WESTWOOD CHEMICAL CORPORATION

SITE SPECIFIC
HEALTH & SAFETY PLAN

352139

HEALTH AND SAFETY PLAN

Westwood Chemical Corporation
46 Tower Road
Middletown, New York 10941

Prepared for:

U.S. Environmental Protection Agency
Region 2
2890 Woodbridge Avenue
Edison, New Jersey 08837

Prepared by:

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March 2005

Project No: 84210

HEALTH AND SAFETY PLAN APPROVAL

This Health and Safety Plan (HASP) was prepared for employees performing a specific, limited scope of work. It was prepared based on the best available information regarding the physical and chemical hazards known or suspected to be present on the project site. While it is not possible to discover, evaluate, and protect in advance against all possible hazards, which may be encountered during the completion of this project, adherence to the requirements of the HASP will significantly reduce the potential for occupational injury.

By signing below, I acknowledge that I have reviewed and hereby approve the HASP for the Westwood Chemical Corporation site. This HASP has been written for the exclusive use of Earth Tech, Inc., its employees, and subcontractors. The plan is written for specified site conditions, dates, and personnel, and must be amended if these conditions change.

Written by:

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Brett D. Hodgson — Date

Safety Professional

Approved by:

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EPA Health and Safety

Approved by:

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David G. Bofinger — Date

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On-Scene Coordinator

TABLE OF CONTENTS

1.0 INTRODUCTION 1-1
1.1 General 1-1
1.2 Policy Statement 1-1
1.3 References 1-1
1.3.1 Earth Tech Safety, Health and Environmental Website 1-2
2.0 SITE INFORMATION AND SCOPE OF WORK 2-1
2.1 Site Information 2-1
2.1.1 General Description 2-1
2.1.2 Site Background/History 2-1
2.1.3 Previous Investigations 2-1
2.2 Scope Of Work 2-2
2.2.1 Additional Work Operations 2-2
3.0 PROJECT HEALTH AND SAFETY ORGANIZATION 3-1
3.1 On-scene coordinator [Dilshad Perera] 3-1
3.2 United States Coast Guard – Atlantic Strike Team (AST) 3-1
3.3 Program Manager [Joseph West] 3-1
3.4 Response Manager [David Bofinger] 3-1
3.4.1 Responsibilities 3-1
3.4.2 Authority 3-1
3.4.3 Qualifications 3-2
3.5 Site Safety Officer [David Bofinger] 3-2
3.5.1 Responsibilities 3-2
3.5.2 Authority 3-2
3.5.3 Qualifications 3-2
3.6 Employees 3-3
3.6.1 Employee Responsibilities 3-3
3.6.2 Employee Authority 3-3
3.7 Safety Professional 3-3
3.8 Subcontractors 3-3
3.9 Visitors 3-4
4.0 SAFETY PROGRAMS 4-1
4.1 Environmental Standard Operating Procedures 4-1
4.2 HAZWOPER Qualifications 4-2
4.3 Safety Training 4-2
4.3.1 Site-Specific Training/Orientation 4-2
4.4 Hazard Communication 4-3
4.5 Recordkeeping 4-3
4.6 Confined Space Entry 4-3
4.7 Hazardous, Solid, Or Municipal Waste 4-3
4.8 General Safety Rules 4-3
4.8.1 Housekeeping 4-3

TABLE OF CONTENTS (continued)

4.8.2 Smoking, Eating, or Drinking 4-4
4.8.3 Personal Hygiene 4-4
4.8.4 Buddy System 4-4
4.8.5 Heat and Cold Stress 4-4
4.9 Stop Work Authority 4-5
4.10 Client Specific Safety Requirements 4-5
5.0 HAZARD ASSESSMENT 5-1
5.1 Task Hazard Analysis 5-1
5.1.1 Unanticipated Work Activities/Conditions 5-1
5.2 Environmental Contaminant Exposure Hazards 5-1
5.2.1 Glycol (Ethylene glycol) 5-1
5.2.2 Acids (Hydrochloric Acid/Sulfuric Acid) 5-1
5.2.3 Zirconium Oxychloride (solid) 5-1
5.2.4 Aluminum Chlorohydrate (salts) 5-2
5.2.5 Assessment of Exposure Hazards 5-2
5.3 Physical Hazards 5-2
5.4 Biological Hazards 5-2
6.0 ACTIVITY SPECIFIC REQUIREMENTS 6-1
6.1 Supplemental Safety Procedures 6-1
6.1.1 Utilities 6-1
6.1.2 Manual Lifting 6-1
6.1.3 Heavy Equipment and Vehicle Operations 6-1
6.1.4 Slips, Trips, Falls, and Protruding Objects 6-1
6.1.5 Electrical and Powered Equipment 6-1
6.1.6 Noise 6-2
6.1.7 Diesel Fuel Cell 6-2
6.2 Exposure Monitoring Procedures 6-2
6.2.1 Real-Time Exposure Measurement 6-2
6.2.2 Noise Exposure Monitoring 6-5
7.0 PERSONAL PROTECTIVE EQUIPMENT 7-1
7.1 Personal Protective Equipment 7-1
7.2 Decontamination 7-2
7.2.1 PPE Doffing and Donning Information 7-2
7.2.2 Disposal of PPE & Decontamination Materials 7-2
8.0 SITE CONTROL 8-1
8.1 General 8-1
8.2 Controlled Work Areas 8-1
8.2.1 Exclusion Zone 8-1
8.2.2 Contamination Reduction Zone 8-1
8.2.3 Support Zone 8-1
8.3 SITE ACCESS DOCUMENTATION 8-2
8.3.1 Visitor Access 8-2
8.4 Site Security 8-2

TABLE OF CONTENTS (continued)

9.0 EMERGENCY RESPONSE PLANNING 9-1
9.1 Emergency Action Plan 9-1
9.1.1 Emergency Coordinator 9-1
9.1.2 Site-Specific Emergency Procedures 9-1
9.1.3 Spill Containment Procedure 9-2
9.1.4 Accident/Incident Reporting 9-2
10.0 PERSONNEL ACKNOWLEDGEMENT 10-1

ATTACHMENTS

Attachment A Task Hazard Analyses
Attachment B Material Safety Data Sheets
Attachment C Chemical Safety Cards
Attachment D Client-Specific Health & Safety Guidelines
Attachment E Site-Specific Health and Safety Plan Supplements

FIGURES

Figure 8-1. Site Control Layout 8-3
Figure 9-1. Site/Hospital Route/Detail Map 9-4

TABLES

Table 4-1 Applicable ENVs 4-1
Table 6-2. Monitoring Parameters and Equipment 6-3
Table 6-3. Monitoring Procedures and Action Levels 6-4
Table 7-1. Personal Protective Equipment 7-1
Table 9-1. Emergency Planning 9-1
Table 9-2. Emergency Contacts 9-3

1.0 INTRODUCTION

This Health and Safety Plan (HASP) (including Attachments A-E) provides a general description of the levels of personal protection and safe operating guidelines expected of each employee or subcontractor associated with the environmental services being conducted at the Westwood Chemical Corporation site, located at 46 Tower Road in Middletown, New York. This HASP also identifies chemical and physical hazards known to be associated with the Earth Tech-managed activities addressed in this document.

HASP Supplements will be generated as necessary to address any additional activities or changes in site conditions which may occur during field operations. Once generated, each Supplement will be inserted in Attachment E and reviewed/acknowledged by field personnel prior to the start of applicable work activities.

1.1 GENERAL

The provisions of this HASP are mandatory for all Earth Tech personnel engaged in fieldwork associated with the environmental services being conducted at the subject site. A copy of this HASP, any applicable HASP Supplements and the Earth Tech Environmental, Health and Safety Manual for Environmental Practices (ENVs) shall be maintained on site and available for review at all times. Record keeping will be maintained in accordance with this HASP and the applicable ENVs. In the event of a conflict between this HASP, the ENVs and federal, state, and local regulations, workers shall follow the most stringent/protective requirements.

1.2 POLICY STATEMENT

Earth Tech has developed ten "Core Values", which form the foundation of our Safety Management System. These Core Values were developed for two basic reasons:

1. To communicate the company's basic safety tenets to Earth Tech employees, partners, and customers; and
2. To serve as a constant reminder for every Earth Tech staff member that our everyday business and operational decisions must be made in concert with these tenets.

The Core Values will be posted at the site in a common area and communicated to all employees prior to beginning work activities.

Earth Tech maintains the following goals for all operations:

- Zero work-related injuries or illnesses.
- Zero damage to property, and/or equipment from our activities.
- Zero releases to the environment from our ongoing projects.

1.3 REFERENCES

This HASP meets the regulatory requirements and guidelines established in the following documents:

- Title 29, Part 1910 of the Code of Federal Regulations (29 CFR 1910), *Occupational Safety and Health Standards* (with special attention to Section 120, *Hazardous Waste Operations and Emergency Response*).
- Title 29, Part 1926 of the Code of Federal Regulations (29 CFR 1926), *Safety and Health Regulations for Construction*.
- National Institute for Occupational Safety and Health (NIOSH)/OSHA/U.S. Coast Guard (USCG)/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, Publication No. 85-115, 1985.

1.3.1 Earth Tech Safety, Health and Environmental Website

Earth Tech's Safety Website is located on the Earth Tech Corporate Intranet, and is available for all Earth Tech employees as a resource for safety information, updates, and procedures. Project management and employees are encouraged to visit the website for key safety items and information, such as:

- The Earth Tech Employee Orientation,
- Contact information for Earth Tech's Safety Department staff,
- Safety Forms,
- Safety Program Manuals,
- Safety Alerts and other communications,
- Accident, Injury, and Near-Miss Reporting Requirements,
- e-Tracking
- Links to safety and regulatory information,
- Training Resources,
- Ergonomics Information, and
- A feedback link to the Earth Tech Safety Director.

The website is located at the following web address:

http://etonline.earthtech.com/etonline/healthsafety/

Please note that the website can only be accessed when connected to Earth Tech's Wide-Area Network (e.g., via iPass).

2.0 SITE INFORMATION AND SCOPE OF WORK

Earth Tech will conduct environmental services at the Westwood Chemical Corporation site. Work will be performed in accordance with the applicable Statement of Work (SOW) and associated Work Plans developed for Westwood Chemical Corporation. Deviations from the listed SOW will require that a Safety Professional review and changes made to this HASP, to ensure adequate protection of personnel and other property.

The following is a summary of relevant data concerning the Westwood Chemical Corporation site, and the work procedures to be performed. The Work Plan, prepared by Earth Tech as a companion document to this HASP, provides significantly greater details concerning both site history and planned work operations.

2.1 SITE INFORMATION

This section provides a general description and historical information associated with the site.

2.1.1 General Description

The Westwood Chemical Corporation site is located at 46 Tower Road, Middletown, New York (see Section 9). There are three laboratories on site full of small chemical containers (approximately 2000). The facility is all under one roof.

2.1.2 Site Background/History

Westwood Chemical Company produced and supplied customers with pharmaceutical active ingredients and waste water treatment chemicals. The plant dealt primarily with inorganic chemicals, producing metal salt solutions. Westwood Chemical produced two major products while in operation, prior to their shutdown. The first, which generated around 85-90 % of their revenue, was making aluminum-zirconium salts as the active ingredient in commercial antiperspirants. Their clients included Gillette & Procter/Gamble. Their second product, which accounted for the remaining 10-15% of the revenue, was an aluminum salt solution which was used in waste water treatment as a flocculant. Both processes began with reacting aluminum ingots with hydrochloric acid (20 degree baume) and water to produce an aluminum chlorohydrate solution. Once they had the aluminum chlorohydrate, it could be mixed with zirconium oxychloride (ZOC) and/or zirconium basic carbonate (ZBC) to produce the aluminum zirconium trichlorohydrex for antiperspirant. Or the aluminum chlorohydrate could be further reacted with sulfuric acid to produce the polyaluminum hydroxychlorosulfate, which was sold as the water treatment flocculant. In addition, sometimes they would mix polyquartenary amine or poly dimethyldiallylammonium chloride into the water treatment product.

The majority of the material for disposal at the site, approximately 160,000 plus gallons, is a wash/rinse water that they generated during production. The material is stored in bulk tanks, totes and drums. Some of this material has the potential to be hazardous for chromium and lead, but the majority is believed to be non hazardous. The work plan calls for bulking the totes into empty storage tanks, and sampling from there. The site also contains bulk tanks of muriatic acid which will need to be sampled, as well as bulk tanks of unused aluminum chlorohydrate solutions.

The site contains three R&D and QC laboratories, and their contents will need to be lab packed for disposal. Also, the basement has a storage room that is full of small QC samples of both finished products and raw materials. The initial plan for this material is to haz-cat for compatibility, and then bulk the small containers into drums for disposal. The warehouse contains drums of both finished and raw product that will require analysis for disposal. And a large quantity of finished and off-spec products, mostly in powder form, that will need to be sampled and bulked into roll-offs for disposal.

2.1.3 Previous Investigations

On 2/10/05 the Town of Wallkill Code Enforcement Officer performed an inspection at this site along with a member of the Orange County Hazardous Materials Response Team. After the inspection, the Code Enforcement Officer notified NYSDEC. The NYSDEC found various petroleum ethers and miscellaneous organic ethers in unknown stages of decomposition. There were also waste acids that were in uncovered

containers. Further, there were large quantities of sulfuric acid and nitric acid in carboys, miscellaneous alcohols, glycols, acetone, and reagent chemicals.

Information gathered at the facility indicates that the facility was shut down in the Fall of 2004. The power had been turned off in the building and the sprinkler system was non-operational. The initial walk through of the building did not reveal any leaking chemical containers. The Town Code Enforcement Officer declared the building to be unsafe under the town ordinance.

Since the initial inspection of this site, NYSDEC has restored power and heat to this building, and a contractor was hired to stabilize and remove the potentially shock sensitive chemicals from this site. NYSDEC contractors have also brought some corrosive materials from the plant storage yard to the inside of the plant building. Inspections of the facility have revealed large quantities of hydrochloric and sulfuric acids in bulk storage at this site, and numerous small containers of reagents, off-spec chemicals, and chemical intermediaries within the plant buildings. The plant storage yard contains many containers of apparent chemical wastes.

2.2 SCOPE OF WORK

- Work zone/site set-up (CRZ)
- Snow removal via backhoe
- Transportation/staging of containers (totes)/drums into indoor facility using forklift
- Drum/tote consolidation using transfer pumps to pump waste into fiberglass ASTs for composite sampling
- Transferring/removal of liquid waste and product via pumps and vac-truck.
- Removing of solid waste once liquid waste is removed and the handling of the solid waste
- Small container operations (sampling, consolidation, lab packing, crushing)
- Concrete berm/containment decontamination and demolition
- Tank cutting, demolition, and removal operations
- Removal/line breaking of process lines/pipes
- Sampling fluids/solids in totes, drums, and tanks for confirmation sampling
- Pressure washing

-Scope of work (THAs) will be updated on a task by task basis moving forward-

2.2.1 Additional Work Operations

The following additional tasks will also be performed as necessary in support of planned site activities:

Mobilization/Demobilization: Mobilization and demobilization represent limited pre and post-task activities. These activities include driving to and from the site; initial site preparations, such as trailer and toilet facilities setup; and post-work activities, such as removing files and office equipment and general housekeeping.

Equipment Decontamination: Earth Tech and subcontractor personnel will perform decontamination of equipment used to perform work within controlled work areas.

3.4.3 Qualifications

In addition to being Hazardous Waste Operations and Emergency Response (HAZWOPER)-qualified (see Section 4.1), the RM is required to have completed an 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4) within the past three (3) years.

3.5 SITE SAFETY OFFICER [DAVID BOFINGER]

The RM will also perform the duties of the SSO unless an alternate SSO is named.

3.5.1 Responsibilities

The SSO is responsible to:

- Update the site-specific HASP to reflect changes in site conditions or the scope of work. HASP updates must be reviewed and approved by the Safety Professional.
- Be aware of changes in Earth Tech Safety Policy. Changes are posted on the Earth Tech Safety Website (see Section 1.3 of this HASP).
- Monitor the lost time incidence rate for this project and work toward improving it.
- Inspect the site for compliance with this HASP and the ENVs using the appropriate audit inspection checklist provided by an Earth Tech Safety Professional.
- Work with the RM and PM to develop and implement corrective action plans to correct deficiencies discovered during site inspections. Deficiencies will be discussed with project management to determine appropriate corrective action(s).
- Contact the Safety Professional for technical advice regarding safety issues.
- Provide a means for employees to communicate safety issues to management in a discreet manner (i.e., suggestion box, etc.).
- Determine emergency evacuation routes, establishing and posting local emergency telephone numbers, and arranging emergency transportation
- Ensure that all site personnel and visitors have received the proper training and medical clearance prior to entering the site
- Establish any necessary controlled work areas (as designated in this HASP or other safety documentation)
- Initiate tailgate safety meetings and maintain attendance logs and records
- Discuss potential health and safety hazards with the RM, the Safety Professional, and the PM
- Select an alternate SSO by name and inform him/her of their duties, in the event that the SSO must leave or is absent from the site.

3.5.2 Authority

The SSO has authority to:

- Verify that all operations are in compliance with the requirements of this HASP.
- Issue a "Stop Work Order" under the conditions set forth in Section 4.7 of this HASP.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the RM, Safety Professional and the PM.

3.5.3 Qualifications

In addition to being HAZWOPER-qualified (see Section 4.1), the SSO is required to have completed an 8-hour HAZWOPER Supervisor Training Course in accordance with 29 CFR 1910.120 (e)(4) within the past three (3) years.

3.0 PROJECT HEALTH AND SAFETY ORGANIZATION

3.1 ON-SCENE COORDINATOR [DILSHAD PERERA]

The OSC, as the representative of the U.S. EPA is responsible for overall project administration and for coordinating health and safety standards for all individuals on site at all times. All U.S. EPA, Earth Tech, and contractors' health and safety guidelines and requirements, as well as all applicable OSHA standards shall be applied. The OSC is the overall site safety officer and will be responsible for the health and safety of site visitors. However, each contractor (as an employer under OSHA) is also responsible for the health and safety of its employees. If there is any dispute with regard to health and safety, the following procedures shall be followed:

1. Attempt to resolve the issue on site; and
2. If the issue cannot be resolved, site personnel shall consult off-site health and safety personnel for assistance and the specific task or operation in dispute shall be discontinued until the issue is resolved.

3.2 UNITED STATES COAST GUARD – ATLANTIC STRIKE TEAM (AST)

The United States Coast Guard (USCG) – Atlantic Strike Team (AST) is responsible for providing the OSC with assistance and support in regard to air monitoring aspects of site activity.

3.3 PROGRAM MANAGER [JOSEPH WEST]

The Earth Tech Program Manager (PM) has overall management authority and responsibility for all Earth Tech personnel and their safety. The specific safety responsibilities for the PM are listed in Section 4.0 of ENV 001, *General EH&S Responsibilities for Environmental Practices*. The PM will provide the Response Manager with the appropriate work plans, personnel, equipment, and resources necessary to complete the associated work tasks in a safe and healthy manner.

3.4 RESPONSE MANAGER [DAVID BOFINGER]

The Response Manager (RM) has the overall responsibility and authority to direct Earth Tech personnel at the job site according to the provided work plans.

3.4.1 Responsibilities

The RM is responsible to:

- Discuss deviations from the work plan with the PM and an Earth Tech Safety Professional.
- Discuss safety issues with the PM, Earth Tech Safety Professional, and field personnel.
- Assist the SSO with the development and implementation of corrective actions for site safety deficiencies.
- Assist the SSO with the implementation of this HASP and ensuring compliance.
- Assist the SSO with inspections of the site for compliance with this HASP and applicable ENVs.

3.4.2 Authority

The RM has authority to:

- Verify that all operations are in compliance with the requirements of this HASP, and halt any activity which poses a potential hazard to personnel, property or the environment.
- Temporarily suspend individuals from field activities for infractions against the HASP pending consideration by the SSO, the Safety Professional, and the PM.

3.6 EMPLOYEES

3.6.1 Employee Responsibilities

Responsibilities of employees associated with this project include, but are not limited to:

- Immediately report any injury, illness, or safety incident to the SSO or RM
- Notifying the SSO, in writing or verbally, of unsafe conditions and acts.
- Understanding and abiding by the policies and procedures specified in the HASP and other applicable safety policies, and clarifying those areas where understanding is incomplete.
- Providing feedback to health and safety management relating to omissions and modifications in the HASP or other safety policies.

3.6.2 Employee Authority

The health and safety authority of each employee assigned to the site includes the following:

- The right to refuse to work and/or stop work authority when the employee feels that the work is unsafe (including subcontractors or team contractors), or where specified safety precautions are not adequate or fully understood.
- The right to refuse to work on any site or operation where the safety procedures specified in this HASP or other safety policies are not being followed.
- The right to contact the SSO or the Safety Professional at any time to discuss potential concerns.

3.7 SAFETY PROFESSIONAL

The Safety Professional is the member of the Earth Tech Safety, Health and Environmental Department assigned to oversee health and safety requirements for the project and provide any needed technical support. The Safety Professional will be the first point-of-contact for all of the project's health and safety matters. Duties include the following:

- Approving this HASP and any required changes.
- Approving of the designated SSO (if RM does not cover SSO duties).
- Providing sound technical safety support.
- Reviewing all personal exposure monitoring results.
- Investigating any reported unsafe acts or conditions.

3.8 SUBCONTRACTORS

The requirements for subcontractor selection and subcontractor safety responsibilities are outlined in ENV 104, *Subcontractor Selection*. Each Earth Tech subcontractor is responsible for assigning specific work tasks to their employees. Each subcontractor's management will provide qualified employees and allocate sufficient time, materials, and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any required personnel protective equipment (PPE).

Earth Tech considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with the regulatory requirements that pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, in order to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to Earth Tech for review prior to the start of onsite activities, if required.

Hazards not listed in this HASP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the Earth Tech RM or the Site Supervisor prior to beginning work operations. The Site Supervisor or authorized representative has the authority to halt any

subcontractor operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

3.9 VISITORS

Authorized visitors (e.g., client representatives, regulators, Earth Tech management staff, etc.) requiring entry to any work location on the site will be briefed by the RM on the hazards present at that location. Visitors will be escorted by the RM or designee at all times at the work location and will be responsible for compliance with their employer's health and safety policies. In addition, this HASP specifies the minimum acceptable qualifications, training and personal protective equipment which hare required for entry to any controlled work area; visitors must comply with these requirements at all times.

Unauthorized visitors, and visitors not meeting the specified qualifications, will not be permitted within established controlled work areas.

4.0 SAFETY PROGRAMS

4.1 ENVIRONMENTAL STANDARD OPERATING PROCEDURES

Environmental standard operating procedures (ENVs) have been developed as guidance documents for specific work tasks. The following is a list of ENVs found in the Earth Tech *Environmental, Health and Safety Manual for Environmental Practices*. In the table below, ENVs containing specific information regarding tasks anticipated for this project have been identified.

Table 4-1 Applicable ENVs
(ENVs anticipated to be at the project are checked in the boxes below)

	ENV #	ENV TOPIC		ENV #	ENV TOPIC
☒	001	General EH&S Responsibilities	☒	508	Drum Sampling
☒	002	EH&S Organization	☒	509	Tank and Large Container Sampling
☒	003	EH&S Administrative Support	☒	510	Unknown Hazardous Waste Drum Handling
☒	101	EH&S Project Support	☒	511	Confined Space Entry
☒	102	General EH&S Plan Requirements	☒	512	Line Entry
☒	103	Purchasing Activities	☒	513	Tank Cleaning
☒	104	Subcontractor Selection	☒	514	Tank Removal / Demolition
☒	105	EH&S Inspections	☐	515	Excavation
☒	201	General Safety Rules	☐	516	Cranes and Lifting Devices
☒	202	Safety Meetings	☒	517	Welding, Torch Cutting and Other Hot Work
☒	203	Medical Monitoring Program	☒	518	Lockout / Tagout
☒	204	Hearing Conservation Program	☒	519	Fork Lift Vehicles
☒	205	Personnel Protective Equipment	☒	520	Heavy Earth Working Equipment (Excavation/Digging)
☒	206	Respiratory Protection Program	☐	521	Drilling
☒	207	Hazard Communication Program	☒	522	Working Surfaces
☒	208	Injury and Illness Prevention Program	☒	523	Manlifts
☒	209	Environmental Training Requirements	☒	524	Overhead Electrical Lines
☒	301	Hazardous Waste Operations	☐	525	Chainsaw Operations
☐	302	Asbestos Operations	☒	526	High Pressure Washers
☐	303	Lead Operations	☐	527	Powder Actuated Tools
☐	304	Radiological Operations	☒	528	Heat Stress and Hot Weather Operations
☐	305	Construction Operations	☒	529	Cold Stress and Winter Operations
☐	306	OE/Unexploded Ordnance Operations	☐	530	Working On / Near / Over Water or Ice
☐	307	Landfill Operations	☒	531	Machine Guarding
☒	401	Protection From Solvents	☐	532	Traffic Safety
☒	402	Flammable and Combustible Liquids	☐	533	Wood Chipping Equipment
☐	403	Compressed Gasses	☒	534	Woodworking and Metalworking Machines
☒	501	Manual Materials Handling	☒	535	Decontamination
☒	502	Ladders	☐	536	All Terrain Vehicles (ATVs)
☐	503	Scaffolding	☐	537	Cylinder Disposition & Decommissioning
☒	504	Powered Hand Tools		EHS #	CORPORATE SOP TOPIC
☒	505	Manual Hand Tools	☒	001	SH&E Policy Statement
☒	506	Electrical Safety	☒	101	Injury, Illness, and Near-Miss Reporting
☒	507	Handling of Drums and Large Containers	☒	102	Incident Investigation and Review
			☒	116	Driver and Vehicle Safety

4.2 HAZWOPER QUALIFICATIONS

Personnel performing work art the job site must be qualified as HAZWOPER workers (unless otherwise noted in specific THAs or by the SSO), and must meet the medical monitoring and training requirements specified in the following safety procedures:

- ENV 202, *Safety Meetings*
- ENV 207, *Hazard Communication Program*
- ENV 209, *Environmental Training Requirements*
- ENV 301, *Hazardous Waste Operations*

Personnel must have successfully completed training meeting the provisions established in 29 CFR 1910.120 (e)(2) and (e)(3) (40-hour initial training). As appropriate, personnel must also have completed annual refresher training in accordance with 29 CFR 1910.120 (e)(8); each person's most recent training course must have been completed within the previous 365 days. Personnel must also have completed a physical exam in accordance with the requirements of 29 CFR 1910.120 (f), where the medical evaluation includes a judgment of the employee's ability to use respiratory protective equipment and to participate in hazardous waste site activities. These requirements are further discussed in ENV 301, *Hazardous Waste Operations*.

If site monitoring procedures indicate that a possible exposure has occurred above the OSHA permissible exposure limit (PEL), employees may be required to receive supplemental medical testing to document specific to the particular materials present.

4.3 SAFETY TRAINING

For this project, the training required to perform work includes:

1. HAZWOPER 40-hour and current 8-hour refresher,
2. 8-hour Supervisor (at least one person on site),
3. 10-Hour OSHA Construction Safety.
4. Hearing Conservation,
5. Respiratory Protection,
6. Site-Specific training/orientation (See Below),
7. First Aid/CPR training (at least one person on site), and
8. Confined Space Entry.

Refer to Section 4.3.1 below for site specific training requirements. Training will be conducted by the SSO (or his/her designee) and will be documented on the form attached to ENV 202, *Safety Meetings*.

4.3.1 Site-Specific Training/Orientation

In addition to the general health and safety training programs, personnel will be provided with a site-safety orientation to include:

1. HASP: Instructed on the contents of applicable portions of this HASP and THAs developed for the tasks to be performed.
2. Hazard Communication: Informed about the potential routes of exposure, protective clothing, precautionary measures, and symptoms or signs of chemical exposure and heat stress.
3. Hazards and Recognition: Made aware of task-specific physical, chemical, biological hazards and other hazards that may be encountered during site work. This includes any potential confined space and lockout/tagout procedures.
4. Air Monitoring: Made aware of air monitoring requirements, including where to locate action levels.
5. Emergency Response Plan: Made aware of emergency response procedures.

The orientation will be documented on a *Safety Training Log* form and placed in project files.

4.4 HAZARD COMMUNICATION

Section 5.2 provides information concerning the materials that may be encountered as environmental contaminants during the work activities. In addition, any organization wishing to bring any hazardous material onto any Earth Tech-controlled work site must first provide a copy of the item's Material Safety Data Sheet (MSDS) to the SSO for approval and filing (the SSO will maintain copies of all MSDSs on site). MSDSs may not be available for locally-obtained products, in which case some alternate form of product hazard documentation will be acceptable. In accordance with the requirements of ENV 207, *Hazard Communication Program*, all personnel shall be briefed on the hazards of any chemical product they use. and shall be aware of and have access to all MSDSs.

All containers on site shall be properly labeled to indicate their contents. Labeling on any containers not intended for single-day, individual use shall contain additional information indicating potential health and safety hazards (flammability, reactivity, etc.).

Attachment B provides copies of MSDSs for those items planned to be brought on site at the time this HASP is prepared. This information will be updated as required during site operations.

4.5 RECORDKEEPING

It is the SSO's duty to ensure that all safety documentation is included in the site's daily operations report, to include:

- Daily Safety Tailgate Form
- Daily Task Hazard Analysis Hazard Forms
- Air Monitoring Logs/Documentation
- Exclusion (Hot Zone) Entry Log
- Site Personnel/Visitor Sign-In Sheet

4.6 CONFINED SPACE ENTRY

The SSO/site supervisor shall identify all potential hazards associated with each individual confined space in accordance with ENV 511, *Confined Space Entry*. In addition, the SSO/site supervisor will inform all employees of the location of confined spaces and their associated hazards. Confined space entry procedures and training requirements are listed in ENV 511.

4.7 HAZARDOUS, SOLID, OR MUNICIPAL WASTE

If hazardous, solid and/or municipal wastes are generated during any phase of the project, the waste shall be accumulated, labeled, and disposed of in accordance with applicable Federal, State. and/or local regulations.

4.8 GENERAL SAFETY RULES

All site personnel shall adhere to ENV 201, *General Safety Rules*, during site operations. In addition, the housekeeping and personal hygiene requirements listed below will also be observed.

4.8.1 Housekeeping

During site activities, work areas will be continuously policed for identification of excess trash and unnecessary debris. Excess debris and trash will be collected and stored in an appropriate container (e.g., plastic trash bags, garbage can, roll-off bin) prior to disposal. At no time will debris or trash be intermingled with waste PPE or contaminated materials.

4.8.2 Smoking, Eating, or Drinking

Smoking, eating and drinking will not be permitted inside any controlled work area at any time. Field workers will first wash hands and face immediately after leaving controlled work areas (and always prior to eating or drinking). Consumption of alcoholic beverages is prohibited at any Earth Tech site.

4.8.3 Personal Hygiene

The following personal hygiene requirements will be observed:

Water Supply: A water supply meeting the following requirements will be utilized:

Potable Water - An adequate supply of potable water will be available for field personnel consumption. Potable water can be provided in the form of water bottles, canteens, water coolers, or drinking fountains. Where drinking fountains are not available, individual-use cups will be provided as well as adequate disposal containers. Potable water containers will be properly identified in order to distinguish them from non-potable water sources.

Non-Potable Water - Non-potable water may be used for hand washing and cleaning activities. Non-potable water will not be used for drinking purposes. All containers of non-potable water will be marked with a label stating:

Non-Potable Water
Not Intended for Drinking Water Consumption

Toilet Facilities: A minimum of one toilet will be provided for every 20 personnel on site, with separate toilets maintained for each sex except where there are less than 5 total personnel on site. For mobile crews where work activities and locations permit transportation to nearby toilet facilities on-site facilities are not required.

Washing Facilities: Employees will be provided washing facilities at each work location. The use of water and hand soap (or similar substance, such as wipes) will required by all employees following exit from the Exclusion Zone, prior to breaks, and at the end of daily work activities.

4.8.4 Buddy System

All field personnel will use the buddy system when working within any controlled work area. Personnel belonging to another organization on site can serve as "buddies" for Earth Tech personnel. Under no circumstances will any employee be present alone in a controlled work area.

4.8.5 Heat and Cold Stress

Heat and cold stress may vary based upon work activities, PPE/clothing selection, geographical locations, and weather conditions. To reduce the potential of developing heat/cold stress, be aware of the signs and symptoms of heat/cold stress and watch fellow employees for signs of heat/cold stress. For additional requirements, refer to ENV 528, *Heat Stress*, and ENV 529, *Cold Stress*.

4.8.5.1 Hot Zone Medical Monitoring (Vital Signs)

Refer to ENV 528, Heat Stress for work/rest tables. For workers wearing semipermeable or impermeable encapsulating ensembles, workers should be monitored when the ambient temperature is above 70 degrees Fahrenheit.

Heart Rate: If heart rate is greater than 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest the same. If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by on-third.

Oral Temperature: If oral temperature exceeds 99.6 degrees Fahrenheit, shorten the next work scyle by one-third without changing the rest period. If the temperature still exceeds the 99.6 degrees Fahrenheit at the beginning of the next rest period, shorten the following work cycle by one-third

4.8.5.2 Solar Protection

To protect against exposure to solar radiation, workers will observe the following requirements:

1. All workers will wear sunglass-type safety glasses (Z87.1 approved) at all times when working outdoors during daylight hours.
2. Workers will utilize a commercial sunblock with a minimum solar protection factor (SPF) of 15.

4.9 STOP WORK AUTHORITY

All employees have the right and duty to stop work when conditions are unsafe, and to assist in correcting these conditions. Whenever the SSO determines that workplace conditions present an uncontrolled risk of injury or illness to employees, immediate resolution with the appropriate supervisor shall be sought. Should the supervisor be unable or unwilling to correct the unsafe conditions, the SSO is authorized and required to stop work, which shall be immediately binding on all affected Earth Tech employees and subcontractors.

Upon issuing the stop work order, the SSO shall implement corrective actions so that operations may be safely resumed. Resumption of safe operations is the primary objective; however, operations shall not resume until the Safety Professional has concurred that workplace conditions meet acceptable safety standards.

4.10 CLIENT SPECIFIC SAFETY REQUIREMENTS

The client has specified no additional health and safety requirements.

5.0 HAZARD ASSESSMENT

5.1 TASK HAZARD ANALYSIS

Task hazard analysis (THA) is a technique used to identify hazards and hazard controls associated with a specific job function. THAs focus on the relationship between the workers, the task, the resources required to complete the task, and the work environment. These variables must be evaluated to identify the potential hazards associated with the task. Once identified, steps can be taken to eliminate, reduce, or control the hazards to an acceptable risk level.

Section 2.2 lists the work activities anticipated during this project. Individual THAs for the tasks associated with this work can be found in Attachment A. THAs will contain specific information regarding the work activities being performed and the resources necessary to complete each task.

5.1.1 Unanticipated Work Activities/Conditions

Operations at the site may require additional tasks not identified in Section 2.2 or addressed in Attachment A THAs. Before performing any task not covered in this HASP a THA must be prepared, and approved by the Safety Professional.

5.2 ENVIRONMENTAL CONTAMINANT EXPOSURE HAZARDS

The following is a discussion of the hazards presented to worker personnel during this project from on-site chemical and radiological hazards known or suspected to be present on site. Hazards associated with chemical products brought to the site during work operations are addressed separately, under the Hazard Communication process described in Section 4.3.

Exposure symptoms and applicable first aid information for each suspected site contaminant listed in Section 2 are located in the following subsections. Not all chemicals located on-site are described below in detail. The "big hitters" are mentioned below in detail. Additional data is provided in Chemical Safety Cards, located in Attachment C or Attachment D (MSDS).

5.2.1 Glycol (Ethylene glycol)

Glycol is housed as a base in many of the solutions at the site. The ACGIH PEL is set at 100 mg/m^3. The main hazard presented with glycol is skin contact and inhalation. Symptoms of exposure are irritation of the eyes, skin, nose, and throat. The targeted organs are the eyes, skin, respiratory system and central nervous system.

5.2.2 Acids (Hydrochloric Acid/Sulfuric Acid)

Skin burns and mucosal irritation are like that from exposure to volatile inorganic acids. Hydrochloric acid burns exhibit severe pain, redness, possible swelling and early necrosis. Corrosive and irritating to the upper and lower respiratory tracts. Hydrogen chloride hydrolyzes very rapidly yielding hydrochloric acid. Symptoms include lachrymation, cough, labored breathing and excessive salivary and sputum formation. Excessive irritation of the lungs causes acute pneumonitis and pulmonary edema which could be fatal. High toxic levels that come in contact with skin can cause hydrochloric acid burns and skin lesions resulting in early necrosis and scarring. Chemical pneumonitis and pulmonary edema result from exposure to the lower respiratory tract and deep lung. Residual pulmonary malfunction might also occur. Burns to the eye result in lesions and possible loss of vision. The OSHA PEL (ceiling) for hydrochloric acid (HCL) is 5ppm (c) and the OSHA PEL for sulfuric acid is 1 mg/m^3.

5.2.3 Zirconium Oxychloride (solid)

Zirconium is incompatible with strong oxidizing agents, water, moisture, and alkali metals. It is strongly corrosive, yet stable. It is harmful if swallowed or inhaled, and in contact with skin. Combustible, but solid form is difficult to ignite; however, powder form may ignite spontaneously and can continue burning under water. The OSHA TWA for zirconium is 5 mg/m^3.

5.2.4 Aluminum Chlorohydrate (salts)

Aluminum salts are mostly a stable inorganic, but incompatible with many metals. It is a irritant and harmful in contact with the eyes - may cause serious eye damage. Very destructive of mucous membranes. The NIOSH PEL is 2 mg/m^3.

5.2.5 Assessment of Exposure Hazards

Inhalation - Irritation to respiratory tract, eyes nose and throat. Leave area and exit to a fresh air area. Refer to air monitoring table for upgrades.

Skin Contact - Skin contact with site contaminants is likely to be moderate to high. Protective clothing (see applicable THAs and Section 7.0 of this HASP) is to be utilized to prevent skin contact.

Ingestion –Protection against exposure via ingestion can be accomplished by performance of proper decontamination procedures when exiting contaminated work areas (see Section 8.2).

5.3 PHYSICAL HAZARDS

The following physical hazards may be encountered during operations at the Westwood Chemical Corporation site:

- Cuts/lacerations (from powered/manual tools, protruding objects, sharp edges)
- Burns (from powered tools/equipment)
- Crush (from building materials and moving equipment)
- Electrical (from powered tools and energized equipment)
- Confined space
- Heavy lifting (materials heavier than 49 pounds)
- Slip/trip/fall (from uneven ground, ice, and poor housekeeping)
- Utilities (overhead and underground)
- Heat/cold stress

5.4 BIOLOGICAL HAZARDS

Contact with bodies of water, animals, insects, and plants can cause injury and illness to personnel. Care must be taken to ensure that these types of injuries are avoided. Some examples of biological hazards include:

- Wild animals, such as snakes, raccoons, squirrels, and rats. These animals not only can bite and scratch, but can carry transmittable diseases (e.g., rabies). Avoid the animals whenever possible. If bitten, go to the nearest medical facility.
- Insects such as mosquitoes, ticks, bees, and wasps. Mosquitoes can potentially carry and transmit the West Nile Virus. Ticks can transmit Lyme disease or Rocky Mountain Spotted Fever. Bees and wasps can sting by injecting venom, which causes some individuals to experience anaphylactic shock (extreme allergic reaction). Whenever you will enter areas that provide a habitat for insects (e.g., grass areas, woods), wear light-colored clothing, long pants and shirt, and spray exposed skin areas with a DEET-containing repellent. Keep away from high grass wherever possible. Keep your eyes and ears open for bee and wasp nests. If bitten by insects, see a doctor if there is any question of an allergic reaction.
- Plants such as poison ivy and poison oak can cause severe rashes on exposed skin. Be careful where you walk, wear long pants, and minimize touching exposed skin with your hands after walking through thickly vegetated areas until after you have thoroughly washed your hands with soap and water.

6.0 ACTIVITY SPECIFIC REQUIREMENTS

6.1 SUPPLEMENTAL SAFETY PROCEDURES

As discussed in Section 5.0, personnel may be exposed to a variety of chemical, physical, and biological hazards. The requirements for the control of many of these hazards these hazards is discussed in Standard Operating Procedures found listed in Table 4-1. Specifically, the 400 and 500 series of ENVs provide specific information regarding hazard control and the requirements necessary to complete tasks in a safe manner.

6.1.1 Utilities

Various forms of underground/overhead utility lines or pipes may be encountered during site activities. Prior to the start of intrusive operations, utility clearance is mandated, as well as obtaining authorization from all concerned public utility department offices. Should intrusive operations cause equipment to come into contact with utility lines, the SSO and an Earth Tech SH&E Professional will be notified immediately. Work will be suspended until the applicable utility agency is contacted and the appropriate actions for the particular situations can be taken. For this site, the applicable agency is Dig Safely New York. The phone number is provided in the Emergency Contacts list found in Section 8. For additional requirements, refer to ENV 515, *Excavations*; ENV 521, *Drilling*; and ENV 525, *Overhead Electrical Lines*.

6.1.2 Manual Lifting

Most materials associated with investigation and remedial activities are moved by hand. The human body is subject to severe damage in the forms of back injury, muscle strains, and hernia if caution is not observed in the handling process. Whenever possible, use at least two people to lift, or roll/lift with your arms as close to the body as possible. Under no circumstances should any one person lift more than 49 pounds unassisted. For additional requirements, refer to ENV 501, *Manual Materials Handling*.

6.1.3 Heavy Equipment and Vehicle Operations

Heavy equipment and site vehicles present serious hazards site personnel. Blind spots, failure to yield, and other situations may cause heavy equipment/vehicles to come into contact with personnel. To reduce the possibility of contact between equipment/traffic and personnel, always adhere to the following:

- Personnel must wear a high visibility, reflective safety vest at all times when working near heavy equipment and/or other vehicle traffic.
- Personnel must always yield to equipment/vehicle traffic and stay at least 100 feet away from all equipment/vehicle traffic. Always maintain eye contact with operators.
- When feasible, place barriers between work areas and equipment/vehicle traffic.
- Always ensure reverse warning alarms are working and louder than surrounding noise. Personnel must report inoperative reverse warning alarms.

For additional requirements, refer to ENV 520, *Heavy Earth Working Equipment*.

6.1.4 Slips, Trips, Falls, and Protruding Objects

A variety of conditions may exist that may result in injury from slips, trips, falls, and protruding objects. Slips and trips may occur as a result of wet, slippery, or uneven walking surfaces. To prevent injuries from slips and trips, always keep work areas clean; keep walkways free of objects and debris; and report/clean up liquid spills. Serious injuries may occur as a result of falls from elevated heights. Always wear fall protection while working at heights of 6 feet or greater above the next lower level. Protruding objects are any object that extends into the path of travel or working area that may cause injury when contacted by personnel. Always be aware of protruding objects and when feasible remove or label the protruding object with an appropriate warning.

6.1.5 Electrical and Powered Equipment

Electrical and powered equipment may be used during a variety of site activities. Injuries associated with electrical and powered equipment include electric shock, cuts/lacerations, eye damage (from flying debris), and

burns. To reduce the potential of injury from the hazards associated with electrical and powered equipment, always comply with the following:

- Wear ANSI-approved (Z87.1) safety glasses. Faceshields may be required to provide additional face protection from flying debris.
- Wear appropriate work gloves. Work gloves may reduce the severity of burns and cuts/lacerations.
- Use ground fault circuit interrupters (GFCIs) when using electrical powered tools/equipment. GFCIs prevent electrical shock by detecting the loss of electricity from a power cord and/or electrical device.
- Use lockout/tagout procedures when performing maintenance or repairs on equipment.

6.1.6 Noise

Hazardous noise may be produced during site activities by heavy equipment, powered tools, and other equipment or operations. Refer to ENV 204, *Hearing Conservation Program* for requirements regarding hazardous noise and hearing protection.

6.1.7 Diesel Fuel Cell

All portable diesel fuel tanks used on-site (to service site equipment/vehicles) must be staged within a diked containment area. The dike containment area should be at least 10 feet from any building. The containment area must be adequately lined and of sufficient size to capture the entire contents of the tank in the event of a release. The containment area shall be visually inspected after each rain event and confirmed to be free of oil prior to discharge of rain water.

The tank must also be grounded to a locally installed grounding rod that is set at a minimum depth of 6 feet. Bonding wire and clamps shall also be provided for bonding between containers during all fuel transfers. Care shall be taken to ensure that metal to metal contact is made at the clamping surfaces to guarantee electrical continuity. The following additional precautions shall also be taken:

- The tank shall be adequately marked to display its contents.
- A no-smoking zone shall be adequately marked and extend to a minimum of 50 feet around the tank.
- A fire extinguisher must be within 50 feet of the tank and shall be maintained in a fully charged and operable condition. The extinguisher must be visually inspected each month and tagged with the inspection date.
- Ensure that the equipment is shut-off prior to dispensing fuel.

6.2 EXPOSURE MONITORING PROCEDURES

Monitoring procedures will be employed during site characterization activities to assess employee exposure to chemical and physical hazards. Monitoring will consist primarily of onsite determination of various parameters (e.g., airborne contaminant concentrations and heat stress effects). but may be supplemented by more sophisticated monitoring techniques, if necessary.

6.2.1 Real-Time Exposure Measurement

Monitoring shall be performed within the work area on site in order to detect the presence and relative levels of toxic substances. The data collected throughout monitoring shall be used to determine the appropriate levels of PPE. Monitoring shall be conducted as specified in each THA (Attachment A) as work is performed.

Table 6-1specifies the real-time monitoring equipment which will be used for this project.

Table 6-1. Monitoring Parameters and Equipment

INSTRUMENT	MANUFACTURER/MODEL*	SUBSTANCES DETECTED
Photo Ionization Detector (PID)	RAE Systems mini-RAE Photovac Microtip HNu Model Hnu (min. 10.2 eV bulb)	Organic Solvents
Multi or 4 Gas Detectors	RAE Systems Multi-RAE	Lower Explosive Limit Oxygen (O_2) Carbon Monoxide (CO) Hydrogen Sulfide (H_2S)
Colorimetric Detector Tubes	Sensidyne Draeger	Hydrochloric acid Sulfuric acid
Particulate Monitor	MIE Model PDM-3 mini-RAM Data-RAM	Aerosols, mist, dust, and fumes

6.2.1.1 Health and Safety Action Levels

An action level is a point at which increased protection is required due to the concentration of contaminants in the work area or other environmental conditions. The concentration level (above background level) and the ability of the PPE to protect against that specific contaminant determine each action level. The action levels are based on concentrations in the breathing zone.

If ambient levels are measured which exceed the action levels in areas accessible to unprotected personnel, necessary control measures (barricades, warning signs, and mitigative actions, etc.) must be implemented prior to commencing activities at the specific work area.

Personnel should also be able to upgrade or downgrade their level of protection with the concurrence of SSO or the Safety Professional.

Reasons to upgrade:

- Known or suspected presence of dermal hazards.
- Occurrence or likely occurrence of gas, vapor, or dust emission.
- Change in work task that will increase the exposure or potential exposure to hazardous materials.

Reasons to downgrade:

- New information indicating that the situation is less hazardous than was originally suspected.
- Change in site conditions that decrease the potential hazard.
- Change in work task that will reduce exposure to hazardous materials.

Table 6-2. Monitoring Procedures and Action Levels

PARAMETER	LOCATION AND INTERVAL	RESPONSE LEVEL (Meter units/ppm above background)	RESPONSE
Oxygen Levels (multi-gas detector or O_2 meter)	In the breathing zone/work area within the confined space prior to and continuously during entry or in the immediate work area during intrusive activities involving impacted materials.	19.5 – 23.5 percent (%) O_2	Continue work and monitoring. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors.
		< 19.5 or > 23.5 percent (%) O_2	Cease work, exit the work area or confined space and contact the SSO.
Carbon Monoxide	In the breathing zone/work area prior to and during operation of equipment with combustion motors.	< 25 ppm	Continue work and monitoring. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors.
		≥ 25 ppm	Cease work, exit the work area or confined space and contact the SSO.
Hydrogen Sulfide (multi-gas detector or individual H_2S meter)	In the breathing zone/work area within the confined space prior to and continuously during entry or in the immediate work area during intrusive activities involving impacted materials.	< 10 ppm	Continue work activities. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors.
		≥ 10 ppm	Cease work, exit the area or confined space, and contact the SSO.
Explosive Atmospheres (multi-gas detector or CGI)	In the breathing zone/work area prior to and during entry in to container/drum, impacted work area or confined space.	< 10% LEL	Continue work activities. If significant changes exist in this acceptable range, contact the SSO to investigate the potential for contributing factors.
		≥ 10% LEL	Cease work, exit the area or confined space, and contact the SSO.
Work Area HCL Detector tubes (e.g., Drager or equivalent)	Breathing zone, every 60 minutes during site operations involving the risk for potential HCL exposure, such as: liquid transfer, pipe removal, tank decon, and sampling. Once sufficient data is gathered showing HCL exposure is minimal, the Safety Professional and EPA Health and Safety Representative will determine how periodically to monitor during site tasks.	≥ 1 - < 5- ppm	Cease work, exit the area, contact the SSO/SH&E Manager and upgrade to Level C PPE (minimum GMC/P100 cartridges or equivalent chemical cartridge combined with P100). Continue to monitor for HCL.
		≥ 5 ppm	Cease work, exit the area, contact the SSO/SH&E Manager and upgrade to Level B.
Dust, Mist, Aerosols (Total by Mini-Ram)*	At least every 30 minutes in the worker's breathing zone during cutting, demolition, solid waste removal/handling activities involving impacted materials.	< 1 mg/m³ (Sustained for more than 5 minutes)	Continue Level D work and continue monitoring.
		≥ 1< 5 mg/m³ (Sustained for more than 5 minutes)	Upgrade to Level C PPE. Contact the RM and SSO, implement mitigation measures, and continue Level C (minimum GMC/P100 cartridges or equivalent chemical cartridge combined with P100) and continue monitoring.
		≥ 5 mg/m³ (Sustained for more than 5 minutes)	Temporarily cease work operations, contact the RM and SH&E Manager to discuss improving site mitigation measures. Possible upgrade to Level B for exclusion zone workers.

6.2.1.2 Monitoring Equipment Calibration

All instruments used will be calibrated at the beginning and end of each work shift, in accordance with the manufacturer's recommendations. If the owner's manual is not available, the personnel operating the equipment will contact the applicable office representative, rental agency or manufacturer for technical guidance for proper calibration. If equipment cannot be pre-calibrated to specifications, site operations requiring monitoring for worker exposure or off-site migration of contaminants will be postponed or temporarily ceased until this requirement is completed.

6.2.1.3 Personal Sampling

Should site activities warrant performing personal sampling to better assess chemical exposures experienced by Earth Tech employees, the SSO, under the direction of a Certified Industrial Hygienist (CIH), will be responsible for specifying the monitoring required. Baseline sampling will be conducted at beginning of site operations and carried out periodically. Within five working days after the receipt of monitoring results, the CIH will notify each employee, in writing, of the results that represent that employee's exposure. Copies of air sampling results will be maintained in the project files.

6.2.1.3.1 Metal Sampling

Sampling for worker exposure to metals in the work place will follow NIOSH 7300 Method using a closed 0.8 MCEF cassette.

6.2.1.3.2 Hydrochloric Acid Sampling

Sampling for worker exposure to hydrochloric acid in the work place will follow NIOSH 7903 Method using a silica gel tube as media.

6.2.2 Noise Exposure Monitoring

When heavy equipment is in operation, it will be necessary to ensure that each exclusion zone fully encompasses all areas where hazardous noise levels are present (85dBA or greater). Once each work day, the SSO will use a sound level meter to survey the perimeter of each exclusion zone, while all onsite heavy equipment within the zone is being operated simultaneously. If the sound pressure level exceeds 85 dBA at any location along the site perimeter, the SSO will exit the exclusion zone and use the meter to determine the 85 dBA limit. The exclusion zone boundary will then be adjusted to fully encompass this region.

7.0 PERSONAL PROTECTIVE EQUIPMENT

7.1 PERSONAL PROTECTIVE EQUIPMENT

The purpose of personal protective equipment (PPE) is to provide a barrier, which will shield or isolate individuals from the chemical and/or physical hazards that may be encountered during work activities. ENV 205. *Personal Protective Equipment*, lists the general requirements for selection and usage of PPE. Table 7-1 lists the minimum PPE required during site operations and additional PPE that may be necessary. The specific PPE requirements for each work task are specified in the individual THAs found in Attachment A.

By signing this HASP you are agreeing that you have been properly trained in the use, limitations, care and maintenance of the protective equipment you will use at this project. If you have not received training on the proper use, care, and limitations of the PPE required for this project, please see the RM/SSO for the proper training prior to signing this HASP.

Table 7-1. Personal Protective Equipment

TYPE	MATERIAL	ADDITIONAL INFORMATION
Minimum PPE:		
Safety Vest	High-visibility	Must have reflective tape and be visible from all sides
Boots	Leather	ANSI Z41 approved safety toe
Safety Glasses w/ sideshields		ANSI Z87.1 Approved
Hard Hat		ANSI Approved
Work Uniform		No shorts/cutoff jeans or sleeveless shirts
Additional PPE:		
Hearing Protection	Ear plugs and/ or muffs (minimum 29 NRR)	In hazardous noise areas
Work Gloves	Leather	If working with sharp objects or powered equipment.
Protective Chemical Gloves	Inner: Nitrile Outer: Heavy Duty Nitrile. PVC, Neoprene, Viton	
Protective Chemical Coveralls	Inner: Tyvek® or equivalent Outer: Tychem SL® or equivalent	
Protective Chemical Boots	Rubber, neoprene, PVC	
Level C Respiratory Protection	MSA (Full Face or equivalent) equipped with GMC/P100	Fit test required annually
Level B Respiratory Protection	Self Contained Breathing Apparatus (SCBA). Airline with 5 minute escape pack.	Grade "D" Certified Air (Certificate Required). Obtain certificate of analysis from compressed gas vendor.
Face Protection	Debris/splash shield	
Body Protection	Apron, Chaps	During chainsaw operations
Welding PPE	Leathers, appropriate lens	See ENV 517 for specific PPE
Cold Weather Gear	Hard hat liner, hand warmers, insulated gloves, beta boots	

7.2 DECONTAMINATION

All requirements for performing personal and equipment decontamination may be found in Earth Tech Environmental Practice Standard ENV 535, *Decontamination*.

7.2.1 PPE Doffing and Donning Information

The following information is to provide field personnel with helpful hints that, when applied, make donning and doffing of PPE a more safe and manageable task:

- Never cut disposable booties from your feet with basic utility knives. This has resulted in workers cutting through the booty and the underlying sturdy leather work boot, resulting in significant cuts to the legs/ankles. Recommend using a pair of scissors or a package/letter opener (cut above and parallel with the work boot) to start a cut in the edge of the booty, then proceed by manually tearing the material down to the sole of the booty for easy removal.
- When applying duct tape to PPE interfaces (wrist, lower leg, around respirator, etc.) and zippers, leave approximately one inch at the end of the tape to fold over onto itself. This will make it much easier to remove the tape by providing a small handle to grab while still wearing gloves. Without this fold, trying to pull up the tape end with multiple gloves on may be difficult and result in premature tearing of the PPE.
- Have a "buddy" check your ensemble to ensure proper donning before entering controlled work areas. Without mirrors, the most obvious discrepancies can go unnoticed and may result in a potential exposure situation.
- Never perform personal decontamination with a pressure washer.

7.2.2 Disposal of PPE & Decontamination Materials

All PPE and decontamination materials (i.e., rinsate, tubs, brushes, etc.) must be disposed of in accordance with federal, state, and local regulations. Contaminated PPE and decontamination materials may need to be disposed of as hazardous waste based on the types and degree of contamination.

8.0 SITE CONTROL

8.1 GENERAL

The purpose of site control is to minimize potential contamination of workers, protect the public from site hazards, and prevent vandalism. The degree of site control necessary depends on the site characteristics, site size, and the surrounding community.

Controlled work areas will be established at each work location, and if required, will be established directly prior to the work being conducted. Diagrams designating specific controlled work areas will be drawn on site maps, posted in the support vehicle or trailer and discussed during the daily safety meetings. If the site layout changes, the new areas and their potential hazards will be discussed immediately after the changes are made. A general example of a zone layout has been developed for site activities and is attached to this section.

8.2 CONTROLLED WORK AREAS

Each HAZWOPER controlled work area will consist of the following three zones:

- Exclusion Zone: Contaminated work area.
- Contamination Reduction Zone: Decontamination area.
- Support Zone: Uncontaminated or "clean area" where personnel should not be exposed to hazardous conditions.

Each zone will be periodically monitored in accordance with the air monitoring requirements established in this HASP. The Exclusion Zone and the Contamination Reduction Zone are considered work areas. The Support Zone is accessible to the public (e.g., vendors, inspectors).

8.2.1 Exclusion Zone

The Exclusion Zone is the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc. This area must be clearly marked with hazard tape, barricades or cones, or enclosed by fences or ropes. Only personnel involved in work activities, and meeting the requirements specified in the applicable THA and Sections 4.1 and 4.2, will be allowed in an Exclusion Zone.

The extent of each area will be sufficient to ensure that personnel located at/beyond its boundaries will not be affected in any substantial way by hazards associated with sample collection activities

All personnel should be alert to prevent unauthorized, accidental entrance into controlled-access areas (the Exclusion Zone and CRZ). If such an entry should occur, the trespasser should be immediately escorted outside the area, or all HAZWOPER-related work must cease. All personnel, equipment, and supplies that enter controlled-access areas must be decontaminated or containerized as waste prior to leaving (through the CRZ only).

8.2.2 Contamination Reduction Zone

The Contamination Reduction Zone is the transition area between the contaminated area and the clean area. Decontamination is the main focus in this area. The decontamination of workers and equipment limits the physical transfer of hazardous substances into the clean area. This area must also be clearly marked with hazard tape and access limited to personnel involved in decontamination. Decontamination procedures are further explained in ENV 535.

8.2.3 Support Zone

The Support Zone is an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located. The Support Zone shall have minimal potential for significant exposure to contaminants (i.e., background levels).

Employees will establish a Support Zone (if necessary) at the site before the commencement of site activities. The Support Zone would also serve as the entry point for controlling site access.

8.3 SITE ACCESS DOCUMENTATION

All personnel entering the site shall complete the "Site Entry/Exit Log" located at the Command Post.

If implemented by the RM, all personnel required to enter established site control zones shall complete the Exclusion and/or "Hot Zone" Log located at the decontamination area.

8.3.1 Visitor Access

Visitors to any HAZWOPER controlled-work area must comply with the health and safety requirements of this HASP, and demonstrate an acceptable need for entry into the work area. All visitors desiring to enter any controlled work area must observe the following procedures:

1. A written confirmation must be received by Earth Tech documenting that each of the visitors has received the proper training and medical monitoring required by this HASP. Verbal confirmation can be considered acceptable provided such confirmation is made by an officer or other authorized representative of the visitor's organization.
2. Each visitor will be briefed on the hazards associated with the site activities being performed and acknowledge receipt of this briefing by signing the appropriate tailgate safety briefing form.
3. All visitors must be escorted by the RM or designee.

If the site visitor requires entry to any Exclusion Zone, but does not comply with the above requirements, all work activities within the Exclusion Zone must be suspended. Until these requirements have been met, entry will not be permitted.

8.4 SITE SECURITY

Site security is necessary to:

- Prevent the exposure of unauthorized, unprotected people to site hazards.
- Avoid the increased hazards from vandals or persons seeking to abandon other wastes on the site.
- Prevent theft.
- Avoid interference with safe working procedures.

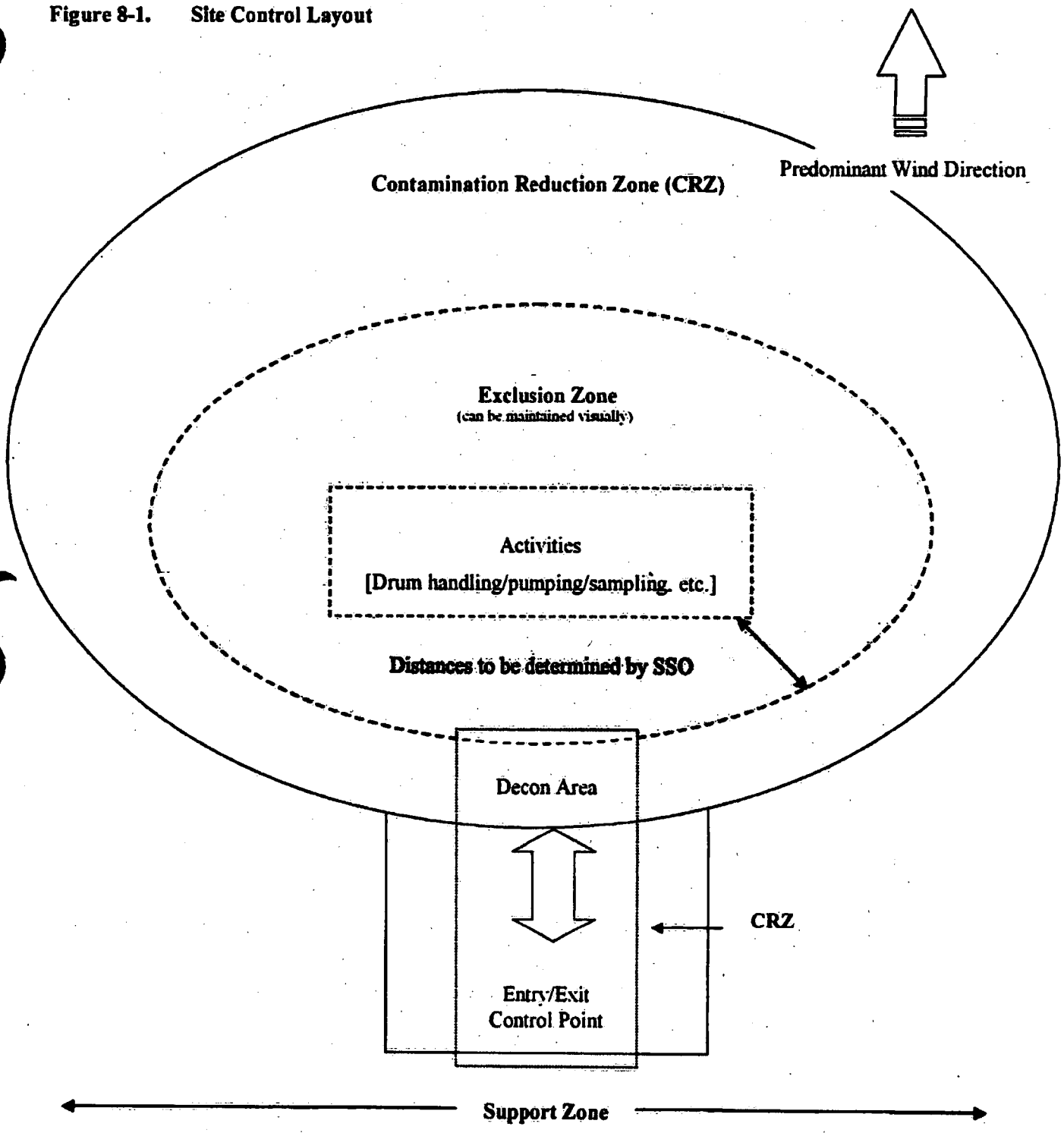
To maintain site security during working hours:

1. Maintain security in the Support Zone and at access control points.
2. Establish an identification system to identify authorized persons and limitations to their approved activities.
3. Assign responsibility for enforcing authority for entry and exit requirements.
4. When feasible, install fencing or other physical barrier around the site.
5. If the site is not fenced, post signs around the perimeter and whenever possible, use guards to patrol the perimeter. Guards must be fully apprised of the hazards involved and trained in emergency procedures.
6. Have the RM approve all visitors to the site. Make sure they have valid purpose for entering the site. Have trained site personnel accompany visitors at all times and provide them with the appropriate protective equipment.

To maintain site security during off-duty hours:

1. If possible, assign trained, in-house technicians for site surveillance. They will be familiar with the site, the nature of the work, the site's hazards, and respiratory protection techniques.
2. If necessary, use security guards to patrol the site boundary. Such personnel may be less expensive than trained technicians, but will be more difficult to train in safety procedures and will be less confident in reacting to problems around hazardous substances.
3. Enlist public enforcement agencies, such as the local police department, if the site presents a significant risk to local health and safety.

Figure 8-1. Site Control Layout



9.0 EMERGENCY RESPONSE PLANNING

9.1 EMERGENCY ACTION PLAN

Although the potential for an emergency to occur is remote, an emergency action plan has been prepared for this project should such critical situations arise. The only significant type of onsite emergency that may occur is physical injury or illness to a member of the Earth Tech team. The emergency action plan will be reviewed by all personnel prior to the start of field activities.

Three major categories of emergencies could occur during site operations:

1. Illnesses and physical injuries (including injury-causing chemical exposure)
2. Catastrophic events (fire, explosion, earthquake, or chemical)
3. Safety equipment problems

9.1.1 Emergency Coordinator

The RM will assume the duties of the emergency coordinator (EC). In addition, the RM will select a competent person to act as the alternate EC. The alternate EC must be listed in Table 9-2 The duties of the EC and the alternate EC have been specified in ENV 102.

9.1.2 Site-Specific Emergency Procedures

Prior to the start of site operations, the EC shall fill in Table 9-1 with any additional site-specific information regarding evacuations, muster points, communication, and other site-specific emergency procedures:

Table 9-1. Emergency Planning Emergency Planning
(SSO must complete this site specific Emergency Action Plan)

Emergency Action Plan	
Injury/Illness/Incident: Report to supervisor and seek medical attention. Supervisor will contact the Incident Reporting Line (800-348-5046).	
Security or Other Threat: Contact Supervisor by Nextel to have 911 personnel contacted	
Chemical Spill: Notify office personnel, Evacuate area of site personnel using buddy system to meet at front gate for a head count, Don appropriate level of protection, clean up and containerize the spilled material.	
Fire/Explosion: Evacuate area using buddy system, Inform supervisor by Nextel to call 911 for assistance, meet at front gate area for a head count.	
Tornado: Contact site personnel by Nextel radios. Evacuate work zone using buddy system, seek shelter in the basement of office area.	
Lightning: Contact site personnel by Nextel Radio, Evacuate work zone using buddy system, seek shelter in the break room of the office area.	
Communication Procedures: Nextel Radios between field personnel and office personnel.	
CPR/First Aid Trained Personnel	David Bofinger, Ken Bracken, John Tuttle, McKyland Miller.

9.1.3 Spill Containment Procedure

Work activities may involve the use of hazardous materials (i.e. fuels. solvents) or work involving drums or other containers. The following procedures will be used to prevent or contain spills:

- All hazardous material will be stored in appropriate containers
- Tops/lids will be placed back on containers after use.
- Containers of hazardous materials will be stored appropriately away from moving equipment.

At least one spill response kit, to include an appropriate empty container, materials to allow for booming or diking the area to minimize the size of the spill, and appropriate clean-up material (i.e. speedy dri) shall be available at each work site (more as needed).

- All hazardous commodities in use (i.e. fuels) shall be properly labeled.
- Containers shall only be lifted using equipment specifically manufactured for that purpose.
- For drums/containers. follow the procedures in ENV 507, *Handling of Drums and Large Containers*, to minimize spillage.

9.1.4 Accident/Incident Reporting

All accidents and incidents that occur on-site during any field activity will be promptly reported to the SSO and the RM in accordance with Earth Tech Safety Procedure EHS 101, *Injury, Illness, and Near-Miss Reporting*.

If any Earth Tech employee is injured and requires medical treatment, the RM will contact **Earth Tech's Incident Reporting Line at (800) 348-5046 immediately**. The FM will initiate a written report, using the ***Supervisor's Report of Incident*** form (see EHS 101). The FM will complete the first two sections of this form and forward to the CTO Manager for completion of Section 3. The report will then be provided to the H&SP before the end of the following shift.

If any employee of a subcontractor is injured, documentation of the incident will be accomplished in accordance with the subcontractor's procedures; however, copies of all documentation (which at a minimum must include the OSHA Form 301 or equivalent) must be provided to the SSO within 24 hours after the accident has occurred.

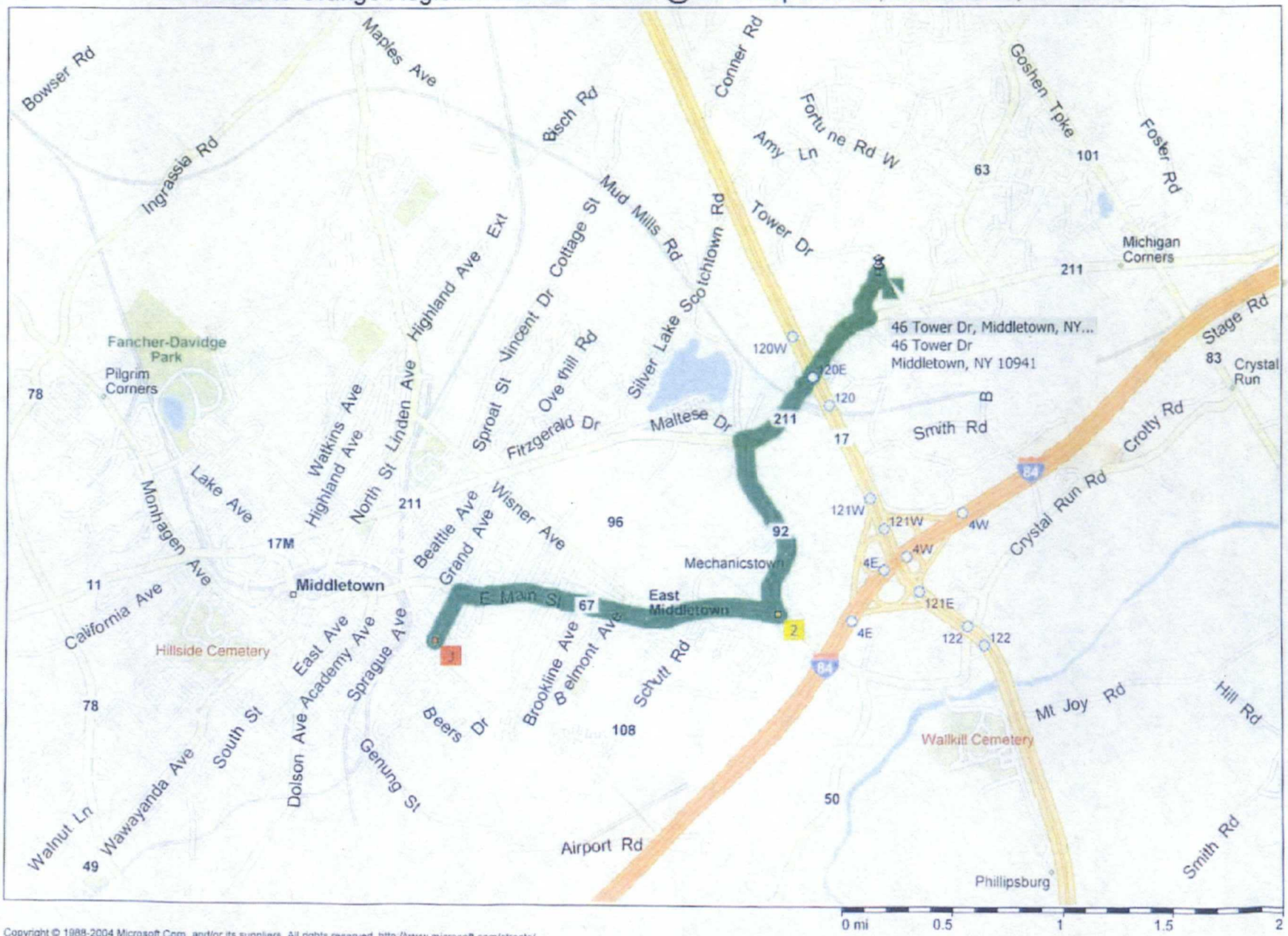
Table 9-2. Emergency Contacts

Emergency Coordinators / Key Personnel			
Name	**Title/Workstation**	**Telephone Number**	**Cellular Phone**
Dilshad Perera	On-Scene Coordinator		908-420-4514
Joe West	Program Manager	804-515-8504	804-229-4529
David Bofinger	RM/SSO/EC		814-590-9470
Dale Prokopchak	Safety Manager	804-515-8556	804-839-8312
		(Home) 804-360-3301	
Ryan Wolschleger	Safety Professional	616-940-4235	616-446-6913
Steve Baril	Safety Professional	616-940-4292	616-450-9533
Brett Hodgson	Safety Professional	616-940-4444	616-446-6910
Incident Reporting	**Corporate Safety Administrator**	**800-348-5046**	
	Secondary EC		

Organization / Agency	
Name	**Telephone Number**
Police Department	911
Fire Department	911
State Police	911
Ambulance Service *(EMT will determine appropriate hospital for treatment)*	911
Poison Control Center	800-222-1222
Pollution Emergency	800-292-4706
National Response Center	800-424-8802
Chem-Trec	800-424-9300
Title 3 Hotline	800-535-0202
Hospital	
Orange Regional Medical Center	845-343-2424
60 Prospect Avenue, Middletown, NY	
Hospital Route: See map(s) on the following page(s) for route information	
Public Utilities	
Name	**Telephone Number**
Dig Safely New York	800-962-7962

Figure 9-1. Site/Hospital Route/Detail Map

Directions to Orange Regional Medical Center @ 60 Prospect Ave, Middletown, NY 10940



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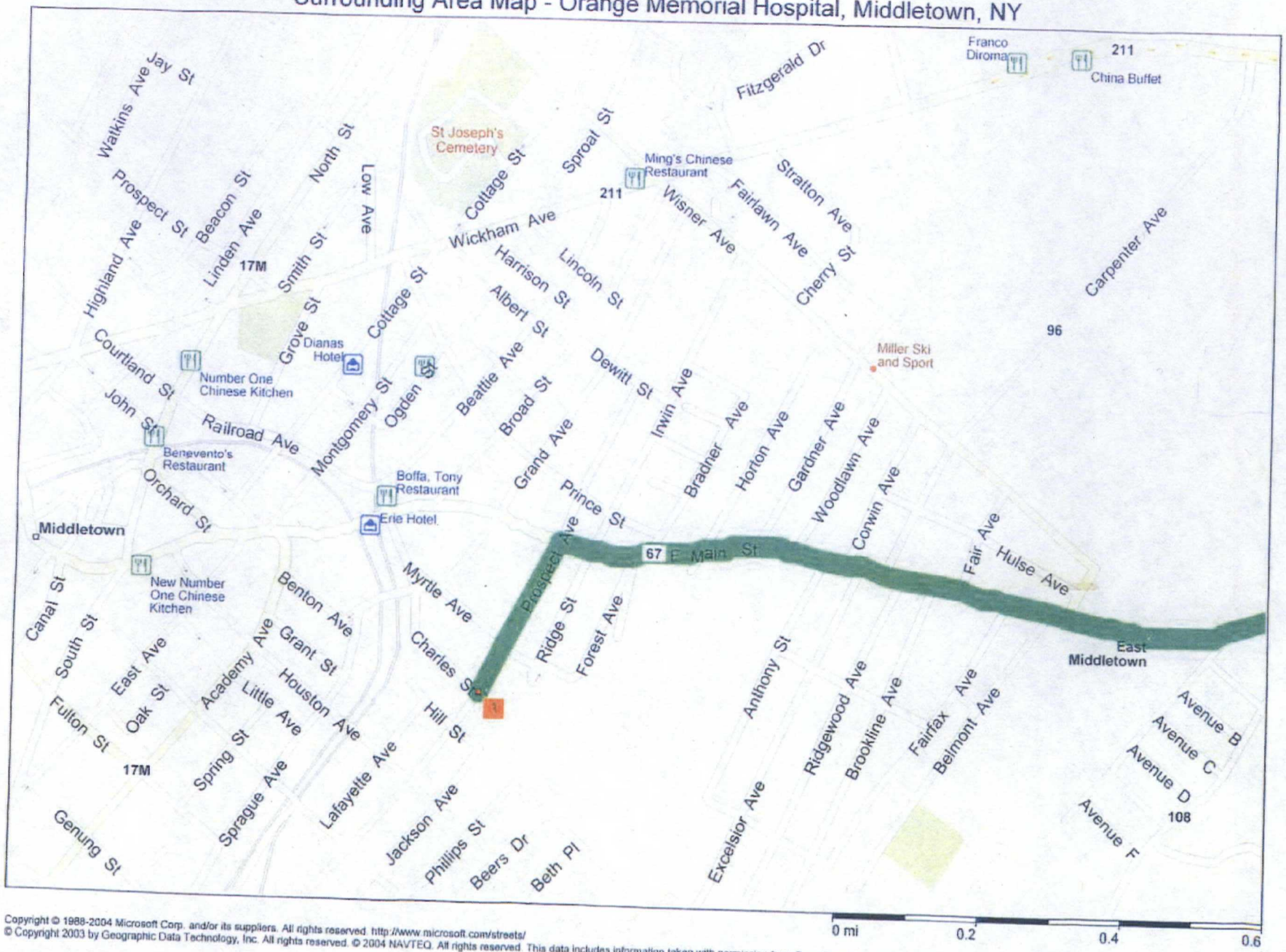
Surrounding Area Map - Orange Memorial Hospital, Middletown, NY



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9:00 AM	0.0 mi	1 Depart Westwood Chemical Corporation [46 Tower Dr, Middletown, NY 10941] on Tower Dr (East) for 0.6 mi
9:01 AM	0.6 mi	Turn RIGHT (West) onto SR-211 for 0.8 mi
9:02 AM	1.4 mi	Turn LEFT (South-East) onto Local road(s) for 10 yds
9:03 AM	1.4 mi	Bear RIGHT (South) onto CR-92 [Dunning Rd] for 0.8 mi
9:05 AM	2.3 mi	2 At near Mechanicstown, turn RIGHT (West) onto CR-67 [E Main St] for 1.5 mi
9:09 AM	3.7 mi	Turn LEFT (South) onto Prospect Ave for 0.2 mi
9:10 AM	4.0 mi	3 Arrive 60 Prospect Ave, Middletown, NY 10940

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10.0 PERSONNEL ACKNOWLEDGEMENT

By signing below, the undersigned acknowledges that he/she has read and reviewed the Earth Tech Health and Safety Plan for the Westwood Chemical Corporation site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

PRINT NAME	SIGNATURE	ORGANIZATION	DATE
Anthony Evan Smith	[signature]	ET	4/12/05
DILSHAD PEREZA	[signature]	US EPA	04/12/05
RUSSELL M STRATHERN	[signature]	USCG	04/14/05
ANICIA HOKANSON	[signature]	USCG	14APR05
BRYAN NYSTROM	[signature]	USCG	14APR05
KENNETH BRACKEN	[signature]	EARTH TECH	4/15/05
Brian Tigue	[signature]	Summit Research Labs	4-15-05
GARY COLEMAN	[signature]	SUMMIT RESEARCH LABS	4/15/05
Tony Buzzelli	[signature]	SRL	4/15/05
McKayland Miller	[signature]	ET	4/15/05
CHARLES SKUPIEN	[signature]	ETRS	4-19-05
John Tuttle	[signature]	ET	4-19-05
JERRY MINNEFIELD	[signature]	ETRS	4-19-05
John Price	[signature]	ET	4-25-05
Rob McKown	[signature]	ETRS	05/16/05
Todd Nash	[signature]	ETRS	5/16/05
Billy Scheer	[signature]	ET	5/16/05
Mark Kreutz	[signature]	ET	5/16/05
Joe Magyar	[signature]	Environmental Dreams	6/8/05
Carlos Marziago		Environmental Dreamscp.	6/8/05
Peter Skalski		Environmental Dreamscpes	6/8/05
CHRISTOPHER PRIOU	[signature]	SJ TRANSPORTATION	6/9/05
ROGER SMITH	[signature]	SJ "	6/9/05
MERLE L McDowell	[signature]	SJ "	6-13-05
FRANK J. ROMANOWSKI	[signature]	FCI	6-13-05
ED WILLIAMS	[signature]	FREEHOLD CART.	6.14.05
Ariel Miranda	[signature]	NAPP	6/15/05
Bryan O'Neill	[signature]	NAPP Electric	6/15/05
Robert Metz	[signature]	Napp Electric	

William Root	[signature]	Root FCI	6/15/05
Rai Gundermann	[signature]	USCG	6/15/05
GARY NEFF	[signature]	SJ TRANSPORTATION	6/16/05
Kent Mosvel	[signature]	FCI	6-20-05
Steve Bivins	[signature]	FCI	6-21-05
James Doc Jacobs III	[signature]	FCI	6-27-05
George C Fleetwood III	[signature]	FCI	6-28-05
John Kapsimalis	[signature]	USCG	6-28-05
Tim Brannon Jr	[signature]	ET	7/11/05
Irvin Bacon		FCI	7/12/05
Joseph Bryce	[signature]	SJ	12 July 05
Robert Lester	[signature]	SJ	7/13/05
Ike McDowell	[signature]	SJ	7/14/05
Charles B. Raff	[signature]	SJ	7/14/05
Gregory Pesano	[signature]	ET	7-18-05
Charles Lawson	[signature]	SJ	7-18-05
Bill Butler	[signature]	LJC ASSOC.	7-20-05
Rob Hynes	[signature]	SJ	7-25-05
Greene W Hamilton	[signature]	SJ	7-25-05
John Dixon	[signature]	ET	8-1-05
SCOTT GALVIN	[signature]	USCG	8-3-05

10.0 PERSONNEL ACKNOWLEDGEMENT

By signing below, the undersigned acknowledges that he/she has read and reviewed the Earth Tech Health and Safety Plan for the Westwood Chemical site. The undersigned also acknowledges that he/she has been instructed in the contents of this document and understands the information pertaining to the specified work, and will comply with the provisions contained therein.

PRINT NAME	SIGNATURE	ORGANIZATION	DATE
TRISHA HILL	Trisha R. Hill	USCG	03 AUG 05
Joe Henry	[illegible]	ET	03 Aug 05
Edward A. Young	Edward A. Young		8 Aug 05
Joe Galb	[illegible]	Summit Research Labs	8-8-05
Tom Goellner	Tom Goellner	Summit Research Labs	8/8/05
Richard Savannah	Richard Savannah	Summit Research Labs.	8.8.05
Bill Bowers	B. Bowers	US. ENVIRO	8.9.05.
Greg Ney	[illegible]	Horwith	8-9-05
Tom Harper	Thomas Harper	Summit	8-10-05
John Stewart	John Stewart	Summit	8/10/05
Jeremiah J Edwards	[illegible]	NEIR	8-10-05
John Kondered	[illegible]	CARBOX	8.10/05
MARK GRAY	[illegible]	USCG	8-22-05
KARL SMITH	Karl Smith	AJWEISAND	8/24/05
Earnest Burgess	Earnest Burgess	ET	9-12-05
CHRIS Zenal Youngstown	Chris Zenal Youngstown	ET	9-12-05
Andy Betcher	Andy Betcher	Naupp Elect	9/16/05
John Morberger	[illegible]	USENV	10/27/05

Attachment A

Task Hazard Analyses

5.0 RESPONSE

Response to severe weather will vary with each instance of potential or actual severe weather. In all cases, sufficient time must be allotted to provide for appropriate responses, such as decontamination, shutdown of operations, securing equipment, and travel to muster locations. If an imminent danger situation arises, the professional judgment of the EC will dictate the decision-making needs. In addition, careful documentation of severe weather activities and response is highly recommended. Refer to the table below and the site specific Emergency Response Plan for recommended response to severe weather situations.

5.1 Lightning

Response to situations involving lightning will vary based upon work activities and location factors. In general, work operations should cease when thunder or visible lightning is present. Sensitive work operations, such as those involving flammable materials, drilling or crane operations, elevated work, or work near tall objects should cease at least 15 minutes prior to expected arrival of lightning and severe weather, even if lightning or thunder are not present. For example, if the National Weather Service predicts thunderstorms in the area at 11:15 AM, work operations will cease at 11:00 AM or earlier to allow sufficient time to shutdown equipment or take other necessary actions.

SEVERE WEATHER	RESPONSE		
	Cease Work	Resume Work	Recommended Muster Location
Lightning *General Work Operations*	If thunder or visible lightning present	15 minutes after last thunder or lightning strike	Completely enclosed, sturdy structure; completely enclosed automobile; low lying areas away from tall objects
Lightning *High Risk Operations* (i.e., crane operations, work with flammable materials or near tall structures, other elevated work, etc.)	15 minutes or more prior to expected arrival of lightning and severe weather	15 minutes after last thunder or visible lightning strike	See above
Tornado *Note:* If sufficient shelter is not available, allow for enough time to leave site and find shelter.	Be in shelter 15 minutes prior to expected arrival	Assess damages and resume work if conditions permit after severe weather has ceased	Lowest area of sturdy structure, (i.e., basement); center rooms in sturdy structure; crouch under sturdy objects (i.e., desk)
Hail	Be in shelter 5 minutes prior to expected arrival	5 minutes after severe weather has ceased	Completely enclosed, sturdy structure; stay clear of windows

6.0 ADDITIONAL CONSIDERATIONS

For additional information and resources, refer to SH&E 203—Accident Prevention Program-Requirements for SH&E Documentation, the Site-Specific Health & Safety Plan (HASP) or contact a Capital District Safety Professional.

1.0 PURPOSE

To establish minimum requirements in the event of severe weather events (i.e., lightning, tornadoes, hail, snow, etc.) during Earth Tech Emergency and Rapid Response Services (ERRS) operations.

2.0 SCOPE

This procedure applies to all ERRS work locations and affected personnel. Office locations will refer to the appropriate Emergency Action Plan developed for that particular location. All subcontractors under the direction of Earth Tech will adhere to this procedure at a minimum while on ERRS sites.

3.0 TRAINING

All Earth Tech and subcontractor personnel will be provided site-specific training including, but not limited to the following:

- A review of this Policy
- Site-specific Emergency Response Plan or emergency procedures to include:
  - Potential effects of severe weather.
  - Identified muster locations for tornadoes, storms, and lighting events.
  - Method(s) of communicating potential severe weather events
  - Roles and responsibilities of site personnel to identify and communicate potential severe weather events to supervisor or Response Manager (RM)
  - Equipment or operation(s) shut down procedures

Training must be documented on the Earth Tech *Safety Training Log* located in ENV 202, *Safety Meetings*.

4.0 RECOGNITION

Severe weather may approach work locations quickly and without warning. Identification of potential or actual severe weather occurrences may reduce the risk of injury or other damage to equipment. Weather forecasts and Doppler Radar represent the best methods of identifying severe weather, while observation of weather conditions may provide additional warning.

4.1 Weather Forecasts and Radar

Television/Radio stations and Internet sites (e.g., www.nws.noaa.gov, etc) will provide continuous severe weather forecast updates in various regions. Checking weather forecasts prior to the beginning of daily activities is highly recommended, especially during periods when the potential for severe weather is greatest (i.e., hurricane and tornado seasons, etc.). Internet Doppler Radar sites may provide live storm tracking images showing the movement and location of storms. However, be aware that storms may shift course and intensity at any time. When feasible, the RM or designee should check weather forecasts and provide weather updates to site personnel at the beginning of the shift and throughout the day.

4.2 Weather Observation

When severe weather is anticipated during work activities, observation of weather conditions at the site will provide warning of pending severe weather. Dark clouds, lightning flashes, thunder, and increase winds may be evidence of approaching severe weather. When available, on-site weather stations may provide additional warning, such as changes in barometric pressure or temperature. It is highly recommended that the emergency coordinator (EC) act as or designate a "spotter" to monitor severe weather.

EARTH TECH
A TYCO INTERNATIONAL LTD COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION
MIDDLETOWN, NEW YORK

Evaluated by: Brett Hodgson, SH&E Professional

Date: March, 2005

TASK NAME

SITE SET-UP AND SNOW REMOVAL

TASK DESCRIPTION

This task hazard analysis refers to the process of mobilizing and demobilizing the people and the materials to complete the tasks outlined in the work plan. This applies primarily to moving/loading/unloading of equipment and materials and the set up of office trailers. This THA also includes the hazards of snow removal via backhoe and working in winter conditions.

CHEMICAL EXPOSURE HAZARDS

- None

PPE

Level D

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Winter clothing.

OTHER SAFETY EQUIPMENT

- Leather gloves while handling sharp edges or operating powered tools/machinery.
- Hearing protection (minimum 29 NRR)
- First aid kit
- Fire extinguisher
- Flashlight
- Use probe to measure depth of standing water during initial site walk

PHYSICAL HAZARDS

- Cuts/lacerations (handling of sharp objects, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic (bobcat, forklift, backhoe, etc.)
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Icy conditions

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201. General Safety Rules
- ENV 501, Manual Materials Handling
- ENV 504, Powered Hand Tools
- ENV 505, Manual Hand Tools
- ENV 519, Fork Lift Vehicles
- ENV 520, Heavy Equipment Operation
- ENV 524, Overhead Electrical Lines
- ENV 528/529. Heat/Cold Stress
- ENV 532, Traffic Safety

ADDITIONAL SAFETY CONSIDERATIONS

1. If necessary contact a security agency prior to mobilization to provide site security.
2. Use spotters when loading/unloading heavy equipment, forklifts, etc.
3. Ensure Daily Heavy Equipment Checklist is completed.
4. Tape off standing water areas and other hazardous areas during initial site walk.

MONITORING PROCEDURES

Monitoring is not anticipated for this task.

A R T H T E C H
A EJIGS INTERNATIONAL LTD. COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION
MIDDLETOWN, NEW YORK

Evaluated by: Brett D. Hodgson, SH&E Professional

Date: April, 2005

TASK NAME

HANDLING/STAGING OF DRUMS AND CONTAINERS INDOORS

TASK DESCRIPTION

This task includes the handling/transporting of drums/containers from outside and staging the drums/containers inside the facility.

CHEMICAL EXPOSURE HAZARDS

- Metals (chromium, aluminum, lead)
- Zirconium oxychloride
- Hydrochloric acid
- Sulfuric acid
- Aluminum chlorohydrate (salt)

PPE

Modified Level D (see Table 6-2 for upgrade/downgrade criteria)

- High-visibility reflective safety vest.
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Protective chemical gloves (inner & outer), Tychem SL® or equivalent and rubber boots

OTHER SAFETY EQUIPMENT

- Leather gloves while handling sharp edges or operating powered tools/machinery.
- Hearing protection (minimum 29 NRR)
- Fall protection (contact Safety Professional)
- First aid kit
- Fire extinguisher
- SPF 15 sunblock when working outdoors.
- Air Purifying Respirator with GMC/P100 cartridge

PHYSICAL HAZARDS

- Cuts/laceration/burns (from operating powered/hand-operated tools)
- Slips, trips, falls, and protruding objects (uneven terrain, holes, etc.)
- Manual lifting (materials heavier than 49 pounds)
- Heat/cold stress
- Noise
- Pinch points (Drums)
- Slipping on ice/snow

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 401, Protection from Solvents
- ENV 501, Manual Materials Handling
- ENV 502, Ladders
- ENV 504, Powered Hand Tools
- ENV 505, Manual Hand Tools
- ENV 507, Handling of Drums/Containers
- ENV 519, Forklift Vehicles
- ENV 528/529, Heat/Cold Stress
- ENV 535, Decontamination

ADDITIONAL SAFETY CONSIDERATIONS

- Evaluate surrounding work area for additional hazards that may be present.
- All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
- Yield to heavy equipment and maintain a clear distance.
- Ensure drums are stabilized when transporting.
- Maintain eye contact with heavy equipment operator when approaching equipment.

MONITORING PROCEDURES

Refer to Table 6-2 *Monitoring Procedures and Action Levels* of the HASP for Monitoring Requirements.

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A TYCO INTERNATIONAL LTD COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION SITE
MIDDLETOWN, NY

Evaluated by: Brett Hodgson, SH&E Professional

Date: March 2005

TASK NAME

CONCRETE DEMOLITION AND REMOVAL OPERATIONS

TASK DESCRIPTION

Tank containment areas may be demolished after gross decontamination has been completed. Concrete debris will be staged on-site until load-out for transportation and disposal.

CHEMICAL EXPOSURE HAZARDS

- Metals (chromium, aluminium)
- Zirconium oxychloride
- Cement dust and silica
- Aluminum Chlorohydrate

PPE

Level D

- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- ANSI Hearing Protection.
- High-visibility reflective safety vest
- Leather Gloves
- ANSI approved goggles as required by operation (eg. jackhammering)
- Tyvek coveralls as required by the SSO.
- Rubber boots/boot covers as required by the SSO.

OTHER SAFETY EQUIPMENT

- Air Purifying Respirator with GMC/P100 cartridge as required by the SSO.

PHYSICAL HAZARDS

- Noise greater than 85 dBA
- Crushing and pinch-point hazards
- Cuts/lacerations (sharp edges/protrusions).
- Equipment traffic (bobcat, forklift, backhoe, front-end loader, other).
- Heat/cold stress
- Slips/trips/falls/protruding objects
- Inadequate lighting/illumination
- Vibration hazard
- Heavy lifting (objects over 49 pounds)

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 204, Hearing Conservation
- ENV 205, PPE
- ENV 206, Respiratory Protection Program
- ENV 305, Construction Operations
- ENV 501, Manual Materials Handling
- ENV 504, Powered Hand-tools
- ENV 514, Tank Removal/Demolition
- ENV 515, Cranes and Lifting Devices
- ENV 520, Heavy Earth Working Equipment
- ENV 528, Heat Stress and Hot Weather Operations
- ENV 532, Traffic Safety

ADDITIONAL SAFETY CONSIDERATIONS

1. Observe heavy equipment safety protocols.
2. Be aware of trip/slip/fall hazards and holes/sumps, etc.
3. Evaluate the requirement for upgrading PPE to Level C based on air monitoring (Data RAM/dust hazard).
4. Utilize dust suppression techniques as required.
5. Evaluate the need for upgrade to Modified Level D/Level C based on expected contamination levels.

MONITORING PROCEDURES

Monitor for total dust using Data RAM. The action level for use of appropriate respiratory protection for the site is 1 mg/m_3 unless monitoring for respirable dust is instituted.

EARTH TECH
A TETRA TECH INTERNATIONAL LTD COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION SITE
MIDDLETOWN, NY

Evaluated by: Brett Hodgson, SH&E Professional

Date: March 2005

TASK NAME

TANK CUTTING, DEMOLITION AND REMOVAL OPERATIONS

TASK DESCRIPTION

Fiberglass. poly and steel tanks that have been previously cleaned will be dismantled or otherwise demolished as required to effect disposal.

CHEMICAL EXPOSURE HAZARDS

- Metals (chromium, aluminium)
- Zirconium oxychloride
- Hydrochloric acid
- Sulfuric acid
- Aluminum Chlorohydrate

PPE

Level C

- Air Purifying Respirator with GMC/P100 cartridge
- ANSI approved hardhat
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- ANSI Hearing Protection.
- Leather Gloves
- Tyvek coveralls
- Rubber boots/booties (all seams must be taped/sealed).
- ANSI approved goggles/face shields as required by operation (eg. when using cutoff saw/saws all)

OTHER SAFETY EQUIPMENT

- Power saws: approved dust collection equipment with /HEPA attachment
- Electrical: GFI protection.
- Full Body Harness for fall protection when manlifts used to access tanks.
- Non-Sparking tools
- Combustible gas indicator (O_2/LEL)
- Hoists, slings, cranes or other devices for supporting and lowering structural components.
- Fall Protection (ladder tie-offs, lanyards, full body harnesses, etc.)

PHYSICAL HAZARDS

- Noise greater than 85 dBA
- Suspended loads/struck-by hazards
- Crushing and pinch-point hazards
- Cuts/lacerations (sharp edges/protrusions).
- Equipment traffic (bobcat, forklift, backhoe, cranes, other).
- Electrical
- Heat/cold stress
- Slips/trips/falls/protruding objects
- Inadequate lighting/illumination
- Elevated work areas/falls
- Potential Explosion Hazards

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 204, Hearing Conservation
- ENV 205, PPE
- ENV 206, Respiratory Protection Program
- ENV 502, Ladder Safety
- ENV 504, Powered Hand-tools
- ENV 506, Electrical Safety
- ENV 511, Confined Space Entry
- ENV 513, Tank Cleaning
- ENV 514, Tank Removal/Demolition
- ENV 515, Cranes and Lifting Devices
- ENV 518, Lockout/Tagout
- ENV 523, Manlifts
- ENV 528, Heat Stress and Hot Weather Operations
- ENV 531, Machine Guarding

ADDITIONAL SAFETY CONSIDERATIONS

1. Do not enter tank, vats, sumps, holes, or other potential confined spaces without a Confined Space Entry Procedure, Hazard Evaluation, and Permit completed.
2. Monitor all tanks/confined spaces for %LEL/Toxics prior to cutting.
3. Secure tank components prior to dismantling.
4. Use appropriate harnesses/lanyards and ladder tie-offs when working in elevated areas.
5. Be aware of trip/slip/fall hazards and holes/sumps, etc.
6. Evaluate operations to determine if Lockout/Tag-out requirements will apply.
7. Evaluate the requirement for upgrading PPE to Level C based on air monitoring.
8. A full-body harness and lanyard must be worn when working at heights ≥6 feet from the working surface.
9. Adjust the hotzone as necessary.
10. Use barriers as feasible to reduce contaminant migration.

MONITORING PROCEDURES

Perform direct read monitoring for HCL (tubes), LEL (4-gas), and particulates (DataRam) during the above stated operations. Reference Table 6-2 in HASP for action levels and how often to monitor.

ARTH TECH
A SUEZ INTERNATIONAL LTD COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION SITE
MIDDLETOWN, NY

Evaluated by: Brett Hodgson, SH&E Professional

Date: April 2005

TASK NAME

TANK/TOTE/DRUM REMOVAL OF SOLID WASTE

TASK DESCRIPTION

This task includes the process of deconning/removing the solid waste left behind in tanks/totes/drums once the liquid waste is removed and the handling of the solid waste.

CHEMICAL EXPOSURE HAZARDS

- Metals (chromium, aluminum, lead)
- Zirconium oxychloride
- Hydrochloric acid
- Sulfuric acid
- Aluminum chlorohydrate (salt)

PPE

Level C

- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Protective chemical gloves (inner & outer). Tychem SL® or equivalent and rubber boots/booties (all seams must be taped/sealed)
- Air Purifying Respirator with GMC/P100 cartridge
- Butyl gloves/boots when working with high concentrated sulfuric acid (78%)

Level B

- When performing confined space entry operations.

OTHER SAFETY EQUIPMENT

- Intrinsically Safe Flashlights/equipment
- Fire extinguisher
- Non-sparking tools (intrinsically safe equipment)
- First aid kit
- Explosion proof equipment (air tools)
- 4-Gas Meter
- HCL direct read tubes and hand pump
- Tripod or rescue rope for confined space entry

PHYSICAL HAZARDS

- Cuts/lacerations (handling of sharp objects, opening drums, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Unstable materials (drums, totes, debris, etc.)
- Fire/explosion
- Inadequate lighting/illumination
- Confined Space

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 501, Manual Materials Handling
- ENV 504, Powered Hand Tools
- ENV 505, Manual Hand Tools
- ENV 507, Handling of Drums and Large Containers
- ENV 511, Confined Space Entry
- ENV 513, Tank Cleaning
- ENV 519, Forklift Vehicles
- ENV 534, Metalworking Machines

ADDITIONAL SAFETY CONSIDERATIONS

1. Do not enter areas without sufficient lighting.
2. Be aware of trip/slip/fall hazards and holes/sumps, etc.
3. Do not enter tank, vats, sumps, holes, or other potential confined spaces without a Confined Space Entry Procedure, Hazard Evaluation, and Permit completed.
4. A full-body harness and lanyard must be worn when working at heights ≥6 feet from the working surface.
5. Be aware of your surroundings at all times.

MONITORING PROCEDURES

Perform direct read monitoring for HCL (tubes), 4-Gas monitoring, and particulate monitoring (DataRam) during the above stated operations Reference Table 6-2 in HASP for action levels and how often to monitor.

EARTH TECH
A AECOM INTERNATIONAL LTD. COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION SITE
MIDDLETOWN, NY

Evaluated by: Brett Hodgson, SH&E Professional

Date: April 2005

TASK NAME

SMALL CONTAINER OPERATIONS

TASK DESCRIPTION

This task includes the process of sampling, consolidation, lab packing, and crushing of all small containers located in the labs (QA/QC, etc.) throughout the site.

CHEMICAL EXPOSURE HAZARDS

- Metals (chromium, aluminum, lead)
- Zirconium oxychloride
- Hydrochloric acid
- Sulfuric acid
- Aluminum chlorohydrate (salt)

PPE

Level C

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Protective chemical gloves (inner & outer), Tychem SL® or equivalent and rubber boots/booties (all seams must be taped/sealed)
- Air Purifying Respirator with GMC/P100 cartridge
- Butyl gloves/boots when working with high concentrated sulfuric acid (78%)

OTHER SAFETY EQUIPMENT

- Intrinsically Safe Flashlights/equipment
- Fire extinguisher
- Non-sparking tools (intrinsically safe equipment)
- First aid kit
- Explosion proof equipment (air tools)
- LEL meter
- HCL direct read tubes and hand pump

PHYSICAL HAZARDS

- Cuts/lacerations (handling of sharp objects, opening drums, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Unstable materials (drums, totes, debris, etc.)
- Fire/explosion
- Inadequate lighting/illumination

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 501, Manual Materials Handling
- ENV 502, Ladders
- ENV 505. Manual Hand Tools
- ENV 507, Handling of Drums and Large Containers
- ENV 508, Drum Sampling
- ENV 535, Decontamination

ADDITIONAL SAFETY CONSIDERATIONS

1. Do not enter areas without sufficient lighting.
2. Be aware of trip/slip/fall hazards and holes/sumps, etc.
3. Watch for standing water, probe area first.
4. Do not enter tank, vats, sumps, holes, or other potential confined spaces without a Confined Space Entry Procedure. Hazard Evaluation, and Permit completed.
5. Ensure full body harness is worn during manlift operations, along with a lanyard attached to manlift railing.
6. Ensure full body harness is tied-off when working at heights greater than 6 feet above surface.
7. Ensure tank/drum/tote is vented prior to sampling.
8. Ensure routes of egress are clearly marked and not blocked.

MONITORING PROCEDURES

Perform direct read monitoring for HCL (tubes). 4-Gas monitoring, and particulate monitoring (DataRam) during the above stated operations Reference Table 6-2 in HASP for action levels and how often to monitor.

ARTH TECH
A CH2M INTERNATIONAL LTD. COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION SITE
MIDDLETOWN, NY

Evaluated by: Brett Hodgson, SH&E Professional

Date: April 2005

TASK NAME

SAMPLING

TASK DESCRIPTION

This task includes the process of sampling fluids/solids in totes, drums, and tanks for confirmation sampling throughout the site.

CHEMICAL EXPOSURE HAZARDS

- Metals (chromium, aluminum, lead)
- Zirconium oxychloride
- Hydrochloric acid
- Sulfuric acid
- Aluminum chlorohydrate (salt)

PPE

Level C

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Protective chemical gloves (inner & outer), Tychem SL® or equivalent and rubber boots/booties (all seams must be taped/sealed)
- Air Purifying Respirator with GMC/P100 cartridge
- Butyl gloves/boots when working with high concentrated sulfuric acid (78%)

OTHER SAFETY EQUIPMENT

- Intrinsically Safe Flashlights/equipment
- Fire extinguisher
- Non-sparking tools (intrinsically safe equipment)
- First aid kit
- Explosion proof equipment (air tools)
- LEL meter
- HCL direct read tubes and hand pump

PHYSICAL HAZARDS

- Cuts/lacerations (handling of sharp objects, opening drums, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Unstable materials (drums, totes, debris, etc.)
- Fire/explosion
- Inadequate lighting/illumination

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 501, Manual Materials Handling
- ENV 505, Manual Hand Tools
- ENV 507, Handling of Drums and Large Containers
- ENV 508, Drum Sampling
- ENV 509, Tank and Large Container Sampling
- ENV 510, Unknown Waste Drum Handling
- ENV 519, Forklift Vehicles
- ENV 523, Manlifts

ADDITIONAL SAFETY CONSIDERATIONS

1. Do not enter areas without sufficient lighting.
2. Be aware of trip/slip/fall hazards and holes/sumps, etc.
3. Watch for standing water, probe area first.
4. Do not enter tank, vats, sumps, holes, or other potential confined spaces without a Confined Space Entry Procedure, Hazard Evaluation, and Permit completed.
5. Ensure full body harness is worn during manlift operations, along with a lanyard attached to manlift railing.
6. Ensure full body harness is tied-off when working at heights greater than 6 feet above surface.
7. Ensure tank/drum/tote is vented prior to sampling.

MONITORING PROCEDURES

Perform direct read monitoring for HCL and LEL monitoring during the above stated operations. Reference Table 6-2 in HASP for action levels and how often to monitor.

EARTH TECH
A TETRA TECH INTERNATIONAL LTD COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION SITE
MIDDLETOWN, NY

Evaluated by: Brett Hodgson, SH&E Professional

Date: March 2005

TASK NAME

PRESSURE WASHING OPERATIONS

TASK DESCRIPTION

Various areas of the site contain zirconium and aluminium complexes and other contaminants and will be pressure washed as required to reduce contaminant levels. Surfaces such as tank exteriors, interiors, concrete flooring/dikes, steel columns/beams may be decontaminated using a pressure washer.

CHEMICAL EXPOSURE HAZARDS

- Metals (chromium, aluminium)
- Zirconium oxychloride
- Hydrochloric acid
- Sulfuric acid

PPE

Level D (upgrade based on sampling results and Safety Professional approval)

- ANSI approved hardhat
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Metal foot and shin guards.
- Protective chemical gloves (inner & outer) – use heavy PVC/Butyl rubber for outer gloves.
- PVC rain suit or Coveralls (Tychem SL®) as approved by the SSO.
- Rubber boots/booties (all seams must be taped/sealed)

Face Shield (splash hazard)
Hearing Protection.

OTHER SAFETY EQUIPMENT

- Electrical: Use GFI protection.
- Air Purifying Respirator with GMC/P100 cartridge as required by SSO
- Full Body Harness for fall protection when man lifts used to access tanks.

PHYSICAL HAZARDS

- Flying Debris/Objects
- Noise greater than 85 dBA
- Electrical (potential energized connections/outlets/other)
- Cuts/lacerations (potential contact with direct water spray from high pressure lance).
- Equipment traffic (bobcat, forklift, other).
- Slips/trips/falls/protruding objects/wet surfaces
- Heat/cold stress
- Inadequate lighting/illumination
- Potential confined spaces when cleaning tanks.

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 204, Hearing Conservation
- ENV 205, PPE
- ENV 206, Respiratory Protection Program
- ENV 301, Hazardous Waste Operations
- ENV 506, Electrical Safety
- ENV 511, Confined Space Entry
- ENV 513, Tank Cleaning
- ENV 523, Manlifts
- ENV 526, High Pressure Washers
- ENV 528, Heat Stress and Hot Weather Operations

ADDITIONAL SAFETY CONSIDERATIONS

1. Do not enter areas without sufficient lighting.
2. Be aware of trip/slip/fall hazards and holes/sumps, etc.
3. Do not enter tank, vats, sumps, holes, or other potential confined spaces without a Confined Space Entry Procedure, Hazard Evaluation, and Permit completed.
4. Evaluate operations to determine if Lockout/Tagout requirements will apply.
5. Evaluate the requirement for upgrading PPE to Level C/B based on air monitoring, visual contaminant levels of areas being cleaned and other site conditions.

MONITORING PROCEDURES

Direct reading colorimetric tubes will be used to monitor for hydrogen chloride every 30 minutes in the breathing zone during pressure wash operations. Frequency of breathing zone monitoring may be reduced based on observed levels. The action level for upgrade to Level C is 1 ppm HCl. Refer to Table 6.2 for specific action levels.

EARTH TECH
A TYCO INTERNATIONAL LTD COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION SITE
MIDDLETOWN, NEW YORK

Evaluated by: Brett Hodgson, SH&E Professional

Date: March 2005

TASK NAME

MOBILIZATION/DEMOBILIZATION

TASK DESCRIPTION

This task hazard analysis refers to the process of mobilizing and demobilizing the people and the materials to complete the tasks outlined in the work plan. This applies primarily to moving/loading/unloading of equipment and materials and the set up of office trailers and work zones. This THA does not cover the actual hazards present within the buildings and work areas. This THA does apply whenever new materials are brought to the site or removed from the site.

CHEMICAL EXPOSURE HAZARDS

- Carbon monoxide

PPE

Level D

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.

OTHER SAFETY EQUIPMENT

- Leather gloves when handling sharp object or operating powered equipment
- Hearing protection (minimum 29 NRR)
- Fall protection (contact Safety Professional)
- Flashlights
- Pole/probe (for checking holes, sumps, and other water covered areas)
- First aid kit
- Fire extinguisher

PHYSICAL HAZARDS

- Cuts/lacerations (handling of sharp objects, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic (bobcat, forklift, street traffic, etc.)
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Security/high crime
- Hazardous noise levels
- Falls/elevated heights (6 feet or more above next lower level)
- Inadequate lighting
- Holes, sumps, and other water covered areas
- Confined spaces

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 501, Manual Materials Handling
- ENV 504, Powered Hand Tools
- ENV 505, Manual Hand Tools

ADDITIONAL SAFETY CONSIDERATIONS

1. If necessary contact a security agency prior to mobilization to provide site security.
2. Use spotters when loading/unloading heavy equipment, forklifts, etc. Stand clear of these operations.
3. Do not enter tank, vats, sumps, holes, or other potential confined spaces without a Confined Space Entry Procedure, Hazard Evaluation, and Permit completed.

MONITORING PROCEDURES

Monitoring is not anticipated for this task.

EARTH TECH
A TETRA TECH INTERNATIONAL LTD COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION SITE
MIDDLETOWN, NY

Evaluated by: Brett Hodgson, SH&E Professional

Date: March 2005

TASK NAME

LIQUID TRANSFER/BULKING OPERATIONS USING TRANSFER PUMPS

TASK DESCRIPTION

Liquids from totes, drums, sumps and tank containment areas will be transferred to bulk storage tanks (fiberglass ASTs) for consolidation in preparation for disposal. A composite sample** will then be taken to determine disposal options. The materials will later be transferred to vacuum trucks/tankers for transport and disposal.

**Note: See THA for sampling operations.

CHEMICAL EXPOSURE HAZARDS

- Metals (chromium, aluminium)
- Zirconium oxychloride
- Hydrochloric acid
- Sulfuric acid
- Aluminum Chlorohydrate

PPE

Level D (upgrade based on sampling results and Safety Professional approval)

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Protective chemical gloves (inner & outer) Neoprene outer gloves must be changed immediately if contact with acid is made. PVC/Butyl rubber outer required when contact with material is expected. Use butyl rubber only for >78% H_2SO_4.
- Coveralls (Tychem SL ®)
- Rubber boots/booties. Use Butyl rubber boots when the potential exists for contact with concentrated acid solutions (all seams must be taped/sealed)
- Face Shield (splash hazard)

Level C
When transferring pure product (acids)

OTHER SAFETY EQUIPMENT

- Intrinsically Safe Lighting and Equipment
- Fire extinguisher
- Non-sparking tools (intrinsically safe equipment)
- Air Purifying Respirator with GMC/P100 cartridge
- Full Body Harness for fall protection when manlifts used to access tanks.

PHYSICAL HAZARDS

- Cuts/lacerations (handling of sharp objects, opening drums, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic (bobcat, forklift, street traffic, etc.)
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Unstable materials (drums, totes, debris, etc.)
- Fire/explosion
- Inadequate lighting/illumination

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 301, Hazardous Waste Operations
- ENV 501, Manual Materials Handling
- ENV 505, Manual Hand Tools
- ENV 507, Handling of Drums and Large Containers
- ENV 508, Drum Sampling
- ENV 509, Tanks and Large Container Sampling
- ENV 510, Unknown Waste Drum Handling
- ENV 523, Manlifts

ADDITIONAL SAFETY CONSIDERATIONS

1. Use slings to remove unstable drums/totes or strap drums together on pallets before moving.
2. Do not enter areas without sufficient lighting.
3. Be aware of trip/slip/fall hazards and holes/sumps, etc.
4. Do not enter tank, vats, sumps, holes, or other potential confined spaces without a Confined Space Entry Procedure, Hazard Evaluation, and Permit completed.
5. Evaluate operations to determine if Lockout/Tagout requirements will apply.
6. Ensure spill kit is readily available for chemical spills during liquid transfer operations.
7. If worker is heavily contaminated with product/waste (acid), rush worker immediately to showers located throughout site and decon appropriately.
8. Check showers weekly and document.

MONITORING PROCEDURES

Direct reading colorimetric tubes will be used to monitor for hydrogen chloride every 60 minutes in the breathing zone during transfer operations. Frequency of breathing zone monitoring may be reduced based on observed levels. The action level for upgrade to Level C is 1 ppm HCl. Refer to Table 6.2 for specific action levels.

EARTH TECH
A AECOM INTERNATIONAL LTD. COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION SITE
MIDDLETOWN, NY

Evaluated by: Brett Hodgson, SH&E Professional

Date: April 2005

TASK NAME

REMOVAL OF PROCESS LINES/PIPES

TASK DESCRIPTION

This task includes the process of draining, flushing, breaking, and removal of product lines/pipes throughout the site.

CHEMICAL EXPOSURE HAZARDS

- Metals (chromium, aluminum, lead)
- Zirconium oxychloride
- Hydrochloric acid
- Sulfuric acid
- Aluminum chlorohydrate (salt)

PPE

Level C

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Protective chemical gloves (inner & outer), Tychem SL® or equivalent and rubber boots/booties (all seams must be taped/sealed)
- Air Purifying Respirator with GMC/P100 cartridge
- Butyl gloves/boots when working with high concentrated sulfuric acid (78%)

OTHER SAFETY EQUIPMENT

- Intrinsically Safe Flashlights/equipment
- Fire extinguisher
- Non-sparking tools (intrinsically safe equipment)
- First aid kit
- Explosion proof equipment (air tools)
- LEL meter
- HCL direct read tubes and hand pump
- HEPA vacuum
- Hoists, slings, cranes, or other devices for supporting.
- Full-body harness/lanyard

PHYSICAL HAZARDS

- Cuts/lacerations (handling of sharp objects, opening drums, etc.)
- Heavy lifting (objects over 49 pounds)
- Equipment traffic
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Unstable materials (drums, totes, debris, etc.)
- Fire/explosion
- Elevated heights
- Inadequate lighting/illumination
- Suspended loads

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 501. Manual Materials Handling
- ENV 502, Ladders
- ENV 503, Scaffolding
- ENV 504, Powered Hand Tools
- ENV 505. Manual Hand Tools
- ENV 512, Line Entry
- ENV 518, Lockout/Tagout
- ENV 523, Manlifts

ADDITIONAL SAFETY CONSIDERATIONS

1. Evaluate surrounding work area for additional hazards that may be present.
2. All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
3. Any person working in an aerial lift (manlift) must wear a full-body harness and lanyard. The lanyard must be attached to the boom/basket or an approved attachment point.
4. A full-body harness and lanyard must be worn when working at heights ≥6 feet from the working surface.
5. Fill out *Line Breaking Permit Form* prior to line breaking.
6. Use HEPA vacuum while cutting to limit particulate exposure while cutting lines.

MONITORING PROCEDURES

Perform direct read monitoring for HCL (tubes). LEL (4-gas), and particulates (DataRam) during the above stated operations. Reference Table 6-2 in HASP for action levels and how often to monitor.

EARTH TECH
A TYCO INTERNATIONAL LTD COMPANY

TASK HAZARD ANALYSIS (THA)
WESTWOOD CHEMICAL CORPORATION
MIDDLETOWN, NEW YORK

aluated by: Brett D. Hodgson, SH&E Professional

Date: March, 2005

TASK NAME

CHEMICAL/DRUMS (UNKNOWN) SPILL CLEAN-UP

TASK DESCRIPTION

This task includes the clean-up of any spilled or damaged unknown chemicals stored in drums or containers.

CHEMICAL EXPOSURE HAZARDS

- Glycol base solutions
- Corrosives (acids/bases)

PPE

Level B

- High-visibility reflective safety vest
- ANSI approved hardhat.
- ANSI approved safety glasses.
- ANSI approved steel toe safety shoes/boots.
- Supplied air respirator (SCBA or airline)
- Protective chemical gloves (inner & outer), coveralls (tyvek ®), and rubber boots/booties when potential exists for contact with impacted materials (all seams must be taped/sealed)

OTHER SAFETY EQUIPMENT

- Leather gloves while handling sharp edges or operating powered tools/machinery.
- Hearing protection (minimum 29 NRR)
- First aid kit
- Fire extinguisher
- Non-sparking tools (intrinsically safe equipment)

PHYSICAL HAZARDS

- Cuts/laceration/burns (from operating powered/hand-operated tools)
- Slips, trips, falls, and protruding objects (uneven terrain, holes, etc.)
- Manual lifting (materials heavier than 49 pounds)
- Heat/cold stress
- Noise
- Pinch points (Drums)
- Slipping on ice/snow

APPLICABLE OPERATIONAL SAFETY PROCEDURES

- ENV 201, General Safety Rules
- ENV 501, Manual Materials Handling
- ENV 504, Powered Hand Tools
- ENV 505, Manual Hand Tools
- ENV 507, Handling of Drums and Large Containers
- ENV 510, Unknown Waste Drum Handling
- ENV 519, Forklift Vehicles

ADDITIONAL SAFETY CONSIDERATIONS

- Cuts/lacerations (handling of sharp objects, operating powered tools/equipment, etc.)
- Heavy lifting (objects over 49 pounds)
- Slips/trips/falls/protruding objects
- Heat/cold stress
- Unstable materials (drums, debris, etc.)
- Falling debris (building materials)
- Fire/explosion
- Inadequate lighting/illumination

MONITORING PROCEDURES

Continually monitor with PID/FID and 4-gas meter and observe action levels in Section 6 of HASP. All instruments must be calibrated prior to use. Pay special attention to monitors if material is spilled.

Attachment B

Material Safety Data Sheets

NIOSH Pocket Guide to Chemical Hazards

Ethylene glycol	**CAS** 107-21-1
$HOCH_2CH_2OH$	**RTECS** KW2975000
Synonyms & Trade Names 1,2-Dihydroxyethane; 1,2-Ethanediol; Glycol; Glycol alcohol; Monoethylene glycol	**DOT ID & Guide**

Exposure Limits	NIOSH REL: See Appendix D		
	OSHA PEL†: none		
IDLH N.D. See: IDLH INDEX		**Conversion**	

Physical Description
Clear, colorless, syrupy, odorless liquid. [antifreeze] [Note: A solid below 9°F.]

MW: 62.1	BP: 388°F	FRZ: 9°F	Sol: Miscible
VP: 0.06 mmHg	IP: ?		Sp.Gr: 1.11
Fl.P: 232°F	UEL: 15.3%	LEL: 3.2%	

Class IIIB Combustible Liquid: Fl.P. at or above 200°F.

Incompatibilities & Reactivities
Strong oxidizers, chromium trioxide, potassium permanganate, sodium peroxide [Note: Hygroscopic (i.e., absorbs moisture from the air).]

Measurement Methods
NIOSH 5523; OSHA PV2024
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; nausea, vomiting, abdominal pain, lassitude (weakness, exhaustion); dizziness, stupor, convulsions, central nervous system

depression; skin sensitization
Target Organs Eyes, skin, respiratory system, central nervous system
See also: INTRODUCTION See ICSC CARD: 0270

Material Safety Data Sheet

Agway Petroleum Corporation, PO Box 4852, Syracuse, NY 13221

DATE ISSUED:	04/30/01

I. IDENTIFICATION AND EMERGENCY INFORMATION

PRODUCT NAME
DIESEL FUEL

CAS NUMBER
68476-34-6

OTHER NAMES
#2 Fuel Oil, Low Sulfur Diesel, Premium Gold Diesel

FORMULA
#2 Fuel Oil (Petroleum Distillate) - 100%

PRODUCT APPEARANCE AND ODOR
Amber Colored Liquid with Petroleum Odor. May be dyed red for identification of tax status.

CLASSIFICATION
Flammable or Combustible Liquid — NA 1993
DOT Hazard Class: 3 — Packing Group: III

DISTRIBUTOR
Agway Petroleum Corporation
PO Box 4852
Syracuse, NY 13221

PRODUCT INFORMATION
315-449-6363

EMERGENCY PHONE NUMBER
Chemtrec: 800-424-9300

II. SUMMARY OF HAZARDS

COMPONENTS	CAS NUMBER	CONCENTRATION
#2 Fuel Oil	68476-34-2	100%

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM (HIS)

Health	1	0 - Minimal	3 - Serious
Flammability	2	1 - Slight	4 - Severe
Reactivity	0	2 - Moderate	

OCCUPATIONAL EXPOSURE LIMIT
TWA 400 ppm 8 Hours

III. EMERGENCY FIRST AID PROCEDURES

INHALATION
Remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance and call a physician. If breathing has stopped, use mouth to mouth resuscitation.

EYE CONTACT
Flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT
Dry-wipe the skin. Cleanse the area with waterless hand cleaner, and follow by washing thoroughly with soap and water. Remove contaminated clothing. Launder clothing before reuse. Discard shoes if material has penetrated to inside surface.

INGESTION
Do not induce vomiting. Give 1 to 2 glasses of water. Get medical attention.

NOTE TO PHYSICIAN
Material if aspirated into the lungs may cause chemical pneumonitis. Treat appropriately.

IV. FIRE AND EXPLOSION

FLASH POINT
125°F

AUTOIGNITION TEMPERATURE
500°F

FLAMMABLE LIMITS (% at Normal Atmos. Temp. And Pressure)
Lower: 0.6
Upper: 7.4

EXTINGUISHING MEDIA
Water Fog, Dry Chemical, CO_2 or Chemical Foam

FIRE AND EXPLOSION HAZARDS
Flowing oil can be ignited by self-generated static electricity; check for combustible vapors prior to and during welding and torch cutting on tanks and vessels.

SPECIAL FIREFIGHTING PROCEDURES
Use a water spray to cool fire-exposed containers. Use a smothering technique for extinguishing fire of this combustible liquid. Do not use a forced water stream directly on oil fires as this will scatter the fire. Firefighters should wear self-contained breathing apparatus and full protective clothing.

V. HEALTH HAZARDS

	PRIMARY ROUTE
INHALATION Vapors or mist may cause irritation of the nose and throat, headache, nausea, vomiting, dizziness, drowsiness, euphoria, loss of coordination, and disorientation. In poorly ventilated areas or confined spaces, unconsciousness and asphyxiation may result.	Yes
EYE CONTACT May cause irritation, experienced as mild discomfort and seen as slight excess redness of the eye.	Yes
SKIN IRRITATION Prolonged or widespread skin contact may result in the absorption of potentially harmful amounts of material.	Yes
INGESTION If more that several mouthfuls are swallowed, abdominal discomfort, nausea, and diarrhea may occur. Aspiration may occur during swallowing or vomiting resulting in lung damage.	N/A

CHRONIC
NIOSH has recommended that whole diesel exhaust be regarded as a potential occupational carcinogen based on findings of carcinogenic responses in laboratory animals exposed to whole diesel exhaust. The excess cancer risk for workers exposed to diesel exhaust has not been calculated; the probability of developing cancer should be decreased by minimizing exposure to the lowest feasible limits.

Repeated skin contact may cause a persistent irritation or dermatitis.

OTHER REMARKS
This product may contain benzene. Prolonged and repeated exposure to benzene has been associated with anemia and leukemia in humans.

VI. PHYSICAL AND CHEMICAL DATA

The following data are approximate or typical values and should not be used for precise design purposes.

BOILING RANGE
340-700°F

SPECIFIC GRAVITY
0.85

VAPOR PRESSURE (mmHg @ 20°C)
< 0.5

VAPOR DENSITY
> 4

VI. PHYSICAL AND CHEMICAL DATA (Continued)

SOLUBILITY IN WATER
Insoluble

pH
N/A

VOLATILE CHARACTERISTICS
N/A

STABILITY
Stable

HAZARDOUS POLYMERIZATION
Not expected to occur

APPEARANCE AND ODOR
Amber Colored Liquid. May be dyed red for identification of tax status.

CONDITIONS TO AVOID
Strong oxidizing agents, heat, spark, flame and build-up of static electricity.

HAZARDOUS DECOMPOSITION PRODUCTS
CO, CO_2, SO_2, Reactive Hydrocarbons

VII. PROTECTION AND PRECAUTIONS

HANDLING

Eye Protection:	Remove contact lenses and wear chemical safety glasses, goggles or faceshield where contact with liquid or mist may occur.
Skin Protection:	Wear impervious gloves, clothing and boots when contact with skin may occur. Wash with soap and water before eating, drinking and smoking. Launder contaminated clothing before reuse.
Inhalation:	Use approved respiratory protective equipment for cleaning large spills or entry into large tanks, vessels and other confined spaces, or in any situation where airborne concentrations may exceed occupational exposure limits.
Ventilation:	Provide adequate general and local exhaust ventilation: (1) to meet occupational exposure limits, (2) to prevent the formation of explosive atmospheres and (3) to prevent oxygen deficient atmospheres; especially in confined spaces.

SPECIAL PRECAUTIONS AND COMMENTS

Storage Requirements:	Store in tightly closed containers in a dry, cool place, away from sources of heat or ignition and incompatible substances. Ground and bond all transfer and storage equipment to prevent static sparks and equip with self closing valves, pressure vacuum bungs and flame arresters. Empty containers may contain residue (liquid and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, flame, sparks or other sources of ignition; they may explode and cause injury or death.

VIII. TRANSPORTATION AND OSHA RELATED LABEL INFORMATION

TRANSPORTATION INCIDENT INFORMATION
For further information relative to spills resulting from transportation incidents, refer to latest Department of Transportation Emergency Response Guidebook for Hazardous Materials Incidents, DOT P 5800.3.

DOT IDENTIFICATION NUMBER
#2 Diesel Fuel (a/k/a Fuel Oil) Flammable or Combustible Liquid/NA 1993/Hazard Class 3

OSHA REQUIRED LABEL INFORMATION
The following Hazard warning should be found on a label, bill of lading or invoice accompanying this shipment:

DANGER!
HARMFUL IF INHALED
MAY BE HARMFUL IF ABSORBED THROUGH SKIN
MAY CAUSE DIZZINESS AND DROWSINESS
ASPIRATION HAZARD IF SWALLOWED – CAN ENTER LUNGS AND CAUSE DAMAGE
COMBUSTIBLE LIQUID AND VAPOR
USE ONLY AS FUEL

ATTENTION! POSSIBLE CANCER HAZARD
CONTAINS MIDDLE DISTILLATES WHICH MAY CAUSE CANCER BASED ON ANIMAL DATA

IX. ENVIRONMENTAL INFORMATION

EPA INFORMATION FOR HAZARDOUS CHEMICAL REPORTING

EPA HAZARD CLASSIFICATION CODE

Acute Hazard	Chronic Hazard	Fire Hazard	Pressure Hazard	Reactive Hazard
xxx	xxx	xxx		

REPORTABLE QUANTITY (RQ), EPA REGULATION 40 CFR 302 (CERCLA Section 102)
None

THRESHOLD PLANNING QUANTITY (TPQ), EPA REGULATION 40 CFR 355 (SARA Sections 301-304)
None

TOXIC CHEMICAL RELEASE REPORTING, EPA REGULATION 40 CFR 372 (SARA Section 313)
None

PRECAUTIONS IF MATERIAL IS SPILLED OR RELEASED
Remove sources of heat or ignition including internal combustion engines and power tools. Remove spill with vacuum trucks or pump and soak up residue with an inert absorbent. Do not flush to sewer or surface water. Ventilate area and avoid breathing vapors or mists.

WASTE DISPOSAL METHODS
Product is suitable for burning for fuel value in compliance with applicable laws and regulations.

RCRA INFORMATION: Disposal of unused product may be subject to RCRA regulations (40 CFR 261) due to the characteristic(s) /chemical(s) listed below. Disposal of the used product may also be regulated due to ignitability or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP).

FLASH: 125°F

"EMPTY" CONTAINER WARNING
Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity or other sources of ignition.

The information and recommendations contained herein are a compilation of data provided by various suppliers and, to the best of Agway Petroleum Corporation's (APC) knowledge and belief, accurate and reliable as of the date issued. APC does not warrant or guarantee their accuracy or reliability, and APC shall not be liable for any loss or damage arising out of the use thereof. The information and recommendations are offered for the user's consideration and examination, and it is the user's responsibility to satisfy itself that they are suitable and complete for its particular use. If buyer repackages this product, legal counsel should be consulted to insure proper health, safety, and other necessary information is included on the container.

The Environmental Information included under Section IX hereof as well as the Hazardous Materials Identification System (HMIS) and National Fire Protection Association (NFPA) ratings have been included by APC in order to provide additional help and hazard classification information. The ratings recommended are based upon the criteria supplied by the developers of these rating systems, together with APC's interpretation of the available data.

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **HYDROGEN CHLORIDE**

CAS Number: 7647-01-0
DOT Number: UN 1050 (anhydrous)
UN 2186 (refrigerated liquid)

RTK Substance number: 1012
Date: January 1995 Revision: June 2001

HAZARD SUMMARY

* **Hydrogen Chloride** can affect you when breathed in.
* **Hydrogen Chloride** is a CORROSIVE CHEMICAL and contact can severely irritate and burn the skin and eyes with possible eye damage and loss of sight.
* Breathing **Hydrogen Chloride** can irritate the nose and throat.
* Breathing **Hydrogen Chloride** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
* Long-term exposure may cause yellowing and erosion of the teeth.
* **Hydrogen Chloride** may affect the liver and kidneys.

IDENTIFICATION

Hydrogen Chloride is a colorless to slightly yellow gas, with a strong odor, which is often used in solution. It is used in metal processing, analytical chemistry and in making other chemicals.

REASON FOR CITATION

* **Hydrogen Chloride** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, HHAG, NFPA and EPA.
* This chemical is on the Special Health Hazard Substance List because it is **CORROSIVE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.
* **ODOR THRESHOLD = 0.25 to 10 ppm.**
* The range of accepted odor threshold values is quite broad. Caution should be used in relying on odor alone as a warning of potentially hazardous exposures.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is **5 ppm**, not to be exceeded at any time.

NIOSH: The recommended airborne exposure limit is **5 ppm**, which should not be exceeded at any time.

ACGIH: The recommended airborne exposure limit is **5 ppm**, which should not be exceeded at any time.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Hydrogen Chloride**.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Hydrogen Chloride** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure. concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Hydrogen Chloride**:

* Contact can severely irritate and burn the skin and eyes with possible eye damage and loss of sight.
* Breathing **Hydrogen Chloride** can irritate the nose and throat.
* Breathing **Hydrogen Chloride** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Hydrogen Chloride** and can last for months or years:

Cancer Hazard

* There is limited evidence that workers who manufacture **Hydrogen Chloride** have an increase of respiratory cancers.
* Many scientists believe there is no safe level of exposure to a carcinogen. Such substances may also have the potential for causing reproductive damage in humans.

Reproductive Hazard

* According to the information presently available to the New Jersey Department of Health and Senior Services, **Hydrogen Chloride** has not been tested for its ability to affect reproduction.

Other Long-Term Effects

* **Hydrogen Chloride** may cause yellowing and erosion of the teeth.
* **Hydrogen Chloride** can irritate the lungs. Repeated exposures may cause bronchitis to develop with cough, phlegm, and/or shortness of breath.
* **Hydrogen Chloride** may affect the liver and kidneys.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

* Lung function tests.

If symptoms develop or overexposure is suspected, the following are recommended:

* Consider chest x-ray after acute overexposure.
* Liver and kidney function tests.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

Mixed Exposures

* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.
* Because more than light alcohol consumption can cause liver damage, drinking alcohol may increase the liver damage caused by **Hydrogen Chloride**.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is, (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically transfer **Hydrogen Chloride** gas or pump liquid **Hydrogen Chloride** from cylinders or other storage containers to process containers.
* Specific engineering controls are required for this chemical by OSHA. Refer to the OSHA Standard: 29 CFR 1910.101.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Hydrogen Chloride** should change into clean clothing promptly.

* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Hydrogen Chloride**.
* Eye wash fountains should be provided in the immediate work area for emergency use.
* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Hydrogen Chloride**, immediately wash or shower to remove the chemical.
* Do not eat, smoke, or drink where **Hydrogen Chloride** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Hydrogen Chloride**. Wear acid-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Safety equipment manufacturers recommend *Neoprene*, *Polyvinyl Chloride* and *Nitrile Butyl Rubber* as protective materials.

Eye Protection

* Wear non-vented, impact resistant goggles when working with fumes, gases, or vapors.
* Wear indirect-vent, impact and splash resistant goggles when working with liquids.
* Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.
* Contact lenses should not be worn when working with this substance.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposure over 5 ppm, use a MSHA/NIOSH approved full facepiece respirator with an acid gas cartridge which is specifically approved for **Hydrogen Chloride**. Increased protection is obtained from full facepiece powered-air purifying respirators.
* If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Hydrogen Chloride**, or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to 50 ppm is immediately dangerous to life and health. If the possibility of exposure above 50 ppm exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

* Prior to working with **Hydrogen Chloride** you should be trained on its proper handling and storage.
* **Hydrogen Chloride** will react with METALS to form flammable and explosive *Hydrogen gas*.
* **Hydrogen Chloride** must be stored to avoid contact with STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); AMINES; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); ORGANIC MATERIALS; METAL CARBIDES and SULFURIC ACID since violent reactions occur.
* Store cylinders at temperatures under 125°F (52°C).
* Store in tightly closed containers in a cool, dry, well-ventilated area.
* Wherever **Hydrogen Chloride** is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?

A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 292-5677 (fax)

Web address: http://www.state.nj.us/health/eoh/odisweb/

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **HYDROGEN CHLORIDE**
DOT Number: **UN 1050 (anhydrous)**
UN 2186 (refrigerated liquid)
NAERG Code: **125**
CAS Number: **7647-01-0**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	0
REACTIVITY	-	1
CORROSIVE POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* Extinguish fire using an agent suitable for type of surrounding fire. **Hydrogen Chloride** itself does not burn.
* POISONOUS GASES ARE PRODUCED IN FIRE, including *Chlorine*.
* CONTAINERS MAY EXPLODE IN FIRE.
* Use water spray only to keep fire-exposed containers cool. Do not get water inside container as explosions may occur.
* Use water spray to reduce vapors.
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Hydrogen Chloride** gas is leaked, take the following steps:

* Evacuate persons not wearing protective equipment from area of leak until clean-up is complete.
* Ventilate area of leak to disperse the gas.
* Stop flow of gas. If source of leak is a cylinder and the leak cannot be stopped in place, remove the leaking cylinder to a safe place in the open air, and repair leak or allow cylinder to empty.

If **Hydrogen Chloride** in solution is spilled or leaked, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Cover with dry lime, sand or soda ash, and place in covered containers for disposal.
* Ventilate and wash area after clean-up is complete.
* It may be necessary to contain and dispose of **Hydrogen Chloride** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: 1-877-WARN-DEP

HANDLING AND STORAGE (See page 3)

FIRST AID

In NJ, for POISON INFORMATION call 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water. Continue without stopping for at least 30 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of water. Seek medical attention immediately.

Breathing

* Remove the person from exposure.
* Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Vapor Pressure: 3.54×10^4 mm Hg at 77°F (25°C)
Water Solubility: Highly soluble

OTHER COMMONLY USED NAMES

Chemical Name:
Hydrochloric Acid
Other Names:
Anhydrous Hydrochloric Acid; Chlorohydric Acid; Muriatic Acid

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

New Jersey Department of Health and Senior Services

HAZARDOUS SUBSTANCE FACT SHEET

Common Name: **SULFURIC ACID**

CAS Number: 7664-93-9
DOT Number: UN 1830 (more than 51% acid)
UN 2796 (less than 51% acid)

RTK Substance number: 1761
Date: March 1995 Revision: June 2002

HAZARD SUMMARY

* **Sulfuric Acid** can affect you when breathed in.
* **Sulfuric Acid** is a CORROSIVE CHEMICAL and contact can severely irritate and burn the skin and eyes with possible eye damage and may lead to blindness.
* Breathing **Sulfuric Acid** can irritate the nose and throat.
* Breathing **Sulfuric Acid** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.
* Repeated exposure can cause permanent lung damage, damage to teeth and stomach upset.
* **Sulfuric Acid** is a REACTIVE CHEMICAL and an EXPLOSION HAZARD.
* *CONSULT THE NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES HAZARDOUS SUBSTANCE FACT SHEET ON SULFURIC ACID, FUMING.*

IDENTIFICATION

Sulfuric Acid is an oily liquid. It is used in fertilizers, chemicals, dyes, petroleum refining, etching and analytical chemistry, in making iron and steel, and in industrial explosives.

REASON FOR CITATION

* **Sulfuric Acid** is on the Hazardous Substance List because it is regulated by OSHA and cited by ACGIH, DOT, NIOSH, DEP, NFPA and EPA.
* This chemical is on the Special Health Hazard Substance List because it is **CORROSIVE** and **REACTIVE**.
* Definitions are provided on page 5.

HOW TO DETERMINE IF YOU ARE BEING EXPOSED

The New Jersey Right to Know Act requires most employers to label chemicals in the workplace and requires public employers to provide their employees with information and training concerning chemical hazards and controls. The federal OSHA Hazard Communication Standard, 1910.1200, requires private employers to provide similar training and information to their employees.

* Exposure to hazardous substances should be routinely evaluated. This may include collecting personal and area air samples. You can obtain copies of sampling results from your employer. You have a legal right to this information under OSHA 1910.1020.
* If you think you are experiencing any work-related health problems, see a doctor trained to recognize occupational diseases. Take this Fact Sheet with you.

WORKPLACE EXPOSURE LIMITS

OSHA: The legal airborne permissible exposure limit (PEL) is 1 mg/m^3 averaged over an 8-hour workshift.

NIOSH: The recommended airborne exposure limit is 1 mg/m^3 averaged over a 10-hour workshift.

ACGIH: The recommended airborne exposure limit is 0.1 mg/m^3 (for the *inhalable fraction*) averaged over an 8-hour workshift.

WAYS OF REDUCING EXPOSURE

* Where possible, enclose operations and use local exhaust ventilation at the site of chemical release. If local exhaust ventilation or enclosure is not used, respirators should be worn.
* Wear protective work clothing.
* Wash thoroughly immediately after exposure to **Sulfuric Acid** and at the end of the workshift.
* Post hazard and warning information in the work area. In addition, as part of an ongoing education and training effort, communicate all information on the health and safety hazards of **Sulfuric Acid** to potentially exposed workers.

This Fact Sheet is a summary source of information of all potential and most severe health hazards that may result from exposure. Duration of exposure, concentration of the substance and other factors will affect your susceptibility to any of the potential effects described below.

HEALTH HAZARD INFORMATION

Acute Health Effects

The following acute (short-term) health effects may occur immediately or shortly after exposure to **Sulfuric Acid**:

* Contact can severely irritate and burn the skin and eyes with possible eye damage and may lead to blindness.
* Breathing **Sulfuric Acid** can irritate the nose and throat.
* Breathing **Sulfuric Acid** can irritate the lungs causing coughing and/or shortness of breath. Higher exposures can cause a build-up of fluid in the lungs (pulmonary edema), a medical emergency, with severe shortness of breath.

Chronic Health Effects

The following chronic (long-term) health effects can occur at some time after exposure to **Sulfuric Acid** and can last for months or years:

Cancer Hazard

* Occupational exposure to strong *Inorganic Acid* mists containing **Sulfuric Acid** is carcinogenic to humans.
* Many scientists believe there is no safe level of exposure to a carcinogen. Such substances may also have the potential for causing reproductive damage in humans.

Reproductive Hazard

* There is no evidence that **Sulfuric Acid** affects reproduction. This is based on test results presently available to the New Jersey Department of Health and Senior Services from published studies.

Other Long-Term Effects

* **Sulfuric Acid** can irritate the lungs. Repeated exposure may cause bronchitis to develop with cough, phlegm, and/or shortness of breath.
* Repeated exposure can cause permanent lung damage, damage to teeth and stomach upset.

MEDICAL

Medical Testing

For those with frequent or potentially high exposure (half the TLV or greater), the following are recommended before beginning work and at regular times after that:

* Lung function tests.
* Exam of the teeth.

If symptoms develop or overexposure is suspected, the following is recommended:

* Consider chest x-ray after acute overexposure.

Any evaluation should include a careful history of past and present symptoms with an exam. Medical tests that look for damage already done are not a substitute for controlling exposure.

Request copies of your medical testing. You have a legal right to this information under OSHA 1910.1020.

Mixed Exposures

* Because smoking can cause heart disease, as well as lung cancer, emphysema, and other respiratory problems, it may worsen respiratory conditions caused by chemical exposure. Even if you have smoked for a long time, stopping now will reduce your risk of developing health problems.

WORKPLACE CONTROLS AND PRACTICES

Unless a less toxic chemical can be substituted for a hazardous substance, **ENGINEERING CONTROLS** are the most effective way of reducing exposure. The best protection is to enclose operations and/or provide local exhaust ventilation at the site of chemical release. Isolating operations can also reduce exposure. Using respirators or protective equipment is less effective than the controls mentioned above, but is sometimes necessary.

In evaluating the controls present in your workplace, consider: (1) how hazardous the substance is. (2) how much of the substance is released into the workplace and (3) whether harmful skin or eye contact could occur. Special controls should be in place for highly toxic chemicals or when significant skin, eye, or breathing exposures are possible.

In addition, the following controls are recommended:

* Where possible, automatically pump liquid **Sulfuric Acid** from drums or other storage containers to process containers.
* Before entering a confined space where **Sulfuric Acid** may be present, check to make sure that an explosive concentration does not exist.

Good **WORK PRACTICES** can help to reduce hazardous exposures. The following work practices are recommended:

* Workers whose clothing has been contaminated by **Sulfuric Acid** should change into clean clothing promptly.
* Contaminated work clothes should be laundered by individuals who have been informed of the hazards of exposure to **Sulfuric Acid**.
* Eye wash fountains should be provided in the immediate work area for emergency use.

* If there is the possibility of skin exposure, emergency shower facilities should be provided.
* On skin contact with **Sulfuric Acid**, immediately wash or shower to remove the chemical. At the end of the workshift, wash any areas of the body that may have contacted **Sulfuric Acid**, whether or not known skin contact has occurred.
* Do not eat, smoke, or drink where **Sulfuric Acid** is handled, processed, or stored, since the chemical can be swallowed. Wash hands carefully before eating, drinking, smoking, or using the toilet.

PERSONAL PROTECTIVE EQUIPMENT

WORKPLACE CONTROLS ARE BETTER THAN PERSONAL PROTECTIVE EQUIPMENT. However, for some jobs (such as outside work, confined space entry, jobs done only once in a while, or jobs done while workplace controls are being installed), personal protective equipment may be appropriate.

OSHA 1910.132 requires employers to determine the appropriate personal protective equipment for each hazard and to train employees on how and when to use protective equipment.

The following recommendations are only guidelines and may not apply to every situation.

Clothing

* Avoid skin contact with **Sulfuric Acid**. Wear acid-resistant gloves and clothing. Safety equipment suppliers/manufacturers can provide recommendations on the most protective glove/clothing material for your operation.
* All protective clothing (suits, gloves, footwear, headgear) should be clean, available each day, and put on before work.
* Safety equipment manufacturers recommend *Polyvinyl Chloride* as a protective material.

Eye Protection

* Wear indirect-vent, impact and splash resistant goggles when working with liquids.
* Wear a face shield along with goggles when working with corrosive, highly irritating or toxic substances.
* Contact lenses should not be worn when working with this substance.

Respiratory Protection

IMPROPER USE OF RESPIRATORS IS DANGEROUS. Such equipment should only be used if the employer has a written program that takes into account workplace conditions, requirements for worker training, respirator fit testing and medical exams, as described in OSHA 1910.134.

* Where the potential exists for exposure over **0.1 mg/m^3**, use a MSHA/NIOSH approved full facepiece respirator with an acid gas cartridge which is specifically approved for **Sulfuric Acid** and a high efficiency pre-filter. Increased protection is obtained from full facepiece powered-air purifying respirators.
* If while wearing a filter or cartridge respirator you can smell, taste, or otherwise detect **Sulfuric Acid** or if while wearing particulate filters abnormal resistance to breathing is experienced, or eye irritation occurs while wearing a full facepiece respirator, leave the area immediately. Check to make sure the respirator-to-face seal is still good. If it is, replace the filter or cartridge. If the seal is no longer good, you may need a new respirator.
* Be sure to consider all potential exposures in your workplace. You may need a combination of filters, prefilters or cartridges to protect against different forms of a chemical (such as vapor and mist) or against a mixture of chemicals.
* Where the potential for high exposure exists, use a MSHA/NIOSH approved supplied-air respirator with a full facepiece operated in a pressure-demand or other positive-pressure mode. For increased protection use in combination with an auxiliary self-contained breathing apparatus operated in a pressure-demand or other positive-pressure mode.
* Exposure to **15 mg/m^3** is immediately dangerous to life and health. If the possibility of exposure above **15 mg/m^3** exists, use a MSHA/NIOSH approved self-contained breathing apparatus with a full facepiece operated in a pressure-demand or other positive-pressure mode.

HANDLING AND STORAGE

* Prior to working with **Sulfuric Acid** you should be trained on its proper handling and storage.
* **Sulfuric Acid** must be stored to avoid contact with WATER; CYCLOPENTADIENE; CYCLOPENTANONE; OXIME; OXIDIZING AGENTS (such as PERCHLORATES, PEROXIDES, PERMANGANATES, CHLORATES, NITRATES, CHLORINE, BROMINE and FLUORINE); STRONG BASES (such as SODIUM HYDROXIDE and POTASSIUM HYDROXIDE); CHROMATES; CARBIDES; FULMINATES; PICRATES; CYANIDES; HALIDES; POWDERED METALS; ORGANIC COMPOUNDS; PHOSPHORUS; NITROARYLAMINES; HEXALITHIUM DISILICIDE; and PHOSPHORUS OXIDE since violent reactions occur.
* Store in tightly closed containers in a cool, dry, well-ventilated area away from SUNLIGHT and COMBUSTIBLES in an area with an acid resistant cement floor.
* Always add acid to water, never the reverse.
* Wherever **Sulfuric Acid** is used, handled, manufactured, or stored, use explosion-proof electrical equipment and fittings.
* Contact of **Sulfuric Acid** with metal drums may cause the release of flammable and explosive *Hydrogen gas*. Storage drums should be coated with acid resistant material.

QUESTIONS AND ANSWERS

Q: If I have acute health effects, will I later get chronic health effects?
A: Not always. Most chronic (long-term) effects result from repeated exposures to a chemical.

Q: Can I get long-term effects without ever having short-term effects?
A: Yes, because long-term effects can occur from repeated exposures to a chemical at levels not high enough to make you immediately sick.

Q: What are my chances of getting sick when I have been exposed to chemicals?
A: The likelihood of becoming sick from chemicals is increased as the amount of exposure increases. This is determined by the length of time and the amount of material to which someone is exposed.

Q: When are higher exposures more likely?
A: Conditions which increase risk of exposure include physical and mechanical processes (heating, pouring, spraying, spills and evaporation from large surface areas such as open containers), and "confined space" exposures (working inside vats, reactors, boilers, small rooms, etc.).

Q: Is the risk of getting sick higher for workers than for community residents?
A: Yes. Exposures in the community, except possibly in cases of fires or spills, are usually much lower than those found in the workplace. However, people in the community may be exposed to contaminated water as well as to chemicals in the air over long periods. This may be a problem for children or people who are already ill.

Q: Don't all chemicals cause cancer?
A: No. Most chemicals tested by scientists are not cancer-causing.

The following information is available from:

New Jersey Department of Health and Senior Services
Occupational Health Service
PO Box 360
Trenton, NJ 08625-0360
(609) 984-1863
(609) 292-5677 (fax)

Web address: http://www.state.nj.us/health/eoh/odisweb/

Industrial Hygiene Information
Industrial hygienists are available to answer your questions regarding the control of chemical exposures using exhaust ventilation, special work practices, good housekeeping, good hygiene practices, and personal protective equipment including respirators. In addition, they can help to interpret the results of industrial hygiene survey data.

Medical Evaluation
If you think you are becoming sick because of exposure to chemicals at your workplace, you may call personnel at the Department of Health and Senior Services, Occupational Health Service, who can help you find the information you need.

Public Presentations
Presentations and educational programs on occupational health or the Right to Know Act can be organized for labor unions, trade associations and other groups.

Right to Know Information Resources
The Right to Know Infoline (609) 984-2202 can answer questions about the identity and potential health effects of chemicals, list of educational materials in occupational health, references used to prepare the Fact Sheets, preparation of the Right to Know Survey, education and training programs, labeling requirements, and general information regarding the Right to Know Act. Violations of the law should be reported to (609) 984-2202.

DEFINITIONS

ACGIH is the American Conference of Governmental Industrial Hygienists. It recommends upper limits (called TLVs) for exposure to workplace chemicals.

A **carcinogen** is a substance that causes cancer.

The **CAS number** is assigned by the Chemical Abstracts Service to identify a specific chemical.

A **combustible** substance is a solid, liquid or gas that will burn.

A **corrosive** substance is a gas, liquid or solid that causes irreversible damage to human tissue or containers.

DEP is the New Jersey Department of Environmental Protection.

DOT is the Department of Transportation, the federal agency that regulates the transportation of chemicals.

EPA is the Environmental Protection Agency, the federal agency responsible for regulating environmental hazards.

A **fetus** is an unborn human or animal.

A **flammable** substance is a solid, liquid, vapor or gas that will ignite easily and burn rapidly.

The **flash point** is the temperature at which a liquid or solid gives off vapor that can form a flammable mixture with air.

HHAG is the Human Health Assessment Group of the federal EPA.

IARC is the International Agency for Research on Cancer, a scientific group that classifies chemicals according to their cancer-causing potential.

A **miscible** substance is a liquid or gas that will evenly dissolve in another.

mg/m^3 means milligrams of a chemical in a cubic meter of air. It is a measure of concentration (weight/volume).

MSHA is the Mine Safety and Health Administration, the federal agency that regulates mining. It also evaluates and approves respirators.

A **mutagen** is a substance that causes mutations. A **mutation** is a change in the genetic material in a body cell. Mutations can lead to birth defects, miscarriages, or cancer.

NAERG is the North American Emergency Response Guidebook. It was jointly developed by Transport Canada, the United States Department of Transportation and the Secretariat of Communications and Transportation of Mexico. It is a guide for first responders to quickly identify the specific or generic hazards of material involved in a transportation incident, and to protect themselves and the general public during the initial response phase of the incident.

NCI is the National Cancer Institute, a federal agency that determines the cancer-causing potential of chemicals.

NFPA is the National Fire Protection Association. It classifies substances according to their fire and explosion hazard.

NIOSH is the National Institute for Occupational Safety and Health. It tests equipment, evaluates and approves respirators, conducts studies of workplace hazards, and proposes standards to OSHA.

NTP is the National Toxicology Program which tests chemicals and reviews evidence for cancer.

OSHA is the Occupational Safety and Health Administration, which adopts and enforces health and safety standards.

PEOSHA is the Public Employees Occupational Safety and Health Act, a state law which sets PELs for New Jersey public employees.

PIH is a DOT designation for chemicals which are Poison Inhalation Hazards.

ppm means parts of a substance per million parts of air. It is a measure of concentration by volume in air.

A **reactive** substance is a solid, liquid or gas that releases energy under certain conditions.

A **teratogen** is a substance that causes birth defects by damaging the fetus.

TLV is the Threshold Limit Value, the workplace exposure limit recommended by ACGIH.

The **vapor pressure** is a measure of how readily a liquid or a solid mixes with air at its surface. A higher vapor pressure indicates a higher concentration of the substance in air and therefore increases the likelihood of breathing it in.

>>>>>>>>>>>>>>>>>> EMERGENCY INFORMATION <<<<<<<<<<<<<<<<<<

Common Name: **SULFURIC ACID**
DOT Number: **UN 1830 (more than 51% acid)**
UN 2796 (less than 51% acid)
NAERG Code: **137 (more than 51% acid)**
157 (less than 51% acid)
CAS Number: **7664-93-9**

Hazard rating	NJDHSS	NFPA
FLAMMABILITY	-	0
REACTIVITY	-	2
CORROSIVE AND REACTIVE DO NOT USE WATER POISONOUS GASES ARE PRODUCED IN FIRE CONTAINERS MAY EXPLODE IN FIRE		

Hazard Rating Key: 0=minimal; 1=slight; 2=moderate; 3=serious; 4=severe

FIRE HAZARDS

* Extinguish fire using an agent suitable for type of surrounding fire. **Sulfuric Acid** itself does not burn.
* DO NOT USE WATER.
* POISONOUS GASES ARE PRODUCED IN FIRE or ON CONTACT WITH WATER or STEAM, including *Sulfur Oxides*.
* CONTAINERS MAY EXPLODE IN FIRE.
* Use water spray only to keep fire-exposed containers cool.
* **Sulfuric Acid** may ignite combustibles (wood, paper, and oil).
* If employees are expected to fight fires, they must be trained and equipped as stated in OSHA 1910.156.

SPILLS AND EMERGENCIES

If **Sulfuric Acid** is spilled or leaked, take the following steps:

* Evacuate persons not wearing protective equipment from area of spill or leak until clean-up is complete.
* Cover spills with dry sand, soda ash or lime. DO NOT use organic materials like sawdust and DO NOT wash down a spill of **Sulfuric Acid** with water.
* Collect spilled material in the most convenient and safe manner and deposit in sealed containers.
* Ventilate area after clean-up is complete.
* Keep **Sulfuric Acid** out of a confined space, such as a sewer, because of the possibility of an explosion, unless the sewer is designed to prevent the build-up of explosive concentrations.
* It may be necessary to contain and dispose of **Sulfuric Acid** as a HAZARDOUS WASTE. Contact your state Department of Environmental Protection (DEP) or your regional office of the federal Environmental Protection Agency (EPA) for specific recommendations.
* If employees are required to clean-up spills, they must be properly trained and equipped. OSHA 1910.120(q) may be applicable.

FOR LARGE SPILLS AND FIRES immediately call your fire department. You can request emergency information from the following:

CHEMTREC: (800) 424-9300
NJDEP HOTLINE: 1-877-WARN-DEP

HANDLING AND STORAGE (See page 3)

FIRST AID

In N.J. for POISON INFORMATION call 1-800-764-7661

Eye Contact

* Immediately flush with large amounts of water. Continue without stopping for at least 30 minutes, occasionally lifting upper and lower lids. Seek medical attention immediately.

Skin Contact

* Quickly remove contaminated clothing. Immediately wash area with large amounts of soap and water. Seek medical attention immediately.

Breathing

* Remove the person from exposure.
* Begin rescue breathing (using universal precautions) if breathing has stopped and CPR if heart action has stopped.
* Transfer promptly to a medical facility.
* Medical observation is recommended for 24 to 48 hours after breathing overexposure, as pulmonary edema may be delayed.

PHYSICAL DATA

Vapor Pressure: 0.001 mm Hg at 68°F (20°C)
Water Solubility: Miscible/Reactive

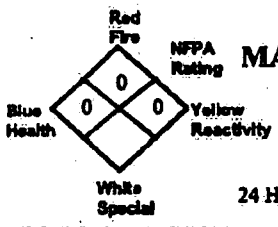
OTHER COMMONLY USED NAMES

Chemical Name:
Sulfuric Acid
Other Names:
BOV; Dipping Acid; Oil of Vitriol; Battery Acid

Not intended to be copied and sold for commercial purposes.

NEW JERSEY DEPARTMENT OF HEALTH AND SENIOR SERVICES
Right to Know Program
PO Box 368, Trenton, NJ 08625-0368
(609) 984-2202

Alconox ®



MATERIAL SAFETY DATA SHEET

Alconox, Inc.
30 Glenn Street
White Plains, NY 10603

24 Hour Emergency Number – Chem-Tel (800) 255-3924

I. IDENTIFICATION

Product Name (as appears on label)	ALCONOX
CAS Registry Number:	Not Applicable
Effective Date:	January 1, 2001
Chemical Family:	Anionic Powdered Detergent
Manufacturer Catalog Numbers for sizes	1104, 1125, 1150, 1101, 1103 and 1112

II. HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

There are no hazardous ingredients in ALCONOX as defined by the OSHA Standard and Hazardous Substance List 29 CFR 1910 Subpart Z.

III. PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point (F):	Not Applicable
Vapor Pressure (mm Hg):	Not Applicable
Vapor Density (AIR=1):	Not Applicable
Specific Gravity (Water=1):	Not Applicable
Melting Point:	Not Applicable
Evaporation Rate (Butyl Acetate=1):	Not Applicable
Solubility in Water:	Appreciable-Soluble to 10% at ambient conditions
Appearance:	White powder interspersed with cream colored flakes.
pH:	9.5 (1%)

IV. FIRE AND EXPLOSION DATA

Flash Point (Method Used):	None
Flammable Limits:	LEL: No Data UEL: No Data
Extinguishing Media:	Water, dry chemical, CO_2, foam
Special Fire fighting Procedures:	Self-contained positive pressure breathing apparatus and protective clothing should be worn when fighting fires involving chemicals.
Unusual Fire and Explosion Hazards:	None

V. REACTIVITY DATA

Stability:	Stable
Hazardous Polymerization:	Will not occur
Incompatibility (Materials to Avoid):	None
Hazardous Decomposition or Byproducts:	May release CO_2 on burning

VI. HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation? Yes Skin? No Ingestion? Yes
Health Hazards (Acute and Chronic):	Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Exposure may irritate mucous membranes. May cause sneezing.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	Material should be stored in a dry area to prevent caking.
Other Precautions:	No special requirements other than the good industrial hygiene and safety practices employed with any industrial chemical.

VIII. CONTROL MEASURES

Respiratory Protection (Specify Type):	Dust mask - Recommended
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are useful but not required.
Eye Protection:	Goggles are recommended when handling solutions.
Other Protective Clothing or Equipment:	None
Work/Hygienic Practices:	No special practices required

THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH BUT NO WARRANTY IS EXPRESSED OR IMPLIED.

Material Safety Data Sheets

Division of Facilities Services

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

HYDROCHLORIC ACID (MURATIC ACID)

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

The information in this document is compiled from information maintained by the United States Department of Defense (DOD). Anyone using this information is solely reponsible for the accuracy and applicability of this information to a particular use or situation.
Cornell University does not in any way warrant or imply the applicability, viability or use of this information to any person or for use in any situation.

Section 1 - Product and Company Identification
HYDROCHLORIC ACID (MURATIC ACID)

Product Identification: HYDROCHLORIC ACID (MURATIC ACID)
Date of MSDS: 06/29/1988 **Technical Review Date:** 08/02/1995
FSC: 6810 **NIIN:** **LIIN:** 00N031994
Submitter: N EN
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: ALCOLAC INC
Manufacturer's Address1: 3440 FAIRFIELD RD
Manufacturer's Address2: BALTIMORE, MD 21226
Manufacturer's Country: US
General Information Telephone: 301-354-0100
Emergency Telephone: 800-424-9300 (CHEMTREC)
Emergency Telephone: 800-424-9300 (CHEMTREC)
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: N
Published: Y
CAGE: IO313
Special Project Code: N

Contractor Information

Contractor's Name: ALCOLAC INC
Contractor's Address1: 3440 FAIRFIELD RD
Contractor's Address2: BALTIMORE, MD 21226
Contractor's Telephone: 301-354-0100
Contractor's CAGE: IO313

Contractor Information

Contractor's Name: ALCOLAC INC.
Contractor's Address1: UNKNOWN
Contractor's Address2: UNKNOWN, NK 00000
Contractor's Telephone: UNKNOWN
Contractor's CAGE: 57577

Section 2 - Compositon/Information on Ingredients
HYDROCHLORIC ACID (MURATIC ACID)

Ingredient Name: HYDROCHLORIC ACID
Ingredient CAS Number: 7647-01-0 **Ingredient CAS Code:** M
RTECS Number: MW4025000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 20-22
% Enviromental Weight:
Other REC Limits: N/K

OSHA PEL: NOT APPLICABLE **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT APPLICABLE **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity: 5000 LBS
DOT Reporting Quantity: 5000 LBS
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
HYDROCHLORIC ACID (MURATIC ACID)

Health Hazards Acute & Chronic: ACUTE/CHRONIC: SEVERE EYE, SKIN & RESPIRATORY IRRITANT ON PROLONGED CONTACT. INHALATION OF CONCENTRATIONS OF ABOUT 1500 PPM IN AIR ARE FATAL IN A FEW MINUTES.

Signs & Symptoms of Overexposure:
SEE HEALTH HAZARDS.

Medical Conditions Aggravated by Exposure:
NONE SPECIFIED BY MANUFACTURER.

LD50 LC50 Mixture: NONE SPECIFIED BY MANUFACTURER.

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

Carcenogenicity Indicators
- **NTP:** NO
- **IARC:** NO
- **OSHA:** NO

Carcinogenicity Explanation: NOT RELEVANT.

Section 4 - First Aid Measures
HYDROCHLORIC ACID (MURATIC ACID)

First Aid:
INHAL:MOVE TO FRESH AIR IMMED. GIVE O2 FOR RELIEF OF COUGHING. IF BRTHG HAS STOPPED, PERFORM ARTF RESP. KEEP VICTIM WARM & RESTED. SEEK MD IMMED. EYES:IMMED FLUSH W/COPIOUS AMTS OF WATER FOR AT LEAST 15 MINS, OCCASNLY LIFTING EYELIDS. GET MD IMMED. SKIN:FLUSH CONTAMD SKIN W/WATER. REMOVE ANY CONTAMD CLTHG. GET MD. INGEST:DO NOT INDUCE VOM. IF INGESTED & VICTIM IS CONSCIOUS, GIVE LGE (SUPP DATA)

Section 5 - Fire Fighting Measures
HYDROCHLORIC ACID (MURATIC ACID)

Fire Fighting Procedures:

WEAR NIOSH/MSHA APPROVED SCBA & FULL PROTECTIVE EQUIPMENT (FP N).
Unusual Fire or Explosion Hazard:
THIS MATERIAL CAN REACT W/MOST METALS TO EVOLVE HYDROGEN WHICH IS FLAMMABLE.
Extinguishing Media:
NON-FLAMMABLE MATERIAL. USE MEDIA SUITABLE FOR SURROUDING FIRE CONDITIONS (FP N).
Flash Point: Flash Point Text: NON-COMBUSTIBLE

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s): N/A
Upper Limit(s): N/A

Section 6 - Accidental Release Measures
HYDROCHLORIC ACID (MURATIC ACID)

Spill Release Procedures:
DIKE & NEUTRALIZE W/AN ALKALINE MATERIAL. ABSORB ON SAND OR OTHER INDUSTRIAL ABSORBENT. THOROUGHLY WASH AREA TO REMOVE ANY RESIDUAL PRODUCT.

Section 7 - Handling and Storage
HYDROCHLORIC ACID (MURATIC ACID)

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
HYDROCHLORIC ACID (MURATIC ACID)

Repiratory Protection:
NIOSH/MSHA APPROVED ACID VAPOR CARTRIDGE RESPIRATOR W/FULL FACE MASK FOR LOW VAPOR CONCENTRATION. NIOSH/MSHA APPROVED SCBA FOR HIGH VAPOR CONCENTRATIONS.
Ventilation:
LOCAL EXHAUST AT POINT OF FORMULATION.
Protective Gloves:
RUBBER GLOVES.
Eye Protection: CHEM WORK GOGGS/FULL LENGTH FSHLD (FP N)
Other Protective Equipment: FULL RUB SUIT IF EXPOSED TO SPRAY OR HIGH VAPOR CONCENTRATIONS. CLOTHING TO PREVENT REPEATED OR PROLONGED SKIN CONTACT.
Work Hygenic Practices: NONE SPECIFIED BY MANUFACTURER.
Supplemental Health & Safety Information: FIRST AID PROC:AMOUNTS OF LIME WATER OR MILK OF MAGNESIA. CALL THE POISON CONTROL CENTER OR A MD. SEEK IMMEDIATE MEDICATION TREATMENT.

Section 9 - Physical & Chemical Properties
HYDROCHLORIC ACID (MURATIC ACID)

HCC: C1
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: 230F,110C
Melting/Freezing Point: Melting/Freezing Text: N/K
Decomposition Point: Decomposition Text: N/K
Vapor Pressure: 10 @ 25C **Vapor Density:** N/K
Percent Volatile Organic Content:
Specific Gravity: 1.107 (H2O=1)
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/K
Solubility in Water: COMPLETE
Appearance and Odor: COLORLESS TO LIGHT YELLOW FUMING LIQUID; STRONG IRRITATING ODOR.
Percent Volatiles by Volume: N/K
Corrosion Rate: N/K

Section 10 - Stability & Reactivity Data
HYDROCHLORIC ACID (MURATIC ACID)

Stability Indicator: YES
Materials to Avoid:
COMMON METALS: THEIR OXIDES, CARBIDES & CARBONATES.
Stability Condition to Avoid:
CONTACT W/COMMON METALS.
Hazardous Decomposition Products:
HYDROGEN.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NOT RELEVANT.

Section 11 - Toxicological Information
HYDROCHLORIC ACID (MURATIC ACID)

Toxicological Information:
N/P

Section 12 - Ecological Information
HYDROCHLORIC ACID (MURATIC ACID)

Ecological Information:
N/P

Section 13 - Disposal Considerations
HYDROCHLORIC ACID (MURATIC ACID)

Waste Disposal Methods:
ABSORBED MATERIAL MAY BE LANDFILLED IN CLOSED CONTAINERS & NEUTRALIZED MATERIAL CAN BE FLUSHED AWAY IN ACCORDANCE W/ LOCAL, STATE & FEDERAL REGULATIONS.

Section 14 - MSDS Transport Information
HYDROCHLORIC ACID (MURATIC ACID)

Transport Information:
N/P

Section 15 - Regulatory Information
HYDROCHLORIC ACID (MURATIC ACID)

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

Section 16 - Other Information
HYDROCHLORIC ACID (MURATIC ACID)

Other Information:
N/P

HMIS Transportation Information

Product Identification: HYDROCHLORIC ACID (MURATIC ACID)
Transporation ID Number: 36692
Responsible Party CAGE: IO313
Date MSDS Prepared: 06/29/1988
Date MSDS Reviewed: 01/12/1993
MFN: 01/12/1993
Submitter: N TN
Status Code: C

Container Information
- **Unit of Issue:** NK
- **Container Quantity:** NK
- **Type of Container:**
- **Net Unit Weight:**

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:

Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:

Department of Transportation Information

DOT Proper Shipping Name: HYDROCHLORIC ACID
DOT PSN Code: HJG
Symbols:
DOT PSN Modifier:
Hazard Class: 8
UN ID Number: UN1789
DOT Packaging Group: II
Label: CORROSIVE
Special Provision(s): A3,A6,B3,B15,N41,T9,T27
Packaging Exception: 154
Non Bulk Packaging: 202
Bulk Packaging: 242
Maximimum Quanity in Passenger Area: 1 L
Maximimum Quanity in Cargo Area: 30 L
Stow in Vessel Requirements: C
Requirements Water/Sp/Other:

IMO Detail Information

IMO Proper Shipping Name: HYDROCHLORIC ACID
IMO PSN Code: IEX
IMO PSN Modifier:
IMDG Page Number: 8183
UN Number: 1789
UN Hazard Class: 8
IMO Packaging Group: II/III
Subsidiary Risk Label: -
EMS Number: 8-03
Medical First Aid Guide Number: 700

IATA Detail Information

IATA Proper Shipping Name: HYDROCHLORIC ACID
IATA PSN Code: NPG
IATA PSN Modifier:
IATA UN Id Number: 1789
IATA UN Class: 8
Subsidiary Risk Class:
UN Packaging Group: II
IATA Label: CORROSIVE
Packaging Note for Passengers: 809
Maximum Quantity for Passengers: 1L
Packaging Note for Cargo: 813
Maximum Quantity for Cargo: 30L
Exceptions: A3

AFI Detail Information

AFI Proper Shipping Name: HYDROCHLORIC ACID, SOLUTION
AFI Symbols:
AFI PSN Code: NPG
AFI PSN Modifier:
AFI UN Id Number: UN1789
AFI Hazard Class: 8
AFI Packing Group: II
AFI Label:
Special Provisions: P4, A3, A6, N41
Back Pack Reference: A12.3

HAZCOM Label Information

Product Identification: HYDROCHLORIC ACID (MURATIC ACID)
CAGE: IO313
Assigned Individual: Y
Company Name: ALCOLAC INC
Company PO Box:
Company Street Address1: 3440 FAIRFIELD RD
Company Street Address2: BALTIMORE, MD 21226 US
Health Emergency Telephone: 800-424-9300 (CHEMTREC)
Label Required Indicator: Y
Date Label Reviewed: 06/22/1992
Status Code: C
Manufacturer's Label Number:
Date of Label: 06/22/1992
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: DANGER
Health Hazard: Slight
Contact Hazard: Severe
Fire Hazard: None
Reactivity Hazard: None

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Material Safety Data Sheets

Division of Facilities Services

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

704 HYDRAULIC OIL

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

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Section 1 - Product and Company Identification
704 HYDRAULIC OIL

Product Identification: 704 HYDRAULIC OIL
Date of MSDS: 04/22/1994 **Technical Review Date:** 03/16/1995
FSC: 9150 **NIIN:** 01-345-6134
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: SOUTHWESTERN PETROLEUM CORP
Post Office Box: 789
Manufacturer's Address1: 534 N MAIN ST
Manufacturer's Address2: FORT WORTH, TX 76101
Manufacturer's Country: US
General Information Telephone: 817-332-2336
Emergency Telephone: 817-332-2336, CHEMTREC 800-424-9300
Emergency Telephone: 817-332-2336, CHEMTREC 800-424-9300
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: 14392
Special Project Code: N

Item Description

Item Name: LUBRICATING OIL,HYDRAULIC
Item Manager: S9G
Specification Number: NK
Type/Grade/Class: SAE 15
Unit of Issue: CN **Quantitative Expression:** 00000000006GL
Unit of Issue Quantity: 1
Type of Container: CAN

Contractor Information

Contractor's Name: SOUTHWESTERN PETROLEUM CORP
Post Office Box: 961005
Contractor's Address1: 534 N MAIN ST
Contractor's Address2: FORT WORTH, TX 76106
Contractor's Telephone: 817-348-7235
Contractor's CAGE: 14392

Section 2 - Compositon/Information on Ingredients
704 HYDRAULIC OIL

Ingredient Name: DISTILLATES, HYDROTREATED HEAVY PARAFFINIC
Ingredient CAS Number: 64742-54-7 **Ingredient CAS Code:** M
RTECS Number: PY8035500 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:

% High Volume: % High Volume Code:
% Text: SEE # 7
% Enviromental Weight:
Other REC Limits: NONE SPECIFIED
OSHA PEL: 5 MG/M3 OIL MIST **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5 MG/M3 OIL MIST **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: DISTILLATES, SOLVENT-DEWAXED LIGHT PARAFFINIC
Ingredient CAS Number: 64742-56-9 **Ingredient CAS Code:** M
RTECS Number: PY8039500 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: SEE # 7
% Enviromental Weight:
Other REC Limits: NONE SPECIFIED
OSHA PEL: 5 MG/M3 OIL MIST **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5 MG/M3 OIL MIST **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: MINERAL OIL, PETROLEUM DISTILLATES, SOLVENT-DEWAXED HEAVY PARAFFINIC
Ingredient CAS Number: 64742-65-0 **Ingredient CAS Code:** M
RTECS Number: PY8038500 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: SEE # 7

% Enviromental Weight:
Other REC Limits: NONE SPECIFIED
OSHA PEL: 5 MG/M3 OIL MIST **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5 MG/M3 OIL MIST **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: REFINED HEAVY PARAFFINIC DISTILLATES
Ingredient CAS Number: 64741-88-4 **Ingredient CAS Code:** M
RTECS Number: RTECS Code: X
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >97
% Enviromental Weight:
Other REC Limits: NONE SPECIFIED
OSHA PEL: 5 MG/M3 (OIL MIST) **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5 MG/M3 (OIL MIST) **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: RESIDUAL OILS, HYDROTREATED
Ingredient CAS Number: 64742-57-0 **Ingredient CAS Code:** M
RTECS Number: RTECS Code: X
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: SEE # 7
% Enviromental Weight:
Other REC Limits: NONE SPECIFIED
OSHA PEL: 5 MG/M3 (OIL MIST) **OSHA PEL Code:** M

OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5 MG/M3 (OIL MIST) ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: SOLVENT REFINED, HYDROTREATED LIGHT PARAFFINIC DISTILLATE
Ingredient CAS Number: 64742-55-8 Ingredient CAS Code: M
RTECS Number: PY8036500 RTECS Code: M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: SEE # 7
% Enviromental Weight:
Other REC Limits: NONE SPECIFIED
OSHA PEL: 5 MG/M3 OIL MIST OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5 MG/M3 OIL MIST ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: SOLVENT,DEWAXED RESIDUAL OIL (PETROLEUM)
Ingredient CAS Number: 64742-62-7 Ingredient CAS Code: M
RTECS Number: RTECS Code: X
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: SEE # 7
% Enviromental Weight:
Other REC Limits: NONE SPECIFIED
OSHA PEL: 5 MG/M3 OIL MIST OSHA PEL Code: M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 5 MG/M3 OIL MIST ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:

EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
704 HYDRAULIC OIL

Health Hazards Acute & Chronic: MAY BE MILDLY IRRITATING TO THE EYES. PROLONGED OR REPEATED CONTACT MAY CAUSE MILD IRRITATION AND INFLAMMATION. ASPIRATION HAZARD.

Signs & Symptoms of Overexposure:
EYE IRRITATION, SKIN IRRITATION, SKIN INFLAMMATION, CHEMICAL PNEUMONIA.

Medical Conditions Aggravated by Exposure:
PERSONNEL WITH PRE-EXISTING SKIN DISORDERS SHOULD AVOID CONTACT WITH THIS PRODUCT.

LD50 LC50 Mixture: NOT GIVEN FOR PRODUCT AS A WHOLE

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

Carcenogenicity Indicators
- **NTP:** NO
- **IARC:** NO
- **OSHA:** NO

Carcinogenicity Explanation: THIS COMPOUND CONTAINS NO INGREDIENTS AT CONCENTRATIONS OF 0.1% OR GREATER THAT ARE CARCINOGENS OR SUSPECT CARCINOGENS.

Section 4 - First Aid Measures
704 HYDRAULIC OIL

First Aid:
EYES: FLUSH WITH WATER FOR 15 MINUTES WHILE HOLDING EYELIDS OPEN. GET MEDICAL ATTENTION. SKIN: REMOVE CONTAMINATED CLOTHING. WASH WITH SOAP AND WATER. IF IRRITATION PERSISTS, GET MEDICAL ATTENTION. IN HALATION: REMOVE TO FRESH AIR. RESTORE BREATHING. GET MEDICAL ATTENTION. INGESTION: DO NOT INDUCE VOMITING. GET MEDICAL ATTENTION.

Section 5 - Fire Fighting Measures
704 HYDRAULIC OIL

Fire Fighting Procedures:
FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO COOL NEARBY CONTAINERS

EXPOSED TO FIRE.
Unusual Fire or Explosion Hazard:
WATER MAY CAUSE FROTHING. TOXIC GASES ARE RELEASED DURING COMBUSTION.
Extinguishing Media:
WATER FOG, DRY CHEMICAL, CARBON DIOXIDE, FOAM
Flash Point: Flash Point Text: >354F,>179C

Autoignition Temperature:
Autoignition Temperature Text: >500F
Lower Limit(s): 0.9 %
Upper Limit(s): 7 %

Section 6 - Accidental Release Measures
704 HYDRAULIC OIL

Spill Release Procedures:
USE INERT ABSORBENT MATERIAL TO CONFINE SPILLS AND TO ABSORB MATERIAL. SCOOP INTO A DISPOSABLE CONTAINER.

Section 7 - Handling and Storage
704 HYDRAULIC OIL

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
704 HYDRAULIC OIL

Repiratory Protection:
IF VENTILATION DOES NOT MAINTAIN INHALATION EXOSURES BELOW PEL (TLV), USE NIOSH/MSHA APPROVED RESPIRATOR AS PER CURRENT 29 CFR 1910.134. INSTRUCTIONS/WARNINGS AND NIOSH RESPIRATOR SELECTION.
Ventilation:
LOCAL EXHAUST AND MECHANICAL (GENERAL) VENTILATION TO MAINTAIN EXPOSURE LEVELS.
Protective Gloves:
IMPERVIOUS
Eye Protection: SAFETY GLASSES OR GOGGLES
Other Protective Equipment: PROTECTIVE CLOTHING AS REQUIRED TO AVOID SKIN CONTACT. AN EMERGENCY EYE WASH STATION AND SHOWER SHOULD BE AVAILABLE.
Work Hygenic Practices: WASH WITH SOAP AND WATER AFTER HANDLING PRODUCT AND BEFORE EATING DRINKING OR SMOKING.
Supplemental Health & Safety Information: NONE SPECIFIED BY MANUFACTURER.

Section 9 - Physical & Chemical Properties
704 HYDRAULIC OIL

HCC: V6

NRC/State License Number: N/R
Net Property Weight for Ammo: N/R
Boiling Point: Boiling Point Text: >559F,>293C
Melting/Freezing Point: Melting/Freezing Text: NOT GIVEN
Decomposition Point: Decomposition Text: UNKNOWN
Vapor Pressure: NOT GIVEN **Vapor Density:** > 5
Percent Volatile Organic Content:
Specific Gravity: 0.9
Volatile Organic Content Pounds per Gallon:
pH: N/K
Volatile Organic Content Grams per Liter:
Viscosity: SAE 15
Evaporation Weight and Reference: NOT GIVEN
Solubility in Water: INSOLUBLE
Appearance and Odor: RED COLORED LIQUID,, LUBE OIL ODOR
Percent Volatiles by Volume: N/K
Corrosion Rate: UNKNOWN

Section 10 - Stability & Reactivity Data
704 HYDRAULIC OIL

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZING AGENTS
Stability Condition to Avoid:
HEAT, OPEN FLAME
Hazardous Decomposition Products:
CARBON MONOXIDE, CARBON DIOXIDE, UNIDENTIFIED ORGANIC COMPOUNDS.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
NONE. WILL NOT OCCUR.

Section 11 - Toxicological Information
704 HYDRAULIC OIL

Toxicological Information:
N/P

Section 12 - Ecological Information
704 HYDRAULIC OIL

Ecological Information:
N/P

Section 13 - Disposal Considerations
704 HYDRAULIC OIL

Waste Disposal Methods:
PREVENT WASTE FROM CONTAMINATING SURROUNDING ENVIRONMENT. DISCARD ANY PRODUCT, RESIDUE, DISPOSAL CONTAINER OR LINER IN ACCORDANCE WITH ALL FEDERAL, STATE AND LOCAL REGULATIONS.

Section 14 - MSDS Transport Information
704 HYDRAULIC OIL

Transport Information:
N/P

Section 15 - Regulatory Information
704 HYDRAULIC OIL

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

Section 16 - Other Information
704 HYDRAULIC OIL

Other Information:
N/P

HMIS Transportation Information

Product Identification: 704 HYDRAULIC OIL
Transporation ID Number: 127770
Responsible Party CAGE: 14392
Date MSDS Prepared: 04/22/1994
Date MSDS Reviewed: 05/20/1993
MFN: 05/20/1993
Submitter: D DG
Status Code: C

Container Information
- **Unit of Issue:** CN
- **Container Quantity:** 1
- **Type of Container:** CAN
- **Net Unit Weight:** 45.0 LBS

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

Additional Data:

Department of Transportation Information

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

IMO Detail Information

IMO Proper Shipping Name: NOT REGULATED FOR THIS MODE OF TRANSPORTATION
IMO PSN Code: ZZZ
IMO PSN Modifier:
IMDG Page Number: N/R
UN Number: N/R
UN Hazard Class: N/R
IMO Packaging Group: N/R
Subsidiary Risk Label: N/R
EMS Number: N/R
Medical First Aid Guide Number: N/R

IATA Detail Information

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

AFI Detail Information

AFI Proper Shipping Name: NOT REGULATED BY THIS MODE OF TRANSPORTATION
AFI Symbols:
AFI PSN Code: ZZZ
AFI PSN Modifier:
AFI UN Id Number: N/R

AFI Hazard Class: N/R
AFI Packing Group: N/R
AFI Label: N/R
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: 704 HYDRAULIC OIL
CAGE: 14392
Assigned Individual: N
Company Name: SOUTHWESTERN PETROLEUM CORP
Company PO Box: 961005
Company Street Address1: 534 N MAIN ST
Company Street Address2: FORT WORTH, TX 76106 US
Health Emergency Telephone: 817-332-2336/800-424-9300(CHEMTREC)
Label Required Indicator: Y
Date Label Reviewed: 12/05/1991
Status Code: C
Manufacturer's Label Number: N/R
Date of Label: 12/05/1991
Year Procured: N/K
Organization Code: F
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: N/P
Signal Word: CAUTION
Health Hazard: None
Contact Hazard: Slight
Fire Hazard: Slight
Reactivity Hazard: None

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Material Safety Data Sheets

Division of Facilities Services

DOD Hazardous Material Information (ANSI Format)
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SODA ASH

Section 1 - Product and Company Identification	Section 9 - Physical & Chemical Properties
Section 2 - Compositon/Information on Ingredients	Section 10 - Stability & Reactivity Data
Section 3 - Hazards Identification Including Emergency Overview	Section 11 - Toxicological Information
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Section 1 - Product and Company Identification
SODA ASH

Product Identification: SODA ASH
Date of MSDS: 01/01/1987 **Technical Review Date:** 04/27/1987
FSC: 6810 **NIIN:** 00-223-1715
Submitter: G AW
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: PRILLAMAN CHEM CORP
Manufacturer's Address1:
Manufacturer's Address2: N/P, NK 00000
Manufacturer's Country: NK
General Information Telephone:
Emergency Telephone: 703-638-8829
Emergency Telephone: 703-638-8829
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: KO654
Special Project Code: N

Item Description

Item Name: SODIUM CARBONATE,ANHYDROUS, TECHNICAL
Item Manager: GSA
Specification Number: CID A-A-41
Type/Grade/Class: NK
Unit of Issue: BG **Quantitative Expression:** NK
Unit of Issue Quantity: 100 LBS.
Type of Container: BAG

Contractor Information

Contractor's Name: PRILLAMAN CHEM CORP
Contractor's Address1: UNKNOWN
Contractor's Address2: UNKNOWN, NK 00000
Contractor's Telephone: UNKNOWN
Contractor's CAGE: KO654

Contractor Information

Contractor's Name: PRILLAMAN CHEMICAL CORP
Contractor's Address1: 825 FISHER STREET
Contractor's Address2: MARTINSVILLE, VA 24112-3145
Contractor's Telephone: 540-638-8829
Contractor's CAGE: 2R560

Section 2 - Compositon/Information on Ingredients
SODA ASH

Ingredient Name: SODIUM CARBONATE
Ingredient CAS Number: **Ingredient CAS Code:** X
RTECS Number: VZ4040000 **RTECS Code:** M
=WT: **=WT Code:**
=Volume: **=Volume Code:**
>WT: **>WT Code:**

>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: 99
% Enviromental Weight:
Other REC Limits: N/P
OSHA PEL: N/P OSHA PEL Code:
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 10 MG/CUM ACGIH TLV Code: M
ACGIH STEL: N/P ACGIH STEL Code:
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical:

Section 3 - Hazards Identification, Including Emergency Overview
SODA ASH

Health Hazards Acute & Chronic: N/P

Signs & Symptoms of Overexposure:
MAY CAUSE SEVERE IRRITAT OF EYES,INCLD CORNEAL OPACITIES.DSTS/MSTS IRRIT. TO SKN,MUCOUS MEMBRANE(SUP

Medical Conditions Aggravated by Exposure:
N/P

LD50 LC50 Mixture: N/P

Route of Entry Indicators:
- **Inhalation: N/P**
- **Skin: N/P**
- **Ingestion: N/P**

Carcenogenicity Indicators
- **NTP: N/P**
- **IARC: N/P**
- **OSHA: N/P**

Carcinogenicity Explanation: N/P

Section 4 - First Aid Measures
SODA ASH

First Aid:
EYES:FLUSH W/LG AMTS OF WATR F/AT LEAT 15 MIN.SEE AN OPTHALMOLOGIST IF IRRIT PERSISTS. SKN:WASH W/PLENTY OF WATR F/15 MIN.IF IRRIT OCCURS &

PERSISTS,OBTN MEDICAL ATTN.INHAL:REMOV FR EXPOSR.IF DOSCOMFT ,OBTN MEDICAL ATTN.INGEST:DRINK WATR TODILUTE,OB

Section 5 - Fire Fighting Measures
SODA ASH

Fire Fighting Procedures:
NONE
Unusual Fire or Explosion Hazard:
NONE
Extinguishing Media:
WATER
Flash Point: Flash Point Text: NON-COMBUSTIBLE

Autoignition Temperature:
Autoignition Temperature Text: N/A
Lower Limit(s):
Upper Limit(s):

Section 6 - Accidental Release Measures
SODA ASH

Spill Release Procedures:
SWEEP UP AS MUCH AS POSS FOR SALVAGE OR DISPOSAL. WASH AWAY RESIDUE W/WATER.

Section 7 - Handling and Storage
SODA ASH

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
SODA ASH

Repiratory Protection:
N/P
Ventilation:
GEN RM DILUT OR LOC EXHAUST VENTILAT F/EXCESSIVE DUST.
Protective Gloves:
GEN PURPOSE
Eye Protection: CHEM GOGGLES
Other Protective Equipment: FULL COVER CLOTHING
Work Hygenic Practices: N/P
Supplemental Health & Safety Information: EFFCTS OF OVEREXPOSR: AND UPPER RESPIRATORY TRACT. MAY CAUS INFLAMMATION OF THE MUCOUS MEMBRANES IN THE RESPIRATORY TRACT AND OF THE SKIN.

Section 9 - Physical & Chemical Properties

SODA ASH

HCC: N1
NRC/State License Number:
Net Property Weight for Ammo:
Boiling Point: Boiling Point Text: N/A
Melting/Freezing Point: Melting/Freezing Text: N/A
Decomposition Point: Decomposition Text: N/A
Vapor Pressure: N/P **Vapor Density:** N/P
Percent Volatile Organic Content:
Specific Gravity: 2.509
Volatile Organic Content Pounds per Gallon:
pH: N/P
Volatile Organic Content Grams per Liter:
Viscosity: N/P
Evaporation Weight and Reference: N/P
Solubility in Water: 33%
Appearance and Odor: WHITE GRANULAR SOLID
Percent Volatiles by Volume: N/P
Corrosion Rate: N/P

Section 10 - Stability & Reactivity Data
SODA ASH

Stability Indicator: YES
Materials to Avoid:
REACTS W/ACIDS TO RELEASECO*2 & HEAT.
Stability Condition to Avoid:
CONTACT W/ACIDS
Hazardous Decomposition Products:
N/P
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
N/P

Section 11 - Toxicological Information
SODA ASH

Toxicological Information:
N/P

Section 12 - Ecological Information
SODA ASH

Ecological Information:
N/P

Section 13 - Disposal Considerations
SODA ASH

Waste Disposal Methods:
IF MATRL CANNOT BE SALVAGED;THE PREFERRED METHOD OF DISPOSAL IS IN A

SECURE LANDFILL IN ACCORDANCE W/ ALL LOC,STATE & FED. ENVIRONMENTAL REGULATIONS. EMPTY CONTAINERS MAY BE INCINERATED, OR DISCARDED AS GENERAL TRASH.

Section 14 - MSDS Transport Information
SODA ASH

Transport Information:
N/P

Section 15 - Regulatory Information
SODA ASH

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

Section 16 - Other Information
SODA ASH

Other Information:
N/P

HMIS Transportation Information

Product Identification: SODA ASH
Transporation ID Number: 57321
Responsible Party CAGE: KO654
Date MSDS Prepared: 01/01/1987
Date MSDS Reviewed: 04/27/1987
MFN: 04/27/1987
Submitter: G AW
Status Code: C

Container Information
- **Unit of Issue:** BG
- **Container Quantity:** 100 LBS.
- **Type of Container:** BAG
- **Net Unit Weight:**

Article without MSDS: N
Technical Entry NOS Shipping Number:
Radioactivity:
Form:
Net Explosive Weight:
Coast Guard Ammunition Code:
Magnetism: N/P
AF MMAC Code:
DOD Exemption Number:
Limited Quantity Indicator:

Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:

Department of Transportation Information

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

IMO Detail Information

IMO Proper Shipping Name: SEE ADDITIONAL DATA FIELD IN HMIS FOR FURTHER INFORMATION
IMO PSN Code: XXX
IMO PSN Modifier:
IMDG Page Number: N/A
UN Number:
UN Hazard Class: N/A
IMO Packaging Group:
Subsidiary Risk Label:
EMS Number: N/A
Medical First Aid Guide Number: N/A

IATA Detail Information

IATA Proper Shipping Name: SEE ADDITIONAL DATA FIELD IN HMIS FOR FURTHER INFORMATION
IATA PSN Code: XXX
IATA PSN Modifier:
IATA UN Id Number:
IATA UN Class:
Subsidiary Risk Class:
UN Packaging Group:
IATA Label:
Packaging Note for Passengers:
Maximum Quantity for Passengers:
Packaging Note for Cargo:
Maximum Quantity for Cargo:
Exceptions:

AFI Detail Information

AFI Proper Shipping Name: SEE ADDITIONAL DATA FIELD IN HMIS FOR FURTHER INFORMATION
AFI Symbols:
AFI PSN Code: XXX
AFI PSN Modifier:
AFI UN Id Number: N/A
AFI Hazard Class: N/A
AFI Packing Group: N/A
AFI Label:
Special Provisions: N/A
Back Pack Reference: N/A

HAZCOM Label Information

Product Identification: SODA ASH
CAGE: KO654
Assigned Individual: Y
Company Name: PRILLAMAN CHEM CORP
Company PO Box:
Company Street Address1: UNKNOWN
Company Street Address2: UNKNOWN, NK 00000 NK
Health Emergency Telephone: 703-638-8829
Label Required Indicator: Y
Date Label Reviewed: 12/16/1998
Status Code: C
Manufacturer's Label Number:
Date of Label: 12/16/1998
Year Procured: N/K
Organization Code: G
Chronic Hazard Indicator: N/P
Eye Protection Indicator: N/P
Skin Protection Indicator: N/P
Respiratory Protection Indicator: N/P
Signal Word: N/P
Health Hazard:
Contact Hazard:
Fire Hazard:
Reactivity Hazard:

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CORNELL

Material Safety Data Sheets

Division of Facilities Services

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

LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

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

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Section 1 - Product and Company Identification
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Product Identification: LIQUEFIED PETROLEUM GAS (LPG) - PROPANE
Date of MSDS: 07/01/1996 **Technical Review Date:** 05/29/1997
FSC: 3433 **NIIN:** 01-161-4998
Submitter: D DG
Status Code: C
MFN: 01
Article: N
Kit Part: N

Manufacturer's Information

Manufacturer's Name: COOPER HAND TOOLS/COOPER INDUSTRIES
Manufacturer's Address1: 821 PARK AVE
Manufacturer's Address2: SYCAMORE, IL 60178-2419
Manufacturer's Country: US
General Information Telephone: 815-895-4545
Emergency Telephone: 815-895-4545
Emergency Telephone: 815-895-4545
MSDS Preparer's Name: N/P
Proprietary: N
Reviewed: Y
Published: Y
CAGE: IO716
Special Project Code: N

Item Description

Item Name: TORCH SET,PROPANE,S
Item Manager: S9G
Specification Number: NK
Type/Grade/Class: NK
Unit of Issue: EA
Unit of Issue Quantity: 1
Type of Container: BOTTLE

Contractor Information

Contractor's Name: COOPER HAND TOOLS/TURNER
Contractor's Address1: 821 PARK AVENUE
Contractor's Address2: SYCAMORE, IL 60178
Contractor's Telephone: 815-895-4545
Contractor's CAGE: IO716

Contractor Information

Contractor's Name: NOLAND INDUSTRIES
Post Office Box: UNKNOW
Contractor's Address1: UNKNOWN
Contractor's Address2: UNKNOWN, NK 00000
Contractor's Telephone: UNKNOWN
Contractor's CAGE: 9A144

Contractor Information

Contractor's Name: TURNER CO DIV OF CLEANWELD PRODUCTS CO
Post Office Box: 6200
Contractor's Address1: 821 PARK AVE
Contractor's Address2: SYCAMORE, IL 60178-2419
Contractor's Telephone: 815-895-4545

Contractor's CAGE: 61112

Section 2 - Compositon/Information on Ingredients
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Ingredient Name: BUTANE
Ingredient CAS Number: 106-97-8 **Ingredient CAS Code:** M
RTECS Number: EJ4200000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <2.5
% Enviromental Weight:
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 800 PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: 800 PPM; 9495 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: MERCAPTAN (USED AS AN ODORANT)
Ingredient CAS Number: Ingredient CAS Code: X
RTECS Number: RTECS Code: X
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: UNKNOWN
% Enviromental Weight:
Other REC Limits: NONE RECOMMENDED
OSHA PEL: NOT ESTABLISHED **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: NOT ESTABLISHED **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:

Ozone Depleting Chemical:

Ingredient Name: PROPANE
Ingredient CAS Number: 74-98-6 **Ingredient CAS Code:** M
RTECS Number: TX2275000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: >90
% Enviromental Weight:
Other REC Limits: NONE RECOMMENDED
OSHA PEL: 1000 PPM **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: ASPHYXIANT; 9495 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Ingredient Name: PROPYLENE (PROPENE) (SARA 313)
Ingredient CAS Number: 115-07-1 **Ingredient CAS Code:** M
RTECS Number: UC6740000 **RTECS Code:** M
=WT: =WT Code:
=Volume: =Volume Code:
>WT: >WT Code:
>Volume: >Volume Code:
<WT: <WT Code:
<Volume: <Volume Code:
% Low WT: % Low WT Code:
% High WT: % High WT Code:
% Low Volume: % Low Volume Code:
% High Volume: % High Volume Code:
% Text: <5
% Enviromental Weight:
Other REC Limits: NONE RECOMMENDED
OSHA PEL: NOT ESTABLISHED **OSHA PEL Code:** M
OSHA STEL: OSHA STEL Code:
ACGIH TLV: ASPHIXIANT; 9495 **ACGIH TLV Code:** M
ACGIH STEL: N/P **ACGIH STEL Code:**
EPA Reporting Quantity:
DOT Reporting Quantity:
Ozone Depleting Chemical: N

Section 3 - Hazards Identification, Including Emergency Overview
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Health Hazards Acute & Chronic: *TARGET-ORGANS:CNS, RESPIRATORY SYSTEM* EYE/SKIN CONTACT MAY CAUSE FROSTBITE. INHALATION:HIGH CONCENTRATIONS MAY CAUSE CNS DEPRESSION OR ASPHYXIATION. INGESTION:NOT EXPECTED AS PRODUCT IS A GAS. NO AD VERSE CHRONIC EFFECTS ANTICIPATED.

Signs & Symptoms of Overexposure:
CNS EFFECTS OF DROWSINESS, DIZZINESS, CONFUSION, EXCITATION. ALSO SYMPTOMS OF ASPHYXIATION SUCH AS DIMINISHED MENTAL ALERTNESS, POOR MUSCULAR COORDINATION, FAULTY JUDGEMENT, FATIGUE, AIR HUNGER, RAPID BREATHING, NAUSEA, LOSS OF CONSCIOUSNESS.

Medical Conditions Aggravated by Exposure:
NONE KNOWN

LD50 LC50 Mixture: PRODUCT'S LD50 (ORAL RAT) WAS NOT STATED

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

Carcenogenicity Indicators
- **NTP:** NO
- **IARC:** NO
- **OSHA:** NO

Carcinogenicity Explanation: MFR GAVE THE ABOVE LISTINGS ON THE MSDS BUT NO OTHER COMMENTS ABOUT CARCINOGENICITY WERE RECORDED.

Section 4 - First Aid Measures
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

First Aid:
IF IRRITATION PERSISTS OR IS SEVERE, GET MEDICAL ATTENTION. EYE:FLUSH W/WATER FOR 15 MIN. SKIN:FLUSH AFFECTED AREA W/WATER. TREAT FOR FROSTBITE BY GENTLY WARMING AFFECTED AREA. INHALED:REMOVE FROM EXP OSURE. KEEP VICTIM CALM. AID OR RESTOREBREATHING AS NEEDED. INGESTED:NOT CONSIDERED A POTENTIAL ROUTE OF EXPOSURE.

Section 5 - Fire Fighting Measures
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Fire Fighting Procedures:
WEAR SELF-CONTAINED BREATHING APPARATUS & FULL PROTECTIVE CLOTHING. COOL CONTAINERS W/WATER UNTIL WELL AFTER FLAMES HAVE BEEN EXTINGUISHED.

Unusual Fire or Explosion Hazard:
PRODUCES CARBON OXIDES. HIGHLY FLAMMABLE & EXPLOSIVE. VAPORS

ACCUMULATE IN LOW AREAS & MAY TRAVEL TO IGNITION SOURCE & FLASH BACK. CONTAINER MAY RUPTURE W/HEAT.
Extinguishing Media:
SMALL FIRES:DRY CHEMICAL, CARBON DIOXIDE. LARGE FIRES:WATER SPRAY, FOG. STOP FLOW OF GAS BEFORE ATTEMPTING TO EXTINGUISH
Flash Point: Flash Point Text: -156F,-104C

Autoignition Temperature:
Autoignition Temperature Text: N/K
Lower Limit(s): 2.1
Upper Limit(s): 9.5

Section 6 - Accidental Release Measures
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Spill Release Procedures:
REMOVE ALL IGNITION SOURCES! REMOVE LEAKING CONTAINER TO OUTSIDE IF POSSIBLE. IF NOT, ISOLATE AREA. VENTILATE AREA. FLUSH LARGE SPILLS W/WATER. CLEAN-UP WATER RUNOFF T O SEWERS MAY CAUSE FIRE OR EXP LOSION. DO NOT RE-ENTER AREA UNTIL VAPORS ARE GONE

Section 7 - Handling and Storage
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Handling and Storage Precautions:

Other Precautions:

Section 8 - Exposure Controls & Personal Protection
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Repiratory Protection:
NONE UNDER ANY NORMAL CONDITION OF USE.
Ventilation:
USE LOCAL EXHAUST TO PREVENT BUILDUP OF EXPLOSIVE & >TLV CONCENTRATIONS. USE EXPLOSION PROOF EQUIPMENT.
Protective Gloves:
NEOPRENE, PLASTIC OR RUBBER
Eye Protection: SAFETY GLASSES OR GOGGLES
Other Protective Equipment: AN EYEWASH FOUNTAIN & SAFETY SHOWER SHOULD BE NEARBY & READY FOR USE.
Work Hygenic Practices: NO SMOKING OR OPEN LIGHTS IN AREA.
Supplemental Health & Safety Information: NONE

Section 9 - Physical & Chemical Properties
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

HCC: G2
NRC/State License Number: NONE
Net Property Weight for Ammo: NONE

Boiling Point: Boiling Point Text: -44F,-42C
Melting/Freezing Point: Melting/Freezing Text: -305F,-187C
Decomposition Point: Decomposition Text: UNKNOWN
Vapor Pressure: 300 PSIG **Vapor Density:** 1.52
Percent Volatile Organic Content:
Specific Gravity: 0.51
Volatile Organic Content Pounds per Gallon:
pH: N/A.
Volatile Organic Content Grams per Liter:
Viscosity: GAS
Evaporation Weight and Reference: UNKNOWN
Solubility in Water: NEGLIGIBLE
Appearance and Odor: COLORLESS GAS, PUNGENT ODOR (MERCAPTAN ADDITIVE)
Percent Volatiles by Volume: GAS
Corrosion Rate: UNKNOWN

Section 10 - Stability & Reactivity Data
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Stability Indicator: YES
Materials to Avoid:
STRONG OXIDIZERS. PROPANE & CHLORINE DIOXIDE CAN EXPLODE ON CONTACT.
Stability Condition to Avoid:
MFR GAVE NO INFORMATION OF MSDS.
Hazardous Decomposition Products:
THERMAL DECOMPOSITION WILL PRODUCE CARBON OXIDES.
Hazardous Polymerization Indicator: NO
Conditions to Avoid Polymerization:
WILL NOT OCCUR.

Section 11 - Toxicological Information
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Toxicological Information:
N/P

Section 12 - Ecological Information
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Ecological Information:
N/P

Section 13 - Disposal Considerations
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Waste Disposal Methods:
CLEANUP PERSONNEL TO WEAR APPROPRIATE PROTECTIVE EQUIPMENT INCLUDING RESPIRATORY PROTECTION. DISPOSE OF I/A/W FEDERAL, STATE & LOCAL REGULATIONS. DISPOSE PER 40DFR261 & 262.

Section 14 - MSDS Transport Information
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Transport Information:
N/P

Section 15 - Regulatory Information
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

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

Section 16 - Other Information
LIQUEFIED PETROLEUM GAS (LPG) - PROPANE

Other Information:
N/P

HMIS Transportation Information

Product Identification: LIQUEFIED PETROLEUM GAS (LPG) - PROPANE
Transporation ID Number: 112179
Responsible Party CAGE: IO716
Date MSDS Prepared: 07/01/1996
Date MSDS Reviewed: 05/29/1997
MFN: 05/29/1997
Submitter: D DG
Status Code: C

Container Information
- **Unit of Issue:** EA
- **Container Quantity:** 1
- **Type of Container:** BOTTLE
- **Net Unit Weight:** 14.01 OZ

Article without MSDS: N
Technical Entry NOS Shipping Number: NONE
Radioactivity: N/K
Form:
Net Explosive Weight: N/K
Coast Guard Ammunition Code: N/K
Magnetism: N/P
AF MMAC Code: NK
DOD Exemption Number: N/K
Limited Quantity Indicator:
Multiple Kit Number: 0
Kit Indicator: N
Kit Part Indicator: N
Review Indicator: Y
Additional Data:
NONE

Department of Transportation Information

DOT Proper Shipping Name: PROPANE
DOT PSN Code: MFA
Symbols:
DOT PSN Modifier: SEE ALSO PETROLEUM GASES, LIQUEFIED
Hazard Class: 2.1
UN ID Number: UN1978
DOT Packaging Group:
Label: FLAMMABLE GAS
Special Provision(s): 19
Packaging Exception: 306
Non Bulk Packaging: 304
Bulk Packaging: 314,315
Maximimum Quanity in Passenger Area: FORBIDDEN
Maximimum Quanity in Cargo Area: 150 KG
Stow in Vessel Requirements: E
Requirements Water/Sp/Other: 40

IMO Detail Information

IMO Proper Shipping Name: PROPANE
IMO PSN Code: MIR
IMO PSN Modifier:
IMDG Page Number: 2147
UN Number: 1978
UN Hazard Class: 2(2.1)
IMO Packaging Group: -
Subsidiary Risk Label: -
EMS Number: 2-07
Medical First Aid Guide Number: 310

IATA Detail Information

IATA Proper Shipping Name: PROPANE
IATA PSN Code: UZT
IATA PSN Modifier:
IATA UN Id Number: 1978
IATA UN Class: 2.1
Subsidiary Risk Class:
UN Packaging Group:
IATA Label: FLAMMABLE GAS
Packaging Note for Passengers: FORB
Maximum Quantity for Passengers: FORB
Packaging Note for Cargo: 200
Maximum Quantity for Cargo: 150KG
Exceptions: A1

AFI Detail Information

AFI Proper Shipping Name: PROPANE OR PROPANE MIXTURES; SEE ALSO PETROLEUM GASES, LIQUEFIED
AFI Symbols:
AFI PSN Code: UZT
AFI PSN Modifier:
AFI UN Id Number: UN1978
AFI Hazard Class: 2.1

AFI Packing Group: N/A
AFI Label:
Special Provisions: P4
Back Pack Reference: A6.3, A6.7

HAZCOM Label Information

Product Identification: LIQUEFIED PETROLEUM GAS (LPG) - PROPANE
CAGE: IO716
Assigned Individual: Y
Company Name: COOPER HAND TOOLS/TURNER
Company PO Box:
Company Street Address1: 821 PARK AVENUE
Company Street Address2: SYCAMORE, IL 60178 US
Health Emergency Telephone: 815-895-4545
Label Required Indicator: Y
Date Label Reviewed: 05/29/1997
Status Code: C
Manufacturer's Label Number: NONE
Date of Label: 05/29/1997
Year Procured: 1997
Organization Code: F
Chronic Hazard Indicator: N
Eye Protection Indicator: YES
Skin Protection Indicator: YES
Respiratory Protection Indicator: YES
Signal Word: DANGER
Health Hazard: Slight
Contact Hazard: Slight
Fire Hazard: Severe
Reactivity Hazard: None

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SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CJMETALS
222 Bridge Plaza South
Ft. Lee, NJ 07024

EMERGENCY CONTACT:
CHEMTREC(R)
(800) 424-9300

SUBSTANCE: ZIRCONIUM OXYCHLORIDE

TRADE NAMES/SYNONYMS:
BASIC ZIRCONIUM CHLORIDE; CHLOROZIRCONYL; ZIRCONIUM(IV) OXYCHLORIDE; ZIRCONYL CHLORIDE; ZIRCONIUM OXIDE CHLORIDE; DICHLOROOXOZIRCONIUM; ZIRCONIUM, DICHLOROOXO; ZIRCONIUM OXYDICHLORIDE; ZIRCONIUM CHLORIDE OXIDE; ZIRCONIUM DICHLORIDE MONOXIDE; ZIRCONIUM DICHLORIDE OXIDE; ZIRCONYL DICHLORIDE; Cl2OZr; CMC25640; RTECS ZH7700000

CHEMICAL FAMILY: inorganic, salt

CREATION DATE: Jan 16 1998
REVISION DATE: Mar 22 2001

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: ZIRCONIUM OXYCHLORIDE
CAS NUMBER: 7699-43-6
EINECS NUMBER (EINECS): 231-717-9
PERCENTAGE: 100.0

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

EMERGENCY OVERVIEW:
COLOR: colorless to off-white
PHYSICAL FORM: crystals, powder
ODOR: odorless
MAJOR HEALTH HAZARDS: respiratory tract burns, skin burns, eye burns, mucous membrane burns

POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: burns
LONG TERM EXPOSURE: same as effects reported in short term exposure, allergic reactions, lung damage
SKIN CONTACT:
SHORT TERM EXPOSURE: burns
LONG TERM EXPOSURE: same as effects reported in short term exposure, allergic reactions
EYE CONTACT:
SHORT TERM EXPOSURE: burns

LONG TERM EXPOSURE: same as effects reported in short term exposure
INGESTION:
SHORT TERM EXPOSURE: burns
LONG TERM EXPOSURE: same as effects reported in short term exposure

CARCINOGEN STATUS:
OSHA: No
NTP: No
IARC: No

SECTION 4 FIRST AID MEASURES

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

SKIN CONTACT: Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get immediate medical attention. Thoroughly clean and dry contaminated clothing and shoes before reuse. Destroy contaminated shoes.

EYE CONTACT: Immediately flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

INGESTION: If swallowed, drink plenty of water, do NOT induce vomiting. Get immediate medical attention.

NOTE TO PHYSICIAN: For inhalation, consider oxygen. Avoid gastric lavage or emesis.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Negligible fire hazard.

EXTINGUISHING MEDIA: regular dry chemical, carbon dioxide, water, regular foam

Large fires: Use regular foam or flood with fine water spray.

FIRE FIGHTING: Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. Use extinguishing agents appropriate for surrounding fire. Do not get water directly on material. Large fires: Flood with fine water spray. Reduce vapors with water spray. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas.

SECTION 6 ACCIDENTAL RELEASE MEASURES

OCCUPATIONAL RELEASE:
Do not touch spilled material. Stop leak if possible without personal risk. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Small dry spills: Move containers away from spill to a safe area. Large spills: Dike for later disposal. Keep unnecessary people away, isolate hazard area and deny entry.

SECTION 7 HANDLING AND STORAGE

STORAGE: Store and handle in accordance with all current regulations and standards. Keep separated from incompatible substances.

HANDLING: Use methods to minimize dust.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
ZIRCONIUM OXYCHLORIDE:
ZIRCONIUM COMPOUNDS (as Zr):
5 mg/m3 OSHA TWA
10 mg/m3 OSHA STEL (vacated by 58 FR 35338, June 30, 1993)
5 mg/m3 ACGIH TWA
10 mg/m3 ACGIH STEL
5 mg/m3 NIOSH recommended TWA 10 hour(s)
10 mg/m3 NIOSH recommended STEL
1 mg/m3 DFG MAK (peak limitation category-III) (inhalable dust fraction) (insoluble compounds)
5 mg/m3 UK OES TWA
10 mg/m3 UK OES STEL

MEASUREMENT METHOD: Particulate filter; Acid; Inductively coupled plasma; NIOSH IV # 7300, Elements

VENTILATION: Provide local exhaust or process enclosure ventilation system. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles with a faceshield. Provide an emergency eye wash fountain and quick drench shower in the immediate work area.

CLOTHING: Wear appropriate chemical resistant clothing.

GLOVES: Wear appropriate chemical resistant gloves.

RESPIRATOR: The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
Measurement Element:

irconium (Zr)
mg/m3
Any dust and mist respirator.
mg/m3
Any dust and mist respirator.
Any powered, air-purifying respirator with a dust and mist filter.
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any supplied-air respirator.
Any self-contained breathing apparatus with a full facepiece.
Escape -
Any air-purifying respirator with a full facepiece and a high-efficiency particulate filter.
Any appropriate escape-type, self-contained breathing apparatus.
For Unknown Concentrations or Immediately Dangerous to Life or Health -
Any supplied-air respirator with full facepiece and operated in a pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Any self-contained breathing apparatus with a full facepiece.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: solid
APPEARANCE: efflorescent
OR: colorless to off-white
SICAL FORM: crystals, powder
R: odorless
LECULAR WEIGHT: 178.12
MOLECULAR FORMULA: ZR-O-CL2
BOILING POINT: decomposes
MELTING POINT: 230 F (110 C) (hydrate)
VAPOR PRESSURE: Not applicable
VAPOR DENSITY: Not applicable
SPECIFIC GRAVITY (water=1): >1
WATER SOLUBILITY: soluble
PH: acidic
VOLATILITY: Not applicable
ODOR THRESHOLD: Not available
EVAPORATION RATE: Not applicable
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: ethanol, methanol
Slightly Soluble: hydrogen chloride
Insoluble: chloroform, hexane, organic solvents

SECTION 10 STABILITY AND REACTIVITY

CTIVITY: Stable at normal temperatures and pressure.

ITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. angerous gases may accumulate in confined spaces. May ignite or explode on

contact with combustible materials.

COMPATIBILITIES: combustible materials

ZIRCONIUM OXYCHLORIDE:
N-NITROSOPHENYLHYDROXYLAMINE O-AMMONIUM SALT: Destabilized by zirconium salts with explosive decomposition at temperatures below 40 C.

HAZARDOUS DECOMPOSITION:
Thermal decomposition products: chlorine

POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

ZIRCONIUM OXYCHLORIDE:
TOXICITY DATA:
2950 mg/kg oral-rat LD50; 400 mg/kg intraperitoneal-rat LD50; 500 mg/kg subcutaneous-rat LDLo; 40 mg/kg intravenous-rat LD50; 1227 mg/kg oral-mouse LD50; 172 mg/kg intraperitoneal-mouse LD50; 12800 mg/kg/16 day(s) intermittent oral-rat TDLo
LOCAL EFFECTS:
Corrosive: inhalation, skin, eye, ingestion
ACUTE TOXICITY LEVEL:
Moderately Toxic: ingestion
CARCINOGENIC DATA:
400 ug/kg intradermal-mouse TDLo

HEALTH EFFECTS:
INHALATION:
ZIRCONIUM OXYCHLORIDE: May cause respiratory irritation with cough and sore throat. Zirconium accumulates primarily in the lungs and pulmonary lymph nodes. Finely dispersed aerosols of zirconium compounds may cause lung granulomas or pneumonitis. May cause sensitization reactions. See information on corrosive substances.

ACUTE EXPOSURE:
CORROSIVE SUBSTANCES: May cause severe irritation of the respiratory tract with coughing, choking, pain and possibly burns of the mucous membranes. In some cases, pulmonary edema may develop, either immediately or more often within a period of 5-72 hours. The symptoms may include tightness in the chest, dyspnea, frothy sputum, cyanosis, and dizziness. Physical findings may include moist rales, low blood pressure and high pulse pressure. Severe cases may be fatal.

CHRONIC EXPOSURE:
CORROSIVE SUBSTANCES: Depending on the concentration and duration of exposure, repeated or prolonged exposure may cause inflammatory and ulcerative changes in the mouth and possibly bronchial and gastrointestinal disturbances.

SKIN CONTACT:
ZIRCONIUM OXYCHLORIDE: Zirconium compounds may cause irritation. Topical

application of zirconyl oxychloride did not cause granuloma formation in 54 human subjects tested; however, soluble zirconium compounds are known to induce allergenic-type granulome. Repeated contact with zirconium salts may cause persistent granulomas with dusky reddish-brown discrete papules. May cause skin sensitization in previously exposed susceptible individuals. See information on corrosive substances.

ACUTE EXPOSURE:
CORROSIVE SUBSTANCES: Direct contact may cause severe irritation, pain and possibly burns.

CHRONIC EXPOSURE:
CORROSIVE SUBSTANCES: Effects depend on concentration and duration of exposure. Repeated or prolonged contact may result in dermatitis or effects similar to acute exposure.

EYE CONTACT:
ZIRCONIUM OXYCHLORIDE: See information on corrosive substances.

ACUTE EXPOSURE:
CORROSIVE SUBSTANCES: Direct contact may cause severe irritation, pain and burns, possibly severe. The degree of injury depends on the concentration and duration of contact. The full extent of the injury may not be immediately apparent.

CHRONIC EXPOSURE:
CORROSIVE SUBSTANCES: Effects depend on concentration and duration of exposure. Repeated or prolonged contact may result in conjunctivitis or effects as in acute exposure.

INGESTION:
ZIRCONIUM OXYCHLORIDE: May cause nausea, vomiting and abdominal pain. Rats given toxic doses of soluble zirconium compounds show progressive depression and decreased activity until death occurs within a few hours to several days after exposure. See information on corrosive substances.

ACUTE EXPOSURE:
CORROSIVE SUBSTANCES: May cause immediate pain and severe burns of the mucous membranes. There may be discoloration of the tissues. Swallowing and speech may be difficult at first and then almost impossible. The effects on the esophagus and gastrointestinal tract may range from irritation to severe corrosion. Edema of the epiglottis and shock may occur.

CHRONIC EXPOSURE:
CORROSIVE SUBSTANCES: Depending on the concentration, repeated ingestion may cause effects as with acute ingestion.

SECTION 12 ECOLOGICAL INFORMATION

TOXICITY DATA:
TOXICITY: 15000 ug/L 96 hour(s) LC50 (Mortality) Bluegill (Lepomis macrochirus)

ERTEBRATE TOXICITY: 221180 ug/L 96 hour(s) EC50 (Immobilization) Tubificid Worm (Tubifex tubifex)
ALGAL TOXICITY: 1440 ug/L 3-4 week(s) (Population Growth) Green algae (Chlorella vulgaris)

SECTION 13 DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101:
PROPER SHIPPING NAME: Corrosive solids, n.o.s. (zirconyl chloride)
ID NUMBER: UN1759
HAZARD CLASS OR DIVISION: 8
PACKING GROUP: II
LABELING REQUIREMENTS: Corrosive
PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.154
NON-BULK PACKAGING: 49 CFR 173.212
BULK PACKAGING: 49 CFR 173.240
QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: 15 kg
CARGO AIRCRAFT ONLY: 50 kg

CANADIAN TRANSPORTATION OF DANGEROUS GOODS: No classification assigned.

LAND TRANSPORT ADR/RID:
SUBSTANCE NAME: Corrosive solid, n.o.s.
UN NUMBER: UN1759
ADR/RID CLASS: 8
ITEM NUMBER: 65(b)
WARNING SIGN/LABEL: 8
HAZARD ID NUMBER: 80

AIR TRANSPORT IATA/ICAO:
PROPER SHIPPING NAME: Corrosive solid, n.o.s.
UN/ID NUMBER: UN1759
IATA/ICAO CLASS: 8
PACKAGING GROUP: II
LABEL: Corrosive

MARITIME TRANSPORT IMDG:
CORRECT TECHNICAL NAME: Corrosive solid, n.o.s.
UN/ID NUMBER: UN1759
IMDG CLASS: 8
PACKAGING GROUP: II
EmS No.: 8-15
IAG Table No.: 760,see4.3
IMDG CODE PAGE: 8151

ION 15 REGULATORY INFORMATION

..S. REGULATIONS:
CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4): Not regulated.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.30): Not regulated.

SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355.40): Not regulated.

SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370.21):
ACUTE: Yes
CHRONIC: No
FIRE: No
REACTIVE: No
SUDDEN RELEASE: No

SARA TITLE III SECTION 313 (40 CFR 372.65): Not regulated.

OSHA PROCESS SAFETY (29CFR1910.119): Not regulated.

STATE REGULATIONS:
California Proposition 65: Not regulated.

DIAN REGULATIONS:
HMIS CLASSIFICATION: Not determined.

EUROPEAN REGULATIONS:
EC CLASSIFICATION (CALCULATED):
C Corrosive

DANGER/HAZARD SYMBOL:
C Corrosive

EC RISK AND SAFETY PHRASES:

R 34	Causes burns.
S 2	Keep out of reach of children.
S 20	When using do not eat or drink.
S 24	Avoid contact with skin.
S 25	Avoid contact with eyes.
S 26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 27	Take off immediately all contaminated clothing.
S 39	Wear eye/face protection.
S 46	If swallowed, seek medical advice immediately and show this container or label.

TIONAL INVENTORY STATUS:
S. INVENTORY (TSCA): Listed on inventory.

.SCA 12(b) EXPORT NOTIFICATION: Not listed.

AQ - 60

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION

TRADE NAME: AQ - 60
CHEMICAL NAME: Aluminum Chloride Solution

WESTWOOD CHEMICAL CORPORATION
46 Tower Drive, Middletown, NY 10941
Phone: (845)692-6721 Fax: (845)695-1906

PREPARED BY: Jateen Parekh
PREPARED: August 2001

SECTION 2 - PRODUCT COMPOSITION INFORMATION

COMPONENT	CAS No.	% (BY WEIGHT)	ACGIH TLV - TWA OSHA PEL
Aluminum Chloride	7784-13-6	40 - 50%	2 mg/M^3 as Al
Water	7732-18-5	40 - 50%	N/A

SECTION 3 - PHYSICAL AND CHEMICAL DATA

APPEARANCE: Clear Water white to Slight Yellow Liquid **PHYSICAL STATE:** Liquid
WATER SOLUBILITY: 100% **ODOR:** Odorless **BOILING POINT :** 220F **pH:** (As is) < 1
FREEZING POINT: -31°F **SPECIFIC GRAVITY (@ 25°C):** 1.27 - 1.29

SECTION 4 - REACTIVITY DATA

STABILITY: Material is stable under normal conditions.
INCOMPATIBILITY: Material reacts with Aluminum, Zinc, Steel, Bronze and Copper. Also avoid contact with strong base such as Caustic Soda as the reaction can be exothermic. (Generates Heat)
HAZARDOUS DECOMPOSITION PRODUCTS: None.
HAZARDOUS POLYMERIZATION: Will not occur under normal temperature and Pressure.

SECTION 5 FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY: Material is non-flammable.
FLASH POINT: Not applicable. **FLAMMABLE LIMITS:** Not applicable
UNUSUAL FIRE AND EXPLOSION HAZARD: None.
EXTINGUISHING MEDIA: Material is non flammable. Use extinguishing media which is appropriate for surrounding.
FIRE FIGHTING INSTRUCTIONS: May decompose to HCl in a fire. Use a self-contained breathing apparatus.

SECTION 6 - HEALTH HAZARD INFORMATION

ROUTES OF ENTRY: Skin, Eye and Ingestion are possible routes of entries. Inhalation is not a route of entry in normal circumstances unless the handling requires any exposure to mist.

HEALTH EFFECTS AND FIRST AID PROCEDURES:
EYE CONTACT: Causes irritation and painful burns of the eye and eyelids upon contact. Stinging, redness, tearing are some common symptoms.
FIRST AID: Flush eye(s) gently holding eyelids apart with plenty of water for at least 15 min.
Do Not Rub Your Eye(s). Seek medical attention immediately.

SKIN CONTACT: Exposure may cause mild skin irritation. Prolonged exposure may cause a dermatitis.
FIRST AID: Wash the affected area with mild soap and plenty of water to remove any product residue. Seek medical attention if redness and swelling of the skin persists.

INHALATION: Not expected to present any inhalation hazard under anticipated conditions of normal use However, exposure to the mist may cause nose, throat and respiratory tract irritation.
FIRST AID: Remove the person from exposure area to fresh air. Keep person warm and at rest.
Seek medical attention if needed.

INGESTION: Swallowing may cause vomiting and digestive discomfort. Swallowing in large amount can be more harmful.
FIRST AID: Have conscious person drink large amount of water or milk. DO NOT Induce Vomiting and also DO NOT give anything by mouth to an unconscious person. Seek medical attention immediately.

SECTION 7 - PERSONAL PROTECTION

EYE PROTECTION: Chemical splash goggles and face shield. Eye wash station should be readily available in handling area.
SKIN PROTECTION: Impervious gloves & clothing and rubber boots are recommended. Safety showers should be available in the handling area.
RESPIRATORY PROTECTION: Respiratory protection is not required in normal use as the material is not volatile. However NIOSH approved respirator with appropriate cartridges are recommended if exposed to mists in handling or firefighting.
ENGINEERING CONTROLS: Local ventilation.

SECTION 8 - SPILL CLEAN UP AND DISPOSAL PROCEDURES

Prevent the material from entering storm sewer or drinking water supplies. Spill must be neutralized with Soda Ash, Sodium Bicarbonate or lime by qualified personnel. Wear proper protective clothing and equipment when cleaning up the spill. For small spills, transfer the spilled material for disposal and label correctly..Waste must be disposed of in accordance with Local, State and Federal regulations.

aq - 60 msds

SECTION 9 - STORAGE AND HANDLING

Material should be stored in acid resistant FRP tanks or plastic containers as it is corrosive to most of the metals. DO NOT store in unlined metal containers. Wear proper protective equipments as mentioned in Section 6. Empty drums should be disposed of as per Local, State and Federal regulations.

SECTION 10 - TRANSPORTATION INFORMATION

D.O.T. SHIPPING NAME: Aluminum Chloride Solution
D.O.T HAZARD CLASS: 8, PG III **UN ID No. UN 2581**
Labeling: CORROSIVE
Special Transportation Instruction: DO NOT TRANSPORT IN UNLINED METAL CONTAINERS

The information provided in this MSDS has been obtained from the sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The condition or methods of handling, storage, use and disposal of this material is beyond our control and may be beyond our knowledge. For this and other reasons, Westwood Chemical Corporation does not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with handling, storage, use or disposal of the product. This MSDS is prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS may not be applicable.

VOPAK Products Americas, Corp.
A Royal Vopak Company (FKA Ureco Inc.)
8201 S. 212TH Kent, WA. 98032
PH#: 253-437-3202-3205, FAX#: 253-437-3200

MATERIAL SAFETY DATA SHEET

Product Name:	ZIRCONIUM BASIC CARBONATE		Issued: 6/98
U.N. NO:	None Allocated	CLASS:	None Allocated
HAZCHEM:	None Allocated		
PACKAGING GP:	None Allocated		
EPG:	None Allocated	POISONS SCHEDULE:	None Allocated

Not classified as hazardous according to criteria of Worksafe Australia

IDENTIFICATION		
OTHER NAMES	Zirconium Carbonate Paste, Zirconium Carbonate Hydroxide oxide.	
CAS NUMBER	57219-64-4	
INGREDIENTS	Zirconium Carbonate (equivalent to ~40% as Zirconium Oxide) as a paste, CO_2 - 7%, H_2O - 53%.	
USES	Intermediate	
PHYSICAL DESCRIPTION / PROPERTIES	Bulk Density	>900 kg / m3
	(Typical values only - consult specification sheet)	
APPEARANCE / ODOUR	White odourless paste.	
SOLUBILITY	Soluble in mineral and organic acids. Insoluble in water	
HEALTH HAZARD INFORMATION		
HEALTH EFFECTS	Considered to be practically non harmful by all exposure routes.	
	ACUTE EFFECTS:	
	Eye	May cause physical irritation to the eyes
	Skin	Contact with skin may result in irritation
	As with any chemical, ingestion and prolonged or repeated skin contact should be avoided by good occupational work practice.	
FIRST AID	*Ingestion*	Thoroughly rinse mouth with water. Give plenty of water to drink. If vomiting occurs give further water to achieve effective dilution. Seek medical assistance if indicated
	Eye	Irrigate with copious quantities of water for 15 minutes. Seek medical assistance if effect persists.
	Skin	Wash contaminated skin with plenty of soap and water. Remove contaminated clothing and wash before re-use.
ADVICE TO DOCTOR	Treat symptomatically	
TOXICITY	Oral LD50 (rat): 2500 mg - 10,000 mg / kg for several zirconium compounds. No deaths occurred in rats fed doses of zirconium carbonate equivalent to up to 10 g / kg zirconium oxide in a sixty day observation study. No toxic effects were noted in studies of chronic toxicity in rats and kittens.	

PRECAUTIONS FOR USE		
EXPOSURE LIMITS	No value assigned for this material by the National Health and Medical Research Council. However, Threshold Limit Value (TLV) for: Zirconium compounds, as Zr: TWA - 5mg/m3 As published by the National Occupational Health and Safety Commission (Worksafe Australia). TLV is the time weighted average concentration of the work atmosphere for a normal 8-hour work day and a 40-hour work week, to which nearly all workers can be repeatedly exposed, day after day, without adverse effect. These TLV's are issued as guidelines for good practice. All atmospheric contamination should be kept to as low a level as is practically possible. These TLV levels should not be used as fine lines between safe and dangerous concentrations.	
VENTILATION	Use with adequate ventilation.	
PERSONAL PROTECTION	***Ventilation***	General ventilation is usually adequate. If necessary, use local exhaust to minimise exposure.
	Protective Gloves	Impervious gloves, such as rubber.
	Eye Protection	Safety glasses with side shields.
	Work / Hygienic Practices	Always wash hands before smoking, eating, drinking or using the toilet.
FLAMMABILITY	Non combustible.	
SAFE HANDLING INFORMATION		
STORAGE AND TRANSPORT	Not defined as a Dangerous Good by the Australian Code for the Transport of Dangerous goods by Road or Rail. No special precautions required.	
SPILLS	Contain - prevent contamination of drains and waterways. If material cannot be recovered collect and seal in properly labelled drums for disposal. Wash area down with excess water.	
DISPOSAL	Refer to local authorities. If recovery not possible, normally suitable for disposal at approved land waste site.	
FIRE / EXPLOSION HAZARDS	Not combustible.	

NOTE: This information is given in good faith, but no warranty, expressed or implied, is made.

This information is given in good faith without warranty

MATERIAL SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET PREPARED DATE : March 1997	WESTWOOD CHEMICAL CORPORATION 46 TOWER DRIVE MIDDLETOWN, NY 10940 PHONE (914)692-6721 (For Emergency and Information) FAX (914)695-1906

This MSDS Complies with 29 CFR 1910.1200 (Hazard Communication Standard)

SECTION I. PRODUCT IDENTIFICATION

PRODUCT Westchlor FA 2000/PD5

CAS No: 12042-91-0 DOT Hazard Class: N/A
DOT Proper Shipping Name: N/A
UN/NA No: N/A

SECTION II. MATERIAL IDENTIFICATION

Components	CAS NO	WT (%)	O S H A PEL A C G I H TLV-TWA
Hazardous Components: None	N/A		N/A
Non Hazardous Components:			
(1)Aluminum Chlorohydrate	12042-91-0	80-95%	N/A
(2)Polydimethyldiallyammonium Chloride (20% Aq. Soln)	26062-79-3	5-20%	N/A
Total		100%	

SECTION III. PHYSICAL AND CHEMICAL DATA

(1) Boiling Point: >212°F	(2) Specific Gravity: 1.2-1.35 (H_2O = 1)
(3) Vapor Pressure: Not determined (mm Hg & Temp.)	(4) Freezing Point: 22°F
(5) Vapor Density: N/A (Air = 1)	(6) Evaporation Rate: Not determined
(7) Solubility in water: Complete	(8) Water Reactive: N/A
(9) Appearance and Odor: Clear water white to slightly yellow liquid with slight amine odor.	(10) pH(1%w/v aq.) 4-4.5

SECTION IV. REACTIVITY DATA

STABILITY :	Stable
INCOMPATIBILITY:	Light Metals, Iron, Aluminum, Copper, Bronze, Strong Oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition of Poly(Dimethyldiallylammonium chloride) may be oxides of nitrogen,carbon dioxide and/or carbon monoxide and Hydrogen Chloride.	
HAZARDOUS POLYMERIZATION: N/A	

SECTION V FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A	AUTO-IGNITION TEMPERATURE	N/A
FLAMMABLE LIMITS IN AIR, % by volume	LOWER N/A	UPPER N/A

EXTINGUISHING MEDIA: Material is Non-Flammable.
SPECIAL FIRE FIGHTING PROCEDURES: N/A
UNUSUAL FIRE AND EXPLOSION HAZARD: N/A

SECTION VI HEALTH HAZARD

EFFECT OF ACUTE EXPOSURE	
EYE CONTACT:	Irritation may occur upon contact.
SKIN CONTACT:	Moderate to mild irritation on prolonged contact. Dry skin on contact.
INHALATION:	N/A
INGESTION:	Not expected to be harmful by ingestion.
EFFECT OF CHRONIC EXPOSURE:	No information found.
EMERGENCY AND FIRST-AID PROCEDURE	
EYE CONTACT :	Flush eyes with large amount of water for 15 minutes. Seek medical immediately aid if irritation persists.
SKIN CONTACT:	Flush the affected area of the skin with soap and water immediately.
INHALATION:	N/A
INGESTION:	DO NOT INDUCE VOMITING. If large amounts of solution has been ingested, give large amount of water or milk to drink. Seek medical aid immediately.

SECTION VII PROTECTIVE EQUIPMENTS TO BE USED

RESPIRATORY PROTECTION:	N/A
EYE PROTECTION:	Use Safety Glasses/Chemical Goggles/Face Shield.
PROTECTIVE GLOVES:	Use Impervious Gloves. (Neoprene)
VENTILATION:	Local Exhaust
OTHER PROTECTIVE EQUIPMENTS:	Long pants, Long Sleeve shirt, gloves. Contaminated clothing should be thoroughly cleaned before reused.

MATERIAL SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET PREPARED DATE : March 1997	WESTWOOD CHEMICAL CORPORATION 46 TOWER DRIVE MIDDLETOWN, NY 10940 PHONE (914)692-6721 (For Emergency and Information) FAX (914)695-1906

This MSDS Complies with 29 CFR 1910.1200 (Hazard Communication Standard)

SECTION I. PRODUCT IDENTIFICATION

PRODUCT Westchlor FA 2000/PD5

CAS No: 12042-91-0 DOT Hazard Class: N/A
DOT Proper Shipping Name: N/A
UN/NA No: N/A

SECTION II. MATERIAL IDENTIFICATION

Components	CAS NO	WT (%)	O S H A PEL A C G I H TLV-TWA
<u>Hazardous Components</u>: None	N/A		N/A
<u>Non Hazardous Components</u>:			
(1)Aluminum Chlorohydrate	12042-91-0	80-95%	N/A
(2)Polydimethyldiallyammonium Chloride (20% Aq. Soln)	26062-79-3	5-20%	N/A
Total		100%	

SECTION III. PHYSICAL AND CHEMICAL DATA

(1) Boiling Point: >212°F	(2) Specific Gravity: 1.2-1.35 (H_2O = 1)
(3) Vapor Pressure: Not determined (mm Hg & Temp.)	(4) Freezing Point: 22°F
(5) Vapor Density: N/A (Air = 1)	(6) Evaporation Rate: Not determined
(7) Solubility in water: Complete	(8) Water Reactive: N/A
(9) Appearance and Odor: Clear water white to slightly yellow liquid with slight amine odor.	(10) pH(1%w/v aq.) 4-4.5

SECTION IV. REACTIVITY DATA

STABILITY :	Stable
INCOMPATIBILITY:	Light Metals, Iron, Aluminum, Copper, Bronze, Strong Oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition of Poly(Dimethyldiallylammonium chloride) may be oxides of nitrogen,carbon dioxide and/or carbon monoxide and Hydrogen Chloride.	
HAZARDOUS POLYMERIZATION: N/A	

SECTION V FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A	AUTO-IGNITION TEMPERATURE	N/A
FLAMMABLE LIMITS IN AIR, % by volume	LOWER N/A	UPPER N/A

EXTINGUISHING MEDIA: Material is Non-Flammable.
SPECIAL FIRE FIGHTING PROCEDURES: N/A
UNUSUAL FIRE AND EXPLOSION HAZARD: N/A

SECTION VI HEALTH HAZARD

EFFECT OF ACUTE EXPOSURE	
EYE CONTACT:	Irritation may occur upon contact.
SKIN CONTACT:	Moderate to mild irritation on prolonged contact. Dry skin on contact.
INHALATION:	N/A
INGESTION:	Not expected to be harmful by ingestion.
EFFECT OF CHRONIC EXPOSURE:	No information found.
EMERGENCY AND FIRST-AID PROCEDURE	
EYE CONTACT :	Flush eyes with large amount of water for 15 minutes. Seek medical immediately aid if irritation persists.
SKIN CONTACT:	Flush the affected area of the skin with soap and water immediately.
INHALATION:	N/A
INGESTION:	DO NOT INDUCE VOMITING. If large amounts of solution has been ingested, give large amount of water or milk to drink. Seek medical aid immediately.

SECTION VII PROTECTIVE EQUIPMENTS TO BE USED

RESPIRATORY PROTECTION:	N/A
EYE PROTECTION:	Use Safety Glasses/Chemical Goggles/Face Shield.
PROTECTIVE GLOVES:	Use Impervious Gloves. (Neoprene)
VENTILATION:	Local Exhaust
OTHER PROTECTIVE EQUIPMENTS:	Long pants, Long Sleeve shirt, gloves. Contaminated clothing should be thoroughly cleaned before reused.

Attachment C

Chemical Safety Cards

MATERIAL SAFETY DATA SHEET

MATERIAL SAFETY DATA SHEET PREPARED DATE : March 1997	WESTWOOD CHEMICAL CORPORATION 46 TOWER DRIVE MIDDLETOWN, NY 10940 PHONE (914)692-6721 (For Emergency and Information) FAX (914)695-1906

This MSDS Complies with 29 CFR 1910.1200 (Hazard Communication Standard)

SECTION I. PRODUCT IDENTIFICATION

PRODUCT Westchlor FA 2000/PQA50

CAS No: 12042-91-0 DOT Hazard Class: N/A
DOT Proper Shipping Name: N/A
UN/NA No: N/A

SECTION II. MATERIAL IDENTIFICATION

Components	CAS NO	WT (%)	O S H A PEL A C G I H TLV-TWA
Hazardous Components: None	N/A		N/A
Non Hazardous Components:			
(1) Aluminum Chlorohydrate	12042-91-0	50%	N/A
(2) Polyquaternary amine in water solution		50%	N/A
Total		100%	

SECTION III. PHYSICAL AND CHEMICAL DATA

(1) Boiling Point: >212°F	(2) Specific Gravity: 1.2-1.35 (H_2O = 1)
(3) Vapor Pressure: Not determined (mm Hg & Temp.)	(4) Freezing Point: 22°F
(5) Vapor Density: N/A (Air = 1)	(6) Evaporation Rate: Not determined
(7) Solubility in water: Complete	(8) Water Reactive: N/A
(9) Appearance and Odor: Clear water white to slightly yellow liquid with slight amine odor.	(10) pH(1%w/v aq.) 4-4.5

SECTION IV. REACTIVITY DATA

STABILITY :	Stable
INCOMPATIBILITY:	Light Metals, Iron, Aluminum, Copper, Bronze, Strong Oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition of Polyquaternary amine in solution may produce carbon monoxide, carbon dioxide, oxides of nitrogen and/or hydrogen chloride gas.	
HAZARDOUS POLYMERIZATION: N/A	

SECTION V FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: N/A	AUTO-IGNITION TEMPERATURE	N/A
FLAMMABLE LIMITS IN AIR, % by volume	LOWER N/A	UPPER N/A

EXTINGUISHING MEDIA: Material is Non-Flammable.
SPECIAL FIRE FIGHTING PROCEDURES: N/A
UNUSUAL FIRE AND EXPLOSION HAZARD: N/A

SECTION VI HEALTH HAZARD

EFFECT OF ACUTE EXPOSURE	
EYE CONTACT:	Irritation may occur upon contact.
SKIN CONTACT:	Moderate to mild irritation on prolonged contact. Dry skin on contact.
INHALATION:	N/A
INGESTION:	Not expected to be harmful by ingestion.
EFFECT OF CHRONIC EXPOSURE:	No information found.
EMERGENCY AND FIRST-AID PROCEDURE	
EYE CONTACT :	Flush eyes with large amount of water for 15 minutes. Seek medical immediately aid if irritation persists.
SKIN CONTACT:	Flush the affected area of the skin with soap and water immediately.
INHALATION:	N/A
INGESTION:	DO NOT INDUCE VOMITING. If large amounts of solution has been ingested, give large amount of water or milk to drink. Seek medical aid immediately.

SECTION VII PROTECTIVE EQUIPMENTS TO BE USED

RESPIRATORY PROTECTION:	N/A
EYE PROTECTION:	Use Safety Glasses/Chemical Goggles/Face Shield.
PROTECTIVE GLOVES:	Use Impervious Gloves. (Neoprene)
VENTILATION:	Local Exhaust
OTHER PROTECTIVE EQUIPMENTS:	Long pants, Long Sleeve shirt, gloves. Contaminated clothing should be thoroughly cleaned before reused.

WESTCHLOR FA 2000

NSF

Certified to ANSI/NSF60

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT AND MANUFACTURER IDENTIFICATION

TRADE NAME: Westchlor FA 2000
CHEMICAL NAME: Aluminum Chlorhydrate

MANUFACTURED BY:
WESTWOOD CHEMICAL CORPORATION
46 Tower Drive, Middletown, NY 10941
Phone: (914)692-6721 Fax: (914)695-1906

PREPARED BY: Jateen Parekh
PREPARED: February 1999
SUPERSEDES: August 1998

FOR CHEMICAL EMERGENCY CALL INFOTRAC 1-800-535-5053 (24 Hours)

SECTION 2 - PRODUCT COMPOSITION INFORMATION

COMPONENT	CAS No.	% (BY WEIGHT)	OSHA PEL/ACGIH TLV
(1) Aluminum Chlorohydrate	12042-91-0	50%	N/A
(2) Water	7732-18- 5	50%	N/A

SECTION 3 - PHYSICAL AND CHEMICAL DATA

APPEARANCE & ODOR: Clear Water white to slight Yellow odorless liquid
SPECIFIC GRAVITY (@ 25°C): 1.338 ± .005 **pH: (as is)** 3.7 - 3.8
FREEZING POINT 22°F

SECTION 4 - REACTIVITY DATA

STABILITY: Material is stable
INCOMPATIBILITY: Material reacts with Aluminum, Zinc, Steel, Bronze and Copper.
HAZARDOUS DECOMPOSITION PRODUCTS: None
HAZARDOUS POLYMERIZATION: Will not occur.

SECTION 5 - HEALTH HAZARD INFORMATION

ROUTES OF ENTRY: Skin, Eye and Ingestion are possible routes of entries.Inhalation is not a route of entry in normal circumstances unless the handling requires any exposure to mist.

HEALTH EFFECTS AND FIRST AID PROCEDURES:
EYE CONTACT: Causes irritation and painful burns of the eye and eyelids upon contact. Stinging, redness, tearing are some common symptoms.
FIRST AID: Flush eye(s) gently holding eyelids apart with plenty of water for at least 15 min. **Do Not Rub Your Eye(s).** Seek immediate medical attention.

SKIN CONTACT: Exposure may cause mild skin irritation. Prolonged exposure may cause a dermatitis.
FIRST AID: Wash the affected area with mild soap and plenty of water to remove any product residue. Seek medical attention if redness and swelling of the skin persists.

INHALATION: Not expected to present any inhalation hazard under anticipated conditions of normal use. However, exposure to the mist may cause nose, throat and respiratory tract irritation.
FIRST AID: Remove the person from exposure area to fresh air. Seek medical attention if needed

INGESTION: Swallowing may cause vomiting and digestive discomfort.Swallowing in large amount can be more harmful.
FIRST AID: Have **conscious** person drink several glasses of water or milk. **DO NOT Induce Vomiting** and also **DO NOT give anything by mouth to an unconscious person.** Seek immediate medical attention.

SECTION 6 - PERSONAL PROTECTION

EYE PROTECTION: Safety Glasses/Chemical splash goggles/ Face shield must be used when handling this product. Eye wash station should be readily available in handling area.
SKIN PROTECTION: Basic safety measures such as long sleeves shirt and long pants and gloves are recommended for skin protection.
RESPIRATORY PROTECTION: Respiratory protection is not required in normal use as the material is not volatile. However NIOSH approved respirator with appropriate cartridges are recommended if exposed to mists in handling.
ENGINEERING CONTROLS: Local ventilation.

SECTION 7 - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY: Material is non-flammable.
FLASH POINT: Not applicable. **FLAMMABLE LIMITS:** Not applicable
UNUSUAL FIRE AND EXPLOSION HAZARD: None.
EXTINGUISHING MEDIA: Material is non flammable and non combustible.
FIRE FIGHTING INSTRUCTIONS: No special precautions are necessary when fighting fires involving this product.
NFPA RATING: HEALTH - 1 FLAMMBILITY- 0 REACTIVITY - 0

SECTION 8 - SPILL CLEAN UP AND DISPOSAL PROCEDURES

Dike the spilled material from spreading by using absorbent material. Prevent the material from entering storm sewer or drinking water supplies. Neutralize the spill with Soda Ash.Transfer the material to a proper container for disposal. Waste must be disposed of in accordance with Local, State and Federal regulations. Proper protective clothings and equipment must be used when cleaning up the spill.

SECTION 9 - TRANSPORTATION INFORMATION

D.O.T. SHIPPING NAME: WFA 200 is not a DOT regulated material.

SECTION 10 - REGULATORY INFORMATION

TSCA (Toxic Substances Control Act) Status: WFA 2000 is listed as Aluminum Chloohydrate in TSCA inventory.
CERCLA (Comprehensive Environmental Response, Compensation and Liability Act): (40CFR 302.4) Material is not a CERCLA Hazardous substance.
SARA (Superfund Amendments and Reauthorization Act of 1986) TITLE III Section 302: Material is not listed as Extremely Hazardous Substance (EHS).
SARA Title III Hazards: FIRE: No **REACTIVITY:** No **SUDDEN RELEASE OF PRESSURE:** No
ACUTE: Yes **CHRONIC :** No

NSF CERTIFICATION: Westchlor FA 2000 is an NSF/ANSI standard 60 certified under Coagulation and Flocculation Section.**MAXIMUM ALLOWABLE PRODUCT DOSAGE IS 250 mg/L.**

The information provided in this MSDS has been obtained from the sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The condition or methods of handling, storage, use and disposal of this material is beyond our control and may be beyond our knowledge. For this and other reasons, Westwood Chemical Corporation does not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with handling, storage, use or disposal of the product. This MSDS is prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS may not be applicable.

VOPAK Products Americas, Corp.
A Royal Vopak Company (FKA Ureco Inc.)
8201 S. 212TH Kent, WA. 98032
PH#: 253-437-3202-3205, FAX#: 253-437-3200

MATERIAL SAFETY DATA SHEET

Product Name:	ZIRCONIUM BASIC CARBONATE		Issued: 6/98
U.N. NO:	None Allocated	CLASS:	None Allocated
HAZCHEM:	None Allocated		
PACKAGING GP:	None Allocated		
EPG:	None Allocated	POISONS SCHEDULE:	None Allocated

Not classified as hazardous according to criteria of Worksafe Australia

IDENTIFICATION		
OTHER NAMES	Zirconium Carbonate Paste, Zirconium Carbonate Hydroxide oxide.	
CAS NUMBER	57219-64-4	
INGREDIENTS	Zirconium Carbonate (equivalent to ~40% as Zirconium Oxide) as a paste, CO_2 - 7%, H_2O - 53%.	
USES	Intermediate	
PHYSICAL DESCRIPTION / PROPERTIES	Bulk Density	>900 kg / m3
	(Typical values only - consult specification sheet)	
APPEARANCE / ODOUR	White odourless paste.	
SOLUBILITY	Soluble in mineral and organic acids. Insoluble in water	
HEALTH HAZARD INFORMATION		
HEALTH EFFECTS	Considered to be practically non harmful by all exposure routes.	
	ACUTE EFFECTS:	
	Eye	May cause physical irritation to the eyes
	Skin	Contact with skin may result in irritation
	As with any chemical, ingestion and prolonged or repeated skin contact should be avoided by good occupational work practice.	
FIRST AID	*Ingestion*	Thoroughly rinse mouth with water. Give plenty of water to drink. If vomiting occurs give further water to achieve effective dilution. Seek medical assistance if indicated
	Eye	Irrigate with copious quantities of water for 15 minutes. Seek medical assistance if effect persists.
	Skin	Wash contaminated skin with plenty of soap and water. Remove contaminated clothing and wash before re-use.
ADVICE TO DOCTOR	Treat symptomatically	
TOXICITY	Oral LD50 (rat): 2500 mg - 10,000 mg / kg for several zirconium compounds. No deaths occurred in rats fed doses of zirconium carbonate equivalent to up to 10 g / kg zirconium oxide in a sixty day observation study. No toxic effects were noted in studies of chronic toxicity in rats and kittens.	

PRECAUTIONS FOR USE		
EXPOSURE LIMITS	No value assigned for this material by the National Health and Medical Research Council. However, Threshold Limit Value (TLV) for: Zirconium compounds, as Zr: TWA - 5mg/m3 As published by the National Occupational Health and Safety Commission (Worksafe Australia). TLV is the time weighted average concentration of the work atmosphere for a normal 8-hour work day and a 40-hour work week, to which nearly all workers can be repeatedly exposed, day after day, without adverse effect. These TLV's are issued as guidelines for good practice. All atmospheric contamination should be kept to as low a level as is practically possible. These TLV levels should not be used as fine lines between safe and dangerous concentrations.	
VENTILATION	Use with adequate ventilation.	
PERSONAL PROTECTION	***Ventilation***	General ventilation is usually adequate. If necessary, use local exhaust to minimise exposure.
	Protective Gloves	Impervious gloves, such as rubber.
	Eye Protection	Safety glasses with side shields.
	Work / Hygienic Practices	Always wash hands before smoking, eating, drinking or using the toilet.
FLAMMABILITY	Non combustible.	
SAFE HANDLING INFORMATION		
STORAGE AND TRANSPORT	Not defined as a Dangerous Good by the Australian Code for the Transport of Dangerous goods by Road or Rail. No special precautions required.	
SPILLS	Contain - prevent contamination of drains and waterways. If material cannot be recovered collect and seal in properly labelled drums for disposal. Wash area down with excess water.	
DISPOSAL	Refer to local authorities. If recovery not possible, normally suitable for disposal at approved land waste site.	
FIRE / EXPLOSION HAZARDS	Not combustible.	

NOTE: This information is given in good faith, but no warranty, expressed or implied, is made.

NIOSH Pocket Guide to Chemical Hazards

Sodium hydroxide	CAS 1310-73-2
NaOH	RTECS WB4900000
Synonyms & Trade Names Caustic soda, Lye, Soda lye, Sodium hydrate	DOT ID & Guide 1823 154 (dry, solid) 1824 154 (solution)

Exposure Limits	NIOSH REL: C 2 mg/m^3
	OSHA PEL†: TWA 2 mg/m^3
IDLH 10 mg/m^3 See: 1310732	Conversion

Physical Description
Colorless to white, odorless solid (flakes, beads, granular form).

MW: 40.0	BP: 2534°F	MLT: 605°F	Sol: 111%
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 2.13
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid, but when in contact with water may generate sufficient heat to ignite combustible materials.

Incompatibilities & Reactivities
Water; acids; flammable liquids; organic halogens; metals such as aluminum, tin & zinc; nitromethane [Note: Corrosive to metals.]

Measurement Methods
NIOSH 7401
See: NMAM or OSHA Methods

Personal Protection & Sanitation	**First Aid (See procedures)**
Skin: Prevent skin contact	Eye: Irrigate immediately
Eyes: Prevent eye contact	Skin: Water flush immediately
Wash skin: When contaminated	Breathing: Respiratory support
Remove: When wet or contaminated	Swallow: Medical attention immediately
Change: Daily	
Provide: Eyewash, Quick drench	

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 10 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode$^\varepsilon$/(APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter$^\varepsilon$/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; pneumonitis; eye, skin burns; temporary loss of hair

Target Organs Eyes, skin, respiratory system

WESTCHLOR FA-18

MATERIAL SAFETY DATA SHEET

SECTION 1 - PRODUCT IDENTIFICATION

TRADE NAME: Westchlor FA 18
CHEMICAL NAME: Polyaluminum Chloride

WESTWOOD CHEMICAL CORPORATION
46 Tower Drive, Middletown, NY 10941
Phone: (914)692-6721 Fax: (914)695-1906

PREPARED BY: Jateen Parekh
PREPARED: August 1998

FOR CHEMICAL EMERGENCY CALL INFOTRAC 1- 800- 535- 5053 (24 Hours)

SECTION 2 - PRODUCT COMPOSITION INFORMATION

COMPONENT	CAS No.	% (BY WEIGHT)	OSHA PEL/ACGIH TLV
(1) Polyaluminum Chloride	1327- 41- 9	<50%	2 mg/m^3 as Al
(2) Water	7732-18- 5	>50%	N/A

SECTION 3 - PHYSICAL AND CHEMICAL DATA

PHYSICAL STATE: Liquid
APPEARANCE: Clear Water white to Slight Yellow Liquid
BOILING POINT : 212° - 230° F
SPECIFIC GRAVITY (@ 25°C): 1.37 ± .03

WATER SOLUBILITY: 100%
ODOR: Odorless
FREEZING POINT: -4° to 14° F
pH: (As is) 0.9± 0.3

SECTION 4 - REACTIVITY DATA

STABILITY: Material is stable
INCOMPATIBILITY: Material reacts with Aluminum, Zinc, Steel, Bronze and Copper Also avoid contact with stong base such as Caustic Soda as the reaction can be highly exothermic. (Generates Heat)
HAZARDOUS DECOMPOSITION PRODUCTS: Thermal decomposition of product may include toxic fumes of chlorine and aluminum compounds.
HAZARDOUS POLYMERIZATION: Will not occur under normal temperatures and pressures.

SECTION 5 - HEALTH HAZARD INFORMATION

ROUTES OF ENTRY: Skin, Eye and Ingestion are possible routes of entries.Inhalation is not a route of entry in normal circumstances unless the handling requires any exposure to mist.

HEALTH EFFECTS AND FIRST AID PROCEDURES:
EYE CONTACT: Causes irritation and painful burns of the eye and eyelids upon contact. Stinging, redness, tearing are some common symptoms.
FIRST AID: Flush eye(s) gently holding eyelids apart with plenty of water for at least 15 min. Do Not Rub Your Eye(s). Seek medical attention immediately.

SKIN CONTACT: Exposure may cause mild skin irritation. Prolonged exposure may cause a dermatitis.
FIRST AID: Wash the affected area with mild soap and plenty of water to remove any product residue. Seek medical attention if redness and swelling of the skin persists.

INHALATION: Not expected to present any inhalation hazard under anticipated conditions of normal use. However, exposure to the mist may cause nose, throat and respiratory tract irritation.
FIRST AID: Remove the person from exposure area to fresh air.Keep person warm and at rest. Seek medical attention if needed.

INGESTION: Swallowing may cause vomiting and digestive discomfort.Swallowing in large amount can be more harmful.
FIRST AID: Have conscious person drink large amount of water or milk. DO NOT Induce Vomiting and also DO NOT give anything by mouth to an unconscious person. Seek medical attention immediately.

SECTION 6 - PERSONAL PROTECTION

EYE PROTECTION: Chemical splash goggles and face shield. Eye wash station should be readily available in handling area.
SKIN PROTECTION: Impervious gloves & clothings and rubber boots are recommended.Safety showers should be available in the handling area.
RESPIRATORY PROTECTION: Respiratory protection is not required in normal use as the material is not volatile. However NIOSH approved respirator with appropriate cartridges are recommended if exposed to mists in handling or firefighting.
ENGINEERING CONTROLS: Local ventilation.

SECTION 7 - FIRE AND EXPLOSION HAZARD DATA

FLAMMABILITY: Material is non-flammable.
FLASH POINT: Not applicable. FLAMMABLE LIMITS: Not applicable
UNUSUAL FIRE AND EXPLOSION HAZARD: None.
EXTINGUISHING MEDIA: Material is non flammable and non combustible
FIRE FIGHTING INSTRUCTIONS: Use extinguishing media as appropriate for surrounding fire.
NFPA RATING: HEALTH - 1 FLAMMBILITY- 0 REACTIVITY - 1

SECTION 8 - SPILL CLEAN UP AND DISPOSAL PROCEDURES

Prevent the material from entering storm sewer or drinking water supplies.Spill must be neutralized with Soda Ash, Sodium Bicarbonate or lime by qualified personnel.Wear proper protective clothings and equipment when cleaning up the spill. DO NOT TOUCH SPILLED MATERIAL. For small spills, transfer the spilled material for disposal and label correctly. Waste must be disposed of in accordance with Local, State and Federal regulations.

SECTION 9 - STORAGE AND HANDLING

Material should be stored in acid resistant FRP tanks or plastic containers as it is corrosive to most of the metals. Wear proper protective equipments as mentioned in Section 6. Storage temperature of the material should be maintained around 32° F to prevent from freezing. Containers should be tightly closed. Empty drums should be disposed of as per Local, State and Federal regulations.

SECTION 10 - TRANSPORTATION INFORMATION

D.O.T. SHIPPING NAME: CORROSIVE LIQUIDS, n.o.s.
(POLYALUMINUM CHLORIDE)
D.O.T HAZARD CLASS: 8 UN NUMBER: 1760 PACKAGING GROUP: III
D.O.T Labelling requirements: CORROSIVE Exceptions: 49 CFR 173.203
Non Bulk Packaging: 49 CFR 173.203 Bulk Packaging: 49 CFR 173.243

SECTION 11 - REGULATORY INFORMATION

TSCA (Toxic Substances Control Act) Status: All the components of this product are listed in TSCA inventory.
CERCLA (Comprehensive Environmental Response, Compensation and Liability Act): (40CFR 302.4) Material is not a CERCLA Hazardous substance.
SARA Section 302,304 & 313 No.

SARA Title III Hazards: FIRE: No REACTIVITY: No SUDDEN RELEASE OF PRESSURE: No
ACUTE: Yes CHRONIC : No

The information provided in this MSDS has been obtained from the sources which we believe are reliable. However, the information is provided without any warranty, express or implied, regarding its correctness. The condition or methods of handling, storage, use and disposal of this material is beyond our control and may be beyond our knowledge. For this and other reasons, Westwood Chemical Corporation does not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with handling, storage, use or disposal of the product. This MSDS is prepared and is to be used only for this product. If the product is used as a component in another product, this MSDS may not be applicable.

NIOSH Pocket Guide to Chemical Hazards

Sulfuric acid	CAS 7664-93-9
H_2SO_4	RTECS WS5600000
Synonyms & Trade Names Battery acid, Hydrogen sulfate, Oil of vitriol, Sulfuric acid (aqueous)	**DOT ID & Guide** 1830 137 1831 137 (fuming) 1832 137 (spent)

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL: TWA 1 mg/m^3
IDLH 15 mg/m^3 See: 7664939	**Conversion**

Physical Description
Colorless to dark-brown, oily. odorless liquid. [Note: Pure compound is a solid below 51°F. Often used in an aqueous solution.]

MW: 98.1	BP: 554°F	FRZ: 51°F	Sol: Miscible
VP: 0.001 mmHg	IP: ?		Sp.Gr: 1.84 (96-98% acid)
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but capable of igniting finely divided combustible materials.

Incompatibilities & Reactivities
Organic materials, chlorates, carbides, fulminates, water, powdered metals [Note: Reacts violently with water with evolution of heat. Corrosive to metals.]

Measurement Methods
NIOSH 7903; OSHA ID113, ID165SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash (>1%), Quick drench (>1%)	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Respirator Recommendations NIOSH/OSHA
Up to 15 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 25) Any powered, air-purifying respirator with acid gas cartridge(s) in combination with a high-efficiency particulate filter[£]
(APF = 50) Any chemical cartridge respirator with a full facepiece and acid gas cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; eye, skin burns; dermatitis

Target Organs Eyes, skin, respiratory system, teeth

See also: INTRODUCTION See ICSC CARD: 0362 See MEDICAL TESTS: 0218

Attachment D

Client-Specific Health and Safety Guidelines

Attachment E

Health and Safety Plan Supplements

ENV 001 GENERAL EH&S RESPONSIBILITIES FOR ENVIRONMENTAL PRACTICES	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 2

SUMMARY: General Environmental, Health and Safety (EH&S) responsibilities for Earth Tech managers and personnel are provided below.

1.0 GWES DIVISION ENVIRONMENTAL, HEALTH AND SAFETY DIRECTOR

Earth Tech's Global Water and Environmental Services (GWES) Division Environmental, Health and Safety Director (EHSD) is the senior EH&S official for environmental operations. The GWES EHSD reports directly to the GWES President, and manages the EH&S Program for environmental practices. The GWES EHSD is responsible for:

- Reviewing and approving the environmental practice EH&S Procedures (ENV-series).
- Appointing EH&S Managers for the GWES EH&S Department to oversee the support of environmental practice operations.

The EHSD has the authority to issue project-specific modifications/exemptions to established Corporate or environmental practice EH&S Procedures where required to meet specific workplace/client needs.

2.0 ENVIRONMENTAL, HEALTH AND SAFETY MANAGERS

Organizationally, the GWES EH&S Department is divided into individually managed groups, each consisting of several EH&S Professionals (EHSPs) operating under the direction of an Environmental, Health and Safety Manager (EHSM). Each EHSM is appointed by the EHSD, and is responsible for:

- Ensuring adequate staffing of their group to support the ongoing and planned activities that are supported.
- Serving as an initial EH&S point of contact for project managers initiating new environmental projects/programs.
- Assigning an Environmental, Health and Safety Professional (EHSP) to support each environmental project involving field operations.
- Reviewing and approving all EH&S-related documentation prepared by their group.
- Advising the individual operating units on the administrative EH&S matters for which they are responsible (see ENV 003).

EH&S Managers have the authority to issue project-specific modifications/exemptions to established environmental practice EH&S Procedures where required to meet specific workplace/client needs.

3.0 SECTION MANAGERS

Section managers of individual operating units have direct responsibility for the technical and financial performance of their individual profit center. With respect to EH&S performance, section managers are responsible for:

- Ensuring that the section's project management personnel and staff are aware of their EH&S responsibilities and duties, and coordinating with the EH&S Department for support of each project.
- Ensuring that all personnel in their section maintain the EH&S-related qualifications required for the performance of their duties (e.g., HAZWOPER qualification).

- Appointing an Environmental, Health and Safety Administrator (EHSA) to oversee the section's EH&S administrative needs (see ENV 003).

4.0 PROJECT MANAGERS

Project managers (PMs) have management authority and responsibility for the activities for an individual project/program. With respect to EH&S, PMs are responsible for:

- Coordinating with the EH&S Department (through an EHSM) to arrange support for each project involving environmental field operations by Earth Tech personnel or subcontractor organizations (see ENV 101).
- Providing adequate budgetary and staffing resources to meet project EH&S needs (as coordinated with the EHSM).
- Assigning only qualified personnel to manage and perform on-site work activities.
- Ensuring that specified EH&S requirements are incorporated into all project operational activities.

5.0 TECHNICAL STAFF PERSONNEL

Technical staff personnel are those employees assigned to provide project support in non-administrative capacities. Examples of technical staff personnel include engineers, scientists, geologists, and technicians. With respect to EH&S, technical staff personnel are responsible for:

- Maintaining any necessary EH&S-related qualifications needed for the performance of their assigned duties (e.g., annual medical monitoring clearances, annual refresher training requirements).
- Observing specified EH&S requirements during the performance of their assigned duties.
- Communicating with site/project management personnel and the EH&S Department regarding observed or perceived workplace safety hazards or operational violations.

6.0 NON-DOMESTIC/INTERNATIONAL OPERATIONS

Section Managers responsible for non-domestic (e.g., Canada) and International Operations will designate a Health and Safety contact to provide coordination of company policy and programs with the EHSM.

REFERENCES:

EHS 001 – *Statement of Commitment*
EHS 003 – *EH&S Program Division/Location-Specific Responsibilities*
ENV 002 – *EH&S Organization for Environmental Practice Support*
ENV 003 – *EH&S Administrative Support*
ENV 101 – *EH&S Project Support*
ENV 103 – *Purchasing Activities*
ENV 104 – *Subcontractor Selection*
ENV 105 – *EH&S Inspections*

ENV 002 EH&S ORGANIZATION FOR ENVIRONMENTAL PRACTICE SUPPORT	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 1

SUMMARY: The GWES EH&S Department is organized into individually managed groups to support environmental practice activities. Each group is led by an EH&S Manager, who is the initial point of contact within the group when requesting EH&S-related support.

1.0 EH&S SUPPORT FOR ENVIRONMENTAL PRACTICE OPERATIONS

EH&S Professionals who support Earth Tech's environmental operations are assigned to the Global Water and Environmental Services (GWES) Division EH&S Department. These personnel are organized into several groups, each of which are managed by an Environmental, Health and Safety Manager (EHSM). Details concerning the personnel assigned to each of the groups can be found on the EH&S Department's website (http://corp.earthtech.com/healthsafety).

EH&S support for each environmental project will be coordinated with an EHSM by the Project Manager (PM) Project Managers for any project involving field activities MUST contact an EHSM to coordinate their project's EH&S support needs, for all other project coordination with an EHSM is at the discretion of the PM based on project needs.

The EHSM will work with the PM to determine the specific EH&S needs for each project, and will identify a qualified member of the EH&S Department who will be assigned to work with the PM to provide any necessary technical support. The designated EHSP will be then become the primary point-of-contact within the EH&S Department for the project manager and project staff.

2.0 EH&S CONTACTS – OTHER EARTH TECH OPERATIONS

In addition to having EH&S personnel with environmental practice expertise, Earth Tech also maintains EH&S resources with expertise in areas such as construction operations, water/wastewater treatment plant operations, and infrastructure services. Details concerning these personnel, including contact information, can be found on the EH&S Department's website (http://corp.earthtech.com/healthsafety).

REFERENCES: ENV 101 – *EH&S Project Support*

ENV 003 EH&S ADMINISTRATIVE SUPPORT	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 1

SUMMARY: Administrative EH&S functions are handled at the local (section) level, with oversight and guidance from the GWES EH&S Department.

1.0 SECTION MANAGERS

Section managers of groups that perform environmental operations have the overall responsibility for ensuring that their personnel meet any regulatory-required or Earth Tech-established training and medical monitoring qualifications. To meet this responsibility, section managers will:

- Identify those personnel within their section whose job duties require that they meet specific EH&S-related training or medical monitoring requirements to perform the work. This includes identifying new hires who will require training or medical monitoring prior to start of work.
- Ensure that the identified personnel maintain their qualifications to perform field activities by attending all required EH&S training courses and medical monitoring examinations.
- Appoint an Environmental, Health and Safety Administrator (EHSA) for the section to perform the routine scheduling and tracking functions related to worker training and medical monitoring (see below).
- Notify the EH&S Department of EHSA appointments and changes.

2.0 ENVIRONMENTAL, HEALTH AND SAFETY ADMINISTRATORS

Each EHSA will manage recordkeeping and scheduling functions of EH&S-related training and medical monitoring for the section's personnel. Each EHSA will be responsible for:

- Tracking each assigned employee's current training dates and status with respect to OSHA training courses.
- Tracking each assigned employee's current medical monitoring status.
- Ensuring employees receive periodic refresher training/medical monitoring examinations at required intervals.
- Notifying section managers and the EH&S Department when employees become ineligible to perform field activities because training or medical monitoring qualifications have expired (see ENV 301 - 304).
- Scheduling identified new hires for baseline medical examinations and initial training courses prior to the start of work.
- Maintaining hardcopy records for all training and medical monitoring events for each assigned employee.
- Maintaining a database that tracks the training status of all EH&S-qualified personnel assigned to their section.
- Notifying the EH&S Department regarding any person whose work qualification is no longer valid due to expiration of a required training or medical monitoring requirement.

EHSAs provide administrative support of employee training and medical monitoring programs only. They DO NOT provide technical support to individual projects; *Project Managers* must contact the EH&S Department (an EH&S Manager or the *assigned* EH&S Professional) regarding any technical support needs.

REFERENCES: ENV 002 – *EH&S Organization for Environmental Practice Support*
ENV 300-series – *Operation-Specific Requirements*

This procedure applies to Earth Tech Environmental Practice operations. Earth Tech's Environmental, Health and Safety (EH&S) Department is solely responsible for its issuance, revision, and maintenance. Any deviation from these requirements requires approval from the GWES EH&S Director or an EH&S Manager.

ENV 101 EH&S PROJECT SUPPORT	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 2

SUMMARY: Technical EH&S support is provided directly to each project as needed, as a coordinated effort between the project manager (PM) and the EH&S Department.

1.0 RESPONSIBILITIES

1.1 PROJECT MANAGERS

Project managers are responsible for managing all aspects of the work operations within applicable regulatory and Earth Tech EH&S requirements, and are accountable to Earth Tech senior management for the safe performance of the work activities. Specific EH&S-related duties of the PM include:

- Contacting the EH&S Department (an EH&S Manager) at the start of each new project to coordinate EH&S support for field activities where personnel may be exposed to chemical or physical hazards.
- Providing adequate budgetary and staffing resources to meet project EH&S needs (as coordinated with the EH&S Manager or the assigned EH&S Professional).
- Coordinating with the assigned EH&S Professional regarding project purchasing and subcontracting activities for field operations (see ENV 103 and ENV 104).
- Ensuring that specified EH&S requirements are incorporated into all project operational activities.
- Working with the assigned EH&S Professional as field operations progress to ensure that EH&S needs continue to be met.
- Coordinating EH&S project auditing activities (see ENV 105).

1.2 EH&S MANAGERS

An EH&S Manager will serve as the initial point of contact for new environmental projects, as well as the approval authority for the project's EH&S plan. The EH&S Manager will be responsible for:

- Assisting the PM with identifying the EH&S technical and resource needs for each new or proposed project.
- Appointing an EH&S Professional (from the GWES EH&S Department staff) to support each project.
- Approving each project's EH&S operational documentation/plans prior to implementation or submittal to outside agencies.
- Approval of revisions/modifications to EH&S operational procedures/plans.
- Investigation of any reported accidents/injuries, or any unsafe acts or conditions.

2.0 PROCEDURE FOR COORDINATION OF TECHNICAL SUPPORT

Project managers are responsible for coordinating EH&S support requirements with the EH&S Department for each new project involving field operations or other out-of-office activities which may expose Earth Tech personnel to chemical or physical hazards.

At the start of the project the project manager will contact an EH&S Manager to discuss the project scope and the nature of the work activities. Together, they will assess the project's specific EH&S needs and resource requirements and identify any unique or special requirements. Items to be accomplished during this initial coordination include:

- Determination of a budget, resource needs and schedule for development of the project's EH&S management document(s).

- Determination of the appropriate staff to develop the project's EH&S management document(s) (i.e., project personnel or a member of the EH&S Department).
- Determination of a budget for annual review of the project's EH&S management documentation (projects lasting more then 12 months only).
- Determination of any necessary on-site staffing requirements needed to meet operational EH&S needs.
- Determination of a schedule and budget for on-site support by the EH&S Department.

REFERENCES: ENV 001 - *General EH&S Responsibilities for Environmental Practices*

ENV 102 GENERAL EH&S PLAN REQUIREMENTS	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 10

SUMMARY: An EH&S management plan must be prepared for any environmental practice project involving field activities that may subject Earth Tech personnel to chemical or physical hazards. Requirements applicable to Earth Tech office-location activities are addressed in Earth Tech Corporate Procedures EHS202, *Office Safety and Ergonomics*, and EHS205, *Emergency Action/Fire Protection Program*.

1.0 PROCEDURES

Any environmental practice project involving the performance of field activities that subject Earth Tech personnel to potential chemical or physical hazards must be accomplished in accordance with appropriate EH&S management plan documentation. This management plan may be referred to by a variety of names:

- Health and Safety Plan (HASP or HSP)
- Injury and Illness Prevention Plan (IIPP)
- Standard Operating Procedures (SOPs)
- Accident Prevention Plan (APP)
- Emergency Action Plan (EAP)
- Safe Work Procedure (SWP)

Regardless of name, the general intent of the management plan is to define operational safety procedures to be implemented during the work activities to provide maximum protection to personnel, property and the community, and to meet regulatory compliance requirements during the performance of the field activities.

Specific EH&S management plan needs will vary for each project. In some cases it may be acceptable to utilize general (non-site-/project-specific) EH&S procedural documentation prepared for the type of work activities being performed, while in others project-specific documentation is required to be developed as part of the project planning operations. The specific operational needs of individual projects will be determined as part of the initial coordination between the project manager (PM) and the EH&S Department.

Where it is determined that project-specific EH&S documentation must be developed, it must comply with the requirements outlined in the following section. Additional category-specific requirements (e.g., HAZWOPER, asbestos/lead, radiological, etc.) may also apply as specified in the ENV300 series EH&S Procedures, *Operation-Specific Requirements*.

2.0 EH&S PLAN REQUIREMENTS

Ensuring that proper EH&S documentation is prepared is the responsibility of the PM.

1. All EH&S documentation will be prepared using Earth Tech formats and templates supplied by the EH&S Department, unless otherwise required to meet specific contractual obligations.[1]
2. Preparation of the EH&S documentation can be performed by the EH&S Department or a member of the project team. However, all EH&S documentation (including draft versions of documents) will be approved by the EH&S Department ***prior*** to release for outside agency review (e.g., clients, regulatory agencies, etc.). An EH&S Department member must sign the final version of each project's EH&S documentation prior to its field implementation.
3. Any changes to EH&S documentation made in response to regulator/client comments must be approved by the EH&S Department. Any written responses made to regulator/client comments regarding the EH&S documentation also must be reviewed and approved by the EH&S Department.

[1] Any approved EH&S documentation already in use as of January 15, 2003 may remain in effect for the duration of the project.

4. EH&S documentation prepared by any organization other than Earth Tech (including any client or client-representative) may ***not*** be used by Earth Tech or its subcontractors without the specific authorization of the EH&S Department. This applies not only to projects where Earth Tech controls the entire project and job site, but also in situations where Earth Tech is limited to providing specific on-site services in a subcontracted role.
5. The PM must ensure that a master copy of the EH&S documentation is maintained on site for reference by personnel, together with copies of any required EH&S-related records or operational documentation. The master copy must be current in all respects, and will include any changes or modifications made as work progresses.
6. The EH&S documentation for every ongoing project of duration greater than 12 months (based on project start and end dates, not on-site operational days) will be reviewed and revised annually or at another frequency as determined by the EH&S Department, not to exceed biannually. This ensures that the documentation continues to reflect the current project operational scope and knowledge of site conditions, and that any revised regulatory or Earth Tech company requirements are properly addressed.
7. As field operations progress, conditions may vary from those expected, or operational changes/additions may become necessary that were not part of initial work planning effort. Such conditions may require modification, change, or addition to existing EH&S procedures/documentation. All such changes/modifications must be coordinated with and approved by the EH&S Department.

Any EH&S-related submittals or direction provided to subcontractors for use in developing their own procedures will be reviewed and approved by the EH&S Department.

3.0 EMERGENCY RESPONSE PLAN

The purpose of this section is to outline the necessary response during times of emergency; to minimize hazards to human health; and to protect against fire, explosion, flood, and chemical release to soil and air. Effective emergency planning requires coordination and forethought by project personnel. Constant vigilance and awareness of potential hazards and a continuing effort to eliminate or control them are prime requisites to accident prevention. Emergencies sometimes develop, however, and an important part of any safety program is preparation for any emergency so that proper action may be taken.

This Emergency Response Plan is meant to serve as a guide to identify the major considerations in an emergency.

3.1 EMERGENCY IDENTIFICATION

An emergency is any situation (on or off the site) that immediately threatens human life, health, the environment, or damage to facilities. The ultimate determination of an emergency situation is left to the discretion of each individual.

Many emergencies potentially include a combination of two or more types of situations. Emergencies that typically occur usually fall within the following categories:

- Explosions
- Hazardous Materials Emergency (Toxic Chemicals, Laboratory Spills)
- Leaking Pipelines, Tanks, Vessels
- Severe Weather
- Fires
- Power Interruption

- Medical Emergencies
- Safety Equipment Problems

To ensure that facility operations go on with minimum disruption of service, emergencies must be anticipated so plans using alternate methods of operation, emergency repair, first aid, or other emergency response procedures may be put into action. OSHA (and state-sponsored health and safety agencies) requires this written Emergency Response Plan along with specific information and training for employees to be available at this site.

3.2 IMPLEMENTATION OF EMERGENCY PLAN

It is necessary for an Emergency Response Plan to be developed for and present on each individual project location. The desire to protect staff members as well as off-site neighbors drives the development and planning of these specific procedures and practices designed to provide rapid, accurate, practical, and safe responses to emergency situations on the project site.

The decision to implement the Emergency Response Plan depends on whether an impending incident could threaten human health or the environment. If an emergency situation arises, decide on the course of action, and then carry out the plans in a safe, orderly, and controlled manner. Do not panic—remain calm and deal with the incident in a logical and methodical fashion. If the procedure required to correct an emergency situation is too extensive or unsafe to be handled by the personnel on hand, additional personnel must be contacted. ***DO NOT ATTEMPT RESOLUTION OF AN EMERGENCY IF A LOGICAL COURSE OF ACTION IS NOT READILY APPARENT—GET HELP!!***

Any person discovering an emergency situation should contact the proper agencies (e.g., Police Department, Fire Department) and the Primary Emergency Coordinator or the Alternate if the Primary Coordinator is unavailable or cannot be reached. The Primary and Alternate Coordinators have complete authority to commit all Earth Tech resources in the event of an emergency. The Emergency Coordinator will determine which organizations must be contacted based on the nature of the emergency. Table 1 (at the end of Section 3.0) provides the list of the emergency contacts, and the necessary phone and/or pager numbers. A copy of the list shall be posted at all phones with outside lines. A map depicting the route to the nearest hospital from the site must also be attached to the site-specific plan.

3.3 EMERGENCY COORDINATOR AND STAFF

Earth Tech recognizes the need to be prepared in the event of an emergency so that damage to human health and to the environment can be avoided or minimized. A key figure in implementing a response plan is the Emergency Coordinator. His or her specific responsibilities and duties during and after the emergency incident are described in the following section. However, the emphasis on prevention and immediate response to hazardous conditions requires that the Coordinator be free to use professional judgment in emergency situations. Frequent inspection and active participation in this project on a daily basis by the Primary and Secondary Coordinator minimizes the chance of a major accident.

It is the Emergency Coordinator's responsibility to manage emergency situations with all available assets instead of merely providing a response to a crisis. Emergency management applies good planning, definition of roles and authority, and direction of a trained and motivated staff to control the situation and resolve it quickly and efficiently.

In the event of an emergency, call the emergency service agency (e.g., Fire Department) immediately and, if there are injuries, ask for medical assistance. Next, contact an Emergency Coordinator. When calling in the emergency, give your location, describe the nature of the emergency, and provide your name.

Any time the Emergency Response Plan is implemented, the Emergency Coordinator will develop a detailed report of the entire incident. Careful documentation during and after an emergency will be needed for insurance issues, legal issues, accident investigations and analysis to prevent re-occurrence. Good record keeping and a

critique of an incident after the fact can provide an excellent method of preventing another incident. All records will be maintained in project files.

3.4 EMERGENCY CONDITION AND RESPONSE

The purpose of this section is to provide guidance to the Emergency Coordinator and staff in making emergency decisions. The following provides a number of possible emergency situations. Remember that many emergencies may include a combination of two or more types of situations at the same time.

In the event of any emergency incident, the following general requirements apply:

- Work activities will cease and all personnel will be evacuated from the work location. The evacuation will proceed in a direction opposite the critically affected area, with all personnel assembling in a pre-designated location outside of the site proper.
- A headcount will be taken of the assembled employees and any injured individuals shall be administered first aid.
- If not present at the work location, the Site Safety Officer (SSO) and Emergency Coordinator will be contacted immediately.
- In the event of a chemical spill, send someone to meet the responders outside the area to direct them to the scene and provide information about the conditions that may exist, including appropriate Material Safety Data Sheets (MSDSs) for hazardous material. The Fire Department has spill containment dikes, absorbents, neutralizing chemicals and other means of mitigating spills or leaks.
- Without endangering personnel, make a quick assessment of the situation. Call the emergency services agency (Fire Department, etc.) immediately and, if there are injuries, ask for medical assistance. Next, contact an Emergency Coordinator. When calling in the emergency, give your location, describe the nature of the emergency, and provide your name.

A universal signal for emergency evacuation (e.g., use of a horn), and designation of the evacuation assembly location, shall be established by the SSO and Emergency Coordinator and briefed to all workers during initial site-specific training. Any alterations mandated by changing conditions shall be determined by the Emergency Coordinator and communicated to workers during the tailgate safety briefing.

All personnel will evacuate and assemble in a predetermined area that is specified prior to initiation of site activities, or as otherwise directed by the PM or SSO.

3.4.1 Explosion

The possibility of an explosion may exist. Some explosion risks include:

- Flammable containers (contents of many of the containers have flash points at room temperature).
- Explosive gases collected in low areas (manholes, etc.)
- High/low pressure air lines
- Pressurized water lines
- Electrical receivers

3.4.2 Hazardous Material Release

The most common hazardous materials at project sites are:

- Unknown chemicals
- Fuel/oil

- Laboratory/field chemicals
- Cleaning solutions, acids/bases
- Impacted materials release (e.g., water)

The appropriate emergency response to a hazardous materials incident will be dictated by the MSDS.

To deter or minimize a release of a hazardous material, a person may close a valve or flick a switch as they are leaving the affected area. ***Do not attempt to re-enter the affected area without proper equipment, training, and assistance.***

Special response equipment and PPE are needed when responding to hazardous materials incidents.

Site personnel who are trained and HAZWOPER-certified are available to assist the local fire department and Emergency Coordinators in addressing the incident.

In the event of a spill or release of hazardous materials brought on site or during the transportation of site materials, the owner and/or carrier of the material is responsible for appropriate notification, remediation, and disposal. Cleanup operations must return the impacted area or equipment back to pre-release condition.

If a spill or release occurs on site or at a nearby off-site location (requiring limited travel) involving removed or treated materials, personnel will provide support to mitigate any further release of the material and clean up the results of the release as requested by the PM.

3.4.3 Leaking Pipelines, Tanks, and Vessels

Ruptures and stoppages in piping systems are always possible. Ruptures are most frequent in pressurized lines (e.g., water, air). In either case, the first action must be to relieve pressure and isolate the pipe. This may be done by stopping and locking out pumps and closing valves (to isolate) or opening valves (to relieve pressure). If possible, bypass the problem to maintain operation.

Emergency procedures after a rupture or stoppage may create other hazards subsequent to the initial incident, such as flooding, and/or may endanger the public. If removal of an underground storage tank is required, refer to ENV514, *Tank Removal/Demolition,* before initiating removal activities.

When excavation is required for repairs, contact a utility locator service and the PM before digging. If the excavation is near a public throughway, acquire proper signage and traffic control devices.

To clear a stoppage, after relieving pressure, remove the material causing the stoppage. In some cases, the stoppage can be removed by flushing with high-pressure water. Remember to keep valves open if flushing is attempted. In other cases, the piping must be dismantled and the foreign material removed by remote methods (see ENV512, Line Entry). The choice of method is left to the operator.

Follow a few general principles in removing stoppages:

- Personnel must know the piping system and conveyed materials they are working on. They must be familiar with the valves and their functions in the system, bypasses, pumps, and, most of all, the purpose of the system.
- Never work on any pressure system until the source of the pressure is removed by closing the proper valves or turning off the proper pump or compressor. Don't start work until the system valves and pumps or compressors are locked and tagged or in the closed-off position, and the system pressure has been bled off as necessary.
- When removing material from a line, always wear proper PPE, including gloves to protect hands from anything imbedded in the material, and safety glasses and goggles to protect from splashes.

3.4.4 Severe Weather

Severe weather includes hurricanes, tornadoes, lightning, and flooding. Some of these conditions, such as tornadoes, can come upon the work site suddenly, with little to no warning. The following actions shall be implemented for each situation:

- Tornadoes/hurricanes - Radio stations will provide continual updates when hurricanes are tracking toward the site or when conditions are right for tornado formation. The Emergency Action Coordinator will listen to these updates and, if conditions worsen, personnel will either be sent to their homes (if time and conditions allow) or to pre-designated shelters. In the event of being outside when a tornado forms, personnel shall evacuate all equipment and lie flat in the nearest low point on the ground (unless time permits evacuation to the designated shelter).
- Lightning - In the event of lightning, all construction equipment shall be shut off and personnel shall enter the nearest structure. Under no circumstances should personnel stand under a solitary tree. If a structure is not nearby, either remain in an enclosed vehicle or lie flat at a low point on the ground.
- Flooding - When flooding is expected, take all equipment to the highest ground level possible. Workers will then proceed to the highest available point (e.g., multi-story building).

3.4.5 Fires

Fires occur most frequently in electrical devices, in storage areas, and in work areas. A fire may also create hazards subsequent to the fire itself, such as an explosion or toxic vapor release. Identify and locate potential fire sources at the site prior to project startup.

If the fire is small, try to extinguish it ***only after help is on the way***. It is better to have the fire out when the Fire Department arrives than to discover too late that you cannot control the fire and should have called for help. Pre-planning and training is necessary before performing this task—if you have not been trained in the proper usage of fire extinguishers, do not attempt to control the fire. Leave the area immediately. ***EXCEPTION: NEVER TRY TO FIGHT A FIRE IN A HAZARDOUS MATERIALS STORAGE AREA.***

If you cannot extinguish the fire, follow these general procedures (if it is safe to do so) to prevent further spread of the fire, and minimize damage to personal health and/or the facilities.

- Never endanger your own life.
- Remove any combustible material from the vicinity of the fire.
- Shut down gas supply lines to the area.
- If it is an electrical fire, cut the power to the affected area by pulling the appropriate circuit breaker.
- Hose down nearby structures (only after shutting down all utilities to the structures.)
- Remove any equipment that can be safely moved from the area.
- Close doors, windows, and vents.
- Be aware of chemicals located in the affected area such as welding equipment, propane, and other hazardous materials.
- Make appropriate MSDSs available to fire fighters before entry.
- Keep all personnel away from affected area.

Fire extinguishers are primarily first response instruments, intended for use on fires in their beginning stages before they get a chance to spread. Portable fire extinguishers have specific regulations developed governing their type and use. Only personnel trained in the use of fire extinguishers shall operate them. Fire extinguishers

available for use shall be inspected monthly to ensure they are fully charged and have not been used. Particular attention must be given to selecting the proper type of fire extinguisher for the particular type of fire. The following list shows various types of fire extinguishers, listed in order of preference, typically used with each class of fire.

- Class A for use on materials such as wood, cloth, paper, and rubber;
- Class B for use on flammable liquids, gases, and greases;
- Class C for use on energized electrical fires (Class A and B extinguishers may be used effectively on de-energized electrical fires);
- Class D for use on combustible metals such as magnesium, titanium, zirconium, sodium, and potassium.

NEVER USE A SOLID STREAM OF WATER ON ELECTRICAL FIRES. WATER IS AN EXCELLENT CONDUCTOR OF ELECTRICITY AND ITS USE MAY RESULT IN ELECTRICAL SHOCK.

Remember, if evacuation from a burning facility becomes necessary, ***Move Quickly*** to the nearest exit, ***Keep Calm*** and ***Stay Low.*** The temperature difference between the air at the floor level and eye level can be considerable. Try not to inhale smoke; if necessary, breathe through a damp cloth. ***If your clothing catches fire DO NOT RUN; Instead, "STOP, DROP, AND ROLL."*** Running merely fans the flames and intensifies the fire. If there is a rug, coat, or blanket available, roll in it. Rolling will smother the flames. Once out of the affected area, proceed to an out-of-danger area and when possible, assemble in groups. This prevents interference with fire fighters and at the same time gives the opportunity to account for personnel and to issue further instructions. If you cannot account for everyone and suspect they may still be inside the facility, notify the Fire Department. They give first priority to the preservation of life.

Do Not Re-enter the Building for any reason. Clothing, valuables, or other items that were left inside are not worth your life.

The following shall be implemented to minimize the potential for fires:

- No smoking around potential fire sources.
- For work in the field, all electrical equipment shall be equipped with ground fault circuit interrupters.
- Proper storage of flammable and combustible materials.
- Spark-proof tools/equipment shall be used when working with flammable materials.

3.4.6 Power Interruptions

Interruptions in power may become emergency situations. Almost all of the equipment used to operate and maintain the project uses electricity.

Power interruptions are emergencies when the potential for damage to human health or the environment exists. Usually during power interruptions, other hazards are present (such as severe weather, etc.).

The person responding to a power interruption should assess the situation, and then contact an emergency coordinator if the potential for an emergency situation exists. Contact the utility company and the client to notify them of the power failure and potential emergency. When calling in the emergency, give the location, describe the nature of the emergency, provide your name, and ask when the power is expected to be restored.

If the power interruption is not linked to the power company, an electrician should be called to determine the cause and make corrections.

3.4.7 Medical Emergencies

Medical emergencies are situations that present a significant threat to the health of personnel. These can result from chemical exposures, physical injury, heat stress, cold stress, and poisonous insect or snake bites. Medical emergencies must be dealt with immediately and proper care should be administered. This may be in the form of first aid and/or emergency hospitalization.

In the event of a medical emergency:

- Contact the ambulance using the number in Table 1 (must be completed by site/facility personnel).
- No injured individual shall be moved unless in immediate danger of a hazard. First aid can be provided on site by qualified first aid personnel (qualified by training, such as that received from the American Red Cross).
- If the employee is in the hot zone, and the emergency responders or qualified first aid person allows it, the employee can be removed from the hot zone by personnel wearing proper personal protective equipment (PPE). If the situation warrants it, the injured employee can be removed from his/her PPE without following all the decontamination procedures as long as the materials of concern are not a greater hazard (e.g., skin-absorbable or IDLH). In the event that the PPE is removed in this manner, decon shall be performed at the earliest possible opportunity when it is safe to do so.

3.4.8 Safety Equipment Problems

An emergency may develop due to malfunction or other problems associated with health and safety equipment being used by field personnel. These equipment problems must be corrected before proceeding with field activities. Health and safety problems that may occur include:

- Leaks or tears in protective clothing.
- Failure of respiratory protective devices (e.g., APRs).
- Encountering contaminants for which prescribed PPE may not be suitable.

EMERGENCY/SAFETY EQUIPMENT

List of Equipment

The following equipment will be available in the field trailer or site vehicles:

- Cartridge-type respirators
- Tyvek suits (or equivalent)
- Portable radios
- Cleaner-sanitizer for personal safety equipment
- Explosion-proof, 3-cell flashlights with batteries
- Eye and face protection
- Fire extinguishers
- First-aid kits
- Hardhats
- Hearing protection devices
- Hand protection (gloves)

3.5.2 First Aid Kits

Each work site shall have a first-aid kit meeting the following requirements:

- First-aid kits in weatherproof containers will be assembled, provided, and maintained in accordance with ANSI and shall be present at all locations where employees will be working.
- First-aid kits shall be available at the work areas at all times.
- First-aid kits shall be inspected and restocked as necessary.
- For jobs outside the local area, the site supervisors shall replenish the kit from the nearest pharmaceutical source, with supplies equivalent to those used.
- Personnel permitted to use first-aid kits shall possess a current first-aid/CPR card.

3.5.3 Eyewash Units

If corrosive materials are present/used, eyewash units meeting the requirements of ANSI Standard Z358.1-1990 will be used at the site and shall be strategically located for use by personnel in multi-work areas. Eyewashes shall be capable of supplying hands-free irrigation for both eyes for at least 15 minutes at a flow rate of at least 0.4-gallon per minute.

3.5.4 Fire Extinguishers

As a minimum, fire extinguishers capable of extinguishing Class A, B, and C fires will be available for use at the site at all times. Site personnel will be readily aware of the location of the fire extinguisher at all times.

3.6 EVACUATION PROCEDURES

In the event that employees must evacuate the area due to an emergency situation, the primary muster point will be the onsite office/trailer, which should be located in the prevalent upwind direction. In the event that evacuation must be downwind and a significant chemical release/fire is occurring, evacuated personnel should move a minimum of 800 meters away from the chemical release/fire source.

3.7 COMMUNICATIONS

A telephone shall be available at all times at the site (either cellular or land line) to allow personnel to call for emergency assistance. A copy of the Emergency Contact shall be posted in the vicinity of all land lines with outside calling capability.

The following hand signals will be used to signal an emergency:

Hand Signal	Meaning
• Hand clutching throat	Out of air; can't breathe
• Hands on top of head	Need assistance
• Thumbs up	OK; I'm alright; I understand
• Thumbs down	No; negative
• Grip partner's wrist or both hands around wrists	Leave area immediately

Employees will be equipped with radios or internal communications when feasible. In the event that radios are not feasible, other means of communication such as air horns will be set up by the SSO.

Table 1-Emergency Contacts

Emergency Coordinators / Key Personnel

Name	Title/Workstation	Phone Number	Cellular Phone
	Project Manager		
Dale Prokopchak	GWES EH&S Director	804-515-8556 (office) 804-360-3301 (home)	804-839-8312
Ron Partilla	GWES EH&S Mgr. (East)	616-940-4416 (office) 616-863-4953 (home)	616-446-6911
Bob Poll	GWES EH&S Mgr. (West)	562-951-2242 (office) 562-433-8221 (home)	562-884-1414
	Site Safety Officer		

Organization / Agency (provide local numbers in addition to "911")	**Phone Number**
POLICE DEPARTMENT:	
FIRE DEPARTMENT:	
STATE POLICE:	
AMBULANCE SERVICE*:	
**EMT WILL DETERMINE APPROPRIATE HOSPITAL FOR TREATMENT*	
HOSPITAL NAME*:	
STREET ADDRESS:	
CITY/STATE:	
ZIP CODE:	
**USE BY SITE PERSONNEL IS ONLY FOR NON-EMERGENCY CASES*	
HOSPITAL ROUTE (SEE ATTACHED MAP):	
POISON CONTROL CENTER	800-222-1212
POLLUTION EMERGENCY	800-292-4706
NATIONAL RESPONSE CENTER	800-424-8802
CHEM-TREC	800-424-9300
TITLE 3 HOTLINE	800-535-0202

PUBLIC UTILITIES (INSERT APPROPRIATE STATE-SPECIFIC UTILITY)

UTILITY NAME:

ATTACHMENTS: Attachment 1 – *HASP Request Form*

HASP Request Form

ADMINISTRATIVE INFORMATION

Project Name:	Project Number (with task/subtask):
Site/Facility Address:	HASP Budget (labor only):
HASP Due Date:	Anticipated Work Schedule:
HASP Delivery Address and Addressee:	
Client Name:	
Client Address:	
Client Contact (name/phone):	Site Safety Officer:
PM/RM (full name/phone):	POC for Additional Info:

SITE INFORMATION

Has Site History/Scope of Work been completed?: ☐Yes ☐No	Has Site History/SOW been sent to H&S?: ☐Yes ☐No
Client-specific safety guidelines/requirements? ☐Yes ☐No	Have client-specific guidelines been sent to H&S? ☐Yes ☐No

Anticipated Work Activities (check all that apply or *CLICK BOX* if completing electronically):

☐ Demolition/Renovation	☐ Asbestos Survey/Removal	☐ Drilling/Geoprobe®	☐ Confined Space Activities
☐ Excavation/Trenching	☐ Lead Survey/Removal	☐ Working On or Near Water	☐ UST/Drum Removal
☐ Crane/Hoisting/Rigging	☐ Elevated Work	☐ Soil/Sediment Sampling	☐ Soil Gas/Vapor Testing
☐ Welding/Cutting	☐ Well Install/Monitoring	☐ Hand Augering	☐ Utility Clearance
☐ Use of Explosives	☐ Well Abandonment	☐ Cylinder Remediation	☐ Other (see below*)

***Other work activities or unusual site conditions:**

ANTICIPATED SITE CONTAMINANTS (IF AVAILABLE, ATTACH OR FAX EXISTING ANALYTICAL DATA)

1.	6.
2.	7.
3.	8.
4.	9.
5.	10.

CONTRACTING INFORMATION

Are Subcontractors to be used?: ☐ Yes ☐ No	Subcontractor H&S contact:
Subcontractor	**Scheduled Task(s)**
1.	
2.	
3.	

Please send (E-file when possible) the completed HASP Request form, proposal and/or work plan (for site history/scope of work), and maps or analytical data to your regional Health and Safety Office.

ENV 103 PURCHASING ACTIVITIES	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 1

SUMMARY: Purchase of subcontractor services for field activities, or procurement of EH&S related supplies for project-specific needs (as designated in the project's EH&S documentation), requires coordination with the EH&S Department.

1.0 REQUIREMENTS

The following procurement activities require coordination with the EH&S Department:

1. Selection of a subcontractor organization to provide on-site personnel/support, exclusive of administrative duties.
2. Purchase of EH&S-related supplies (e.g., personal protective equipment, monitoring equipment) as needed to meet project-specific operations needs.[1]

The Project Manager (PM) is responsible for confirming EH&S Department concurrence prior to the procurement action. Concurrence must be in writing on the appropriate *Purchase Request* form or other purchasing document. The PM may be requested to modify a procurement action/document to meet an EH&S regulatory or procedural requirement. In the case of subcontractor services, additional information may be required as specified in ENV 104, *Subcontractor Selection*.

REFERENCES: ENV 104 – *Subcontractor Selection*

[1] This does not include the routine purchase of EH&S supplies for general use, or for employee use as personal-issue items.

ENV 104 SUBCONTRACTOR SELECTION	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 2

SUMMARY: Subcontractors used to support Earth Tech for non-administrative field operations must demonstrate both a commitment to good EH&S practices and a performance record indicative of that commitment.

1.0 SUBCONTRACTOR SELECTION REQUIREMENTS

For all subcontractor organizations used to provide non-administrative activities at Earth Tech work sites, the selection process will include consideration of candidate firms' EH&S management and performance indicators. This will be accomplished using a subcontractor instruction and evaluation process that includes the following requirements:

- All *Purchase Requisition* forms (or similar purchasing documents) related to the procurement of subcontractors for performance of on-site activities must be approved by the EH&S Department before execution. Any associated solicitation documents provided to bidders (e.g., scope of work) will include an EH&S Department-approved section stating the EH&S information and performance requirements applicable to the subcontractor's work, including:
    - Subcontract specifications must state that the subcontractor is solely responsible for all non-operational costs associated with EH&S compliance (e.g., employee medical monitoring procedures), and
    - that any cost or schedule impacts resulting from a subcontractors' non-compliance with applicable Safety and Health regulations or Earth Tech operational procedures are the responsibility of that subcontractor.
- Except where waived by the EH&S Department, subcontractor bids/submittals must include a completed *Contractor Prequalification Evaluation* (CPT) form (available on the Earth Tech Intranet at http://corp/healthsafety/hsforms.htm). Each CPE will be evaluated by the EH&S Department during the subcontractor selection process to identify any organizations whose past EH&S performance may disqualify them from selection.
- Selected subcontractor firms are required to provide copies of any EH&S documentation (e.g., operational safety procedures, employee training/medical monitoring certifications) to the Project Manager prior to the start of their on-site operations.

2.0 SUBCONTRACTOR EH&S REQUIREMENTS

Subcontractor organizations are responsible for safely performing their assigned work activities in accordance with all applicable federal and state occupational safety and health regulations. Subcontractors will also be provided with Earth Tech's project-specific EH&S documentation for the specification of minimum acceptable on-site EH&S performance. Subcontractors are responsible for ensuring that their employees are provided the appropriate equipment, training, and medical surveillance to perform the work safely.

Prior to starting fieldwork, each subcontractor organization shall provide Earth Tech with at least one of the following for review and acceptance:

- Site-specific EH&S documentation addressing specific performance requirements for the subcontractor's on-site work activities; or
- A written statement of adoption of the provisions in Earth Tech's project EH&S documentation as the subcontractor's own procedures while working on the job site. This documentation must be in letter format (company letterhead), and must include the following information:
    - Site location.
    - Anticipated scope of work activities to be performed by the subcontractor.

- Name of the subcontractor's Site Safety Officer, with contact phone numbers.
- Name of the subcontractor's Health and Safety Manager (HSM), with contact phone numbers.
- Statement adopting the Earth Tech project EH&S documentation as the subcontractor's own requirements for the project.
- Statement requiring that only qualified and trained personnel (to the level of assigned responsibilities) will perform assigned work activities on the site.
- Designation of required personal protective equipment (PPE) anticipated for the subcontractor's assigned work activities.
- Copies of supplemental or additional subcontractor-specific provisions, policies, procedures and/or protocols that will be implemented by the subcontractor during site activities.

REFERENCES: None

ENV 105 EH&S INSPECTIONS	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 2

SUMMARY: Field operations are subject to inspection by both the EH&S Department and regulatory agencies.

1.0 INTERNAL AUDITS

The EH&S Department will conduct periodic site visits to audit field activities. These audits may be scheduled or unannounced. The purpose of these visits will be to:

- Review compliance with EH&S requirements.
- Identify successful EH&S performances/activities for incorporation into other Earth Tech operations.
- Identify any EH&S program deficiencies for correction in future field operations.
- Assist with correction of any site-level EH&S compliance deficiencies.

For planned audits, a schedule will be coordinated between the EH&S Department and the Project Manager (PM) as part of initial project support coordination (see ENV 101). Special site visits may be required in response to events such as a regulatory agency inspection or a significant on-site accident/injury.

All EH&S audits will be conducted by a member of the EH&S Department.

2.0 OUTSIDE AGENCY INSPECTIONS

Various federal, state, and local regulatory agencies have the authority to visit and inspect Earth Tech work sites for compliance with regulatory requirements. In addition, clients/client-representatives have the right to inspect Earth Tech operations on their property for compliance with both regulatory requirements and any applicable client-specified or Earth Tech project-specific EH&S requirements. All such outside agency inspections may occur unannounced.

In the event of an outside agency inspection, the Site Manager will:

1. Meet with the inspection team upon arrival at the site and assign an appropriate member of the site staff to accompany the team throughout its work.

2. Immediately contact the EH&S Department to notify of the inspection. If possible, a member of the EH&S Department will travel to the site to participate in the inspection process.

3. At the conclusion of the inspection the Site Manager (and EH&S Department representative, if present) will meet with the inspection team to discuss their findings. Specific items of concern or non-compliance should be identified and discussed at that time. The Site Manager will compile a list of all items and provide this list to the EH&S Department.

4. If a member of the EH&S Department is not present, the Site Manager will report the results of the inspection to the EH&S Department. Copies of any written results/findings or regulatory citations will be forwarded to the EH&S Department immediately upon receipt.

3.0 FOLLOW-UP/CORRECTIVE ACTION IMPLEMENTATION AND CLOSURE

The PM is responsible for implementing corrective actions for every identified item, and will utilize the listing to track the status of each item. Requirements for implementation of corrective actions are as follows:

- Whenever possible, on-the-spot correction of items will be accomplished. For these cases, information regarding the corrective action can be provided to the EH&S Department when reporting the results of the audit/inspection.
- For items which cannot be corrected immediately, the PM will identify appropriate corrective actions to the EH&S Department for concurrence.
- If implementation of the final corrective action will require more than 30 calendar days to accomplish, an "interim action" must also be implemented to prevent accident/injury from occurring until the final corrective action is implemented.
- As each corrective action is implemented, the PM will provide written notification to the EH&S Department, but will continue to track the item as open. Close of each identified item will occur only after the EH&S Department approves the implemented corrective action(s).

REFERENCES: ENV 101 – *EH&S Project Support*

ATTACHMENT: EH&S Audit Inspection Checklist Form

ENV 201

GENERAL FIELD OPERATIONS REQUIREMENTS

Published:	January 20, 2003
Revised:	N/A
Page:	1 of 2

SUMMARY: The fundamental requirements presented in this procedure are generally applicable to Earth Tech work activities conducted at any job site, unrelated to the type of work activity being performed.

1.0 WORK SITE RULES

1. Each office/project site will have the appropriate labor posters (including state or Federal OSHA Notification) posted prominently. A source for these forms can be found on the EH&S website at http://corp.earthtech.com/healthsafety.
2. Legible and understandable precautionary labels will be prominently affixed to all containers of chemical raw materials, intermediates, products, by-products, mixtures, scrap, waste, debris, and contaminated clothing, per DOT, EPA, OSHA, or other applicable regulations.
3. At least one person qualified in the administration of first aid and cardiopulmonary resuscitation (CPR) will be present at all times at each Earth Tech work site unless exempted by the EH&S Department. Recognized agencies providing training and qualification in First Aid/CPR are the American Red Cross and the American Heart Association. A first aid kit will be provided at each project site. As appropriate, equipment on site will be bonded and grounded, spark proof, and explosion resistant. Ground fault interrupters will be utilized for all electrical equipment.
4. Hazards from protruding objects, careless movements, or placement of materials on paths or foot traffic areas present a problem with regard to slips, trips, falls, and puncture wounds. Personnel will use a reasonable amount of effort to keep slip, trip and fall hazards to a minimum.

2.0 EMPLOYEE PERFORMANCE RULES

1. Each employee, as a condition of employment, is required to comply with the health and safety procedures and the site safety plan governing in each area the employee is required to work. Project managers are to review records of each employee to ensure that all requirements are in compliance.
2. No one will initiate work on a project involving hazardous materials until appropriate training as required by regulation, contract and/or EH&S procedures have been implemented.
3. All employees are directed to immediately bring to the attention of the Site Supervisor or Site Safety Officer any unsafe condition, practice or circumstance.
4. The following practices are expressly forbidden during operations on work sites:
   - Smoking, eating, or drinking while on site except in designated areas;
   - Ignition of flammable or reactive materials;
   - Entry on site without proper safety equipment;
   - Conduct of operations on site without backup personnel;
5. Every accident is to be reported to the Site Supervisor immediately, whether or not anyone is injured.
6. Employees may not alter or attempt to repair any item of safety equipment unless specifically authorized and qualified.
7. An employee must not attempt to move or lift heavy or bulky objects beyond his capacity. No employee will lift more than 49 pounds without aid.
8. Possession or use of intoxicants or drugs on company premises or job sites is prohibited. Employees may not report for work or perform duties while under the influence of intoxicants or drugs. Use of prescription drugs are to be reported to the Site Supervisor and shall not impair the ability of the worker to work safely.
9. Walking under or working under a suspended load is not permitted.
10. Personnel on site will use the "buddy" system (pairs), working alone on any job site is forbidden. Communication or visual contact will be maintained between crew members at all times.

3.0 EMERGENCY PLANNING

1. A sufficient number of fire extinguishers, with a minimum rating of 1A:10B:C, will be strategically located throughout the areas where active work is progressing so that travel distance to an extinguisher from any location is less than 75 linear feet.
2. Where work operations involve the on-site handling or use of corrosive materials (strong acids/bases, etc.) or materials which can cause significant eye irritation/damage, a fixed or portable eye wash unit will be located within 15 feet of the work area. The eyewash unit will meet the latest requirements of American National Standards Institute (ANSI) Standard Z358.1, and be capable of supplying hands-free irrigation of both eyes for at least 15 minutes at a flow rate of at least 0.4-gallon per minute. At the discretion of the EH&S Department, and emergency drench shower, meeting the requirements of ANSI Z358.1, will also be provided.

4.0 STANDARD OPERATING PROCEDURES

The EH&S Department has developed standard operating procedures (SOPs) addressing EH&S requirements for performance of many types of field activities. The requirements are found in the ENV 500-series Procedures, *Activity-Specific Safe Operating Procedures (SOPs)*.

REFERENCES: ENV 208 – *Injury and Illness Prevention Program*

ENV 202

SAFETY MEETINGS

Published:	January 20, 2003
Revised:	N/A
Page:	1 of 1

SUMMARY: Periodic safety meetings will be held at all job sites to coordinate work activities and inform employees of the potential hazards associated with the work tasks.

1.0 PROJECT INITIATION/KICK-OFF

Where specified in the project-specific EH&S documentation (see ENV 102), an kick-off safety meeting will be conducted prior to the start of field operations, and will involve representatives of all organizations working on the job site. Topics for this meeting will include:

- Communication of all on site EH&S responsibilities and authority.
- Communication of organizational EH&S performance expectations.
- Identification of significant project EH&S issues/hazards and solutions.
- Coordination of organizational EH&S conflicts and interactions.

A Pre-Task Planning Log for Safety form is included as Attachment 1.

2.0 ON-SITE MEETINGS

Safety meetings will be conducted at all job sites for the following operational milestones:

1. Project Start-up: On the first day of field operations for a new project or a new phase of work.
2. Periodic: On a regular, recurring frequency of not less than once per week (daily meetings are required for HAZWOPER activities).
3. Significant Personnel Turn-over: The start of any work day where a new organization begins work on site or more than 25 percent of the day's work force is new to the site.
4. Accident Recovery: The start of the work day following any accident which results in more than $1000 dollars in property damage or an where an injury to one or more personnel requires medical treatment (discuss the accident, its causes and preventive measures).

The meetings will be documented on the *Tailgate Safety Briefing Form Sign-In Log*, found in Attachment 1.

3.0 SUPPLEMENTAL SAFETY TRAINING

The Site Supervisor or Site Safety Officer can implement worker training on general safety topics as part of routine on-site training activities. Where such training is conducted it will be documented on the *Safety Training Log*, found in Attachment 2.

REFERENCES: ENV 102 – *General EH&S Plan Requirements*

ATTACHMENTS:
Attachment 1 – *Pre-Task Planning Log*
Attachment 2 – *Tailgate Safety Briefing Sign-In Log*
Attachment 3 – *Safety Training Log*

Earth Tech
Tailgate Safety Briefing Sign-In Log

Date: Time:

Briefing Conducted By:	Signature:	Company Name:

This sign-in log documents the topics of the tailgate safety briefing and individual attendance at the briefing. Personnel who perform work operations onsite are required to attend each safety briefing and acknowledge receipt of such briefings daily.

TOPICS COVERED:

- ☐ General PPE usage
- ☐ Hearing Conservation
- ☐ Respiratory Protection
- ☐ Personal Hygiene
- ☐ Exposure Guidelines
- ☐ Decontamination Procedures
- ☐ Smoking, Eating, and Drinking
- ☐ Slips, Trips, and Falls
- ☐ Heat Stress
- ☐ Site Control
- ☐ Emergency Procedures
- ☐ Existing Work Zones
- ☐ Lockout/Tagout Safety
- ☐ Excavation/Confined Space Safety
- ☐ New Work Procedures
- ☐ _____

Personnel Sign-In List

Printed Name	Signature	Company Name

PRE-TASK PLAN FOR SAFETY (Continued)

Equipment Required: _____

Engineering Required: _____

Scaffolding Required: _____

Other: _____

Control Measures

Area Secured:

____ Warning Tape

____ Barricades

____ Roof Perimeter Protection

Other: _____

____ Escape Route Identified

____ Task Safety Checklist Completed

Other: _____

Verification of Understanding

(Crew members sign to assure that they understand the plan)

Print	Sign

Post Task Inspection Checklist

	Yes	No	N/A
Post-Job Cleanup	___	___	___
Secured Installed Materials	___	___	___
Hot Work Monitored after Work Completed	___	___	___
Barricades Installed where Needed	___	___	___
Equipment Shut Down/ Secured	___	___	___
Locks Removed	___	___	___

Emergency Numbers
EH&S Contacts

Environmental Services

Dale Prokopchak, CIH, CSP	(804) 839-8312
Bob Poll, CIH, CSP	(562) 884-1414
Ron Partilla, CSP, OHST	(616) 446-6911

Construction Services

Chuck Pryor, CSP	(858) 705-1653

Director

Alden Tansey	(858) 536-5610

Shift Manager: _____

Project Manager: _____

Earth Tech

Pre-Task Planning Form For Safety

EARTH TECH

PRE-TASK PLAN FOR SAFETY

Project: _____ **Location:** _____

Date: _____ **Shift:** _____

Foreman: _____ **PM/RM:** _____

General Foreman (Sign after Review):

_____

Description of Work: _____

_____

_____

_____

_____

HAZARD IDENTIFICATION

____ Housekeeping	____ Evacuation Process
____ High Voltage cables/hot rails	____ Trenches Properly shored/sloped
____ Requires Fall Protection	____ Asbestos or Lead paint
____ Open Holes	____ Confined Space(s)
____ Guarding	
____ Materials/ Scrap	____ Hot Work Protection
____ Noise	____ High Temperature
____ Working above/ below workers	____ Carbon Monoxide (150 PPM = evacuate area)
____ Acids/ Caustics	____ Radiation
____ Toxins	____ Hazardous Material

Task Safety Checklist (check all that apply)

Personal Protective Equipment	YES	NO	N/A
Goggles/Face shield	___	___	___
Gloves	___	___	___
Rubber boots/suits	___	___	___
Respirators	___	___	___
Body Harness/Shock absorbing lanyard	___	___	___
Welding Shield	___	___	___
Leather Sleeves/coat	___	___	___
Ear Plugs	___	___	___
Long Sleeve Shirts	___	___	___
Fire Retardant Clothing	___	___	___
Energized Equipment			
Lockout Verified	___	___	___
All Locks Labeled/ Tagged	___	___	___
Broken/ Exposed Wiring	___	___	___
Fire Protection			
Proper Fire Extinguisher & Fire Hose	___	___	___
Flammable Materials Removed or Protected	___	___	___
Fire Blankets	___	___	___
Fire Watch Required	___	___	___
Area Need to be Flagged	___	___	___
Tools			
Proper Tools for the Job	___	___	___
Ladder Inspection	___	___	___
Hand Tools in Good Condition	___	___	___
Air hoses secured	___	___	___
Ground Fault protection in place	___	___	___
Oxygen/ Acetylene tied off	___	___	___

Housekeeping	Yes	NO	N/A
Work Surface Level	___	___	___
Aisles, Stairs, Floors Clean	___	___	___
Storage of Materials	___	___	___
Material Handling/Equipment Inspection			
Cranes or Cherry Pickers	___	___	___
Air Tuggers	___	___	___
Rigging Checked	___	___	___
Cables, Ropes, Slings	___	___	___
Chain Falls	___	___	___
Pre-Lift Required	___	___	___
Fall Protection			
Rope Grabs	___	___	___
Retractables	___	___	___
Vertical Lifelines	___	___	___
Horizontal Lifelines	___	___	___
Guardrail System – Handrail, Midrail, toeboard	___	___	___
Floor Openings Protected	___	___	___
Miscellaneous			
Ladders Secured	___	___	___
Scaffolds Inspected	___	___	___
Rebar Protected	___	___	___
Pinch Points	___	___	___
Purge Requirements	___	___	___
Trailer Inspection	___	___	___
Daily Shift Ending Audit (Assure Equip & Area is secure)	___	___	___

Permits**	Required Yes	Required No	Complete
Work Permit	___	___	___
Excavation	___	___	___
Confined Space	___	___	___
Hot Work	___	___	___
MSDS Available	___	___	___
Special Written Procedure	___	___	___

** Completing this form does NOT replace completion of the required permits

Specific Work Requirements: _____

_____

Alternative Work Areas: _____

_____

Safety & Productivity Improvement Suggestion(s): _____

_____

Voltage of Equipment Used _____

SAFETY TRAINING LOG

Project Name: _____ **Project No.:** _____

Date:_____ **Time:**_____

Briefing Conducted By:	Signature:	Company Name:

This sign-in log documents the safety training conducted in accordance with various Parts of 29 CFR 1910 and 29 CFR 1926 as well as other applicable regulatory requirements. Earth Tech personnel who perform work activities in field/facility environments are required to attend each safety training session and acknowledge receipt of such training at least weekly or prior to a change in site/facility-specific operations or conditions. Additional training topics and/or regulations can be added to address ongoing site/facility operations. The assigned Manager (i.e., project, construction, response, facility, etc.) is instructed to maintain the completed documents at the facility for review for the duration of the project.

TOPICS COVERED:

☐ General PPE Usage	☐ Site -specific Guidelines	☐ Emergency Procedures
☐ New Work Procedures	☐ Slips Trips and Falls	☐ Elevated Work Surfaces
☐ Personal Hygiene	☐ Heat/Cold Stress	☐ Construction Safety
☐ HAZCOM Issues	☐ Confined Space Entry	☐ Hearing Conservation
☐ Exposure Guidelines	☐ Severe Weather	☐ Other:_____

Personnel Information

Printed Name	Signature	Company Name

ENV 203 MEDICAL MONITORING - GENERAL	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 3

SUMMARY: All personnel assigned to environmental practice activities in designated work categories, or whose job-site activities involve exposure to hazardous materials, hazardous noise or other dangerous conditions, will participate in Earth Tech's Medical Monitoring Program.

1.0 MEDICAL MONITORING PROVIDER

The Earth Tech Medical Monitoring Program provides a physician-evaluation of each employee for fitness to safely perform assigned work activities and to identify any adverse health impacts due to occupational activities. Administration of this program is subcontracted to the Corporate Medical Provider (CMP).

Specific medical examination protocols have been developed by the CMP for the following work categories:

- Hazardous waste (HAZWOPER) workers – see ENV 301
- Asbestos workers – see ENV 302
- Drivers (Dept. of Transportation-mandated)
- General Fitness (field personnel not covered in other categories)

Supplemental examination procedures are specified for workers exposed to lead (see ENV 303) and hazardous noise (see ENV 204). The EH&S Department may also refer employees for special medical examinations based on evidence of significant workplace exposure to hazardous materials.

2.0 MEDICAL MONITORING PROGRAM ELEMENTS

2.1 MEDICAL EXAMINATIONS

The following types of examinations (and the enumerated examination elements) comprise the requirements for Earth Tech's medical monitoring process:

Baseline Medical Examination – This examination will be provided to each worker as part of initial employment (new hire, re-train into new position, etc.). The examination will be used to identify any pre-existing medical conditions which may be affected during work operations, determine fitness to use respiratory protection (if applicable) and various types of protective clothing, determine acceptable hearing and visual acuity, and determine any physical limitations which may affect work performance. This examination will also provide a baseline for comparison with later medical examination in evaluating if occupational conditions are producing adverse health impacts.

Results from the baseline medical examination and CMP clearance must be received by the employee's Environmental, Health and Safety Administrator (EHSA) prior to start of employment at Earth Tech.

Annual Medical Examination – Each year every worker in the Earth Tech Medical Monitoring Program will be required to undergo a medical examination in order to remain qualified to perform field activities[1]. The examination will be used to identify any changes in medical status that may affect the employee's continued ability to perform assigned duties, as well for the evaluation of any negative health trends which may be indicative of adverse workplace exposures to on-site hazards.

[1] The CMP and the EH&S Department will jointly identify an alternate examination frequency, at periods of up to two years, in cases where the worker's exposures to worksite hazards are of moderate to low intensity and are experienced only infrequently (e.g., senior management personnel).

Termination Medical Examination – At the conclusion of employment each employee will be provided with the opportunity to receive a termination medical examination[2]. The purpose of this examination will be to provide a final evaluation for any negative health trends that may be indicative of adverse workplace exposures to on-site hazards, and to provide a record of the employees medical status at the time that employment is ended.

Special Examinations – The EH&S Department and the CMP will work to identify any special medical monitoring needs required in response to changes in an employees health, specific regulatory requirements, known/suspected exposures to chemical or physical hazards which may have impacted health, or in response to changing site conditions. The elements of such examinations will be determined by the CMP based on Earth Tech-supplied information concerning occupational conditions and knowledge of the desired goals of the examination procedure. This will include enrollment in a drug testing program based on client requirements, project-specific random testing, or post-accident analysis requirements.

2.2 MEDICAL CLEARANCES

Results of each occupational medical examination will be provided by the CMP as a physician-signed medical clearance. The clearance will document the extent of the physician's evaluation, compliance with any applicable regulatory standards, the physician's evaluation of the employee's fitness to perform the designated work activities, fitness for use of respiratory protection (if applicable), and any limitations on work activities related to the employee's current medical condition (if applicable). Copies of the medical clearance will be provided to the employee, and the employee's EHSA.

The medical clearance will NOT provide any specific physician observations, laboratory sample results or other measured medical/physical parameters, which are confidential and may only be released to Earth Tech by the employee. An exception to this requirement is the measured results of specific medical tests taken in response to a regulatory mandate where the specific parameter is used to assess workplace exposures (e.g., blood lead levels).

2.3 MEDICAL RESTRICTIONS

If any employee's medical clearance indicates any work activity limitations or evidence of adverse exposure the EHSA will immediately contact the EH&S Department, and will forward a copy of all materials received from the CMP. The EH&S Department will then investigate the medical evaluation findings and prepare a written document detailing the scope of any required work activity restrictions. The employee's direct supervisor and section manager will be provided copies of the EH&S Department's documentation, and will be responsible for managing the employee's work assignments in accordance with the mandated restrictions (a copy of the written restrictions will also be provided to the EHSA for filing).

Any modifications or changes to an employee's restrictions can be made only by an EH&S Manager, and then only in response to updated information from the CMP (not the employee or the employee's personal physician).

3.0 ENVIRONMENTAL, HEALTH AND SAFETY ADMINISTRATOR DUTIES

The EHSA for each section is responsible for:

- Scheduling baseline examinations for new-hires upon notification by the Section Manager.
- Maintaining a file for each medically monitored employee which contains copies of all medical clearances, medical restriction notices/changes, and other medical monitoring-related documentation.

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[2] In Earth Tech's program terminating employees may decline this examination. Where this occurs a note is added to the medical record to document the employee's choice.

- Maintaining a database that tracks the medical monitoring status of all medically monitored personnel in the section.
- Coordinating with each medically monitored employee to schedule and complete the annual medical examination before expiration of the previous clearance.
- Notifying the EH&S Department if examination results for any employee indicate the need for work restrictions, evidence of adverse exposure, or other abnormal event, or if medical clearance is not granted.
- Notifying the EH&S Department regarding any medically-monitored person who's medical clearance is expired for over 30 days.

REFERENCES: ENV 003 – *EH&S Administrative Support*

ENV 204 HEARING CONSERVATION PROGRAM	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 2

SUMMARY: Personnel with the potential to be exposed to workplace noise in excess of 85 decibels on the "A-weighted" scale will be enrolled in Earth Tech's Hearing Conservation Program.

1.0 HEARING CONSERVATION POLICY

All Earth Tech employees whose work activities may exposure them to sound pressure levels at or above 85 A-weighted decibels (85 dBA) will be included the Hearing Conservation Program (HCP) described in this procedure, and will be required to wear hearing protectors in areas where this threshold is exceeded.

2.0 AUDIOMETRIC HEARING TESTS

Audiometric hearing examinations will be included as an element of the employee medical monitoring program for all field workers (see ENV 203), as well as for other categories of workers who's noise exposure meet the criteria stated above. Audiogram protocols will be determined by Earth Tech's Corporate Medical Provider (CMP), and will include the following types of examinations:

Baseline Audiogram: An initial (baseline) audiogram performed as part of the initial (pre-employment) medical examination, or as soon as the employee is identified as requiring enrollment in the HCP.

Annual Audiogram: An annual audiogram will be administered for each employee enrolled in the HCP as part of the annual medical examination. Results of annual tests will be compared with the baseline exam by the CMP, who will determine if results indicate the need for more detailed testing.

Termination Audiogram: All employees enrolled in the HCP will be provided an audiogram as part of the termination medical monitoring examination.

3.0 ON-SITE MONITORING OF NOISE LEVELS

Monitoring of on-site noise levels may be conducted at Earth Tech project sites to establish sound pressure levels associated with individual work activities or site activities; this need will be determined by the EH&S Department. Results of this monitoring will be used to determine requirements for engineering controls and use of hearing protection during Earth Tech work activities.

All results of nose monitoring activities will be provided to the EH&S Department for inclusion in employee medical records.

4.0 HEARING PROTECTORS

Project-specific requirements for the use of hearing protection is specified in the project EH&S documentation. The use of hearing protection is mandatory for all employees exposed to sound pressure levels of 85 dBA or greater.

All employees issued hearing protection will be trained in the proper use, care, and maintenance of the protectors. All hearing protection will carry a minimum noise reduction rating (NRR) of at least 26 dBA, and must be approved by the EH&S Department prior to use in the field.

All requirements pertaining to the issuance and use of hearing protection will apply to any subcontractor or visitor personnel working in Earth Tech-controlled areas where the use of hearing protection has been specified.

5.0 TRAINING PROGRAM

All employees exposed to noise at or above a sound pressure level of 85 dBA will participate in an annual training program. The training program will focus on:

- The effects of noise;
- The purpose of hearing protectors, their advantages and disadvantages, and use and care; and
- The purpose and procedure of audiometric testing.

This training will be provided as part of the employee's annual EH&S training requirements.

6.0 RETENTION OF RECORDS

- Employee noise exposure measurement records will be retained for a minimum of three years after exposure.
- Employee audiometric test records will be retained as part of medical monitoring records (to be maintained on file for the duration of employment plus 40 years).
- Annual employee training session documentation will be retained for the duration of employment.

REFERENCES: ENV 203 – *Medical Monitoring Program*

ENV 205 PERSONAL PROTECTIVE EQUIPMENT	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 4

SUMMARY: Requirements for use of protective clothing and equipment will be specified by the EH&S Department on a task-by-task basis. The performance characteristics of the protective equipment will meet the following requirements.

1.0 PROTECTIVE EQUIPMENT PERFORMANCE SPECIFICATIONS

Requirements for use of protective equipment are specified by the EH&S Department, on a task-by-task basis, in the project EH&S documentation. All protective equipment used by Earth Tech personnel must meet or exceed the following performance requirements.

1.1 HEAD PROTECTION

Hard hats will meet the requirements of the latest version of ANSI Z89.1 or CSA Z94.1.

1.2 EYE PROTECTION

Eye protection (safety glasses) will meet the requirements of the latest version of ANSI Z87.1 or CSA Z94.3. Sideshields are only required where specified by the client or in the project EH&S documentation, however ALL safety glasses will meet the following minimum requirements:

1. Provide adequate protection against the particular hazards for which they are designed.
2. Be reasonably comfortable when worn under the designated conditions.
3. Fit snugly and not unduly interfere with the wearer's movements.
4. Be easily cleaned and sanitized.

Contact lenses do not provide eye protection; contact lens wearers must use the same additional eye protection as non-lens wearers.

1.3 FACE PROTECTION

Face protection (face shields) will be used when there is a significant splash hazard, or where there is an increased hazard from impact (e.g., use of a bench grinder). Face shields used on site must meet the requirements in the latest version of ANSI Z87.1 or CSA Z94.3.

1.4 HEARING PROTECTION

Hearing protectors can be either ear plugs or ear muffs, but must provide a minimum noise reduction rating (NRR) of 26.

1.5 FOOT PROTECTION

All footwear used on site must provide ankle support (minimum height of 6 inches) with leather uppers, and must provide a safety-toe meeting the specifications in the latest version of ANSI Z41PT91 (M/I 75, C75).

1.6 HAND PROTECTION

Hand protection serves two purposes:

- Control of physical hazards
- Control of skin contact with hazardous materials

1.6.1 Control of Physical Hazards

Where workers are exposed to physical hazards the use of standard leather or cloth work gloves will be employed. These gloves do not need to conform to any ANSI or other standard, however selected gloves should:

1. Be of sturdy construction
2. Be intended to protect against the particular hazard(s) associated with the job (e.g., insulated gloves for hot work)
3. Properly fit the worker's hands

1.6.2 Control of Skin Contact With Hazardous Materials

Gloves intended to provide chemical protection must be rated by the manufacturer as effective against the substance(s) expected to be encountered. Specific selection will be made on a task-by-task basis and approved by the EH&S Department.

1.7 FALL PROTECTION

Fall protection equipment includes full-body harness, body belts, safety lines and attachment devices used to prevent or arrest falls by employees working unprotected by a rail or net system at heights greater than 6 feet above ground. Fall protection devices will also be used by workers operating from manlifts (at heights greater than 6 feet) if any portion of their body other than hand/arms extends beyond the rail system, or when one or more sides of the lift is unprotected. Earth Tech will implement 100% fall protection in all work areas.

Fall protection equipment must meet the following requirements:

- All fall arrest systems must utilize a full-body harness (body belts are prohibited for fall arrest).
- The attachment point of the body harness shall be located in the center of the wearer's back near shoulder level, or above the wearer's head.
- All lanyards and lifelines must have a minimum breaking strength of 5,000 pounds (attachment points for these lines must also meet this requirement).
- Fall arrest systems must limit the free-fall to 4 feet or less, and subject the worker to no more than 1800 pounds of arrest force.
- Personal fall arrest systems and components subjected to impact loading shall be immediately removed from service and shall not be used again for employee protection until inspected and determined to be undamaged and suitable for reuse.

Fall protection equipment will be used for employee safety only, not for hauling or lifting equipment.

1.8 SPECIALIZED SAFETY EQUIPMENT

Specialized safety equipment includes items such as welding shields or extraction/rescue equipment for use in confined space entry operations. Performance specifications for this equipment are provided in task-specific EH&S documentation for the work operations.

2.0 MINIMUM PROTECTIVE EQUIPMENT REQUIREMENTS

Unless otherwise specified in task-specific guidance in the project EH&S documentation, the following protective equipment/clothing will represent the minimum acceptable for use at any Earth Tech field site:

- Hardhat
- Shirt with sleeves and long pants (shorts are unacceptable for use)
- Safety glasses
- Safety-toed boots

3.0 PROTECTIVE EQUIPMENT PROCUREMENT AND CARE

3.1 STORAGE AND MAINTENANCE

3.1.1 Personal Items

The following PPE items will be obtained by the individual users, with costs reimbursed based on the condition and safe operating use of PPE. The employee's supervisor will approve new purchases of required PPE by the employee.

- Safety-toed boots (leather)[1]
- Safety Glasses[2]

Employees are expected to maintain this equipment in a clean, ready-to-use condition, and to perform periodic inspections to ensure that equipment is undamaged and fully functional. Any equipment which becomes unserviceable shall be replaced by the employee, subject to reimbursement in accordance with Earth Tech's PPE Allowance criteria.

3.1.2 Individually-Issued Items

The following PPE items will be issued individually to each worker, or will be obtained by each worker at Earth Tech expense for their personal use:

- Hard hat
- Safety-toed boots (rubber)
- Air purifying respirators
- Ear Muffs/ear plugs
- Cold weather gear

Employees are expected to maintain this equipment in a clean, ready-to-use condition, and to perform periodic inspections to ensure that equipment is undamaged and fully functional. Any problems should be identified to the site safety officer immediately so that replacements can be arranged.

3.1.3 Central Issue Items

Except for personal issue items, all other PPE will be stored on site and issued to workers as required for use. This includes:

- Work coveralls
- Chemically-protective outer coveralls
- Leather and chemically-protective gloves
- Face shields
- Fall protection equipment

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[1] Earth Tech has established a boot purchase program with RED WING Shoes that provides for a 15% price discount and company-direct billing up to a total cost of $100. Information about this program can be found on the EH&S website at http://corp.earthtech.com/healthsafety/hsforms.htm.

[2] Earth Tech has established a prescription safety eyewear program with Wal-Mart that provides for a price discount and company-direct billing up of approved eyewear frames and lenses. Information about this program can be found on the EH&S website at http://corp.earthtech.com/healthsafety/hsforms.htm.

- Specialized safety equipment

All central issue equipment will be maintained in a clean, dry condition.

3.2 INSPECTION

Prior to use of any safety equipment (individual issue or centrally stored) personnel should inspect each piece to ensure that it is in good working order. Equipment exhibiting any signs of wear or damage will be immediately placed out of service and repaired/replaced.

REFERENCES: None

ENV 206 RESPIRATORY PROTECTION PROGRAM	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 7

SUMMARY: Respiratory protection is used to prevent inhalation of hazardous airborne contaminants. The Respiratory Protection Program (RPP) established in this Procedure complies with the requirements in 29 CFR 1910.134, and describes the requirements for respirator selection and issue, medical surveillance needs, respirator use, cleaning, maintenance, storage, and inspection. Fit testing and training requirements are also presented. Requirements for use of respiratory protection will be specified by the EH&S Department on a task-by-task basis.

1.0 SELECTION OF RESPIRATORY PROTECTION

Operational safety documentation (e.g., Health and Safety Plans [HASPs], permit-required confined-space entry procedures) specify respiratory protection needs on a task-by-task basis. However, in the absence of such guidance, the following minimum requirements will be observed:

Airborne VOCs:
- 0-2 ppm – No respiratory protection required
- > 2-10 ppm – Full-face air purifying respirator with organic vapor cartridges
- > 10 ppm – Full-face supplied air respirator in pressure-demand mode

Airborne Dusts:
- 0-5 milligrams per cubic meter (mg/m^3) or <1/2x Permissible Exposure Limit (PEL) - No respiratory protection required
- > 5-25 mg/m^3 or >½-5x PEL – Full-face air purifying respirator with P100 cartridges
- > 25 mg/m^3 or >5x PEL - Full-face supplied air respirator. In pressure-demand mode

Oxygen Depletion:
- < 19.5 percent - Full-face supplied air respirator in demand or pressure-demand mode

Other Airborne Contaminants:
- < ½ PEL – No respiratory protection required
- > ½ PEL – 5x PEL - Full-face air purifying respirator w/specific cartridges (If no contaminant-specific cartridges exist supplied air respiratory protection is required)
- > 5x PEL - Full-face supplied air respirator in pressure-demand mode

In cases where mixed contaminants are present, the most protective respirator type will be used. Combination cartridges are acceptable for air purifying respirators.

2.0 GENERAL REQUIREMENTS

2.1 MEDICAL AND PHYSICAL REQUIREMENTS

Employees who wear respiratory protection shall be medically evaluated to ensure that they are able to wear respirators. The examining physician will determine the specific requirements for the examination. The physician shall provide to the employer a written evaluation on each employee's ability to wear respirators, and limitations, if any.

Medical surveillance for respiratory protection shall be performed on an annual basis as part of Earth Tech's employee medical surveillance program.

2.2 RESPIRATOR ISSUE

Respiratory protection equipment issued for use by Earth Tech employees will be individually provided to each user, who is solely responsible for its use and care.

The following requirements will apply to all respirator issue/use:

1. The employee shall be issued only the manufacturer's model and size respirator for which he/she has been trained and fit tested.
2. All respirators must be cleaned and disinfected after each use.
3. Only employees who have been trained, fit tested, and medically qualified in accordance with this RPP shall be issued respirators.

2.3 RESPIRATOR USE

To provide protection from inhalation of airborne contaminants, respirators must be properly used. The following use requirements shall be adhered to at all times:

1. All parts supplied with the respirator (including the air hose that connects to the respirator) are specifically approved as a unit. Removal or interchanging of different parts voids the National Institute of Occupational Health (NIOSH)/Mine Safety and Health Administration (MSHA) approval. Under no circumstances shall respirators be modified to void the approval.
2. Each respirator shall be used only by the employee to whom it was issued and has been fit tested. Respirators come in different models and sizes. A loaned respirator may not protect the employee, since it may be the wrong model and size.
3. Only employees who have been trained, fit tested, and medically qualified in accordance with the provisions of this RPP shall wear respirators.
4. Negative pressure respirators shall not be worn where conditions prevent a good seal. This includes:
   - Where facial hair interferes with the seal or the working of the respirator (i.e., full beards or goatees that are long enough to keep the exhalation valve open).
   - Scars that may cause leakage between the face and facepiece.
   - Glasses with temples, since the temples will pass between the face and face piece. Spectacle kits will be provided for wearers of prescription lenses, or the use of contact lenses is acceptable inside full-face masks.
   - Any other condition that prevents a good seal, such as donning a respirator after putting on a hood, and the hood protrudes into the sealing area.
5. Employees shall not wear personally owned respirators when performing work.
6. Personnel shall inspect the respirator prior to each use to ensure that it is not defective.
7. Areas where respirators must be worn shall be posted indicating respirators are required so that inadvertent entry by unprotected personnel will be prevented.
8. Respirators shall be cleaned and stored after each use in accordance with this RPP.
9. Respirators shall be stored in a plastic, resealable bag when not in use.
10. Respirators shall be stored in such a way as to prevent face piece distortion, and protect it from crushing and scratching.

2.4 INSPECTION OF RESPIRATORY PROTECTION EQUIPMENT

A respirator must be inspected prior to each use to ensure that it is operational and without defect. The following items must be inspected during each pre-use inspection:

1. Check the overall mask shape to ensure that the respirator has not been deformed.
2. Check the straps to ensure they have maintained their elasticity, and that the clips are operational.
3. If feasible, remove the cover to the exhalation valve (typically located on the bottom outside of the respirator), pull the exhalation valve away from the seat (to ensure it is not stuck), and check for tears or improper seating (from particulate interference or change in shape of the valve). Place the exhalation valve cover back on.
4. For full-face respirators, check the lens to ensure that it is not scratched or clouded to prevent proper vision during wearing.
5. Turn the respirator over. Check the outside sealing area of the respirator to ensure there are no cracks, and that the respirator has maintained its shape.
6. APRs - Remove each cartridge, and remove the gasket (if so equipped). Check both sides of each cartridge gasket to ensure that there are no cracks or indentations that would cause a leakage point.
7. APRs - Check the underside of each cartridge to ensure that the elevated portion that seals on the gasket (or face piece if there is no gasket) is not dented, which would allow leakage.
8. APRs - Replace old/used cartridges with new the cartridges.
9. APRs - Look inside the respirator and find the inhalation valves (one per cartridge). Check to make sure they are not stuck, and that they lay properly.
10. SARs - Check all hoses for kinks and holes.
11. SARs – Examine the regulator to ensure it is operational.

If during the inspection a defect is found, discard the respirator and obtain a new one. Go through the inspection procedure for the new respirator.

2.5 RESPIRATOR CLEANING AND MAINTENANCE

Respirators shall be cleaned after each use. Use a cleaner/disinfectant that is made for respirator cleaning. Under no circumstances should any alcohol-containing cleaner be used. After cleaning, store the respirator in a clean Zip-loc® bag (or equivalent), ensuring nothing is stored on top of the respirator which could crush or damage it. When storing rubber full-face respirators, do not pull the head strap over the lens, as the antioxidant in the rubber can damage the lens.

The only on-site maintenance allowed for respirators is the changing of cartridges, and inspection of the respirator for defects, and cleaning. Replacement of respirator parts can only be performed by personnel specifically trained by the manufacturer. Requirements for replacement of cartridges are:

Particulate cartridges can be cleaned with the respirator, and, as long as the cartridges did not cause breathing difficulty (indicating clogging), can be placed back on the respirator for reuse.

Chemical cartridges once these are opened they should only be used within the week they were opened. After the week (or if the respirator will not be used again within a week) the cartridges are to be discarded.

2.6 TRAINING

Personnel who wear respiratory protection shall be trained prior to the issuance of respirators. The training shall include the following:

1. The provisions of this instruction.
2. Employee responsibilities within the respirator program.
3. Respirator selection.
4. Respirator issue procedures.
5. Inspection of respirators.
6. Cleaning/maintenance.
7. Discussions of the types of jobs that personnel may perform that require respirators, the hazards for which respirators would be required, and the typical types of respirators.

3.0 AIR PURIFYING RESPIRATORS

The following requirements shall apply to all use of air purifying respirators by Earth Tech personnel:

1. Only full-face, negative pressure air purifying respirators are acceptable for use unless specific authorization is provided by the EH&S Department.
2. It is critical that air-purifying respirators have the appropriate cartridges attached for the contaminant(s) of concern; otherwise, the respirator will not protect the employee.
3. When using air-purifying respirators with chemical cartridges, if an odor is noted, or if irritation results, exit the work area and replace the cartridges.
4. When using air-purifying respirators with particulate filters, replace the filters when breathing becomes difficult.
5. Chemical cartridges shall not be used after the manufacturer's expiration date.
6. Chemical cartridges shall be discarded after 1 day's use, or more frequently if odor or irritation is noted.[1]

3.1 TRAINING AND FIT TESTING

During initial respirator training, users of APRs shall be taught the following prior to the issuance of respirators:

1. Cartridge selection criteria
2. Respirator and cartridge limitations
3. Respirator use procedures
4. Cartridge change-out frequencies and indications

Personnel shall also be fit tested to determine the manufacturer, model, and size of respirator that best fits. The fit testing shall be accomplished using one of the three accepted qualitative fit test methods (quantitative fit testing may be performed; however, accepted protection factors of respirators will be based solely on qualitative factors specified in the regulation):

1. Irritant smoke.
2. Isoamyl acetate.
3. Bitrex.

Fit testing will be accomplished only by personnel trained in fit testing procedures by the EH&S Department.

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[1] Selection of specific cartridges will be made by the EH&S Department based on contaminants present. A cartridge change-out frequency will also be specified in the HASP based on manufacturer's cartridge performance data.

3.2 DONNING/DOFFING OF APRs

Respirators will provide adequate protection only if properly donned. The following are the donning procedures for most air-purifying respirators:

1. Place the neck straps around the neck and snap together. Make sure the straps are straight.
2. Grab the head straps, and pull up and over the head. Snap together around the crown of the head (over the ears).
3. Position the respirator on the face; pull the adjustment straps to secure the respirator in the proper location. Do not over tighten.
4. Perform a positive and negative pressure check:
   - Positive pressure check: Place the palm of your hand lightly over the exhalation valve cover. Lightly exhale. The respirator should lightly push away from your face, with no outward leakage noted between the face and face piece.
   - Negative pressure check: Place you hands lightly over the cartridges (*or end* of the hose) to cover the air holes. Inhale and hold your breath. The respirator should lightly collapse on your face, with no inward leakage noted between the face and face piece.

4.0 SUPPLIED AIR RESPIRATORY PROTECTION

The following requirements shall apply to all use of supplied air respiratory protection by Earth Tech personnel:

1. Airline respirators will not be used with more than 300 feet of airline hose from the respirator to the air source.
2. Supplied air respirators and SCBA shall be used only with air that meets the minimum requirement for Grade D air, as specified by the Compressed Gas Association. These requirements are:
   a. Oxygen content of 19.5-23.5%.
   b. Hydrocarbon (condensed) content of no more than 5 milligrams per cubic meter.
   c. Carbon monoxide (CO) content of no more than 10 ppm.
   d. Carbon dioxide content of no more than 1,000 ppm.
   e. No noticeable odor.
3. Each shipment of Grade D air will be accompanied by a certificate confirming these requirements.

4.1 SELF-CONTAINED BREATHING APPARATUS (SCBAs)

SCBA are to be used whenever level A or B protection is required, whenever the site health and safety officer requires their use, or whenever the hazards of a situation cannot be assessed prior to entry. Exceptions based upon site conditions may be granted where an airline respirator with escape pack system has been approved by the site safety officer.

1. Only SCBA operating in the positive pressure (pressure demand) mode will be used.
2. Persons will not be assigned tasks requiring the use of an SCBA unless it has been determined that they are physically able to perform the work while wearing the SCBA. A physician with sufficient knowledge of respiratory protection will determine what health and physical conditions are pertinent. The medical status of persons assigned to use SCBA will be reviewed annually.
3. No individual will use an SCBA until training on the use, care and limitations of the SCBA has been received. Such training will be received at least annually.
4. If SCBA are used for entry into IDLH contact the EH&S Department for additional guidance.

5. SCBAs are not to be used if the tank is not fully charged or if any other condition exists which could cause failure of the unit during use.
6. When using an SCBA, users will leave the work area promptly when the low air pressure alarm signal sounds.
7. Individuals are not to make repairs or modifications to an SCBA unless specifically authorized by the manufacturer of the unit and the site safety officer.

The Site Safety Officer is responsible to ensure that site personnel using the equipment maintain each SCBA in a ready for use state at all times. This includes performing the monthly inspections and inspecting, sanitizing, and refilling or replacing the air tanks after each use. Monthly inspections are to include checks on tightness of connections and the condition of the headbands, valves, and connecting tubes. Rubber parts are to be inspected for pliability and deterioration. The air tank must be fully charged and the hydrostatic test certification must be up-to-date (within 3 years for a composite cylinder, 5 years for a steel cylinder). Regulator and warning devices must function properly. A record of inspection dates is to be maintained on the *Monthly SCBA Check Form* (Attachment 1), which will be maintained on the SCBA or in its storage container. The inspection checklists are to be kept with the SCBA for reference. Any deficiency noted during inspection requires removing the SCBA from service until the condition is corrected. The SCBA and the storage case must be clearly marked or tagged "OUT OF SERVICE."

4.2 COMPRESSED GAS SAFETY

Supplied air respiratory protection systems will utilize compressed gas as a breathing air source. Gas will be stored in various size cylinders, and provided for use with a regulator/cascade system. The improper use, storage, and maintenance of compressed gas can result in injury. The following procedures will apply to all compressed gas use during project activities:

Compressed Gas Cylinders: The following requirements will be observed when handling, casing, or storing compressed gas cylinders:

1. Compressed gas cylinders shall be equipped with connections complying with ANSI B57.1-1965, "Compressed Gas Cylinder Valve Outlet and Inlet Connections."
2. Compressed gas cylinders shall be legibly marked for the purpose of identifying the gas content with either the chemical or trade name of the gas. Such marking shall be by means of stenciling, stamping, or labeling and shall not be readily removable. The markings shall be located on the shoulder of the cylinder.
3. Cylinders of compressed gas shall be stored in areas where they are protected from external heat sources such as flame, intense radiant heat, electric arc, or high-temperature steam lines.
4. Compressed gas cylinders shall be stored in a well-protected, well-ventilated, dry location, at least 20 feet from highly combustible materials. Assigned storage spaces shall be located where cylinders will not be damaged by passing or falling objects.
5. Compressed gas cylinders shall be transported in a manner to prevent them from creating hazard by tipping, falling or rolling.
6. All cylinders shall be equipped with valve protection devices when the cylinders are not in use or connected for use.
7. Compressed gas cylinders in portable service shall be conveyed by suitable trucks to which they are securely fastened; and all gas cylinders in service shall be securely held in a rack or secured to rigid structures so they will not fall or be knocked over.
8. Valve protection devices shall not be used for lifting cylinders. Cylinder valves shall be closed before moving cylinders.
9. Cylinder valves shall be closed when work is finished.
10. Cylinders shall never be used as rollers or supports for moving other equipment.

11. Cylinders will be inspected and maintained properly.

Pressure Regulators: Use of pressure regulators will be in accordance with the following:

1. Regulators or automatic reducing valves shall be used only for the gas and at the pressure for which they are intended. Defective fuel gas pressure regulators shall not be used.
2. Gauges on oxygen regulators shall be marked "USE NO OIL."
3. Before connecting a regulator to a cylinder valve, the valve shall be tested by being opened slightly and closed immediately. The valve shall be opened while standing to one side of the outlet; never in front of it.
4. Before a regulator is removed from a cylinder, the cylinder valve shall be closed and the gas released from the regulator.
5. If cylinders are found to have leaky valves or fittings that cannot be stopped by closing the valve, the cylinder shall be taken outdoors away from ignition sources and slowly emptied.

REFERENCES: None

Attachments: Attachment 1 – *Monthly SCBA Check Form*
Attachment 2 – *Qualitative Respirator Fit Test Form*

Monthly SCBA Check Form

Month	Yes	Inspector's Initials	Corrective Action(s) Needed	Date(s) Corrected

The following shall be checked on each SCBA during each monthly inspection:

1) Check the overall shape of each facepiece to ensure it has not been misshapen.
2) Check the respirator straps to ensure they maintain their elasticity, and that the clips are operational.
3) Remove the cover of the exhalation valve (if possible), and make sure the valve rests properly and not dirty or cracked/bent.
4) Check all hoses for kinks and holes.
5) Check the facepiece to ensure that the lens is not scratched or clouded to prevent proper vision during wearing.
6) Check straps of the harness to ensure they are not cracked or rotted.
7) Turn on airflow and check to ensure that the bottle is full and that air is flowing.
8) Turn off air and verify that low air alarm is operational.

Earth Tech
Qualitative Respirator Fit Test

Name: _____ Employee ID#: _____

Company: Earth Tech Home Office: _____

Tester Inspection of Respirator: _____Passed _____Failed Comments: _____

_____

Method: Irritant Smoke_____ Other _____

Sensitivity Check Before Donning Respirator: _____Passed _____Failed

Respirator: Manufacturer_____ Size _____
Model _____ HEPA Cartridge/P-100_____

Facepiece: Rubber_____ Synthetic_____

Is Respirator Comfortable? _____Yes _____No If No, Explain:_____

_____

Does employee wear glasses or contacts? _____

Have inserts been provided? _____ Are inserts worn during this test? _____

Face Seal Checks:

Visual _____ Negative Pressure _____ Positive Pressure _____

Fit Test Procedure (perform each for 1 minute):

Gross Leak Check	_____	Nod Head	_____
Breathe Normally	_____	Repeat Passage	_____
Breathe Deeply	_____	Bend Over	_____
Turn Head	_____	Breathe Normally	_____

Sensitivity Check After Doffing Respirator _____Passed _____Failed

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

Test Given By: _____ Date: _____

EARTH TECH

ENV 207 HAZARD COMMUNICATION PROGRAM	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 3

SUMMARY: All employees of Earth Tech and all outside contractors working for Earth Tech will be provided with information on the hazards associated with the use of chemical products in their workplace.

1.0 GENERAL REQUIREMENTS

Any use of a hazardous commodity (any material or product containing a hazardous chemical, excluding site environmental contaminants) will be subject to the requirements of this Hazard Communication (HAZCOM) Program. The HAZCOM Program addresses:

- Requirements for identifying and labeling hazardous commodities.
- Requirements for maintaining safety and health documentation for hazardous commodities.
- Requirements for procurement of hazardous commodities.
- Requirements for worker training in the use of hazardous commodities.
- Requirements for subcontractor organizations on Earth Tech worksites.

2.0 HAZARDOUS COMMODITY IDENTIFICATION AND LABELING

2.1 CONTAINER LABELING

Each container holding a hazardous commodity will be labeled, tagged, or marked with the following information:

1. Identity of the hazardous substance(s) contained therein; and
2. Appropriate hazard warnings - using an NFPA-type label (see below).

Labels on incoming purchased chemicals are not to be removed or defaced. Any container received without proper labeling cannot enter the site until properly labeled. Container size is not the determining factor in deciding if a label is required, ALL containers of hazardous chemicals must be labeled.

If a hazardous commodity is transferred from its original container, the receiving container must be labeled with the chemical identity and hazard warning. The only exception to this requirement involves the transfer of the commodity from a labeled container for immediate use; the term "immediate use" is intended to mean that the hazardous chemical will be exclusively under the control of and used by the person performing the transfer, and work will be completed within the current work shift. For such cases the "immediate use" container does not need to be labeled.

2.1.1 NFPA Labeling System

The National Fire Protection Association has developed a four-part, color-coded label for use with hazardous commodities. NFPA-compliant labels can be either a four-section diamond shape or a four-line label, to address the following conditions:

BLUE Section	~~~	Health Hazard Rating
RED Section	~~~	Fire Hazard Rating
YELLOW Section	~~~	Reactivity Hazard Rating
WHITE Section	~~~	Other specific hazards

Each of the three "rating" sections incorporates a numerical system for identification of the degree of hazard as follows:

0 - Minimal hazard

1 - Slight hazard

2 - Moderate hazard

3 - Serious hazard

4 - Severe hazard

2.2 PIPE/VESSEL LABELING

For treatment systems all pipes or piping systems, and all process vessels containing hazardous commodities, must be labeled. The Project Manager (PM) or Response Manager (RM) is responsible for ensuring that this is accomplished at each project site.

3.0 HAZARDOUS COMMODITIES DOCUMENTATION

Earth Tech does not manufacture, package or distribute hazardous commodities. However, as an end user Earth Tech must maintain hazard documentation for each hazardous commodity used on each job site. This documentation will take the form of a listing of all on-site hazardous commodities, and copies of manufacturer-developed Materials Safety Data Sheets (MSDSs) for each listed item.

A MSDS shall be available for every hazardous commodity used or stored on each job site (this does not include MSDSs for known or suspected environmental contaminants, the hazards of which are addressed on project-specific EH&S documentation). Copies of all MSDSs will be maintained on-site in either a dedicated folder/binder, or as part of the project-specific EH&S documentation. All site personnel will be briefed as to the location of the MSDSs, and will have immediate access to examine any MSDS at any time during their work shift.

For on-going projects, each MSDS associated with a material no longer in use will be marked as obsolete and the date it was obsolete. At the completion of any project the accumulated MSDSs will be maintained as part of the project records. NO MSDS ASSOCIATED WITH ANY PROJECT WILL BE DESTROYED.

4.0 PROCUREMENT OF HAZARDOUS COMMODITIES

No hazardous commodity may be purchased for use on an Earth Tech-managed job site unless it:

- Is accompanied by a copy of the item's MSDS (unless already on file on the job site)
- Is packaged with proper hazardous commodity hazard warning labels affixed to each container.

All hazardous chemicals, even those purchased at local stores, must be accompanied with a MSDS. If a vendor cannot provide a MSDS at the time of procurement, the material should not be purchased.

5.0 WORKER HAZCOM TRAINING

All new personnel will be provided with information and training on the hazardous commodities in their work area at the time of their initial assignment. The information and training will include the following topics:

1. Requirements of the Federal OSHA regulation (29 CRF 1910.1200), and any applicable state or local regulations.
2. Operations at the work area where hazardous commodities are present.
3. The location and availability of this written HAZCOM Program document, the on-site list of hazardous commodities, and all MSDSs.
4. Methods to detect the presence or release of a hazardous substance in the work area (such as monitoring conducted by the employer, continuous monitoring devices, visual appearance or odor of hazardous substances when being released, etc.).

5. The physical and health hazards of the substances in the work area, and the measures which can be taken to protect against these hazards.

Training will be provided at the start of each project, upon arrival of a new employee, and on an annual basis for all long-term projects. Supplemental training will be performed for all personnel whenever a new hazardous commodity is introduced into the work area.

6.0 SUBCONTRACTOR ORGANIZATIONS

Personnel associated with Earth Tech subcontractor organizations on any job site shall be provided the same training and access to hazardous commodity information as Earth Tech personnel. Any subcontractor organization wishing to bring any hazardous commodity onto an Earth Tech-controlled work site must:

- Provide a copy of the item's Material Safety Data Sheet (MSDS) to Earth Tech for approval and filing.
- Ensure that all hazardous commodities containers conform to Earth tech's requirements for product hazard labeling.

REFERENCES: ENV 103 – *Purchasing Activities*
ENV 104 – *Subcontractor Selection*

ENV 208

INJURY AND ILLNESS PREVENTION PROGRAM

Published:	January 20, 2003
Revised:	N/A
Page:	1 of 3

SUMMARY: Accidents are caused by either unsafe acts or unsafe conditions, and are therefore preventable. All Earth Tech supervisors, managers and employees shall ensure that unsafe acts are prevented through compliance with all EH&S requirements, and that work is not performed when unsafe conditions exist.

1.0 GENERAL REQUIREMENTS

Earth Tech will implement a formal Injury and Illness Prevention Program (IIPP) for all environmental practice operations. The IIPP is intended to:

1. Promote safe and healthful working conditions where the potential for unsafe conditions or practices may exist.
2. Identify, evaluate and control sources of workplace injuries and illnesses.
3. Ensure that all employees are trained in the proper procedures for preventing occupational injuries and illnesses.
4. Control losses and liabilities incurred through damage to equipment or injury to personnel, and comply with regulatory agency requirements.

2.0 INJURY AND ILLNESS PREVENTION

2.1 IDENTIFICATION OF HAZARDS

The on-going identification of potential hazards is critical to the prevention of workplace accidents. The following are examples of potential hazards to consider during the planning and performance of field work activities:

- Chemical hazards present and the potential for causing injury or illness through inhalation, ingestion and skin/eye contact
- Hazards associated with excavations/trenching
- Confined space entry
- Equipment to be used on site, including vehicles, hand tools, and power tools
- Elevated work
- Noise, heat/cold stress
- Trips, slips, falls
- Material lifting
- Animals, insects, reptiles
- Interaction with the public (e.g., traffic safety)
- Environmental/work site conditions (e.g., weather, surface water)
- Burns
- Biohazards

2.2 HAZARD MITIGATION

After defining the potential hazards, proper budgeting and scheduling for hazard mitigation will be accomplished. Hazard mitigation techniques to be considered include:

- Material substitution
- Process selection
- Use of engineering controls, such as ventilation, isolation

- Administrative controls, when allowed by this Plan, which include assignment of work/rest rotations
- Use of PPE
- Use of air monitoring
- Erection of scaffolding, guard rails
- Medical surveillance
- Training of personnel
- Immunizations

2.3 PERSONNEL TRAINING

Prior to performance of field work, each Earth Tech field supervisor shall ensure that assigned personnel have the proper qualifications and training to perform the assigned tasks safely. This training includes not only trade-specific training (e.g., welding), but also incorporates the qualifications required by regulations (e.g., respirator training and fit testing), and additional training needed such as use and care of PPE, requirements for tasks such as confined space entry or hazardous waste operations, and the hazards of the tasks and materials being used.

2.4 WORK SITE INSPECTIONS

All personnel are responsible for inspection of their work site(s) to identify potential hazards. These identified hazards will then be corrected using appropriate hazard mitigation methods as determined by the EH&S Department. Under no circumstances will work be performed under unsafe conditions.

2.5 SIGNS/POSTINGS/BARRICADES

Areas where hazards have been identified shall be posted when unprotected personnel could enter. Examples of such warning signs include those bearing labels such as "Hard Hat Area" and "No Smoking." Barricades are also to be used to protect personnel, as in re-routing vehicle or foot traffic. When barricades are used, they shall only be used together with the appropriate hazard warning signs, barriers will not be erected without warning regarding the associated hazard.

2.6 COMPLIANCE WITH EH&S POLICIES

All employees shall comply with applicable Earth Tech EH&S requirements. Personnel who violate established requirements shall be disciplined in accordance with Earth Tech policy.

3.0 GENERAL SAFE WORK PRACTICES

The following safe work practices will be implemented during all Earth Tech environmental practice operations:

Except where exempted by the EH&S Department, all work will be performed using a "two-man" or buddy-system" policy.

- Any employee may stop work at any time if they identify any condition which they feel is unsafe. The field supervisor should be notified to corrected the situation as quickly as possible so that work can be resumed.
- At a minimum, all personnel performing field work will utilize safety-toed boots, safety glasses and hardhat. Additional protective equipment requirements, as specified in the project-specific EH&S planning document, must also be observed at all times.
- The use of sleeveless shirts, tank tops, shorts, or cut-off pants are prohibited.
- No field work will be performed unless addressed in an EH&S Department-approved Health and Safety Plan (HASP) or similar project-specific EH&S planning document.
- Good housekeeping practices will be observed in workplaces at all times.

- At least one person trained and certified in the performance of first aid and cardio-pulmonary resuscitation will be present on every job site.
- Defective or damaged tools or equipment will be placed out of service and WILL NOT BE USED unless properly repaired.
- Personnel using over-the-counter or Doctor-prescribed medication which may impair their performance or judgment must alert their supervisor immediately.
- All use of alcohol or illegal substances on site is prohibited. No person will work on an Earth Tech site while under the influence of alcohol or illegal substances.
- Firearms are prohibited on all Earth Tech job sites without exception.
- Only qualified electricians are permitted to perform any work on electrical systems in excess of 50 volts, unless systems are verified to be fully de-energized using appropriate lock-out procedures.
- All work areas will be lighted to a minimum intensity of 10 foot-candles.
- Field supervisors should perform safety inspections of their work areas on at least a daily basis, and should ensure that any problems identified are corrected immediately.

REFERENCES: ENV 201 – *General Field Operations Requirements*

ENV 209

ENVIRONMENTAL TRAINING REQUIREMENTS

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Page:	1 of 3

SUMMARY: Prior to starting work in either the office or the field, employees will receive an employee orientation about health and safety hazard awareness. Additional training will be provided to ensure personnel are knowledgeable of potential hazards prior to performing specific work activities. The training programs will be updated and/or revised based on company policy and federal/state/local regulations.

1.0 GENERAL REQUIREMENTS

Earth Tech will implement a training program for all employees to provide information on health, safety, and environmental hazards. Once introduced to identifying and controlling hazards, the employees will be held accountable to work in a safe manner.

2.0 SPECIFIC TRAINING REQUIREMENTS

The table provided in this procedure specifies the minimum training requirements for employees based on the tasks associated with the work they will perform. Additional training may be recommended by the EH&S Manager and/or outlined in the applicable Earth Tech EH&S manual. Environmental, Health and Safety Administrators (EHSA) will manage all required training scheduling and recordkeeping functions in accordance with ENV 003.

Task	Minimum Training Requirements and Sources
Office Safety	• Corporate Procedures EHS 111 and 202 • Safety Alert • EH&S Intranet page on "Ergonomics" • ENV 501
Activities requiring workers to wear personal protective equipment (PPE)	• ENV 204, 205, 206, and 29 CFR 1910.95 • 29 CFR Subpart I – PPE 1910.132-.138 • Referenced ANSI standards
Activities involving potential contact with chemicals	• ENV 207 • 29 CFR 1910.1200
HAZWOPER Operations	• ENV 301 • 29 CFR 1910.120 • Three days of field experience under a trained supervisor
Asbestos Activities	• ENV 302 • 29 CFR 1926.1101 • 29 CFR 1910.1001
Lead Activities	• ENV 303 • 29 CFR 1926.62 • 29 CFR 1910.1025
Radiological Support	• ENV 304 • Corporate Procedures EHS 500-503 • Project-specific Radiation Worker/Supervisor Training

Construction Support	• ENV 305 • Earth Tech Construction EH&S Manual • ClickSafety training classes (construction)
Ladder Use	• ENV 502 • ANSI A14.1-14.2 • 29 CFR 1910.27
Scaffolding	• ENV 503 • Construction EH&S Manual • 29 CFR 1910.28 • 29 CFR 1926.29
Powered Hand Tools	• ENV 504 • 29 CFR 1910.241, .242, .243, and .246
Manual Hand Tools	• ENV 505 • Safety Alert
Electrical Work	• ENV 506 and 518 • 29 CFR 1910 – Subject Index under "Electric"
Drum Handling and Sampling	• ENV 507 and 508 • HAZWOPER training under 29 CFR 1910.120 • Three days of field experience under a trained supervisor • 29 CFR 1910.1200 • U.S. Department of Transportation (DOT) drum specifications
Tank and Large Container Sampling and Cleaning (including unknowns)	• ENV 509, 510, 511, and 513 • 29 CFR 1910.146 – Permit-Required Confined Space Entry
Confined Space Entry	• ENV 511 • 29 CFR 1910.146
Tank Removal/Demolition	• ENV 514 • Construction EH&S Manual
Excavation	• ENV 515 • 29 CFR 1926.650 though 652
Cranes and Lifting Devices	• ENV 305 and 516 • 29 CFR 1926, Subpart N • 29 CFR 1910.180 • Construction EH&S Manual
Welding, Torch Cutting, and Hot Work	• ENV 517 • 29 CFR 1910.252

Lock-Out/Tag-Out	• ENV 518 • 29 CFR 1910.147
Forklift Operations	• ENV 519 • 29 CFR 1910.178
Heavy Earth-Working Equipment	• ENV 520 • 29 CFR 1926.602 • Safety Alerts
Drilling Operations	• ENV 521 • Construction Manual
Manlifts	• ENV 523 • ANSI 92 • Construction EH&S Manual • 29 CFR 1910.68
Powder-Actuated Tools	• ENV 527 • ANSI A10.3
Machine Guarding Required	• ENV 531 • 29 CFR 1910.211-.222
Woodworking Machinery	• ENV 534 • 29 CFR 1910.213 and .243
Decontamination Activities (Personnel and Equipment)	• ENV 535 • ENV 301 • 29 CFR 1910.120

3.0 NON-DOMESTIC/INTERNATIONAL OPERATIONS

Health and Safety contacts for non-domestic and International Operations will coordinate with Corporate EH&S to provide appropriate training programs for their employees.

ENV 301 HAZARDOUS WASTE OPERATIONS	Published: January 20, 2003
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	Page: 1 of 7

SUMMARY: All hazardous waste operations (HAZWOPER) work performed or managed by Earth Tech will be performed in accordance with the following requirements, which are intended to ensure compliance with 29 CFR 1910.120 (and equivalent state regulations).

1.0 PERSONNEL QUALIFICATIONS

All personnel working at HAZWOPER sites must meet the training and medical monitoring requirements specified in 29 CFR 1910.120 (e) and (f). Also, additional training will be required based on site activities (e.g., confined space, lead in construction, OSHA 10-hour construction). These additional training requirements will be outlined in the project- or site-specific health and safety plan.

1.1 EARTH TECH PERSONNEL

Earth Tech's HAZWOPER-qualified employees will participate in the following training and medical monitoring procedures.

1.1.1 Medical Monitoring

Specific HAZWOPER medical examination protocols have been developed by Earth Tech's Corporate Medical Provider (CMP) to meet the requirements of 29 CFR 1910.120 (f). To be medically qualified to perform HAZWOPER work personnel receive the following medical examinations:

- Initial (Baseline) Examination - The initial examination is a part of pre-employment requirements, and must be completed (with results received) prior to the employee's start of work date.
- Annual Examination - HAZWOPER-qualified employees will complete a medical examination once each year[1].
- Termination Examination - At the conclusion of employment at Earth Tech, or when re-assigned to non-HAZWOPER duties, personnel will be provided with the opportunity to receive a termination medical examination.
- Special Examinations - The EH&S Department and the CMP will jointly determine the need for special examinations due to:
  - Unusual exposure conditions.
  - In response to possible overexposures.

The CMP will determine the medical protocol elements for each of these examinations based on exposure information provided by the EH&S Department. The CMP will evaluate the results of each employee's examination, and will provide a medical clearance clearly stating medical compliance with the HAZWOPER regulatory standard (29 CFR 1910.120 (f)), and approval of the employee to perform unrestricted HAZWOPER activities. For Initial and Annual examinations the CMP will also evaluate the employee for the use of air purifying and supplied air respiratory protection, and the written evaluation from these examinations will indicate the physician's approval/limitations on the employee's sue of respiratory protection.

1.1.2 Training

All personnel assigned to work at a hazardous waste site must participate in training meeting the requirements of 29 CFR 1910.120 (e).

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[1] Medical qualification expires on the anniversary date of the last examination completed, and there will be no "grace period" exemptions beyond this date without the express approval of an EH&S Manager. At the recommendation of the EH&S Department, the CMP may approve an alternate examination frequency, at periods of up to two years, in cases where the worker's exposures to environmental contaminants are infrequent and typically well below any occupational exposure limits (e.g., senior management personnel).

1. Initial 40-Hour Training - Before being assigned to a HAZWOPER site all Earth Tech personnel must complete 40 hours of training meeting the requirements of 29 CFR 1910.120 (e)(3)(i). At the conclusion of training personnel will receive a written certification of course completion, signed by the instructor, which indicates the course of instruction (40-hour HAZWOPER) and training dates. A copy of this certification must be provided to the employee's HSA. The employee is responsible for maintaining their own copy of this certificate, and bringing it when working on any HAZWOPER site.

   Available Training Sources:
   - On-site training provided by the EH&S Department
   - Outsourced training providers approved by the EH&S Department

2. Refresher 8-Hour Training - To remain qualified to perform on-site work activities each Earth Tech employee will complete 8-hours of HAZWOPER refresher training meeting the requirements of 29 CFR 1910.120 (e)(8) at yearly intervals[2] following completion of Initial 40-hour training. At the conclusion of training personnel will receive a written certification of course completion, signed by the instructor, which indicates the course of instruction (8-hour HAZWOPER Refresher) and the training date. A copy of this certification must be provided to the employee's Health and Safety Administrator (HSA). The employee is responsible for maintaining their own copy of this certificate, and bringing it when working on any HAZWOPER site.

   Available Training Sources:
   - Internet-based training approved by the EH&S Department
   - On-site training provided by the EH&S Department
   - Outsourced training providers approved by the EH&S Department
   - Earth Tech's Take-home Refresher Training course (with EH&S Manager approval only)

3. Supervisor Training - Any Earth Tech employee acting in a management capacity for HAZWOPER activities (e.g., project management personnel, field managers, site safety officers, etc.) must complete 8 hours of HAZWOPER Supervisor training meeting the requirements of 29 CFR 1910.120 (e)(4). This training is required only once, no supervisor refresher training is specified (however supervisors must still maintain their overall HAZWOPER-qualification through annual completion of Refresher training). At the conclusion of training personnel will receive a written certification of course completion, signed by the instructor, which indicates the course of instruction (HAZWOPER Supervisor) and the training date. A copy of this certification must be provided to the employee's HSA. The employee is responsible for maintaining their own copy of this certificate, and bringing it when working on any HAZWOPER site.

   Available Training Sources:
   - On-site training provided by the EH&S Department
   - Outsourced training providers approved by the EH&S Department

4. 24-Hour HAZWOPER Training - Some site support contractors and site visitors may qualify to substitute 24-hour HAZWOPER training in place of 40-hour training, as specified in 29 CFR 1910.120 (e)(3)(ii). Personnel potentially qualifying for this alternative training include:
   - Site support personnel who will not work in any Exclusion Zone areas.
   - Subcontractors and site visitors who's duties will not entail significant exposure to site contaminants[3].

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[2] Training expires on the anniversary date of the last class completed. The worker's HAZWOPER-qualification expires at this time, and there will be no "grace period" exemptions beyond this date without the express approval of an EH&S Manager.

[3] Defined as not working in any areas where airborne contaminant concentrations exceed one-half of any applicable occupational exposure limit, and no contact or exposure to materials with site contaminant concentrations exceeding natural background levels.

An EH&S Manager must approve of the substitution of 24-hour training for Initial 40-hour training. Persons qualifying for 24-hour training must provide written certification of course completion prior to beginning work on site. Persons completing 24-hour training must complete 8 hours of annual refresher training at the required interval to maintain eligibility for on-site work, and must provide proof of this training (as necessary to demonstrate re-training) prior to beginning work on site.

1.2 SUBCONTRACTOR PERSONNEL

Any subcontractor organization whose employees will support Earth Tech operations at a HAZWOPER site will:

- Provide the Earth Tech Project Manager with a copy of their written HAZWOPER medical monitoring and training program requirements. The elements of the program must be similar to those for Earth Tech's own program, as detailed above.
- Provide the Project Manager with written certification of a physician's approved medical clearance for each employee who will work on the site. Certification can be demonstrated by:
  - A copy of the physician's signed medical clearance for each employee (preferred), or
  - A letter identifying the medical status and clearance expiration date of every employee, signed by the company's safety director or an officer of the company.
- A copy of the each employee's training certifications, which <u>must</u> include:
  - The Initial 40-hour training certificate (24-hour training may be substituted with EH&S Department approval).
  - The most current Refresher training certificate (must be current within the previous 1-year period).
  - A copy of the Supervisor training certificate for each person serving in a management capacity (e.g., foreman personnel).

2.0 PROJECT EH&S DOCUMENTATION – HEALTH AND SAFETY PLANS

The project EH&S documentation prepared for HAZWOPER activities is referred to as a Health and Safety Plan (HASP), and must meet the requirements presented in 29 CFR 1910.120 (b)(4). The required plan elements include:

1. A description of the work location, the site history, and a summary of any information available concerning site hazards (including both physical hazards and contamination conditions).
2. A summary of the work activities to be performed under Earth Tech's scope of activities.
3. A safety and health risk or hazard analysis for each on-site task which will be performed. Identified risks must include both chemical and physical hazards to which personnel may be exposed during the conduct of the work task.
4. Protective measures for each work task to prevent or mitigate the potential hazards identified in the hazard analyses.
5. Personal protective equipment (PPE) requirements for each work task.
6. Frequency and types of air monitoring, personal monitoring, and environmental sampling techniques and instrumentation to be used.
7. Site control measures.
8. Decontamination procedures.
9. An emergency response plan addressing actions to be taken in the event of each type of credible incident which might result during the performance of planned work activities, including minor and major injuries,

and chemical release and fire. Response plans must address the means for coordinating the evacuation of all on-site personnel in the event of a catastrophic incident.

Responsibility for development of each HASP will be coordinated between the Project Manager and the EH&S Department as part of project initiation. Regardless of where the HASP is developed, it will be reviewed and approved by the EH&S Department prior to submission to any agency outside of Earth Tech.

3.0 HAZWOPER PROTECTIVE EQUIPMENT ENSEMBLES

Defined HAZWOPER PPE ensembles are specified for general use on all HAZWOPER operations. The project HASP may specify modifications to these requirements to meet specific on-site conditions.

3.1 LEVEL D ENSEMBLE

The Level D ensemble provides a minimal level of skin protection (primarily against physical rather than chemical hazards) and no respiratory protection. Level D PPE is the minimum work uniform which will be used on HAZWOPER sites. Its use is appropriate when there is no significant potential for encountering chemical materials while working in controlled work areas.

Level D Equipment List

- Hard hat
- Eye protection
- Safety-toe work boots
- Hearing protection (as required).

3.2 MODIFIED LEVEL D ENSEMBLE

The Modified Level D ensemble provides moderate skin protection against chemical contact, but no respiratory protection. It's use is appropriate where there is a moderate to low potential for skin contact with chemical materials, but no significant inhalation hazard is expected. The Modified Level D ensemble will consist of the Level D ensemble, supplemented by the addition of one or more of the following items:

- Chemical-resistant disposable outer coveralls
- Chemical-resistant outer gloves (taped to outer coveralls)[4]
- Chemical-resistant inner gloves[4]
- Chemical-resistant safety-toe boots (taped to outer coveralls)

3.3 LEVEL C ENSEMBLE

The Level C ensemble provides moderate skin protection against chemical contact and moderate respiratory protection. It's use is appropriate where there is the potential for skin contact with chemical materials, together with a limited and well defined potential for exposure via inhalation.

[4] Selection of specific glove types/materials will be provided in the project HASP based consideration of the contaminants and the physical conditions of the work.

Level C Equipment List

- Full-face air-purifying respirator equipped with HASP-designated cartridges[5]
- Chemical-resistant disposable outer coveralls
- Chemical-resistant outer glove (taped to outer coveralls)[4]
- Chemical-resistant inner gloves[4]
- Hard hat
- Safety-toe boots (taped to coveralls) the use of boot covers or chemical-resistant boot may be specified
- Hearing protection (as required).

3.4 LEVEL B ENSEMBLE

The Level B ensemble provides both the highest level of inhalation exposure protection, and considerable skin contact protection. It's use is appropriate where there are significant chemical hazards involving both skin and inhalation exposure (up to and including IDLH conditions), or where adverse atmospheric conditions cannot be mitigated by use of air purifying respirators (e.g., oxygen deficient atmospheres, chemicals with poor warning properties).

Level B Equipment List

- Supplied air respirator (either SCBA or air line system w/Grade D or better breathing air)
- Chemical-resistant disposable outer coveralls
- Chemical-resistant outer glove (taped to outer coveralls)[4]
- Chemical-resistant inner gloves[4]
- Hard hat
- Chemical resistant safety-toe boots (taped to coveralls)
- Hearing protection (as required).

3.5 LEVEL A ENSEMBLE

The Level A ensemble provides the highest level of both respiratory and skin protection, up to and including protection against skin contact with vapor-phase contaminants. The use of Level A PPE requires approval from the GWES EH&S Director.

Specific Level A ensemble components will be determined on a case-by-case basis by the EH&S Department.

4.0 EXPOSURE MONITORING

Air monitoring at HAZWOPER sites will be conducted to monitor and control employee exposures to chemical contaminants, and to regulate controlled work area boundaries for the protection of non-HAZWOPER workers and the general public.

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[5] Selection of specific cartridges will be made by the EH&S Department based on contaminants present. A cartridge change-out frequency will also be specified in the HASP based on manufacturer's cartridge performance data.

4.1 DIRECT READING AIR MONITORING REQUIREMENTS

Airborne contaminants present potential hazards to HAZWOPER personnel working within controlled work areas, and to non-HAZWOPER workers and the general public present outside the controlled areas. On site monitoring will be utilized to asses the magnitude of these hazards, and provide indications of any necessary control procedures to mitigate unacceptable hazards.

Specific air monitoring requirements will be established in individual Health and Safety Plans (HASPs) subject to the following requirements:

- Direct reading instrumentation will be used when available. Instruments include:
  - Flame Ionization Detectors (FIDs – e.g., OVA) – select organic vapors
  - Photoionization detectors (PID – e.g., miniRAE or Micro-TIP) – select organic vapors
  - Explosimeters – explosivity (as a percent of the Lower Explosive Limit)
  - Oxygen monitors – oxygen concentration (in percent)
  - Single gas meters (mono-tox) – selected contaminants (in parts per million)
    - Hydrogen sulfide
    - Carbon monoxide
    - Oxides of Nitrogen
    - Cyanide
  - Colorimeteric Detector Tubes (e.g., Draegar) – selected contaminants (in parts per million)
  - Aerosol monitors (e.g., mini-RAM) – airborne particulate concentration (in milligrams per cubic meter)
  - Portable gas chromatographs (e.g., OVA) – selected organic vapors

Selected instruments will be capable of discriminating contaminant concentrations to concentrations of at least one-half of the HASP-specified exposure limit. All direct reading instrumentation will be calibrated daily as directed by the manufacturer.

4.1.1 Work Area Monitoring

1. Work area monitoring will include breathing zone readings for the maximally exposed worker(s).
2. Results will be used to determine adequacy of PPE (especially respiratory protection). Specific criteria for upgrade/downgrade will be established in the HASP.

4.1.2 Perimeter Air Monitoring

1. Perimeter air samples will be collected when the potential exists for airborne contaminants to migrate off-site.
2. Perimeter monitoring will be conducted at locations downwind from the project activities at a minimum.
3. Results will be used to determine if the existing controlled work area boundaries are adequate, and/or if work operations present unwarranted hazards to off-site personnel.

4.2 PERSONAL EXPOSURE MONITORING

Personal exposure monitoring will be conducted to determine individual exposures, as specified in the HASP or directed by the EH&S Department.

- Sample results will be recorded in a log book or on the sample log form provided in Attachment 2.
- Records will indicate individual name, SSN, and job/operation at the time of sample collection.

- Samples sent out for independent laboratory analysis will follow chain of custody requirements.
- Exposure results will be posted on site and explained in a safety briefing.
- Employees will receive a written statement of results within 5 days of receipt from the laboratory.

Results of all personal exposure monitoring will be provided to the EH&S Department for inclusion in the employee medical records.

REFERENCES: ENV 003 – *EH&S Administrative Support*
ENV 203 – *Medical Monitoring Program*

ATTACHMENT: Attachment 1 – *Direct Reading Instrument Monitoring Log*
Attachment 2 - *Personal Sampling Data Sheet*
Attachment 3 - *Instrument Calibration Log*

DIRECT READING INSTRUMENT MONITORING LOG

Project: _____ Job No.: _____

Date: _____ Operator: _____

Instrument: _____ Calibration: _____
(Amt, Component. Date)

Sampling Technique: _____

_____

Sample Interval: _____

Background Reading: _____

Action Level/Response: _____

Time	Location	Reading (units)	Detection Limits (Scale)

EARTH TECH
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Earth Tech
Instrument Calibration Log

Instrument Information	
Instrument Name:	Manufacturer:
Serial Number:	Last Service Date:
Parameter(s):	Calibration Gas:
Calibration Procedure:	

Daily Calibration Results

Date: _____ Calibration Result: _____
Name: _____ Signature: _____
Notes:

Date: _____ Calibration Result: _____
Name: _____ Signature: _____
Notes:

Date: _____ Calibration Result: _____
Name: _____ Signature: _____
Notes:

Date: _____ Calibration Result: _____
Name: _____ Signature: _____
Notes:

Date: _____ Calibration Result: _____
Name: _____ Signature: _____
Notes:

Date: _____ Calibration Result: _____
Name: _____ Signature: _____
Notes:

Date: _____ Calibration Result: _____
Name: _____ Signature: _____
Notes:

PERSONAL SAMPLING DATA SHEET

Client: _____ Material: _____

Site Location: _____ Job No.: _____ Sampling Media: _____

Item No.	Name of Earth Tech Personnel	SS Number	Sample Number	Date	Start Time	Stop Time	Total Time	Air Flow Vm		Total Air Flow (l)	Sampler's Initials	Amount (mg)	Conc. ppm, mg/m^3	Remarks
								Pre	Post					

ENV 401 PROTECTION FROM SOLVENTS	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 1

SUMMARY: The guidelines presented below provide for worker protection from the adverse effects associated with the use of solvent-containing products and the handling of solvent-contaminated materials.

1.0 GENERAL SOLVENT PROPERTIES

1. All solvents remove protective oils from the skin on contact, increasing the possibility of dermatitis and infection. Some solvents may be absorbed through the skin and produce systemic effects.
2. Repeated skin contact can cause a person to become sensitized to a given solvent.
3. All solvents have varying adverse effects if ingested. Hydrocarbon liquids produce respiratory complications if allowed to enter the lungs.
4. Airborne vapor concentrations for a given solvent are highly difficult to predict in any task because they depend on the method of dispensing, agitation, temperature, air movement, and confinement. In any case, the concentration will be directly proportional to the area of the surface wetted under a given set of conditions.
5. Some solvent vapors may be detected by odor before the occupational exposure limit (OEL) is reached. However, smell is not a reliable method for protection against overexposure since some solvents paralyze the sense of smell while other solvents present no noticeable odor until the OEL has been exceeded.

2.0 GENERAL SAFETY PROCEDURES

1. The amount of solvent stored in work areas must be limited to the amount necessary for daily operation.
2. Solvent containers for bench use shall be of the smallest size practical and shall provide a method of dispensing without pouring (e.g., by wetting cloth, squeeze bottle, or plunger-type safety container).
3. All wiping cloths used for solvents shall be placed in a closed container immediately after use.
4. Disposition of all solvent wastes must be by an environmentally approved method.
5. Spills shall be cleaned up immediately. Clear the area of other persons as necessary.
6. No solvent shall be used in a way that permits skin contact with the liquid. In most instances this means that gloves must be worn.
7. Solvent-contaminated clothing must be removed at once.
8. Any use of a solvent in a poorly ventilated room or enclosed space requires the use of respiratory protection.
9. When using solvents inside a pit or confined area, regardless of quantity, personnel must wear supplied air respiratory protection and treat the activity as a permit-required confined space entry until air monitoring can be used to verify that no hazardous atmosphere exists.
10. Containers of solvents shall be labeled with an appropriate warning label.
11. The following precautions must be observed when opening full drums of solvents or chemicals:
    - When opening full drums, all personnel in the immediate area must wear chemical goggles or a face shield.
    - When removing the bung, the barrel must be in an upright position and a proper bung wrench used. The bung will first be loosened one turn, internal drum pressure allowed to reach atmospheric pressure, and then removed. Never place head or face above a bung when opening.

REFERENCES: ENV 511 – Permit-Required Confined Space Entry

This procedure applies to Earth Tech Environmental Practice operations. Earth Tech's Environmental, Health and Safety (EH&S) Department is solely responsible for its issuance, revision, and maintenance. Any deviation from these requirements requires approval from the GWES EH&S Director or an EH&S Manager.

ENV 402

FLAMMABLE AND COMBUSTIBLE LIQUIDS

Published:	January 20, 2003
Revised:	N/A
Page:	1 of 2

SUMMARY: The requirements below provide general requirements for the safe storage, use and handling of flammable and combustible liquids.

1.0 DEFINITIONS

Class I Flammable - Those having a "flash point" below 100°F.

Class II Combustible Liquids - Those having a "flash point" at or above 100°F, but below 140°F.

Class III Combustible Liquids - Those having a "flash point" above 140°F, but below 200°F.

2.0 GENERAL INFORMATION

It is fundamentally important to handle and store flammable liquids in closed or approved safety containers and avoid exposing the liquid surface to air. Placards required for flammable or combustible liquids are as follows:

- "Flash point" of 20°F or below: "DANGER! EXTREMELY FLAMMABLE."
- "Flash point" from 20°F to 100°F: "WARNING! FLAMMABLE."
- "Flash point" from 100°F to 200°F: "CAUTION! COMBUSTIBLE."

3.0 HANDLING AND DISPENSING

- Storage containers in storage racks are to be stored a minimum of 50 feet from the nearest structure. All containers are to be electrically grounded. Drip trays are to be provided under container spigots.
- When transferring a flammable/combustible liquid an electrical bond (metal-to-metal) is to be established between the two transfer containers prior to transfer. Storage containers are to be equipped with an approved safety faucet and flexible metal hose. A pressure-vacuum relief vent is required for containers of flammable liquids. Metal-to-metal contact may also be established by using a grounding strap.
- Spill containment is required for all solvent dispensing areas. The secondary containment dike will be designed for 110 percent of the maximum stored solvent volume, with the capacity for 24-hour holding time.
- The maximum amount of flammable solvent (used for cleaning purposes) at any workstation is limited to one quart. Variance from this requirement requires the prior approval of an EH&S Manager.
- Maximum use must be made of fireproof metal cabinets to store flammable liquids inside any structure.
- Rags, kimwipes, etc., that are contaminated with flammable liquids are to be placed in a safety container equipped with a fusible link lid.
- All containers of flammable liquids must be properly identified as to contents.
- All manually handled flammable liquids shall be handled in approved safety containers. The exception is pint-sized squirt bottles.
- Where flammable solvents must be used in wash containers, such as for paint sprayer cleaning, the container must be provided with a self-closing or fusible lid.
- Flammable liquid in portable containers in excess of the amount required for one day of use must be stored in approved flammable liquid storage cabinets.

- Flammable storage cabinets will be kept closed, and will be latched each time after use.
- "NO SMOKING" signs are to be posted in areas where flammable liquids are stored, dispensed, or used.
- An adequate supply of fire extinguishers will be located to support each area where flammable or combustible liquids are handled or stored.

Additional information and requirements for handling and storage of specific flammable liquids are detailed in Material Safety Data Sheets, which must be obtained and maintained on site for each solvent material in use.

REFERENCES: None

ENV 501 MANUAL MATERIALS HANDLING	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 6

SUMMARY: Earth Tech personnel will observe the procedures below when performing manual handling in excess of 10 pounds. No person shall lift more than 49 pounds without the use of mechanical aid or assistance from other personnel.

1.0 INTRODUCTION

Manual materials handling (MMH) means moving or handling things by lifting, lowering, pushing, pulling, carrying, holding, or restraining. Improper MMH can result in cuts, pinches, crushing, and serious back, abdomen, arm, and leg muscle and joint injury. Even "light" objects, lifted improperly, can contribute to injury, causing cuts and muscle injuries.

The level of hazard associated with MMH work depends on what is being handled, what the task is, and what the conditions are at the workplace. Specific considerations include:

- Is the load too heavy for the task that you are doing?
- Is the load located too high or low for a safe lift?
- Is the load too big or may have a shape that makes it difficult to handle?
- Is the load wet, slippery, or have sharp edges that make it difficult to grasp?
- Is the load unstable or can shift its center of gravity because contains items that can move or flow (e.g., a partially filled drum or concrete in a wheelbarrow)?
- Is the load too big to let you see where you are putting your feet?

The task can make MMH hazardous if a worker:

- Uses poor lifting techniques (lifting too fast, too often or too long; lifting with back bent or while twisting or reaching too far; lifting while sitting or kneeling, etc.),
- Has to move material over long distances,
- Doers not take appropriate rest breaks; insufficient recovery time, and
- Performs a combination of different handling tasks together (e.g. lifting, carrying and lowering).

The site conditions can also contribute to hazards of MMH if:

- Walking surfaces are uneven, sloping, wet, icy, slippery, unsteady, etc..
- There are differences in floor levels or walking surfaces.
- There is poor housekeeping that causes slip, trip and fall hazards.
- There is inadequate lighting.
- Work is performed at a fast pace.
- Movement is restricted because of clothing or personal protective equipment, or because the space is small or posture is constrained.

2.0 GENERAL REQUIREMENTS

Mechanical equipment or assistance such as dollies, carts, come-alongs, or rollers are to be used whenever possible. Mechanical assistance must be of proper size, have wheels sized for the terrain, and be designed to prevent pinching or undue stress on wrists. Objects to be moved must be secured to prevent falling and properly balanced to prevent tipping.

The following guidance will be observed:

1. Before performing the lift:
    a. Check to see if mechanical aids such as hoists, lift trucks dollies or wheelbarrows are available.

b. Be sure that you can lift the load without over-exertion, and get help with heavy or awkward loads. All loads in excess of 49 pounds require use of mechanical aids or assistance from other personnel.
c. Be sure that the load is "free" to move.
d. Check that the planned location of the load is free of obstacles and debris.
e. Be sure that the path to the planned location of the load is clear. Grease, oil, water, litter and debris can cause slips and falls.
f. Particular handling and lifting techniques are needed for different kinds of loads or materials being handled (for example, compact loads, small bags, large sacks, drums, barrels, cylinders, sheet materials like metal or glass). See Section 2.0 for additional guidance.
g. Do not lift if you are not sure that you can handle the load safely.

2. General tips for lifting:
   a. Prepare for the lift by warming up the muscles.
   b. Stand close to the load and face the way you intend to move.
   c. Use a wide stance to gain balance.
   d. Be sure you have a good grip on the load.
   e. Keep arms straight.
   f. Tighten abdominal muscles.
   g. Tuck chin into the chest.
   h. Initiate the lift with body weight.
   i. Lift the load as close to the body as possible.
   j. Lift smoothly without jerking.
   k. Avoid twisting and side bending while lifting.
3. Engineering Controls:
   a. Material handling tasks should be designed to minimize the weight, range of motion, and frequency of the activity.
   b. Alter the task to eliminate the hazardous motion and/or change the position of the object in relation to the employee's body – such as adjusting the height of a pallet or shelf.
   c. Work methods and stations should be designed to minimize the distance between the person and the object being handled.
   d. High-strength push-pull requirements are undesirable, but pushing is better than pulling. Material handling equipment should be easy to move, with handles that can be easily grasped in an upright posture.
   e. Workbench or workstation configurations can force people to bend over. Corrections should emphasize adjustments necessary for the employee to remain in a relaxed upright stance or fully supported, seated posture. Bending the upper body and spine to reach into a bin or container is highly undesirable. The bins should be elevated, tilted or equipped with collapsible sides to improve access.
   f. Repetitive or sustained twisting, stretching, or leaning to one side are undesirable. Corrections could include repositioning bins and moving employees closer to parts and conveyors.
   g. Store heavy objects at waist level.
4. Whenever possible, utilize hand holds or other lifting attachments on objects being handled:
   a. Use the "hook grip" on loads with cut-out handholds.
   b. Curl your fingers around the edge.

c. Do not hold the load with fingertips.
d. Use containers with handles located more than halfway up the side of the container.
e. Use the "ledge grip" to handle regularly shaped objects without handles.
f. Use vacuum lifters to handle sheet materials or plates.
g. Hold the object with hands placed diagonally.
h. Wear gloves where practical.

5. When significant, sustained lifting work is required it is desirable to rotate employees to spread the work load among several people and avoid fatigue. Rotation is not simply performing a different job, but must be a job that utilizes a completely different muscle group from the ones that have been over-exerted.

3.0 SPECIFIC HANDLING TECHNIQUES

The following guidance will be used when performing MMH for various types of materials.

3.1 SQUARE OR RECTANGULAR OBJECTS

To lift square or rectangular objects:

- Place one foot slightly in front of the other.
- Squat as close to the object as possible.
- Grasp one of the top corners away from the body and the opposite bottom corner closest to the body.
- Tilt the object slightly away from the body, tilt forward at the hips, keep the back straight, and tuck in the chin.
- Test to be sure the object is loose from floor and shall lift without snagging.
- Straighten the legs, keeping the backbone straight, pull the object into the body, and stand up slowly and evenly without jerking or twisting.
- If turning or change of direction is required, turn with feet without twisting the torso and step in the direction to travel.
- To set an object down, reverse the sequence, being sure not to trap the bottom hand between the object and the surface on which the object is set.

3.2 CYLINDRICAL OBJECTS

When lifting/moving round or cylindrical objects, the objects should be rolled wherever possible. Rolling must be controlled by chute, tagline, or other means of limiting acceleration. Workers must not be positioned downhill from rolled objects. Use of the legs for pushing and tagline control of rolled objects must be stressed.

Cylindrical objects, such as drums that must remain upright, are to be handled manually by slightly tilting the object, using the legs for control, and balancing the object on the bottom edge. The handler then walks besides the object, with the object tilted toward the body, positioning the hands on the top edge away from the body and moving so they do not cross, thus, maintaining the balance and a steady controlled forward motion. Motion must be controlled so that stopping walking and moving the hands shall stop forward motion.

Use carts or tracks to transport cylinders. Make sure that two people transport a cylinder if carts cannot be used, use lifting straps to improve grip.

Technique for one person lifting a cylinder onto a platform:

1. Roll the cylinder to within 3 feet of the platform.

2. Position the forward foot around the cylinder, the back foot about 1 foot behind the cylinder.
3. Bend knees slightly.
4. Place one hand on the valve protective cap, the other hand underneath the cylinder about 1 foot from the ground.
5. Tilt the cylinder onto the thigh of the back leg.
6. Balance the cylinder on the thigh by pressing down with the back hand while lifting the cylinder with the forward hand.
7. Extend both knees to initiate and forward movement of the cylinder and continue by pushing up and forward with the arms until the cylinder is located on the platform.
8. Climb on the platform.
9. Straddle the cylinder at the valve end.
10. Grasp the valve protective cap of the cylinder with both hands between the thighs.
11. Lean forward and straighten the knees to set the cylinder upright.

3.3 BAGS AND SACKS

The best way to handle a bag depends on its size, weight and how far it is to be carried. When lifting, remember to:

- Straddle the end of the bag.
- Bend the hips and knees.
- Keep the back straight.
- Grasp the bag with both hands under the closer end. Keep elbows inside the thighs.
- Lean forward, straightening the knees to set the bag upright.
- Readjust the straddle position moving feet closer to the bag.
- Readjust the grasp, with one hand clasping the bag against the body and the other under it.
- Stand up by thrusting off with the back leg and continuing in an upward and forward direction.
- Thrust the bag up with the knee while straightening the body.
- Put the bag on the shoulder opposite the knee used to thrust the bag up.
- Stabilize the bag on the shoulder.
- Move off without bending sideways.

Avoid unloading a bag from the shoulder directly to floor level. Use an intermediate platform or get help from a coworker.

1. Stand close to the platform.
2. Place one foot in front of the platform.
3. Bend hips and knees.
4. Keep the back straight.
5. Ease the bag off the shoulder and put it upright on the platform.
6. Pull the bag slightly over the edge of the platform.
7. Stand close to the platform with the bag touching the chest.
8. Clasp the bag against the body with one hand, the other hand holding bottom of the bag.
9. Step back.
10. Bend hips and knees, keeping back straight.
11. Ease the bag on the floor.

Bulkier sacks are easier to carry on your back. Lift the sack onto your back from a platform:

1. Move the sack to the edge of the platform.
2. Put your back against the sack.
3. Grasp with both hands on the upper corners of the sack.
4. Ease the sack onto the back, bending hips and knees before taking the weight.
5. Keep the back straight.
6. Stand up and straighten the hips and knees.
7. Stabilize the sack.
8. Move away without bending sideways.

Two-person handling of a sack:

1. Position one person on either side of the sack.
2. Squat with one foot balancing behind the sack.
3. Keep back straight.
4. Grasp with the outer and on the upper corner, the other holding the bottom of the sack.
5. On one person's command:
   a. Stand up and straighten the hips and knees.
   b. Move towards the stack.
   c. Put the sack on the stack.

3.4 SHEET MATERIALS

When lifting sheet materials:

1. Stand close to the pile of sheets in a walking stance.
2. Grasp sheet firmly at the mid-point of its long side with the closer hand.
3. Pull sheet up and toward the body.
4. Change grip using your other hand and put your fingers on top of the sheet.
5. Pull sheet up to the vertical position and to the side until one half is off the pile.
6. Grasp the lower edge of the sheet with the free hand and support the hand by placing it on your knee.
7. Stand up without bending and twisting body.

To carry sheets:

- Use drywall carts to carry sheet materials.
- Get help from another person where carts are not available.
- Apply carrying handles for manual carrying.
- Always use gloves and carrying handle for glass and other materials with sharp edges.

Team Handling - Team handling occurs when more than one person is involved during the lift. Use team lifting and carrying where other solutions are inappropriate.

- Remember that the combined strength of the team is less than the sum of individual strength.
- Select team members of similar height and strength.
- Assign a leader to the team.
- Determine a set of commands to be used such as "lift", "walk", "stop", "down". Make sure that everyone knows what to do when they hear the command.
- Follow the commands given by the team leader.

- Practice team lifting and carrying together before attempting the task.

4.0 MATERIALS STORAGE

When storing materials on site

- Store materials at a convenient height.
- Leave the lowest shelf unused if necessary.
- Use vertically mobile shelves to avoid bending and overhead reaching.
- Use bin racks for storing small items.
- Store heavy and frequently used materials at waist height.
- Do not store materials at floor level.
- Use hand trucks with elevating devices in storage and loading areas.
- Use trucks with a tilting device to avoid bending.
- Use elevating platforms to avoid overhead reaching.

REFERENCES: ENV 507 - *Handling of Drums and Large Containers*
ENV 522 – *Working Surfaces*

ENV 502 LADDERS	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 3

SUMMARY: Earth Tech personnel will use portable ladders in a manner consistent with this procedure, ensuring the safety of all employees.

1.0 GENERAL REQUIREMENTS

- A ladder shall be provided at all personnel points of access if there is a break in elevation of 16 inches or more and if a ramp, runway, sloped embankment, stairway or personnel hoist is not provided.
- A ladder shall be inspected before use, and after it has fallen or been involved in an accident.
- A ladder shall be immediately tagged "DANGEROUS-DO NOT USE" and taken out of service if any of the following defects are noted:
  - Broken, worn or missing rungs, cleats or steps
  - Broken or split side rails
  - Broken or bent guides or iron spreaders
  - Broken or bent locks.
- Wood ladders shall be constructed and maintained as prescribed in the ANSI standard A14.1-1990.
- Employees shall face the ladder when ascending and descending. When using a ladder an employee shall maintain thee points of contact with it (each foot on a rung and each hand gripping the ladder count a single point of contact) at all times. An employee shall not carry anything up and down ladders that requires violating this policy, or which could cause him/her to lose his/her balance and fall.
- Ladders shall be placed on a substantial and stable base.
- A ladder shall not be used in a doorway, passageway, driveway or any other location where it can be displaced, unless it is guarded by barricades or secured to prevent displacement.
- Personnel using ladders must:
  - Face the ladder while working;
  - Work only on objects located only within arm's length of the ladder;
  - Utilize fall protection equipment when working (not just ascending/descending) at heights greater than 6 feet above the ground;
  - Use both hands when ascending or descending;
  - Allow no other person on the ladder; and
  - Use a rope to raise or lower materials and tools.
- Only one person shall be present on a ladder at any one time.

2.0 PORTABLE LADDERS

- A portable ladder shall be used such that the pitch of the ladder is not more than ¼ of the vertical distance between the base and the top support.
- A portable ladder with a pitch less than 1/5 of the vertical distance between the base and the top support shall have the top secured to prevent tipping.
- Portable ladders shall be equipped with safety feet, unless the ladder is tied, blocked or otherwise secured. Safety feet are not a substitute for proper securing of the ladder.
- A portable ladder used at a pitch of 80 degrees or more shall meet the requirements of a fixed ladder.

- A portable ladder, when used to access an upper landing surface, shall either:
  - Extend 3 feet beyond the upper landing surface.
  - If it is not feasible to extend 3 feet beyond the upper landing surface, then the top of the ladder shall be secured, and a grab-rail or equivalent shall be provided for employees' use in mounting or dismounting the ladder.
- A manufactured portable metal ladder shall not be used for electrical work, or where an employee may contact electrical conductors. A ladder shall have non-conductive side-rails for work around electrical equipment.
- Metal or wood ladders should be used in a potentially high-solvent environment. Appropriate decontamination methods must then be applied.
- A ladder shall not be used or moved around overhead power lines unless a minimum of 20 feet clearance can be maintained at all times.
- A manufactured portable ladder shall not be used for more than the following lengths:

Single section ladder:	22 feet
Two section extension ladder:	40 feet
Three section extension ladder:	60 feet
Assembled section ladder:	21 feet

- An employee shall not stand on the top 2 rungs or within 3 feet of the top of the ladder.
- Two portable ladders shall not be spliced together.
- Portable extension ladders shall be adjusted only from the ground or floor.
- Employees shall not use the backside of a stepladder for climbing.
- Unless equipped with a handrail, the top step and the cap of a stepladder shall not be used.
- A stepladder shall not be used as a straight ladder by leaning it against a vertical surface.
- Ladders will not be used in the horizontal position as platforms, runways, scaffold, or as guys, braces, skids, or for any use other than the intended purpose.
- Ladders must not be placed on boxes, barrels, or other unstable bases to obtain additional height.
- Only stepladders equipped with metal spreader or locking devices to hold the front and back sections in an open position shall be used. The ladder shall be opened fully and the spreaders locked when in use.
- Wood ladders shall bear a brand to show the manufacturer's name, or an appropriate abbreviation thereof, the last two digits of the year they were made, the ladder grade, and certification of compliance with ANSI standard A14.1.
- Non-wood ladders shall bear a permanent mark or tag to show the manufacturer's name, or an appropriate abbreviation thereof, the last two digits of the year they were made, the ladder grade, and certification of compliance with ANSI standard A14.2.

2.1 LADDER STORAGE

- A ladder shall be stored to provide ease of access and inspection. Ladders stored horizontally shall be supported at a sufficient number of points to prevent sagging.
- A wood ladder shall be stored six or more feet from a radiator, stove or steam pipe. The ladder shall not be subject to excessive heat or dampness during storage.

- A metal ladder shall not be stored where it is subject to reaction with corrosive materials.
- A plastic ladder shall be stored on edge on racks when not in use in a location free of corrosive substances, and away from adverse environmental conditions.

2.2 LADDER MAINTENANCE

- A ladder shall be maintained free of slip hazards, and in good condition.
- A ladder shall not be painted, unless it is with a suitable transparent protective material to retard splintering.
- The side rails and legs of a ladder shall be kept free of splinters. All hardware and fittings shall be maintained securely. The joint between the side rail and step shall remain tight.
- Moveable metal parts shall operate freely without undue play. Lubricate if needed.
- Ladder surfaces shall be maintained free of puncture or laceration hazards and slippery substances such as oil and grease.

2.3 INSPECTION AND REPAIR OR REPLACEMENT

- A portable ladder shall be inspected before its use, and after it has fallen or been involved in an accident, to determine its condition for use.
- A ladder shall be repaired or replaced if it shows:
  - Splits in its side rails through to the opposite surface in excess of 3 inches at the rungs, or 6 inches along the rails.
  - Gouges, dents or other damage, which can be repaired as long as the rail thickness or depth is not reduced by more than 10 percent.
  - Worn, crushed, cracked, split, splintered or missing rungs, steps, tops or platforms.
  - Longitudinal play of ¾ inch in the rails due to looseness of rungs or steps.
  - Broken or bent guide irons, spreaders or locks.
- A ladder with a defect shall be tagged as "Danger-Do Not Use," and either properly repaired or destroyed.

REFERENCES: ENV 522 – *Working Surfaces*

ENV 504 POWERED HAND TOOLS	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 9

SUMMARY: All power-operated hand tools and equipment shall be used, handled and stored in accordance with the following requirements.

1.0 GENERAL REQUIREMENTS

1.1 SELECTION AND USE

1. Select tools that can be used without bending the wrist. Hand tools should allow the operator to grasp, hold, and use the tool with the wrist held straight.
2. Select the tool with the workplace layout and job design in mind. Sometimes a tool is correct for one operation and incorrect for another.
3. Use the right tool for the job. Ensure it is the right size and has sufficient power to do the job safely. When there is a choice, select a tool of a low weight.
4. Select low-vibrating tools, or choose tools with vibration-absorbing handles, like those covered with cork, rubber, plastic or plastic bonded to steel, to reduce hand-arm vibration.
5. Choose hand tools that have the center of gravity within or close to the handle.
6. Select tools with rounded and smooth handles that you can grip easily.
7. If they are available, choose hand tools with double handles to permit easier holding and better manipulation of the tool.
8. Select tools with a trigger strip, rather than a trigger button. This strip will allow you to exert more force over a greater area of the hand that, in turn, will reduce muscle fatigue.
9. Ensure that the trigger works easily to reduce the effort needed to operate it.
10. Ensure that your tool is well maintained and in good repair.
11. Frequently used tools that weigh more than 1 pound should be counter-balanced.
12. Hold the tool close to the body. Do not overreach.
13. Keep good balance and proper footing at all times. This will help operators to control the tool better, especially in response to unexpected situations.
14. Rest your hands by putting the tool down when you are not using it.
15. Reduce power to the lowest setting that can complete the job safely. This action reduces tool vibration at the source.
16. Ensure that cutting tools, drill bits, etc., are kept sharp, clean, and well maintained.
17. Do not wear gloves, loose clothing or jewelry while using revolving power tools. Tie back long hair or wear appropriate hair protection to prevent hair from getting caught in moving parts of equipment.
18. Do not use a tool unless you have been trained to use it safely and know its limitations and hazards.

1.2 STORAGE AND HANDLING

1. All tools shall be stored in a manner to prevent damage and injury. Store tools in a dry, secure location when they are not being used.
2. Tools shall be properly put away after use.

3. Sharp or pointed tools shall be handled only if the sharp/pointed edge is covered, carried in a tool box or other device designed for that purpose, or the sharp/pointed edge is pointed downward, away from the body.

2.0 ELECTRIC TOOLS

2.1 GENERAL REQUIREMENTS

All electrical tools and equipment must be operated in accordance with the requirements of ENV 506, *Electrical Safety*.

2.1.1 Inspection

1. Inspect tools for any damage prior to each use.
2. Ensure that the power tool has the correct guard, shield or other attachment that the manufacturer recommends.
3. Ensure that the tools are properly grounded using a three-prong plug, are double-insulated (and are labeled as such), or are powered by a low-voltage isolation transformer: this will protect users from an electrical shock.
4. Check electric tools to ensure that a tool with a 3-prong plug has an approved 3-wire cord and is grounded. The three-prong plug should be plugged in a properly grounded 3-pole outlet. If an adapter must be used to accommodate a two-hole receptacle, the adapter wire must be attached to a known, functioning ground. Never remove the third, grounding prong from a plug.
5. Check the handle and body casing of the tool for cracks or other damage.
6. If the tool has auxiliary or double handles, check to see that they installed securely.
7. Inspect cords for defects: check the power cord for cracking, fraying, and other signs of wear or faults in the cord insulation.
8. Check for damaged switches and ones with faulty trigger locks.
9. Inspect the plug for cracks and for missing, loose or faulty prongs.
10. If a tool is defective, remove it from service, and tag it clearly "Out of service for repair". Replace damaged equipment immediately - do not use defective tools "temporarily". DO NOT ATTEMPT FIELD REPAIRS.

2.1.2 Battery-Powered Tools

1. Use only the kind of battery that the tool manufacturer specifies for the battery-powered tool that you are using.
2. Recharge a battery-powered tool only with a charger that is specifically intended for the battery in that tool.
3. Remove the battery from the tool or ensure that the tool is switched off or locked off before changing accessories, making adjustments, or storing the tool.
4. Store a battery pack safely so that no metal parts, nails, screws, wrenches and so on can come in contact with the battery terminals; this could result in shorting the battery and possibly cause sparks, fires or burns.

2.1.3 Using Electric Tools

1. Switch off the tools before connecting them to a power supply.

2. If a power cord feels more than comfortably warm or if a tool is sparking excessively, have it checked by an electrician or other qualified person.
3. Disconnect the power supply before making adjustments or changing accessories.
4. Remove any wrenches and adjusting tools before turning on a tool.
5. Inspect the cord for fraying or damage before each use. Tag defective tools clearly with an "Out of service" tag and replace immediately with a tool in good running order.
6. During use, keep power cords clear of tools and the path that the tool will take.
7. Use clamps, a vice or other devices to hold and support the piece being worked on, when practical to do so. This will allow you to use both hands for better control of the tool and will help prevent injuries if a tool jams or binds in a work piece.
8. Use only approved extension cords that have the proper wire size for the length of cord and power requirements of the electric tool that you are using. This will prevent the cord from overheating.
9. For outdoor work, use outdoor extension cords marked "W-A" or "W".
10. Suspend power cords over aisles or work areas to eliminate stumbling or tripping hazards.
11. Eliminate octopus connections: if more than one receptacle plug is needed, use a power bar or power distribution strip that has an integral power cord and a built-in overcurrent protection.
12. Pull the plug, not the cord when unplugging a tool. Pulling the cord causes wear and may adversely affect the wiring to the plug - an electrical shock to the operator may result.
13. Keep power cords away from heat, water, oil, sharp edges and moving parts. They can damage the insulation and cause a shock.
14. Avoid accidental starting by ensuring the tool is turned off before you plug it in. Also do not walk around with a plugged-in tool with your finger touching the switch.
15. Do not bypass the ON/OFF switch and operate the tools by connecting and disconnecting the power cord.
16. Do not disconnect the power supply of the tool by pulling or jerking the cord from the outlet.
17. Do not leave a running tool unattended. Do not leave it until it has been turned off, has stopped running completely, and has been unplugged.
18. Do not use electric tools in wet conditions or damp locations unless tool is connected to a ground fault circuit interrupter (GFCI).
19. Do not expose electric power tools to rain or wet conditions; wet tools increase the likelihood for getting an electric shock.
20. Avoid body contact with grounded surfaces like refrigerators, pipes and radiators when using electric powered tools; this will reduce the likelihood of shock if the operator's body is grounded.
21. Do not plug several power cords into one outlet by using single-to-multiple outlet adapters or converters ("cube taps").
22. Do not use light duty power cords.
23. Do not connect or splice extension cords together to make a longer connection: the resulting extension cord may not be able to provide sufficient current or power safely.
24. Do not carry electrical tools by the power cord.

25. Do not tie power cords in knots. Knots can cause short circuits and shocks. Loop the cords or use a twist lock plug.
26. Never break off the third prong on a plug: replace broken 3-prong plugs and make sure the third prong is properly grounded.
27. Never use extension cords as permanent wiring: use extension cords only as a temporary power supply to an area that does not have a power outlet.
28. Do not walk on or allow vehicles or other moving equipment to pass over unprotected power cords. Cords should be put in conduits or protected by placing planks on each side of them.
29. Do not brush away sawdust, shavings or turnings while the tool is running. Never use compressed air for cleaning surfaces or removing sawdust, metal turnings, etc.
30. Do not operate tools in an area containing explosive vapors or gases.
31. Do not clean tools with flammable or toxic solvents.
32. Do not surprise or touch anyone who is operating a tool. Startling a tool operator could end up causing an accident or injury.

2.2 BELT SANDERS

1. Wear safety glasses.
2. Make sure the sander is switched "OFF" before connecting the power supply.
3. Disconnect power supply before changing a sanding belt, making adjustments, or emptying dust collector.
4. Inspect sanding belts before using them. Replace those belts that are worn or frayed.
5. Install sanding belts that are the same widths as the pulley drum.
6. Adjust sanding belt tension to keep the belt running true and at the same speed as pulley drum.
7. Secure the sanding belt in the direction shown on the belt and the machine.
8. Keep hands away from a sanding belt.
9. Use two hands to operate sanders - one on a trigger switch and the other on a front handle knob.
10. Keep all cords clear of sanding area during use.
11. Clean dust from a motor and vents at regular intervals.
12. Do not use a sander without an exhaust system or a dust collector present that is in good working order. Empty the collector when 1/4 full. The dust created when sanding can be a fire and explosion hazard. Proper ventilation is essential.
13. Do not exert excessive pressure on a moving sander. The weight of the sander supplies adequate pressure for the job.
14. Do not work on unsecured stock unless it is heavy enough to stay in place. Clamp the stock into place or use a "stop block" to prevent movement.
15. Do not overreach. Always keep proper footing and balance.
16. Do not cover the air vents of the sander.

2.3 DRILLS

1. Wear safety glasses.

2. Keep drill air vents clear to maintain adequate ventilation.
3. Keep drill bits sharp always.
4. Keep all cords clear of the cutting area during use. Inspect for frays or damage before each use.
5. Disconnect power supply before changing or adjusting bit or attachments.
6. Tighten the chuck securely. Remove chuck key before starting drill.
7. Secure workpiece being drilled to prevent movement.
8. Slow the rate of feed just before breaking through the surface.
9. Drill a small "pilot" hole before drilling large holes.
10. For small pieces, clamp stock so work will not twist or spin. Do not drill with one hand while holding the material with the other.
11. Do not use a bent drill bit.
12. Do not exceed the manufacturer's recommended maximum drilling capacities.
13. Do not use a hole saw cutter without the pilot drill.
14. Do not use high speed steel (HSS) bits without cooling or using lubrication.
15. Do not attempt to free a jammed bit by starting and stopping the drill. Unplug the drill and then remove the bit from the workpiece.
16. Do not reach under or around stock being drilled.
17. Do not overreach. Always keep proper footing and balance.
18. Do not raise or lower the drill by its power cord.

2.4 PLANERS

1. Wear safety glasses.
2. Disconnect the planer from the power supply before making any adjustments to the cutter head or blades.
3. Use blades of the same weight and set at the same height.
4. Ensure that the blade-locking screws are tight.
5. Remove adjusting keys and wrenches before turning on power.
6. Support the material (stock) in a comfortable position that will allow the job to be done safely and accurately.
7. Check stock thoroughly for staples, nails, screws, or other foreign objects before using a planer.
8. Start a cut with the infeed table (front shoe) resting firmly on the stock and with the cutter head slightly behind the edge of the stock.
9. Use two hands to operate a planer - one hand on the trigger switch and the other on a front handle.
10. Do not put your finger or any object in a deflector to clean out chips while a planer is running.
11. Disconnect the power supply when stopping to dump out chips.
12. Do not set a planer down until blades have stopped turning.
13. Keep all cords clear of cutting area.

2.5 ROUTERS

1. Wear safety glasses.
2. Disconnect the power supply before making any adjustments or changing bits.
3. Ensure that the bit is securely mounted in the chuck and the base is tight.
4. Put the base of the router on the work, template or guide. Make sure that the bit can rotate freely before switching on the motor.
5. Secure stock. Never rely on yourself or a second person to support or hold the material. Sudden torque or kickback from the router can cause damage and injury..
6. Before using a router, check stock thoroughly for staples, nails, screws or other foreign objects.
7. Keep all cords clear of cutting area.
8. Hold both hands on router handles always, until a motor has stopped. Do not set the router down until the exposed router bit has stopped turning.
9. Do not overreach. Keep proper footing and balance.
10. When inside routing, start the motor with the bit above the stock. When the router reaches full power, lower the bit to two times the required depth.
11. When routing outside edges, guide the router counter clockwise around the work.
12. When routing bevels, moldings and other edge work, make sure the router bit is in contact with the stock to the left of a starting point and is pointed in the correct cutting direction.
13. Feed the router bit into the material at a firm, controlled speed.
14. With softwood, you can sometimes move the router as fast as it can go. With hardwood, knotty and twisted wood, or with larger bits, cutting may be very slow.
15. The sound of the motor can indicate safe cutting speeds. When the router is fed into the material too slowly, the motor makes a high-pitched whine. When the router is pushed too hard, the motor makes a low growling noise.
16. When the type of wood or size of the bit requires going slow, make two or more passes to prevent the router from burning out or kicking back.
17. To decide the depth of cut and how many passes to make, test the router on scrap lumber similar to the work.

2.6 CIRCULAR SAWS

1. Wear safety glasses and hearing protection.
2. Check the retracting lower blade guard to make certain it works freely.
3. Ensure that the blade that you have selected is sharp enough to do the job. Sharp blades work better and are safer.
4. Check the saw for proper blade rotation.
5. Set the depth of the blade, while the saw is unplugged, and lock it at a depth so that the lowest tooth does not extend more than about 1/8 inch beneath the wood.
6. Keep all cords clear of cutting area.

7. Circular saws are designed for right-hand operation; left-handed operation will demand more care to operate safely.
8. Check the retracting lower blade guard frequently to make certain it works freely. It should enclose the teeth as completely as possible, and cover the unused portion of the blade when cutting.
9. Check that the retracting lower blade guard has returned to its starting position before laying down the saw.
10. Keep upper and retracting lower blade guard clean and free of sawdust.
11. Disconnect power supply before adjusting or changing the blade.
12. Allow the saw to reach full power before starting to cut.
13. Use two hands to operate saws - one on a trigger switch and the other on a front knob handle.
14. Keep the motor free from accumulation of dust and chips.
15. Select the correct blade for stock being cut and allow it to cut steadily. Do not force it.
16. Secure work being cut to avoid movement.
17. Do not hold or force the retracting lower guard in the open position.
18. Do not place your hand under the shoe or guard of the saw.
19. Do not over-tighten the blade-locking nut.
20. Do not twist the saw to change, cut or check alignment.
21. Do not use a saw that vibrates or appears unsafe in any way.
22. Do not force the saw during cutting.
23. Do not cut materials without first checking for obstructions or other objects such as nails and screws.
24. Do not carry the saw with a finger on the trigger switch.
25. Do not overreach. Keep proper footing and balance.
26. Do not rip stock without using a wedge or guide clamped or nailed to the stock.

2.7 OTHER SAWS

1. Wear safety glasses.
2. Disconnect power supply before changing or adjusting blades.
3. Use lubricants when cutting metals.
4. Keep all cords clear of cutting area.
5. Position the saw beside the material before cutting and avoid entering the cut with a moving blade.
6. Make sure guards, if present, are installed and are working properly.
7. Remember sabre saws cut on the upstroke.
8. Secure and support stock as close as possible to the cutting line to avoid vibration.
9. Keep the base or shoe of the saw in firm contact with the stock being cut.
10. Select the correct blade for the material being cut and allow it to cut steadily. Do not force it. Clean and sharp blades operate best.

11. Set the blade to go no further than 1/8 to 1/4 inch deeper than the material being cut.
12. Do not start cutting until the saw reaches its full power.
13. Do not force a saw along or around a curve. Allow the machine to turn with ease.
14. Do not insert a blade into or withdraw a blade from a cut or lead hole while the blade is moving.
15. Do not put down a saw until the motor has stopped.
16. Do not reach under or around the stock being cut.
17. Maintain control of the saw always. Avoid cutting above shoulder height.
18. External Cuts:
    - Make sure that the blade is not in contact with the material or the saw will stall when the motor starts.
    - Hold the saw firmly down against the material and switch the saw on.
    - Feed the blade slowly into the stock, maintaining an even forward pressure.
19. Internal Cuts:
    - Drill a lead hole slightly larger than the saw blade. With the saw switched off, insert the blade in the hole until the shoe rests firmly on the stock.
    - Do not let the blade touch the stock until the saw has been switched on.

3.0 PNEUMATIC TOOLS

3.1 GENERAL REQUIREMENTS

1. Wear safety glasses.
2. Ensure that the compressed air supplied to the tool is clean and dry. Dust, moisture, and corrosive fumes can damage a tool. An in-line regulator filter and lubricator increases tool life.
3. Keep tools clean and lubricated, and maintain them according to the manufacturers' instructions.
4. Use only the attachments that the manufacturer recommends for the tools you are using.
5. Be careful to prevent hands, feet, or body from injury in case the machine slips or the tool breaks.
6. Reduce physical fatigue by supporting heavy tools with a counter-balance wherever possible.
7. Use the proper hose and fittings of the correct diameter.
8. Use hoses specifically designed to resist abrasion, cutting, crushing and failure from continuous flexing.
9. Choose air-supply hoses that have a minimum working pressure rating of 150 psig or 150% of the maximum pressure produced in the system, whichever is higher.
10. Check hoses regularly for cuts, bulges and abrasions. Tag and replace, if defective.
11. Blow out the air line before connecting a tool. Hold hose firmly and blow away from yourself and others.
12. Make sure that hose connections fit properly and are equipped with a mechanical means of securing the connection (e.g., chain, wire, or positive locking device).
13. Install quick disconnects of a pressure-release type rather than a disengagement type. Attach the male end of the connector to the tool, NOT the hose.
14. Do not operate the tool at a pressure above the manufacturer's rating.

15. Turn off the air pressure to the hose when not in use or when changing power tools.
16. Do not carry a pneumatic tool by its hose.
17. Avoid creating trip hazards caused by hoses laid across walkways or curled underfoot.
18. Do not use compressed air to blow debris or to clean dirt from clothes.

3.2 PNEUMATIC NAILING AND STAPLING TOOLS

1. Permit only experienced and trained persons to operate pneumatic nailing and stapling tools.
2. Wear safety glasses or face a shield and, where necessary, use hearing protection.
3. Inspect a tool before connecting it to air supply:
   - Check tool safety mechanisms if applicable.
   - Tighten securely all screws and cylinder caps.
4. Check correct air supply and pressure before connecting a tool.
5. Check that the tool is correctly and securely connected to the air supply hose and that it is in good working order, with the safety mechanism operative, before using.
6. Always handle a tool as if it loaded with fasteners (nails, staples, etc.).
7. Equip tools with a work-contacting element that limits the contact area to one that is as small as practical.
8. Make sure that the mechanical linkage between the work-contacting element and trigger is enclosed.
9. Disconnect a tool from the air supply when the tool is unattended and during cleaning or adjustment. Before clearing a blockage, be sure that depressing the trigger exhausts all air from the tool.
10. Use only fasteners recommended by the manufacturer.
11. Permit only properly trained people to carry out tool maintenance.
12. Do not operate at a pressure above the manufacturers' rating.
13. Do not depress the trigger unless the nosepiece of tool is directed onto a safe work surface.
14. Do not carry a tool with the trigger depressed.
15. Do not load a tool with fasteners while the trigger is depressed.
16. Do not overreach. Keep proper footing and balance.
17. Do not use compressed air to blow debris or to clean dirt from clothes.

REFERENCES: None

ENV 505 MANUAL HAND TOOLS	Published: January 20, 2003
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	Page: 1 of 10

SUMMARY: All manually operated hand tools and equipment shall be used, handled, and stored in accordance with the following requirements.

1.0 GENERAL REQUIREMENTS

1. Select the right tool for the job. Substitutes increase the chance of having an accident.
2. Use tools designed to allow the wrist to stay straight. Avoid using hand tools with your wrist bent.
3. Ensure that employees are properly trained in the safe use of hand tools.
4. Use good quality tools.
5. Keep tools in good condition at all times.
6. Inspect tools for defects before use. Replace or repair defective tools.
7. Keep cutting tools sharp and cover sharp edges with suitable covering to protect the tool and to prevent injuries from unintended contact.
8. Replace cracked, splintered, or broken handles on files, hammers, screwdrivers, or sledges.
9. Ensure that the handles of tools like hammers and axes fit tightly into the head of the tool.
10. Replace worn jaws on wrenches, pipe tools and pliers.
11. Redress burred or mushroomed heads of striking tools.
12. Pull on a wrench or pliers. Never push unless you hold the tool with your palm open.
13. Point sharp tools (e.g., saws, chisels, knives) laying on benches away from aisles and handles should not extend over the edge of the bench top.
14. Maintain tools carefully. Keep them clean and dry, and store them properly after each use.
15. Carry tools in a sturdy tool box to and from the worksite.
16. Wear safety glasses or goggles and well-fitting gloves appropriate for the hazards to which you may be exposed when doing various tasks.
17. Keep the work environment clean and tidy to avoid clutter which may cause accidents.
18. Use a heavy belt or apron and hang tools at your sides, not behind your back.
19. Do not use tools for jobs they are not intended to do. For example, do not use a slot screwdriver as a chisel, pry bar, wedge or punch, or a wrench as a hammer.
20. Do not apply excessive force or pressure on tools.
21. Do not cut toward yourself when using cutting tools.
22. Do not hold the stock in the palm of your hand when using a cutting tool or a screwdriver.
23. Do not wear bulky gloves to operate hand tools.
24. Do not throw tools. Hand them, handle first, directly to other workers.
25. Do not carry tools in a way that interferes with using both hands on a ladder, while climbing on a structure, or when doing any hazardous work. If working on a ladder or scaffold, tools should be raised and lowered using a bucket and hand line.
26. Do not carry a sharp tool in your pocket.

2.0 TOOL-SPECIFIC REQUIREMENTS

2.1 CUTTING TOOLS

1. Wear safety glasses and protective gloves when using cutters.
2. Choose the proper cutter for the job. Cutters are designed for a specific type, hardness, and size of material.
3. Cut materials straight across - keep the material being cut at right angles to the cutting edges of jaws.
4. Prevent injury from flying metal by wrapping a burlap bag, cloth or rag around the cutting jaws. Metal can fly when cut. The harder the metal, the farther it will fly.
5. Warn those in the area to take precautionary measures to avoid possible injury from flying metal pieces.
6. Keep cutting tools in good repair.
7. Adjust and lubricate cutter and moving parts daily if heavily used.
8. Sharpen jaws according to manufacturers' instructions.
9. Do not use a cutting tool until you are trained in its proper and safe use.
10. Do not use cushion grip handles for jobs requiring electrically-insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
11. Do not use cutters which are cracked, broken or loose.
12. Do not exceed the recommended capacity of a tool.
13. Do not cut diagonally.
14. Do not rock cutters from side to side when cutting wire.
15. Do not pry or twist with tool when cutting.
16. Do not hammer on cutting tools or extend the handle length to achieve greater cutting power.
17. Do not expose cutters to excessive heat.

2.2 HAMMERS

1. Hammers are designed according to the intended purpose. Select a hammer that is comfortable for you and that is the proper size and weight for the job. Misuse can cause the striking face to chip, possibly causing a serious injury.
2. Choose a hammer with a striking face diameter approximately ½ inch larger than the face of the tool being struck (e.g., chisels, punches, wedges, etc.).
3. Ensure that the head of the hammer is firmly attached to the handle.
4. Replace loose, cracked or splintered handles.
5. Discard any hammer with mushroomed or chipped face or with cracks in the claw or eye sections.
6. Strike a hammer blow squarely with the striking face parallel to the surface being struck. Always avoid glancing blows and over and under strikes. (Hammers with bevelled faces are less likely to chip or spall).
7. Look behind and above you before swinging the hammer.
8. Watch the object you are hitting.
9. Hold the hammer with your wrist straight and your hand firmly wrapped around the handle.

10. Do not use a hammer with a loose or damaged handle.
11. Do not use handles that are rough, cracked, broken, splintered, sharp-edged or loosely attached to the head.
12. Do not use any hammer head with dents, cracks, chips, mushrooming, or excessive wear.
13. Do not use a hammer for any purpose for which it was not designed or intended.
14. Do not use one hammer to strike another hammer, other hard metal objects, stones or concrete.
15. Do not redress, grind, weld or reheat-treat a hammer head.
16. Do not strike with the side or cheek of the hammer.

2.3 SAWS

1. Saws are made in various shapes and sizes and for many uses. Use the correct saw for the job.
2. Wear safety glasses.
3. Select a saw of proper shape and size for stock being used.
4. Choose a saw handle that keeps your wrist in a natural position in the horizontal plane.
5. Choose a saw with a handle opening of at least 5 inches long and 2.5 inches wide and slanted at a 15° angle.
6. Check the stock being cut for nails, knots, and other objects that may damage or buckle the saw.
7. Start the cut by placing your hand beside the cut mark with your thumb upright and pressing against blade. Start the cut carefully and slowly to prevent blade from jumping. Pull upward until blade bites. Start with a partial cut, then set the saw at the proper angle.
8. Apply pressure on downstroke only.
9. Hold stock being cut firmly in place.
10. Use a helper, a supporting bench or vise to support long stock if required.
11. Keep teeth and blades properly set.
12. Protect teeth of saw when not in use.
13. Keep saw blades clean.
14. Hacksaws:
    - Select correct blade for material being cut.
    - Secure blade with the teeth pointing forward.
    - Keep blade rigid, and frame properly aligned.
    - Cut using strong, steady strokes, directed away from yourself.
    - Use entire length of blade in each cutting stroke.
    - Use light machine oil on the blade to keep it from overheating and breaking.
    - Cut harder materials more slowly than soft materials.
    - Clamp thin, flat pieces requiring edge cutting.

2.4 PIPE TOOLS (WRENCHES, CUTTERS, REAMERS, AND THREADERS)

1. Pipe tools are made in various shapes and sizes and for many uses. Always use the correct tool for the job.

2. Select a pipe wrench with sufficient capacity and leverage to do the job.
3. Use a pipe wrench to turn or hold a pipe. Never use a pipe wrench to bend, raise or lift a pipe.
4. Adjust the pipe wrench grip to maintain a gap between the back of the hook jaw and the pipe. This concentrates the pressure at the jaw teeth, producing the maximum gripping force. It also aids the ratcheting action.
5. Inspect pipe wrenches periodically for worn or unsafe parts and replace them (e.g., check for worn threads on the adjustment ring and movable jaw).
6. Keep pipe wrench teeth clean and sharp.
7. Face a pipe wrench forward. Turn wrench so pressure is against heel jaw.
8. Pull, rather than push on the pipe wrench handle. Maintain a proper stance with feet firmly placed to hold your balance.
9. Do not use a pipe wrench as a hammer, or strike a pipe wrench with a hammer.
10. Do not use pipe wrenches on nuts and bolts.
11. Do not use a pipe extender for extra leverage. Get a larger pipe wrench.
12. Replace pipe cutter wheels which are nicked or otherwise damaged.
13. Use a 3- or 4-wheeled cutter, if there is not enough space to swing the single wheel pipe cutter completely around the pipe.
14. Choose a cutting wheel suitable for cutting the type of pipe material required:
    - Thin wheel for cutting ordinary steel pipe.
    - Stout wheel for cutting cast iron.
    - Other wheels for cutting stainless steel, plastic and other materials.
15. Select the proper hole diameter and correct tap size to tap a hole. The hole should be sized so that the thread cut by the tap will be about 75% as deep as the thread on the tap.
16. Use a proper tap wrench (with a "T" handle) for turning a tap.
17. Use lubricant or machine cutting fluid with metals other than cast iron.
18. Do not permit chips to clog flutes (groves in the tap that allow metal chips to escape from the hole). The chips may prevent the tap from turning - this may result in the tap breaking if you continue to apply pressure.
19. Do not use a conventional adjustable wrench for turning a tap - it will cause uneven pressure on the tap that may cause it to break.
20. Do not attempt to thread hardened steel. This can chip or damage the die.
21. Do not thread any rod or other cylindrical object that is larger in diameter than the major diameter of the die thread.
22. Do not use a spiral reamer on a rotating pipe. The reamer may snag and cause serious injury.

2.5 PLIERS AND WIRE CUTTERS

1. Pliers are made in various shapes and sizes and for many uses. Use the correct pliers or wire cutters for the job.
2. Choose pliers or wire cutters that have a grip span of 2½ - 3½ inches to prevent your palm or fingers from being pinched when the tools are closed.

3. Use adjustable pliers that allow you to grip the workpiece firmly while maintaining a comfortable handgrip (i.e., hand grasp is not too wide).
4. Use tools only if they are in good condition.
5. Make sure that the cutting edges are sharp. Dull and worn-down cutting edges require many times more force for cutting.
6. Make sure that the toothed jaws are clean and sharp. Greasy or worn-down jaws can result in compromised safety. Such tools also require increased force to hold the workpiece which, in turn, increases the risk of muscular fatigue and repetitive strain injuries.
7. Oil pliers and wire cutters regularly. A drop of oil on the hinge will make the tools easier to use.
8. Pull on the pliers; do not push away from you when applying pressure. If the tool slips unexpectedly, you may lose your balance or injure your hand.
9. Cut at right angles. Never rock the cutting tool from side to side or bend wire back and forth against the cutting edges.
10. Do not cut hardened wire unless the pliers or wire cutters are specifically manufactured for this purpose.
11. Do not expose pliers or wire cutters to excessive heat.
12. Do not bend stiff wire with light pliers. Needle-nose pliers can be damaged by using the tips to bend large wire. Use a sturdier tool.
13. Do not use pliers as a hammer.
14. Do not hammer on pliers or wire cutters to cut wires or bolts.
15. Do not extend the length of handles to gain greater leverage. Use a larger pair of pliers for gripping or a bolt cutter for cutting.
16. Do not use cushion grip handles for jobs requiring tools with electrically insulated handles. Cushion grips are for comfort primarily and do not protect against electric shock.
17. Do not use pliers on nuts and bolts; use a wrench.

2.6 SCREWDRIVERS

1. Screwdrivers are made in various shapes and sizes and for many uses. Use the correct screwdriver for the job.
2. Choose contoured handles that fit the shank tightly, with a flange to keep the hand from slipping off the tool.
3. Use a slot screwdriver with a blade tip width that is the same as the width of the slotted screw head.
4. For cross-head screws, use the correct size and type of screwdriver: a Phillips screwdriver may slip out of a screw head designed for use with the slightly flatter-tipped Pozi-driv screwdriver.
5. Use a vise or clamp to hold the stock if the piece is small or moves easily.
6. Keep the screwdriver handle clean. A greasy handle could cause an injury or damage from unexpected slippage.
7. If work must be carried out on "live" electrical equipment, use screwdrivers that have insulated handles designed for electrical work and a non-conducting shaft. Remember, most plastic handles are designed for grip and comfort.
8. Use non-magnetic tools when working near strong magnets (e.g., in some laboratories).

9. Use a screw-holding screwdriver (with screw-holding clips or magnetic blades) to get screws started in awkward, hard-to-reach areas. Square-tipped screwdrivers (e.g., Robertson) that hold screws with recessed square holes are also useful in such situations.
10. Use an offset screwdriver in close quarters where a conventional screwdriver cannot be used.
11. Use a screwdriver that incorporates the following features when continuous work is needed:
    - A pistol grip to provide for a straighter wrist and better leverage.
    - A "Yankee drill" mechanism (spiral ratchet screwdriver or push screwdriver) which rotates the blade when the tool is pushed forward.
    - A ratchet device to drive hard-to-move screws efficiently, or use a powered screwdriver.
12. File a rounded tip square making sure the edges are straight. A dull or rounded tip can slip out of the slot and cause hand injury or damage to materials.
13. Store screwdrivers in a rack or partitioned pouch so that the proper screwdriver can be selected quickly.
14. Do not lean or push on a screwdriver with any more force than necessary to keep contact with the screw. A screw properly piloted and fitted will draw itself into the right position when turned. Keep the shank directly over the screw being driven.
15. Do not hold the stock in one hand while using the screwdriver with the other. If the screwdriver slips out of the slot you may cut your hand.
16. Do not hammer screws that cannot be turned.
17. Do not grind the tip to fit another size screw head.
18. Do not try to use screwdrivers on screw heads for which they are not designed (e.g., straight blade screwdrivers on Phillips, clutch head, Torx or multi-flutted spline screw heads).
19. Do not use defective screwdrivers (e.g., ones with rounded or damaged edges or tips; split or broken handles; or bent shafts).
20. Do not use a screwdriver for prying, punching, chiseling, scoring, scraping or stirring paint.
21. Do not use pliers on the handle of a screwdriver for extra turning power. A wrench should be used only on the square screwdriver shank designed for that purpose.
22. Do not expose a screwdriver blade to excessive heat. Heat can affect the temper of the metal and weaken the tool.
23. Do not use a screwdriver to check if an electrical circuit is live. Use a suitable meter or other circuit testing device.
24. Do not carry screwdrivers in your pockets.

2.7 SNIPS

1. Wear safety glasses and protective gloves when working with snips. Small pieces of metal may go flying in the air and cut edges of metal are sharp.
2. Snips are made in various shapes and sizes for various tasks. The handle can be like those on scissors with finger and thumb holes or like plier handles. Models are available for cutting in straight lines and in curves to the left or right.
3. Universal snips can cut in both straight and wide curves.
4. Straight snips and duckbill snips (flat blade, "perpendicular" to the handle, with pointed tips) are generally designed to cut in straight lines; some duckbill snips are designed for cutting curved lines.

5. Hawk's bill snips (with crescent-shaped jaws) are used for cutting tight circles.
6. Aviation snips have compound leverage that reduces the effort required for cutting.
7. Offset snips have jaws that are set at an angle from the handle.
8. Select the right size and type of snips for the job; check the manufacturer's specifications about the intended use of the snips (e.g., type of cut - straight, wide curve, tight curve, right or left, and maximum thickness and kind of metal or other material that can be cut).
9. Use only snips that are sharp and in good condition.
10. Use snips for cutting soft metal only. Hard or hardened metal should be cut with tools designed for that purpose.
11. Use ordinary hand pressure for cutting. If extra force is needed, use a larger tool.
12. Cut so that the waste is on the right if you are right-handed or on the left if you are left-handed.
13. Avoid springing the blades. This results from trying to cut metal that is too thick or heavy for the snips you are using.
14. Keep the nut and the pivot bolt properly adjusted at all times.
15. Oil the pivot bolt on the snips occasionally.
16. Do not try to cut sharp curves with straight cut snips.
17. Do not cut sheet metal thicker than the manufacturer's recommended upper limit (e.g., cuts up to 16-gauge cold, rolled steel or 18-gauge stainless steel). Do not extend the length of handles to gain greater leverage.
18. Do not hammer or use your foot to exert extra pressure on the cutting edges.
19. Do not use cushion grip handles for tasks requiring insulated handles. They are for comfort primarily and not for protection against electric shocks.
20. Do not attempt to resharpen snips in a sharpening device designed for scissors, garden tools, or cutlery.

2.8 WOOD CHISELS

1. Wear safety glasses.
2. Wood chisels are made in various shapes and sizes and for many uses. Use the correct chisel for the job.
3. Use the right size of chisel for the job.
4. Choose smooth, rectangular handles that have no sharp edges and are attached firmly to the chisel.
5. Ensure that the cutting edge is sharp. Dull chisels can be difficult to control and require more effort to do the job.
6. Check stock thoroughly for knots, staples, nails, screws, or other foreign objects before chiseling.
7. Clamp stock so it cannot move.
8. Adjust your stance so that you do not lose your balance if the tool slips.
9. Chip or cut away from yourself.
10. Keep your hands and body behind the cutting edge.
11. Use a wooden or plastic mallet with a large striking face on all chisels. Only heavy-duty or framing chisels are made of a solid or molded handle that can be struck with a steel hammer.

12. Make finishing or paring cuts with hand pressure alone.
13. Place chisels safely within the plastic protective caps to cover cutting edges when not in use.
14. Replace any chisel that is bent or shows dents, cracks, chips, or excessive wear.
15. Store chisels in a "storage roll," a cloth or plastic bag with slots for each chisel, and keep them in a drawer or tray.
16. Replace broken or splintered handles.
17. Sharpen cutting edges as often as necessary.
18. Do not use a wood chisel as a pry or a wedge.
19. Do not use a wood chisel on metal.
20. Do not use an all-steel chisel with a mushroomed face or a chipped edge. Redress with a file or whetstone.
21. Do not use a grinder to redress heat-treated tools. Use a whetstone.
22. Do not use a dull chisel.

2.9 WRENCHES

1. Use the correct wrench for the job - pipe wrenches for pipes and plumbing fittings, and general-use wrenches for nuts and bolts.
2. Discard any damaged wrenches (e.g., open-ended wrenches with spread jaws or box wrenches with broken or damaged points).
3. Select the correct jaw size to avoid slippage.
4. Position your body in a way that will prevent you from losing balance and hurting yourself if the wrench slips or something (e.g., a bolt) suddenly breaks.
5. Use a box or socket wrench with a straight handle, rather than an off-set handle, when possible.
6. Ensure that the jaw of an open-ended wrench is in full contact (fully seated, "flat," not tilted) with the nut or bolt before applying pressure.
7. Face an adjustable wrench "forward," adjust tightly, and turn the wrench so pressure is against the permanent or fixed jaw.
8. Ensure that the teeth of a pipe wrench are sharp and free of oil and debris and that the pipe or fitting is clean to prevent unexpected slippage and possible injuries.
9. Apply a small amount of pressure to a ratchet wrench initially to ensure that the ratchet wheel (or gear) is engaged with the pawl (a catch fitting in the gear) for the direction you are applying pressure.
10. Support the head of the ratchet wrench when socket extensions are used.
11. Pull on a wrench using a slow, steady pull; do not use fast, jerky movements.
12. Stand aside when work is done with wrenches overhead.
13. Make sure adjustable wrenches do not "slide" open during use.
14. Keep tools well maintained (cleaned and oiled).
15. Clean and place tools and wrenches in a tool box, rack or tool belt after use.
16. Do not push on a wrench - losing your balance is more likely if the wrench slips.

17. Do not use a wrench that is bent or damaged.
18. Do not use worn adjustable wrenches. Inspect the knurl, jaw and pin for wear.
19. Do not pull on an adjustable wrench that is loosely adjusted.
20. Do not use pipe wrenches on nuts or bolts.
21. Do not use pipe wrenches for lifting or bending pipes.
22. Do not use a wrench on moving machinery.
23. Do not use the wrong tools for the job. For example, never use pliers instead of a wrench or a wrench as a hammer.
24. Do not use a makeshift wrench.
25. Do not insert a shim in a wrench for better fit.
26. Do not strike a wrench (except a "strike face" wrench) with a hammer or similar object to gain more force.
27. Do not increase the leverage by adding sleeved additions (e.g., a pipe) to increase tool handle length.
28. Do not expose a wrench to excessive heat (like from a blow torch) that could affect the temper of the metal and ruin the tool.

2.10 FILES/RASPS

1. Personnel will not use a file as a pry bar, hammer, screwdriver, or chisel.
2. When using a file or a rasp, grasp the handle in one hand and the toe of the file in the other.
3. Personnel will not hammer on a file.

2.11 CHISELS

1. Personnel will not use a chisel that has a dull cutting edge.
2. Personnel will not use chisels that have "mushroomed" striking heads.
3. Hold a chisel by using a tool holder if possible.
4. Clamp small workpieces in the vise and chip towards the stationary jaw when working with a chisel.

2.12 VISES

1. When clamping a long workpiece in a vise, support the far end of the workpiece by using an adjustable pipe stand, saw horse or box.
2. Position the workpiece in the vise so that the entire face of the jaw supports the workpiece.
3. Personnel will not use a vise that has worn or broken jaw inserts, or has cracks or fractures in the body of the vise.
4. Personnel will not slip a pipe over the handle of a vise to gain extra leverage.

2.13 CLAMPS

1. Personnel will not use the C-clamp for hoisting materials.
2. Personnel will not use the C-clamp as a permanent fastening device.

2.14 JACKS

1. Personnel will not exceed the jack's rated lifting capacity as noted on the label of the jack.
2. Clear all tools, equipment and any other obstructions from under the vehicle before lowering the jack.

2.15 TOOL BOXES/CHESTS/CABINETS

1. Use the handle when opening and closing a drawer or door of a tool box, chest, or cabinet.
2. Tape over or file off sharp edges on toolboxes, chests or cabinets.
3. Personnel will not stand on toolboxes, chests or cabinets to gain extra height.
4. Lock the wheels on large toolboxes, chests or cabinets to prevent them from rolling.
5. Push large chests, cabinets and toolboxes rather that pulling them.
6. Personnel will not open more than one drawer of a toolbox at a time.
7. Close and lock all drawers and doors before moving the tool chest to a new location.
8. Personnel will not move a toolbox, chest or cabinet if it has loose tools or parts on the top.

REFERENCES: None

ENV 506 ELECTRICAL SAFETY	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 4

SUMMARY: All on-site uses of electrical systems will conform to generally accepted electrical safety procedures.

1.0 ON-SITE USE OF ELECTRICITY

1.1 GENERAL REQUIREMENTS

- Earth Tech personnel may set up temporary circuits up to 220 volts. Maintenance or installation of circuits over 220 volts will require qualified subcontractor personnel.
- Lockout devices will be used to prevent the operation/energizing of equipment or circuits during maintenance or other work. Tagout devices will be used only where it is not feasible to use a lockout device.
- Insulated tools and electrical handling equipment shall be inspected prior to use to ensure the protective properties are not damaged. Damaged equipment will be tagged and removed from service.
- Extension cords and electrical connections on hand-held and other power tools will be inspected prior to use for cuts, kinks, frayed wires, etc. If any deficiency is noted, the equipment will be tagged "DAMAGED" and removed from service. Manufacturer-installed insulated electrical cords will not be repaired or spliced.
- Extension cords are to be kept clean, free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords are not to be placed across aisles, through doors, through holes in a wall, or in areas where the cord may be damaged or create a tripping hazard. Extension cords will be appropriate for the specific task and environment.
- Ground Fault Circuit Interrupter (GFCI) devices will be in place between the equipment and power source for all temporary circuits.

1.2 DISTRIBUTION SYSTEM SETUP

- Under no circumstances shall electrical lines be routed through doorways, hatches, windows or other openings where lines could be crimped, bent or cut.
- Circuit breakers shall be labeled as to use.
- All circuit breaker panels shall be kept covered when not in use.
- A fuse puller shall be used to remove cartridge fuses where one or more energized circuits are present.
- All live parts of electrical equipment operating at 50 volts or more shall be properly guarded against accidental contact, which includes:
    - Limit access to the equipment to qualified employees only.
    - Label using the proper accident prevention sign, stating DANGER as well as the voltage of the equipment.
    - Provide a conductor of the ampacity of not less than the rating of the circuit breaker or fuses protecting that circuit.
    - Ensure that a bare conductor or earth return is not used for any temporary circuit.
    - Ensure that all electrical wiring is protected from physical damage by covering and by not placing it in a location where it can be crimped or cut, etc.
    - Extension cords for portable electric tools shall be of a 3-wire type.
- Use of extension cords is allowed only for temporary installations not to exceed 90 days (e.g., decorations).

- Extension cords shall be provided with a plug cap, which is either molded to the cord or equipped with a cord clamp to prevent strain on the terminal screws.
- Extension cords shall not be fastened with staples, or otherwise hung in a manner that could damage the outer jacket or insulation.
- Extension cords shall be inspected prior to each use to ensure that there is no damage or defects. Defective cords shall not be used.
- Extension cords used with grounding-type equipment (e.g., three-prong plug) shall contain a grounding-type conductor (have three plugs to accept the ground plug).
- Ground fault circuit interrupters shall be used for all non-permanent wiring needed for construction purposes, or when working in wet or moist areas, or onboard ships.
- Extension cords used in highly conductive work locations (e.g., wet areas) shall be of the type approved for such locations.
- Grounding-type equipment (e.g., three-prong plugs) shall not be modified to mate to incompatible outlets (e.g., cut off grounding prong to fit two prong outlets).
- A temporary light shall not be suspended by the cord, unless the cord and light are designed for suspension.
- Temporary lights shall be equipped with bulb protectors, unless they are installed at least 7 or more feet overhead.
- Electric lines crossing work areas, personnel, or vehicular traffic areas, shall be either fastened securely overhead (at a height that provides safe clearance for work operations), or protected by a cover capable of withstanding the imposed loads without creating a trip hazard.
- Only qualified personnel shall perform electrical wiring or connections.
- If work on electrical systems is required, ensure that specific lock-out/tag-out procedures are implemented.

2.0 WORKING ON OR NEAR ENERGIZED PARTS

Working on or near energized parts covers either potential direct physical contact or contact by means of tools or equipment.

- Only properly trained persons shall work with energized equipment or electric circuits.
- Work on energized systems requires special precautionary techniques, PPE, insulating and shielding materials, insulating tools, and testing equipment.
- Personnel working in the vicinity of overhead power lines, either on the ground or elevated, shall not physically be closer than, or allow conductive tools/equipment closer than, the distances specified below:

Voltage Range	Distance
300 volts and less	Avoid Contact
More than 300 volts, but not more than 750 kilovolts (kV)	1 foot
More than 750 volts, but not more than 2 kV	1½ feet
More than 2 kV, but not more than 15 kV	2 feet
More than 15 kV, but not more than 37 kV	3 feet
More than 37 kV, but not more than 87.5 kV	3½ feet
More than 87.5 kV, but not more than 121 kV	4 feet
More than 121 kV, but not more than 140 kV	4½ feet

3.0 PERSONAL PROTECTIVE EQUIPMENT/WORK PRACTICES

- Non-conductive hardhats shall be worn when there is danger of head injury from electric shock or burns due to exposure to energized parts.
- Jewelry shall not be worn when working around or with energized parts.
- Insulated tools shall be used to work with energized parts. Tools that have insulation that might be damaged (e.g., rubber handles) shall be inspected prior to each use to ensure the insulation is not damaged.
- Eye protection with side shields shall be worn when working with energized parts.
- Rubber mats, non-conductive shields, or protective barriers shall be used as needed to protect employees from electrical hazards.
- Appropriate insulating gloves shall be worn to pick up or unplug connections that are in highly conductive areas, such as in water.
- Do not plug in or unplug electric equipment with wet hands.

4.0 PORTABLE ELECTRICAL EQUIPMENT

- Double-insulated, portable, industrial-type electrical tools meeting the requirements of the National Electrical Code (NEC) are authorized for use (ground wire not required). Where this type of tool is used, the equipment must be distinctly marked.
- Portable electrical tools not provided with special insulating or grounding protection are not for use in damp, wet, or conductive locations (e.g., by persons standing on the ground or on metal floors).
- All portable electrical appliances and equipment where the non-current-carrying metal parts are exposed to contact by personnel shall be grounded by a continuous conductor of adequate capacity from the device to a grounded receptacle. The Site Safety Officer shall resolve any question of whether or not a particular appliance should be grounded.
- Manufacturer-installed guards shall not be tampered with, modified, or removed. These guards will be in place and utilized during operation of equipment.

- The dimension of the working space in the direction of access to energized parts in switchboards, control panels, fused switches, circuit breakers, panel boards, motor controllers, and similar equipment that requires examination, adjustment, servicing, or maintenance while energized, shall not be less than 36 inches deep and 30 inches wide or the width of the equipment, whichever is greater.
- Energized parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by the use of approved cabinets or enclosures. Warning sign(s) shall be conspicuously placed on the enclosure.
- Grounding of receptacles shall be accomplished in one of two ways:
  - A built-in, green-colored ground wire may be attached to the ground pole of the receptacle.
  - The conduit system, if installed in an approved manner, may be relied upon for grounding of a receptacle serving single-phase appliances with ratings up to 230 volts. At outside construction sites, all single-phase 15- and 20-ampere receptacle outlets operating at 230 volts or less, which are not a part of the permanent wiring of the building or structure, must have GFCIs for personnel protection.
- The outlet box for portable extension cords for outdoor use shall be weatherproof and maintained in good condition.

REFERENCES: ENV 518 – *Lock-out/Tag-out*

ENV 507

HANDLING OF DRUMS AND LARGE CONTAINERS

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Page:	1 of 3

SUMMARY: This procedure provides guidance to employees and managers to minimize injuries, exposures, environmental contamination, and work disruptions resulting from accidents or injuries that could be caused by improper handling of drums and other containers.

1.0 GENERAL REQUIREMENTS

These requirements apply to drums of 10-gallon capacity and larger, and to other portable atmospheric containers of 10-gallon capacity or larger. The requirements of this procedure are not applicable to the handling of containers used to store pressurized gases or to hazardous waste drum handling.

1.1 DEFINITIONS

The following definitions apply to these procedures and are slightly modified for specific operations.

Drums - Hollow, cylindrical containers (capacity between 10 and 55 gallons) used for the storage or containerization of bulk quantities of work materials or wastes.

Other Large Containers - Containers other than drums that are used to hold bulk quantities of work materials or wastes. These include tanks and roll-off bins, and are generally much larger than drums.

Tanks - Hollow containers of capacity greater than 55 gallons used for the storage or containerization of bulk liquids.

Roll-off Bins - Rectangular-shaped containers capable of being transported using a specially designed vehicle on which the roll-off bin can be mounted/dismounted. Roll-off bins can be placed at a site, used to containerize bulk materials, and re-mounted on the vehicle for off-site transportation. Some roll-off bins are equipped with wheels, and can be moved manually.

2.0 PROCEDURES

2.1 GENERAL

All storage and handling of drums and other containers will conform to the following handling requirements.

- No drum or container will be filled beyond its rated capacity (expressed as either weight or volume). For liquid-containing drums/containers, a void space must be left to allow for liquid expansion in extreme heat.
- Storage locations for drums/containers shall be segregated so that differing types of materials are not stored together or co-mingled. Chemical products and waste materials shall not be stored together. Incompatible materials (e.g., fuels and oxidizers) shall not be stored together.
- Any drum/container storage structure must have the capability to fully contain a spill consisting of the contents of the largest container permitted for use in the structure plus the volume of water expected to be generated by a 25-year storm. The storage area shall be fenced and locked, and access will be limited to designated personnel.
- In accordance with the requirements of 29 CFR 1910.1200 (Hazard Communication), all drums and other containers will be labeled as to their contents. Hazardous properties such as flammability, etc., shall also be clearly indicated. For containers of hazardous wastes, the date on which waste was first accumulated in the drum/container shall be noted.

2.2 DRUMS

In addition to the above requirements, handling of all drums will be accomplished in accordance with the following:

- Only drums meeting U.S. Department of Transportation (DOT) specifications shall be used. Drums shall be inspected for rust, corrosion, warping, and other damage. Damaged drums shall not be used.
- Drums containing any materials will be covered with a tight-fitting lid when not in use.
- At the conclusion of each working shift, all drums will be placed in the designated storage area appropriate to their contents. Each such area will be properly marked and secured.
- Drums containing hazardous or flammable materials will be electrically grounded to prevent the buildup of static charge. As required, containers will be bonded to ensure that no potential charge difference exists between containers that might come into contact and cause sparking.
- Manual lifting, carrying, or moving of drums will not be permitted. A drum-handling cart or similar apparatus will be used for moving drums from collection points to the designated storage area.

2.3 OTHER CONTAINERS

- Each container shall be inspected for rust, corrosion, warping, and other damage prior to use. Damaged containers shall not be used.
- Containers larger than 55 gallons and/or 800 pounds will not be moved using any type of manual method, including non-powered mechanical devices. All handling will be accomplished using powered mechanical equipment designed specifically for that purpose.
- As applicable, any container holding material shall be covered with a tight-fitting lid when not in use.
- Containers of hazardous or flammable materials will be electrically grounded to prevent the buildup of static charge. As required, containers will be bonded to ensure that no potential charge difference exists between containers that might come into contact and cause sparking.

3.0 DRUM HANDLING PROCEDURE

Use mechanical aids whenever possible. Do not attempt to raise a full drum alone.

Moving an upright drum:

1. Stand close to the drum with feet apart. One foot at the front and the other behind.
2. Keep knees slightly flexed.
3. Put your hands firmly against upper rim of the drum.
4. Keep arms straight with the elbows "locked".
5. Rock the drum gently to get the feel of its contents before you move it.
6. Push the top of the drum away by extending the back leg and shifting your body weight onto your front leg.
7. Stop tilting the drum at the balance point. Use back leg as a counter balance.

Raising a drum laid on its side:

1. Make sure that the drum is empty before raising it.
2. Stand at the end of the drum.
3. Place one foot forward at the side of the drum, the other behind.
4. Bend your hips and knees.
5. Keep the back straight.
6. Grasp the rim about 15 cm from the ground with the elbows inside thighs.

7. Stand up by thrusting off with the back leg and continuing in an upward and forward direction.
8. Bring the back leg forward as if you are walking. Keep close to the drum.
9. Stop at the balance point to change hand grip.
10. Set the drum on its base by moving back leg forward. Use the body weight as a counter balance.

REFERENCES: ENV 501 – *Manual Materials Handling*
ENV 508 – *Drum Sampling*

ENV 509

TANK AND LARGE CONTAINER SAMPLING

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Page:	1 of 2

SUMMARY: Sampling conducted on large tanks, trucks, and tank cars will follow procedures established in the project Health and Safety Plan (HASP), subject to the requirements specified below.

1.0 GENERAL REQUIREMENTS

Sampling of storage tanks, tank trucks, and tank cars is potentially dangerous. Therefore, only experienced personnel specializing in sampling techniques should perform tank-sampling operations. Specific sampling procedures and EH&S requirements will be specified in the HASP.

2.0 STORAGE TANKS

2.1 INSPECTION

Although a variety of structural storage facilities may exist at a hazardous waste site, the most common is the aboveground storage tank (AST) similar to those found at oil refineries. Underground storage tanks (USTs) are also commonly encountered. Sampling storage tanks and similar structures presents certain safety hazards not generally encountered in other types of waste sampling. Often these factors are related to the structural integrity of the tank and the location of access points.

When sampling tank structures, it may be necessary to climb on them to obtain access. A thorough inspection of the containment structure must be made to determine the soundness of the tank and any ladders, catwalks, or platforms on which sampling personnel must walk. If there is any uncertainty regarding safety, alternative approaches must be used. Structures in poor physical condition often are rusted, with many openings through which sampling can be performed. Care should be taken to avoid snagging protective clothing or arms and legs on jagged metal edges.

2.2 TANK ENTRY

Entry of any tank must be treated as a permit-required confined space entry, even tanks that are open to the atmosphere and are not likely to contain explosive gas mixtures or high concentrations of other vapors. Prior to sampling, air quality monitoring must be performed using an organic vapor analyzer (OVA), combustible gas meter, or another method as dictated by the entry procedure.

Access to the interior of a closed tank may be obtained through existing hatches or covers. Because of the potential for producing sparks or releasing pressurized gases as the hatch is opened, the procedure must be performed by personnel wearing a self-contained breathing apparatus (SCBA) and full-coverage protection. The individual performing the operation should proceed slowly and position himself to one side of the hatch to avoid being struck if the hatch is blown open by internal pressure. Especially where there is the possibility of explosion, some type of remote opening system, perhaps using ropes and pulleys, is preferred to direct opening of hatches by individuals.

Closed tank structures may be entered only by specially trained personnel equipped with an SCBA and only after extensive air monitoring has been performed. Oxygen-deficient atmospheres may develop in a closed tank even if the entry port is open. An oxygen meter and a carbon monoxide meter should also be used to assess environments of closed structures when warranted. Other toxic contaminants may also be present in the tank atmosphere. Do not enter any tank structure unless approved by the EH&S Department.

3.0 TANK CARS AND TANK TRUCKS

Mobile storage tanks (railroad tank cars and tank trucks) present similar hazards to large stationary tanks. However, because of requirements associated with the mobile nature of these tanks, they may present unique hazards such as:

- Very limited-size access hatches.
- Interior baffles or other structures.
- Small interior volumes.

Since tank configurations can vary widely, specific entry procedures must be coordinated with the EH&S Department prior to implementation, which must take into account the unique conditions associated with the tank. As with stationary tanks, rail car tanks and tank trucks will be considered to be permit-required confined spaces.

REFERENCES: ENV 511 – *Confined Space Entry*

ENV 510 UNKNOWN HAZARDOUS WASTE DRUM HANDLING	Published: January 20, 2003
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	Page: 1 of 5

SUMMARY: Drums containing unknown materials, or damaged drums containing hazardous materials, must be handled in accordance with the following procedures.

1.0 PLANNING

Because drum handling introduces the potential for danger, every step of the operation should be carefully planned, based on all available information. The results of the preliminary inspection can be used to determine: (1) if any hazards are present and the appropriate response, and (2) which drums need to be moved in order to be opened and sampled. A preliminary plan should be developed that specifies the procedures based on the hazards associated with the probable drum contents as determined by visual inspection. This plan should be revised as new information is obtained during drum handling.

2.0 AIR MONITORING

Continuous air monitoring is required during the initial evaluation and handling of unknown/hazardous waste drums. Readings will be collected in the breathing zone and general work area. Readings will be collected for organic vapors, combustible gas (% LEL), oxygen (% oxygen), and radiation. The following levels will be utilized as action levels unless otherwise specified in the Health and Safety Plan (HASP). During initial monitoring, when materials are not adequately characterized, or if drums/containers are leaking and/or ruptured, Level B personal protective equipment (PPE) will be worn by site personnel.

Organic Vapors

Readings	Action/Level of Protection
0 – 1 ppm	Continue monitoring, Level D personal protective equipment (PPE)
>1 – 10 ppm	Continue monitoring, Level C PPE; Institute engineering controls
>10 ppm	Cease work and withdraw from the area. Contact the EH&S Professional for guidance. Level B PPE may be required.

Combustible Gases

Readings	Action/Level of Protection
<10% LEL	Continue monitoring.
≥10% LEL	Cease work activities immediately. Evacuate area and ventilate, then re-monitor. Re-entry allowed only after level falls below 10% LEL. Continue to ventilate and monitor area.

Oxygen

Readings	Action/Level of Protection
19.5 to 23.5% O_2	Continue work activities
<19.5 or >23.5% O_2	Cease work, exit area, and contact the EH&S Professional.

3.0 HANDLING

The purpose of handling is to: (1) respond to any obvious problems that might impair worker safety, such as radioactivity, leakage, or the presence of explosive substances; (2) unstack and orient drums for sampling; and

(3) If necessary, to organize drums into different areas on site to facilitate characterization and remedial action. Handling may or may not be necessary, depending on how the drums are positioned at a site.

Since accidents occur frequently during handling, particularly initial handling, drums should be handled only if necessary. Prior to handling, all personnel should be warned about the hazards of handling and instructed to minimize handling by using remote methods. In all phases of handling, personnel should be alert for new information about potential hazards. Personnel should respond to new hazard information before continuing with routine handling operations.

Overpack drums, which are larger drums that contain leaking or damaged drums for storage or shipment (see 49 CFR Part 173.3(c)), and an adequate volume of absorbent should be kept near areas where minor spills may occur. In these areas, a containment berm adequate to contain the entire volume of liquid in the drums should be constructed prior to any drum handling. If drum contents spill, personnel trained in spill-response procedures should isolate and contain the spill.

Several types of equipment can be used to move drums: (1) A drum grappler attached to a hydraulic excavator; (2) a small front-end loader, which can be either loaded manually or equipped with a bucket sling; (3) a rough-terrain forklift; (4) a roller conveyor equipped with solid rollers; and (5) drum carts designed specifically for drum handling. Sometimes drums are moved manually. The drum grappler is the preferred piece of equipment for drum handling. The grappler distances the operator from the drums so there is less likelihood of injury if the drums detonate or rupture. If the drum is leaking, the operator can stop the leak by rotating the drum and immediately placing it into an overpack. In case of an explosion, grappler claws help protect the operator by partially deflecting the force of the explosion.

The following procedures are to be used to maximize worker safety during drum handling and movement:

- Train personnel in proper lifting and moving techniques to prevent back injuries.
- Make sure the vehicle selected has sufficient rated load capacity to handle the anticipated loads and can operate smoothly on the available road surface.
- Air condition vehicle cabs to increase operator efficiency; protect the operator with heavy splash and/or blast shields.
- Supply operators with appropriate respiratory protective equipment when needed. Normally, either a combination self-contained breathing apparatus (SCBA)/supplied-air respirator (SAR) with the air tank fastened to the vehicle or an airline respirator and an escape SCBA are used because of the high hazard potential of drum handling. Respiratory equipment improves operator efficiency and provides protection in case the operator must abandon the equipment.
- Have overpacks ready before attempting to move drums.
- Determine the most appropriate sequence for moving the various drums and other containers. For example, it may be necessary to move small containers first in order to move larger drums or to permit heavy equipment to enter the area.
- Exercise extreme caution in handling drums that are not intact and tightly sealed.
- Ensure that operators have a clear view of the roadway when carrying drums. If necessary, station ground workers to guide the operator's motion.

3.1 BURIED DRUMS

- Prior to initiating subsurface excavation, use ground-penetrating systems to estimate the location and depth of the drums.
- Remove soil with great caution to minimize the potential for drum rupture.

- Keep a dry chemical fire extinguisher on hand to control small fires.

3.2 DRUMS CONTAINING RADIOACTIVE WASTE

If the drum exhibits radiation levels above background, immediately contact a health physicist. Do *not* handle any drums that are determined to be radioactive before consulting individuals with expertise in this area.

3.3 DRUMS THAT MAY CONTAIN EXPLOSIVE OR SHOCK-SENSITIVE WASTE

- If a drum is suspected to contain explosive or shock-sensitive waste as determined by visual inspection, seek specialized assistance before handling.
- If handling is necessary, handle these drums with *extreme caution.*
- Prior to handling these drums, move all nonessential personnel a safe distance away.
- Use a grappler unit constructed for explosive containment for initial handling of such drums.
- Place drums on pallets prior to transport. Secure drums to pallets.
- Use an audible siren signal system, similar to the type used in conventional blasting operations, to signal the commencement and completion of explosive waste-handling activities.
- Maintain continuous communications with the Site Safety Officer and/or the command post until drum-handling operations are complete.

3.4 BULGING DRUMS

- Pressurized drums are extremely hazardous. Wherever possible, do not move drums that are internally pressurized, as evidenced by bulging or swelling.
- If a pressurized drum must be moved, whenever possible, handle the drum with a grappler unit constructed for explosive containment. Either move the bulged drum only as far as necessary to allow seating on firm ground or carefully overpack the drum. Exercise extreme caution when working with or near potentially pressurized drums.
- Pressure may be released using remote methods. Contact the Corporate Certified Industrial Hygienist (CIH) to outline specific steps to accomplish this task. The following methods may be used:
  - Tube and spear device. A light aluminum tube (3 meters long) is positioned at the vapor space of the drum. A rigid, hooking device attached to the tube goes over the chime and holds the tube securely in place. The spear is inserted in the tube and positioned against the drum wall. A sharp blow on the end of the spear drives the sharpened tip through the drum and the gas vents along the grooves. Venting should be done from behind a wall or barricade. This device can be cheaply and easily designed and constructed. Once the pressure has been relieved, the bung can be removed and the drum sampled.
  - Hydraulic device. A piercing device with a metal point is attached to the end of a hydraulic line and is pushed into the drum by hydraulic pressure. The piercing device can be attached so that a hole for sampling can be made in either the side or the head of the drum. Some metal piercers are hollow or tube-like so that they can be left in place and serve as a permanent tap or sampling port. The piercer is designed to establish a tight seal after penetrating the container.
- Protect personnel by keeping them at a safe distance from the drums being opened. If personnel must be near the drums, place explosion-resistant plastic shields between them and the drums as protection in case of detonation. Locate controls for drum-opening equipment, monitoring equipment, and fire-suppression equipment behind the explosion-resistant plastic shield.
- Use the following remote-controlled devices for opening drums:

- Pneumatically operated impact wrench to remove drum's bungs.
- Hydraulically or pneumatically operated drum piercers.
- Backhoes equipped with bronze spikes for penetrating drum tops in large-scale operations.

- Do *not* use picks, chisels, or firearms to open drums.
- Perform all steps slowly. Relieve excess pressure prior to opening and, if possible, from a remote location using devices such as a pneumatic impact wrench or hydraulic penetration device. If pressure must be relieved manually, place a barrier, such as explosion-resistant plastic sheeting, between the worker and bung to deflect any gas, liquid, or solids that may be expelled as the bung is loosened.

3.5 LEAKING, OPEN, AND DETERIORATED DRUMS

- If a drum containing a liquid cannot be moved without rupture, immediately transfer its contents to a sound drum using a pump designed for liquid transfer.
- Using a drum grappler, immediately place the following damaged drums in overpack containers:
  - Leaking drums that contain sludges or semi-solids.
  - Open drums that contain liquid or solid waste.
  - Deteriorated drums that can be moved without rupture.

4.0 OPENING

Drums are usually opened and sampled in place during site investigations. However, remedial and emergency operations may require a separate drum-opening area. Procedures for opening drums are the same regardless of location. To enhance the efficiency of drum-opening operations and the safety of personnel, the following procedures should be instituted.

- If a supplied-air respiratory protection system is used, place a bank of air cylinders outside the work area and supply air to the operators via airlines and escape SCBAs. This practice enables workers to operate in relative comfort for extended periods of time.
- If possible, monitor continuously while drums are being opened. Place monitoring equipment sensors, such as colormetric tubes, dosimeters, radiation survey instruments, explosion meters, organic vapor analyzers, and oxygen meters as close as possible to the source of contaminants (i.e., at the drum opening).
- Hang or balance the drum-opening equipment to minimize worker exertion.
- Open exotic metal drums and polyethylene or polyvinyl chloride-lined (PVC-lined) drums through the bung by removal or drilling. Exercise extreme caution when manipulating these containers.
- Do *not* open or sample individual containers within laboratory packs.
- Reseal open bungs and drill openings as soon as possible with new bungs or plugs to avoid explosions and/or vapor generation. If an open drum cannot be resealed, place the drum into an overpack. Plug any openings in pressurized drums with pressure-venting caps set to a 5-psi (pounds per square inch) release to allow venting of vapor pressure.
- Decontaminate equipment after each use to avoid mixing incompatible wastes.

5.0 DRUM SEGREGATION AND STAGING

Drums and containers used during the cleanup will meet the appropriate U.S. Department of Transportation (DOT), Occupational Safety and Health Administration (OSHA), and U.S. Environmental Protection Agency (USEPA) regulations for their respective wastes.

Unlabeled drums and containers will be considered to contain hazardous substances and will be handled accordingly until the contents are positively identified and noted on the label.

Before moving drums or containers, employees with the transfer operation should be warned of the potential hazards associated with the contents of the drums or containers and should review the latest site information and risk analysis forms. In congested areas where drums are staged, Earth Tech personnel will use forklifts to move drums to minimize abrasions, pinch hazards, etc.

Prior to handling or moving any containers, the condition of each drum will be noted and appropriate handling procedures discussed with the Project Manager. Drums will be marked to indicate acceptability for handling. Specific locations for drum staging will be constructed during site mobilization. These areas will be equipped with all proper safety and emergency equipment necessary to contain spills and releases. Exact staging locations will be noted on the site plan and incorporated into this HASP using the task risk (job safety) analysis form.

The DOT-specified salvage drums or containers and sizable quantities of proper absorbent and neutralizers (diatomaceous earth, citric acid powder, soda ash, activated carbon, sorbent pads, and boom) will be available and used in areas where spills, leaks, or ruptures may occur.

For major spills or leaks, a customized spill pallet with all necessary tools and equipment will be moved into position. The pallet will contain sorbent media, neutralizing media, tools and equipment, and fire extinguishers. The pallet will be accessible and fully stocked at all times to respond to spills, leaks, or releases during the project.

Drums and containers that cannot be moved without rupture, leakage, or spillage will be emptied into a sound container using a device classified for the material being transferred. Typically, this would be done with an explosion-proof transfer pump or a peristaltic pump. Soil or covering material will be removed with caution to prevent drum or container rupture. Fire extinguishers will be available to control small fires. Personnel will don level B PPE to include Saran® suits and chemical-resistant gloves/booties.

Chemical spills, splashes, and reactions between incompatible chemicals present the greatest risks for exposure in these operations. *The principal routes of exposure are skin contact and inhalation. An emergency eyewash station will be present in the work area.*

REFERENCES: ENV 507 – *Handling of Drums and Large Containers*
ENV 508 – *Drum Sampling*

ENV 511 CONFINED SPACE ENTRY	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 3

SUMMARY: Earth Tech personnel will not enter any confined space until it has been evaluated, classified, and (if necessary) has had a specific entry procedure developed. Personnel performing such entries will meet training requirements specified below.

1.0 DEFINITIONS

Confined Space - is a space which:

- Is large enough and so configured that an employee can physically enter and perform assigned work; and
- Has limited or restricted means for entry or exit; and
- Is not designed for continuous human occupancy.

Permit-Required Confined Space (PRCS) – a confined space that exhibits one or more of the following properties:

- Contains or has a potential to contain a hazardous atmosphere;
- Contains a material that has the potential for engulfing an entrant;
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
- Contains any other recognized serious safety or health hazard.

2.0 CLASSIFICATION OF CONFINED SPACES

2.1 IDENTIFICATION OF CONFINED SPACES

As part of project planning activities, all on-site confined spaces that may be entered during environmental practice activities will be identified, evaluated and classified (permit-required vs. non-permit-required). Likewise, confined spaces discovered during work activities, and which will require entry, will also be evaluated and classified.

2.2 CLASSIFICATION OF CONFINED SPACES

For each identified confined space, an evaluation to determine the nature and extent of all possible hazards to entrants must be conducted. Consideration will be given to the following types of hazards:

- The presence of possible airborne contaminants within the PRCS at concentrations exceeding established occupational exposure limits (OELs)
- The presence of any physical hazards within the PRCS (e.g., electrical shock, mechanical injury, etc.)
- The presence of flammable or explosive conditions within the PRCS
- The presence of any potential for rapid flooding or engulfment within the PRCS
- PRCS configurations/positioning that may cause an entrant to become trapped.

Wherever possible, the site owner (e.g., Earth Tech's client) should be contacted to provide this information; however, in the absence of such input the EH&S Department is responsible for the evaluation. The evaluation will be documented using the *Confined Space Hazard Assessment* form found in Attachment 1.

For non-permit-required spaces, entry activities can proceed without any specialized access procedures or documentation. For PRCSs a specific PRCS entry procedure will be developed and approved by the EH&S Department.

2.2.1 PRCS-Specific Entry Procedures

To protect employees during PRCS entries, and to meet the requirements of 29 CFR 1910.146, Earth Tech-specific PRCS entry procedures will be developed for each PRCS to be entered. Each entry procedure will detail:

- The identity of the PRCS(s) to which the procedure applies
- Details concerning the potential hazards associated with the entry operation/PRCS
- Pre-entry preparation
  1. Required air monitoring equipment.
  2. PPE.
  3. Required emergency response/extraction equipment.
  4. Required ventilation procedures (as applicable).
  5. Required isolation procedures (as applicable).
  6. Rescue agency notification requirements (as applicable).
- Required pre-entry monitoring procedures and applicable at-entry re-classification criteria
- Air monitoring procedures during entry (if re-classification has not occurred)
- PPE requirements during entry (if re-classification has not occurred).

2.2.2 PRCS Entry

Prior to the start of the entry operation the Entry Supervisor (usually the site supervisor) will assign individuals on the entry team to the following jobs:

1. Entrant – the person entering the PRCS
2. Primary Attendant[1] - the person dedicated <u>only</u> to assisting the entrant, observing the entry operation and maintaining communications with the entrant throughout the entry procedure.
3. Secondary Attendant for Rescue Procedures – an employee assigned either to specific support of the entry operation or working nearby who can assist with rescue operations in the event of an accident. This person can perform other duties unrelated to observing the entry.

The Entry Supervisor is responsible for ensuring that the individuals assigned to each job fully understand their duties and responsibilities prior to initiating the entry operation. The Entry Supervisor will review the complete entry procedure with all team members prior to the work. The Entry Supervisor will also verify the availability of rescue services.

2.2.3 PRCS Entry Permits

A PRCS Entry Permit is required to be completed for each individual PRCS entry operation (Exception: Multiple entries of an *individual PRCS* during a <u>single</u> work shift can be covered by a single Permit). The Permit provides the means for documenting:

- The identities and roles of all individuals involved in the entry operation.
- Equipment used for performance of the entry (monitoring instruments, extraction equipment, etc.).
- Pre-entry and operational monitoring results.

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[1] Note: The Entry Supervisor can serve as the Primary or Secondary Attendant, but <u>cannot</u> perform work as the PRCS Entrant.

- Other relevant workplace conditions or events related to the entry operation (e.g., vault isolation procedures).

The Permit also provides the documented basis for re-classification of any PRCS as non-permit required (for purposes of the particular entry operation) based upon pre-entry monitoring procedures. Each Permit will be signed and authorized by the Entry Supervisor. At the completion of the entry operation the Permit will be field as part of the project records.

A copy of Earth Tech's PRCS Entry Permit form is provided in Attachment 2.

3.0 CONFINED SPACE ENTRY TRAINING

Personnel participating in the entry of any permit-required confined space must first complete initial confined space entry training. In addition, personnel will receive site-specific training covering confined space entry procedures associated with the work site.

3.1 INITIAL TRAINING

Personnel will not be permitted to perform entry of <u>any</u> permit-required confined space prior to completing this training. The training will be administered or approved by the EH&S Department, and will consist of the following elements:

1. Orientation regarding the differences between a confined space and a permit-required confined space (PRCS).
2. Review of applicable regulatory requirements (29 CFR 1910.146).
3. Air monitoring instrumentation and monitoring methods.
4. Use of respiratory protection and PPE during PRCS operations.
5. Entrant duties during PRCS entries.
6. Attendant duties during PRCS entries.

Initial training is expected to take approximately 4 hours, and is intended only to qualify personnel to perform the duties of general PRCS entry duties. This training must be supplemented by site/procedure-specific training prior to any new entry operation.

3.2 SITE/PROCEDURE-SPECIFIC TRAINING

Because entry procedures will be specifically developed for individual PRCSs, personnel will require training in the specific procedure(s) prior to on site implementation. Training must be conducted by a member of the EH&S Department or an approved alternate.

<u>REFERENCES</u>: ENV 522 – *Working Surfaces*

<u>ATTACHMENTS</u>: Attachment 1 – *Confined Space Hazard Assessment Form*
Attachment 2 – *PRCS Entry Permit Form*

ENV 508 DRUM SAMPLING	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 4

SUMMARY: Drum sampling activities will be performed using the specific procedures and equipment specified in this procedure.

1.0 REQUIREMENTS

Prior to sampling, drums must be inventoried, staged, and opened. Inventory entails recording visual qualities of each drum and any characteristic pertinent to the contents' classification. Staging involves the organization, and sometimes consolidation, of drums that have similar wastes or characteristics. Closed drums can be opened manually or remotely. Remote drum opening is recommended for worker safety. Air monitoring is mandatory during drum-handling operations.

2.0 EQUIPMENT/APPARATUS

2.1 PREREQUISITE EQUIPMENT/MATERIALS

The following are standard programs, plans, materials and equipment required for sampling:

- Health and Safety Plan
- Personal protective equipment (PPE)
- Wide-mouth glass jars with Teflon® cap liner and approximately 500-ml volume
- Uniquely numbered sample identification labels with corresponding data sheets
- One-gallon covered cans half-filled with absorbent
- Chain-of-custody sheets
- Decontamination plan and materials
- Glass thieving tubes and materials

2.2 DRUM-OPENING DEVICES

Bung Wrench

A universal bung wrench is commonly used to manually open drums. These wrenches have fittings to remove nearly all bung types. Wrenches are usually constructed of cast iron, brass, or a bronze-beryllium, nonsparking alloy formulated to reduce the likelihood of sparks.

The use of a wrench designated as "non-sparking" does not eliminate the possibility of a spark being produced, however.

Drum Deheader

If a drum cannot be opened manually using a bung wrench, another alternative is a drum deheader. Constructed of forged steel with an alloy steel blade, this tool is designed to completely or partially cut the lid of a drum with scissor-like cutting action. A limitation of this device is that it can be attached only to closed-head drums. Drums with removable heads must be opened by other means.

Hand Pick, Pickaxe, and Hand Spike

These tools are usually constructed of brass or a nonsparking alloy, with a sharpened point that can penetrate a drum lid or head when the tool is swung. Hand picks or pickaxes are commonly used and commercially available; spikes are generally fabricated 4-foot poles with a pointed end.

Backhoe Spike

The most common tool for remotely opening drums for sampling is a metal spike attached or welded to a backhoe bucket. This is an efficient opening method that greatly reduces the likelihood of personnel exposure.

Hydraulic Drum Opener

A fabricated hydraulic device can effectively open drums remotely to minimize exposure. This device uses hydraulic pressure to pierce through the wall of a drum. It consists of a manually operated pump that pressurizes through a length of hydraulic line.

Pneumatic Devices

A pneumatic bung remover consists of a compressed air supply that is controlled by a heavy-duty, two-stage regulator. A high-pressure air line of desired length delivers compressed air to a pneumatic drill, which turns a sized fitting to remove the bung. An adjustable bracketing system has been designed to position and align the pneumatic drill over the bung. This bracketing system must be attached to the drum before the drill can be operated. Once the bung has been loosened, the bracketing system must be removed before the drum can be sampled. Because this remote bung opener does not permit slow venting of the container, appropriate precautions must be taken. It also requires the container to be upright and relatively level. Bungs that are rusted shut cannot be removed using this device.

3.0 DRUM SAMPLING PROCEDURES

After the drum has been opened, preliminary monitoring of headspace gases should be performed using an explosimeter and organic vapor analyzer (OVA). In most cases, it is impossible to observe the contents of these sealed or partially sealed vessels. Since some layering or stratification is likely in any solution left undisturbed over time, a sample must be taken that represents the entire depth of the vessel.

When sampling a previously sealed vessel, check for the presence of a bottom sludge. This is easily accomplished by measuring the depth to apparent bottom, then comparing it to the known interior depth of the drum.

3.1 GLASS THIEF SAMPLER

The most widely used instrument for sampling is a glass tube (glass thief, 6 mm to 16 mm inner diameter [ID], and 48 inches in length). This tool is simple, cost-effective, quick, and collects a sample without having to be decontaminated.

Specific Sampling Procedure Using a Glass Thief

1. Remove cover from sample container.
2. Insert glass tubing almost to the bottom of the drum or until a solid layer is encountered. About 1 foot of tubing should extend above the drum.
3. Allow the waste in the drum to reach its natural level in the tube.
4. Cap the top of the sampling tube with a tapered stopper or thumb, ensuring the liquid remains within the stopper.
5. Carefully remove the capped tube from the drum and insert the uncapped end in the sample container. Do not spill liquid on the outside of the sample container.
6. Release stopper and allow the glass thief to drain completely into the sample container. Fill the container to about two-thirds of capacity.
7. Remove tube from the sample container, break it into pieces, and place the pieces in the drum.

8. Cap the sample container tightly and place the pre-labeled sample container in a carrier.
9. Replace the bung or place the pieces in the drum.
10. Transport sample to decontamination zone for preparation for transport to analytical laboratory.

In many instances, a drum containing waste material will have a sludge layer on the bottom. Slow insertion of the sample tube down into this layer and then a gradual withdrawal will allow the sludge to act as a bottom plug to maintain the fluid in the tube. The plug can be gently removed and placed into the sample container by using a stainless-steel lab spoon.

It should be noted that in some instances disposal of the tube by breaking it into the drum may interfere with eventual plans for the removal of its contents. The use of this technique should be cleared with the project manager or other disposal techniques evaluated.

3.2 COLIWASA SAMPLER

There is equipment that will collect a sample from the full depth of a drum and maintain it in the transfer tube until delivery to the sample bottle. These equipment designs include primarily the Composite Liquid Waste Sampler (COLIWASA) and modifications thereof. The COLIWASA is a sampler designed to permit representative sampling of multiphase wastes from drums and other containerized wastes. One configuration is a 152-cm-by-4-cm ID section of tubing with a neoprene stopper at one end, attached by a rod running the length of the tube to a locking mechanism which opens and closes the sampler by raising and lowering the neoprene stopper.

The major drawbacks associated with using a COLIWASA are decontamination and costs. The sampler is difficult if not impossible to decontaminate in the field and its high cost in relative to alternative procedures (glass tubes) makes it an impractical throwaway item. It still has applications, however, especially in instances where a true representation of a multiphase waste is absolutely necessary.

Procedures for Use

1. Put the sampler in the open position by placing the stopper rod handle in the T-position and pushing the rod down until the handle sits against the sampler's locking block.
2. Slowly lower the sampler into the liquid waste. (Lower the sampler at a rate that permits the levels of the liquid inside and outside the sampler tube to be about the same. If the level of the liquid in the sample tube is lower than that outside the sampler, the sampling rate is too fast and will result in a nonrepresentative sample.)
3. When the sampler stopper hits the bottom of the waste container, push the sampler tube downward against the stopper to close the sampler. Lock the sampler in the closed position by turning the T-handle until it is upright and one end rests tightly on the locking block.
4. Slowly withdraw the sample from the waste container with one hand, while wiping the sampler tube with a disposable cloth or rag with the other hand.
5. Carefully discharge the sample into a suitable sample container by slowly pulling the lower end of the T-handle away from the locking block while the lower end of the sampler is positioned in a sample container.
6. Cap the sample container with a Teflon®-lined cap, attach label and seal, and record on sample data sheet.
7. Unscrew the T-handle of the sampler and disengage the locking block. Clean sampler.

4.0 SAMPLE HANDLING AND STORAGE

- Place sample container in two Ziplock® plastic bags.
- Place each bagged container in a one-gallon, covered can containing absorbent packaging material.
- Place lid on can.
- Mark the sample identification number on the outside of the can.
- Place marked cans in a cooler, and fill remaining space with absorbent packing material.
- Fill out chain-of-custody record for each cooler, place in plastic, and affix to the inside of the cooler lid.
- Secure and custody-seal the cooler lid.
- Arrange for the appropriate transportation mode consistent with the type of hazardous waste involved.

REFERENCES: ENV 507 - *Handling of Drums and Large Containers*

EARTH TECH

EARTH TECH
PRCS ENTRY PERMIT

1. Permit space to be entered:_____ Project Name & No.:_____
2. Purpose of entry:_____
3. Good on this date only:_____ From:_____ AM/PM To:_____ AM/PM

Authorized Entrants:	Authorized Attendants:	Entry Supervisor:
_____	_____	_____
_____	_____	_____
_____	_____	_____

5. Hazards within the permit space:_____

6. Permit Space Preparation
   1. Work area isolated with signs/barriers? _____Yes _____No
   2. All energy sources locked/tagged out? _____Yes _____No
   3. All input lines capped/blinded? _____Yes _____No
   4. Permit Space contents drained/flushed/neutralized? _____Yes _____No
   5. Permit Space cleaned/purged? _____Yes _____No
   6. Ventilation provided 30 minutes before entry? _____Yes _____No

7. Initial atmospheric testing.

	Reading	Time	Acceptable level
Oxygen%	_____	_____	_____
LEL	_____	_____	_____
Other Contaminants	_____	_____	_____
Other Contaminants	_____	_____	_____
Other Contaminants	_____	_____	_____

8.

Test (s) To Be Taken	Permissible Entry Levels	Test 1	Test 2	Test 3	Test 4
A. Percent of Oxygen	19.5% to 23.5%				
B. Explosivity	<10% LEL				
C.					
D.					
E.					
Name of Tester					
Test Times					

9. Rescue Services (circle one) On Site Off Site

Phone # for Rescue Services or means of summoning:

10. Communication devices and procedures to be used during entry:

11. Safety Equipment required for entry:

PPE	N/A ( ) YES ( )	Specify_____
Testing Equipment	N/A ( ) YES ( )	Specify_____
Alarm System	N/A ( ) YES ( )	Specify_____
Rescue Equipment	N/A ( ) YES ( )	Specify_____
Other	N/A ( ) YES ( )	Specify_____

12. Additional Permits Required:
    Hot work: _____Yes _____No
    Other: _____Yes _____No

13. Permit Authorization
    I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

    Permit Authorization by entry Supervisor (Signature): _____Date/Time_____

EARTH TECH

EARTH TECH
CONFINED SPACE HAZARD ASSESSMENT FORM

Space Name/Description (1 confined space per form):

Hazards		Expected Entry Conditions	
Yes/No/N/A	**Type**	**Yes/No/N/A**	**Condition**
	Explosive / Combustion Hazard		Confined Space Entry Permit posted
	Exposed Electrical Circuits		Oxygen 19.5 – 23.5%
	Unguarded Machine Parts		Explosivity <10% LEL
	Atmospheric Hazard		Airborne contaminant levels less than Action Limit/PEL
	Potential Atmospheric Hazard		No engulfing material in space
	Thermal Hazard		No hazardous chemicals or material
	Chemical Hazard		Drained – Flushed
	Fall Hazard		Rescue team available on site
	Engulfment Hazard		Ventilation established & maintained
	Converging Walls	**Entry & Rescue Equipment Required**	
	Floors Slope-Small Cross-Section	**Yes/No/N/A**	**Type**
	Slip Hazard		Full-Body Harness
Entry Path			Tripod
Yes/No/N/A	**Type**		Man Winch
	Side Entry		Fall Arrest Unit
	Bottom Entry		Emergency Retrieval Line
	Top Open Entry		Atmospheric Monitor
	Top Manhole Entry		Blower & Hose
	Hinged Hatch		Intrinsically Safe Drop Light
Comments:			Communication Gear
			Ladder
			Hand Held Radios
			Portable Lighting
			Floor Level Opening Barrier

Diagram:

Form Completed By:

Name: Signature: Date:

ENV 512 LINE ENTRY	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 2

SUMMARY: This procedure provides the safe work requirements to perform line-breaking operations.

1.0 PRE-ENTRY PROCEDURE

As part of work planning activities, the need to open or enter any lines, pipes or similar sealed systems will be identified. Each line should be regarded as potentially full and pressurized with a hazardous product until it is proven otherwise.

1. Determine the line contents to assess the product's hazardous properties.
2. If able/necessary, sample line contents.
3. Trace line to each end. For example, identify the pipe run between tanks or reactors.
4. Check for color coding. Many plants designate line contents by their own color-coding system. Do not assume one plant's code is the same as another or consistent within each plant.
5. Any electrical lines near the work area must be de-energized prior to beginning operations. All electrical circuits are to be locked out.
6. Establish the level of protection (personal protective equipment) needed for the job, as well as any decontamination, secondary containment or spill response procedures.

2.0 LINE BREAKING

1. Isolate the line by closing, locking/ tagging all valves entering the line.
2. Lock/tag all electrical systems for pumps and automatic valves contained in the pipe run to be entered.
3. Remove all free product by pumping or draining. Inert or purge if applicable.
4. Blank or disconnect line – Install some physical barrier to prevent additional product from entering the system.
5. Insert a blank or blind in a line to block it completely.
6. Make use of double block and bleed (two closed valves within close proximity of each other with an open drain line between), if available.

2.1 PREPARE FOR LINE BREAKING

1. Establish exclusion zone. Zone should be sufficiently large to prevent unprepared people from contacting line material from liquid splash or vapor/gas emission.
2. Stage appropriate spill-control media at site.
3. Establish fire watch if necessary.
4. Review level of personal protective equipment (e.g., respirator, clothing, gloves, and eye protection).
5. Conduct air monitoring, including perimeter monitoring, for possible releases and explosive atmosphere survey or work area.

2.2 BREAKING THE LINE

1. Enter line at a flange, if possible.
2. Use nonsparking tools, such as brass, to loosen flange bolts if dealing with a flammable material.

3. Slowly loosen top flange bolts first. This will relieve pressure if any. If the line still contains fluid, the material will be noted as dripping or welling around the flange. If these conditions are noted, retighten and recheck purge procedures.
4. Because of possible leaks, no one will stand adjacent to or under a flange when opening.
5. The project supervisor is responsible for evaluating all safety hazards and ensuring that the line entry permit is properly completed.
6. Line breaking permits (see Attachment) will be maintained in the project file.

REFERENCES: ENV 511 – *Confined Space Entry*
ENV 518 – *Lock-out/Tag-out*

ATTACHMENT: Attachment 1 – *Line Breaking Permit Form*

EARTH TECH

EARTH TECH
LINE BREAKING PERMIT

Date _____ Time _____ To _____ AM/PM

Location _____

Line of Equipment _____

_____

Potential Chemical Hazards _____

Checklist of Applicable Safety Precautions

1)	All emergency equipment in position?	Yes		No	
2)	Lines drained, purged and/or washed clean of material?	Yes		Not Necessary	
3)	All valves checked for positioning and tagged?	Yes		Not Necessary	
4)	All electrical equipment locked out and tagged?	Yes		Not Necessary	
5)	Fire watch designated?	Yes		Not Necessary	
6)	Exclusion zone roped off and signs posted?	Yes		Not Necessary	
7)	Personnel wearing adequate personal protective equipment for expected hazard (consult site safety plan)?	Yes		Not Necessary	
8)	LEL survey completed?	Yes		Not Necessary	
9)	Air monitoring equipment for poisonous/toxic substance available?	Yes		Not Necessary	
10)	Decontamination, spill response equipment and procedures established, in place, and ready for response?	Yes		Not Necessary	
11)	All personnel briefed on procedures?	Yes		Not Necessary	

I certify that all necessary precautions have been taken in accordance with Earth Tech's line breaking procedures.

Supervisor _____

Foreman _____

Site Safety Officer _____

Line Breaking Crew _____

_____

_____

This Permit is valid only for the work shift during which it is initiated.

ENV 513 TANK CLEANING	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 1

SUMMARY: Prior to removal or demolition of aboveground or underground storage tanks, the following procedures will be implemented to ensure that potential hazards associated with tank contents have been mitigated.

1.0 GENERAL REQUIREMENTS

Before removing or demolishing underground or aboveground storage tanks:

- Sample and analyze the contents, if any, of the tanks.
- Properly dispose of any liquids or gases remaining in the tank.
- Render the atmosphere within the tank inert (atmosphere <10% lower explosive limit and/or oxygen content <5%).

2.0 HAZARDS OF TANK CLEANING

- Hazardous atmospheres in and around tanks.
- Direct inhalation or dermal exposure to hazardous materials.

3.0 SAFETY PROCEDURES

3.1 REMOVAL OF LIQUID AND SLUDGE FROM TANKS

- Disconnect or remove sources of ignition from the vicinity of the tank before venting or removal operations start.
- Personnel conducting the removal operations shall be appropriately protected from harmful exposure to toxic or corrosive vapors or gases.
- Empty the tank of all liquids, including the removal of liquids from any internal piping.
- Liquid or residue shall be removed as completely as possible using vacuum systems or pumps prior to tank excavation and removal.
- Blank or disconnect all piping to the tank.
- During liquid transfer all hoses/transfer nozzles shall be electrically bonded to the tank to prevent accumulation of static electricity.
- Site personnel shall remain upwind of operations whenever feasible.

3.2 REMOVAL OF FLAMMABLE VAPORS

- Inerting of vapor space shall be performed by a qualified individual thoroughly familiar with the limitations and characteristics of the inerting gas being used.
- Close all openings in the tank with the exception of the filling connection and vent.
- Introduce inerting gas at a point near the bottom of the tank.
- A combustible gas/oxygen meter shall be used to remotely monitor the atmosphere within the tank.

REFERENCES: None

ENV 519 FORKLIFT VEHICLES	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 7

SUMMARY: All use of forklift vehicles must conform to the procedures below.

1.0 OPERATOR AND EQUIPMENT REQUIREMENTS

1.1 OPERATORS

Any person who operates a fork lift on an Earth tech-controlled site must meet the following qualifications. Current copies of each operator's driver's license, training documentations, and *Industrial Lift Truck Card* will be maintained by the employee's EH&S Administrator (EHSA).

1.1.1 Initial Qualification

Prior to being permitted to operate a forklift, the operators of forklifts must provide a copy of a valid state driver's license and a valid *Industrial Lift Truck Card* issued by an authorized source. Personnel who do not posses the *Industrial Lift Truck Card* must complete initial operator training, which addresses the following elements:

1. The method for properly performing a daily pre-operational forklift inspection.
2. Rules for operating powered industrial trucks, and an explanation of why these rules exist.
3. An emphasis on loading and unloading, center of gravity, stability, and mechanical limitations.
4. A combination of oral, written, and operational performance tests which adequately demonstrate the operator's ability to safely use a forklift.

Training providers must be approved by an EH&S Manager. Upon completion of this training the operator will be awarded an *Industrial Lift Truck Card.*

On-Site Training – Before initial operation of a forklift on any job site, the site safety officer (SSO) or designated alternate must instruct each new operator in the nature of hazards associated with the work site, any special requirements or hazards of the operator's particular work area, and the local guidelines for performing work safely.

1.1.2 Periodic Refresher Training

Refresher training will be provided for each forklift operator every 2 years, or when there is reason to believe that there has been an unsafe operation. Examples of unsafe operation include, but are not limited to:

- When an accident or a near-miss occurs.
- When an evaluation indicates that the operator is not capable of performing the assigned work.

Training must be approved by an EH&S Manager.

1.2 FORKLIFTS

All forklifts operated by Earth Tech will conform to the following requirements:

1. Those manufactured after June 1998 - Part III, ASME B56.1-1993, Safety Standard for Low Lift and High Lift Trucks
2. Those manufactured before June 1998 – Part II, ANSI B56.1-1975, American National Standard for Powered Industrial Trucks.

Approved forklifts must bear a label or some other identifying mark indicating conformance with the applicable standard.

Under both standards, manufacturers are required by federal regulation to equip forklifts with certain mandatory features, such as lights and an "operator-controlled" warning device (e.g., a horn), to warn others when the truck is approaching locations where vision is obstructed. Other mandatory features include:

1. Overhead protection to guard the operator from falling objects.
2. A manufacturer's capacity plate, including the truck's maximum rated capacity stenciled on the mast and on both sides of truck's body.
3. Seat belts are required in all forklifts, except those designed only for operation while standing.

These features must be present and operable on any forklift used by Earth Tech personnel.

2.0 OPERATIONS PROCEDURES

Forklift operators will observe the following requirements in their use of forklifts.

2.1 PRE-OPERATIONAL INSPECTION

Prior to the first use of any forklift on any work shift, the operator will conduct a pre-operational inspection to ensure the following parts, equipment, and accessories (as applicable) work and are free of apparent damage:

- General condition and cleanliness.
- Fire extinguisher - present and charged.
- Engine oil level, fuel level, radiator water level (liquid propane gas [LPG], gas and diesel forklifts).
- Battery - fully charged; check cables for exposed wires; battery plug connections not loose, worn or dirty; vent caps not clogged; electrolyte levels in cells; holddowns or brackets keep battery securely in place.
- Bolts, nuts, guards, chains, or hydraulic hose reels not damaged, missing, or loose.
- Wheels and tires - check for wear, damage, and air pressure, if pneumatic tires.
- Forks - forks not bent; no cracks present; positioning latches in good working condition; carriage teeth not broken, chipped, or worn.
- Chain anchor pins - not worn, loose, or bent.
- Fluid leaks - no damp spots or drips.
- Hoses - held securely; not loose, crimped, worn, or rubbing.
- Warning devices – horn is working and loud enough to be heard in working environment; other warning devices operational.
- Lights - headlights and warning lights operational.
- Foot brake - pedal holds, unit stops smoothly.
- Parking brake - holds against slight acceleration.
- Deadman seat brake - holds when operator rises from seat.
- Clutch and gearshift - shifts smoothly with no jumping or jerking.
- Dash control panel - all lights and gauges are operational.
- Steering - moves smoothly.
- Lift mechanism - operates smoothly (check by raising forks to maximum height then lowering forks completely).
- Tilt mechanism - moves smoothly, holds (check by tilting mast all the way forward and backward.)
- Cylinders and hoses - not leaking after above checks.

- Listen for any unusual sounds or noises.

The inspection will be documented using the *Forklift Pre-Operation Inspection Checklist* found in Attachment 1. Each Checklist is valid for a one-week period, and will be maintained with the forklift. At the end of each week all Checklist forms will be collected and submitted to the SSO or designated alternate for review and filing. If any malfunctions or defects are found during the inspection, the forklift will be parked (with the keys removed), placed out of service, and the SSO will be notified to arrange servicing and repair.

2.2 OPERATING RULES

The requirements below apply to all forklift use.

2.2.1 Driving a Forklift

1. Operate forklifts only in designated areas with adequate ventilation.
2. Do not exceed the floor load rating.
3. Secure (i.e., tie down) unstable loads before starting the vehicle.
4. Decrease speed at all corners, sound horn, and watch the swing of both the rear of the lift truck and the load.
5. Keep arms and legs inside the forklift structure, except when signaling for turns or stops.
6. Do not jump from or out of a moving forklift.
7. Make sure that there is adequate clearance before passing under or between structures.
8. Maintain indoor speed under 5 mph (8 km/hr) and outdoor speed under 15 mph (24 km/hr).
9. Yield to pedestrians.
10. Do not carry passengers, except where factory-installed seats are provided.
11. Tilt the mast back before traveling.
12. Stay at least three vehicle lengths back when following another forklift.
13. Maintain forks about 4 to 6 in. (10 to 15 cm) above the driving surface when traveling.
14. Do not attach slings, cables, or chains to the forks to lift objects from underneath them.
15. When forward vision is obscured, drive in reverse.
16. Do not leave a forklift parked with an elevated load.
17. Do not park a forklift without turning off the power, placing all the controls in the neutral position, and setting the parking brake. A forklift is considered unattended if the operator is out of sight of the truck or more than 25 ft (8 m) away.
18. Observe all traffic signals.
19. Do not use a forklift to tow or push other forklifts, other vehicles, or other equipment.
20. Use pneumatic-wheel forklifts when traveling on irregular terrain and on surface streets. Use hard-wheel forklifts indoors only.
21. Maintain at least a 10 ft (3 m) separation from overhead power lines at all times.
22. When crossing rails or other irregular areas, slow down and approach diagonally.
23. Move to the right side of the lane when traveling on roads to allow passing vehicles adequate clearance. Pull over and stop when necessary.

24. Mount a "Slow Moving Vehicle" sign (triangle) to the rear of forklifts approved for road use when traveling off site.

2.2.2 Handling Loads

1. Keep the mast of the forklift in an upright position before inserting the forks into a pallet.
2. Level the fork before inserting it into the pallet.
3. Insert the fork all the way under the load.
4. Adjust the fork as wide as possible to fit the load and to provide a more even distribution of weight.
5. Space the fork evenly from the center stringer of the pallet to balance the load.
6. Do not protrude the fork past the back of a pallet when stacking in tight areas.
7. Place tines as wide as possible for the load and lock them in place to prevent sideways movement.
8. Never add a counterweigh to balance an overload - know the weight of the load.
9. Do not exceed the forklift's rated capacity.
10. Do not lift material or equipment you are unfamiliar with.
11. Ensure that the load is secured before moving. If it is not, pile the load again or strap the load to skid.
12. Ensure that loads on pallets are stable, neat, cross-tied if possible, and evenly distributed.
13. Remove damaged pallets from service.
14. Do not raise or lower the fork unless the lift truck is stopped and braked.
15. Lift loads straight up or tilt back slightly.
16. Do not lift a load that extends above the load backrest unless no part of the load can possibly slide back toward the operator.

2.2.3 Parking

The requirements below apply when parking forklifts:

1. Park on level surfaces.
2. Lower the forks to the ground.
3. Tilt the mast forward.
4. Set the parking brake.
5. Place the controls in the neutral position.
6. Turn off the engine.
7. Chock the wheels if the truck must be parked on a slope.

2.2.4 Loading Docks

When operating a forklift on a loading dock, the driver will:

1. Ensure at least one trailer wheel is chocked before driving onto or into a truck trailer.
2. Drive the forklift slowly on wet and slippery docks.
3. Slow down and sound your horn when proceeding through doorways.

4. Stay clear of edges of docks, rail cars or ramps. Have edges clearly marked.
5. Do not operate forklifts inside vehicles for long periods without ventilation.
6. Make sure that the dock plate is properly secured and can support the load before driving over it. (Load weight should be clearly marked.) Drive carefully and slowly over the plate. Do not spin wheels.

2.2.5 Ramps

When operating a forklift on ramps, the driver will:

1. Point the forks up the ramp when carrying a load, regardless of the travel direction.
2. Drive unloaded forklifts with the forks pointing downhill for added stability.
3. Obtain help to guide you when going up a ramp with a load and your vision is blocked.
4. Never turn a forklift sideways on a ramp.

2.2.6 Refueling

Refuel gasoline, diesel, and propane fuel-powered forklifts outdoors only. Close the valve for the propane bottle while the engine is running to consume all gas in the line. The engine shall be turned off whenever refilling fuel tanks, and shall not be restarted until the fuel cap is replaced.

Recharge electric forklift batteries only in designated, posted, and well-ventilated areas. Do not conduct spark-producing operations while batteries are being charged. Battery maintenance will not be performed by operator personnel.

Employees are not permitted to smoke during refueling/recharging.

2.3 INDOOR OPERATIONS

The following requirements apply where forklifts are operated indoors:

1. Use adequate ventilation for forklifts powered by internal-combustion engines.
2. Only use forklifts with the appropriate classification in areas with explosives or flammable gases.
3. Sound the horn when approaching intersections, pedestrians, doors, or corners. Slow down and sound the horn anywhere vision is blocked or impaired.
4. Electric forklifts are preferred for indoor operations and required when working in confined spaces.

2.4 PEDESTRIAN AREAS

Pedestrians working nearby should be sure to keep a safe distance from forklifts. This means staying clear of the forklift's turning radius and making sure the operator knows where all pedestrians are.

The operator will:

1. Yield the right-of-way to pedestrians.
2. Prevent anyone from walking or standing under elevated forks.
3. Sound the horn as a warning when approaching personnel.

3.0 MAINTENANCE ACTIVITIES

3.1 SEMI-ANNUAL INSPECTION

Every 6 months each forklift will be inspected by a manufacturer-certified servicer. A qualified inspector will also inspect all new, altered, modified, or extensively repaired forklifts prior to initial use.

1. Qualified Inspectors will inspect and load-test all assigned forklifts annually to 100% of their rated capacity.
2. Following a suspected overloading incident, the forklift involved will have a nondestructive test (NDT) performed on it. This test will be performed on the forks, carriage, mast, and at other stress points.
3. Inspectors will furnish written reports showing test procedures and confirming the adequacy of repairs or alterations. These reports will be maintained in the project files.
4. Inspectors will load-test the tines of forklifts used for explosives annually to 100% of their rated capacity. Every three years, following the load-test, the trucks will undergo an NDT to detect if there are any conditions that may weaken the tines.

Records of the annual inspections will be maintained by each project/site, and will indicate:

1. The date the inspection was performed.
2. The name of the service provider.
3. Any items identified for corrective action.
4. Dates corrective actions were completed and the forklift returned to service.

3.2 MAINTENANCE SAFETY

1. Permit only qualified persons to service and maintain forklift equipment.
2. Disconnect all batteries before doing any maintenance work.
3. Before servicing LPG forklifts:
   a. Shut off the tank fuel valve.
   b. Run the engine until it stops.
   c. Disconnect the tank from the hose.
4. Block the forklift securely when removing wheels.
5. Support the forklift hood in upright position or remove to do work.
6. Keep the work area clean and well lit.
7. Clean spilled oil or hydraulic fluid immediately.
8. Remove all tools and parts before starting the engine.
9. Handle batteries with care. Avoid contact with battery terminals with hoisting chains, tools, and metal objects. Cover the battery top with insulating material.
10. Attach a chain hoist to the counterweight before removing it from a forklift.
11. Check the bolts holding the counterweight to the body and replace any worn or missing bolts.
12. Do not leave parts, creepers, cans, tools or other obstacles around.
13. Do not start a forklift if it is on a lift hoist or wheel stands.
14. Do not work on forklift attachments unless you are familiar with their operation.

15. Do not work beneath elevated forklift trucks or forks unless they are securely supported by approved blocks.
16. Do not run LPG, gas, or diesel forklifts in unventilated areas.

REFERENCES: None

ATTACHMENT: Attachment 1 – *Forklift Pre-Operation Inspection Checklist*

FORKLIFT PRE-OPERATION INSPECTION CHECKLIST

Forklift Information

Number/Name: | **Make/Model:**

Checklist Items - Operator must initial each item (UNSAT items require corrective action prior to forklift use)

Hour meter reading															
Check the following as appropriate	Operator Name/Date			Operator Name/Date			Operator Name/Date			Operator Name/Date			Operator Name/Date		
	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A
1. Operator Qualified to Operate Forklift															
2. Overhead guard															
3. Horn															
4. Lights															
5. Parking brake															
6. Service brakes															
7. Steering															
8. Oil Level															
9. Radiator fluid level															
10. Major fluid leaks															
11. Mast and forks (tines)															
12. Backup alarm															
13. Tires (visual)															
14. Seat belts															
15. Fuel leaks (liquid or propane)															
16. Fire extinguisher full and secure															
17. Fuel lines secure															
18. Electrical lines															
19. Exhaust components															

Comments/Remarks

ENV 520

HEAVY EARTH-WORKING EQUIPMENT

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Revised:	N/A
Page:	1 of 6

SUMMARY: The following procedures outline safe working requirements during heavy earth-working equipment operations.

1.0 DEFINITIONS

Heavy equipment – for this procedure, all excavating equipment and any heavy earthmoving machinery defined in 29 CFR 1926.602(a)(1). These include scrapers, loaders, crawler or wheel tractors, excavators, backhoes, bulldozers, off-highway trucks, graders, agricultural and industrial tractors, and similar equipment.

Operator – any person who operates heavy equipment.

Ground personnel/workers – personnel required to perform work on foot (note: operators are considered ground personnel when outside of the equipment cab).

2.0 GENERAL REQUIREMENTS

Field operations that involve heavy equipment represent a significant hazard to ground workers as well as heavy equipment operators. Heavy equipment may cause serious injury or death as a result of rollover, contact with ground personnel, and pinch points. All personnel working at or visiting a site where heavy equipment operations occur shall read and abide by the requirements of this procedure.

2.1 COMMUNICATIONS

Communication between site supervisors/managers, heavy equipment operators, and other site personnel is a key method of preventing serious injury or death during heavy equipment operations. The following outline the communication requirements during heavy equipment operations:

- Site supervisors/managers shall ensure that all operators are notified/informed of when, where, and how many ground personnel will be working on site.
- Site supervisors/managers shall inform all ground personnel before changes are made in the locations of designated areas.
- If required to work near heavy equipment, ground personnel shall use industry standard hand signals to communicate with operators.
- Always maintain eye contact with operators to the greatest extent possible (always face equipment). Never approach equipment from a blind spot or angle.
- All heavy equipment shall be equipped with reverse warning devices (i.e., backup alarms) that can be significantly heard over equipment and other background noise. Reverse signaling lights shall be in working order.
- When feasible, two-way radios shall be used to verify the location of nearby ground personnel.
- When an operator cannot adequately survey the working or traveling zone, a guide shall use a standard set of hand signals to provide directions. Flags or other high visibility devices may be used to highlight these signals.

2.2 CLEARANCE

Ground clearance around heavy equipment may significantly reduce hazards posed during heavy equipment operations. The following outline the clearance requirements during heavy equipment operations:

- Ground personnel shall always yield to heavy equipment.
- Ground personnel shall maintain approximately 100 feet of clearance from all active heavy equipment, unless an approved, job-specific hazard analysis that identifies any special precautions is completed and communicated to the appropriate operators and ground personnel.
- Site supervisors/managers shall designate areas of heavy equipment operation and ensure that all ground personnel are aware of designated areas. Designated areas shall include boundaries and travel routes for heavy equipment. Travel routes shall be set up to reduce crossing of heavy equipment paths and to keep heavy equipment away from ground personnel.
- When feasible, site supervisors/managers shall set up physical barriers (e.g., caution tape, orange cones, concrete jersey barriers) around designated areas and ensure that unauthorized ground personnel do not enter such areas.
- Operators shall stop work whenever unauthorized personnel or equipment enter the designated area and only resume when the area has been cleared.
- Operators shall only move equipment when aware of the location of all workers and when the travel path is clear.
- Ground personnel shall never stand between two pieces of heavy equipment or other objects (i.e., steel support beams, trees, buildings, etc.).
- Ground personnel shall never stand directly below heavy equipment located on higher ground.
- If working near heavy equipment, ground personnel shall stay out of the travel and swing areas (excavators, all-terrain forklifts, hoists, etc.) of all heavy equipment.
- Ground personnel shall never work near heavy equipment during times of inadequate lighting.
- Personnel shall keep all extremities, hair, tools, and loose clothing away from pinch points and other moving parts on heavy equipment.

2.3 PERSONAL PROTECTIVE EQUIPMENT

At a minimum, all ground personnel and operators outside of heavy equipment shall wear the following:

- **High visibility, reflective safety vest** that is visible from all angles and made of fluorescent material and orange, white, or yellow reflective material (ensure that vest is not faded or covered with outer garments, dirt, etc.)
- ANSI-approved hard hat
- ANSI-approved safety glasses with sideshields
- ANSI-approved steel toe safety boots
- Hearing protection as needed
- Appropriate work uniform (i.e., full length jeans/trousers and a sleeved shirt; no tank, crew tops or other loose clothing permitted).

2.4 UTILITIES

When contacted by heavy equipment, aboveground and underground utilities may cause severe injuries or death as a result of electrocution, explosion, etc. The following outline the requirements while performing heavy equipment operations that may lead to contact with aboveground or underground utilities:

- Always be aware of surrounding utilities.
- Ensure all equipment (i.e., dump trailers, loaders, excavators, etc.) is lowered prior to moving underneath of aboveground utilities.
- Ensure utilities are cleared and identified prior to beginning any earthmoving operation. Contact the local utility service providers for clearance prior to performing work.
- Follow the applicable requirements outlined in ENV 515 – *Excavation*, ENV 516 – *Cranes & Lifting Devices*, and ENV 524 – *Overhead Electrical Lines*.

3.0 HEAVY EQUIPMENT REQUIREMENTS

3.1 TRAINING

- Only designated, qualified personnel shall operate heavy equipment.
- Operators shall have all appropriate local, state, or federal licenses or training to operate a designated piece of heavy equipment.
- Operators shall be evaluated through documented experience (resume) and a practical evaluation of skills (field tests). Operators shall be knowledgeable and competent in the operation of a designated piece of heavy equipment.

3.2 INSPECTIONS AND MAINTENANCE

- All heavy equipment shall be inspected and if necessary, repaired prior to use. Operators shall not operate heavy equipment that has not been cleared for use. All machinery and mechanized equipment will be certified to be in safe operating condition (certification form attached) by a competent individual seven days prior to on-site operation, and is valid for one year.
- All heavy equipment shall be inspected at a minimum to the manufacturer's recommendations prior to each work shift. All defects shall be reported to the site supervisor/manager immediately. Inspection records shall be maintained at the site. If a manufacturer's or company-specific inspection checklist is not provided, use the Heavy Equipment Pre-Operation Inspection Checklist (attached).
- Defective heavy equipment shall be immediately taken out of service until repaired.
- All heavy equipment shall be maintained and operated in accordance with the manufacturer's specifications and recommendations (i.e., speed restrictions, load limits, inspections, etc.).
- Never service heavy equipment in an unsafe or hazardous situation (e.g., do not crawl under the raised dump body during an inspection/service of a dump truck).
- All windows and windshields shall be kept free from obstructions and dirt. Windows shall not be cracked or visibly broken. All cab glass shall be safety glass or equivalent that introduces no visible distortion.
- Operators shall keep the cab, deck, rails, steps, and rungs free of grease, oil, mud, ice, and other debris.
- All heavy equipment shall be equipped with overhead protection to guard the operator from falling objects.

- All heavy equipment shall be equipped with a rollover protective structure meeting all OSHA requirements.
- All heavy equipment shall be equipped with seats belts that meet the requirements of the Society of Automotive Engineers Guidelines. Seat belts must be worn while operating heavy equipment.
- All heavy equipment shall be equipped with a tagged, fully charged fire extinguisher.
- All scissor points on front end loaders and other heavy equipment shall be guarded appropriately.

3.3 OPERATION

- All heavy equipment shall be operated in a safe manner that will not endanger persons or property.
- All heavy equipment shall be operated at safe speeds.
- Always move heavy equipment up and down the face of a slope. Never move equipment across the face of a slope.
- Slow down and stay as far away as possible while operating near steep slopes, shoulders, ditches, cuts, or excavations.
- When feasible, operators shall travel with the "load trailing", if the load obstructs the forward view of the operator.
- Slow down and sound horn when approaching a blind curve or intersection. Flagmen equipped with 2-way radio communications may be required to adequately control traffic.
- Operators shall remain in cab while heavy equipment is being loaded.
- Always keep heavy equipment in gear while in operation. Do not place in neutral.
- All heavy equipment shall be shut down prior to and during fueling. Do not smoke or use electrical devices while fueling. Fuel shall not be carried in or on heavy equipment, except in permanent fuel tanks or approved safety cans.
- Turn off heavy equipment, place gear in neutral, and set parking brake prior to leaving vehicle unattended. Also, place all buckets and blades on the ground and place hydraulic gear in neutral. Heavy equipment parked on slopes shall have the wheels chocked.
- Never jump on to or off of a piece of heavy equipment.
- Never exit heavy equipment while it is in motion.
- Passengers shall only ride in heavy equipment designed for occupancy of passengers.
- Never ride on the outside of a piece of heavy equipment (e.g., tailgates, buckets, steps, etc.).
- Site vehicles must be parked in a safe place away from heavy equipment.
- Operators shall never push/pull "stuck" or "broken-down" equipment unless a spotter determines that the area is cleared of all personnel around and underneath the equipment.
- Operators shall wear seatbelts at all times while operating heavy equipment.
- If designated for work in contaminated areas/zones, equipment shall be kept in the exclusion zone until work or the shift has been completed. Equipment will be decontaminated within designated decontamination areas.
- Equipment left unattended at night adjacent to traveled roadways shall have appropriate lights or reflectors, or barricades equipped with appropriate lights or reflectors, to identify the location of that

equipment, and shall not be closer than 6 feet (or the regulatory requirement for the work location) to the active roadway.

- Pneumatic-tired earthmoving haulage equipment, with a maximum speed exceeding 15 miles per hour, shall be equipped with fenders on all wheels.
- Lift trucks shall have the rated capacity clearly posted on the vehicle, and the ratings are not exceeded.
- Steering or spinner knobs shall not be attached to steering wheels.
- High lift rider industrial trucks shall be equipped with overhead guards.
- When ascending or descending grades in excess of 5%, loaded trucks shall be driven with the load upgrade.
- All belts, gears, shafts, pulleys, sprockets, spindles, drums, flywheels, chains, or other reciprocating, rotating or moving parts of equipment shall be guarded when exposed to contact by persons or when they otherwise create a hazard.
- All hot surfaces of equipment, including exhaust pipes or other lines, shall be guarded or insulated to prevent injury and fire.
- All equipment having a charging skip shall be provided with guards on both sides and open end of the skip area to prevent persons from walking under the skip while it is elevated.
- Platforms, footwalks, steps, handholds, guardrails, and toeboards shall be designed, constructed, and installed on machinery and equipment to provide safe footing and access ways.
- Equipment shall be provided with suitable working surfaces of platforms, guard rails, and hand grabs when attendants or other employees are required to ride for operating purposes outside the operator's cab or compartment. Platforms and steps shall be of nonskid material.
- Substantial overhead protection shall be provided for the operators of fork lifts and similar equipment.

3.4 FUELING AND BATTERIES

- Only the type and quality of fuel recommended by the engine manufacturer shall be used.
- A well-ventilated area shall be used for refueling.
- Fuel tanks shall not be filled while the engine is running. All electrical switches shall be turned off.
- No one shall spill fuel on hot surfaces. Any spillage should be cleaned before starting an engine.
- Spilled fuel shall be cleaned with cotton rags or cloths; do not use wool or metallic cloth.
- Open lights, lighted smoking materials, and flames or sparking equipment shall remain well away from the fueling area.
- Heaters in carrier cabs shall be turned off when refueling the carrier or the drill rig.
- Portable fuel containers shall not be filled completely to allow expansion of the fuel during temperature changes.
- The fuel nozzle shall be kept in contact with the tank being filled to prevent static sparks from igniting the fuel.
- Portable fuel containers shall not travel in the vehicle or carrier cab with personnel.
- Fuel containers and transfer hoses shall be kept in contact with a metal surface during travel to prevent buildup of a static charge.

- Batteries shall be serviced in a ventilated area while wearing appropriate PPE.
- When a battery is removed from a vehicle or service unit, the battery shall be disconnected ground post first.
- When installing a battery, the battery shall be connected ground post last.
- When charging a battery, cell caps shall be loosened prior to charging to permit gas to escape.
- When charging a battery, the power source shall be turned off to the battery before either connecting or disconnecting charger loads to the battery posts.
- Spilled battery acid shall be immediately flushed off the skin with a continuous supply of water.
- Should battery acid get into the eyes, the eyes shall be flushed immediately with copious amounts of water and medical attention sought immediately.
- To avoid battery explosions, the cells shall be filled with electrolytes. A flashlight (not an open flame) shall be used to check water electrolyte levels. Avoid creating sparks around battery by shorting across a battery terminal. Lighted smoking materials and flames shall be kept at least 25 feet away from battery-charging stations.

REFERENCES:

ENV 515 – *Excavation*
ENV 516 – *Cranes & Lifting Devices*
ENV 524 – *Overhead Electrical Lines*
ENV 532 – *Traffic Safety*

ATTACHMENTS:

Certification Form for Machinery and Mechanized Equipment
Heavy Equipment Pre-Operation Inspection Checklist

HEAVY EQUIPMENT PRE-OPERATION INSPECTION CHECKLIST

Project Name/Location

Number/Name: | **Make/Model:**

Checklist Items - Operator must initial each item (UNSAT Items require corrective action prior to equipment use)

Hour meter reading:															
	Operator Name/Date:			Operator Name/Date			Operator Name/Date			Operator Name/Date			Operator Name/Date		
Check the following as appropriate	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A	SAT	UNSAT	N/A
1. Operator Qualified to Operate Designated Piece of Heavy Equipment															
2. Overhead guard															
3. Horn															
4. Lights (including reverse signaling lights)															
5. Parking brake															
6. Service brakes															
7. Steering															
8. Oil Level															
9. Hydraulic oil level															
10. Radiator fluid level															
11. Major fluid leaks															
12. Windows															
13. Backup alarm															
14. Tires (visual)															
15. Seat belts															
16. Fuel leaks															
17. Fire extinguisher full and secure															
18. Fuel lines secure															
19. Electrical lines															
20. Exhaust components															

Comments/Remarks

ENV 522

WORKING SURFACES

Published:	January 20, 2003
Revised:	N/A
Page:	1 of 2

SUMMARY: Employees are required to maintain a workplace free of hazards (e.g., hazards associated with tripping, falling, or overhead objects as a result of uneven walking surfaces, holes, or debris). This procedure addresses requirements for flooring, work platforms, and stairway safety.

1.0 GENERAL REQUIREMENTS

- A means of access (e.g., ladder, stairway, ramp) shall be provided for all personnel points of access where a break of elevation of 16 inches or more exists.
- Means of access shall be kept clear to allow free passage for employees.
- Unprotected sides of stairway landings shall be provided with guardrail systems.
- Floor or deck holes shall be guarded using a secure cover to prevent accidental passage of materials or tools.
- Floor openings that are 4 feet or more above adjacent floor or ground level shall be guarded either by:
  - A secure cover.
  - A guardrail and toeboards installed on all exposed sides.
  - Perimeter cable installed on all exposed sides. (Note: if the perimeter cable is not 18 inches or more away from the opening, then a mid-height cable shall also be installed.)
- Openings in decks through which personnel or materials may fall shall be guarded as follows:
  - Openings greater than or equal to 18 square feet must be protected using standard railing and toeboards. The railing shall be constructed so rail supports do not exceed 10 feet off center spacing, and rails (both top and midrail) shall be constructed of 2" by 4" lumber, or taut wire rope. Toeboards shall be a minimum of 4 inches in height.
  - Openings less than 18 square feet shall be protected as above, with the exception of tank tops or inner bottoms. Tank tops or inner bottoms shall be protected using a rail system, constructed of iron or steel, where the rail is between 30 to 31 inches in height, with a top rail only. These guards shall be constructed such that they do not require removal for entry.
- When a cover has been removed, the opening shall be protected by barricades installed a minimum of 6 feet from the opening.
- A wall opening or floor opening being used to lower equipment (a chute used for equipment/debris) shall have a barricade or barrier, or a worker assigned to prevent personnel from entering the area where the equipment is descending.
- All platforms in buildings that are 6 feet or more above an adjacent floor or ground level shall be protected with a guardrail or perimeter cable, unless it is not feasible. In such circumstances the use of fall protection is mandatory.
- Where gratings, platforms, or floor plates have been removed, standard railings shall be installed, unless it will interfere with the work.
- On open decks, where the fall from the exposed edge is 5 or more feet, standard guard rails shall be installed.
- All platforms above or adjacent to dangerous equipment, tanks of hazardous substances, or other hazards shall be guarded with perimeter rails or cables.
- When the top of an open tank or vat that contains a hazardous substance is less than 36 inches above the floor or platform, then a barrier (e.g., guard rails) shall be erected to at least 36 inches in height.

- Runways or ramps shall be guarded as follows:
  - Guarded by guardrails on both open sides if the height is 4 or more feet above the floor or ground level.
  - Guarded by guardrails on both sides, regardless of height, if above or adjacent to dangerous equipment, tanks of hazardous substances or other hazards.
- A wall opening that has a bottom that is less than 3 feet above the working surface shall be guarded by a guardrail or wall screen.
- Stairways shall be equipped with a stair railing or handrail as follows:
  - A stairway not more than 44 inches wide and enclosed on both sides, shall have a handrail on the right descending side.
  - A stairway not more than 44 inches wide and open on one side, shall have a stair railing on the open side.
  - A stairway not more than 44 inches wide, which has two open sides, shall have a stair railing on each side.
  - A stairway that is more than 44 inches wide but less than 88 inches shall have 1 handrail on each enclosed side and 1 stair rail on each open side.
  - A stairway that is 88 inches or more in width shall have 1 handrail on each enclosed side, 1 stair rail on each open side, and 1 intermediate stair rail located in the middle of the stairway.
- A guardrail (except for tank tops or inner bottoms) shall consist of a top rail, an intermediate rail, and supporting posts. The top rail shall be not less than 42 inches above the floor, ramp, platform or runway. The intermediate rail shall be halfway between the floor and the top rail. If the intermediate rail will allow for an opening of more than 24 inches, then more than one intermediate rail is required to keep openings less than 24 inches. The guardrail shall be constructed to be able to withstand a 200-pound force in any direction. Supporting posts shall not be more than 8 feet apart (on ships, not more than 10 feet apart off center).
- A toeboard shall be not less than 4 inches in height, and secured in place not more than ¼ inch above the floor, platform, or runway.
- Temporary stairways shall have a minimum width of 22 inches.
- A stairway shall have a minimum vertical clearance of 7 feet, unless the overhead object is padded and caution signs or paint is used to visibly demarcate the hazard.
- A skylight guard shall be constructed to withstand a 200-pound load applied perpendicularly to any one portion of the screen. The guard shall be of grillwork with openings not more than 4 inches long or slatwork with an opening not more than 2 inches wide.

2.0 MAINTENANCE

Floors, platform stair treads and landings shall be maintained free of broken, worn, splintered or loose pieces that would create a tripping or falling hazard. Material used to repair these components shall meet the design strength of the original components.

REFERENCES: ENV 502 - *Ladders*
ENV 503 - *Scaffolding*

ENV 523 MANLIFTS	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 3

SUMMARY: All use of manlifts shall conform to the requirements below.

1.0 GENERAL REQUIREMENTS

1. All aerial lifts used by Earth Tech must be certified by the manufacturer to meet requirements of the American National Standards Institute (ANSI) standard applicable to the device:
   a. For truck-mounted boom or scissor lifts – ANSI Standard 92.2.
   b. For manually propelled boom or scissor lifts – ANSI Standard 92.3.
   c. For self-propelled boom lifts – ANSI Standard 92.5.
   d. For self-propelled scissor lifts – ANSI Standard 92.6.
2. Lift controls on extensible and articulating boom platforms shall be clearly identified as to function.
3. Aerial lifts primarily designed as personnel carriers shall have both work platform (primary) and lift mount (secondary) controls. Primary controls shall be within easy reach of the operator. Secondary controls shall be capable of overriding the upper controls. All controls shall be plainly marked to identify their function.

2.0 INSPECTION AND MAINTENANCE

All aerial lifts operated by Earth Tech personnel will be inspected in accordance with the following requirements:

2.1 PRE-OPERATIONAL INSPECTION

The operator of any aerial lift will perform a pre-operation inspection of the equipment prior to its first use during a work shift. During the inspection the operator will ensure that the equipment is free of visible defects or hazards, and that all operational controls are fully functional. Items to be performed during this inspection include:

- Check all welds between cylinders and booms for cracks or wear.
- Inspect all pivot pins for security of their locking devices.
- Check all exposed cables, sheaves and leveling devices for wear and secure attachment.
- Inspect hydraulic system for frayed hoses and leaks.
- Check lubrication and fluid levels.
- Inspect boom and basket for cracks or abrasions.
- Check for the load capacity posting.
- Operate boom from ground controls through one complete cycle. Check for unusual noises and uncontrolled movements.

If any problems are noted the aerial lift will be placed out of service and the Department Manager will be notified to arrange servicing and repair.

2.2 PERIODIC MAINTENANCE INSPECTION

At least annually, each aerial lift will be inspected by a manufacturer-certified servicer to ensure that it is properly functioning and maintained. Records of the annual inspections will be maintained by each Department, and will indicate:

1. The date the inspection was performed.
2. The name of the service provider.
3. Any items identified for corrective action.
4. Dates corrective actions were completed and the aerial lift returned to service.

3.0 OPERATIONS PROCEDURES

3.1 GENERAL REQUIREMENTS

The following requirements pertain to ANY use of aerial lift equipment.

1. Any person working in an aerial lift MUST wear a full-body harnesses and lanyard. The lanyard MUST be attached to the boom or basket on an approved attachment point when the lift is in operation or maintained in an elevated position. Employees working from aerial lifts shall not tie off belts or harnesses to adjacent poles, structures, or equipment.
2. The load in any boom/basket must not exceed the manufacturer's specified limits for the equipment.
3. Employees working in baskets shall always stand on the floor of the basket, and may not sit or climb on the edge of the basket or use planks, ladders, or other devices for a work position. The use of ladders, planks or other objects positioned in the aerial lift to gain greater height is PROHIBITED.
4. Aerial lifts will be positioned on ground which is stable, and provides a secure base for the equipment and anticipated load. Outriggers must be used and placed on pads or on solid surfaces.
5. Brakes on aerial lifts shall be set when in use. When using aerial lifts on inclined surfaces, wheel chocks shall be used if they can be safely installed.
6. Lift mount (secondary) level controls SHALL NOT be operated without permission from the operator in the aerial lift, unless the operator is incapacitated.
7. Aerial lifts shall not be moved along the ground with employees in an elevated basket unless the equipment is specifically designed for this operation. Before moving an aerial lift for travel, the boom must be properly cradled and the outriggers stowed. Aerial ladders on ladder trucks and tower trucks shall be secured in the lower traveling position by the locking device on top of the truck cab, and the manually operated device at the base of the ladder before the truck is moved for highway travel.
8. Do not work above other workers. Clear the area below using cones or other visible indicators; in moving traffic situations utilize signs placed at least 50 feet away from the work zone in either direction to warn drivers.
9. Secure all tools or other items to prevent drops. Do not throw tools to or from an elevated work platform.
10. Workers shall not exit from an elevated work platform onto any other elevated surface.
11. Work on aerial lifts will be stopped and the platforms lowered and secured if:
    a. Wind speeds exceed 25 miles per hour.
    b. Lightning is occurring within 3 miles of the work area.
12. If electric welding operations will occur, ensure that the aerial lift has been prepared by disconnecting the positive and negative terminals of the battery before initiating the weld. Do NOT use any part of the aerial lift as a ground for electric welding operations.
13. Aerial lifts WILL NOT be operated <u>over</u> live electrical wiring. The following minimum separation distance will be maintained between any portion of an aerial lift and any energized electrical component, unless operated by a certified electrical worker for the express purpose of performing electrical work:

Nominal Voltage (Kilovolts)	Minimum Safe Working Distance
0 - 50	10 feet
over 50 - 75	11 feet
over 75 – 125	13 feet
over 125 – 175	15 feet
over 175 - 250	17 feet
over 250 - 370	21 feet
over 370 – 550	27 feet
over 550 – 1000	42 feet

3.2 BOOM LIFTS

In addition to the general requirements in Section 1.0, the following requirements apply specifically to operation of boom lifts.

1. Do not enter or leave a bucket by walking on the boom.
2. Boom lifts SHALL NOT be used as a crane or for lifting/handling loads.
3. Operate all controls slowly to ensure smooth platform movement.
4. Elevated baskets SHALL NOT be attached to or suspended from any other object.

3.2.1 Scissor Lifts

In addition to the general requirements in Section 1.0, the following requirements apply specifically to operation of scissor lifts.

1. Scissor lifts and other platform-type man lifts shall be used only with proper railings and toe boards installed.
2. When moving a self-propelled scissor lift, the operator must first position themselves on board the work platform.
3. "Towering" (movement of the lift with the platform elevated) is PROHIBITED.

REFERENCES: ENV 522 – *Working Surfaces*

ENV 524 OVERHEAD ELECTRICAL LINES	Published: January 20, 2003
	Revised: N/A
	Page: 1 of 3

SUMMARY: This procedure provides the safe work requirements to be observed where overhead power lines are present on a job site.

1.0 INTRODUCTION

Operation of heavy equipment and cranes in areas with overhead power lines represents a significant hazard to all personnel on the job site. Accidental contact with an energized line or arcing between a high power line and grounded equipment can cause electrocution of equipment operators or nearby ground personnel, and damage to power transmission and operating equipment. While maintaining a safe distance from all energized lines is the preferred means for control of this hazard, site conditions may not always accommodate this. If work will (or may) occur within 50 feet of any energized line, the procedures outlined below will be observed.

2.0 HAZARD IDENTIFICATION

Overhead power lines will be identified on each job site before the work commences. For each identified line, the Project Manager must determine whether it is energized (and the operating voltage for energized lines), and whether work operations will require that activities with heavy equipment (excavators, loaders, cranes, etc.) will occur within 50 feet of the line.

3.0 HAZARD PREVENTION

Safe working distance is the minimum distance which must be maintained between any energized electrical line and any part of the operating equipment to maintain adequate safety margins, and is based on the line voltage of the power line. The following safe working distance criteria will be applied for all Earth Tech operations:

Line Voltage (Kilovolts)	Minimum Safe Working Distance
0 – 50	10 feet
>50 – 200	15 feet
>200 – 350	20 feet
>350 – 500	25 feet
>500 – 750	35 feet
>750 – 1000	45 feet

Source: American National Standards Institute, Publication B30.5

3.1 ACCEPTABLE SAFETY PROCEDURES

Where any work task will not allow the minimum safe working distance to be maintained at all times, an alternate means of protection must be identified and approved by the Environmental, Safety and Health Department. In order of preference, acceptable procedures are:

1. De-energize the power line(s).
2. Install insulated sleeves on power lines.
3. Assign line spotters to assist the equipment operator.

3.1.1 De-Energize Power Lines

Elimination of electrical power provides the most acceptable means of ensuring safety of personnel. While temporary site power lines are under the control of the site manager (and can be de-energized locally), electrical distribution and transmission lines can be de-energized only by the owner of the line (generally the local electrical utility). Therefore, de-energizing of a line requires advance coordination with the line owner – generally at least one week advance notice should be provided.

3.1.2 Install Insulating Sleeves

Insulating sleeves can be placed over power lines to provide a contact and arcing barrier if work must occur closer to the power lines than the accepted safe work distance. Although not as desirable as line de-energizing, the use of these sleeves can provide an acceptable alternative where electrical lines are required to remain in service.

As with de-energizing of distribution and transmission lines, placement of insulating sleeves can be performed only by the line owner. This requires advance coordination with the line owner – generally at least one week advance notice should be provided. To install the sleeves, representatives of the line owner will require access to the job site.

3.1.3 Assign Line Spotters

A line spotter is a person located at ground level who is assigned to observe equipment operations, with the specific duty of assisting the equipment operator to ensure that no part of the equipment gets too close to an energized, unprotected electrical line.

Persons assigned to act as line spotters must meet the following requirements:

1. While acting as a line spotter, no other duties may be performed (e.g., the line spotter cannot also act as the load spotter during a lifting operations).
2. The spotter will have a radio or other direct means of communicating with the equipment operator at all times.
3. The spotter will be positioned at a right angle to the equipment operator's line of sight to maximize the sight angles between the personnel.

Under no circumstances will any portion of a piece of equipment pass closer than 10 feet to any energized, un-insulated electrical line.

3.2 ADDITIONAL SAFETY MEASURES

The following additional safety measures can be implemented as needed when working around energized power lines:

1. Provide equipment with proximity warning devices – these provide an audible alarm if any part of the equipment gets too close to a line.
2. Install ground safety stops – these prevent vehicles from accidentally entering hazardous areas.
3. Equip cranes with a boom-cage guard – this prevents the boom from becoming energized if an electrical line is contacted.
4. Utilize insulated links and polypropylene tag lines - these prevent transmission of electricity to loads or tag line handlers if an electrical line is contacted.

NOTE: These additional safeguards are intended as supplemental protection. Use of these measures is not permissible as a substitute for maintaining the safe working distance or implementation of the procedures in Section 3.1.

4.0 ACCIDENT RESPONSE

If an electrical power line is hit or an electrical arc occurs:

1. All ground personnel must evacuate IMMEDIATELY to a distance of at least 50 feet. DO NOT attempt to rescue any injured person until the line can be de-energized.
2. The operator should remain in the cab until the line can be de-energized, and carefully try to extricate the equipment from the power line. This may not be possible where melting of insulator material or metal has occurred.
3. Contact the line owner to report the line contact and request that the line be de-energized immediately.
4. Once the line has been confirmed to be de-energized, the operator can safely evacuate the cab and rescue can commence for any injured personnel.
5. Contact the EH&S Department to report the incident and implement any instructions provided.

If the operator must evacuate while the line is still energized (due to fire or other life-threatening condition) he/she should jump clear of the equipment (making SURE to avoid touching the equipment and the ground simultaneously), and land upright and with feet together. Once on the ground, proceed in a direct line away from the equipment, using a short, shuffling gait (feet touching, sliding each foot no more than 1 foot forward at a time) to minimize shock hazard from electrical energy being transmitted through the ground.

REFERENCES: ENV 107 – *Accident Investigation*

ENV 528 HEAT STRESS AND HOT WEATHER OPERATIONS	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 4

SUMMARY: Field supervisors are responsible for protecting their workers from heat stress conditions by incorporating protective measures into the work routine. The heat stress prevention procedures below will be implemented whenever the temperature exceeds 75 degrees Fahrenheit for workers in normal work clothing, or 65 degrees Fahrenheit for workers in chemically protective clothing.

1.0 GENERAL REQUIREMENTS

Heat stress can be a significant field site hazard, especially for workers wearing chemically protective clothing (CPC). Site personnel must be instructed in the recognition of heat stress symptoms, the first-aid treatment procedures for severe heat stress, and the prevention of heat stress injuries. Workers must be encouraged to immediately report any heat stress that they may experience or observe in fellow workers. Supervisors must use such information to adjust the work-rest schedule to accommodate such problems.

Wherever possible, a designated break area should be established in an air conditioned space, or in shaded areas where air conditioning is impractical. The break area should be equipped to allow workers to loosen or remove protective clothing, and sufficient seating should be available for all personnel. During breaks, workers must be encouraged to drink plenty of water or other liquids, even if not thirsty, to replace lost fluids and to help cool off. Cool water should be available at all times in the break area, and in the work area itself unless hygiene/chemical exposure issues prevent it.

Workers who exhibit ANY signs of significant heat stress (e.g., profuse sweating, confusion and irritability, pale, clammy skin), should be relieved of all duties at once, made to rest in a cool location, and provided with large amounts of cool water. Anyone exhibiting symptoms of heat stroke (red, dry skin, or unconsciousness) must be taken immediately to the nearest medical facility, taking steps to cool the person during transportation (clothing removal, wet the skin, air conditioning, etc.). Severe heat stress (heat stroke) is a life threatening condition that must be treated by competent medical authority.

2.0 WORK-REST SCHEDULE

The prevention of heat stress is best performed through supervisor observation of employees and routine heat stress awareness training activities. However, it is also necessary to implement a work routine that incorporates adequate rest periods to allow workers to remove protective clothing, drink fluids (vital when extreme sweating is occurring), rest and recover. The frequency and length of work breaks must be determined by the work supervisor based upon the ambient temperature, amount of sunshine, the amount of physical labor being performed, the physical condition of the workers, and protective clothing being used.

2.1 ESTABLISHING THE WORK-REST SCHEDULE

Earth Tech permits the use of either of two techniques to initially determine an appropriate daily work-rest schedule. These methods are:

1. Wet Bulb Globe Thermometer (WBGT) Method – this method is preferred, if a WBGT meter is available.
2. Adjusted Temperature Method – this method should be used only if WBGT data is not available.

Either procedure will provide the work supervisor with a recommended routine, however adjustments to this routine may be required to accommodate the specific daily conditions at the work site.

2.1.1 WBGT Method

The WBGT is based on guidance prepared by the American Conference of Governmental Industrial Hygienists (ACGIH) and requires the use of a WBGT monitor to provide readings for use in Tables 1 and 2. Table 1, the *Non-CPC Activities WBGT Chart*, is intended for use where personnel are not utilizing CPC. Where workers are required to utilize CPC, Table 2, the *CPC Activities WBGT Chart*, will be used.

WBGT readings (in degrees Fahrenheit - °F) are compared directly with the values the applicable WBGT Chart for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching, very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

Table 1. Non-CPC Activities WBGT Chart

Work-Rest Frequency	°F–WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	85	81	78	
75% Work – 25% Rest	86	83	81	
50% Work – 50% Rest	88	85	83	81
25% Work – 75% Rest	90	87	86	85

Modified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents, for acclimatized workers

Table 2. CPC Activities WBGT Chart

Work-Rest Regimen	°F–WBGT			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
Continuous Work	74	70	67	
75% Work – 25% Rest	75	72	70	
50% Work – 50% Rest	77	74	72	70
25% Work – 75% Rest	79	76	75	74

Modified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents, for acclimatized workers

2.1.2 Adjusted Temperature Method

This method can be utilized where WBGT data is not available, and requires only that the ambient temperature (in degrees Fahrenheit - °F) be known. Adjustment factors are applied to the ambient temperature to account for departures from ideal conditions (sunny conditions, light winds, moderate humidity and a fully acclimated work force). The adjustments should be made by addition or subtraction to the ambient temperature reading, or changes in table position, as indicated in Table 3. Adjustments are independent and cumulative, all applicable adjustments should be applied. The result is the *Adjusted Temperature*, which can be compared with the values in Table 4 for the applicable work rate (where light work corresponds to minimal physical activity besides standing/watching, very heavy work corresponds to significant, continuous physical labor) to determine the work-rest frequency.

Table 3. Temperature Adjustment Factors

<u>Time of Day</u>	
Before daily temperature peak[1]	+2 °F
10 am – 2 pm (peak sunshine)	+2 °F
<u>Sunshine</u>	
No clouds	+1 °F
Partly Cloudy (3/8 – 5/8 cloudcover)	-3 °F
Mostly Cloudy (5/8 – 7/8 cloudcover)	-5 °F
Cloudy (>7/8 cloudcover)	-7 °F
Indoor or nighttime work	-7 °F
<u>Wind (ignore if indoors or wearing CPC)</u>	
Gusts greater than 5 miles per hour at least once per minute	-1 °F
Gusts greater than 10 miles per hour at least once per minute	-2 °F
Sustained greater than 5 miles per hour	-3 °F
Sustained greater than 10 miles per hour	-5 °F
<u>Humidity (ignore if wearing CPC)</u>	
Relative Humidity greater than 90%	+5 °F
Relative humidity greater than 80%	+2 °F
Relative Humidity less than 50%	-4 °F
<u>CPC</u>	
Modified Level D (coveralls, no respirator)	+5 °F
Level C (coveralls w/o hood, full-face respirator)	+8 °F
Level C (coveralls w/hood, full-face respirator)	+10 °F
Level B w/airline	+9 °F
Level B w/SCBA	+9 °F and right one column[2]
Level A	+14 °F and right one column[2]
Other	Specified in the HASP
<u>Miscellaneous</u>	
Unacclimated work force	+5 °F
Partially acclimated work force	+2 °F
Working in shade	-3 °F
Breaks taken in air conditioned space	-3 °F

To read Table 4, determine the *Work Rate* at which the workers will be operating (where light work corresponds to minimal physical activity besides standing/watching, very heavy work corresponds to significant, continuous physical labor), then read down the column to the temperature range which corresponds to the *Adjusted Temperature*. The *Work-Rest Schedule* for that row indicates the appropriate work schedule.

Shaded areas in Table 4 indicate high hazard conditions. When such conditions are anticipated during any work day the field supervisor MUST include a discussion of heat stress as part of the daily tailgate safety meeting topics.

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[1] This adjustment accounts for temperature rise during the day. If the temperature has already reached its daytime peak it can be ignored.

[2] Locate the proper column based on work rate, then move one column to the right (next higher work rate) before locating the corresponding adjusted temperature.

Table 4. Work-Rest Schedule Based on Adjusted Temperature

Work-Rest Schedule	Adjusted Temperature (°F)			
	Light Work	Moderate Work	Heavy Work	Very Heavy Work
No specified requirements	< 80	< 75	< 70	< 65
15 minute break every 90 minutes of work	80 – 90	75 - 85	70 - 80	65 – 75
15 minute break every 60 minutes of work	>90 – 100	> 85 - 95	>80 - 85	>75 - 80
15 minute break every 45 minutes of work	>100 – 110	>95 - 100	>85 - 90	>80 - 85
15 minute break every 30 minutes of work	>110 - 115	>100 - 105	>90 - 95	>85 - 90
15 minute break every 15 minutes of work	>115 - 120	>105 - 110	>95 -100	>90 - 95
Stop Work	**>120**	**>110**	**>100**	**>95**

Note: Time spent performing decontamination or donning/doffing CPC should not be included in calculating work or break time lengths.

2.2 EVALUATING THE WORK-REST SCHEDULE'S EFFECTIVENESS

Once a work-rest schedule is established, the work supervisor must continually evaluate its effectiveness through observation of workers for signs/symptoms of heart stress. Measurement of each worker's pulse can provide additional information in determining if the schedule is adequate, and is accomplished as follows:

At the start of the workday each worker's baseline pulse rate (in beats per minute – bpm) is determined by taking a pulse count for 15 seconds and multiplying the result by four. Worker pulse rates can then be measured at the beginning and end of each break period to determine if the rest period allows adequate cooling by applying the following criteria:

1. Each worker's maximum heart rate at the start of any break should be less than [180 minus workers age] bpm. If this value is exceeded for any worker, the duration of the following work period will be decreased by at least 10 minutes.
2. At the end of each work period all workers' heart rates must have returned to within +10% of the baseline pulse rate. If any worker's pulse rate exceeds this value the break period will be extended for at least 5 minutes, at the end of which pulse rates will be re-measured and the end-of-break criteria again applied.

REFERENCES: None

ENV 529 COLD STRESS AND WINTER OPERATIONS	Published:	January 20, 2003
	Revised:	N/A
	Page:	1 of 4

SUMMARY: This procedure is 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 nearly all workers can be repeatedly exposed without adverse health effects. The objective is to prevent the deep body temperature from falling below 96.8°F and to prevent cold injury to body extremities.

1.0 INTRODUCTION

Fatal exposures to cold among workers have almost always resulted from accidental exposures involving failure to escape from low environmental air temperatures or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is the fall in the deep core temperature of the body. Workers should be protected from exposure to cold so that the deep core temperature does not fall below 96.8°F; lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness with the threat of fatal consequences.

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

2.0 GENERAL REQUIREMENTS

Since prolonged exposure to cold air, or to immersion in cold water, at temperatures even well above freezing can lead to dangerous hypothermia, whole-body protection must be provided.

1. Adequate insulating dry clothing to maintain core temperatures above 96.8°F must be provided to workers if work is performed in air temperatures below 40°F. Wind chill cooling rate and the cooling power of air are critical factors. The higher the wind speed and the lower the temperature in the work area, the greater the insulation value of the protective clothing required. An equivalent chill temperature (ECT) chart relating the actual dry bulb air temperature and the wind velocity is presented in Attachment 1.
2. Unless there are unusual or extenuating circumstances, cold injury to other than hands, feet, and head is not likely to occur without the development of the initial signs of hypothermia. Superficial or deep local tissue freezing will occur only at temperatures below 32°F regardless of wind speed. However, older workers or workers with circulatory problems require special precautionary protection against cold injury. The use of extra insulating clothing and/or a reduction in the duration of the exposure period are among the special precautions which should be considered.
3. For exposed skin, continuous exposure should not be permitted when the air speed and temperature results in an equivalent chill temperature of –25°F or below.
4. At air temperatures of 40°F or less, it is imperative that workers who become immersed in water or whose clothing becomes wet be immediately provided a change of clothing and be treated for hypothermia.
5. If the air velocity at the job site is increased by wind, draft, or artificial ventilating equipment, the cooling effect of the wind should be reduced by shielding the work area or by wearing an easily removable windbreak garment.
6. If the available clothing does not give adequate protection to prevent hypothermia or frostbite, work should be modified or suspended until adequate clothing is made available or until weather conditions improve.

A recommended work/warm-up schedule is discussed in Section 4.0.

3.0 HANDS

Special protection of the hands is required to maintain manual dexterity for the prevention of accidents:

1. If fine work is to be performed with bare hands for more than 10 to 20 minutes in an environment below 60°F, special provisions should be established for keeping the workers' hands warm. For this purpose, warm air jets, radiant heaters (fuel burner or electric radiator), or contact warm plates may be utilized. Metal handles of tools and control bars should be covered by thermal insulating material at temperatures below 30°F.
2. If the air temperature falls below 60°F for sedentary work, 40°F for light work, or 20°F for moderate work, and fine manual dexterity is not required, then gloves should be used by the workers.
3. To prevent contact frostbite, the workers should wear anticontact gloves:
   a. When cold surfaces below 20°F are within reach, a warning should be given to each worker to prevent inadvertent contact by bare skin.
   b. If the air temperature is 0°F or less, the hands should be protected by mittens. Machine controls and tools for use in cold conditions should be designed so that they can be handled without removing the mittens.
4. Provisions for additional total body protection are required if work is performed in an environment at or below 40°F. The workers should wear cold protective clothing appropriate for the level of cold and physical activity:

4.0 WORK-WARMING REGIMEN

If work is performed continuously in the cold at an equivalent chill temperature (ECT) at or below –15°F, heated warming shelters (tents, cabins, rest rooms, etc.) should be made available nearby. The workers should be encouraged to use these shelters at regular intervals, the frequency depending on the severity of the environmental exposure. The onset of heavy shivering, minor frostbite (frostnip), the feeling of excessive fatigue, drowsiness, irritability, or euphoria are indications for immediate return to the shelter. When entering the heated shelter, the outer layer of clothing should be removed and the remainder of the clothing loosened to permit sweat evaporation or a change of dry work clothing provided. A change of dry work clothing should be provided as necessary to prevent workers from returning to work with wet clothing.

Attachment 2 provides guidelines for a work/warm-up schedule.

5.0 OTHER WORK PRACTICES

For work practices at or below 10°F ECT (see Attachment 1), the following should apply:

1. The worker should be under constant protective observation (buddy system or supervision).
2. The work rate should not be so high as to cause heavy sweating that will result in wet clothing; if heavy work must be done, rest periods should be taken in heated shelters and opportunity for changing into dry clothing should be provided.
3. New employees should not be required to work fulltime in the cold during the first days of employment until they become accustomed to the working conditions and required protective clothing.
4. The weight and bulkiness of clothing should be included in estimating the required work performance and weights to be lifted by the worker.
5. The work should be arranged in such a way that sitting still or standing still for long periods is minimized. Unprotected metal chair seats should not be used. The worker should be protected from drafts to the greatest extent possible.
6. The workers should be instructed in safety and health procedures, which should address:

a. Proper rewarming procedures and appropriate first aid treatment.
b. Proper clothing practices.
c. Proper eating and drinking habits.
d. Recognition of impending frostbite.
e. Recognition of signs and symptoms of impending hypothermia or excessive cooling of the body even when shivering does not occur.
f. Safe work practices.

7. Eye protection for workers employed outdoors in a snow and/or ice-covered terrain should be supplied. Special safety goggles to protect against ultraviolet light and glare (which can produce temporary conjunctivitis and/or temporary loss of vision) and blowing ice crystals should be required when there is an expanse of snow coverage causing a potential eye exposure hazard.

8. Workers handling evaporative liquid (gasoline, alcohol or cleaning fluids) at air temperatures below 40°F should take special precautions to avoid soaking of clothing or gloves with the liquids because of the added danger of cold injury due to evaporative cooling. Special note should be taken of the particularly acute effects of splashes of "cryogenic fluids" or those liquids with a boiling point that is just above ambient temperature.

9. Trauma sustained in freezing or subzero conditions requires special attention because an injured worker is predisposed to cold injury. Special provisions should be made to prevent hypothermia and freezing of damaged tissue in addition to providing for first aid treatment.

6.0 COLD-RELATED ILLNESS AND TREATMENT

6.1 FROSTBITE

If exposure occurs in temperatures that are below freezing (30 degrees F or below), frostbite or trench foot (immersion foot) may accompany or complicate the symptoms of hypothermia. Frostbite is the freezing of living tissues with a resultant breakdown of cell structure. Injury due to frostbite may range from superficial redness of the skin, slight numbness, and blisters, to the obstruction of blood flow (ischemia), blood clots (thrombosis), or skin discoloration due to insufficient oxygen in the blood (cyanosis). Frostbite may occur if the skin comes into contact with objects with a surface temperature below freezing, such as metal tool handles. Trench foot is caused by continuous exposure to cold combined with persistent dampness or immersion in water. Injuries in this case include permanent tissue damage due to oxygen deficiency, damage to capillary walls, severe pain, blistering, tissue death, and ulceration. Additionally, cold exposures may either induce or intensify vascular abnormalities. These include chilblain (a swelling or sore), Raynaud's disease, acrocyanosis (blueness of hands and feet) and thromboangiitis (inflammation of the innermost walls of blood vessels with accompanying clot formation). Workers suffering from these ailments should take particular precautions to avoid chilling.

Treatment

1. Wrap the victim in woolen cloth and keep dry until he or she can be brought inside.
2. Do not rub, chafe, or manipulate frozen parts.
3. Bring the victim indoors.
4. Place the victim in warm water (102 degrees to 105 degrees F) and make sure the water remains warm. Test the water by pouring it on the inner surface of your forearm. Never thaw affected body parts if the victim has to go back out into the cold. The affected area may be refrozen.
5. Do not use hot water bottles or a heat lamp, and do not place the victim near a hot stove.
6. Do not allow the victim to walk if his or her feet are affected.
7. Have the victim gently exercise the affected parts once they are thawed.
8. Seek medical aid for thawing of serious frostbite.

6.2 HYPOTHERMIA

Hypothermia damages both the body's internal temperature mechanisms (hypothalamus) and the peripheral mechanisms to prevent heat loss (vasoconstriction and perspiration.) These effects may last up to three years.

Treatment

1. Give artificial respiration and stop any bleeding, if necessary.
2. Bring the victim into a warm room or shelter as quickly as possible.
3. If the victim cannot be moved (spinal injury, etc.), carefully place newspapers, blankets or some other insulation between the victim and the ground.
4. Remove all wet clothing.
5. Provide an external heat source since the body cannot generate its own heat. Wrap the victim in prewarmed blankets, place him or her in the liner of a portable hypothermia treatment unit, put the torso (not the extremities) into a tub of warm water or use body-to-body contact to rewarm the body core. These measures will slowly reopen the peripheral circulation, minimizing the possibility of after-shock or after-drop (the flowing of cooled, stagnated blood from the limbs to the heart), which may cause ventricular fibrillation, cardiac arrest, or death.
6. Do not allow the victim to sleep.
7. Give warm, sweet drinks, no alcohol or pain relievers.
8. Keep the victim still. Do not try to walk.
9. Do not rub numb skin.
10. Get medical help as soon as possible.

REFERENCES: None

ATTACHMENTS: Attachment 1 – *Estimation of Equivalent Chill Temperature*
Attachment 2 – *Work/Warm-up Schedule Guidelines*

Work/Warm-up Schedule Guidelines

Air Temp. (Sunny Sky) °F	No Noticeable Wind		5 mph Wind		10 mph Wind		15 mph Wind		20 mph Wind		25 mph Wind	
	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks	Max. Work Period	Breaks
above 5°	Normal Work Sched.		Normal Work Sched.		Normal Work Sched.		Normal Work Sched.		Normal Work Sched.		Normal Work Sched.	
5° to –1°											100 min	2
0° to –4°									100 min	2	75 min	2
-5° to –9°							100 min	2	75 min	2	55 min	3
-10° to –14°					100 min	2	75 min	2	55 min	3	40 min	4
-15° to –19°			100 min	2	75 min	2	55 min	3	40 min	4	30 min	5
-20° to –24°	100 min	2	75 min	2	55 min	3	40 min	4	30 min	5	Cease Work	
-25° to –29°	75 min	2	55 min	3	40 min	4	30 min	5	Cease Work			
-30° to –34°	55 min	3	40 min	4	30 min	5	Cease Work					
-35° to –39°	40 min	4	30 min	5	Cease Work							
-40° to –44°	30 min	5	Cease Work									
-44° & below	Cease Work											

Modified from ACGIH's 2002 Threshold Limit Values for Chemical Substances and Physical Agents.

Note 1: Schedule describes the maximum continuous duration of work and number of 10-15 minute breaks to be observed during any 4-hour work period, and assumes that period will be followed by an extended warm-up period (e.g., lunch). Allowed breaks should be taken in a warm environment.

Note 2: Schedule applies to moderate to heavy work performed by acclimated workers wearing appropriate layered clothing. For light to moderate work apply the schedule for conditions 1 step lower. For unacclimated workers apply the schedule for conditions 2 steps lower. These modifications are additive.

Note 3: For work under 25% - 50% overcast/clouds apply the schedule for conditions 1 step lower. For work at night or under greater then 50% overcast/clouds apply the schedule for conditions 2 steps lower. These modifications are additive with any applicable modifications from Note 2.

Note 4: For wind speeds in excess of 25 mph cease all non-emergency work when temperatures fall below 5°F.

Estimation of Equivalent Chill Temperature

Estimated Wind Speed (mph)	Actual Temperature Reading (°F)									
	50	40	30	20	10	0	-10	-20	-30	-40
	Equivalent Chill Temperature (°F)									
Calm	50	40	30	20	10	0	-10	-20	-30	-20
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-24	-33	-46	-58	-70
15	36	22	9	-5	18	-32	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-75	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	35	-51	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Wind speeds above 40 mph have little additional effect	LITTLE DANGER				INCREASING DANGER			GREAT DANGER		
	Trenchfoot and immersion foot may occur at any point on this chart.									

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

ENV 535 DECONTAMINATION	Published: January 20, 2003
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	Page: 1 of 4

SUMMARY: Decontamination of contaminated personnel and equipment will comply with the requirements specified below, as well as any additional site-specific procedures that may be required by the Health and Safety Plan (HASP).

1.0 DEFINITIONS

Contamination Reduction Zone (CRZ) - the transition area between the contaminated area and the clean area where decontamination activities occur.

Decontamination – the process of removing or neutralizing contaminants that have accumulated on personnel or equipment.

Exclusion Zone (EZ) – the area where primary activities occur, such as sampling, remediation operations, installation of wells, cleanup work, etc.

LOP – Level of Protection (Personal Protective Equipment or PPE).

Support Zone (SZ) - an uncontaminated zone where administrative and other support functions, such as first aid, equipment supply, emergency information, etc., are located.

2.0 GENERAL REQUIREMENTS

When possible, all necessary steps shall be taken to reduce or minimize contact with chemicals and impacted materials while performing field activities (e.g., avoid sitting or leaning on, walking through, dragging equipment over, tracking, or splashing potential or known impacted materials).

All personal decontamination activities shall be performed with an attendant (buddy) to provide assistance to personnel that are performing decontamination activities. Depending on specific site hazards, attendants may be required to wear a level of protection that is equal to the required level in the exclusion zone.

All persons and equipment entering the EZ shall be considered contaminated, and thus, must be properly decontaminated prior to entering the SZ.

Decontamination procedures may vary based on site conditions and nature of the contaminant. If chemicals or decontamination solutions are used, care should be taken to minimize reactions between the solutions and contaminated materials. In addition, personnel must assess the potential exposures created by the decontamination chemical(s) or solutions. The MSDS must be reviewed, implemented, and filed by personnel contacting the chemicals/solutions.

All contaminated personal protective equipment (PPE) and decontamination materials shall be stored and disposed of in accordance with site-specific requirements determined by site management.

3.0 DECONTAMINATION EQUIPMENT

The equipment required to perform decontamination may vary based on site-specific conditions and nature of the contaminant(s). The following equipment is commonly used for decontamination purposes:

- Soft-bristle scrub brushes or long-handled brushes to remove contaminants;
- Hoses, buckets of water or garden sprayers for rinsing;
- Large plastic/galvanized wash tubs or children's wading pools for washing and rinsing solutions;
- Large plastic garbage cans or similar containers lined with plastic bags for the storage of contaminated clothing and equipment;
- Metal or plastic cans or drums for the temporary storage of contaminated liquids; and

- Paper or cloth towels for drying protective clothing and equipment.

4.0 PERSONAL DECONTAMINATION STEPS

Modified Level D

In the Exclusion Zone:

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash protective suits and safety boots
2. Rinse protective suits and safety boots
3. Safety boot removal
4. Remove protective suit
5. Wash inner gloves
6. Rinse inner gloves
7. Remove inner gloves.
8. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary).

Level C

In Exclusion Zone (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash protective suits and safety boots
2. Rinse protective suits and safety boots
3. Change out (if required): Filter/mask change and redress (boot covers and outer gloves)
4. Safety boot removal
5. Remove protective suit
6. Wash inner gloves

7. Rinse inner gloves
8. Remove respirator/mask
9. Remove inner gloves
10. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary)

Level B

In the Exclusion Zone (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves
4. Rinse boot covers and outer gloves
5. Remove tape
6. Remove boot covers and outer gloves

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash SCBA/airline equipment, protective suits and safety boots
2. Rinse SCBA/airline equipment, protective suits and safety boots
3. Change out (if required): Tank change and redress (boot covers and outer gloves)
4. Safety boot removal
5. SCBA backpack or airline equipment removal
6. Remove protective suit and/or splash suit
7. Wash inner gloves
8. Rinse inner gloves
9. Remove face piece/mask
10. Remove inner gloves
11. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary)

Level A

In the Exclusion Zone (near boundary of CRZ):

1. Equipment drop on plastic sheet
2. Remove the majority of gross contamination
3. Wash boot covers and outer gloves (if applicable to ensemble)
4. Rinse boot covers and outer gloves (if applicable to ensemble)
5. Remove tape (if applicable to ensemble)
6. Remove boot covers and outer gloves (if applicable to ensemble)

In the Contamination Reduction Zone (keep the most contaminated equipment near the EZ boundary):

1. Wash protective suite and safety boots
2. Rinse protective suits and safety boots
3. Change out (if required): Tank change and redress (boot covers and outer gloves)
4. Safety boot removal
5. Remove fully encapsulating suit and hard hat
6. Remove SCBA backpack
7. Wash inner gloves
8. Rinse inner gloves
9. Remove face piece/mask
10. Remove inner gloves
11. Remove inner clothing (if necessary)

In the Support Zone:

1. Finish with personal decon/hygiene wash procedures
2. Redress (if necessary)

5.0 EQUIPMENT DECONTAMINATION

All equipment leaving the EZ shall be considered contaminated and must be properly decontaminated to minimize the potential for exposure and off-site migration of impacted materials. Such equipment may include, but is not limited to: sampling tools, heavy equipment, vehicles, PPE (hoses, cylinders, etc.), and various handheld tools.

All employees performing equipment decontamination shall wear the appropriate PPE to protect against exposure to contaminated materials. The level of PPE may be equivalent to the LOP required in the EZ. Other PPE may include splash protection, such as face-shields and splash suits, and knee protectors. Following equipment decontamination, employees may be required to follow the proper personal decontamination procedures above.

For larger equipment, a high-pressure washer may need to be used. Some contaminants require the use of a detergent or chemical solution and scrub brushes to ensure proper decontamination.

For smaller equipment, use the following steps for decontamination:

1. Remove majority of visible gross contamination in EZ.
2. Wash equipment in decontamination solution with a scrub brush and/or power wash heavy equipment.
3. Rinse equipment.
4. Visually inspect for remaining contamination.
5. Follow appropriate personal decontamination steps outlined above.

All decontaminated equipment shall be visually inspected for contamination prior to leaving the CRZ . Signs of visible contamination may include an oily sheen, residue or contaminated soils left on the equipment. All equipment with visible signs of contamination shall be discarded or re-decontaminated until clean. Depending on the nature of the contaminant, equipment may have to be analyzed using a wipe method or other means.

REFERENCES: None

EARTH TECH A ELECO INTERNATIONAL LTD COMPANY **Safety, Health, & Environment** Safety, Health, & Environmental Policy Statement	PROCEDURE NO. EHS001 DATE March 22, 2004 REVISED

Mission Statement/Objectives

Our goals are simple:

- ZERO work-related injuries or illnesses
- ZERO damage to property, and/or equipment from our activities
- ZERO releases to the environment from our ongoing projects

Strategy

In order to achieve these goals we will:

- Establish and report on our performance relative to short- and long-term Safety, Health, & Environmental (Safety) metrics designed to help us achieve our stated goals
- Consult with, listen to, and respond to our customers, employees and partners with respect to any portion of our Safety program
- Work with our partners, suppliers, competitors and regulators to raise the safety standards of our industry
- Recognize those who contribute to improved Safety performance

Safety, Health, & Environmental Core Values

Earth Tech's Safety Core Values form the foundation of our Safety Management System. These Core Values were developed for two basic reasons: 1) to communicate the company's basic safety tenets to Earth Tech employees, partners, and customers; and 2) to serve as a constant reminder for every Earth Tech staff member that our everyday business and operational decisions must be made in concert with these tenets. Earth Tech's Safety Core Values are:

- Occupational injuries and illnesses, environmental releases, and property damage incidents can and must be prevented. The only meaningful goal is ZERO.
- Earth Tech will only undertake activities (for ourselves and our clients) that we can do without injuring people, damaging property or impairing the environment.
- Safety, Health, & Environmental (Safety) compliance is everyone's responsibility and is a condition of employment.
- Earth Tech management will be involved in the Safety program at all levels within the organization. All company supervisors will lead by direct example and through appropriate decision-making.
- Earth Tech employees are encouraged and expected to be involved in the development of Safety programs and to provide continuous feedback on their effectiveness.
- Earth Tech will provide ongoing training for employees on the elements of our Safety program.
- Earth Tech will analyze all of our activities to ensure that we identify, evaluate, and control hazards and communicate this information to those that may be affected.

- Earth Tech will assess the Safety competencies and capabilities of contractors, suppliers and vendors to safely perform work on our behalf. We will also monitor their implementation of effective Safety controls during all phases of their activities.
- Earth Tech will routinely assess all of our Safety program elements, as well as those programs at the business unit and individual project levels, to enable continuous improvement of our Safety systems.
- Earth Tech employees are expected to openly, thoroughly, and in a timely manner report and communicate all occupational injuries, illnesses, environmental releases, near-miss incidents, and property damage events in order to enhance our ability to prevent future incidents.

Safety Management System

Earth Tech's Safety Management System contains 12 major elements that further build upon our Core Values.

- **Leadership**
  Individuals at all levels in the Earth Tech organization are responsible for leading and engaging our staff, contractors, suppliers and partners in meeting our Safety goals and objectives. We will hold leaders accountable for demonstrating appropriate behavior, clearly defining Safety roles and responsibilities, and providing necessary resources. We will also measure, review and expect continuous improvement in their overall Safety performance.

- **Hazard Analysis**
  We will employ proven techniques to assist in the recognition, evaluation and control of hazards at the project, task and activity level of our operations. We will take appropriate action to ensure that these hazards are communicated to our customers, staff and partners that may be impacted.

- **Compliance**
  We will comply with existing laws and regulations in all locations in which we operate. We will also employ industry-specific Best Management Practices for our activities wherever we operate.

- **Training**
  The skills and competencies of our staff are critical to Earth Tech's success. We will train our staff on the elements of our Safety program and the functions we ask them to perform. We will regularly assess these skills and competencies and provide ongoing opportunities for our staff to increase their knowledge, improve their skills and enhance their performance.

- **Working With Others**
  Contractors, suppliers, vendors, and business partners play an important role in our overall Safety performance. We will work with them to ensure our overall objectives are

EARTH TECH A tyco INTERNATIONAL LTD. COMPANY **Environmental, Health & Safety Procedure**	PROCEDURE NO. EHS116 DATE April 8, 2002 REVISED February 10, 2003
DRIVER AND VEHICLE SAFETY	

Deleted: September 28, 2001

Deleted: Policy &

This supersedes all previous corporate-level procedures of all firms comprising Earth Tech, and is effective as of the date listed above. The Corporate Environmental, Health and Safety (EH&S) Department is responsible for the issuance, revision, and maintenance of this procedure. Any deviations from the procedures set forth herein require approval of the Corporate EH&S Director (CEHSD).

Deleted: set forth in this policy

1.0 PURPOSE

To establish the minimum requirements for Earth Tech personnel to promote driver and vehicle safety.

2.0 SCOPE

This procedure applies to all Earth Tech personnel operating a motor vehicle on Company business. Subcontractors and temporary employees are not allowed to drive any vehicle that is owned or leased by Earth Tech.

3.0 PROCEDURE

3.1 Driver's History

1. Anyone authorized to drive on Earth Tech business must maintain a valid driver's license. Any suspension or revocation of their driver's license and any violation or other conviction involving a motor vehicle must be immediately reported to their local supervisor or manager.

2. Any vehicle used for Earth Tech business must have the appropriate automobile liability insurance required by the state the vehicle is registered in. This includes personal vehicles if the employee is required to drive on Company business. Personal vehicle insurance is the responsibility of the employee.

3. Verification of a valid driver's license and, if appropriate, proof of auto liability insurance must be provided for all new employees who will drive on Company business. Additionally, their driving history for the previous three years must be examined.

4. The line of business Human Resources contact is responsible for re-evaluating driving history, driver's license, and auto liability insurance verification annually. In addition, Human Resources will notify the appropriate line of business manager if an employee has accumulated excessive points (as determined by the state) in the past three years. The affected employee's driving privileges will be suspended if he or she exceeds this

pre-determined criterion. When a driving privilege is temporarily suspended, Earth Tech may attempt, at its discretion, to place the employee in a position that does not require driving. Driving privileges will be revoked after conviction of any of the following violations, regardless of whether the violation occurred while on duty for Earth Tech:

- Driving under the influence ("DUI")/driving while intoxicated)("DWI");
- Negligent homicide with a vehicle;
- Vehicular manslaughter;
- Leaving the scene of an accident;
- Exceeding the speed limit by 25 mph or more;
- Reckless driving;
- Any felony conviction involving a motor vehicle;
- Failure to report an accident; and
- Knowingly falsifying an accident report or police report.

5. New employees may not drive on Company business if their DMV record shows a conviction for any of the following or similar violations within the three years immediately prior to their hiring date:

- Driving under the influence ("DUI")/driving while intoxicated)("DWI");
- Negligent homicide with a vehicle;
- Vehicular manslaughter;
- Leaving the scene of an accident (e.g., hit and run);
- Citation for exceeding the speed limit by 25 mph or more;
- Citation for reckless driving; and
- At Earth Tech's discretion, any other conviction involving a motor vehicle.

3.2 Training

1. It is strongly recommended that employees whose primary job duty involves driving an Earth Tech vehicle attend a recognized driving safety training course.

2. Other employees who normally drive rented vehicles while on business should attend one of the versions of the standard course. Attendance should be at the discretion of local managers and depend on driving frequency, accident records, observation of driving habits, etc.

3. Except where legal requirements dictate otherwise, the frequency of retraining should be determined by local managers.

4. It is recommended that managers observe subordinates' driving performance and provide constructive feedback when possible.

3.3 General Requirements

1. Employees who may be required to drive a vehicle must hold a valid state operator's license appropriate to the type(s) of vehicles they may be driving.

2. The driver is responsible for seeing that all state and local traffic laws and client regulations concerning vehicles are obeyed.

3. All vehicles used on Earth Tech business must be equipped with seat belts. Drivers and occupants of all vehicles shall use seat belts.

4. No employee shall drive on Earth Tech business when temporarily disabled, under the influence of alcohol or illegal drugs, or if excessively fatigued. Earth Tech employees may not work/drive for a combined total of more than 16 hours during a workday

5. Employees must drive defensively at all times.

6. Drivers shall not drive beyond any barricade or into any area with designations such as "HAZARDOUS" or "Do Not Enter." All facility protection directions concerning barricaded areas must be obeyed.

7. Caution shall be used when driving through congested areas or near areas where personnel and equipment are working.

8. Vehicle motors shall not be left running when no one is in the vehicle.

9. Truck operators will use chocks when parking on slopes or grades.

10. Unless required (such as on a client's property), keys will not be left in an unattended vehicle.

11. No motorcycles or private aircraft (unless specifically authorized) are to be driven on Earth Tech business.

12. Analytical samples or glass items shall be transported in vehicles in a safe manner and in accordance with 49 CFR regulations.

13. In case of an accident, regardless of who is injured, whose property is damaged, or who owns the vehicle, the driver shall:

    a. Stop.

    b. Call for medical assistance in case of personal injuries.

    c. Call police or highway patrol.

    d. Complete a Supervisor's Report of Incident and a Vehicle Accident Report and submit it to his/her supervisor as soon as possible in accordance with EHS 101, Injury, Illness and Accident Reporting. In addition, notify Corporate Legal.

    e. Ensure that names and addresses of any witnesses are entered on the Earth Tech report.

    f. Promptly notify his/her supervisor.

14. No personnel will be allowed to ride in a pickup truck cargo bed unless it has been equipped to transport personnel.

15. Verify that vehicle safety equipment is present in their vehicle and is in good working order, including, but not limited to, flashlights, fire extinguishers, and first aid kits.

16. Report missing or defective safety equipment to management and obtain replacement equipment before driving the vehicle.

17. Maintain vehicles in clean and orderly condition.

18. Ensure that the vehicle does not exceed its weight capacity.

~~19. Hitchhikers not permitted in company vehicles.~~

While operating a motor vehicle on Company business, Earth Tech employees are prohibited from:

20. Disabling any safety device including seat belts and air bags.

21. Carrying passengers in vehicles unless those passengers are Earth Tech employees, contractors, or customers with legitimate business reasons for being in the vehicle.

22. Allowing any unauthorized personnel to drive Company vehicles at any time.

23. Overloading and/or overcrowding vehicles.

24. Picking up hitchhikers.

25. Carrying firearms or other weapons in any Company vehicles.

26. Transporting hazardous materials or hazardous waste.

27. Operating any vehicle that is in unsafe operating condition.

28. Using portable computers or similar devices.

29. Being under the influence of alcohol, drugs, or other controlled substances.

30. Driving after taking any prescription or over-the-counter medication that may cause drowsiness, dizziness, or other side effects or that could affect the ability to safely and effectively operate a motor vehicle.

31. Using a company vehicle for any purpose in violation of federal, state, or local laws.

3.4 Fleet Management Program

1. A fleet management program has been developed to include preferred vendors, licensing, vehicle registration, and insurance coverage. This program allows for tracking of vehicles to eliminate the need for project managers to negotiate vehicle leases independently. A centralized program allows for greater efficiency by ensuring that vehicles are available and reduces costs by offering a limited number of vendors with more competitive volume pricing. The fleet management program also provides a centralized source for maintaining insurance coverage on all vehicles, either owned or leased by Earth Tech.

2. Hertz Car Rental and National Car Rental agencies have contracted with Earth Tech to provide low-cost rentals that include insurance in the pricing. Whenever Earth Tech employees rent vehicles from Hertz or National, insurance is included in the rates, and optional insurance should be declined. If it is necessary to rent from vendors other than Hertz or National, however, Earth Tech employees should accept insurance coverage.

3.5 Site Vehicles and Equipment

1. Mobile cranes, forklifts, winch trucks, front-end loaders, tractors, and other materials-handling equipment are not permitted to transport passengers.

2. A maximum of three passengers are permitted to ride inside of the truck cab unless the cab is specifically designed to accommodate additional passengers.

3. Passengers shall ride with all portions of their bodies inside the truck body or frame.

4. Passengers shall be in the seated position, with the seat belts in place, before the vehicle is set in motion.

5. Riding on a vehicle's bumper or tailgate is prohibited.

6. Tailgates will be closed before the vehicle is operated.

7. Passengers are not permitted to ride in the body of a dump truck or in the bed of a pickup truck.

8. Passengers are not permitted to ride on top of the load or to hold materials from shifting.

9. Vehicles must be designed to accommodate passenger transportation or the vehicle will not be used for that purpose.

10. Drivers transporting passengers will follow the posted or specified speed limit and traffic rules established for the project.

3.6 Cellular Phone/Wireless Communications

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While operating a motor vehicle on Company business, Earth Tech employees are prohibited from using wireless communication devices unless legally parked or unless the device is in a hands-free mode and mounted so that its use does not require the driver to divert their eyes from traffic.

3.7 Safety Inspections

1. All vehicles used on Company business must be inspected at the beginning of each work shift before they are driven. These inspections must include verifying the safe operating condition of the following:

   - Seat belts
   - Doors and door locks
   - Headlights and tail-lights
   - Rearview mirrors and side mirrors
   - Turn signals
   - Backup lights
   - Horn
   - Backup alarms, if applicable
   - Parking break
   - Speedometer
   - Steering
   - Windows operate correctly and are clean and free of damage that may interfere with the driver's vision
   - Windshield wipers and windshield washer fluid
   - Windshield defrosters and rear window defrosters (if any)
   - Defroster/Defogger
   - Tire pressure and tread wear within manufacturer's specified limits

2. If any condition prevents an item from working properly or if the vehicle is deemed unsafe as a result of the inspection, the keys must be returned to the supervisor and the vehicle must be repaired or replaced immediately.

4.0 ACCIDENT REVIEW BOARD

Based on the severity and circumstances that caused a vehicle accident, an investigation may be initiated to determine causal agents and any disciplinary actions toward the driver. The Accident Review Board, at a minimum, will consist of the line of business EH&S Manager, Human Resources Coordinator, and the employee's supervisor.

5.0 REFERENCES

- ESH101 Injury, Illness, and Near Miss Reporting
- ESH301 Training Programs

met. We will monitor our contractors' and partners' performance to ensure they meet and/or exceed our expectations.

- **Design and construction**
  We will employ recognized standards, procedures and practices during the design and construction of all new and/or modified facilities. Our design, procurement, construction and commissioning processes will focus on delivering a safe and environmentally sensitive facility throughout the life cycle of the facility.

- **Operations and maintenance**
  We will operate and maintain all facilities and equipment in accordance with approved permits, plans, specifications and all applicable safety health, and environmental regulations.

- **Change Management**
  We will evaluate each change of organization, personnel, systems, procedures, equipment or materials to ensure safety, health and environmental risks are controlled and remain at an acceptable level.

- **Safety performance information**
  We will maintain accurate safety, health and environmental performance information related to all of our operations.

- **Emergency management**
  Emergency management plans will be maintained for all our offices and facilities. The plans will identify equipment, training and personnel necessary in the event of an incident to protect employees, customers, contractors, partners, members of the public, the environment and Earth Tech's reputation.

- **Incident reporting, investigation and prevention**
  Incidents will be reported, investigated and analyzed to determine their root causes and to determine necessary actions to prevent reoccurrence. We will communicate the results of incident investigations throughout the organization.

- **Continuous improvement**
  We will establish a process to routinely assess our compliance with the elements of our safety program. We will use both internal self-assessments and appropriate reviews from outside our organization to help us improve our performance and processes. As part of our continuous improvement process we will recognize those individuals and/or work groups that exhibit exemplary contributions to our overall performance.

Business Unit Responsibilities

Business Unit Managers are responsible for establishing and communicating appropriate systems and processes for each of the 12 Safety elements. They are also responsible for meeting established Safety objectives and for verifying that their processes and systems are effe-

through the use of a routine self-assessment process.

The content of Business Unit Safety management and assessment systems is a matter of management choice. However, any Business Unit policy, program and/or procedure must be:

- Compatible with the Corporate Safety Management System
- Appropriate to operational risks
- Relevant to local regulatory codes

While operational flexibility will continue to be an important element of our culture and success, we encourage standardization of programs, work processes and procedures across similar operations. We also recommend the transfer, sharing and adoption of efficient and cost-effective Best Practices.

EARTH TECH A TYCO INTERNATIONAL LTD. COMPANY **Environmental, Health & Safety Procedure**	PROCEDURE NO. EHS101 DATE February 22, 2002 REVISED
INJURY, ILLNESS, AND NEAR MISS REPORTING	

This supersedes all previous corporate-level procedures of all firms comprising Earth Tech, and is effective as of the date listed above. The Corporate Environmental, Health and Safety (EH&S) Department is responsible for the issuance, revision, and maintenance of this procedure. Any deviations from the procedures set forth herein require approval of the Corporate EH&S Director (CEHSD).

1.0 PURPOSE

All work-related injuries, illnesses, and near-miss situations must be documented and reported to the EH&S Department and Earth Tech management in a timely and accurate manner.

2.0 DEFINITIONS

SRI – Supervisor's Report of Injury (see Attachment 1)

WCA – Workers' Compensation Administrator

Near Miss – Any non-injury safety incident (accident, etc.) where an injury to an on-site worker or member of the public could have occurred, or where more than $500 in property or vehicle damage occurs.

3.0 RESPONSIBILITIES

3.1 EH&S Department

1. Notifying Earth Tech's Medical Case Management Provider of any work-related injury or illness case that requires continuing medical treatment or care.
2. Reviewing all reports and documentation pertinent to any work-related injury, illness, or near miss involving any Earth Tech employee (including Workers' Compensation coverage).
3. Reporting fatalities and/or hospitalization cases to the appropriate OSHA Area Office and to the Corporate Legal Department.
4. Reporting to the Human Resources Department cases involving lost work time of more than five days.

3.2 Section Managers

1. Reviewing the SRI prepared by the workplace supervisor as a result of a work-related injury, illness, or near miss.
2. Forwarding the completed SRI to the EH&S Manager within 8 hours.

3.3 Workplace Supervisors

1. Notifying the appropriate EH&S Manager of any work-related fatality, injury, illness, or near miss.
2. Notifying Earth Tech's Workers' Compensation third-party administrator, Sedgwick Claims Management Services (SCMS), of any work-related injury or illness that has the potential to require medical treatment or care.
3. Initiating an SRI for any work-related injury, illness, or near miss.

4. Forwarding copies of the SRI to the Section Manager and the EH&S Manager.

5. Completing additional documentation/forms as directed.

3.4 All Earth Tech Employees

1. Notifying his/her workplace supervisor of any injury, illness, or near miss, and stating whether any medical treatment will be sought.

3.5 Earth Tech Subcontractor Organizations

1. Notifying Earth Tech's workplace supervisor of any fatality, injury, illness, or near miss.

2. Providing Earth Tech's workplace supervisor with copies of documentation prepared in response to an injury, illness, or near miss that is determined to be work-related.

4.0 PROCEDURES

The following response procedures will be followed in the event of any work-related injury, illness, or near miss occurring at an Earth Tech work location.

4.1 Injury/Illness Involving Earth Tech Personnel

1. Affected Employee: Each injured/ill employee must notify his/her supervisor immediately that an incident has occurred, the circumstances involved, the nature and extent of the injuries/illness, and whether medical treatment may be required. Except for emergency aid, affected employees will follow the supervisor's instructions concerning obtaining medical treatment.

2. Workplace Supervisor: The workplace supervisor must **immediately** perform the following notifications:

   a. Verbally to the EH&S Manager, with a follow-up SRI completed and faxed within 24 hours (see attached SRI, page 2).

   b. Verbally to his/her Manager, and secure the Manager's signature on the SRI within 24 hours. If the supervisor's Manager is unavailable, obtain the signature from a designated acting Manager.

   c. For work-related injuries/illnesses requiring medical treatment, verbally notifying Earth Tech's Workers' Compensation insurance carrier within 8 hours (SCMS: 877-261-8926). Information required by SCMS at the time of notification includes all items in the first two sections of the SRI. The SCMS Claim# assigned to the case will be noted on the SRI.

   d. Fatalities must be reported to the appropriate EH&S Manager and Corporate EH&S Director within 2 hours.

3. Section Manager: Review the SRI as prepared by the workplace supervisor. Complete Section 3 of the form and forward to the WCA within 24 hours of receipt.

4. WCA:

   a. As necessary, provide direction to the workplace supervisor concerning medical treatment for the affected employee(s).

   b. Review the in-progress SRI provided by the workplace supervisor. Coordinate with Earth Tech's Medical Case Management Provider on all medical issues.

   c. Notify the Human Resources Department concerning any work-related injury or illness involving lost work time.

4.2 Injury/Illness Involving Subcontractor Personnel

1. Affected Subcontractor Employee: Notify his/her supervisor immediately that an incident has occurred.

2. Subcontractor's Workplace Supervisor: Notify the Earth Tech workplace supervisor that an incident has occurred and provide a description including all available information related to the incident.

3. Earth Tech Workplace Supervisor: Notify the EH&S Manager of the incident.

4. Subcontractor Organization: Provide Earth Tech with copies of all internal incident documentation (e.g., incident report, medical information, investigation information).

4.3 Near-Miss Incident

1. Affected Employee: Each affected employee must notify his/her supervisor immediately that an incident has occurred and the circumstances involved.

2. Workplace Supervisor: The workplace supervisor must perform the following notifications within 4 hours of any near-miss incident:

   a. Verbally to the EH&S Manager, with a follow-up SRI completed and faxed within 24 hours (see SRI instructions).

   b. Verbally to their Manager, and secure the Manager's signature on the SRI within 24 hours.

3. Section Manager: Review the SRI as prepared by the workplace supervisor. Complete Section 3 of the form and forward to the EH&S Manager within 24 hours of receipt.

4. EH&S Manager: Review the in-progress SRI provided by the workplace supervisor.

5.0 INTERNATIONAL OPERATIONS

The following reporting procedure will be implemented at Earth Tech international locations.

5.1 Fatalities in European Countries

The appointed site/project Health and Safety Manager will notify the European Health and Safety Manager, Corporate EH&S, and the Corporate Legal Department.

Corporate EH&S will inform Corporate Legal and the Senior Vice President of Construction Management Services of appropriate course(s) of action to be taken (e.g., investigation, audit, etc.).

5.2 Fatalities in Non-European Countries

The appointed Health and Safety Manager will notify Corporate EH&S. Corporate EH&S will then initiate the proper notification channels and corrective actions (Corporate Legal, Senior Vice President of Construction Management Services).

5.3 Injury and Illness Reporting

The appointed Health and Safety Manager will contact the appropriate EH&S Manager within 24 hours for review/discussion/corrective actions to be implemented.

5.4 Documentation

If an international location has an established form to be used for reporting incident, illness, injury, fatality, or Workers' Compensation, that form should be completed by the Health and Safety Manager and sent to the Earth Tech Corporate EH&S Department. Otherwise, Health and Safety Managers may complete the Supervisor's Report of Incident (SRI) form, attached.

6.0 ATTACHMENTS

Attachment 1: Supervisor's Report of Incident (SRI)

EARTH TECH
A TYCO INTERNATIONAL LTD. COMPANY

Supervisor's Report of Incident

This is an official document to be initiated by the injured employee's Supervisor regarding possible employee injury. Please answer all questions completely. Fax to EH&S within 24 hours of the injury: (804) 515-8313. See 2nd page for instructions.

Section 1: Data for Employee Involved in Incident – To be completed by supervisor. Avoid reporting delays and complete as much as possible now; submit fully completed form (including corrective actions) at a later time.

Complete Sections 1 & 2, then call 877-261-8926 (TYCO) to obtain a Sedgwick Claim#: _____

Office Location Code (3-digit number) _____ Employee Department (4-digit number) _____

Employee Office Location Address _____

☐ Injury ☐ Illness ☐ Injury From a Vehicle Incident ☐ Near Miss

Employee Name	Work Phone	Home Phone	Birth Date	SSN
Home Address (City, State, Zip)				
Hire Date	Hourly Wage	Marital Status	Dependents	Job Title

Section 2: Supervisor (Must complete each item) - Print Clearly

Date of Incident	Time	Date/Time Reported	To Whom
Client Name/Job Number	Job Assignment at Time of Incident		Time Shift Began
Exact Location & Address of Incident			
Describe Incident			
Root cause of Incident			
Nature of Injury			
Medical Attention? ☐ Yes ☐ No If yes, describe treatment			
Dr./Hospital Name		Address/Phone of Hosp.	
Witness Name *(Any witnesses should attach a short statement)*			
Did injured leave work? When?		Has injured returned to work? ☐ Yes ☐ No	
Corrective Action(s) to Prevent Future Occurrence:			
Supervisor/Foreman (Print Name)		Signature	Telephone Date

Section 3: Manager

Comprehensive comments on root cause of incident and corrective action		
Manager (Print Name)	Signature	Telephone Date

Section 4: Environmental Safety and Health Professional

Concur with action taken? ☐ Yes ☐ No Remarks:

☐ No Medical Care ☐ First Aid Only ☐ Medical Care by Medical Professional ☐ Fatality

OSHA Recordable ☐ Yes ☐ No ☐ Pending ☐ Days away from work _____ ☐ Restricted Days _____

ESH Professional (Print Name)	Signature	Date

Supervisor's Report of Incident
Instructions For Completion

The following types of incidents must be reported using this form:

1. Occupational Injury or Illness (includes first aid only, medical treatment, hospitalization, fatality)
2. Vehicle Accident Injuries
3. Near Miss (incident where employee(s) could have been injured) this includes vehicle incidents

INSTRUCTIONS

1. Employees must report such incidents to their Supervisor **immediately**.
2. The Supervisor must complete **Sections 1 and 2, Employee Data and the Supervisor Section** of the SRI. Any work-related injury or illness that requires medical care in the United States will require notifying SCMS at 877-261-8926.
3. The Supervisor must verbally notify his/her Manager, who in turn must sign **Section 3, Manager**, of the SRI. To avoid delaying the SRI process, a separate copy of the SRI with the Manager's signature can be faxed within 3 days to EH&S.
4. The Supervisor must verbally notify EH&S with a follow-up SRI faxed within 24 hours (see below for fax numbers). EH&S will review and complete **Section 4, Environmental Health and Safety**. For near-miss situations that could have resulted in an injury to an employee, the Supervisor must notify his/her Manager (see Item 3 above) and EH&S with a follow-up SRI faxed within 24 hours.

PRIMARY CONTACTS

Environmental/Engineering/Transportation		**Construction**
East:	Dale Prokopchak, CIH, CSP Telephone: 804-515-8556 Fax: 804-515-8313	Chuck Pryor, CSP Telephone: 510-419-5133 Fax: 510-419-6746
West:	Bob Poll, CIH, CSP Telephone: 562-951-2242 Fax: 562-951-2100	**Contract Operations** Mark Robinson, CSP Telephone: 920-451-2862 Fax: 920-458-0537
Administrator:	Chelsea Ryan Telephone: 804-515-8557 Fax: 804-515-8313	

 This report contains information protected by the Privacy Act.

EARTH TECH A TYCO INTERNATIONAL LTD. COMPANY **Environmental, Health & Safety Procedure**	PROCEDURE NO. EHS102 DATE February 22, 2002 REVISED
INCIDENT INVESTIGATION	

This supersedes all previous corporate-level procedures of all firms comprising Earth Tech, and is effective as of the date listed above. The Corporate Environmental, Health and Safety (EH&S) Department is responsible for the issuance, revision, and maintenance of this procedure. Any deviations from the procedures set forth herein require approval of the Corporate EH&S Director (CEHSD).

1.0 PURPOSE

All work-related injuries, illnesses, and near-miss situations must be investigated. Investigations are conducted to determine the immediate and contributing root causes of incidents so that corrective actions can be taken to minimize future risks to employees.

2.0 DEFINITIONS

IIR – Incident Investigation Report

Near Miss – Any non-injury safety incident (accident, etc.) where an injury to an on-site worker or member of the public could have occurred.

SOP – Standard Operating Procedure

3.0 RESPONSIBILITIES

3.1 EH&S Department

The Corporate EH&S Department is responsible for issuance, revision, and overall direction of this procedure. Any deviations from this procedure require approval from the CEHSD.

3.2 Site Supervisors/Project Managers

Site Supervisors/Project Managers are directly responsible for initiating the incident investigation and complying with the procedures.

3.3 All Earth Tech Employees

Employees will provide accurate information to assist in completion of the IIR forms.

4.0 PROCEDURES

In keeping with Earth Tech's Accident and Incident Reporting Procedure EHS101, all work-related injuries, illnesses, and near-miss situations must be investigated and documented. The degree and depth of the investigation will be determined by the EH&S Manager based on the severity of the incident. Incident investigation procedures are as follows.

4.1 Initial Investigation

Any injury, illness, or near miss must be investigated initially by the responsible Supervisor or Project Manager. Assistance in conducting an incident investigation can be obtained from the responsible EH&S Manager or designated EH&S Professional.

4.2 IIR Form

The investigation shall be conducted within 48 hours of the incident occurrence and findings documented on the IIR form. See Attachment 1.

4.2.1 Investigation Techniques

Use sound investigation techniques, including the following:

- Begin the investigation as soon after the incident as practical.
- Reconstruct and document the event leading up to the incident as accurately as possible.
- Conduct all interviews one-on-one, in private, and use "open-ended" questions.
- Make the goal of the investigation to determine the cause of incidents, rather than to place blame on an individual.
- Identify the root cause of the incident and determine methods to change the "systems," not only the conditions or actions.

4.2.2 Required Data

Gather the following data (where applicable to the incident):

- Background data concerning the incident derived from supervisor's reports and personal interviews with employees, response personnel, and other parties who were either involved in the incident or witnessed its occurrence. This data includes the time, date, location, operation or equipment involved in the incident, as well as personal information on employee(s) involved.
- Equipment information including brand, type, size, custom modifications, current condition, and its repair history.
- Activity at the time of the event indicating the general job task being performed (e.g., pump repair) and specific activity (e.g., using pipe wrench).
- Workshift information such as shift (e.g., day, evening, midnight), length of shift, breaks, etc.
- General preventive measures that were in place at the time of the incident, including: personal protective equipment worn, employee training for the task being performed, SOPs for the activity, and supervision present.
- Weather conditions that may have contributed to the incident such as snow, ice, heat, rain, strong winds, etc.

4.3 Distribution of Completed IIR Forms

Copies of completed IIR forms will be distributed as follows.

4.3.1 All IIR Forms

Copies of the completed IIR form must be sent to the respective Business Section Manager and EH&S Manager, with follow-up to the CEHSD.

4.3.2 Serious Incidents

Depending on the seriousness of the incident (e.g., fatality, multiple injuries/hospitalization), an Accident Review Board will formally perform an investigation. The Board will consist of the Site Supervisor or Project Manager and be managed by the EH&S Department. The Board will conduct a thorough investigation of the incident and issue a Summary of Findings for the review and approval of both the EH&S Manager and CEHSD.

4.4 Corrective Actions

Upon completion of the investigation, the Site Supervisor and/or Project Manager shall implement procedures to prevent reoccurrence of the incident. Acceptable corrective actions include re-training all employees as needed, modifying work practices, installing equipment to alleviate the situation, and using personal protective equipment. Unacceptable actions include retaliation and stating that the accident was unavoidable. Employee counseling (verbal discussions with the employee concerning willful and/or unacceptable acts that led to the accident) are permitted only if written records are maintained for such counseling and placed in the employee's file.

5.0 REFERENCE

ESH101 Injury, Illness, and Near Miss Reporting.

6.0 INTERNATIONAL OPERATIONS

Employees working in Earth Tech offices located outside of the United States must comply with that country's applicable environmental health and safety procedures, rules, and programs. For cases where the host-country regulatory guidance conflicts with the requirements of this procedure, the EH&S Department will assist with the development of an alternate country-specific program. In the absence of contrary host-country requirements, however, EHS102 will be enforced.

ATTACHMENT:

Attachment 1: Incident Investigation Report (IIR) Form

Incident Investigation Report

EARTH TECH
A TYCO INTERNATIONAL LTD. COMPANY

Circle one:

Injury **Illness** **Near Miss**

Project No.:_____ Site Phone No.:_____ Fax No.: _____

Project Location:_____

Employee's Full Name:_____ Dept. No.:_____/Office Location:_____

Details of Incident:

Date/Time of Incident:	Date/Time Reported:	To Whom:

Describe below the apparent extent of injury or illness and parts of the body affected (e.g., laceration, burn, fracture; right lower leg, left index finger):

Did a chemical exposure occur? If yes, what known contaminants were present? What type of exposure occurred (e.g., inhalation, ingestion, skin contact)? Were physical hazards present (e.g., slip/trip/fall, lifting):

Describe fully how the incident happened and give possible causes and results (attach additional sheets if required):

Describe exact location where incident occurred:

List names and addresses of witnesses to the incident:

Work schedule at time of incident (hours per day & days per week):
What direction had been given on the task?
How can you or the company prevent similar incidents from happening again?
Circle level of personal protective equipment utilized at time of incident: Level A Level B Level C Level D
Did personal protective equipment fail? (e.g., Tyvek torn, glove ripped, respirator failed, etc.) If so, describe:
Did protective equipment/tools/machinery fail? (e.g., defective ladder, scaffold, pump, etc.) If so, describe:
What action has been taken or will be taken to prevent similar occurrences?
Additional Comments:

Signatures:

Employee (Print Name):	Signature:	Date:
Supervisor/Project Manager (Print Name):	Signature:	Date:
EH&S Manager (Print Name):	Signature:	Date:

Important: Fill out this form completely and accurately. Within 48 hours of incident, send the original form to the EH&S Manager. Retain a copy at the job site. Attach to report any related information (photographs, doctor slips, witness statements, policy reports, etc.).

EARTH TECH A TYCO INTERNATIONAL LTD COMPANY **Environmental, Health & Safety Procedure**	PROCEDURE NO. EHS116 DATE April 8, 2002 REVISED February 10, 2003
DRIVER AND VEHICLE SAFETY	

This supersedes all previous corporate-level procedures of all firms comprising Earth Tech, and is effective as of the date listed above. The Corporate Environmental, Health and Safety (EH&S) Department is responsible for the issuance, revision, and maintenance of this procedure. Any deviations from the procedures set forth herein require approval of the Corporate EH&S Director (CEHSD).

1.0 PURPOSE

To establish the minimum requirements for Earth Tech personnel to promote driver and vehicle safety.

2.0 SCOPE

This procedure applies to all Earth Tech personnel operating a motor vehicle on Company business. Subcontractors and temporary employees are not allowed to drive any vehicle that is owned or leased by Earth Tech.

3.0 PROCEDURE

3.1 Driver's History

1. Anyone authorized to drive on Earth Tech business must maintain a valid driver's license. Any suspension or revocation of their driver's license and any violation or other conviction involving a motor vehicle must be immediately reported to their local supervisor or manager.

2. Any vehicle used for Earth Tech business must have the appropriate automobile liability insurance required by the state the vehicle is registered in. This includes personal vehicles if the employee is required to drive on Company business. Personal vehicle insurance is the responsibility of the employee.

3. Verification of a valid driver's license and, if appropriate, proof of auto liability insurance must be provided for all new employees who will drive on Company business. Additionally, their driving history for the previous three years must be examined.

4. The line of business Human Resources contact is responsible for re-evaluating driving history, driver's license, and auto liability insurance verification annually. In addition, Human Resources will notify the appropriate line of business manager if an employee has accumulated excessive points (as determined by the state) in the past three years. The affected employee's driving privileges will be suspended if he or she exceeds this

pre-determined criterion. When a driving privilege is temporarily suspended, Earth Tech may attempt, at its discretion, to place the employee in a position that does not require driving. Driving privileges will be revoked after conviction of any of the following violations, regardless of whether the violation occurred while on duty for Earth Tech:

- Driving under the influence ("DUI")/driving while intoxicated)("DWI");
- Negligent homicide with a vehicle;
- Vehicular manslaughter;
- Leaving the scene of an accident;
- Exceeding the speed limit by 25 mph or more;
- Reckless driving;
- Any felony conviction involving a motor vehicle;
- Failure to report an accident; and
- Knowingly falsifying an accident report or police report.

5. New employees may not drive on Company business if their DMV record shows a conviction for any of the following or similar violations within the three years immediately prior to their hiring date:

- Driving under the influence ("DUI")/driving while intoxicated)("DWI");
- Negligent homicide with a vehicle;
- Vehicular manslaughter;
- Leaving the scene of an accident (e.g., hit and run);
- Citation for exceeding the speed limit by 25 mph or more;
- Citation for reckless driving; and
- At Earth Tech's discretion, any other conviction involving a motor vehicle.

3.2 Training

1. It is strongly recommended that employees whose primary job duty involves driving an Earth Tech vehicle attend a recognized driving safety training course.

2. Other employees who normally drive rented vehicles while on business should attend one of the versions of the standard course. Attendance should be at the discretion of local managers and depend on driving frequency, accident records, observation of driving habits, etc.

3. Except where legal requirements dictate otherwise, the frequency of retraining should be determined by local managers.

4. It is recommended that managers observe subordinates' driving performance and provide constructive feedback when possible.

3.3 General Requirements

1. Employees who may be required to drive a vehicle must hold a valid state operator's license appropriate to the type(s) of vehicles they may be driving.

2. The driver is responsible for seeing that all state and local traffic laws and client regulations concerning vehicles are obeyed.

3. All vehicles used on Earth Tech business must be equipped with seat belts. Drivers and occupants of all vehicles shall use seat belts.

4. No employee shall drive on Earth Tech business when temporarily disabled, under the influence of alcohol or illegal drugs, or if excessively fatigued. Earth Tech employees may not work/drive for a combined total of more than 16 hours during a workday

5. Employees must drive defensively at all times.

6. Drivers shall not drive beyond any barricade or into any area with designations such as "HAZARDOUS" or "Do Not Enter." All facility protection directions concerning barricaded areas must be obeyed.

7. Caution shall be used when driving through congested areas or near areas where personnel and equipment are working.

8. Vehicle motors shall not be left running when no one is in the vehicle.

9. Truck operators will use chocks when parking on slopes or grades.

10. Unless required (such as on a client's property), keys will not be left in an unattended vehicle.

11. No motorcycles or private aircraft (unless specifically authorized) are to be driven on Earth Tech business.

12. Analytical samples or glass items shall be transported in vehicles in a safe manner and in accordance with 49 CFR regulations.

13. In case of an accident, regardless of who is injured, whose property is damaged, or who owns the vehicle, the driver shall:

    a. Stop.

    b. Call for medical assistance in case of personal injuries.

    c. Call police or highway patrol.

    d. Complete a Supervisor's Report of Incident and a Vehicle Accident Report and submit it to his/her supervisor as soon as possible in accordance with EHS 101, Injury, Illness and Accident Reporting. In addition, notify Corporate Legal.

    e. Ensure that names and addresses of any witnesses are entered on the Earth Tech report.

    f. Promptly notify his/her supervisor.

14. No personnel will be allowed to ride in a pickup truck cargo bed unless it has been equipped to transport personnel.

15. Verify that vehicle safety equipment is present in their vehicle and is in good working order, including, but not limited to, flashlights, fire extinguishers, and first aid kits.

16. Report missing or defective safety equipment to management and obtain replacement equipment before driving the vehicle.

17. Maintain vehicles in clean and orderly condition.

18. Ensure that the vehicle does not exceed its weight capacity.

19. Smoking is not permitted in company vehicles.

While operating a motor vehicle on Company business, Earth Tech employees are prohibited from:

20. Disabling any safety device including seat belts and air bags.

21. Carrying passengers in vehicles unless those passengers are Earth Tech employees, contractors, or customers with legitimate business reasons for being in the vehicle.

22. Allowing any unauthorized personnel to drive Company vehicles at any time.

23. Overloading and/or overcrowding vehicles.

24. Picking up hitchhikers.

25. Carrying firearms or other weapons in any Company vehicles.

26. Transporting hazardous materials or hazardous waste.

27. Operating any vehicle that is in unsafe operating condition.

28. Using portable computers or similar devices.

29. Being under the influence of alcohol, drugs, or other controlled substances.

30. Driving after taking any prescription or over-the-counter medication that may cause drowsiness, dizziness, or other side effects or that could affect the ability to safely and effectively operate a motor vehicle.

31. Using a company vehicle for any purpose in violation of federal, state, or local laws.

3.4 Fleet Management Program

1. A fleet management program has been developed to include preferred vendors, licensing, vehicle registration, and insurance coverage. This program allows for tracking of vehicles to eliminate the need for project managers to negotiate vehicle leases independently. A centralized program allows for greater efficiency by ensuring that vehicles are available and reduces costs by offering a limited number of vendors with more competitive volume pricing. The fleet management program also provides a centralized source for maintaining insurance coverage on all vehicles, either owned or leased by Earth Tech.

2. Hertz Car Rental and National Car Rental agencies have contracted with Earth Tech to provide low-cost rentals that include insurance in the pricing. Whenever Earth Tech employees rent vehicles from Hertz or National, insurance is included in the rates, and optional insurance should be declined. If it is necessary to rent from vendors other than Hertz or National, however, Earth Tech employees should accept insurance coverage.

3.5 Site Vehicles and Equipment

1. Mobile cranes, forklifts, winch trucks, front-end loaders, tractors, and other materials-handling equipment are not permitted to transport passengers.

2. A maximum of three passengers are permitted to ride inside of the truck cab unless the cab is specifically designed to accommodate additional passengers.

3. Passengers shall ride with all portions of their bodies inside the truck body or frame.

4. Passengers shall be in the seated position, with the seat belts in place, before the vehicle is set in motion.

5. Riding on a vehicle's bumper or tailgate is prohibited.

6. Tailgates will be closed before the vehicle is operated.

7. Passengers are not permitted to ride in the body of a dump truck or in the bed of a pickup truck.

8. Passengers are not permitted to ride on top of the load or to hold materials from shifting.

9. Vehicles must be designed to accommodate passenger transportation or the vehicle will not be used for that purpose.

10. Drivers transporting passengers will follow the posted or specified speed limit and traffic rules established for the project.

3.6 Cellular Phone/Wireless Communications

While operating a motor vehicle on Company business, Earth Tech employees are prohibited from using wireless communication devices unless legally parked or unless the device is in a hands-free mode and mounted so that its use does not require the driver to divert their eyes from traffic.

3.7 Safety Inspections

1. All vehicles used on Company business must be inspected at the beginning of each work shift before they are driven. These inspections must include verifying the safe operating condition of the following:

   - Seat belts
   - Doors and door locks
   - Headlights and tail-lights
   - Rearview mirrors and side mirrors
   - Turn signals
   - Backup lights
   - Horn
   - Backup alarms, if applicable
   - Parking break
   - Speedometer
   - Steering
   - Windows operate correctly and are clean and free of damage that may interfere with the driver's vision
   - Windshield wipers and windshield washer fluid
   - Windshield defrosters and rear window defrosters (if any)
   - Defroster/Defogger
   - Tire pressure and tread wear within manufacturer's specified limits

2. If any condition prevents an item from working properly or if the vehicle is deemed unsafe as a result of the inspection, the keys must be returned to the supervisor and the vehicle must be repaired or replaced immediately.

4.0 ACCIDENT REVIEW BOARD

Based on the severity and circumstances that caused a vehicle accident, an investigation may be initiated to determine causal agents and any disciplinary actions toward the driver. The Accident Review Board, at a minimum, will consist of the line of business EH&S Manager, Human Resources Coordinator, and the employee's supervisor.

5.0 REFERENCES

- ESH101 Injury, Illness, and Near Miss Reporting
- ESH301 Training Programs

Review and evaluates
verifies and completes necessary info
extract ifno
enters info database
reviews a viariety of
evaluates data
utilizes judgement and understanding of
relates findings to
assesses info and provides recom's