reasonable personal use of the car will be allowed to my spouse provided such persons are properly licensed and insured. Friends and children, or other acquaintances of ECC employees are not permitted to drive company vehicles at any time.
- C I agree to wear a seat belt at all times while operating a company vehicle.
- C I agree to observe speed limits and all other traffic rules and regulations while operating a company vehicle.
- C I agree to operate company vehicles free of the influence of mind-altering substances.
- C I agree to report any observed mechanical problems associated with company vehicles to the Project Manager or the Corporate Property Manager.
- C I agree to report accidents involving company vehicles to the ECC Corporate Property Manager within 24 hours of the accident and to report all personal injuries to the on site safety officer within 24 hours. If I am involved in an accident while operating a company vehicle, I will also request a police report.
- C ECC has the rights to revoke the Vehicle Use Agreement at any time.

Employee Name (please print)

Employee Signature Date

Bob Gentry
Corporate Property Manager

*Environmental Chemical Corporation
SOP HS-033 Driver Fleet Safety Program
Revised: December 2000*

Dean Osaki, C.S.P.,
Corporate Health & Safety Manager

SOP HS-034 BIOLOGICAL HAZARDS

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to provide awareness to employees from potential biological hazards that may exist during work operations. It is important that ECC employees recognize and understand the potential hazards and implement preventative control measures at all times.

2.0 RODENTS

Avoid contact with rodents because they frequently are hosts for Hanta Virus. The Hantavirus is transmitted through the aerosolization of dried rodent excreta. The Hantavirus associated disease begins with one or more symptoms including fever, muscle ache, headache, and cough and progresses rapidly to severe lung disease, often requiring intensive care treatment. To control potential contact with dust that may be carrying the rodent excreta, ECC field team will conduct a visual survey of each work area to note whether rodents are thriving in the area. The Center for Disease Control in Atlanta, Georgia has established a hotline for inquiries regarding the Hantavirus (800-532-9929).

3.0 SNAKES, SPIDERS, AND FLEAS

Spiders, snakes and fleas exist in cool dark moist areas. The potential for encounters exist when reaching into dark covered places. Suggestions for control include using a long stick to break apart webs or loosen soil from certain areas. A flashlight should also be used when reaching into a dark area. Field personnel shall be aware of their surroundings and avoid contact with all insects.

4.0 RATTLESNAKES AND SCORPIONS

Rattlesnakes and scorpions are indigenous to many parts of the United States. It should be noted that the American Red Cross does not advocate the use of snakebite kits for snakebite injuries. Experience has shown that the victim has a better chance for recovery without permanent damage when the site of the wound is immobilized. The victim should remain calm in order to reduce the circulation of blood through the bite area, as this will delay absorption of venom. It is vital to rush the victim to the closest emergency medical facility (preferably within 30 minutes).

5.0 POISONOUS PLANTS

Poisonous plants such as poison ivy and poison oak grow wild in shady, moist area and at the base of surrounding seedling or adult trees. Some individuals are prone to break out in dermal

(skin) rashes upon contact with the plant oil. A visual site inspection and identification of the plants should be completed prior to each work shift so that all individuals are aware of the potential exposure.

6.0 WARM BLOODED ANIMALS

Warm-blooded animals such as dogs, cats, rats, and prairie dogs, can transmit rabies and tetanus. Rabies can be transmitted when the saliva from an infected animal contacts an open wound or normal body opening, such as the mouth or eye. All animals are assumed to be potentially dangerous.

7.0 TICK-BORNE DISEASES

Tick-borne diseases represent a significant health risk in many parts of the world. Ticks are documented vectors of virus and bacteria for diseases such as Lyme disease. Personnel shall take precautionary measures by wearing proper clothing, use of repellants, use of good work practices, and recognizing symptoms early. Individuals that develop a rash or experience other early symptoms (i.e., fatigue, headache, muscle aches, neck stiffness, fever, and swollen glands) of Lyme disease should promptly see a physician for treatment.

8.0 ANTS, BEES, WASPS, HORNETS, AND YELLOW JACKETS

Nests and hives for ants, bees, wasps, hornets and yellow jackets often occur in ground, trees, brush and overhangs on buildings. An area will be checked for obvious nests and hives before it is cleared. If a nest or hive is detected, the SSHO will be contacted before the nest is disturbed. If necessary a Pest Management consultant will be brought to the respected site to provide recommended procedures for by passing or moving the nest. Workers with identified insect allergies will not be allowed to work in the area of a nest or hive. If simple first aid measures do not alleviate the symptoms of a sting, the victim will be taken to the nearest medical center for treatment.

**SOP HS-035
BLOOD BORNE PATHOGEN EXPOSURE CONTROL PLAN**

1.0 POLICY

ECC's Blood borne Pathogen Exposure Control Plan is prepared in accordance with federal and California regulations (29 CFR 1910.1030 and CCR, 5193 respectively). Blood borne pathogens include the hepatitis B Virus and the HIV Virus believed to cause Acquired Immune Deficiency Syndrome (AIDS).

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to educate employees on the potential occupational exposure to blood borne pathogens as a result of performing CPR/first aid or miscellaneous services for fellow employees. Employees in the following job classifications *may* have occupational exposure to blood borne pathogens

- Program Managers;
- Corporate H&S Manager;
- Field Chemists;
- Project Managers;
- Field Supervisors
- UXO Personnel
- RAD personnel
- Quality Control Officers
- Safety Officers
- Project Engineers;
- Heavy Equipment Operators; and
- Environmental Technicians.

3.0 WORK PRACTICES TO MINIMIZE EXPOSURE

3.1 Performing CPR/First Aid

The skin is a natural protective shield against virus, bacteria and other germs, including blood borne pathogens, but if the skin is broken by a small cut or sore germs can enter the body.

When performing CPR, the following personal protective equipment shall be used to protect the rescuer from exposure:

- A pair of latex or rubber gloves; and

- A CPR mouth shield.

When performing first aid where there is potential for contact with blood products, the following personal protective equipment shall be worn:

- A pair of latex or rubber gloves; and
- A tyvek suit if there is a splash or splatter hazard or possibility of blood coming into contact with clothing.

Immediately after performing CPR/First Aid, wash all exposed skin surfaces with soap and water. Flush mucous membranes with water if any such areas have been exposed.

3.2 Cleaning Spills of Blood

When blood is spilled on surfaces, assume that it is infected. When differentiation between body fluid types is difficult, all body fluids shall be considered potentially infectious. If it is not possible to clean the blood immediately, block off the area and warn others not to touch it. Blood spill shall be cleaned as soon as feasible.

When cleaning blood, wear rubber gloves and use a disinfectant solution. If it is anticipated that clothing and shoes may come into contact with the blood, wear a tyvek suit and booties. Make the disinfecting solution by mixing one cup of liquid chlorine bleach in nine cups of water. (Important! This solution must be made fresh just prior to its use and discarded each day.) Perform work in such a manner as to minimize splashing, spraying, splattering, and generation of droplets of liquid. Employees shall wash their hands and arms with soap and water after removing gloves.

3.3 Disposal of Waste

Disposable non-sharp products contaminated with blood shall be double-bagged in plastic bags and labeled. The label shall include the date and time of the incident, a description of the bag contents, and the word Biohazard in bold print. As soon as feasible, these materials shall be placed in red bio safety bags and relabeled. Contact the Corporate Health & Safety Manager to determine current disposal requirements. Non-disposable products shall be disinfected.

Sharp materials shall be placed in puncture-resistant containers and labeled as described above. As soon as feasible, these materials shall be placed in red-orange bio safety sharp containers and relabeled.

3.4 Availability of Personal Protective Equipment

Kits containing CPR mouth shields, latex gloves, and an antimicrobial hand wipe are placed near or in all ECC office first aid kits.

3.5 Incident Reporting

First aid incidents involving the presence of blood or other potentially infectious material shall be reported to the Corporate Health & Safety Manager before the end of the work shift during which the first aid incident occurred. The report must include the following information:

- Names of all first aid providers who rendered assistance, regardless of whether personal protective equipment was used, and must describe the first aid incident, including time and date; and
- The description must include a determination of whether or not, in addition to the presence blood or other potentially infectious material, an exposure incident, as defined below, occurred.

The Corporate Health and Safety Manager or Project SSHO shall prepare an accident report that includes the above information.

3.6 Hepatitis B Series Vaccination

If an employee renders assistance in any situation involving the presence of blood or other potentially infectious materials, regardless of whether or not a specific exposure incident occurs, the hepatitis B vaccination will be made available to the employee as soon as possible but in no event later than 24 hours after the incident. The vaccination shall also be provided for the first aid/CPR providers. The vaccination is made available at no charge and is given at three intervals. The vaccination shall take place at a company-approved clinic. Employees who decline the vaccination must sign a declination form.

3.7 Post-Exposure Evaluation and Follow-up

An exposure incident means a specific eye, mouth, other mucous membrane, non-intact skin, or parental contact with blood or other potentially infectious materials that results from the performance of an employee's duties.

Following a report of an exposure incident, ECC shall make immediately available to the exposed employee a confidential medical evaluation and follow-up that includes the following elements:

- Documentation of the route of exposure and the circumstances under which the exposure incident occurred
- Identification and documentation of the source individual, unless ECC can establish that identification is infeasible or prohibited by state or local law. The source individual blood shall be tested as soon as feasible and after consent is obtained to determine hepatitis B virus (HBV) and HIV infection. If consent is not obtained, ECC shall establish that legally required consent cannot be obtained. When the source individual's consent is not required by law, the source individual's blood, if available, shall be made available to the exposed employee, and the employee shall be informed of applicable laws and regulations concerning disclosure of the identity and infectious status of the source individual
- Collection and testing of blood for HBV and HIV status. The exposed employee's blood shall be collected as soon as feasible and tested after consent is obtained. If the employee consents to baseline blood collection, but does not give consent at the time for HIV serologic testing, the sample shall be preserved for at least 90 days. If within 90 days of the exposure incident, the employee elects to have the baseline sample tested, such testing shall be done as soon as feasible
- Post-exposure prophylaxis, when medically indicated, as recommended by the U.S. Public Health Service
- Counseling
- Evaluation of reported illnesses
- A copy of the evaluating health care professionals written opinion within 15 days of the completion of the evaluation

3.8 Information and Testing

Blood borne pathogen training shall be provided as part of new employee orientation training and on an annual basis. Training is provided at no cost to employees and during working hours. The information included in the training is in accordance with state of California and Federal regulations (8 CCR - 5193 and 29 CFR 1910.1030 respectively).

3.9 OSHA Record Keeping

The Corporate Health and Safety Manager shall establish and maintain an accurate record for each employee with occupational exposure. The record shall include:

- The employee's name;

- Dates of any hepatitis B vaccinations administered and any medical records relative to the employee's ability to receive vaccination;
- A copy of all results of examinations, medical testing and follow-up procedures;
- A copy of the health care professionals written opinion as described above; and
- A copy of the information provided to the health care professional in the event that an employee has been involved in an exposure incident:
- Copy of the Blood borne Pathogen Standard;
- Description of the exposed employee's duties as they relate to the exposure incident;
- Documentation of the route(s) of exposure and circumstances under which exposure occurred;
- Results of the source of individual's blood testing, if available; and
- Medical records relevant to the appropriate treatment of the employee including vaccination status.

3.10 Training Records

The Corporate Health and Safety Manager and Project SSHO respectively shall maintain the following training records:

- The dates of the training sessions;
- The contents or a summary of the training session;
- The names and qualifications of persons conducting the training; and
- The names and job titles of all persons attending the training session.

**ENVIRONMENTAL CHEMICAL CORPORATION
Hepatitis B Vaccine Declination**

I understand that due to my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with the hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease.

Name: _____

Signature: _____

Date: _____

SOP HS-036 DRUG AND ALCOHOL PROGRAM

1.0 POLICY

ECC prohibits the use, sale, dispersal, possession, or manufacture of illegal drugs, narcotics or alcoholic beverages on its premises. This prohibition also covers all legal or prescription drugs that impair an employee's ability to perform his/her job safely or properly.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure is to establish guidelines for ECC's "Drug and Alcohol Program" to all ECC employees.

2.1 Drug Free Workplace Policy Statement

Employees will be subjected to disciplinary action, up to and including dismissal, for bringing illegal, non-prescribed drugs and narcotics or alcoholic beverages to work; being under the influence of such substances while working; using such substances while working; or dispensing, distributing, or illegally manufacturing or selling such substances on ECC premises or work sites. Employees, their possessions, and ECC issued equipment and containers under their control are subject to search and surveillance at all times while on ECC premises or while conducting ECC business.

Employees may be required to take a test at any time to determine the presence of drugs, narcotics, or alcohol, unless such tests are prohibited by law. Employees convicted of any criminal drug violation occurring in the work place must report such conviction to Human Resources within five days, who will then take appropriate actions as required by law.

Employee judged to be under the influence of drugs, narcotics, or alcohol will be required to leave the premises. Employees who must use prescribed drugs or narcotics during work should report this fact to their Supervisor, and provide acceptable medical documentation. A determination will then be made as to whether the employee should be able to perform his/her job safely and properly.

Employees experiencing problems resulting from drug, narcotic, or alcohol abuse or dependency are encouraged to seek rehabilitation, counseling, and/or other help.

3.0 PRE-EMPLOYMENT DRUG SCREENING

Pre-employment drug screening shall be required for all ECC full-time and project employees. ECC shall test for the following drugs: ethanol (alcohol), amphetamines, barbiturates,

benzodiazepines, cocaine metabolites, methadone, opiate metabolites, phencyclidine (PCP) and marijuana metabolites (THC). All tests results are kept confidential at all times by the Human Resource Department and the Corporate Health & Safety Manager.

4.0 ANNUAL DRUG SCREENING

Annual drug screening shall be required for all operational department personnel conducting work activities at ECC project sites. ECC shall test for the following drugs: ethanol (alcohol), amphetamines, barbiturates, benzodiazepines, cocaine metabolites, methadone, opiate metabolites, phencyclidine (PCP) and marijuana metabolites (THC). All tests results are kept confidential at all times by the Human Resource Department and the Corporate Health & Safety Manager.

SOP HS-037 OSHA RECORD KEEPING PROGRAM

1.0 POLICY

ECC's OSHA Record Keeping Program is prepared in accordance with 29 CFR 1904 - Recording and Reporting Occupational Injuries and Illnesses.

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to provide accurate recording and reporting of occupational injuries and illnesses.

Results of record keeping under the Occupational Safety and Health Act (OSHA) are used to compile factual information about accidents that have happened. These records provide ECC with a way to evaluate the success of their safety and health activities, and identify high-risk areas of their businesses to which attention should be directed. Employers with 11 or more employees in specific industries must keep the OSHA records. Environmental consulting firms that have employees handling hazardous waste must comply with OSHA record keeping requirements. ECC's Corporate Health & Safety Manager and ECC's Safety Officers will be responsible in completing and maintaining OSHA record keeping requirements.

3.0 DESCRIPTION OF FORMS

The two forms ECC uses for OSHA record keeping are the OSHA 200 and OSHA 101 forms. The OSHA 200 form is used to record injuries and illnesses for a calendar year. Information requested includes company name, establishment name, address; and details of injuries and illnesses, such as employee's name, occupation, department, description of injury or illness, extent of and outcome of injury, type, extent and outcome of illness, and injuries and illnesses with and without "lost workdays.

The OSHA 101 form is used to record additional information. This supplementary record describes how the accident or illness exposure occurred, lists the objects or substances involved, and indicates the nature of the body affected.

To satisfy this requirement, records like Workers Compensation, insurance, or other reports that contain all of the items on the OSHA 101 form can be used instead of the OSHA 101 form.

4.0 TYPES OF ACCIDENTS COVERED

The OSHA 200 and OSHA 101 forms have to be filled out only in the following circumstances:

Illness or death has occurred, or an injury has occurred that involves medical treatment (other than first aid) or loss of consciousness, restriction of work or motion, or transfer to another job (note: when an illness occurs, it can be recorded without further investigation. In cases of injury, further investigation must be done to determine whether it required medical attention, or involved a loss of consciousness, restriction of work or motion, or transfer to another job.

New entries need not be made for the recurrence of symptoms from previous cases. Only accidents that are work related must be recorded. The work environment could be the employer's premises or outside the employers premises if employees are engaged in work related activities, or places where employees are present due to the nature of their job or as a condition of their employment. Employees who travel on company business will be considered to be engaged in work related activities unless noted otherwise.

5.0 OSHA REPORTING

Employers are required to report within 8 hours to the nearest OSHA area office any incident or accident that results in a fatality or hospitalization of three or more employees as required by 29 CFR 1904.8 (a).

6.0 POSTINGS

A copy of the totals and specified information for the year must be posted at each establishment in the place or places where notices to employees are posted customarily. This copy must be posted no later than February 1 of the following year. If there were no injuries or illnesses during the year, zeros must be entered in the spaces for totals and the form posted. The person responsible for the annual summary totals must attest that the totals are true and complete by signing at the bottom of the form.

7.0 DEFINITIONS AND APPLICATIONS

Hospitalization - Hospitalization is defined by OSHA as "to be sent to a hospital, or to go to a hospital or equivalent medical facility, regardless of the treatment provided or the length of stay." This means if three or more employees are sent to a hospital due to an incident or accident, the employer must report to OSHA, even if workers were sent merely as a precautionary measure.

Injury versus Illness - An injury is caused by instantaneous events in the work environment. Cases resulting from anything other than instantaneous events are considered illness. Some conditions may be classified as either an injury or an illness (but not both) depending upon the nature of the event that produced the condition. For example, a loss of hearing resulting from an explosion is classified as an injury. The same condition arising from exposure to industrial noise over a period of time would be classified as an occupational illness.

Lost Workdays - Lost workdays is a term broken down for definition by OSHA into days away from work and days of restricted work activity. In these situations, the ill employee is affected to such an extent that days must be taken off from the job for either medical treatment or recuperation or the employee is unable to perform his/her normal duties during a normal work shift.

Medical Treatment - Medical treatment is classified as treatment other than first aid. First aid is defined as one-time treatment and subsequent observation of minor scratches, cuts, burns, and splinters, which do not ordinarily require medical care. Even if a physician or registered professional gives first aid, it should not be recorded.

The following classifications list certain procedures as either medical treatment or first aid treatment.

8.0 MEDICAL TREATMENT

The following are generally considered medical treatment. Work-related injuries for which this type of treatment was provided or should have been provided are almost always recordable:

- Treatment of *infection*
- Application of *antiseptics during second or subsequent visit* to medical personnel
- Treatment of *second or third degree burn(s)*
- Application of *sutures* (stitches)
- Application of *butterfly adhesive dressing(s) or steri-strip(s)* in lieu of sutures
- Removal of *foreign bodies embedded in eye*
- Removal of *foreign bodies from wound*; if procedure is *complicated* because of depth of embodiment, size, or location
- Use of *prescription medications* (except a single dose administered on first visit for minor injury or discomfort)
- Use of hot or cold *soaking therapy* during second or subsequent visit to medical personnel
- Application of hot or cold *compress(es) during second or subsequent visit* to medical personnel
- *Cutting away dead skin* (surgical debridement)
- Application of *heat therapy during second or subsequent visit* to medical personnel
- Use of *whirlpool bath therapy during second or subsequent visit* to medical personnel
- *Positive x-ray diagnosis* (fractures, broken bones, etc.)
- *Admission to a hospital* or equivalent medical facility *for treatment*

9.0 FIRST AID TREATMENT

The following are generally considered first aid treatment (e.g., one-time treatment and subsequent observation of minor injuries) and should not be recorded if the work-related injury does not involve loss of consciousness, restriction of work or motion, or transfer to another job:

- Application of *antiseptics during first visit to medical personnel*
- Treatment of *first degree burn(s)*
- Application of *bandage(s) during any visit to medical personnel*
- Use of *elastic bandage(s) during first visit to medical personnel*
- Removal of *foreign bodies not embedded in eye* if only irrigation is required
- Removal of *foreign bodies from wound*; if procedure is *uncomplicated*, and is, for example, by tweezers or other simple technique
- Use of *nonprescription medications and administration of single dose of prescription medication* on first visit for minor injury or discomfort
- *Soaking therapy* on initial visit to medical personnel or removal of bandages by soaking
- Application of hot or cold *compress(es) during first visit to medical personnel*
- Application of *ointments* to abrasions to prevent drying to cracking
- Application of *heat therapy during first visit to medical personnel*
- Use of *whirlpool bath therapy during first visit to medical personnel*
- *Negative x-ray diagnosis*
- *Observation* of injury during visit to medical personnel.

The following procedure, by itself, is not considered medical treatment:

- Administration of *Tetanus shot(s) or booster(s)*. However, these shots are often given in conjunction with more serious injuries; consequently, injuries requiring these shots may be recordable for other reasons.

SOP HS-038 EMPLOYEE SAFETY INCENTIVE PROGRAM

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to promote Environmental Chemical Corporation's commitment to a safe work environment and Zero Incident Performance on ECC project sites. This incentive program is implemented to promote awareness, involvement, and participation in ECC's Health and Safety Program.

The incentive program will motivate employees to work safely resulting in zero incident performance, which in turn provides three benefits:

1. Better safety for each employee;
2. Decreased costs associated with job-related accidents;
3. Enhancing ECC's position as a high quality contractor for our government clients.

2.0 TARGET AUDIENCE

ECC shall provide the following incentive program to all project employees working at an ECC project site. A project employee is defined as a non-exempt, hourly employee hired for the duration of the project.

3.0 DESCRIPTION

The employee incentive program is a financially based incentive using multiple criteria for monetary awards. The award pool will be based on 0.5% of site payroll for the month. The money is placed into an award pool. Money in the award pool is then subdivided for each employee working on site during the course of the month. The program will recognize group achievement with awards being made to all qualified personnel working on ECC project sites, which meet the award criteria. The awards will be based upon evaluation criteria, and awarded as described in the following sections. Money accrued during an award period, but not awarded, will not be available as future monetary award.

4.0 EVALUATION CRITERIA

1. Recordable Injuries, Illnesses, and Lost Time Cases. **50%** of the total award pool will be based on the site personnel not experiencing any OSHA recordable injuries or illnesses for the month. If a site sustains a recordable injury or illness during the month, all the employees at the site will lose the entire portion of the award pool for that month.
2. Property Damage Greater than \$500. **30%** of the total award fee will be based on the site personnel not experiencing any property damage incidents greater than \$500 in

any single instance during the month. If the site has an incident where the property damage is greater than \$500, all the employees at the site will lose this entire portion of the award pool for that month.

3. OSHA Violation or Serious Safety Violation by the Client/ECC Management. **20%** of the total award fee will be based on the project site not experiencing any OSHA Violation or Serious Safety Violation by the client/ECC Management. A “serious” violation is considered a violation which an employee has the potential of seriously injuring themselves or a fellow employee(s). If the site sustains an OSHA violation or a serious safety violation with the client/ECC Management, all the employees at the site will lose the entire portion of the award pool for that month.

5.0 ELGIBILITY

To be eligible for the monthly safety incentive award, employees must work 90% or more of the allowable project hours for the month. The award amount for each employee will be based on the three criteria listed above.

**SOP HS-039
HAND AND POWER TOOLS SAFETY PROGRAM**

1.0 POLICY

ECC's Hand and Power Tools Safety Program is prepared in accordance with 29 CFR 1910 Subpart P - *Hand and Portable Powered Tools and Other Hand-Held Equipment* (1910.241 to 1910.244); and 29 CFR 1926 Subpart I - *Tools - Hand and Power* (1926.300 to 1926.307).

2.0 OBJECTIVE

The objective of ECC's Hand and Power Tool Safety Program is to reduce the likelihood of injuries and accidents caused by improper handling.

3.0 SAFE OPERATING REQUIREMENTS

All hand tools shall be kept in good repair and used only for the purpose intended. Defective tools shall be acceptably repaired or removed from service. Tools shall not be thrown from one level to another, and when used overhead, shall be secured or placed in holders when not in actual use. All electrical tools shall be of the approved double or triple insulated type or grounded. Hand and portable power tools and equipment shall be guarded IAW 29 CFR 1910.243. Training on the use of hand tools/electrical tools shall be conducted by a competent person. Only trained/qualified employees shall operate tools.

4.0 HAND ARM VIBRATION (HAVs) – REYNAUD'S SYNDROME

Power tools designed to have minimal vibrations will be more comfortable to use and less likely to result in hand arm vibration (HAVs) also known as Reynaud's syndrome. Hand-arm vibration is caused by the use of vibrating hand-held tools. The nature of these tools involves vibration (a rapid back-and-forth type of motion) that is transmitted from the tool to the hands and arms of the person holding the tool. HAVs causes numbness and blanching of the hands, and can progress to complete disability if the worker is not removed from exposure.

The harmful health effects of vibrating tools are related to the length of time that a worker has been using vibrating tools and to the frequency of the vibration. The longer a person uses a vibrating tool, and the faster the tool vibrates the greater the risk of health effects. Temporary tingling or numbness during or soon after use of a vibrating hand tool is not considered to be HAVs; however, tingling and numbness in the fingers lasting more than an hour after finishing work may indicate early stages of HAVs.

Many of the symptoms of vibration syndrome will disappear shortly after a worker stops using the types of tools with transmit vibration to the hands and arms. Fatigue and muscular pain in

the arms and shoulders will generally disappear. In the early stages, if a worker stops using vibrating tools, HAVS will not get any worse and may get slightly better. It is important to provide pads and gloves for relief from the vibration; administrative controls such as work rotation and more frequent rest breaks, and the use of the correct tool.

5.0 SAFETY INSPECTION CHECKLIST

The following list of questions should be considered during an inspection of portable electric tools. Inspections are recommended prior to the use of equipment.

5.1 General

- Low voltage or battery powered equipment used in tanks and wet areas?
- Tools well maintained?
- Motors in good condition?
- Approved tools used in explosive atmospheres?
- Tools left where they cannot fall?

5.2 Cords

- Insulation and plugs unbroken?
- Cords protected against trucks and oil?
- Cords not in aisles?

5.3 Grounding

- Ground wire fastener in safe condition?
- 3-wire plug extension cord (if a 3-wire tool)?
- Ground wire used?
- Defects or minor shocks reported?
- Ground fault circuit interrupter used?

5.4 Guarding

- Guards used on grinders and saws?
- Moveable guards operate freely?
- Eye or face protection worn?

5.5 Pneumatic Tools/ Compressed Air

Pneumatic tools and hoses shall be handled in accordance with OSHA 29 CFRs 1910 and 1926. Compressed air used for cleaning purposes shall not exceed 30 psi when the nozzle end is obstructed or dead ended and then only with personal protective equipment. Compressed air shall not be used to blow dirt from hands, face or clothing. A competent person shall conduct training on the use of pneumatic tools/ compressed air. Only trained/qualified employees shall operate tools.

5.6 Power Tools

Power tools can cause severe injuries to personnel if used improperly. All power tools shall be used in accordance with manufacturer's recommendations and only for the purpose for which they are designed.

5.7 Chain Saws

- Chain saw operators shall follow manufacturer's operating instructions and shall carefully inspect the saws prior to use.
- The saws shall be kept in sound mechanical conditions with all guards, mufflers, spark arresters, handles, etc., properly installed and adjusted.
- The chain saw should not be fueled while running or when the engine is hot or near an open flame. In addition, chain saws should not be operated with ten (10) feet of a fuel container.
- The operators shall hold the chain saw with both hands during all cutting operations.
- Operators will wear personal protective equipment as described below. Eye, ear, hand, foot (safety shoes), and leg protection are required as a minimum.
- Chain saws must never be used to cut above the operators shoulder height.
- Before starting to cut, the operator must be sure of footing and must clear away fallen trees, brush, or other materials that might interfere with cutting operations.
- The idle speed of the saw shall be adjusted so that the chain does not move when the engine is idling.
- The operator will shut off the saw when carrying it over slippery surfaces, through heavy brush, and when adjacent to personnel.

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- A Competent Person shall train all chain saw operators before using a chain saw.
- All chain saws used on the job should have an automatic chain brake or kickback device.

SOP HS-040 BACK INJURY PREVENTION PROGRAM

1.0 OBJECTIVE

The purpose of ECC's Back Injury Prevention Program (BIPP) is to identify existing or potential back exposure hazards in the work environment; identify and evaluate risk factors causing the problems; design and implement control (i.e., engineering and administrative) measures; and to monitor/evaluate the effectiveness of the control measures being implemented.

2.0 BACK INJURIES

The National Institute of Occupational Health (NIOSH) has reported that back disorders account for 27% of all nonfatal injuries and illnesses involving days away from work.

An injured back affects your ability to move your limbs, your hips, your neck, and head. Injuries to the back can be very debilitating, causing a lot of pain/discomfort and time away from work. Severe back disorders/injuries may require physical therapy or even surgery.

2.1 Common Causes of Back Injuries

Some of the common causes of back injuries in the work environment include the following:

- C Heavy lifting
- C Twisting and lifting
- C Bending and over exerting/awkward positions
- C Lifting objects with odd shapes
- C Reaching and lifting
- C Sitting or standing too long in one position
- C Slips due to improper footing

2.2 Things That May Increase the Risk of Back Injury

- C Poor physical condition
- C Poor posture
- C Extra weight
- C Stress (tense muscles)
- C Overdoing it

2.3 Control Measures to Prevent Back Injuries

- C Work at a reasonable pace (don't rush!)

- C Stretch first before lifting an object
- C Rest your back (take frequent breaks) during long lifting activities
- C When possible, push objects C don't pull
- C Avoid twisting at the waist
- C Get help lifting awkward, heavy objects
- C Use carts and hand trucks
- C Try to work in a safe zone between your shoulders and waist
- C Lift correctly

2.4 Employee Monitoring

It is important to closely monitor workers during heavy lifting or any strenuous back activities. Any weight lifting limitations with the worker should be discussed prior to work activities.

3.0 CORRECT LIFTING AND REACHING PROCEDURES

One of the basic ergonomic principles when attempting to lift objects is to minimize the moments (force) on the spine. The following are correct lifting and reaching procedures that should be implemented by employees:

- C Don't bend over an object you are lifting. Bend your knees, squatting in front of the object to reach it.
- C Lift the object slowly and carefully, using your leg and arm muscles to lift, not pulling with your back.
- C Keep your head up and look straight ahead while making the lift
- C While lifting, keep the object as close to your body as possible
- C Keep abdominal muscles tight while making the lift
- C Use the same techniques when you put the object down
- C If the object is too big or too heavy to lift using these techniques, use mechanical assistance or get someone else to help.

When reaching for objects:

- C Do not reach for an object unless you're strong enough to lift it
- C Use a step ladder to reach objects above the shoulder height
- C Avoid awkward stretches while reaching. This can stress your back and cause you to lose your balance

4.0 EMPLOYEE PROTECTIVE EQUIPMENT (Back Support Belts)

There is some controversy about the use of back support belts in order to control low back injuries to workers who don't have an existing injury. According to the report by the National

Safety Council (NSC), available scientific data does not completely support nor condemn the use of back belts to control low back injuries. One thing that is agreed upon is that back support belts should NEVER be a substitute for a comprehensive Back Injury Prevention Program. Many companies have developed their own back belt policy.

The following guidelines shall apply to ECC employees who use back support belts (company or personally owned) during work operations at ECC project/office sites.

ECC BACK SUPPORT BELT POLICY

- C Proper training of the back support belt shall be conducted by the Project Manager or Safety Officer to the employee(s) prior to work activities
- C The employee before each use shall conduct inspection of the back support belt. Any defects in the belt shall be reported to the PM or Safety Officer
- C Back support belts shall be correctly worn by the employee at all times
- C The back support belt shall not be used for any other purpose (i.e., harness) except for its intended use.

When wearing a back support belt, please be aware that you may experience a false sense of security by wearing the belt. There is a temptation to lift loads one wouldn't otherwise lift. Please remember that the belt does NOT provide additional strength, it only supports the back.

**SOP HS-041
LEAD REMEDIATION OPERATING PROCEDURES**

1.0 POLICY

Federal standards applicable to lead in construction consist of the following:

- 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response
- 29 CFR 1910.134 Respiratory Protection
- 29 CFR 1910.141 Sanitation
- 29 CFR 1910.145 Specifications for Accident Prevention, Signs, and Tags
- 29 CFR 1926.59 Hazard Communication
- 29 CFR 1926.62 Lead
- 40 CFR 61 National Emission Standards for Hazardous Air Pollutants
- 40 CFR 261 Resource Conservation and Recovery Act
- 40 CFR 262 RCRA Standards Applicable to Generators
- 49 CFR 171-180 Transportation

2.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to ensure a safe and healthy work environment for ECC's employees involved in Lead Remediation in accordance with Federal lead in construction standards.

3.0 PROGRAM ADMINISTRATOR

ECC's designated Project Manager (competent person) is responsible for the implementation and enforcement of these standard operating procedures. In addition, the competent person shall be adequately trained and is responsible for the planning, training, and inspection of lead remediation projects performed in the field.

4.0 METHODS OF COMPLIANCE

With this program, ECC establishes various methods of compliance, e.g. exposure monitoring, engineering controls, work practices, and administrative controls to minimize employee exposure below the OSHA's Permissible Exposure Limit (PEL) of 50 micrograms/meter cubed (ug/m^3). It is ECC's intent that no employee be exposed above this PEL.

4.1 Initial Exposure Assessment

An initial exposure assessment is performed by an ECC Lead-competent person prior to starting any lead removal project where employee exposure to lead may be at or above the Lead Action level of 30 ug/m³, and/or when performing any of the Lead construction trigger tasks as described in section 4.3.

4.1.1 Conducting An Initial Exposure Assessment

The primary basis of the initial exposure assessment is employee exposure monitoring performed at the beginning of each project as well as any relevant information, such as, field observations, or calculations that would indicate employee exposure to lead, previous measurements of airborne lead, and employee complaints of symptoms that may be attributable to exposure to lead.

Alternately, an initial exposure assessment may also be obtained using historical data (except when performing trigger tasks) that includes air monitoring data collected within the last 12 months of work operations conducted under workplace conditions closely resembling the processes, type of material, control methods, work practices, and environmental conditions used and prevailing in the employer's current operations.

The initial exposure assessment shall be performed on the first day of lead remediation work and shall be representative of a full shift including at least one sample for each job classification in each work area either for each shift or for the shift with the highest exposure to lead.

4.1.2 OSHA Trigger Tasks

OSHA categorizes lead-related work into low, medium, and high exposure tasks. OSHA assumes, unless proven otherwise, that employees will be exposed to certain concentrations of lead while performing these trigger tasks.

- Ⓒ Lowest Exposure Trigger Tasks--assumes > 50 to ≤ 500 ug/m³
 - Ⓒ where lead coatings or paint are present
 - Manual demolition of structures
 - Manual scraping
 - Manual sanding
 - Heat gun applications
 - Power tool cleaning with dust collection systems
 - Ⓒ spray painting with lead
 - Ⓒ Any other tasks where the employer has reason to believe employees may be exposed over the PEL.
- Ⓒ Medium Exposure Trigger Tasks--assumes >500 to ≤ 2500 ug/m³;

- C use of lead-containing mortar
- C where lead coatings or paint are present
 - Lead burning
 - Rivet busting
 - Power tool cleaning without dust collection systems
 - Cleanup of dry expendable abrasives
 - Abrasive blasting enclosure movement and removal
- C Highest Exposure Trigger Tasks--assumes > 2500 ug/m³
 - C where lead coatings or paint are present
 - Abrasive blasting
 - Welding
 - Cutting
 - Torch burning

4.1.3 Worker Protection During Initial Exposure Assessment

For the duration of the initial exposure assessment, ECC shall establish and maintain the following worker protection provisions:

- C Appropriate personal protective equipment--At a minimum, Level C PPE (hard hat, steel toe boots, full body coverall with integral hood and booties, eye protection, and half face Air Purifying Respirator) shall be donned by all employees within the exclusion zone EZ. When performing initial exposure assessments for an OSHA trigger task, use respiratory equipment as required in Table 3.1;
- C Post warning signs and barrier tape to restrictive access to authorized personnel;
- C Maintain hand washing facilities outside the exclusion zone;
- C Maintain change rooms or area outside the contamination reduction zone (CRZ) where employees can change into/out of work clothes;
- C Maintain clean eating facilities outside the support zone;
- C Conduct biological monitoring;
- C Provide awareness training.

Table 4-1 Respiratory Protection for Lead Aerosols

Trigger Task	Airborne Lead Concentration	Required Respiratory
Lowest Exposure Trigger Tasks	Not > 500 ug/m ³ (up to 10 x PEL).....	half-mask air purifying w/HEPA* filters, or half-mask supplied air in negative pressure mode

	Not > 2500 ug/m ³ (up to 25 x PEL).....	loose fitting or helmet PAPR** with HEPA filters, or supplied air in continuous-supply mode
Medium Exposure Trigger Tasks	Not > 2500 ug/m ³ (up to 50 x PEL).....	Full-face piece air purifying with HEPA filters, or full face piece supplies air in demand mode, or half-mask supplied air in continuous-flow mode, or SCBA*** in demand mode.
Highest Exposure Trigger Tasks	Not > 50,000 ug/m ³ (up to 1,000 x PEL).....	half-mask supplied air in positive-pressure mode
	Not > 100,000 ug/m ³ (up to 2000 x PEL).....	full-face piece supplied air in positive-pressure mode
	> 100,000 ug/m ³ (>2,000 x PEL).....	full-face piece SCBA in positive pressure mode

- * HEPA = High Efficiency Particulate Air that is 99.97% effective against particles 0.3 m or larger.
- ** PAPR= powered air-purifying respirator
- *** SCBA=self contained breathing apparatus

4.2 Written Compliance Program

Prior to the start of any lead remediation job where exposures to lead may exceed the PEL, ECC shall establish and implement a written compliance program to include the following:

- C A description of each work activity in which lead may be emitted; e.g. equipment used, material involved, controls in place, crew size, employee job responsibilities, operating procedures and maintenance practices;
- C A description of the specific means ECC will employ to achieve compliance with Federal, State, and local regulations;
- C A description of the technology considered in meeting the PEL;
- C Air monitoring data that documents the source of lead emissions, if applicable;
- C A detailed schedule for implementation of the program, including documentation

- such as copies of purchase orders for equipment, construction contract, etc.;
- C A work plan that incorporates the approved work practices described herein;
- C An administrative control schedule, if applicable;
- C A description regarding disclosure procedures and communications to other contractors on multi-contractor sites;
- C and any other relevant information.
- C provide for regular and frequent inspection of job sites, work areas, materials, and equipment to be made by competent person;

- C Program shall be on site at all times and available to employee, employee representative, or regulatory personnel, etc.
- C Written programs shall be updated every 6 months to reflect the current status of the program.

4.3 Engineering Controls

Engineering controls shall be used whenever possible especially when lead work occurs indoors. Example of engineering controls:

- C Containment barriers (plastic, wood, etc.) to control spread of lead contaminated materials outside the exclusion zone;
- C Negative air machines equipped with HEPA filters to clean and move exclusion zone;

4.4 Work Practices

Proper work practices are key in controlling the release of unnecessary airborne lead during removal actions. Acceptable work practices include, but are not limited to the following:

- C Ensure that lead contaminated materials are wet when disturbed;
- C Ensure that lead contaminated materials are kept separate from other wastes or construction materials; cover with plastic to minimize spreading or cross contamination of the lead waste;
- C Containerize as soon as possible. Where feasible, minimize excessive accumulation of lead waste;
- C Use HEPA vacuums and wet wiping methods to clean up lead containing dust and debris (interior work);
- C Ongoing cleanup and orderly work area;
- C Ensure proper decontamination techniques

4.5 Prohibitive Work Practices

- C high-speed abrasive disc saws that are not equipped with point of cut ventilator or enclosures with HEPA filtered exhaust air;
- < compressed air without HEPA filter assist;
- < dry sweeping, shoveling, or other dry clean up of dust and debris without HEPA assistance;
- < Allowing removed lead waste (indoor) to accumulate (and become dry) anywhere in the work area.

4.6 Administrative Controls

ECC's administrative controls program is implemented to reduce employee's TWA exposure to lead and includes the following:

- C Name of each affected employee;
- C Job rotation schedule;
- C Duration and exposure levels at each job or work station where each affected employee is located; and
- C Any other information that may be useful in assessing the reliability of administrative controls to reduce exposure to lead

4.7 Industrial Hygiene Practices

The following standard hygiene practices apply in areas where employees are exposed at or above the PEL, are performing one of the Trigger Tasks described in 4.3, or conducting initial exposure assessment monitoring. These standards at a minimum, shall consist of a delineated work area (exclusion zone--EZ) area, change rooms (support zone--SZ), decontamination booths or sinks (showers if feasible) (contaminant reduction zone--CRZ), and eating facilities.

4.7.1 Decontamination Procedures

Decontamination procedures are carried out in the CRZ. Showers shall be utilized where feasible. In lieu of showers, ECC shall establish wash stations in the CRZ where employees can decontaminate themselves prior to entering the SZ. An adequate supply of cleansing agents and cloth towels shall be on hand for decontamination purposes. All contaminated PPE is doffed in the CRZ prior to entering the SZ.

4.7.2 Change Rooms

In the change rooms (located in the SZ), employees change into/out of their street clothes. The change rooms are equipped with separate facilities for PPE/equipment and employee's street

clothes. At no time shall there be any contaminated piece of PPE or equipment/material in the clean room. Eating in the change room is prohibitive.

4.7.3 Eating Facilities

ECC shall provide lunchroom or eating areas for all employees involved with lead abatement. All eating areas shall be separate from the exclusion zone (including the support zone) and free of lead contamination.

4.8 Personal Protective Work Clothing

The following personal protective work clothes shall be donned by all ECC employees and other authorized personnel prior to entering the lead EZ (work area) when: conducting the initial exposure assessment; where employees are exposed at or above the PEL; and where employees are exposed to lead compounds prone to cause eye and skin irritation:

- C Full body coverall with integral head covering and booties;
- C Steel toe boots;
- C Hart hat;
- C Eye protection;
- C Work gloves.

For lead activities not included in the OSHA trigger tasks, historical air monitoring data can be used to determine the respiratory protection required.

4.9 Respiratory Protection

Respiratory protection is required at all time in the EZ during the initial exposure assessment; where employees are exposed at or above the PEL; and where employees are exposed to lead compounds prone to cause eye and skin irritation. The required respiratory protection during the initial exposure assessment will depend on the type of work being performed relative to the OSHA trigger task classification. Results of the initial exposure monitoring (and subsequent exposure monitoring events) will dictate the type of respirator equipment required to continue the remediation.

For lead activities not included on the OSHA trigger tasks list, historical air monitoring data (section 3.1.1) can be used to generate the initial exposure assessment and the required respiratory protection required.

4.10 Air Monitoring Strategies

The OSHA PEL for lead dust is 50 ug/m³ and an action level of 30 ug/m³. It is ECC's intent that no employee or authorized visitor to an exclusion zone be exposed to an airborne lead dust concentration of 50 ug/m³ as determined as an eight-hour time weighted average. Representative personal and environmental air samples for lead dust are collected by a competent person(s). Lead air samples are analyzed an approved laboratory using NIOSH method 7082. Personal sampling pumps are affixed to the employees waist with the appropriate cassette secured at the employees breathing zone. Personal air samples are designed to continuously run for the duration of the sampling period (8 hours) stopping only at lunch, rest breaks, or for emergency situations where employee(s) must exit the work area. The competent person calculates the amount of airflow received through the cassette using a calibrated rotameter. All air monitoring documentation is recorded on ECC's air monitoring form(s).

For interior remediation projects, both representative air samples shall be collected inside and outside the work area monitor effectiveness of jobs engineering controls and work practices. The pumps, tripod stands, and cassettes are set up at different locations including: at the outside entrance to the CRZ, at the pressure deferential unit exhaust (outside work area) if applicable, and in inside the work area. For exterior work, ECC shall collect representative samples at the CRZ and downwind of the work area.

4.10.1 Initial Exposure Monitoring

To be performed at the beginning of a lead-remediation project. Personal exposure monitoring shall be conducted on the first day of lead remediation work and shall be, at a minimum, representative of a full shift including at least one sample for each job classification in each work area either for each shift or for the shift with the highest exposure to lead.

4.10.2 Frequency/Termination of Personal Exposure Monitoring

For employee exposure at or above the Lead Action level but below the Lead PEL, ECC shall perform personal exposure monitoring as described above (1st para) at least every six (6) months until at least two consecutive air monitoring results, collected at least 7 days apart, are below the action level at which time air monitoring may be terminated for that employee.

For employee exposure above the Lead PEL, ECC shall perform personal air monitoring as described above on a quarterly basis until at least two consecutive air monitoring results, collected at least 7 days apart, are below the PEL but at or above the AL. ECC shall then continue personal exposure monitoring at least every six months until at least two consecutive air monitoring results, collected at least 7 days apart, are below the action level at which time air monitoring may be terminated for that employee.

4.10.3 Additional Exposure Assessments

Additional exposure assessments shall be performed whenever the following may result in an employee exposure to lead at or above the AL or at or above the PEL:

- C if there has been a change in equipment, process, or control;
- C a new task is being performed;
- C a new employee

4.10.4 Negative Exposure Assessments

A negative exposure occurs when no air monitoring results collected during the initial exposure assessment are at or above the lead AL. This negative exposure assessment determination shall be documented in writing and include the date of determination, sample locations of the air monitoring event, laboratory results, and name and social security numbers of employees involved in lead remediation work.

4.10.5 Notification of Exposure Monitoring Results

ECC shall notify, in writing, affected employees 5 days after completion of the exposure assessment or air-monitoring event. In the event that employee exposure is at or above the PEL, ECC shall inform affected employee of results and describe to the employee the corrective actions to be taken by the employer/employee to reduce employee exposure below that level.

4.11 Record Keeping

ECC shall retain complete and accurate medical records of its employees for the length of employment plus 30 years.

4.11.1 Exposure Monitoring Records

All employee exposure monitoring results shall be maintained by ECC for 30 years plus length of employment. Records shall include, at a minimum, the following information:

- C Name, social security numbers, job classification (and of those whose exposure the sample represents), date, sample numbers, duration of test(s), results, rationale to determine representative sampling strategy;
- C Description of sampling and laboratory methodology and evidence sample result reliability;
- C Type of respirators used during sampling event;
- C Any environmental variables present during the sampling event that could affect employee exposure to lead.

4.11.2 Medical Surveillance Records

Medical surveillance records shall be maintained for each employee subject to surveillance monitoring. Employee medical surveillance records shall include, at a minimum, the following information:

- C Employee name, social security number, job classification and description of duties, copies of physician's written opinions, if any, results of exposure monitoring collected on or for employee and copies of results submitted to employee's physician, employee complaints relative to exposure to lead;
- C Copies of medical examinations, work history, etc.;
- C Description of lab procedures and copies of standards and/or guidance documents used to interpret test results;
- C Biological monitoring results;
- C Medical removal from work records to include name, social security number, and date of removal, date of return to work (former job classification), description of how the medical removal procedure was accomplished, exact reason for the medical removal.

4.11.3 Transfer of Records

Whenever ECC ceases to operate in lead remediation, and if there is no successor to receive and retain the records for the prescribed period, ECC will notify the EPA Administrator at least 90 days prior to disposal and upon request, shall transmit them to the administrator.

4.11.4 Availability of Records

The contents of the records of the medical examination shall be made available to the EPA, the Assistant Secretary of Labor for Occupational Safety and Health, to the Director of NIOSH, to authorized physicians and medical consultants, and upon request by the employee, to his or her physician. Any physician who conducts a medical examination required as per 29 CFR 1926.62, where applicable. Shall furnish to ECC all the information specifically required by this section, and any other medical information related to occupational exposure to lead.

5.0 EMPLOYEE TRAINING

The following are the minimal Fed OSHA training requirements for lead-related work. Many States have their own lead standards that will be more stringent than Fed OSHA. The FedOSHA standard applies where States have not enacted lead in construction standards.

5.1 General Training Requirements

ECC's general training requirements for Lead-related construction work can be found in 29 CFR 1926.59--Hazard Communication or Employee Right to Know (RTK) standard. ECC's employee RTK program has been established and maintained and serves as an employee awareness program for each job site. The RTK program is comprised of four elements: general employee information about the chemicals expected to be encountered on the job site; a Material Safety Data Sheet binder of all chemicals on the job site; a warning label/sign system for hazardous chemicals on the job site; and employee training requirements about the RTK program.

5.2 Lead in Construction Training Requirements

In accordance with 29 CFR 1926.62, ECC's requires all employees who may be exposed to lead at or above the AL on any day, or who may be subject to exposure to a lead compound that can cause eye and skin irritation, to be trained for lead remediation. The frequency of the training is annually for any employee exposed at or above the AL for any day. The contents of the training are as follows:

- C Knowledge and understanding of the Fed OSHA standard and its appendices;
- C Availability of the Fed OSHA standard;
- C Training on the specific nature of lead remediation operations that could result in a lead exposure at or above the AL;
- C Training on respirators--their purpose, use, fitting, care, and limitations;
- C Training on the ECC's medical surveillance program;
- C Knowledge and understanding of the adverse health affects from the excessive exposure to lead;
- C Training on the implementation of the proper work practices, engineering controls, ECC's compliance program (section 3.2) related to lead remediation;

6.0 MEDICAL MONITORING

6.1 Initial Medical Surveillance

Available to any ECC employee occupationally exposed on any day to lead at or above the action level (30 ug/m³). Initial medical monitoring consists of analysis of biological monitoring in the form of blood sampling and analysis for lead and zinc protoporphyrin levels. Frequency of biological testing is as follows:

- C initial employee exposure to lead;
- C where last blood sampling and analysis indicated a blood lead level at or above 40 ug/dl, at least every two months. This frequency shall continue until two

- consecutive blood samples and analyses indicate a blood lead level below 40 ug/dl; and
- C for each employee who is removed from exposure to lead due to an elevated blood lead level at least monthly during the removal period

6.2 Medical Surveillance Program

Employees exposed to lead above the Action Level for more than 30 days in any consecutive 12 month period must participate in ECC medical surveillance program that consists of routine biological monitoring and medical examinations (described below).

The frequency of biological monitoring is follows:

- C initial employee exposure to lead;
- C at least every 2 months for the first 6 months and every 6 months thereafter;
- C where last blood sampling and analysis indicated a blood lead level at or above 40 ug/dl, at least every two months. This frequency shall continue until two consecutive blood samples and analyses indicate a blood lead level below 40 ug/dl; and
- C for each employee who is removed from exposure to lead due to an elevated blood lead level at least monthly during the removal period

Medical surveillance examination

Lead related medical exams shall be provided, at no cost to employees and shall:

- C Conducted annually for employees who had a BLL at or above 40 ug/dl during the preceding 12 month period,
- C For employees who report signs or symptoms related to lead poisoning; desires medical advise regarding the effects of lead exposure on the employee's ability to produce a healthy child, is pregnant, or has difficulty breathing while wearing a respirator;
- C Given to any employee, as medically appropriate, who has been removed from his/her usual job involving exposure to lead

The examination shall consist, at a minimum:

- C Detailed work history
- C History and physical exam, with particular attention to gums, teeth, hematologic, gastrointestinal, renal, cardiovascular, neurological systems;
- C Blood pressure measurements;
- C Blood sample and analysis for BLL, ZPP, hemoglobin and hematocrit determination, res cell indices;

- C Examination of peripheral smear morphology;
- C Blood urea nitrogen;
- C Serum creatinine;
- C Urinalysis with microscopic examination;
- C Pregnancy or male fertility evaluation, if requested by the employee; and
- C Any other test deemed necessary by the physician.

6.3 Employee Medical Removal and Return

An examining physician may remove an employee from lead-related work due to 1) An elevated blood level, and 2) a final medical determination issued. An elevated blood level is defined as an employee having a blood lead level of 50 ug/dl or greater for two consecutive blood tests. A medical determination is a medical finding, determination, and/or opinion of the examining physician that employee has a medical condition that places him/her at an increased risk of material impairment to health from exposure to lead.

Condition of return for elevated blood lead level employees occurs when ever two consecutive blood sampling analysis indicate a blood lead level of 40 ug/dl or less. Return to work for employees removed due to a medical determination occurs when the employee no longer has a medical condition as determined by the examining physician.

6.4 Medical Removal Protection Benefits

ECC provides benefits to employees that are removed from lead related work due to a medical removal incident. As long as the job the employee was removed from continues, ECC shall maintain employee's total normal earnings, seniority, and other employee rights and benefits of the employee up to 18 months.

7.0 CHARACTERIZATION, STORAGE, TRANSPORTATION, AND DISPOSAL OF LEAD WASTE

7.1 Characterization of Lead Waste

Lead waste is classified as either a hazardous or non-hazardous waste or solid depending on the lead compounds leachability characteristics. Any lead waste that exhibits a waste toxicity characteristic threshold of 5-ppm (mg/l) via the Toxicity Characteristic Leaching Procedure (TCLP) is considered a listed (D008) RCRA hazardous waste. Any lead waste that passes the TCLP analysis, i.e., has leach ability characteristics of less than 5 PPM is a non hazardous waste.

At each job site, ECC shall establish and manage a site specific waste segregation/minimization plan to reduce the generation of hazardous lead wastes. The plan shall include:

- C Description on avoiding the mixing of hazardous and non-hazardous wastes-- during the remediation of lead-based paint components, segregation of lead-based paint housing components, e.g., painted window and door components from loose lead-based paint chips will can reduce the amount of RCRA waste generated because painted components are usually pass the TCLP while paint chips will fail TCLP. Nevertheless, confirmation sampling shall be conducted for each waste stream prior to transportation and disposal;
- C Recycling plan for components painted with lead-based paint--RCRA Part B-permitted lead smelter when appropriate--recycling of lead-based painted I-beams;
- C Description on the use analytical data and/or historical data to segregate out hazardous and non-hazardous waste streams

7.2 Temporary Storage and Labeling Requirements

Where applicable, all lead-generated waste to be stored prior to transportation will be contained in leak-tight DOT approved containers. Each container holding RCRA lead waste must have the yellow and black hazardous waste label as illustrated below. If at any time during the storage lead containing waste a leak, tear, rip, or hole appears in the waste container, personnel shall immediately seal the leakage off and decontaminate the exposed area using HEPA vacuuming and/or wet methods. The affected waste container shall be discarded into a properly labeled waste container.

Lead-Based Paint Disposal Container Labeling (Yellow and Black Label)

HAZARDOUS
WASTE
IF FOUND, CONTACT THE NEAREST POLICE
AUTHORITY OR THE U.S. ENVIRONMENTAL
GENERATOR INFORMATION;
NAME-----
ADDRESS-----
CITY-----STATE-----
EPA/MANIFEST
ID NO./DOCUMENT NO.-----
ACCUMULATION
START DATE-----
<u>HAZARDOUS WASTE, SOLID, N.O.S.</u>
<u>NA Number</u>
<u>D.O.T. PROPER SHIPPING NAME AND UN NO.</u>

HANDLE WITH CARE

The generation start date is the day when the container is used to store the lead waste. Containers in storage should be positioned in so that label is clearly visible.

7.3 Transportation Of Lead Waste

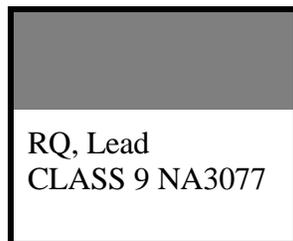
Transportation of the lead waste will be either as hazardous or non-hazardous depending on the determination of the lead waste. Hazardous RCRA waste will be transported by a licensed hazardous waste hauler (to be named later) while the non-RCRA waste will be transported using a licensed hauler with a non-hazardous waste manifest to a Class II or III disposal facility.

A hazardous waste manifest shall accompany all hazardous waste shipments (unless the waste is generated by a conditionally exempt, small-quantity generator [$<100\text{kg}$ or 25gal. /mon]). The manifest is the tracks the waste from the generator to the disposal site. All manifests shall be filled out completely and accurately as per 40 CFR Part 262.20 through 262.22. If the generator does not receive a copy of the manifest within 35 days, the generator shall call the transporter or land disposal facility to determine the status of the manifest. If after 45 days the generator has not received the manifest, an exception report shall be submitted to the EPA Regional Administrator. All copies of manifest shall be retained by ECC for at least 10 years. The proper shipping name for lead waste:

Hazardous Waste Solid, N.O.S. D008 Div. 9 NA 3077 Packing Group III

DOT placards shall display the following:

(Diamond placard with Black zebra stripe on top half)



7.4 Disposal of Lead Waste

The waste materials will be transported to the approved landfill(s) according to the lead concentrations (mentioned above) as determined by the TCLP analytical results. In the event that RCRA waste has been profiled, the RCRA waste is solidified prior to disposal in the

hazardous waste landfill (to named later) while the Non-RCRA waste will landfilled in either Class II or II landfill.

The Land Disposal Restriction (LDR) Ban Notification requires all RCRA waste to meet certain restrictions prior to land disposal. The waste must be treated using a particular treatment method or, the waste must be treated to meet specific numerical values (5 ppm) before land disposal. Lead hazardous waste must be stabilized, undergo physical extraction, chemical extraction, thermal extraction, destruction, or immobilization prior to land disposal. Normally, the hazardous waste management facility will fill out the LDR form. The LDR Ban Notification shall be retained by ECC for a period of 10 years.

SOP HS-042 DISCIPLINARY PROCEDURES

1.0 OBJECTIVE

The objective of this Standard Operating Procedure is to establish professional standards of behavior and performance with all ECC employees. Any deviation from these standards must be corrected and will be subject to discipline. While ECC reserves the right to discipline and /or terminate employees at its sole discretion, when justified, the following procedure may apply: The supervisor will:

1. Meet with the employee to discuss the matter;
2. Inform the employee of the nature of the problem and the action necessary to correct it; and
3. Prepare a memorandum for the supervisor's own records indicating that the meeting has taken place. This memorandum should include the signatures of the supervisor and the employee, and a copy will be placed in the employee's personnel file.

If there is a second occurrence, the supervisor may hold another meeting with the employee and:

1. Issue a written reprimand to the employee;
2. Warn the employee that a third incident will result in more severe disciplinary action; and
3. Prepare and forward to HR a written report describing the first and second incidents and summarizing the action taken during the meeting with the employee. This report should include the signatures of the employee and the supervisor.

2.0 WARNING PERIOD

A warning period may be invoked by a supervisor when a serious problem arises regarding job performance or conduct. This period normally does not exceed ninety (90) days. This period is intended to notify the employee of a specific problem, recommend corrective action, and to give the employee a reasonable period of time in which to make the desired corrections. If there are additional occurrences, the supervisor may:

1. Issue a written reprimand or warning;
2. Suspend the employee without pay for up to five working days; or
2. Suspend the employee indefinitely and recommend termination.

After taking action under this policy, the supervisor will prepare and forward to HR a written report describing the occurrences, indicating the timing between the occurrences, and summarizing the action taken or recommended and its justification. In cases involving serious misconduct, such as a violation of law, these procedures may be disregarded. The supervisor has

the right to suspend the employee immediately and/or recommend termination of the employee. If a supervisor recommends that an employee be terminated, an investigation of the situation will be conducted. The employee is allowed a hearing before management reaches a decision. At any investigatory interview conducted for the purpose of determining the facts involved in suspected violation of rules and regulations, the following procedures apply:

1. Prior to the interview, the employee who is suspected of violating ECC rules or regulations must be informed of the purpose for the interview.
2. The employee may have a co-worker present at the interview, if the employee's interview covers issues affecting other employees.

3.0 EMPLOYEE SUSPENSION

Employees suspended from work will not receive or accrue any benefits during the suspension. Employees who believe they have been disciplined too severely or without good cause are encouraged to utilize the grievance procedure. A period of one year during which an employee experiences no disciplinary problems will nullify any previous violations or incidents for purposes of implementing the disciplinary procedures contained in this policy. Any documentation of employee warnings or hearings should be kept in that employee's personnel file and should be consulted prior to any disciplinary action. All new employees will be informed of these rules and procedures.

SOP HS-043 NEAR MISS REPORTING

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is guidance in reporting health and safety incidents known as “near misses” for ECC personnel and their subcontractors.

2.0 DEFINITION

Environmental Chemical Corporation’s definition of a “**Near Miss**” is a real or potential safety incident that can be attributed to one or more of the following:

1. First Aid Injury* only (non-OSHA recordable) that results in no demonstrable lost time, no restricted or transferred work duty, and no loss in productivity;
2. Incidents involving fires and spills of hazardous materials;
3. Property damage and/or equipment damage resulting in a loss of \$500.00 or less, inclusive of labor and materials to control, contain, mitigate or repair damages caused by the incident;
4. Incorrect identification of UXO as to type of ordnance, fuzing, safety precautions and fuze condition resulting in an incorrect procedure;
5. Reportable violations of safety rules or regulations that could have resulted in injury or accidents; and
6. Required task, activity, work procedure, or situation that if not recognized and immediately modified could result in an accident, personal injury, property damage, or other harm to job-site safety or the environment.

***First Aid Injury (OSHA Definition):**

- Using a non-prescription medication at nonprescription strength for medications available in both prescription and non-prescription form (recommendation by a physician or other licensed health care professional to use a non-prescription medication at prescription strength is considered medical treatment);
- Administering tetanus immunizations other immunizations, such as Hepatitis B vaccine or rabies vaccine, are considered medical treatment;
- Cleaning, flushing or soaking wounds on the surface of the skin;

- Using wound coverings such as bandages, Band-Aids™, gauze pads, etc.; or using butterfly bandages or Steri-Strips™ (other wound closing devices such as sutures, staples, etc., are considered medical treatment);
- Using hot or cold therapy;
- Using any non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc. (devices with rigid stays or other systems designed to immobilize parts of the body are considered medical treatment);
- Using temporary immobilization devices while transporting an accident victim (splints, slings, neck collars, backboards, etc.);
- Drilling of a fingernail or toenail to relieve pressure, or draining fluid from a blister;
- Using eye patches;
- Removing foreign bodies from the eye using only irrigation or a cotton swab;
- Removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs or other simple means;
- Using finger guards;
- Drinking fluids for relief of heat stress.

All treatment NOT on the above list is considered “medical treatment” as stated in 29 CFR 1904.7 (b) (5).

OSHA considers the treatments listed above to be first aid regardless of the professional status of the person (physician or other licensed health care professional) providing the treatment. Similarly, OSHA considers treatment beyond first aid to be medical treatment even when someone provides the treatment other than a physician or other licensed health care professional.

3.0 EXPECTATIONS

All project team members will identify and report near miss conditions. The Quality Control Officer and Safety Officer will also document and inspect all corrective actions, including the effectiveness of such actions after implementation.

The Project Manager with the assistance from the Safety Officer will support the development of remedies and corrective actions.

4.0 RESPONSIBILITY

It is the responsibility of the Project Manager to ensure that near miss reporting is accomplished and posted on ECCONET. The Project Manager may delegate the reporting of near misses to the Safety Officer or the QC Officer. However, the Project Manager may NOT delegate the responsibility for ensuring that such reporting takes place. This proactive process is considered to be a key element in project safety by ECC senior management.

It is the responsibility of the Safety Officer to provide a safety culture that mandates continuous dialog on the project to evaluate the hazards and risks of site conditions and project operations. Near miss reporting is the cornerstone of this dialog. The Safety Officer is responsible for making the hazard-risk assessment process a daily reality within the safety program at the site. This includes planning, training, communications, documentation and reporting of the near misses on the project.

It is the responsibility of the quality control representative to include near miss condition inspections as part of the daily inspection schedules and reporting.

It is the responsibility of each Program Manager and Division Director to include near miss reporting reviews as part of project review criteria and in employee performance evaluations.

5.0 REPORTING PROCEDURES

Reporting and reviewing of “Near Misses” shall be conducted via ECC’s Intranet service. Report(s) shall be prepared within two working days of the incident. Management (Program, Project and/or Safety) shall establish team or personal incentives or other recognition for those who identify, report and document near misses. The project team and management personnel will gain valuable information (e.g., trend analysis) from this “lesson learned” tool.

Near Miss Reporting Instructions

- Go to ECCONET’s homepage
- Click on “Operations”
- Click on “Safety”
- Click on “Near-Miss Rpt. Form” in the left-hand column
- Click on “Add Reports” at the top
- Go through each of the three components/sections of the form (see below).

The three components of ECC’s “Near Miss Report” are:

1. Case Analysis

- Determine immediate causes (actions and conditions) that contributed to this incident (please see Near Miss Report Form)
- Basic Causes – Determine specific personal or job factors that contributed to this incident; (please Near Miss Report Form)

2. Control Measures

- Action Plan – Determine what has and/or should be done to control the causes (please see Near Miss Report Form)

3. Management Review

- Submit Near Miss Report for management review. The Near Miss Report will be posted internally on the ECCONET after management review.

6.0 NO PENALTY

There will be no penalty or adverse impact to individuals or project teams reporting near misses. The goal in reporting these incidents is to:

- 1) Improve project safety by early identification of hazardous trends and conditions so that they can be corrected, and
- 2) Make other ECC project personnel and stakeholders aware of potential hazardous trends and conditions so that corrective action can be taken in advance.

7.0 TIME INVOLVED

Each report is estimated to take 10-15 minutes using the systems provided on the ECCONET. Please ensure that the report has enough details to permit adequate review of the exact nature of the near miss and the follow-on actions.

8.0 DISTRIBUTION

The near miss reports will be distributed to all Division Directors and Program Managers, ECC's Corporate Health & Safety Manager, Safety Officers, and ECC's senior management. This distribution will be conducted automatically using the ECCONET feature.

9.0 FOLLOW-UP

A near miss incident requires proper attention to ensure that the cause can be eliminated before a more serious accident occurs. Project team members such as Project Managers and Safety Officers will likely be contacted by the cognizant Program Manager or Division Director to discuss the nature of the near miss and to seek ideas for preventing reoccurrence.

SOP HS-044 REPEAT VEHICLE ACCIDENT OFFENDER PROGRAM

1.0 OBJECTIVE

The objective of this Standard Operating Procedure (SOP) is to establish a policy for repeat vehicle accident offenders at Environmental Chemical Corporation (ECC).

Report to the Department of Motor Vehicles any automobile accident involving bodily injury or property damage over \$500, to comply with State Financial Responsibility Statutes. Please review SOP HS-033 "Driver Fleet Safety Program" for company accident reporting guidelines.

2.0 DRIVER SAFETY COURSE

ECC drivers will be required to take a one-day driver safety course after committing their second vehicle accident with an ECC vehicle or rental car used during company business. The driver safety class shall be taken within thirty-days following the accident. Courses via the Internet will not be accepted. Registration fees for the class shall be paid by ECC.

3.0 WARNINGS, SUSPENSIONS, AND FORFEITURE OF DRIVING PRIVILEGES

Actions that may constitute warnings, suspensions or loss of company driving privileges under this policy include, but not limited to:

- 1.) Two accidents in two years will result in a written warning;
- 2.) Three accidents in three years results in loss of vehicle for one year; and
- 3.) Four accidents at any time with ECC result in total loss of a company vehicle.

ECC has the right to revoke company vehicle driving privileges at any time.

4.0 MOVING VIOLATIONS AND DRIVING UNDER THE INFLUENCE

ECC management will conduct periodic inspections of driving records from all assigned drivers. **DRIVERS WITH MORE THAN 3 MOVING VIOLATION POINTS OR A DUI (DRIVING UNDER THE INFLUENCE) WITHIN THE LAST THREE YEARS MAY HAVE THEIR COMPANY VEHICLE DRIVING PRIVILEGES SUSPENDED UNTIL THE COMPLETION OF A DRIVER SAFETY COURSE OR A SUBSTANCE ABUSE COUNSELING PROGRAM (DUI).** ECC Management may allow employees to drive company vehicles on their assigned project site (if applicable) during working hours only. ECC has the right to revoke company vehicle driving privileges at any time.

5.0 ACCIDENTS DURING PERSONAL USE

ECC drivers are required to pay the \$2,500 insurance deductible (when applicable) for all vehicle accidents occurring during non-business use. This includes accidents that may occur while the employee is on temporary duty.

6.0 DRUG TESTING

ECC has implemented pre-employment and post accident drug testing of all employees. For the protection of ECC and the ECC driver involved in an accident, a post accident drug screening may be required.

ENVIRONMENTAL CHEMICAL CORPORATION
SOP HS-045
Accident Investigation Reporting &
Corrective Action Plan Development

1.0 PROGRAM OBJECTIVES

The two primary objectives for this Standard Operating Procedure (SOP) “Accident Investigation Reporting & Corrective Action Plan Development” are the following:

- 1.) To provide Environmental Chemical Corporation (ECC) senior management personnel effective accident investigation reporting procedures; and
- 2.) To develop effective corrective action plans to eliminate future accident occurrences.

There are two distinct reports with separate and distinct purposes. The Accident Investigation Report is designed to report the facts (who, what, when, where) related to an accident. The Corrective Action Plan Report is intended to allow the project team to thoughtfully develop a response to an accident that will prevent reoccurrence. Both reports are described in more detail below.

2.0 DEFINITIONS

Accident (ECC):

Any occurrences of job-related nature involving ECC or its subcontractors which results in:

1. An OSHA Recordable Case (defined on page 2);
2. Fires, spills, property damage and/or equipment damage resulting in a loss of more than \$500.00;
3. Hospitalization (overnight) of one or more ECC employees or subcontractors; and
4. An ECC employee or subcontractor suffering death, permanent total disability, complete and/or permanent loss of an eye, hand, foot or major organ.

Occurrences that do not meet the definition of an ECC “Accident” shall be deemed a “Near Miss Safety Incident.” All Incidents (i.e., first aid cases/non OSHA recordable cases, spills, property damage and/or equipment damage resulting in a loss of \$500.00 or less) shall be reported on ECC’s “Near Miss Incident Reporting Form.”

ENVIRONMENTAL CHEMICAL CORPORATION
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Accident Investigation Reporting &
Corrective Action Plan Development

OSHA Recordable Case Definition

An OSHA recordable accident is defined as the following:

- Days away from work;
- Restricted work (cases where the injured or ill employee only works partial days or is restricted from performing their “routine job functions” defined as work activities the employee regularly performs at least once weekly) or job transfer;
- Medical treatment beyond first aid (see below);
- Loss of consciousness; or
- A significant injury or illness diagnosed by a physician or other licensed health care professional, and;
- Death

There are some significant injuries, such as a punctured eardrum or a fractured toe or rib, for which neither medical treatment nor work restrictions may be recommended. In addition, there are some significant progressive diseases, such as byssinosis, silicosis, and some types of cancer, for which medical treatment or work restrictions may not be recommended at the time of diagnosis but are likely to be recommended as the disease progresses. OSHA believes that cancer, chronic irreversible diseases, fractured or cracked bones, and punctured eardrums are generally considered significant injuries and illnesses, and must be recorded at the initial diagnosis even if medical treatment or work restrictions are not recommended, or are postponed, in a particular case.

Medical Treatment vs. First Aid

New OSHA definitions are included for medical treatment and first aid. First aid is defined by treatments on a finite list (see below). All treatment **NOT** on the list is considered “medical treatment” as stated in 29 CFR 1904.7 (b) (5).

OSHA considers the treatments listed below to be first aid regardless of the professional status of the person (physician or other licensed health care professional) providing the treatment. Similarly, OSHA considers treatment beyond first aid to be medical treatment even when someone provides the treatment other than a physician or other licensed health care professional.

- Using a non-prescription medication at nonprescription strength for medications available in both prescription and non-prescription form. A recommendation by a physician or other licensed health care professional to use a non-prescription medication at prescription strength is considered medical treatment.

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- Administering tetanus immunizations (other immunizations, such as Hepatitis B vaccine or rabies vaccine, are considered medical treatment);
- Cleaning, flushing or soaking wounds on the surface of the skin;
- Using wound coverings such as bandages, Band-Aids™, gauze pads, etc.; or using butterfly bandages or Steri-Strips™ (other wound closing devices such as sutures, staples, etc., are considered medical treatment);
- Using hot or cold therapy;
- Using any non-rigid means of support, such as elastic bandages, wraps, non-rigid back belts, etc. (devices with rigid stays or other systems designed to immobilize parts of the body are considered medical treatment);
- Using temporary immobilization devices while transporting an accident victim (e.g., splints, slings, neck collars, backboards, etc.).
- Drilling of a fingernail or toenail to relieve pressure, or draining fluid from a blister;
- Using eye patches;
- Removing foreign bodies from the eye using only irrigation or a cotton swab;
- Removing splinters or foreign material from areas other than the eye by irrigation, tweezers, cotton swabs or other simple means;
- Using finger guards;
- Drinking fluids for relief of heat stress.

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3.0 ACCIDENT INVESTIGATION REPORTING

3.1 Purpose

The primary purpose of an ECC “Accident Investigation Report” is to document factual information regarding the accident. The basic information includes a brief description of what happened, when, where, how, etc. The report should be completed no later than 24 hours after the accident.

3.2 Responsibility

It is the responsibility of the Project Manager to ensure that accident investigation reporting is accomplished and posted on the ECCONET. The Project Manager may delegate the reporting of accidents to the Safety Officer or the QC Officer. However, the Project Manager may NOT delegate the responsibility that such reporting take place.

3.3 Reporting Procedures

Reporting and reviewing of an “Accident Investigation Report” shall be conducted via the ECCONET (<http://ecconet.ecc.net>). In the event the project site does not have access to Internet or e-mail, all reports shall then be faxed to **Dean Osaki @ (650) 347-8789**. The “Accident Investigation Report” shall be forwarded within the first **24 hours** following the accident and reviewed by senior management.

Accident Investigation Reporting Instructions

- Go to ECCONET’s homepage
- Click on “Operations”
- Click on “Safety”
- Click on “Accident Rpt. Form” in the left-hand column
- Click on “Add Reports” at the top
- Fill out/complete Accident Investigation Report (2 pages)
- Submit Accident Investigation Report for management review

3.4 Workers’ Compensation Notification Accident Protocol

The following shall be considered for life threatening and not life threatening injuries.

3.4.1 Workers’ Compensation (Life Threatening)

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- Call 9-1-1, and have employee transported to nearest emergency medical facility.
- Report accident to AIG at **(877) 366-8423** following medical treatment services. AIG will investigate and process a WC claim.
- Submit an ECC Accident Investigation Report to senior management personnel within 24 hours.

3.4.2 *Workers' Compensation Injury (Not Life Threatening)*

- Escort employee to approved medical clinic for treatment. It is mandatory that the SSO escort the employee to the medical treatment facility and consult with the medical provider. It is important to ensure that medical treatment is administered appropriate to the injury and unnecessary medication or other treatment should be avoided.
- Report accident to AIG at **(877) 366-8423** following medical treatment services. AIG will investigate and process a WC claim.
- Submit an ECC Accident Investigation Report to senior management personnel within 24 hours.

AIG automatically provides ECC with Workers' Compensation in every state with the exception of the following states which have government controlled Workers' Compensation programs: West Virginia, North Dakota, Ohio, Washington, and Wyoming.

3.5 **Time Involved Reporting Accidents**

Each report is estimated to take 15-20 minutes using the systems provided on the ECCONET. Please ensure that the report is filled out completely.

3.6 **Distribution of Accident Reports**

The reports will be distributed to all Program Directors and Program Managers, ECC's Corporate Health & Safety Manager, Safety Officers, and ECC's senior management. This distribution will be done automatically using the ECCONET feature.

4.0 **CORRECTIVE ACTION PLAN REPORTING**

4.1 **Purpose**

The primary objective of ECC's "Corrective Action Plan" is to provide effective solutions and control measures to prevent reoccurrence of an accident and to provide an effective means of transferring the lessons learned to other project sites.

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4.2 Responsibility

It is the responsibility of the Project Manager to ensure that the Corrective Action Plan is prepared and posted on the ECCONET. The Project Manager may use appropriate members of the project team to prepare the Corrective Action Plan including the Safety Officer, Superintendent, Foreman, craft workers and others as needed. The corrective action plan shall be reviewed with all employees at the next safety meeting to ensure all employees are trained on the steps and methods to prevent further occurrence of the accident.

4.3 Corrective Action Plan Development

Reporting and reviewing of the “Corrective Action Plan” shall be conducted via the ECCONET (<http://ecconet.ecc.net>). If the project site does not have access to Internet or e-mail, all plans shall be faxed to **Dean Osaki @ (650) 347-8789**. Corrective Action Plans shall be developed within five days and reviewed by senior management.

Corrective Action Plan Reporting Instructions

- Go to ECCONET’s homepage
- Click on “Operations”
- Click on “Safety”
- Click on “Action Plan Form” in the left-hand column
- Click on “Add Plan” at the top
- Fill out/complete Action Plan
- Submit Action Plan for management review

The following control measures should be reviewed when developing the “Corrective Action Plan.” The list includes (but not limited to):

- Management training
- Planned safety inspections
- Activity Hazard Analysis implementation
- Organizational policies/procedures
- Personal Protective Equipment
- Hiring and placement controls
- Emergency preparedness
- Safety committee meetings
- Leadership/direction from upper management
- Safety Audits

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- Task observations

4.4 Time Involved Developing Corrective Action Plans

Each “Corrective Action Plan” shall be developed within five working days following the accident. A thorough analysis shall be conducted to determine the root cause of the accident and corrective measures to be implemented.

4.5 Distribution of Corrective Action Plans

The Corrective Action Plans will be distributed to all Program Directors and Program Managers, ECC’s Corporate Health & Safety Manager, Safety Officers, and ECC’s senior management. This distribution will be done automatically using the ECCONET feature.

4.6 Confidentiality of Corrective Action Plans

Due to employee confidentiality, names and personal information shall be omitted from all Corrective Action Plans.

4.7 Follow-up

As a reminder to complete ECC’s “Corrective Action Plan,” e-mails shall be sent out to the Project Manager, Safety Officer and senior management personnel on the third day following the accident investigation report.