SAFETY AND HEALTH PLAN

FORMER COMMUNICATIONS SITE RI/FS DRUM AND DEBRIS INVESTIGATION

FORT WAINWRIGHT, ALASKA

DRAFT
JULY 2007

Prepared for:
U.S. Army Corps of Engineers
P.O. Box 6898
Elmendorf AFB, Alaska 99506-0898

Prepared by:
Jacobs Engineering Group Inc.
4300 B Street, Suite 600
Anchorage, Alaska 99503

Environmental Remediation Services
Contract No. W911KB-06-D-0006
Task Order No. 06

FORMER COMMUNICATIONS SITE
APPROVAL, ACKNOWLEDGMENT, AND COMMITMENT

Providing for a safe work environment and protecting the health and safety of onsite workers and visitors is everyone's responsibility. This Site Safety and Health Plan addresses location-specific emergency preparedness, escape routes, safety risks, work conditions, and contaminants of concern for this site. This plan will be followed by anyone associated with this job that is authorized by the Site Safety and Health Officer, Safety and Health Manager, or Site Manager to enter the job site. Safety shall be everyone's responsibility.

Name	Date	Name	Date
Site Safety and Health Officer		Project Manager	
Jacobs HSE Manager		Site Manager	

(intentionally blank)

TABLE OF CONTENTS

SECTION **PAGE**

ACRONYMS AND ABBREVIATIONS v

1.0 INTRODUCTION AND PURPOSE 1-1

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES 2-1

2.1 SITE MANAGER/SITE SAFETY AND HEALTH OFFICER REQUIREMENTS 2-1

2.2 EMPLOYEE RESPONSIBILITIES 2-2

2.3 SUBCONTRACTOR RESPONSIBILITIES 2-3

2.4 VISITOR RESPONSIBILITIES 2-4

3.0 PROJECT INFORMATION 3-1

3.1 FORMER COMMUNICATIONS SITE 3-1

3.2 FORMER COMMUNICATIONS SITE UNIQUE HAZARD ELEMENTS 3-1

3.2.1 Contaminants of Potential Concern 3-1

3.2.2 Utility Lines 3-3

3.2.3 Drums with Unknown Contents 3-3

4.0 ACTIVITY HAZARD ANALYSIS 4-1

5.0 HEALTH AND SAFETY ENVIRONMENTAL PROCEDURES/ STANDARD OPERATING PROCEDURES 5-1

6.0 RESPIRATORY PROTECTION PROGRAM 6-1

7.0 AIR MONITORING PLAN 7-1

8.0 HAZARD COMMUNICATION PROGRAM 8-1

9.0 PERSONAL PROTECTIVE EQUIPMENT 9-1

9.1 HEARING PROTECTION 9-1

9.2 EYE PROTECTION 9-1

9.3 PROTECTIVE CLOTHING 9-2

9.4 LEVELS OF PERSONAL PROTECTIVE EQUIPMENT 9-2

9.4.1 Level A 9-2

9.4.2 Level B 9-3

9.4.3 Level C 9-3

9.4.4 Level D 9-4

10.0 SITE CONTROL 10-1

10.1 WORK ZONES 10-1

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

10.2 BUDDY SYSTEM....10-1
10.3 COMMUNICATIONS....10-1
10.4 SITE SAFETY AND SECURITY....10-2
10.5 DECONTAMINATION PROCEDURES....10-2
10.5.1 Personnel Decontamination....10-2
10.5.2 Equipment and Vehicle Decontamination....10-3
10.6 WASTE HANDLING AND DISPOSAL....10-3
10.7 CONFINED SPACE....10-3
11.0 INSPECTIONS....11-1
11.1 SITE INSPECTIONS SAFETY EVALUATION....11-1
11.2 EQUIPMENT INSPECTIONS....11-1
11.2.1 Daily/Shift Inspections and Tests....11-1
11.2.2 Vehicle Inspections....11-2
11.3 SAFETY OBSERVATION REPORTS....11-2
12.0 EXTREME WEATHER SITE WORK....12-1
13.0 EMERGENCY PROCEDURES....13-1
13.1 PRE-EMERGENCY PLANNING....13-1
13.2 EMERGENCY COMMUNICATION....13-1
13.3 EMERGENCY MEDICAL TREATMENT....13-2
13.4 FIRE....13-2
13.5 PERSONAL PROTECTIVE EQUIPMENT....13-3
13.6 OTHER EQUIPMENT FAILURE....13-3
13.7 EVACUATION....13-3
13.8 EMERGENCY RESPONSE AND ACCIDENT FOLLOW-UP....13-3
13.9 EXPOSURE TO BLOODBORNE PATHOGENS....13-4
13.10 VEHICLE ACCIDENT....13-5
13.11 INJURY AND ILLNESS....13-5
13.12 SPILL OR RELEASE PROCEDURES....13-5
14.0 ORIENTATION AND TRAINING....14-1
15.0 SITE POSTINGS....15-1
16.0 REFERENCES....16-1

TABLE OF CONTENTS
(continued)

SECTION **PAGE**

TABLE

Table B-1 Air Monitoring Requirements and Action Levels 7-2

ATTACHMENTS

Attachment 1 FCS Contact List, Emergency Numbers, and Location Map

Attachment 2 FCS Safety and Health Agreement Sign-off Sheet

Attachment 3 Applicable Health, Safety, and Environmental Procedures and Material Safety Data Sheets

Attachment 4 FCS Activity Hazard Analysis

Attachment 5 FCS-Specific Hazard Communication Program

Attachment 6 Applicable Forms

(intentionally blank)

ACRONYMS AND ABBREVIATIONS

ACGIH	American Conference of Government Industrial Hygienists
AHA	Activity Hazard Analysis
BZ	breathing zone
CFR	Code of Federal Regulations
COC	contaminant of concern
DCP	Dichloropropane
DRO	diesel-range organics
FCS	Former Communications Site
GRO	gasoline-range organics
HSE	Health, Safety, and Environment
HSEP	Health, Safety, and Environment Procedure
HSM	Health and Safety Manager
Jacobs	Jacobs Engineering Group Inc.
mg/m^3	milligrams per cubic meter
MSDS	Material Safety Data Sheet
NIOSH	National Institute of Occupational Safety and Health
OFR	Office of the Federal Register
OSHA	Occupational Safety and Health Administration
PADS	Physical Agent Data Sheet
PEL	permissible exposure limit
PID	photoionization detector
POL	petroleum, oil, and lubricants
PPE	personal protective equipment
Ppm	parts per million
SCBA	self-contained breathing apparatus
SOR	Safety Observation Report
SPA	Safe Plan of Action
SSHO	Site Safety and Health Officer
SSHP	Site Safety and Health Plan
STEL	short-term exposure limit

TCE	Trichloroethylene
TLV	threshold limit value
TWA	time-weighted average
USACE	U.S. Army Corps of Engineers
USAED	U.S. Army Engineer District, Alaska
°F	Fahrenheit

1.0 INTRODUCTION AND PURPOSE

This Site Safety and Health Plan (SSHP) is a requirement of the U.S. Army Engineer District, Alaska (USAED), under the Environmental Remediation Services contract. USAED has reviewed and accepted this SSHP as the basis for safety and health procedures adhered to at Former Communications Site (FCS), Alaska, for 2007 fiscal year activities. This SSHP complies with applicable sections of the Code of Federal Regulations (CFR), Title 29, Sections 1910.1200 and 1926.65; Office of the Federal Register (OFR) *Hazardous Waste Operations and Emergency Response* (OFR 1999); and U.S. Army Corps of Engineers (USACE) *Safety and Health Requirements Manual* EM 385-1-1 (USACE 2003).

This SSHP discusses issues and procedures to be followed during mobilization, fieldwork, and demobilization activities scheduled for fiscal year 2007. Figure 1-2 of the Work Plan shows work site locations. Before entering the site, all personnel shall be briefed to this plan and commit to follow applicable procedures by signing the FCS Safety and Health Agreement Sign-off Sheet (Attachment 2). A copy of this plan and referenced documents shall be made available to all personnel at the job site.

Safety and health are basic Jacobs Engineering Group Inc. (Jacobs) values to be adhered to at all Jacobs job sites. The Site Safety and Health Officer (SSHO) and the Safety and Health Manager will maintain copies of this SSHP, and copies will be made available at each site with each work crew, as approved by the SSHO. Modifications due to changing field conditions will require approval of the individuals identified in Attachment 1. Each supervisor, lead person, laborer, operator, and visitor will be held accountable and responsible for working safely and following procedures and guidance set forth in this SSHP.

For the 2007 FCS remedial investigation, all Jacobs personnel will follow Jacobs Health, Safety, and Environment Procedures (HSEP). The Jacobs HSEPs that apply to this work include:

- 2.16 Safe Plan of Action (SPA)
- 2.17 Safety Observation Report (SOR)

- 5.1 Accident and Incidents
- 5.2 Vehicle Accidents
- 7.3 Hazardous Materials Sites and Hazardous Waste Activities
- 8.3 Excavating Equipment Use And Operator Qualifications
- 8.4 Excavations

2.0 PROJECT ORGANIZATION AND RESPONSIBILITIES

This section identifies the project organization and personnel responsibilities for the management and implementation of this SSHP.

Safety is an essential part of every worker and line management function. It is the responsibility of each person to ensure that project personnel comply with all safety rules and requirements. The following assignments have been established to assist with the maintenance of a safe project site.

2.1 SITE MANAGER/SITE SAFETY AND HEALTH OFFICER REQUIREMENTS

The Site Manager/SSHO shall:

- Understand Jacobs and USACE Health, Safety, and Environment (HSE) policies and procedures, and this SSHP. Site management may, if the need arises, apply more stringent HSEPs or work practices.
- Effectively communicate and implement HSE policies and procedures and this SSHP.
- Provide the resources necessary to maintain a safe and healthful work environment and ensure implementation of HSE policies and procedures.
- Assign clear responsibilities that are necessary to achieve a safe and healthful work environment.
- Verify subordinates and subcontractors are executing these responsibilities properly.
- Enforce HSEPs and issue disciplinary actions and/or contractual actions when required.
- Ensure that HSE deficiencies identified in audits and inspections are promptly corrected.
- Implement Jacobs Zero-Incident Culture.
- Assure the adequacy of site HSEPs.
- Take immediate action on any imminent danger observed.
- Review and approve personal protective equipment (PPE), safety equipment, and first aid supplies.
- Ensure HSE orientation of site employees and subcontractor personnel.
- Ensure prompt and adequate treatment for injured employees and subcontractor personnel.
- Ensure adequate investigation and analysis of accidents (non-injury and injury).

- Provide HSE information for the education of management, supervision, and employees concerning:
  - Accident analysis (cause, trends, results, and corrective action)
  - Analysis of inspection results and needed corrective actions
  - Safe work procedures
  - HSE training requirements
- Communicate and promote HSE excellence recognition programs.
- Ensure preparation, submittal, and/or maintenance of required HSE recordkeeping documentation such as inspection reports, training records, Activity Hazard Analysis (AHA)/SPA/SOR, injury logs, accident investigation reports, etc.
- Provide HSE evaluations of employees and supervisors to management as necessary.

2.2 EMPLOYEE RESPONSIBILITIES

Employee acceptance of the HSE policies and procedures is the ultimate key to success of the HSE program. Each Jacobs and subcontractor employee shall:

- Comply with procedures established for his/her safety and health, and for preservation of the environment.
- Assist management and supervision in the positive development of co-worker attitudes toward HSE and workplace morale.
- Suggest improvements in methods or procedures that prevent incidents and protect the environment.
- Stop, or bring attention to management, any unsafe acts or conditions and any potentially harmful environmental practices.
- Immediately correct imminent danger situations (e.g., exposure to falls from elevations, electrocution hazards, exposure to unprotected excavations, etc.).
- Notify supervisor when there is insufficient understandings of:
  - Task(s) to be performed
  - HSEPs
  - Assigned safety equipment
- Promptly report to supervisor incidents or accidents involving personnel or property, no matter how minor.
- Learn the approved HSE safe practices for each work task and practice them.
- Ask for assistance from the supervisor or the HSE department when unsure of a work task or its safe practice.

- Participate in and maintain an active interest in the HSE program.
- Be attentive to safety discussions led by the supervisor and request explanations of points not understood.
- Never bypass the function of a safety device.
- Immediately flag safety device malfunctions to warn others of the hazard and promptly report the malfunction to your supervisor.
- Promptly report any potential work-related injury or illness to your supervisor, no matter how minor the injury.
- Never attempt to perform a job alone when good judgment indicates assistance is needed.
- Inspect, use, and maintain the PPE provided for you.
- Not participate in clowning, scuffling, practical joking, or horseplay of any kind on the job. (Running is prohibited.)
- Be cautious in walking or moving around the work area to avoid slips, trips, or falls. Be especially cautious when weather conditions create a potentially slippery walking surface.
- Plan work and try to anticipate any potential hazards.
- Observe safe practices off the job as well as on the job.

2.3 SUBCONTRACTOR RESPONSIBILITIES

Subcontractors shall implement and follow this plan and will perform the following specific duties:

- Follow the requirements set forth in this SSHP.
- Attend "Supervising for Safety" training at Jacobs prior to site mobilization.
- Attend site-specific orientation.
- Agree to abide by this SSHP by signing the sign-off sheet (Attachment 2) before working onsite. This sign-off sheet will be retained by the SSHO.
- Provide SSHO Material Safety Data Sheet (MSDS) and Physical Agent Data Sheets (PADS) copies for hazardous chemicals and physical exposures onsite.
- Provide SSHO copies of required training certifications and medical authorizations to work on site, including those required by 29 CFR 1926.65.
- Develop AHA/SPAs that address specific hazards associated with tasks to be performed for each phase of work (e.g., underground utilities, approved roads), including developing and providing specific work procedures to Jacobs for review of potential hazards.
- Ensure workers are trained in safe and proper use of all tools they may use.

- Appoint an onsite Competent Safety Representative for each job site.
- Provide all necessary PPE to employees and ensure its proper use.
- Maintain all necessary records and submit required reports.
- Conduct daily safety briefings.
- Obtain all work permits as required.
- Conduct safety inspections on a daily basis, report discrepancies using the SOR form (Attachment 6) and promptly correct unsafe conditions.
- Conduct daily inspections of equipment. Defective or unsafe equipment must be red-tagged and immediately taken out of service or repaired.
- Provide inspection documentation and corrective actions to SSHO on a weekly basis.
- Provide other subcontract information and subcontractor safety performance requirements, as required.

The Site Manager will inform the subcontractor foreman or leader of any safety and health violations. The Site Manager/SSHO can cease subcontractor work under eminently dangerous conditions and resume work when the unsafe condition is corrected. Repeated violations could cause termination of the subcontract.

2.4 VISITOR RESPONSIBILITIES

Visitors entering a controlled area at the site will be responsible to:

- Provide SSHO copies of required training certifications and medical authorizations, as required by 29 CFR 1926.65
- Provide SSHO MSDS/PADS copies for hazardous chemicals and physical exposures onsite
- Comply with provisions of this SSHP

Visitors must obtain clearance from the SSHO and sign into the Visitor Check-in Log (Attachment 6) before obtaining access to controlled areas. In most cases, visitor access will be limited to the support zone. Visitors will receive a job-specific safety briefing and will be escorted at all times in controlled areas. Visitors in areas requiring PPE must have the appropriate training and PPE to gain entry. Jacobs is not responsible for distributing or obtaining PPE for visitors.

3.0 PROJECT INFORMATION

This section briefly discusses the sites and the planned activities. An overall site layout for FCS is presented on Figure 1-2 of the Work Plan.

3.1 FORMER COMMUNICATIONS SITE

Fort Wainwright is located in the city of Fairbanks Alaska.

The work planned for the 2007 field season consists of:

- Mobilization and site setup
- Drum removal and soil excavation
- Soil sampling
- Backfilling and site restoration
- Surveying
- Demobilization

3.2 FORMER COMMUNICATIONS SITE UNIQUE HAZARD ELEMENTS

3.2.1 Contaminants of Potential Concern

A review of the data from previous sampling and investigations has identified diesel-range organics (DRO), gasoline-range organics (GRO), trichloroethylene (TCE), and 1,2-dichloropropane (1,2-DCP) as the contaminants of concern (COCs).

- **DRO:** Hazards associated with DRO are as follows:
  - Combustible acute: Inhalation of vapors may contribute to the occurrence of irregular heartbeat.
  - Inhalation: Can cause light-headedness, vertigo, drowsiness, narcosis, headache, dizziness, unconsciousness, and even death in extreme cases. Exposure to vapors can elevate carboxyhemoglobin level in cardiovascular system.
  - Eyes: Liquid/high-vapor concentration can cause pain and irritation with slight corneal injury possible.
  - Skin: Prolonged/repeated contact can cause irritation and dermatitis.
  - Ingestion: Burning of throat and mouth

- Chronic: Cancer hazard, contains methylene chloride, which is listed as an animal lung carcinogen.
- Major chemicals that have permissible exposure limits (PEL) or threshold limit values (TLV) associated with the ingredients of DRO are:
  - ♦ Anthracene—Occupational Safety and Health Administration (OSHA) PEL: 0.2 milligrams per cubic meter (mg/m^3) (time-weighted average [TWA]) for coal-tar pitch volatiles; American Conference of Government Industrial Hygienists (ACGIH) TLV: 0.2 mg/m^3 (TWA)
  - ♦ Naphthalene—OSHA PEL: 10 parts per million (ppm); 15 short-term exposure limit (STEL) ACGIH TLV: 10 ppm; 15 (STEL)
  - ♦ Diesel fuel as total hydrocarbons—ACGIH TLV 100 mg/m^3

- **GRO:** Hazards associated with GRO as follows:
  - Exposure Routes: Inhalation, skin absorption, ingestion, skin and/or eye contact.
  - Symptoms: Irritation to eyes, skin, and mucous membrane; dermatitis; headache, lassitude (weakness, exhaustion), blurred vision, dizziness, slurred speech, confusion, convulsions; chemical pneumonitis (aspiration liquid); possible liver and kidney damage (potential occupational carcinogen).
  - Target Organs: Eyes, skin, respiratory system, central nervous system, liver, kidneys.
  - Major chemicals associated with the ingredients of GROs are:
    - ♦ Benzene—OSHA PEL: 1 ppm; ACGIH TLV: 0.5 ppm; carcinogen
    - ♦ Ethylbenzene—OSHA PEL: 100 ppm; ACGIH TLV: 100 ppm/125 STEL
    - ♦ Toluene—OSHA PEL: 200 ppm; ACGIH TLV: 50 ppm
    - ♦ Xylene—OSHA PEL: 100 ppm; ACGIH TLV: 100 ppm/150 STEL
- **TCE:** Hazards associated with TCE as follows:
  - Exposure Routes: Inhalation, ingestion, skin contact.
  - Symptoms: change in heartbeat, skin rashes, dizziness, sleepiness, and/or unconciousness, possible death.
  - Target Organs: liver, kidney, heart, central nervous system.
- **1,2 DCP:** Hazards associated with 1,2 DCP as follows:
  - Exposure Routes: inhalation, ingestion, dermal contact.
  - Symptoms: dizziness, headache, nausea, injury to the liver and kidneys, anemia, coma and, ultimately, death
  - Target Organs: liver, kidney, and respiratory systems

3.2.2 Utility Lines

Although Jacobs does not anticipate encountering utility lines in the drum removal area, utility lines including electric, water, sewer and any additional lines that may be present at the FCS. These features will be located prior to commencing excavation. Precautions will be taken to avoid causing any damage to existing utilities.

3.2.3 Drums with Unknown Contents

All intact unopened drums with unknown contents will be flagged for hazard categorization testing. Flagged drums will be carefully moved into a position where they can be opened and sampled. Drum sampling will be conducted by a three-person sampling team. Each member of this team will be trained for the specific Level B PPE that they will be using. Two of the three members of the field crew will don Level B PPE. The third member will be positioned upwind from the drums as far away as is practicable to observe the sampling and man a retrieval system.

The two members of the field crew in Level B will then sample each drum by performing the following actions:

- Open the drum using non-sparking tools.
- Take readings of the drum atmosphere using a four-gas meter and photoionization detector (PID). If the results indicate that the atmosphere is not combustible, sampling may continue.
- Collect a sample of the drum contents and perform hazard categorization testing according to Attachment A-2 of the Field Sampling Plan (Appendix A of the Work Plan). If the results indicate that the drum contents are not hazardous, further drum sampling and management may continue at a lower level of protection.

(intentionally blank)

4.0 ACTIVITY HAZARD ANALYSIS

AHAs are required for all tasks. AHAs are used to define the activities to be performed, identify the hazards anticipated with the task, and identify the control measures, including resources to mitigate the hazards.

AHAs have been developed for this project (Attachment 4) in accordance with the USACE *Safety and Health Requirements Manual* (USACE 2003). These AHAs may not depict actual site conditions. As personnel mobilize to the site and encounter actual site conditions, an AHA will be developed using the site crew to identify actual site conditions and hazards for the activity to verify that protective measures are in place to mitigate incidents.

(intentionally blank)

5.0 HEALTH AND SAFETY ENVIRONMENTAL PROCEDURES/ STANDARD OPERATING PROCEDURES

This SSHP is intended as a personnel resource. This document brings together site- and task-specific corporate procedures (including Jacobs' Corporate Safe Operating Procedures and USAED and CFR requirements) to create a concise and relevant document designed for usability by all members of the FCS field team. In the case of conflict between corporate procedures, the most stringent requirements shall apply.

Field personnel shall participate in a medical surveillance program. Field workers must provide to the SSHO documentation (e.g., a physician's letter) of their participation in the medical program and evidence that they are current. Workers with medical limitations, as well as employers of subcontract employees, are responsible for notifying the Site Manager/SSHO of said limitations so work tasks will be appropriately assigned.

Each Jacobs employee is responsible for completing a monthly Hazardous Material Exposure and Field Activity Report form and for notifying management if an incident or exposure occurs.

Subcontractors shall provide the SSHO documentation of their employee participation in a medical surveillance program, evidence they are current, and any medical restrictions before their employees are sent to a field project. Documentation will be retained onsite.

In addition to the medical surveillance prescribed for hazardous-waste workers, each site SSHP will identify any site-specific medical monitoring required.

(intentionally blank)

6.0 RESPIRATORY PROTECTION PROGRAM

All employees will be provided protection from occupational exposure where potential hazards exist for dusts, fumes, mists, radionuclides, toxic gases, vapors, or oxygen deficiency. Where feasible, exposure to contaminants at concentrations presenting potential health hazards will be eliminated by engineering controls. When effective engineering controls are not feasible, use of respiratory PPE will be required to achieve this goal.

(intentionally blank)

7.0 AIR MONITORING PLAN

Under supervision of the SSHO, air monitoring will be conducted at each site where petroleum, oil, and lubricants (POL) or other contaminates are present. The air monitoring results will be documented in field logbooks. Monitoring of personnel's breathing zone as well as area monitoring will be conducted to verify the field team is using appropriate types and levels of PPE. The type and extent of monitoring conducted will depend upon site-specific conditions and potential contaminants encountered at the site. The information contained in this section is provided as background reference for the participants in this project. Under the guidance of the SSHO, air monitoring will be implemented following the guidelines in this section. Section 9.0 of this plan provides general PPE recommendations. The SSHO, with the assistance of trained field personnel, will identify conditions that may require additional PPE.

Field crews will use the PID equipped with a 10.6-electron-volt lamp as the primary method of monitoring. This method is not considered complete but is the most readily available indicator of organic vapors in the atmosphere. Prior to PID use, background levels must be established in a fresh-air environment, away from any POL-contaminated sites. The PID reads in units of ppm, and the readings should be sustained for 1 minute to determine exposure. Monitoring will be conducted using a PID at all sites where POL is a COC. Workers will dawn appropriate level of protection as identified in Table 1.

All instruments used onsite will be calibrated in accordance with the manufacturer's instruction manual. All calibrations will be recorded in the field logbooks.

Table 1
Air Monitoring Requirements and Action Levels

Instrument	Tasks	Action Levels		Frequency [1]	Calibration [2]
PID: Minimum 10.6 electron volts, calibrated with Isobutylene	All Tasks	0-10 ppm BZ >10-25 ppm BZ >25 to 50 ppm BZ >50 ppm BZ Note: Detections above background levels.	Level D Level C Level B Stop work; reevaluate	Monitor the breathing zone at the beginning of operations and whenever site conditions change. Levels C and B require continuous monitoring. Check waste characterization analytical results for COCs and compare to OSHA/NIOSH PELs to select appropriate respiratory protection.	Daily - pre- and post-use
Direct reading instrument: Colorimetric Tubes: benzene	All Tasks	<5 ppm BZ 5 – 10 ppm BZ >10 to 25 ppm BZ >25 ppm BZ	Level D, 5 minutes Level C Level B Stop work; reevaluate	Monitor initially at all POL sites to eliminate or establish the presence of benzene if site characterization does not support the absence of benzene. Also passive dosimeters will be used if benzene is detected.	Conduct a leak check on pump prior to use
Combustible Gas Meter [3]	As Required	≥10% lower explosive level	Stop work; reevaluate (explosion hazard)	Continuous monitoring of a confined space. Screening during excavation or before performing hot work.	Daily - pre- and post-use
Oxygen Meter	Confined Space Entry	<19.5% >23.5%	Provide alternate air source (Level B) Explosion hazard, stop work, reevaluate	Screening before entering confined space.	Daily - pre- and post-use

Notes:
[1]Air monitoring shall be documented using field logs or monitoring forms.
[2]Calibrations shall be documented in the field logs or calibration logs.
[3]Oxygen must be > 15 percent for lower explosive limits reading to be accurate.
> = greater than
< = less than
For definitions, see the Acronyms and Abbreviations section.

8.0 HAZARD COMMUNICATION PROGRAM

The Hazard Communication Program has been established to inform workers and subcontractors of potential site-specific chemical hazards and comply with the requirements of 29 CFR 1910 and USACE *Safety and Health Requirements Manual* EM 385-1-1 (USACE 2003).

The SSHO will present Hazard Communication training in accordance with the FCS-Specific Hazard Communication Program (Attachment 5). Hazard communication training will be provided before starting work. This training will be documented using the Hazard Communication and Right-to-Know Standards form contained in the FCS-Specific Hazard Communication Program.

(intentionally blank)

9.0 PERSONAL PROTECTIVE EQUIPMENT

All workers at the FCS field site are required to appropriately protect themselves from chemical and physical hazards. In general, all field personnel shall wear the following PPE:

- Safety glasses with side shields (in hazardous work areas)
- Hard hat (when near overhead hazards)
- Steel-toed boots
- High-visibility vest
- Ear plugs
- Pepper spray canister (bear spray)
- Air horn, whistle

Additional PPE may be required depending upon the site conditions, as described below.

9.1 HEARING PROTECTION

Adequate hearing protection is required in all areas that may expose workers to high levels of noise. This includes work areas around heavy equipment. Loud noises are considered to be any noise over 85 decibels. From an arm's length away, if you have to raise your voice to be heard, you may need hearing protection. Hearing protection includes one or a combination of the following:

- Engineering controls (where feasible)
- Ear plugs
- Ear muffs

9.2 EYE PROTECTION

Eye protection is required in all hazardous work areas. Eye protection that may be used includes:

- Safety glasses with side shields (minimal eye protection)
- Goggles (splash, dust, and foreign object protection)
- Face shields with safety glasses and side shields for splash and foreign object protection

9.3 PROTECTIVE CLOTHING

Clothing sufficient to protect workers from contact with substances such as petroleum or heat and cold is required. The following clothing is recommended:

- Rain gear
- Gloves:
  - Nitrile, latex, and cotton gloves
  - Double nitrile gloves for personnel handling samples

The following additional safety equipment and information will be brought to the work sites:

- Portable eyewash
- First aid kit
- Type A-B-C fire extinguisher

9.4 LEVELS OF PERSONAL PROTECTIVE EQUIPMENT

The following section describes the four different levels of PPE.

9.4.1 Level A

The following constitute Level A equipment and may be used as appropriate:

- Positive-pressure, full face-piece self-contained breathing apparatus (SCBA) or positive-pressure, supplied-air respirator with escape SCBA, approved by National Institute on Occupational Safety and Health (NIOSH)
- Totally encapsulating chemical-protective suit
- Coveralls (optional, as applicable)
- Long underwear (optional, as applicable)
- Gloves, outer, chemical-resistant
- Gloves, inner, chemical-resistant
- Boots, chemical-resistant, steel toe and shank
- Hard hat (under suit) (optional, as applicable)
- Disposable protective suit, gloves and boots (depending on suit construction, may be worn over totally encapsulating suit)

9.4.2 Level B

The highest level of respiratory protection is necessary, but a lesser level of skin protection is needed. The following constitute Level B equipment and may be used as appropriate:

- Positive-pressure, full face-piece SCBA or positive-pressure, supplied-air respirator with escape SCBA (NIOSH-approved)
- Hooded chemical-resistant clothing (overalls and long-sleeved jacket, coveralls, one or two-piece chemical-splash suit, disposable chemical-resistant overalls)
- Coveralls (optional, as applicable)
- Gloves, outer, chemical-resistant
- Gloves, inner, chemical-resistant
- Boots, outer, chemical-resistant steel toe and shank
- Boot-covers, outer, chemical-resistant (disposable) (optional, as applicable)
- Hard hat (optional, as applicable)
- Face shield (optional, as applicable)

9.4.3 Level C

The concentration(s) and type(s) of airborne substance(s) are known, and the criteria for using air purifying respirators are met. The following constitute Level C equipment and may be used as appropriate:

- Full-face or half-mask, air-purifying respirators (NIOSH-approved)
- Hooded chemical-resistant clothing (overalls, two-piece chemical-splash suit, disposable chemical-resistant overalls)
- Coveralls (optional, as applicable)
- Gloves, outer, chemical-resistant
- Gloves, inner, chemical-resistant
- Boots (outer), chemical-resistant steel toe and shank (optional, as applicable)
- Boot-covers, outer, chemical-resistant (disposable) (optional, as applicable)
- Hard hat (optional, as applicable)
- Escape mask (optional, as applicable)
- Face shield (optional, as applicable)

9.4.4 Level D

A work uniform affording minimal protection is needed, used for nuisance contamination only. The following constitute Level D equipment and may be used as appropriate:

- Coveralls
- Gloves (optional, as applicable)
- Boots/shoes, chemical-resistant steel toe and shank
- Boots, outer, chemical-resistant (disposable) (optional, as applicable)
- Safety glasses or chemical splash goggles (optional, as applicable)
- Hard hat (optional, as applicable)
- Escape mask (optional, as applicable)
- Face shield (optional, as applicable)

Level B is expected when working with a drum with unknown contents. Level D is the expected level of PPE to be used during the remaining removal action effort.

10.0 SITE CONTROL

Effective site control procedures will reduce the potential exposure of the project team, other workers in the vicinity, and the surrounding environment to the onsite hazards. Site control includes:

- Limiting site access to only essential personnel
- Alerting personnel to the presence of wildlife in the area
- Conducting operations in a manner that reduces the exposure of personnel and equipment and eliminates the potential for offsite dispersion
- Establishing decontamination procedures for personnel and equipment

10.1 WORK ZONES

Clearly delineated work zones help ensure that:

- Site personnel are adequately protected from existing hazards.
- Specific activities and hazards are confined to the appropriate areas.
- Personnel can be accurately and quickly located and evacuated during an emergency.

10.2 BUDDY SYSTEM

The SSHO will require personnel to work with a buddy at all times. The buddy must be capable of:

- Assisting his/her partner
- Monitoring partner for signs of chemical or other exposures (e.g., heat or cold)
- Periodically verifying the integrity of partner's PPE
- Notifying SSHO when emergency help is needed
- Observing work area for wildlife or unexpected weather hazards
- Keeping the Site Manager abreast of location and expected time of return

10.3 COMMUNICATIONS

Due to the site being small and open, communication among personnel at the project site will be conducted using voice and line-of-sight. Communication with personnel not located at the

project site (i.e., in Anchorage) will be made via cell phone or telephone when located at the Jacobs field office. The majority of phone communications will take place via land-line or cell phone from the Jacobs field office.

10.4 SITE SAFETY AND SECURITY

Site security is essential to:

- Prevent unauthorized, unprotected, or unqualified people from being exposed to site hazards
- Protect established and safe working procedures
- Protect personnel from wildlife

Site safety and security will be maintained by:

- Limiting access to authorized and essential personnel
- Requiring the SSHO to approve all visitors to the site
- Stopping work immediately if wildlife attempt to or succeed in accessing the work area or exclusion zone. If wildlife (such as bears) enters the work area, workers shall walk to the nearest vehicle and leave the job site, if necessary.

10.5 DECONTAMINATION PROCEDURES

Decontamination protects workers, the public, and the environment by limiting exposure to harmful substances and by preventing the spread of contamination. The SSHO will oversee decontamination procedures to determine their effectiveness and will take corrective actions to rectify any deficiencies.

10.5.1 Personnel Decontamination

All personnel exiting a site will follow decontamination procedures. Under no circumstances (except emergency evacuation) will personnel be allowed to leave a site before decontamination. The SSHO may approve simplification of the procedures in the field when a determination has been made that decontamination procedures can be less stringent.

Decontamination procedures for the POL-contaminated sites are as follows:

- Wipe off gross contamination on clothes and equipment.
- Scrub boots and gloves in decon solution or detergent water, if necessary.

10.5.2 Equipment and Vehicle Decontamination

Small instruments and equipment will be protected from contamination by draping, masking, or otherwise covering the instruments with plastic to the degree possible without hindering the operation of the unit. Contaminated protective coverings will be removed from the equipment and disposed of in the appropriate containers. Any dirt or obvious contamination on the equipment will be brushed or wiped with damp disposable wipes, and the equipment will be dried. The units will be checked, field calibrated, and recharged if necessary for the next day's operation.

Equipment used onsite will undergo decontamination prior to leaving the site to eliminate contaminant migration from the site and potential cross-contamination of sites. Gross decontamination includes the removal of potentially contaminated materials by use of a shovel or other hand tools and stiff bristle brushes. All materials removed during gross decontamination will be accumulated and managed with similar waste streams.

10.6 WASTE HANDLING AND DISPOSAL

Waste generated onsite from field activities includes investigation-derived waste, PPE, field trash, and office trash. Wastes will be containerized and transferred to the civil subcontractor or waste subcontractor, as appropriate. Disposal of all wastes will be in accordance with state and federal requirements, as discussed in the Work Plan.

10.7 CONFINED SPACE

No confined space entry will be conducted in association with this fieldwork.

(intentionally blank)

11.0 INSPECTIONS

Site and equipment inspections will be performed on a routine basis as described in the following sections.

11.1 SITE INSPECTIONS SAFETY EVALUATION

The following inspections are required:

- The Site Manager/SSHO shall conduct an HSE review of the job site before any new phase of work is initiated and periodically thereafter.
- The Site Manager/SSHO shall conduct daily safety HSE inspections of each project site. Observations noted during the inspection will be documented on SORs (Attachment 6). Deficiencies shall be posted on the deficiency tracking log.

All site inspection results should be reviewed with the Project Manager and site personnel as applicable. All deficiencies will be corrected. Serious deficiencies must be corrected immediately.

11.2 EQUIPMENT INSPECTIONS

Any machinery or mechanized equipment shall be inspected and tested by a competent person and determined to be in safe operating condition prior to use at the site. Inspections and tests shall be in accordance with the manufacturers' recommendations and shall be documented. Records of tests and inspections shall be maintained at the project office.

11.2.1 Daily/Shift Inspections and Tests

All machinery and equipment shall be inspected daily (when in use) to ensure safe operating conditions as indicated below:

- Tests shall be conducted at the beginning of each shift during which equipment is in use to determine that brakes and operating systems are in proper working condition and that all required safety devices are in place and functional.
- Whenever any machinery or equipment is found to be unsafe, or when a deficiency affecting the safe operation of equipment is observed, the equipment shall be immediately taken out of service and its use prohibited until unsafe conditions have been corrected.

- A tag indicating that the equipment shall not be operated and the tag not be removed shall be placed in a conspicuous location on the equipment. Where required, lockout tag-out procedures shall be followed.
- The tag shall remain in its attached location until it is demonstrated to the individual who found the equipment unsafe that the equipment is safe to operate.
- When deficiencies are corrected, the machinery or equipment shall be retested and reinspected before being returned to service.

11.2.2 Vehicle Inspections

All motor vehicles owned or rented by Jacobs or its subcontractors will be inspected prior to use (Attachment 6). All deficiencies found during the inspection will be noted and corrected prior to equipment use. Vehicles that cannot be brought to safe operating condition will not be used. In addition to pre-use inspections, the vehicle's primary driver will be responsible for ensuring scheduled and periodic maintenance to maintain a safe operable condition. At no time will anyone operate a vehicle s/he believes to be unsafe.

11.3 SAFETY OBSERVATION REPORTS

All site personnel, not just the site SSHO, are to complete an SOR form (Attachment 6) when real or potential unsafe acts or unsafe conditions have been identified. The success of this program increases when SORs completed by non-HSE specialists exceed those completed by HSE specialists. This ensures all personnel are developing safety-conscious attitudes.

SORs shall also be used to encourage and reward safe behavior. Providing positive reinforcement of a job or task well executed is far more encouraging than recognizing unsafe behavior. Encouragement can be rewarding for the whole project and lead the project in providing a better and healthier environment.

Any corrective measures shall be documented on the SOR form. All SORs shall be submitted to the SSHO within 24 hours of their completion.

12.0 EXTREME WEATHER SITE WORK

For the purposes of this SSHP, temperatures below –15 degrees Fahrenheit (°F) will be referred to as extreme cold weather. The 2007 field activities will be performed during the summer; therefore, extreme cold weather is not expected.

Site personnel, however, should be prepared for warmer temperatures during the summer months. Field personnel wearing additional PPE may be more susceptible to heat stress. Four environmental factors affect the amount of stress workers experience in hot work areas: temperature, humidity, sun (radiant heat), and wind. Additional stress levels are associated with age, weight, fitness, medical condition, and acclimation to heat. Symptoms of heat stress are heat rash (prickly heat), increased heart rate, loss of concentration, and irritability. These symptoms may lead to fainting or death. The following steps are recommended to reduce the risk of heat stress:

- Move to a cooler place.
- Reduce workload or pace.
- Rest in cool areas (may consider taking longer breaks and monitor stress).
- Wear lightweight clothing.
- Perform strenuous activities during hours when the sun is less intense or temperatures are cooler.
- Drink plenty of water (one pint per person per hour).

If the ambient air temperature reaches below 30 °F or above 80 °F, the SSHO will monitor and provide work-rest regiments to the Site Manager. Work-rest regiments will be based upon the guidelines in ACGIH's *Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*.

(intentionally blank)

13.0 EMERGENCY PROCEDURES

The following sections describe pre-emergency planning, emergency equipment and supplies, emergency contacts, emergency procedures, emergency response and accident follow-up, evacuation information, contacts, post-incident notifications, recordkeeping, and vehicle accident procedures.

13.1 PRE-EMERGENCY PLANNING

The Site Manager/SSHO will coordinate with applicable emergency service providers for all jobsite locations. Contacts, contact numbers, and primary gathering points will be reviewed prior to mobilization to the FCS. Attachment 1 provides an emergency contact list.

13.2 EMERGENCY COMMUNICATION

In addition to communication methods described in the SSHP, the following communication and contact methods will be used:

- Land-line phone
- Cellular phone
- Satellite phone

When placing a call for emergency response, report the following information:

- Your name
- Your company's name
- Type of emergency and perceived severity
- Location of accident or injury
- Time of incident
- Type of first aid or response being given

DO NOT HANG UP until the operator or emergency dispatcher has received the complete information and directs you to hang up.

Notify the Site Manager/SSHO and your immediate supervisor immediately after hanging up the phone. Further information or assistance may be needed from you to complete the accident investigation process.

13.3 EMERGENCY MEDICAL TREATMENT

Should a person become injured, site personnel, along with the SSHO, will determine the severity of the injury(s) sustained. If the victim cannot be treated onsite, evacuation will likely be necessary. There are several medical facilities located close by, Bassett Army Hospital, U.S. Army Hospital and Fairbanks Memorial Hospital.

In the event that a serious injury occurs and further treatment is needed, evacuation to Anchorage will be arranged. Emergency contacts are attached (Attachment 1).

An Authorization for Medical Treatment form (Attachment 6) shall be taken with the employee to the destination medical facility. The site personnel shall complete the top portion of the form and the doctor at the medical facility shall complete the bottom portion of the form. The Site Manager shall:

- Secure the accident area and complete an accident report with all applicable witness statements
- Prepare figures depicting the general site layout, directions, emergency contacts, and the location of the medical facility

13.4 FIRE

Upon notification of a fire, all field crews will assemble at the predetermined point onsite. The muster point will be the Jacobs field office.

13.5 PERSONAL PROTECTIVE EQUIPMENT

If any site worker experiences a failure of PPE that person and his/her buddy will undergo decontamination immediately, and the Site Manager/SSHO will be notified. Return to work will not be permitted until the equipment has been properly repaired or replaced.

13.6 OTHER EQUIPMENT FAILURE

If other equipment onsite fails to operate properly, the equipment shall be red tagged and removed from service and the SSHO notified. After completion of repairs, the equipment shall be reinspected and evaluated, and appropriate actions will be taken. The SSHO will evaluate the safety hazards to site personnel before continuing operations.

13.7 EVACUATION

If an evacuation of the work area is necessary, the following steps should be followed:

- Site personnel shall enter the vehicle nearest to them and proceed to a pre-established meeting point (the Jacobs field office).
- The supervisor will account for field team members at the assembly points.
- The supervisor will complete an incident report with applicable witness statements as soon as possible after an incident.

Evacuation routes and assembly points shall be designated to facilitate access and provide direction for emergency responders. All onsite personnel will be advised of evacuation routes and assembly points during the safety orientation and/or daily tailgate meetings. The Site Manager/SSHO shall document the actual evacuation routes and assembly points, whenever evacuation occurs.

13.8 EMERGENCY RESPONSE AND ACCIDENT FOLLOW-UP

Following an incident or emergency, the Site Manager or designee shall directly notify the Health and Safety Manager (HSM), Project Manager, and client as soon as possible. The Site Manager shall be prepared to provide the following information:

- SSHO name
- Project name and number
- Exact location of incident
- Name victim and their employer
- Nature and extent of injuries
- The name and address of medical facility (if personnel were transported offsite)
- The name of physician providing offsite care
- A phone number where the SSHO can be contacted during the next 24 hours

13.9 EXPOSURE TO BLOODBORNE PATHOGENS

The following procedures will be implemented when a potential exposure to bloodborne pathogens occurs:

- The SSHO must be notified immediately when a first-aid incident occurs.
- The SSHO shall provide a report to the HSM, as required by reporting procedures.
- The report shall include names of all first aid providers who rendered assistance and a description of the incident, including time, date, and types of barriers used.
- If a bloodborne pathogen or other potentially infectious material exposure has occurred, the description of the incident (above) must include an exposure summary to ensure proper post-exposure evaluation, prophylaxis, and immediate follow-up procedures.
- The report shall be recorded on the first aid register.
- Hepatitis B vaccination must be offered to all workers who have occupational exposure to blood or other potentially infectious materials.

An accident with any of the consequences listed below shall be reported immediately to the Jacobs HSM. A government-designated representative will also be notified if the following events occur:

- Fatal injury
- One or more persons admitted to a hospital
- Property damage in an amount specified by the designated authority

Daily records of all first aid treatments not otherwise reportable shall be maintained on prescribed forms and furnished to the HSM weekly.

13.10 VEHICLE ACCIDENT

The Site Manager and SSHO shall be promptly notified of any accidents involving vehicles. The Site Manager will be responsible for notifying the Project Manager, HSM, and client representative. A determination of operator drug testing will be made at that time. Vehicle accident procedures shall be followed and report forms completed (Attachments 3 and 6).

13.11 INJURY AND ILLNESS

An initial accident investigation will begin in accordance with HSEP 5.1, Accident and Incidents (Attachment 3). At a minimum:

- The scene will be secured with no movement of material or equipment until a review of the accident is completed.
- Signed statements from witnesses will be obtained.

If an employee requires medical treatment, the Authorization for Medical Treatment form (Attachment 6) shall be completed and delivered to the HSM as soon as possible. The USACE Accident Investigation Report (Form 3394) and USACE Report of Accident (Form 265-R) are provided in Attachment 6. Both Jacobs and USACE forms shall be completed.

13.12 SPILL OR RELEASE PROCEDURES

The SSHO and Site Manager shall be notified immediately when a spill or release occurs. The SSHO or Site Manager shall notify the Project Manager and client as soon as the site is under control and an AHA/SPA has been developed and implemented. No one shall enter the site until the AHA/SPA is in place and approach has been approved. Regulatory agencies will be notified by the Project Manager or the client.

Personnel involved with containment or cleanup shall wear appropriate PPE as defined in AHA/SPA for specific contaminants. Immediately notify the SSHO or Site Manager. The SSHO or Site Manager will be responsible for notifying the Project Manager and the client. The client and Project Manager will determine the strategy for notifying regulatory agencies.

Appropriate methods to contain, control, or remove released product shall be followed by all personnel involved.

14.0 ORIENTATION AND TRAINING

Prior to the start of work activities all personnel working on this project and any new person visiting or conducting work on this project shall be briefed on this plan. All personnel shall sign the FCS Safety and Health Agreement Sign-off Sheet (Attachment 2), indicating they have been briefed and understand the requirements contained in this SSHP.

Prior to work, a daily safety tailgate meeting will be held to discuss planned work activities, safety precautions, AHAs, emergency response updates, employee concerns, SORs, site conditions, monitoring results, injuries/illnesses that may have occurred, exclusion zone entries, client issues, and other topics of concern to employees. The Safety Tailgate Meeting and Exclusion Zone Entry Log (Attachment 6) will be used to document the meeting.

(intentionally blank)

15.0 SITE POSTINGS

The following employment-related posters are required bulletin board(s) and will be displayed prominently at each field office:

- Employee Polygraph Protection Act
- Notice To Employees—Federal Minimum Wage
- You Have a Right to a Safe and Healthful Workplace
- Equal Employment Opportunity Is the Law
- The Alaska Human Rights Law & Federal Law Prohibit Sexual Harassment
- Jacobs Sexual Harassment Policy
- Unemployment Insurance
- Family and Medical Leave Act
- Safety and Health Protection on the Job
- Alaska Wage and Hour Act
- Notice of Insurance
- Uniformed Services Employment and Reemployment Rights Act
- Map denoting route to nearest care facility
- Emergency phone numbers
- Copy of SSHP
- OSHA 300A Form
- Copy of deficiency tracking log
- Safety and health promotional posters
- Date of last lost workday injury

(intentionally blank)

16.0 REFERENCES

Alaska Community Database, Community Information Systems. 2004. http://www.commerce.state.ak.us/dca/commdb/CIS.cfm

OFR (Office of the Federal Register). 1999 (July). *Hazardous Waste Operations and Emergency Response*. National Archives and Records Administration. 29 CFR 1910.120 and 1926.65.

USACE (U.S. Army Corps of Engineers). 2003 (November). *Safety and Health Requirements Manual*. EM 385-1-1.

(intentionally blank)

ATTACHMENT 1

FSC Contact List, Emergency Numbers, and Location Map

CONTACT LIST AND EMERGENCY NUMBERS

Client: USAED P.O. Box 6898 Elmendorf AFB, Alaska 99506-0898		Phone: (907) 753-2689 Fax: (907) 753-5626
Jacobs 4300 B Street, Suite 600 Anchorage, Alaska 99518		Phone: (907) 222-6256 Fax: (907) 222-6258
Project Manager	Terry Heikkila	Phone: (907) 751-3312 Mobile: (907) 227-3466
Safety and Health Manager	Jon McVay	Phone (907) 751-3395 Mobile: (907) 230-5395
Project Manager	Brian Roberts	Phone: (907) 751-3356 Mobile: (907) 351-9158

EMERGENCY CONTACTS

Medical and Fire Emergency	**911**
Bassett Army Community Hospital 4065 Spruce St Fort Wainwright, Ak 99703	(907) 353-5108
US Army Hospital Fort Wainwright, Ak 99703	(907) 353-6370
Fairbanks Memorial Hospital Tanana Valley Clinic Location 1001 Noble St, Fairbanks, Ak 99701	(907) 458-5606
Fairbanks Memorial Hospital 1650 Cowles St. Fairbanks, Ak 99701	(907) 452-8181

Alaska Airlines	1-800-252-7522

Spills and Toxins	
National Response Center (Oil & Toxic Chemical Spills)	(800) 424-8802
Chemtrec (Customer ID #JAC001)	(800) 424-9300
Poison Control Center	(800) 222-1222

FCS Location Map

ATTACHMENT 2

FCS Safety and Health Agreement Sign-off Sheet

FCS Safety and Health Agreement Sign-off Sheet

Printed Name	Signature	Date
"I have read and agree to abide by this SSHP Addendum and Standard SSHP."		

ATTACHMENT 3

Applicable Health, Safety, and Environmental Procedures and Material Safety Data Sheets

Applicable Health, Safety, and Environmental Procedures

HSEP 2.16	Safe Plan of Action
HSEP 2.17	Safety Observation Report
HSEP 5.1	Accidents and Incidents Investigation and Reporting
HSEP 5.2	Vehicle Accidents
HSEP 7.3	Hazardous Materials/Waste Sites
HSEP 7.3.3	Utility Clearance
HSEP 8.3	Excavation Equipment Use and Operator Qualification
HSEP 8.4	Excavations

JACOBS

HSE Procedure		Document No: HSEP 2.16	Page: 1 of 7
Safe Plan of Action		Supersedes: HSEP 2.16	Revision: 1 Issue Date: 17 Jul 06
Issuing Department: Corporate HSE	Approval: Susan.Kiesling@Jacobs.com	Previous Rev. Date: Rev. 0, 24 Aug 03	Effective Date: 17 Jul 06

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
3.0 DEFINITIONS 2
4.0 PROCEDURE 2
4.1. Levels of Pre-task Planning 2
4.1.1. Project Level — HASAP 2
4.1.2. Activity Level — Various Means and Methods 2
4.1.3. Task Level — SPA 2
4.2. General Planning Requirements 3
4.3. SPA Implementation Plan 4
4.4. SPA Development 4
4.5. SPA Monitoring and Assessment 5
4.5.1. SPA Development Assessment 6
4.5.2. SPA Work In Progress Assessment 6
4.6. Measurement and Improvement 6
4.7. SPA Documentation Retention 6
4.8. Training 6
5.0 REFERENCES AND RELATED DOCUMENTS 6

1.0 PURPOSE AND SCOPE

The SPA is a core element of the Jacobs HSE Program (ref. GSOP 350) and defines the approach and tools used to accomplish pre-task planning. Pre-task planning shall be performed for any activity or task that could reasonably present a risk of injury, illness, environmental, or property damage. Specifically, this procedure defines the expectations and requirements for the use of the Safe Plan of Action (SPA) as a primary element of pre-task planning.

The SPA shall be used prior to starting field or shop work tasks and higher risk, non-routine activities in the office or prior to operating equipment, including motor vehicles.

This procedure applies to all activities performed by company employees, subcontractors, or other contractors when Jacobs is implementing the HSE program.

2.0 RESPONSIBILITIES

General responsibilities for HSE Program implementation are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities that address duties specific to this topic are stated in this procedure.

Management shall be responsible for ensuring that the necessary resources are available for effectively implementing pre-task planning.

Supervisors shall lead the development, implementation, and review of pre-task plans.

All workers engaged in activities requiring pre-task planning shall participate in pre-task planning at the appropriate level.

HSE personnel will facilitate implementation, monitoring, and training associated with pre-task planning, and work with management to ensure that the appropriate focus is placed on identifying hazards/risk potential and actions necessary to improve pre-task planning.

Copyright© 2006 by Jacobs Engineering Group Inc.
All rights reserved. The contents of this document are proprietary and produced for the exclusive benefit of Jacobs Engineering Group Inc. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written approval of Jacobs Engineering Group Inc.

The current applicable version of this publication resides on Jacobs' Intranet. All copies are considered to be uncontrolled.

3.0 DEFINITIONS

Activity	A set of interrelated tasks typically of longer duration involving multiple crews.
Job Hazard Analysis (JHA)	An activity-level pre-task plan, which helps integrate safe work practices into a particular activity to help ensure that the work is performed in a safe and effective manner. In some countries, the JHA may be referred to as a "Method Statement" or by some similar term.
Routine Task	A routine task is one, which the worker normally performs as part of the job function and for which the worker has been trained.
Safe Plan of Action (SPA)	A pre-task plan used to integrate safe work practices into a job or task and to help ensure that the work is performed in a safe and effective manner.
Task	A specific, well-defined portion of work of relatively predictable duration and typically consisting of multiple steps. A task may be performed by one or more workers.
Task Steps	Basic sequential elements of a task that accurately define the task in terms of obtaining resources required to perform the task, preparation of the work area, movement of materials, tools, and people to and from the work area, and completion of the task.

4.0 PROCEDURE

4.1. Levels of Pre-task Planning

4.1.1. Project Level — HASAP

Pre-task planning begins with project-level HSE planning and is documented in the Hazard Assessment and Safety Action Plan (HASAP).

The primary goal of project-level planning is to identify potential hazards associated with the project work activities and to identify controls to mitigate the risk associated with those hazards.

In addition, planning at the project level should define all the HSE program elements required to accomplish activities in a safe and environmentally sound manner. HSE planning also establishes the strategies and methods for implementation and management of the HSE elements.

4.1.2. Activity Level — Various Means and Methods

Pre-task planning is next completed at the activity level and is focused on identifying hazards associated with larger, interrelated tasks, typically executed over a longer duration and by multiple work groups or crews.

Planning at the activity level is typically accomplished in advance of the activity and should facilitate more effective planning at the task level.

There are numerous acceptable means and methods to accomplish activity-level planning. Examples include use of method statements, regular supervisor and project coordination meetings, interactive planning sessions, subcontractor and client meetings, pre-construction meetings, constructability reviews, JHAs, and other means that provide focus on hazard identification and mitigation controls.

4.1.3. Task Level — SPA

Planning at the task level is accomplished through the SPA. The SPA is the most effective means of identifying the hazards associated with daily work tasks and the controls necessary to execute the task in a safe manner.

Copyright© 2006, Jacobs Engineering Group Inc.

In any case, the level of planning shall be appropriate for the task or activity and shall consider:

- Hazards previously identified in the project or site safety plan (HASAP) and other pre-task plans, .e.g., JHA or Method Statement.
- Relevant procedures (including applicable Jacobs HSEPs) for identification of hazards and controls.
- Lessons learned from other tasks, activities, or projects including past incidents.
- Breaking the task into enough steps to adequately define the task.
- Identification of hazards related to adjacent activities, operations, and hazards that could affect the work.
- Identification of all foreseeable hazards and controls necessary to eliminate the hazard or reduce the risk.
- Utilization of multiple countermeasures or controls where appropriate to eliminate or reduce risk.
- Consideration of foreseeable change in the task as it progresses to completion.

4.2. General Planning Requirements

Pre-task planning is required prior to performing any activity or task that could reasonably present a risk of injury, illness, environmental, or property damage. In addition, the following are considered minimum requirements:

- The detailed plan for performing pre-task planning shall be documented in the project, site, or office-specific safety plan (ref. HSEPs 1.2, 1.4, and 2.12).
- Tasks shall be defined in terms of steps required to complete the task so that the hazards can be readily identified.
- The appropriate level of expertise shall be applied when planning each task in order to effectively identify and manage the risks associated with the task.
- Pre-task planning shall be implemented in a manner that focuses on hazard identification, hazard control, and group interaction.
- All personnel shall be involved in pre-task planning, including Jacobs employees and subcontractors. Employees of contractors, who are not directly contracted to Jacobs, should also be involved in pre-task planning when Jacobs is responsible for implementing the HSE program.
- A new SPA shall be developed for each task to ensure that the most current conditions are considered and to ensure that all personnel are involved in the planning for the task.
- The approach for implementing the SPA shall include a means for assessing and improving the quality and effectiveness of pre-task planning.

The pre-task plan shall include an SPA or equivalent method. It may also consist of one or more of the following:

- JHA – typically used for planning larger tasks or activities and for tasks that are performed on a routine or repeated basis (JHAs are typically developed by management and HSE personnel well in advance of the activity or task.);
- Detailed procedures and work instructions – typically used for routine tasks or operations where the order of execution is important; and
- Permit to work system – typically implemented for more hazardous tasks or activities (e.g., confined space entry, hot work, line break, etc.).

Copyright© 2006, Jacobs Engineering Group Inc.

The remainder of this HSEP focuses on the use of the SPA as the primary pre-task planning tool, however, the SPA may also be used for activity-level planning.

4.3. SPA Implementation Plan

Each project or site shall develop a plan for implementing the requirements of this HSEP and document the plan in the project/site HSE plan (HASAP). At a minimum, this plan shall define:

- The conditions under which an SPA is used (identify tasks that require the development of an SPA, when and where the SPA is completed, etc.).
- The detailed roles and responsibilities of management, supervision, workers, and HSE in all aspects of the SPA (development, review, approval, monitoring, and assessment).
- The project/site-specific requirements for SPA development.
- The project/site specific process for SPA assessment.
- The conditions under which work stoppage should occur, including changes in conditions, task, hazard, or other factors that could affect safe execution of the work.

The SPA shall be documented using HSEP 2.16f1 or a project-specific version of this form

The SPA assessment shall be performed using the SPA Assessment form, HSEP 2.16f2, or a project-specific version of this form.

The SPA Assessment form may be modified, as necessary, based on site-specific conditions, such as work scope, hazards present, and other factors.

When the Safety Observation Report (SOR), Behavioral Safety Observation Report (BSOR), and SPA are used together, the forms should be modified to ensure that the checklist categories are consistent to improve the effectiveness of their use.

4.4. SPA Development

The SPA shall be developed as a team by ***all*** the workers involved in the task.

Supervisors shall actively participate in the collaborative effort and shall provide leadership and guidance. Supervisors shall also provide the resources necessary to plan and execute the task.

In the case of subcontract employees, the SPA development activity should be attended by Jacobs management and supervision. The purpose of this attendance is to provide real time coaching on SPA development and hazard recognition to the workers.

The SPA shall identify:

- Steps Involved in Performing the Task
- Hazards and Reaction to Change
    - associated with task steps, including physical hazards, chemical hazards, etc.
    - created by adjacent work or processes, such as owner operations
    - related to co-occupancy of the same work area by others
    - caused by inappropriate reaction to foreseeable changes (changes in conditions, failures that may occur during the task, emergency events, etc.)
    - resulting from completing the task steps in the wrong order
- Safe Plan (controls to mitigate or eliminate the hazards identified)
- Resources
    - personal protective equipment
    - permits, procedures, training, tools, equipment, materials, etc.

Copyright© 2006, Jacobs Engineering Group Inc.

The controls identified in the SPA shall, to the extent possible, be selected based on the effectiveness of the controls to mitigate the risk associated with the hazards. Where possible the controls shall be selected based on the following order of effectiveness:

- Design or engineering change (eliminate or minimize the hazard, substitute materials, relocate hazard source, provide ventilation, designate site traffic patterns, etc.)
- Safety features (fuses, circuit breakers, ground fault circuit interrupters, mechanical stops or travel limiting devices, relief devices, etc.)
- Safety devices (barriers, guards, shields, personal protective equipment, gas and fire detection systems, etc.)
- Warning devices (audible and visual alarms, signs and postings, temporary signs and tapes (warning or danger tape) etc.)
- Administrative controls (procedures, work instructions, checklists, training, etc)

An SPA should be developed at the beginning of the work shift for each new task. The SPA must be reviewed and updated after any change in personnel, task or work scope, environmental conditions, or other factors that could affect the safe performance of the work. The focus of the SPA is on the relationship among the workers, the task, the tools, and the work environment. If any of these elements or their relationship changes, the SPA must be reevaluated.

For routine tasks that are performed on a repetitive basis, an SPA developed at the start of the task may be used for the duration of the task provided adequate consideration is given to changes that may affect the validity of the pre-task plan.

Unless prohibited by unusual conditions, the SPA shall be developed immediately prior to the start of the task and at the job location to maximize the opportunity to identify hazards and understand the work environment/conditions in which the task will be performed.

4.5. SPA Monitoring and Assessment

Management, supervision, workers, and HSE shall routinely monitor and assess the development and implementation of the SPA. The SPA Assessment shall be made using the SPA Assessment form or other means that achieves the same result. The criteria for monitoring and assessment should be defined in the project or site-specific HSE plan and should be based on:

- Relative risks and activities, (e.g., working at elevation, crane operations, lock out tag out work, work on live electrical components, confined space entry, etc.),
- Complexity of the task,
- Locations and varieties of tasks.

A representative sample of SPAs shall be routinely monitored and assessed during both development and the work-in-progress phases to ensure that:

- There is team interaction during the SPA development and buy-in to the plan,
- SPAs are being developed for tasks where required or appropriate,
- The quality of the SPA is appropriate for the work, and
- The work is being performed in accordance with the plan.

The sample size shall be determined by:

- The size of workforce,
- The level of experience in SPA development,
- The workforce turnover, and
- Other factors as deemed appropriate by the Management and HSE.

Copyright© 2006, Jacobs Engineering Group Inc.

4.5.1. SPA Development Assessment

The SPA Development Assessment shall be conducted as supervisors and workers begin pre-task planning. Person performing the assessment shall observe the workers and interact as necessary to assure all elements of a safe work plan are addressed.

The SPA Development Assessment may be performed by an individual or a group, depending on the complexity of the task, using the SPA Assessment form.

Information from the SPA development assessment should be used to provide feedback to the work group to improve the SPA.

4.5.2. SPA Work In Progress Assessment

The SPA Work In Progress Assessment shall include observation of the work being performed, noting both safe and unsafe or at-risk situations and the immediate corrective actions taken. Feedback shall be provided to the workers during the assessment.

The SPA Work In Progress portion of the form shall be completed while observing workers performing the task. Particular attention should be paid to how well the workers react to or manage changed conditions during the performance of the task.

4.6. Measurement and Improvement

Data from the SPA Assessment shall be collected, analyzed, and used to measure the quality and effectiveness of the SPA and pre-task planning. In addition, the data shall be used to identify specific improvement opportunities based on at-risk categories.

The following actions should be considered to maximize improvement.

- Completed SPAs should be used to train new workers and to re-train existing workers.
- The SPA should be reviewed with the workers at the end of the task or shift to identify improvements that can be implemented immediately.
- The observation of the SPA development phase or of work in progress should not be a data collection exercise, but rather a real time coaching, training, and mentoring event.
- Calculate and trend percent safe/at-risk for major categories on assessment checklist.

4.7. SPA Documentation Retention

The completed SPA document should be retained with site or office records in accordance with the field Hazard Assessment and Safety Action Plan (HSEP 2.12) or Office HSE Management plan (HSEP 1.4), respectively.

4.8. Training

Personnel required to perform pre-task planning shall be trained in the development of pre-task plans. Safe Plan of Action Training Presentations and Workbooks are available to HSE staff.

In addition, those personnel required to perform quality assessments of pre-task plans shall receive additional training on the SPA assessment process.

5.0 REFERENCES AND RELATED DOCUMENTS

GSOP 350, HSE Program

HSEP 1.2, Project HSE Management

HSEP 1.4, Office HSE Management

HSEP 2.12, Hazard Assessment and Safety Action Plan

HSEP 2.16f1, Safe Plan of Action Form

HSEP 2.16f2, SPA Assessment Form

HSEP 2.17, Safety Observation Report

Copyright© 2006, Jacobs Engineering Group Inc.

HSEP 2.18, Behavioral Safety Observation Report Process

Safe Plan of Action Training Presentations and Workbooks

SPA Revision Overview

Copyright© 2006, Jacobs Engineering Group Inc.

JACOBS

HSE Procedure		Document No: HSEP 2.17	Page: 1 of 5
Safety Observation Report		Supersedes: HSEP 2.1	Revision: 1 Issue Date: 17 Feb 04
Issuing Department: Corporate HSE	Approval: Mike.Coyle@Jacobs.com	Previous Rev. Date: 1 Jun 97	Effective Date: 17 Feb 04

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
2.1. Site, Project, and Office Manager 1
2.2. Supervisors 2
2.3. Employees 2
2.4. Site HSE Supervisor 2
3.0 PROCEDURE 2
3.1. Conducting HSE Observations 2
3.2. Analysis of Cause(s) 3
3.3. Documenting Corrective Actions 3
3.4. Training 4
4.0 FIGURES 4
Safety Observation Report 5

1.0 PURPOSE AND SCOPE

The purpose of the Safety Observation Report (SOR) process is to engage all workers in the observation of work in progress so that a maximum number of workers, with diverse experiences and perspectives, are involved in the HSE monitoring and observation process.

Use of this process for identification of potential workplace hazards and unsafe actions of workers will minimize workplace injuries and illnesses and damage to the environment in both the field and the office.

This process also provides a method for identifying and documenting safe acts and safe workplace conditions.

Use of SORs by members of the workforce is a recognized Company best practice and is a requirement set forth in GSOP 350.

This HSEP applies to all employees, Company subcontractors, and workers engaged in operations covered by the Company's HSE Program.

2.0 RESPONSIBILITIES

Specific Health, Safety, and Environment Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

2.1. Site, Project, and Office Manager

The responsibilities of Site, Project, and Office Management are to seek opportunities to involve all employees in this process by:

- Providing HSE leadership by actively participating in the SOR process and conducting regular HSE observations,
- Discussing their observations in a positive constructive manner, and where necessary, agree on appropriate corrective actions,

Copyright© 2004 by Jacobs Engineering Group Inc.
All rights reserved. The contents of this document are proprietary and produced for the exclusive benefit of Jacobs Engineering Group Inc. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written approval of Jacobs Engineering Group Inc.

The current applicable version of this publication resides on Jacobs' Intranet. All copies are considered to be uncontrolled.

- Providing support for training in the SOR process,
- Participating in safety observation meetings and presentations, and
- Helping to design promotional and recognition programs to encourage SOR process quality and/or participation.

2.2. Supervisors

The responsibility of supervision is to:

- Actively participate in the SOR process by conducting regular HSE observations,
- Discuss all observations in a positive and constructive manner, and where necessary agree on appropriate corrective actions,
- Ensure that SORs are completed in a timely manner and promptly submitted, and
- Ensure completion of any required corrective action.

2.3. Employees

The responsibilities of employees are to:

- Conduct regular HSE observations of work in progress,
- Discuss observations in a positive and constructive manner and to agree on an appropriate corrective action, if unsafe acts or conditions are observed,
- Record their findings on the SOR form, and
- Submit the SOR to their supervisor or the HSE Department.

2.4. Site HSE Supervisor

The Site HSE Supervisor is responsible for:

- Providing training on the SOR process,
- Gathering and compiling SOR data,
- Generating reports and developing trends to provide feedback to employees and the project team, and
- Tracking and documenting completion of corrective actions.

3.0 PROCEDURE

The SOR (Figure 1) is a proactive process designed to identify, document, and change unsafe conditions and unsafe or at-risk behavior through supervisor and employee involvement.

This procedure incorporates employee involvement in the HSE observation process by reinforcing safe behavior, modifying unsafe behavior through training and data feedback, and assuring that corrective actions have been taken for any identified deficiencies.

The data gathered through this process is used as a leading indicator to improve the overall HSE program.

For those operations that have the necessary resources and want to take their SOR process to the next level, refer to HSEP 2.18, Behavioral Safety Observation Report Process.

3.1. Conducting HSE Observations

Observations may be conducted by individuals or teams of workers. Observers will monitor work in progress for safe or unsafe acts and safe or unsafe conditions.

Observations can include any number of workers for any length of time or workplace conditions.

Open and constructive communication between the observer(s) and worker(s) is an important feature of the SOR process. Unsafe acts and unsafe conditions should be discussed and resolved

Copyright 2004, Jacobs Engineering Group Inc.

on the spot, if possible. Safe work practices should likewise be identified and positively reinforced through compliment and praise.

If imminent danger situations are encountered, work must be immediately stopped and workers removed from the hazard, the hazard abated, and a thorough investigation conducted.

Observations shall be recorded on the Safety Observation Report form.

Although signatures by those submitting SORs are important and typically required, the reports may be submitted anonymously.

Names of workers, who might be involved with unsafe acts or unsafe conditions, are not to be recorded in the SOR.

The causes for unsafe acts or unsafe conditions should be determined through discussion and analysis among worker(s) and observer(s) and recorded in the SOR. (See Figure 1.) Minor modifications of this SOR form to reflect local needs may be made with approval from Corporate HSE. Figure 1 can be printed full size or reduced in size and printed on card stock to fit in a shirt pocket for convenient use in the field.

The form shall be signed and dated by the person(s) conducting the observation.

SORs can be submitted to either the employee's supervisor or the HSE Department.

3.2. Analysis of Cause(s)

The HSE Department will gather and compile SOR data, generate reports, and develop trends to provide feedback to employees and the project team. This input facilitates development of special emphasis programs designed to highlight positive behaviors and work practices and to address the specific types of deficiencies observed.

Thorough identification of the causes of observed deficiencies facilitates remedial action.

3.2.1. Typically, direct causes identified through the SOR process, are due to

- Unsafe acts or
- Unsafe conditions.

3.2.2. Typically, indirect causes identified through the SOR process, are due to a

- Lack of training (knowledge, understanding, perception of risk),
- Lack of resources (time, material, personnel), and/or
- Lack of belief (confidence, commitment, or reinforcement by supervision)

combined with other factors, such as poor morale, peer pressure, inattention, etc.

3.2.3. Typically, basic/root causes identified through the SOR process, are due to an organizational failure to

- Plan,
- Direct,
- Organize, and/or
- Control

the human and material (tools, equipment, etc.) resources.

3.3. Documenting Corrective Actions

It is important that all deficiencies reported have documented corrective actions, the majority of which should be implemented at the time the observation is made.

Some corrective actions may require a period of time to resolve if, for instance, client involvement is required, equipment must be ordered, etc.; therefore, a log or record will be kept to document the final close-out or completion of such actions.

Copyright 2004, Jacobs Engineering Group Inc.

SORs, complete with documentation that corrective measures have been taken, shall be retained by either the operating unit, the office, or the HSE Department.

3.4. Training

Proper "observer training" is required for effective implementation of the SOR process. Simply distributing and collecting SOR forms will provide minimal improvement in the HSE program. The HSE department will provide specialized training for prospective observers that will educate them in:

- The philosophies behind the process,
- Communication techniques that will provide for positive observer-worker interaction during the observation process,
- Identification of safe and at-risk actions and behaviors, and
- Identification of safe and unsafe workplace conditions.

4.0 FIGURES

Safety Observation Report

Copyright 2004, Jacobs Engineering Group Inc.

Figure 1

Safety Observation Report

Date: Time: Supervisor of Observer:

Observation:

Was immediate corrective action taken? Yes ☐ No ☐

Describe Immediate Corrective Action:

Describe Action to Prevent Recurrence:

Describe Indirect Cause:

Lack of Training ☐ Lack of Belief ☐ Lack of Resources ☐

Describe Suggested/Recommended Corrective Action For Indirect Cause:

Observers

Name Printed: Signature:

Name Printed: Signature:

Name Printed: Signature:

Description and Verification of Corrective Action Taken To Address Indirect Cause:

Supervisor/Manager

Name Printed: Signature: Date Completed:

Copyright 2004, Jacobs Engineering Group Inc.

JACOBS

HSE Procedure		Document No: HSEP 5.1	Page: 1 of 14
Accidents and Incidents Investigation and Reporting		Supersedes: HSEP 5.1	Revision: 4 Issue Date: 3 Jan 06
Issuing Department: Corporate HSE	Approval: Susan.Kiesling@Jacobs.com	Previous Rev. Date: 19 May 04	Effective Date: 3 Jan 06

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
2.1. Site or Office Manager 2
2.2. Supervisors 2
2.3. Employees 2
2.4. HSE Representative 2
3.0 DEFINITIONS 2
4.0 PROCEDURE 2
4.1. Post-Incident Drug and/or Alcohol Testing 3
4.2. Accident/Incident Investigation 3
4.3. Investigation Reports and Recordkeeping 4
4.4. Interface with Risk Management (for US Operations) 5
4.5. Communication of Investigation Findings 5
4.6. Releases/Exposures Involving Hazardous Chemicals or Radiological Materials 5
4.7. Recording Work-Related Injuries and Illnesses For Regulatory Purposes 5
4.8. Serious or Fatal Accidents 6
4.9. Property Damage and Business Interruption Loss Notice 7
4.10. Training 7
5.0 REFERENCES AND RELATED DOCUMENTS 7
6.0 FIGURES 7
Authorization for Medical Treatment 8
Accident/Incident Investigation Report 9
Injured Employee's Statement 11
Witness Statement 12
Accident Analysis 13
First Aid Register 14

1.0 PURPOSE AND SCOPE

Reporting, investigating, and recording of all accidents, incidents, and illnesses are key steps in understanding and addressing root causes to prevent recurrence of incidents similar in nature, and detecting trends that may have broader implications. For this reason, it is imperative that all accidents, incidents, and illnesses be reported, investigated, and documented. This includes non-injury events, dangerous occurrences, and releases of Hazardous Chemicals and/or Radiological Materials.

This HSEP applies to accidents and incidents involving Jacobs employees and subcontractors.

For incidents involving motor vehicles, refer to HSEP 5.2.

2.0 RESPONSIBILITIES

General responsibilities for HSE procedures implementation are stated in HSEP 1.5. Additional responsibilities specific to this HSEP include the following.

Copyright© 2006 by Jacobs Engineering Group Inc.
All rights reserved. The contents of this document are proprietary and produced for the exclusive benefit of Jacobs Engineering Group Inc. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written approval of Jacobs Engineering Group Inc.

The current applicable version of this publication resides on Jacobs' Intranet. All copies are considered to be uncontrolled.

2.1. Site or Office Manager

The Site or Office Manager shall

- Report accidents and incidents to their operations manager and their field services manager, as appropriate.
- Organize and participate in accident investigations and engage appropriate resources and the Legal Department, as appropriate.
- Implement appropriate corrective actions into Jacobs work processes.
- Analyze HSE records to measure the effectiveness of preventive/follow-up actions and the ongoing HSE program.

2.2. Supervisors

For accidents, incidents, and illnesses involving their personnel, supervisors must:

- Promptly report them to the HSE representative and to the Site or Office Manager,
- Lead investigations, and
- Ensure that all records are completed in a timely fashion.

2.3. Employees

Employees must immediately report all work-related accidents, incidents, and illnesses to their supervisor or the HSE representative.

2.4. HSE Representative

The HSE representative shall:

- Report accidents and incidents to their HSE Manager, as required,
- Assist the Site or Office Manager in organization of investigations and participate in them,
- Assist Supervisors in reporting and recording all accidents, incidents, and illnesses,
- Identify appropriate HSE professional to support investigations, as appropriate (especially where the HSE Representative is not also an HSE professional),
- Establish and maintain all records required by this HSEP and regulatory agency recordkeeping requirements,
- Assist the Site or Office Manager in the analysis of records to measure the effectiveness of preventive and follow-up actions and the ongoing HSE program, and
- Keep the Regional HSE Manager apprised of accidents, incidents, and illnesses and recommend lessons learned as may be appropriate to other sites/offices.

3.0 DEFINITIONS

Definitions of terms used in this HSEP can be found in Incident and Accident Definitions by Type, Injury Status, and Incident Classification, which is posted on JNet.

An additional definition that is used in this HSEP, which does not appear in the JNet posting, is:.

Serious Incident	Incident resulting in a Days Away from Work (i.e. Lost Time) case and/or greater than USD 5,000 in damage.

4.0 PROCEDURE

In the event of a workplace incident involving injury or illness, the first priority is to provide the best assistance possible to employees, who may need it and to ensure the safety of others who may be affected or acting as emergency responders.

Copyright© 2006, Jacobs Engineering Group Inc.

Incidents, including non-injury or "near miss" events, which are potentially of E-1 or greater severity, and incidents that are potentially reportable to regulatory agencies, including environmental incidents, shall be promptly reported to the responsible:

- Operations Manager,
- Field Services Manager, if appropriate,
- Office Manager, if appropriate, and
- HSE Manager.

Such reports should be made promptly and directly, preferably by phone or in person.

4.1. Post-Incident Drug and/or Alcohol Testing

Except where prohibited by law, the Company will require employees, who are involved in a workplace incident, which results or could have resulted in an injury to a person (other than first aid) and/or property damage to submit, to a post incident test for drugs and/or alcohol as part of the investigation of such incidents. This same policy applies to our subcontractors, as appropriate.

It is the responsibility of the Office Manager or Site Manager, working with Human Resources and Legal, to establish the program for drug and alcohol testing for their location.

Questions that arise concerning possible prohibitions should be directed to the Human Resources and Legal Departments. Disciplinary action against an employee, who fails a drug or alcohol test, shall be coordinated by Human Resources with input from Operations and the Legal Department.

Drug testing is also governed by local regulations in many countries. Contact the company Human Resources and Legal Departments for assistance.

4.2. Accident/Incident Investigation

In order to eliminate incidents, both injury and non-injury, it is important to perform thorough investigations when accidents/incidents occur. Immediate action taken to identify causes can be utilized to prevent recurrence of future incidents of a similar nature. An accident/incident investigation is not for the purpose of fault-finding, but rather fact-finding. It is important that the approach reflects this purpose so that information is readily shared and the response effective.

Investigations must be conducted when an accident/incident occurs, including non-injury and first-aid-type incidents. Participants in the basic investigation process should include, at a minimum:

- The person(s) involved and/or injured in the incident.
- First- and second-line supervisors of the person(s) involved in the incident.
- Site manager or office manager.
- An HSE professional.
- Subject matter/discipline specialists, as appropriate
- Legal and Risk Management representatives, in the event of a Serious Incident.
- Other senior management, as appropriate

The investigation team should examine the accident/incident scene and review all facts pertaining to the incident in a conference environment.

The task-specific safe work plan (Safe Plan of Action and/or Job Safety Analysis) should be examined as part of the investigation process.

Copyright© 2006, Jacobs Engineering Group Inc.

4.3. Investigation Reports and Recordkeeping

4.3.1. Authorization for Medical Treatment

For employee injuries or illnesses that require treatment by a medical services provider, a company supervisor shall complete an Authorization for Medical Treatment form. A new form shall be sent with the employee upon each visit to the medical services provider. (See Figure 1 for a sample authorization form that can be tailored for local use.)

Ask the medical services provider to complete the disposition portion (lower half) of form.

Since form distribution varies by location, check with HSE for distribution in your area.

4.3.2. Investigation Report

The Accident/Incident Investigation Report (Figure 2) shall be completed by the first line supervisor as soon as possible following the incident.

In the event of a Serious Incident, the responsibility for report preparation may be assigned to another investigation team member and a member of the Legal Department must be consulted prior to documentation.

The original of the Accident/Incident Investigation Report shall be maintained at the project or office. A copy shall be sent to the appropriate Regional HSE Manager and Risk Management.

4.3.3. Injured Employee's Statement

Ask the employee with the illness or injury to complete an Injured Employee's Statement (Figure 3).

4.3.4. Witness Statement

The Witness Statement (Figure 4) shall be used to obtain a signed account from witnesses of their factual observations, as soon as reasonably appropriate after the incident.

Statements should be written by the witness, however, another person may record his/her dictation if so requested by the witness.

Statements should be taken and prepared in a confidential and non-threatening environment.

Append the Witness Statement to the Accident/Incident Investigation Report.

4.3.5. Accident Analysis

The supervisor of the injured employee shall assure that an Accident Analysis (Figure 5) is completed and submitted to the HSE representative and the Regional HSE Manager.

4.3.6. First Aid Register

The First Aid Register (Figure 6) is the primary project injury log and must be kept on-site at all times.

All injuries and/or illnesses (job related or personal) treated or reported (actual or alleged) shall be entered in the log, no matter how minor.

4.3.7. Employer's First Report of Injury (US Only)

For US operations, if the injury or illnesses results in lost time from work or in the need for off-site medical treatment, the HSE representative is responsible for immediately completing the Injury Call-In Form (printable/online)and then calling ESIS immediately at 877 329-0695 to report the injury. ESIS provides 24-hour call-in service for claims reporting.

Copyright© 2006, Jacobs Engineering Group Inc.

4.4. Interface with Risk Management (for US Operations)

4.4.1. Workers' Compensation Claim Coordinator

If an injury results in lost time from work or the need for off-site medical treatment, the HSE representative is responsible for immediately notifying the appropriate Workers' Compensation Claim Coordinator with details about the injury.

4.4.2. Documentation Checklist

The HSE representative or designee should use the Accident Investigation Documentation Checklist to ensure that all documents have been completed and submitted within 24 hours to the Workers' Compensation Claim Coordinator. If all forms are not available at the same time, send as many as are available and forward the remainder later.

4.4.3. Authorization to Release Medical Information

The injured worker will complete an Authorization to Release Medical Information and the HSE representative or designee will assure that the completed form is forwarded to the Risk Management Department to authorize the claim adjuster to obtain medical records.

4.5. Communication of Investigation Findings

A review of the incident facts, identified causes, and actions to prevent recurrence should be documented and communicated to employees. Office and project communications can take the form of safety meetings, Task Safety Analysis (TSA) meetings, etc. Findings should also be incorporated in future SPAs and task-specific safe work plans.

The incident investigation team is encouraged to provide lessons learned details and recurrence prevention recommendations to the Regional HSE manager for sharing, as appropriate.

4.6. Releases/Exposures Involving Hazardous Chemicals or Radiological Materials

In addition to the investigation process defined above, incidents involving potential exposure to hazardous materials, including incidents onsite, in the office, during company travel, and hazardous material releases in reportable quantities, as defined by local regulations, e.g., EPA-RCRA in the US, must be reported to a Senior HSE Manager.

Report all releases or exposures even though the incident may be considered minor or even though no adverse health effects or symptoms are apparent at the time.

Further procedures and notifications of regulatory agencies and clients shall be followed as defined in the site-specific Health, Safety, and Environment Plan (HSP) or HASAP.

A copy of the investigation report shall be placed in the medical file of any exposed or potentially exposed employees. Use of baseline testing should be evaluated promptly after any exposure.

The Site or Office Manager shall complete all other investigation and reporting requirements as outlined in this HSEP.

4.7. Recording Work-Related Injuries and Illnesses for Regulatory Purposes

Many local HSE regulatory agencies have incident reporting, recording, and posting requirements, which will be followed by company entities operating in those areas. The HSE Representative and/or Local HSE Manager shall ensuri compliance with these requirements.

4.7.1. Recordkeeping

For US operations, enter OSHA Recordable Cases within three days in the OSHA Form 300, the Log of Work-Related Injuries and Illnesses.

For US operations that are covered by MSHA, recordable cases shall be recorded on Form 7000-1, with copies sent to the designated MSHA offices within the 10th workday after learning of its occurrence.

Refer also to HSEP 5.3 for generation and maintenance of incident statistics.

Copyright© 2006, Jacobs Engineering Group Inc.

4.7.2. Posting Requirements

For US operations, OSHA Form 300A, Summary of Work-Related Injuries and Illnesses, for the preceding year must be posted from February 1 to April 30.

When there were no injuries or illnesses during the year, zeros must be entered on the totals line, and the form posted.

4.8. Serious or Fatal Accidents

Occasionally, serious accidents may occur at project sites or offices that involve company employees or third parties (contractor, client, member of the public, etc.) and may include events such as

- Serious personnel injury and/or illness,
- Significant equipment or structural damage,
- Significant vehicle incidents, and/or
- Significant threat or damage to the environment.

In such cases, the following requirements may apply.

4.8.1. Internal Notifications

In the event of a fatal or serious accident, an immediate telephone report shall be made by the Site or Office Manager to the Operations Manager **and** by the HSE representative to the Regional and Senior HSE Managers.

The Senior HSE Manager shall immediately notify the Vice President of HSE. The Operations Manager shall immediately notify the appropriate Group Vice President. These managers will notify the Legal Department and Risk Management and other senior company managers, as appropriate.

All notifications shall be made in person or via direct phone conversations, rather than by e-mail or voice messages.

4.8.2. Regulatory Agency Notifications

Any necessary notifications to local, state, or Federal agencies will be made by HSE.

For US operations, Fed-OSHA reporting requirements can be found in 29 CFR 1904.8.

4.8.3. Next of Kin Notification

Notification of the next of kin shall be coordinated through Human Resources.

Notification shall be made in person by a member of company management. If, in the event the employee's next of kin resides out of town or state, such notification should be coordinated through a local company office or a local law enforcement organization.

The Site or Office Manager should consider the need for help with immediate, short-term transportation, lodging, or similar assistance for the next-of-kin.

4.8.4. Accident Investigation

The accident scene shall be secured immediately. No movement of material or equipment shall be made until a review of the accident scene has been completed and documented. (Securing equipment or material, which could result in further injury or damage, may be done.)

A team comprised of representatives from HSE, Operations, and the Legal Department will conduct the investigation. The Legal Department will direct the investigation, including any resulting correspondence or other communication related to the accident in order to assure attorney-client privilege, as necessary.

Copyright© 2006, Jacobs Engineering Group Inc.

Investigations shall include:

- Obtaining from witnesses signed statements of their complete and factual observations, as defined above. In the case of certain serious incidents, local law enforcement personnel may participate in, or conduct, collection of witness statements.
- Ensuring that adequate photographs are taken from several angles. Release of photographs shall be coordinated through the Legal Department.
- Documentation management for all photos, measurements, statements, and handwritten notes, etc., in a single file. The Legal Department may designate the contents of this file as confidential, "Attorney – Client Privilege."

4.8.5. Media Relations

Some incidents may involve media interaction. Jacobs Global Policy Supplement, GPS1-105, Media Interaction, must be reviewed and followed before any media interactions.

4.8.6. Client Assurance

The client shall be assured that the company is professionally investigating the incident and will make the necessary program adjustments or recommendations to prevent recurrence.

4.9. Property Damage and Business Interruption Loss Notice

Submit to the Risk Management Department a Property Damage and Business Interruption Loss Notice Form to report Property Loss. A Notice is required if damage to company owned, leased, or rented property, machinery, or equipment, or if business interruption related to such damage is expected to exceed $25,000 US dollars.

4.10. Training

Supervisors must be trained in proper accident/incident investigation techniques and the recording and reporting requirements.

This training will be provided through the HSE Manager.

5.0 REFERENCES AND RELATED DOCUMENTS

29 CFR 1904, Recording and Reporting Occupational Injuries and Illnesses (US only)

US Department of Labor, Bureau of Labor Statistics, Recordkeeping Guidelines for Occupational Injuries and Illnesses (the "Blue Book", US only)

Workers' Compensation Claim Coordinator List (US only)

Accident Investigation Documentation Checklist (US only)

6.0 FIGURES

Authorization For Medical Treatment

Accident/Incident Investigation Report

Injured Employee's Statement

Witness Statement

Accident Analysis

First Aid Register

Copyright© 2006, Jacobs Engineering Group Inc.

Figure 1

Authorization for Medical Treatment

To: _____ Address: _____ Date: _____

This form, signed by our representative, is your authorization to render **initial** medical treatment only to:

_____
(Employee)

in accordance with the provisions of, and under the conditions prescribed by, the Workers' Compensation Act. Unless the case is an emergency, kindly obtain authorization for surgery, radical procedures, or hospitalization from the insurance carrier.

Fax this completed form to (*enter here the fax number for the local Jacobs Risk Management office point of contact*)

Send your bill and report to (*enter insurance carrier's mailing address and name of point-of-contact to whom the report and bill should be sent*)

_____
Authorized Jacobs Representative

Date of Injury _____ Location _____ Job No. _____

How injury occurred _____

_____

For Doctor's Use Only

Diagnosis of Injury: _____

Disposition of Patient: ☐ Occupational ☐ Non-Occupational ☐ Unable to determine

☐ Able to resume regular duties.

☐ Able to resume regular duties next workday.

☐ Able to resume restricted duties with the following limitations: _____

_____

☐ Unable to return to work; estimated length of disability: _____

Return for follow-up visit on _____ (Date)

Discharged from care on _____ (Date)

_____
(Doctor's Signature)

Copyright© 2006, Jacobs Engineering Group Inc.

Figure 2

Accident/Incident Investigation Report

Date of Accident/Incident:_____ Time of Incident:_____ Company:_____

Investigation Date:_____ Project Name & No.:_____ Client:_____

Project Location: _____ Incident Location:_____

Did injury result? Yes/No ____, If yes, provide Employee Name(s):_____

Employee ID or DEN: _____ Skill:_____Yrs. in Skill:_____Yrs. w/Company:_____

Describe Type of Injury:_____

Was property damaged? Yes/No ____ Describe damage/owner:_____

_____

Is damaged property secured/maintained? Yes/No ____ Person Maintaining_____

Names of Witnesses/Coworkers (Including ID or DEN):_____

_____

Weather/Wind Conditions:_____

List/Describe all personal protective equipment (PPE) in use by person exposed or injured:_____

_____

If Chemical or Radiological Materials Involved:

Name(s) of Chemical(s) Encountered:_____

Form of Chemicals (Solid, Liquid, Gas, Vapor, Dust, Mist Fume):_____

Describe Radiological Materials (if any):_____

Volume or Quantity Released:_____

Description of Accident/Incident:_____

_____

_____

_____

_____

Contributing Factors:_____

_____

Copyright© 2006, Jacobs Engineering Group Inc.

What **corrective actions** are being taken to prevent recurrence? Also list the person responsible for implementing and the target completion date for each item.

_____

_____

_____

Was an SPA/JSA developed for the task being performed? Yes/No____, If yes, attach a copy.

Was a permit issued? Yes/No _____, If yes, attach a copy of the permit in effect at time of the incident.

Indirect cause: **Lack of**: Training____, Resources____, Belief____ (*explain)

_____

Basic cause: **Failure to**: Plan____, Direct or Supervise____, Organize____, Control____(*explain)

_____

INVESTIGATION TEAM MEMBERS:

Injured/Involved:	_____ Name	_____ Signature
Supervisor:	_____ Name	_____ Signature
Site/Office Manager:	_____ Name	_____ Signature
HSE Professional:	_____ Name	_____ Signature
_____ Name (Others)	_____ Title	_____ Signature
_____ Name (Others)	_____ Title	_____ Signature

Client Representative(s) Contacted:_____

Agency Representative(s) Contacted:_____

* Attach additional sheets and supplemental data & information as necessary.
** Distribution: File original on-site; promptly send 1 copy to Regional HSE Manager.

Copyright© 2006, Jacobs Engineering Group Inc.

Figure 3

Injured Employee's Statement

Date:

Name:

Title:

Employee ID or DEN:

Temporary Address:

Phone No:

Permanent Address:

Phone No:

Location At Time Of Accident:

Describe How The Accident Happened:

Signature

Copyright© 2006, Jacobs Engineering Group Inc.

Figure 4

Witness Statement

Please print or type.

Name:_____ Title:_____

Employee ID or DEN:_____Date:_____ Time:_____

Temporary Address:_____ Phone No._____

_____

Permanent Address:_____ Phone No._____

_____

Location at Time of Accident:_____

Describe, to the best of your knowledge, what happened just before, during, and just after the accident:

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____
Signature

Copyright© 2006, Jacobs Engineering Group Inc.

Figure 5

Accident Analysis

Accidents result from a Direct Cause, Indirect Cause, and a Basic or Root Cause. These causes occur in the sequence shown below. Review the accident sequence. Check all factors that apply.

DIRECT CAUSE

Unsafe Act

- ☐ Improper use of tool/equipment
- ☐ Defective tool/equipment
- ☐ Failure to use proper PPE
- ☐ Improper body position
- ☐ Improper lifting/placing
- ☐ Removing guard
- ☐ Defeating safety device
- ☐ Servicing live equipment
- ☐ Horseplay
- ☐ Shortcut/Hurrying
- ☐ Other:

Unsafe Condition

- ☐ Flammable Atmosphere
- ☐ Oxygen rich/deficient
- ☐ Toxic Atmosphere
- ☐ Inadequate Illumination
- ☐ Poor housekeeping
- ☐ Congested work area
- ☐ Worn/defective tool
- ☐ Worn/defective equipment
- ☐ Ineffective guard or barricade
- ☐ Missing/lack of guarding
- ☐ Other:

INDIRECT CAUSE — Lack Of

Training

- ☐ No training
- ☐ Poor training
- ☐ Refresher needed
- ☐ Not understood
- ☐ Other:

Resources

- ☐ Time
- ☐ Tools
- ☐ Equipment
- ☐ Material
- ☐ Manpower
- ☐ Other:

Belief

- ☐ Poor morale
- ☐ Peer pressure
- ☐ Awareness
- ☐ Other:

BASIC CAUSE — Organizational Failure To

Plan

- ☐ SPA/JSA not done supervisor
- ☐ SPA/JSA inadequate
- ☐ PPE checklist not done
- ☐ PPE checklist inadequate
- ☐ Improper permit issued
- ☐ Other:

Direct

- ☐ TSA not done by supervisor
- ☐ Instructions not communicated
- ☐ Instructions not understood
- ☐ Improper instructions given
- ☐ Other:

Organize

- ☐ Resources not present (tools, personnel, etc.)
- ☐ Resources not proper (tools, personnel, etc.)
- ☐ Unsafe operating condition
- ☐ Other:

Control

- ☐ Task not conducted as planned
- ☐ Job progress not monitored
- ☐ Other:

Copyright© 2006, Jacobs Engineering Group Inc.

Figure 6

First Aid Register

Company:_____ Project Name/Number:_____

Jobsite Location:_____ Month/Year:_____

Site or Office Manager:_____ Page:_____ of _____

Date	Time	Name	Supervisor or Foreman	Type of Injury, Body Part, and Brief Description of Injury	Class*

***Class** - Classification: **FAV** - First Aid Visit **E-1** - Doctor's Visit **OSHA** - OSHA Recordable **Other:**

Copyright© 2006, Jacobs Engineering Group Inc.

JACOBS

HSE Procedure		Document No: HSEP 5.2	Page: 1 of 4
Vehicle Accidents		Supersedes: HSEP 5.2	Revision: 5 Issue Date: 3 Jan 06
Issuing Department: Corporate HSE	Approval: Susan.Kiesling@Jacobs.com	Previous Rev. Date: 19 May 04	Effective Date: 3 Jan 06

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
2.1. Management 1
2.2. Supervisor 1
2.3. Employee 2
2.4. Risk Management Department 2
3.0 DEFINITIONS 2
4.0 PROCEDURE 2
4.1. Injuries 2
4.2. Vehicle Incident Reporting 2
4.3. Post-incident Actions 3
4.4. Post-incident Drug Testing 3
4.5. Post-incident Drug Testing Procedures for US Operations 4
4.5.1. Pre-selection of Local Drug Testing Collection Facilities 4
4.5.2. Testing After a Vehicle Incident 4
4.5.3. Testing Notifications 4
4.5.4. Test Results Notifications 4
5.0 REFERENCES AND RELATED DOCUMENTS 4

1.0 PURPOSE AND SCOPE

This Health, Safety, and Environment Procedure (HSEP) provides the minimum procedures to be followed in the event of a vehicle accident involving a Company owned, rented, or leased vehicle or a personal vehicle used for Company business and to any other motor vehicle, e.g. personal or borrowed and “third party motor vehicles”, used by personnel engaged in Company business.

This procedure addresses all motorized vehicles.

2.0 RESPONSIBILITIES

General responsibilities for HSE Program implementation are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities that address duties specific to this topic are stated in this procedure.

2.1. Management

The appropriate manager must review all Vehicle Accident Reports with the employee and supervisor involved.

2.2. Supervisor

Supervisors shall promptly report any vehicle incidents to the Site or Office Manager, HSE Manager, and Risk Management.

Supervisors of employees involved in vehicle accidents must investigate the accident and complete the Vehicle Accident Report with input from the person(s) involved in the incident and witnesses to the incident.

Copies of completed reports shall be promptly submitted to the Risk Management department, to the HSE Manager, and to the Office or Site Manager.

Copyright© 2006 by Jacobs Engineering Group Inc.
All rights reserved. The contents of this document are proprietary and produced for the exclusive benefit of Jacobs Engineering Group Inc. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written approval of Jacobs Engineering Group Inc.

The current applicable version of this publication resides on Jacobs’ Intranet. All copies are considered to be uncontrolled.

2.3. Employee

Employees are responsible to promptly report all vehicle accidents to their supervisor or appropriate manager.

Employee drivers involved in vehicle accidents shall assist their supervisor or manager with completion of a Vehicle Accident Report.

2.4. Risk Management Department

The Risk Management Department makes available through JNet the necessary accident report forms, which are to be maintained in each vehicle covered by this HSEP.

3.0 DEFINITIONS

Definitions of terms used in this HSEP can be found in Incident and Accident Definitions by Type, Injury Status, and Incident Classification, which is posted on JNet.

Additional definitions that are used in this HSEP, which do not appear in the JNet posting, are as follows.

Fleet Management Group	The department within Jacobs that manages and supports motor vehicle and heavy equipment rental, leasing, maintenance, repair, and other similar activities in North America.
Occupational Health Services	The group within Jacobs Human Resources Department that provides Health Services support and advice and maintains a list of company-approved local collection facilities in the US for drug and alcohol testing. Phone number 225 922-3360.
Risk Management Department	The department within the Jacobs that manages underwriting, claims management, and other insurance-related functions and matters. Go to JNet and click on the Global Groups tab and then click the Risk Management tab for details.
Vehicle	Motorized vehicles, including cars, trucks, busses, all-terrain vehicles, golf carts, etc.
Vehicle Operators	Employees who have been authorized by the Company to operate a motorized vehicle on Company business.

4.0 PROCEDURE

4.1. Injuries

In the event of an injury resulting from a vehicle incident, the first priority is to provide the best assistance possible to personnel who may need it and to ensure the safety of others who may be affected or acting as emergency responders. Refer to HSEP 5.1, Accidents and Incidents, for steps to follow.

In addition, for US operations, if there is a Jacobs employee injured, refer to Workers' Compensation Claims Instructions and Forms - U.S. Only.

For non-U.S. locations, if there is a Jacobs employee injured as a result of the incident, promptly report the injury to the HSE Manager and Risk Management.

4.2. Vehicle Incident Reporting

Accident report forms shall be maintained in all vehicles owned, rented, leased by the Company, or personal vehicles utilized for Company business. Vehicle Accident Report & Instructions for US Operations are posted on JNet. Supervisors of employees involved in vehicle accidents must investigate the accident and complete the Risk Management department's Vehicle Accident Report with input from the person(s) involved in the incident and witnesses to the incident.

The report shall be distributed as follows:

- Project/Office Manager's File

Copyright© 2006, Jacobs Engineering Group Inc.

- Risk Management
- HSE Manager
- Fleet Management Group

Each incident will be investigated by an HSE representative in order to identify the cause(s) and to determine measures to be taken to prevent a similar recurrence.

If damage to Company owned, leased, or rented property, machinery or equipment, or business interruption related to such damage, is expected to exceed U.S. $25,000, complete the Risk Management department's Property Damage and Business Interruption Loss Notice form in addition to the standard Vehicle Accident Report.

Disciplinary action and/or retraining may be required for any employee involved in a vehicle accident.

4.3. Post-incident Actions

Vehicle operators shall be given instructions by their supervisor or an HSE representative on how to report an accident and what to do at the scene. Action includes:

- Stop at once to investigate.
- If necessary, have someone call for emergency medical services.
- Call the police if the incident occurs on public property.
- Do not admit liability, even if you feel you are at fault.
- Do not discuss the incident with anyone at the scene other than the police, and only answer questions asked by them.
- Copies of any statements or other documents signed or created by the employee must be forwarded to Legal Department and Risk Management.
- Do not move vehicle until cleared by the police, unless the vehicle creates a safety hazard or local ordinances require moving vehicles after an accident.
- If possible, obtain names, addresses, license numbers, and phone numbers of any witnesses and the parties to the accident.
- Promptly notify your supervisor after an incident and assist with completion of the Vehicle Accident Report.
- If you are contacted by individuals or entities outside of the company after an accident, notify the company Legal Department and Risk Management departments.

4.4. Post-incident Drug Testing

Except where prohibited by law, the Company will require employees who are involved in a workplace incident which results or could have resulted in an injury to a person (other than first aid) and/or property damage, to submit to a post incident test for drugs and/or alcohol as part of the investigation of such incidents. This same policy applies to our subcontractors, as appropriate.

It is the responsibility of the Office or Site Manager working in coordination with the Human Resources and Legal Departments, to establish the program for drug and alcohol testing for their location.

Any questions that arise concerning possible prohibitions should be directed to the Human Resources and Legal Departments. Disciplinary action against an employee, who fails a drug or alcohol test, shall be coordinated by Human Resources with input from Operations and the Legal Department.

Drug testing is also governed by local regulations in many countries. Contact the company Human Resources and Legal Departments for assistance.

Copyright© 2006, Jacobs Engineering Group Inc.

If results are positive, HR will notify Risk Management so that appropriate insurance follow-up arrangements can be made.

4.5. Post-incident Drug Testing Procedures for US Operations

4.5.1. Pre-selection of Local Drug Testing Collection Facilities

The Occupational Health Services (OHS) group (phone number 225 922-3360) maintains a list of company-approved local collection facilities in the US.

The local HSE Manager shall state the name, address, and phone number of the specified local collection facility in the project or office HASAP.

4.5.2. Testing After a Vehicle Incident

An employee, who has been involved in a motor vehicle incident, is responsible for immediately notifying his or her supervisor by phone or in person.

The employee or the supervisor shall also notify the Risk Management representative, 877 832-1721, and the local HSE Manager.

A Risk Management representative will, in turn, notify the designated Human Resources (HR) contact for the Operating unit. If the primary HR contact does not respond, a secondary HR contact will be notified.

The HR Manager will direct the employee to the designated collection facility and/or confirm that the post-incident specimens were promptly and properly collected.

4.5.3. Testing Notifications

The HR Manager will contact the OHS and advise them that a motor vehicle post-incident test has been initiated.

The HSE weekly summary shall list all MVAs that have been reported and confirm that alcohol (if required) and drug tests were conducted after each incident.

4.5.4. Test Results Notifications

OHS:

- Will promptly report test results to the appropriate HR Manager,
- Will track test results, and
- Will generate monthly and year-to-date statistics, which will become part of the monthly HSE Scoreboard report.

If results are positive, HR will notify Risk Management so that appropriate insurance follow-up arrangements can be made.

5.0 REFERENCES AND RELATED DOCUMENTS

HSEP 21.2, Motor Vehicle Safety

The following hyperlink takes the reader to a site that is maintained on JNet by the Risk Management Department.

Workers' Compensation Claims Instructions and Forms - U.S. Only.

Vehicle Accident Report

Copyright© 2006, Jacobs Engineering Group Inc.

JACOBS

HSE Procedure		Document No: HSEP 7.3	Page: 1 of 1
Hazardous Materials/Waste Sites		Supersedes: CHSP 7.3	Rev. 2
Issuing Department: Corporate HSE	Approval: Mike.Coyle@Jacobs.com	Previous Rev. Date: 1 Jun 97	Current Revision Date: 9 Aug 01

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
3.0 DEFINITIONS 1
4.0 PROCEDURE 1
5.0 REFERENCES 1
6.0 FIGURES 1

1.0 PURPOSE AND SCOPE

In addition to good business health and safety practices, guidelines and standards for work with hazardous materials and hazardous wastes can be found in Federal and state occupational health and safety regulations.

Guidelines from all such sources have been provided in the Section 7.3 series of HSEPs, which follow.

This series of HSEPs applies to all employees covered by the HSEP and who are involved with Hazardous Waste work at Environmental projects.

2.0 RESPONSIBILITIES

Specific HSE Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

3.0 DEFINITIONS

Refer to Definitions section in individual Section 7 series HSEPs, which follow.

4.0 PROCEDURE

Refer to Procedure section in individual Section 7 series HSEPs, which follow.

5.0 REFERENCES

Refer to Reference section in individual Section 7 series HSEPs, which follow.

6.0 FIGURES

Refer to figures section in individual Section 7 series HSEPs, which follow.

Copyright© 2001 by Jacobs Engineering Group Inc.
All rights reserved. The contents of this document are proprietary and produced for the exclusive benefit of Jacobs Engineering Group Inc. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written approval of Jacobs Engineering Group Inc.

The current applicable version of this publication resides on Jacobs' Intranet. All copies are considered to be uncontrolled.

JACOBS

HSE Procedure		Document No: HSEP 7.3.3	Page: 1 of 6
Utility Clearance		Supersedes: HSEP 7.3.3	Rev. 3
Issuing Department: Corporate HSE	Approval: Susan.Kiesling@Jacobs.com	Previous Rev. Date: 26 Aug 02	Current Revision Date: 21 Aug 06

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
3.0 DEFINITIONS 1
4.0 PROCEDURE 1
4.1. Clearance Step 1 1
4.2. Clearance Step 2 2
4.3. Clearance Step 3 3
4.4. Trenching and Excavations 3
4.5. Other Requirements 4
4.6. Above Ground Utility Lines 4
4.7. Approval 4
4.8. Existing Utility Repair 4
5.0 REFERENCES 5
6.0 FIGURES 5
Utility Clearance Permit 6

1.0 PURPOSE AND SCOPE

To establish Health, Safety, and Environment (HSE) requirements to minimize, and to the extent possible, eliminate the risk to personnel and property from contact with buried or aboveground utility service lines.

This Work Instruction applies to all field activities where there could be contact with aboveground utilities or sub-surface utilities or related service lines.

2.0 RESPONSIBILITIES

Specific HSE Program implementation responsibilities are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities are stated in individual procedures that address responsibilities specific to the HSE topic.

3.0 DEFINITIONS

None

4.0 PROCEDURE

For work involving buried utilities and service lines:

- All three of the following Clearance Steps shall be utilized prior to drilling.
- Follow clearance Steps 1 and 2, in addition to the requirements set forth below for trenching and excavation, before any trenching or excavation work is done.

4.1. Clearance Step 1

Prior to field activities, appropriate property maps, blue lines, and/or as-builts will be examined in an effort to locate underground utility and service lines. Such reviews shall be supplemented by interviews of knowledgeable facility engineering and maintenance personnel.

During the project site walk, any discrepancies or new information regarding utility locations will be added to project maps.

Copyright© 2006 by Jacobs Engineering Group Inc.
All rights reserved. The contents of this document are proprietary and produced for the exclusive benefit of Jacobs Engineering Group Inc. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written approval of Jacobs Engineering Group Inc.

The current applicable version of this publication resides on Jacobs' Intranet. All copies are considered to be uncontrolled.

For projects on Federal land, facility-engineering personnel will be asked to provide utility clearance and sign off. The Site Manager shall obtain and submit proper facility utility service clearance request forms.

For projects within local government jurisdiction, the Site Manager shall request the services of the local utility locater service.

If the project occurs in a state or location, which has an agency that conducts utility clearances, they will be notified. The services of State Underground Service Alert (USA), DigAlert, or other appropriate service will be used. The utility locater service will assign a "ticket" number to your site, which shall be recorded. This ticket number is valid for a limited time.

4.2. Clearance Step 2

4.2.1. Sub-surface Survey

Following map reviews, personnel interviews, and use of locater services, one or more of the most appropriate of the following geophysical sub-surface survey methods shall be used to locate underground utility or service lines.

- Electromagnetic (EM) methods,
- Ground penetrating radar (GPR),
- Magnetic survey, and/or
- Pipe locator.

4.2.2. Finding Pipes and Other Objects via Metal Detection

Magnetic detection can be used to find the following:

- Iron, steel, and copper water lines
- Metal gas lines
- Surveying pins (property markers)
- Copper tracer wire
- Copper and aluminum electrical wires
- Steel cables
- Telephone and TV cables
- Aluminum conduit
- Any continuous metal pipe or line

For magnetic detection to work, the target must contain some iron or steel or have an electrical current flowing through it so that a magnetic detector can find it. Nonferrous objects or objects not carrying an electrical current, such as polyvinyl chloride or high-density polyethylene pipe, must be detected by other means.

The strongest signals come from the ends of an object, as this is where the magnetic fields of force tend to concentrate. Therefore, if an object is oriented vertically, it will produce a stronger signal than one oriented horizontally. This can make a relatively small object, such as a steel drum, easier to find than a long, cast-iron water main.

The same object buried horizontally will likely produce two weaker signals, one directly above each end—one signal being positive and one being negative. Cast-iron or steel water pipe laid end-to-end will produce a strong signal at each joint, even if the pipes are welded together. Magnetic detection of metal pipes often results in a series of peak signals designating the locations of welded end joints.

Electric cables must be energized to be detected magnetically.

Copyright© 2006, Jacobs Engineering Group Inc.

4.2.3. Ground-Penetrating Radar

Ground-penetrating radar (GPR) uses an electromagnetic (radio wave) antenna tuned to a frequency that can penetrate soils, rock, concrete, ice, and other common natural and manmade materials. Such capabilities make radar a prime technique in obtaining geotechnical information and evaluating hazardous-waste sites. As such, it is more suited for use outside of urban areas where natural conditions predominate. Furthermore, a GPR unit requires considerably more time to process than do simpler magnetic detection techniques.

GPR functions in a manner similar to standard aerial radar. A GPR determines subsurface conditions by sending pulses of high-frequency radio waves into the ground from a transmitter antenna located on the surface. Subsurface structures cause some of the wave energy to be reflected back to the surface, while the rest of the energy continues to penetrate deeper. The result is a series of radio "echoes" that delineate underground interfaces such as bedding, cementation, changes in moisture and clay content, voids, fractures, and intrusions as well as manmade objects.

Resolution of radar reflections can be increased by increasing the frequency of the radar waves transmitted into the ground.

GPR is best suited for determining a region's hydrogeology, which is its main function. Smaller manmade objects such as individual drums and utilities are harder for a GPR to delineate, though a sensitive unit can reveal their locations as part of a general survey.

4.2.4. Marking Utilities

The following color code is recommended for marking utility locations.

- white work location
- red electrical
- yellow gas or oil
- orange telephone
- blue water
- green sewer

4.3. Clearance Step 3

When earth drilling or borings are to be done, hand augering (not to be done with a power auger) will be done to a minimum of seven feet for all locations where there is a potential to impact buried utilities.

Prior to drilling, the hole shall be reamed by hand to a diameter of 120% of the drill bit to be used.

For soil gas surveys, the survey probe shall be placed as close as possible to the hand auger.

In cases where hand augers meet refusal at depths less than seven feet bgs, the following steps will be taken to ensure the cause of the refusal is not an underground utility.

- A geologist or other individual qualified to classify soil shall examine the substrate to ensure it appears to be native and/or undisturbed material.
- Two additional step-out hand-augered borings shall be drilled approximately two feet laterally from the original boring. The borings shall be located such that a right triangle is formed, with the original boring forming the apex of the 90-degree angle. If these borings also meet refusal at a similar depth to the first boring, and a qualified person determines the soil is native material, hand augering to the total depth of 7 feet will not be required.

4.4. Trenching and Excavations

Prior to groundbreaking, where trenching or excavating will be done, the soil must be probed with a magnetometer. (Magnetometers sense ferrous metallic objects, or iron-rich rock such as basalt, but give no information about objects such as fiberglass or concrete tanks.)

Copyright© 2006, Jacobs Engineering Group Inc.

To assist the equipment operator in locating any underground obstructions, a spotter will observe the excavation.

Additional requirements for trenching and excavating activities can be found in HSEPs on this subject.

4.5. Other Requirements

The Project Manager and HSE Manager will determine methods for utility clearance for horizontal and slant boring.

All uncovered utilities must be supported. If support is not required, so indicate under "Deviations From HSEP Approval", Paragraph 8, on the attached Utility Clearance form.

Utility lines shall be locked-out and/or tagged-out prior to repairs or modifications.

4.6. Above Ground Utility Lines

4.6.1. Working Near Above-Ground Power Lines

Minimum clearances for working in proximity to overhead power lines are

Nominal Voltage	Minimum Clearance
0 – 50 kV	10 ft. for any part of the crane or load
50 kV+	10 feet + 4 in for each 10 kV over 50 kV, or twice the length of the line insulator, but never less than 10 feet for any part of the crane or load

If it is necessary to work without the minimum clearance, the overhead line must be de-energized and grounded or re-routed by the utility company or a qualified electrician.

4.6.2. Equipment Transit

In transit with no load and boom lowered, the equipment clearance shall be a minimum of 4 feet for voltages less than 50 kV, and 10 feet for voltages over 50 kV, up to and including 345 kV, and 16 feet for voltages up to and including 750 kV.

For all other non-electrical utility lines, there must be a minimum of 1.5 feet vertical clearance. If the clearance is less than 1.5 feet, the lines must be rerouted or a spotter must assist the execution of this activity.

Refer also to HSEP 17.1, Mobile Cranes, and HSEP 19.4, Energized and Potentially Energized Electrical Equipment.

4.7. Approval

The attached Utility Clearance Permit must be completed and signed by the Site Manager or the Project Manager's designee prior to commencement of relevant site work.

The Project Manager after collaboration with the site HSE Officer or HSE Manager must approve deviations from this HSEP. Approval via telephone is acceptable in the event the Project Manager is not on site.

4.8. Existing Utility Repair

Prior to field work, locate the utility shut-offs. Obtain keys and/or tools (or arrange a means to promptly summon the contact person) to access the shut-offs.

Plan other appropriate steps necessary to reduce the emergency response time in the event of a damaged underground line incident, to limit property damage from the leak, and to minimize personnel exposure to a potentially hazardous environment.

When repairing existing utilities, refer to the HSEP for Lock-Out and Tag-Out. Repairs should be made only as directed by utility owners.

Copyright© 2006, Jacobs Engineering Group Inc.

5.0 REFERENCES

29 CFR 1926.650 –1926.652, Excavations

29 CFR 1910.333, Selection and Use of Work Practices in Sub-part S – Electrical

29 CFR 1926.955, Provisions for Preventing Accidents Due to Proximity to Overhead Lines

6.0 FIGURES

Utility Clearance Permit

Copyright© 2006, Jacobs Engineering Group Inc.

Figure 1

Utility Clearance Permit

Project: _____ Completed by: _____

Site Location: _____Date: _____

Reason for Clearance: _____

DESCRIPTION OF ACTIVITY	YES	NO	N/A	DATE	INITIALS
1. Review of Existing Maps					
2. Interviewed Personnel Familiar With Area?					
3. Above Ground Utilities					
a) marked on site maps					
b) necessary to lockout					
c) document procedures used to lockout or re-route					
4. Underground Utilities					
a) State Agency called: (specify)					
Ticket Number:					
b) State name of additional utility called:					
Ticket Number:					
c) Specify geophysical clearance method used:					
Done By:					
d) Utility locations marked with appropriate color code?					
Done By:					
e) Utilities marked on site map (please attach)					
Done By:					
5. Hand augering to _____ feet done by :					
6. Trench/Excavation probed by:					
a) Hand Clearance required:					
7. Clearance Approval Site Manager: Client Representative:					
8. Procedure Deviations Approval: Project Manager: HSE Manager:					

Describe Deviations: _____

_____

Justification: _____

_____

Copyright© 2006, Jacobs Engineering Group Inc.

JACOBS

HSE Procedure		Document No: HSEP 8.4	Page: 1 of 9
Excavations		Supersedes: HSEP 8.4	Revision: 3 Issue Date: 29 Jul 05
Issuing Department: Corporate HSE	Approval: Susan Kiesling@Jacobs.com	Previous Rev. & Issue Date: Rev. 2, 14 Aug 01	Effective Date: 29 Jul 05

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
2.1. Site Management 1
2.2. Site Supervision 2
2.3. Competent Persons 2
3.0 DEFINITIONS 2
4.0 PROCEDURE 3
4.1. General Requirements 3
4.2. Underground Utility Clearance 4
4.3. Access and Egress 4
4.4. Prohibited Task Health Hazard Conditions 4
4.5. Work In Potentially Hazardous Atmospheres 4
4.6. Water Accumulation 5
4.7. Stability of Adjacent Structures 5
4.8. Protection of Employees from Loose Rock or Soil 5
4.9. Fall Protection 5
4.10. Soil Classification 5
4.11. Protective Systems 5
4.11.1. Sloping and Benching 5
4.11.2. Support and Shield Systems (Shoring) 6
4.11.3. Materials and Equipment 6
4.11.4. General Requirements for Shoring 6
4.12. Timber Shoring 6
4.13. Inspection and Storage 7
4.14. Training 7
4.15. Environmental 7
5.0 REFERENCES AND RELATED DOCUMENTS 8
6.0 FIGURES 8
Daily Trench/Excavation Inspection 9

1.0 PURPOSE AND SCOPE

This Corporate Health, Safety, and Environment Procedure provides minimum procedures to be followed when employees are engaged in activities requiring entry into or work around excavations. It applies to all employees and subcontractors engaged in operations covered by the Company HSE Program.

2.0 RESPONSIBILITIES

General responsibilities for HSE Program implementation are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities that address duties specific to this topic are stated in this procedure.

2.1. Site Management

Site Management is responsible for assuring the overall implementation and compliance with the Company's excavation HSEP. They must be familiar with the excavation HSEP and utilize expertise at their disposal to ensure employees are protected form excavation hazards.

Copyright© 2005 by Jacobs Engineering Group Inc.
All rights reserved. The contents of this document are proprietary and produced for the exclusive benefit of Jacobs Engineering Group Inc. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written approval of Jacobs Engineering Group Inc.

The current applicable version of this publication resides on Jacobs' Intranet. All copies are considered to be uncontrolled.

Site Management shall designate Competent Persons for trenching and excavation activities on-site, only after they have completed an appropriate course taught by the Corporate HSE Department, or some other recognized third party.

2.2. Site Supervision

Supervisors responsible for employees performing work covered by the Company's excavation HSEP must:

- Ensure that Competent Persons have been assigned to inspect the safety of excavations and monitor the work for any hazardous situations. Confirm each excavation job is properly evaluated and prepared with hazards being addressed ensuring employees are protected.
- Ensure employees are aware of any hazards associated with their work, and they are properly trained on this HSEP and any site-specific excavation procedures.
- Ensure that employees adhere to all excavation HSEP requirements and any established task requirements.
- Continuously monitor the work to assure compliance with this HSEP.

2.3. Competent Persons

Competent Persons assigned to excavation sites have the responsibility to:

- Train employees on the content of this procedure and ensure it is clearly understood.
- Evaluate whether the excavation is also a confined space.
- Perform documented daily inspections of excavations, the adjacent areas, and protective systems before the start of work each day and as necessary throughout the shift.
- Inspections shall additionally be made after every rainstorm or other hazard-increasing occurrence.
- Where evidence indicates a possible cave-in, failure of the protective system, or other hazardous condition, employees shall be removed until the proper precautions have been taken.

3.0 DEFINITIONS

Aluminum Hydraulic Shoring	A pre-engineered excavation shoring system comprised of aluminum hydraulic cylinders (cross braces) used in conjunction with vertical rails (uprights) or horizontal rails (wales).
Bell Bottom Pier Hole	A type of shaft or footing excavation, the bottom of which is made larger than the cross section above to form a belled shape.
Benching	A method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
Cave-in	The separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury, injure, or immobilize a person.
Competent Person	One who is capable of identifying existing and predictable hazards in the work environment and who has the authority to correct them. For purposes of a Competent Person for excavation activities, this person must receive training and designation through the Corporate Health, Safety, and Environment Department.

Copyright© 2005, Jacobs Engineering Group Inc.

Excavation	Any man made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
Oxygen Deficient	Having an oxygen concentration of less than 19.5%.
Protective System	A method of protecting employees from cave-ins; from material that could fall or roll from an excavation face or into an excavation. Protective systems include: sloping systems, benching systems shoring systems and shield systems.
Ramp	An inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.
Registered Professional Engineer	A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed appropriate when approving designs for pre-engineered or manufactured protective systems.
Shield	A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structures, or can be designed to be portable and moved along as work progresses.
Shoring	A structure such as a timber shoring system, or an aluminum hydraulic shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
Sloping	A method of protecting employees form cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of the slope varies with differences in soil type, environmental conditions and application of imposed loads.
Support System	A structure such as underpinning, bracing, or shoring which provides support to an adjacent structure, underground installation, or the sides of an excavation.
Trench	A narrow excavation, the depth of which normally exceeds the width (not more than 15 feet wide).

4.0 PROCEDURE

4.1. General Requirements

A proper permit must be issued before excavation work begins. This permit is typically issued by the facility owner or the client and is reviewed by a Jacobs HSE Department representative.

All employees shall be protected with personal protective equipment for the protection of head, eyes, respiratory organs, hands, feet, and other parts of the body as required.

In many instances, excavations are considered confined spaces (See HSEP 7.2.) If this is the case, all parts of both the excavation and the confined space entry procedures must be followed.

Physical barricades must be placed around all excavations.

Employees outside of excavations and exposed to vehicular traffic shall wear reflectorized or highly visible warning vests.

No person shall be permitted under loads handled by lifting or digging equipment.

No employees shall stand or work near a vehicle being loaded. Operators may remain in the enclosed cab of the vehicle.

All excavating work must have the prior approval of the area supervisor.

The possibility of flammable or toxic gases settling in low places of excavations must be assessed before entering excavations or doing hot work.

Copyright© 2005, Jacobs Engineering Group Inc.

Employees entering excavations five feet deep or greater must be protected by an adequate protective system, as described below, when a Competent Person determines the possibility of hazardous ground movement.

All surface objects that may present a hazard to employees by rolling or falling into an excavation shall be removed, or all excavations four feet or more in depth require a safe means of access and egress.

4.2. Underground Utility Clearance

Prior to opening an excavation, the location of utility installations that may be encountered shall be determined. All requirements of HSEP 7.3.3 related to underground utility clearance shall be followed.

As set forth in HSEP 7.3.3, utility companies or owners shall be contacted to establish the location of the underground utility installations. The location and depth shall be marked indicating the type of service.

While the excavation is open, underground installations shall be protected, supported, or removed to safeguard employees.

4.3. Access and Egress

A stairway, ladder, ramp, or other safe means of access and egress shall be located in excavations that are four feet or more in depth so as to require no more than 25 feet of lateral travel for employees.

Ladders must extend 36 inches above the point of support at the top of the excavation.

Structural ramps used solely by employees shall be designed by a Competent Person.

Structural ramps used by equipment shall be designed by a Competent Person qualified in structural design and shall be constructed accordingly.

4.4. Prohibited Task Health Hazard Conditions

No worker shall enter a work area where:

- Oxygen concentrations are less than 19.5% or greater than 23.5%, or
- Atmospheres are greater than 1% of the Lower Explosive Limit, or
- Atmospheres are potentially Immediately Dangerous to Life or Health (IDLH), or
- There is unprotected exposure to known human carcinogens, mutagens, or teratogens, or
- There is unprotected exposure to known chemical sensitizers.

When work in these environments seems to be absolutely necessary, the project manager shall appeal to the appropriate senior operations manager and senior HSE manager for written approval to proceed and for specific safe work procedures.

4.5. Work In Potentially Hazardous Atmospheres

Where oxygen deficiency or flammable or toxic atmospheres could exist, the air shall be tested before employees enter excavations.

Adequate precautions shall be taken to prevent employee exposure to oxygen deficiency or hazardous atmospheres. These precautions may include providing task modifications, ventilation, or, as a last resort, respiratory protection.

Periodic testing shall be conducted to ensure that potentially hazardous atmospheres remain safe.

Emergency rescue equipment, such as a self-contained breathing apparatus and a safety harness and lifeline shall be readily available where hazardous atmospheres exist or could develop. This equipment shall be maintained by a qualified attendant.

Copyright© 2005, Jacobs Engineering Group Inc.

Employees entering bell-bottom pier holes or similar deep and confined footing excavations shall wear a harness with a lifeline securely attached. The lifeline shall be individually attended at all times.

4.6. Water Accumulation

Employees shall not work in excavations in which water has accumulated, unless proper precautions have been taken.

Precautions include support or shield systems, water removal to control the level, and use of a safety harness and lifeline. When used, a Competent Person must monitor water removal equipment.

4.7. Stability of Adjacent Structures

Except in stable rock, excavation below the level or base of footing of any foundation or retaining wall shall not be permitted unless the wall is underpinned and other precautions have been taken to ensure the stability of the adjacent walls and the safety of employees involved in the work.

Shoring, bracing, or underpinning shall be inspected daily, or more often, as conditions warrant by a Competent Person. The protection shall be effectively maintained.

4.8. Protection of Employees from Loose Rock or Soil

Excavated or other material and equipment shall be maintained at a distance of at least two feet from the edge of excavations or behind retaining devices sufficient to prevent material or equipment from falling or rolling into the excavation.

If the operator of mobile equipment adjacent to or near the edge of an excavation does not have a clear view of the edge of the excavation, a warning system such as barricades, stop logs, or hand signals shall be used. If possible, the grade should be away from the excavation.

4.9. Fall Protection

Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails shall be provided.

Adequate barricades providing physical protection shall be provided at all excavations. All wells, pits, shafts, etc., shall be barricaded or covered.

Upon completion of operations, temporary wells, pits, shafts, etc., shall be promptly and adequately back filled.

4.10. Soil Classification

Each soil and rock deposit shall be classified by a Competent Person as stable rock, type A, type B, or type C in accordance with the definitions set forth in 29 CFR 1926.652 (Appendix A) and documented on the Daily Trench and Excavation Inspection form (Figure 1).

The classification shall be based on at least one visual and at least one manual analysis. Such analysis shall be conducted by a Competent Person using tests described in 29 CFR 1926.652 (Appendix A).

4.11. Protective Systems

4.11.1. Sloping and Benching

A Registered Professional Engineer shall design sloping and benching systems for excavations greater than 20 feet deep.

For excavations 20 feet deep or less, one of the following options may be used:

- Option 1 - Excavations shall be sloped one-and-one-half horizontal to one vertical (34 degrees measured from the horizontal) unless you use Option 2, 3, or 4. Slopes shall be excavated to form configurations in accordance with slopes shown for Type C Soil in Appendix B, Maximum Allowable Slopes, of 29 CFR 1926.652.

Copyright© 2005, Jacobs Engineering Group Inc.

- Option 2 - Slopes and configurations for sloping and benching systems shall be determined in accordance with the provisions of Soil Classification, as set forth in this HSEP, and with Appendix B, Maximum Allowable Slopes, of 29 CFR 1926.652.
- Option 3 - Designs of sloping and benching systems shall be in accordance with tabulated data and charts identifying parameters, limits of use, and explanatory information as necessary. This data must be in written form on the jobsite and bearing the seal of the approving Registered Professional Engineer.

When excessive loads from stored material or equipment, operating equipment, or traffic are present, the Competent Person shall determine to what degree the slope must be reduced below the maximum allowable slope.

4.11.2. Support and Shield Systems (Shoring)

For excavations greater than 20 feet deep, a Registered Professional Engineer must design or approve any support/shield systems used.

For support and shield systems in excavations 20 feet or less in depth, one of the following options may be used.

- Option 1 - Designs for timber shoring shall be determined using tables C1.3 or C2.3 (29 CFR 1926.652 Appendix C) for soil type C. Designs for aluminum hydraulic shoring shall be in accordance with manufacturers data or 29 CFR 1926.652 (Appendix D).
- Option 2 - Designs for timber shoring shall be determined in accordance with the provisions, as set forth in this HSEP, of Soil Classification and in accordance with the provisions of Timber Shoring.
- Option 3 - Use of pre-fabricated support systems, such as aluminum hydraulic shoring or other protective systems drawn from manufacturers data, must be used in accordance with all specifications and limitations issued by the manufacturer.
- Option 4 - Designs of support, shield, or other protective systems must be in accordance with tabulated data and bear the seal of the approving Registered Professional Engineer.

4.11.3. Materials and Equipment

Materials and equipment used for protective systems shall be free from damage or defects that might impair their proper function. Manufactured materials and equipment shall be used in a manner that is consistent with the recommendations from the manufacturer. Damaged material or equipment shall be removed from use.

4.11.4. General Requirements for Shoring

Members of support systems shall be securely connected in order to prevent sliding, falling, kick outs, or other failure.

Support systems shall be installed and removed in a manner that protects employees from cave ins, collapses, or being struck by support members. Removal shall begin at and progress from the bottom of the excavation. Members shall be released slowly so that changes in the stability of the structure or excavation can be readily assessed.

Components of pre-fabricated systems must be supplied with the manufacturer's seal or identification markings. These markings must remain legible.

Excavation of material from no greater than two feet below the bottom of the support or shield systems is permitted if the system is designed to resist the forces of the full depth.

Employees shall not be allowed in excavations when shields are being installed, removed, or moved.

4.12. Timber Shoring

Timber shoring may be provided in excavations that do not exceed 20 feet as a means of protection from cave-ins.

Copyright© 2005, Jacobs Engineering Group Inc.

A Registered Professional Engineer must design timber shoring for excavations greater than 20 feet deep.

In order to use timber shoring, the soil type must first be determined by a Competent Person using the steps set forth in Soil Classification, as found in this HSEP.

There are six tables in 29 CFR 1926.652; Appendix C, two for each soil type. Minimum sizes of shoring members are specified for each soil type. Using the appropriate table, a selection of size and spacing of members can be made. Selection is based on trench depth and width and on spacing of the cross braces.

The members specified in the table are not adequate when:

- Stored material adjacent to the excavation exceeds the load imposed by a two-foot soil surcharge.
- When surcharge loads are present from equipment weighing in excess of 20,000 pounds.
- When vertical loads imposed on cross braces exceeds a 240-pound gravity load distributed on a one foot section of the center of the cross brace.

When any of these conditions exists, an alternate timber shoring or protective system shall be used.

4.13. Inspection and Storage

Designated Competent Persons shall make inspections of excavations, the adjacent areas, and protective systems before employees or equipment are allowed to enter an excavation, before the start of work each day, and as necessary throughout the shift, by using the Daily Trench/Excavation Inspection form found in Figure 1.

The designated Competent Person must determine whether the excavation is also a confined space and what additional requirements shall apply.

Inspections by Competent Persons shall additionally be made after every rainstorm or other event that has the potential to create or increase hazard(s).

Where there is evidence, which indicates a possible cave-in, failure of the protective system, or other potentially hazardous condition, employees shall be removed until the Competent Person can inspect the situation and proper precautions have been taken.

4.14. Training

Employees involved in trenching and excavations shall be properly trained in accordance with this HSEP.

Employee training shall be conducted and documented by Competent Persons.

Competent Persons shall be so designated by the Site Manager, only after completing an appropriate excavation and trenching course taught by Corporate HSE or other qualified subject matter specialist.

4.15. Environmental

The excavation of soil in an area of known or suspected contamination may require a permit from the local air quality management district. This permit, at a minimum, will likely require routine testing of the air over the soil for volatile organic compounds and/or other contaminants. For a large excavation project in an area of known contamination, the filing of a site-specific mitigation plan may be required.

If the concentration of volatile organic compounds emitted by the soil exceeds the regulatory action level, mitigation measures must be taken to control emissions and the district or agency must be notified. Potential mitigation measures include covering the soil pile with a tarp or spraying with water or vapor suppressant.

Copyright© 2005, Jacobs Engineering Group Inc.

Stockpiled soil that is contaminated must be kept covered to prevent emissions and the cover must be inspected daily. This soil must be moved to a regulated disposal site or treatment unit within 30 days of placement.

Excavation work may require a wet weather erosion control permit from regulators. The purpose of this permit is to prevent sediment runoff from impacting storm water quality. Best management practices include covering stockpiled soil, placement of sand bags in front of storm water inlets, and wash-down of trucks before they leave the site.

Deep excavations may encounter groundwater that must be removed from the pit. This water can be loaded with sediment and direct discharge to the street or storm drain may be prohibited. A filter sock on the end of the discharge hose may be used to filter out solids or the water may be pumped to a settling pit prior to discharge.

It is not always safe to assume that clear and odorless water is free from harmful contaminants. Testing of the water should be conducted if there is a concern. Removal of contaminants prior to discharge may be required. Common removal methods include air stripping, carbon treatment, and offsite disposal.

5.0 REFERENCES AND RELATED DOCUMENTS

29 CFR 1926 Subpart P, Excavations

HSET Training Program No. 021, Excavations

6.0 FIGURES

Daily Trench/Excavation Inspection

Copyright© 2005, Jacobs Engineering Group Inc.

Figure 1

Daily Trench/Excavation Inspection

Date: _____ Time: _____Site Name:_____

Excavation Location_____

Site Evaluation

_____ Surface encumbrances
_____ Underground installations
_____ Access and egress
_____ Exposure to vehicular traffic
_____ Exposure to falling loads
_____ Hazardous atmospheres
_____ % Oxygen (O_2)
_____ Warning system for mobile equipment
_____ Protection from water accumulation
_____ Stability of adjacent structures
_____ Employee protection - loose rock/soil
_____ Inspections
_____ Fall protection
_____ % of Lower Explosive Limit

Note: Atmospheres in excavations greater than four feet shall be tested for oxygen content and flammable gas concentrations prior to entry of personnel. Emergency rescue equipment shall be readily available.

Soil Classification

Soil classification shall be made based on the results of at least one visual, and one manual test.

_____ Stable rock _____ Type A _____ Type B _____ Type C

Visual Tests

Inspect worksite for:

_____ Fissured ground
_____ Layered soil
_____ Previously disturbed earth
_____ Seepage
_____ Vibration
_____ Poor drainage

Manual Tests

Analyze soil for:

_____ Plasticity
_____ Dry strength
_____ Thumb penetration
_____ Pocket penetrometer
_____ Sherevane
_____ Drying test

Protective Support Systems

Sloping & Benching

_____ Stable rock: 90 degrees
_____ Type A: 53 degrees
_____ Type B: 45 degrees
_____ Type C: 34 degrees

Shoring & Shielding

_____ Timber or hydraulic
_____ Trench boxes, trench shields
_____ Design using tabulated data
_____ RPE design

Additional Comments or Information:_____

_____

Inspection performed by: _____

Authorized Competent Person

Copyright© 2005, Jacobs Engineering Group Inc.

JACOBS

JACOBS

HSE Procedure		Document No: HSEP 8.3	Page: 1 of 12
Excavating Equipment Use And Operator Qualification		Supersedes: HSEP 8.3	Revision: 3 Issue Date: 3 Oct 05
Issuing Department: Corporate HSE	Approval: Susan.Kiesling@Jacobs.com	Previous Rev. & Issue Date: 2, 14 Aug 01	Effective Date: 3 Oct 05

Table of Contents

1.0 PURPOSE AND SCOPE 1
2.0 RESPONSIBILITIES 1
2.1. Site Manager 2
2.2. Managers and Supervisors 2
2.3. Equipment Operators 2
2.4. Site HSE Supervisor 2
3.0 DEFINITIONS 2
4.0 PROCEDURE 3
4.1. General Requirements for Excavating Equipment Use 3
4.2. General Requirements for Operators 3
4.3. Transporting or Driving Excavating Equipment on Public Highways 4
4.4. General Requirements for Excavations 4
4.5. General Requirements for Fueling and Maintenance 5
4.6. Excavating Equipment Operator Qualification Procedure 5
4.7. Equipment Specific Precautions 6
4.7.1. Trencher 6
4.7.2. Backhoes and Trackhoes 6
4.7.3. Skid Steer Loaders 7
4.7.4. Compactors 7
4.7.5. Burial Plow Attachment 7
4.7.6. Horizontal Boring Attachment 8
4.7.7. Rock Cutting Attachment 8
4.7.8. Industrial/Agricultural Mower 8
5.0 REFERENCES AND RELATED DOCUMENTS 8
6.0 FIGURES 9
Operator Qualification 10
Medical Evaluation For Equipment Operator's Fitness Determination 11
Excavating Equipment Inspection Report 12

1.0 PURPOSE AND SCOPE

This HSEP provides the minimum procedures to be followed for the use of excavating equipment and for the qualification of excavation equipment operators. Additional guidelines for other types of "Heavy Equipment" operator qualifications can be found in Section 17.0 of the HSE Procedures Manual.

This HSEP applies to all employees and subcontractors covered by the Company Health, Safety, and Environment Program.

2.0 RESPONSIBILITIES

General responsibilities for HSE Program implementation are stated in HSEP 1.5. Additional management, staff, employee, and subcontractor responsibilities that address duties specific to this topic are stated in this procedure.

Copyright© 2005 by Jacobs Engineering Group Inc.
All rights reserved. The contents of this document are proprietary and produced for the exclusive benefit of Jacobs Engineering Group Inc. No part of this document may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without the prior written approval of Jacobs Engineering Group Inc.

The current applicable version of this publication resides on Jacobs' Intranet. All copies are considered to be uncontrolled.

2.1. Site Manager

The Site Manager shall:

- Designate a Competent Person(s) using the procedure and form provided in HSEP 2.5 or personally conduct all excavation equipment operator qualification and inspection. For some non-US locations, the competent person may have to be an external supplier with the proper certificates based on relevant national legislation.
- Ensure that only approved equipment is used.
- Assign qualified persons to operate the excavating equipment.
- Maintain a list of qualified operators.
- Ensure that the proper equipment for the task is provided for the employees performing the work.

2.2. Managers and Supervisors

Managers and supervisors shall ensure that only qualified and authorized employees are assigned to work requiring the use of equipment covered by this HSEP.

Supervisors must monitor the work to ensure that equipment is operated in compliance with this HSEP, with manufacturers' recommendations, and with national, state, local, and client requirements.

2.3. Equipment Operators

Equipment operators are responsible for safe operation of the equipment, which they have been pre-qualified to operate, and must do so in accordance with training they have received, with all applicable Company HSEPs, and with manufacturers' instructions pertinent to the equipment that they will be operating.

Prior to using excavating equipment, the operator must review the operator's manual to assure a comprehensive understanding of the machine's controls and the procedures necessary for its safe operation.

Equipment operators must have the physical ability and knowledge to safely operate the equipment. Operators of equipment that can be used on public highways shall have a valid motor vehicle operator's license.

2.4. Site HSE Supervisor

The Site HSE Supervisor will maintain equipment operator qualification records and send a copy to the Human Resources Department.

3.0 DEFINITIONS

Back Hoe	A tractor mounted attachment for digging trenches and excavations.
Bulldozer	A track mounted machine with a front mounted blade designed for moving materials by pushing it from one place to another.
Bus	A multi-passenger vehicle designed to transport personnel.
Competent Person	One who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has the authorization to take prompt corrective measures to eliminate them. For some non-US locations the competent person may have to be an external supplier with the proper certificates based on relevant national legislation.
Dump Trucks	A vehicle with a tilting body to facilitate unloading itself.
FOPS	Falling Object Protective Structures

Copyright© 2005, Jacobs Engineering Group Inc.

Front-end Loader	A machine with a bucket attachment designed for loading loose materials for transport.
ROPS	Roll Over Protective Structures mounted on equipment to protect the operator.
Scraper	Vehicles designed for removing soil by simultaneously scraping, loading, and transporting excavated materials.
Track Hoe	A track-mounted backhoe.
Tractor/Trailer Dump Bed	A trailer type vehicle, which has a tilting body to facilitate unloading itself and which is moved by an independent tractor or truck.

4.0 PROCEDURE

4.1. General Requirements for Excavating Equipment Use

Do not use equipment that is not in proper operating condition. Attach a “Danger — Do Not Use” tag to inoperable equipment and notify the supervisor.

An Excavating Equipment Inspection Report (Figure 3) shall be completed by a designated Competent Person at least monthly.

Mobile equipment must be equipped with a fire extinguisher with a minimum rating of 2A -10BC.

When mounting or dismounting equipment, clean shoes and hands before climbing. Always use handrails, grab rails, and steps. Maintain a three-point contact with steps and handholds. Never jump on or off equipment. Never attempt to mount or dismount a moving machine. Do not use steering wheel or control levers as a handhold.

Passengers shall not be allowed on equipment unless seated in a manufacturer’s installed seat and with the seat belt fastened.

Never use buckets, forks, or attachments as a work platform or personnel carrier.

The equipment must be equipped with

- a functioning service brake and parking brake maintained in good working order and with
- a functioning audible back-up alarm that is distinguishable from surrounding noise.

All rubber-tired, self-propelled scrapers, rubber-tired front-end loaders, rubber-tired dozers, wheel-type agricultural and industrial tractors, crawler tractors, crawler-type loaders, and motor graders, with or without attachments, that are used in construction work shall be equipped with rollover protective structures (ROPS) and seat belts. This requirement does not apply to sideboom pipe laying tractors.

The manufacturer must provide written approval for modifications, for use of attachments, or for equipment use for other than its intended purpose. Equipment capacities must be adjusted to accommodate the modifications or attachments.

4.2. General Requirements for Operators

It is the responsibility of the operator to read and understand the operators manual and the manufacturers’ recommendations for each type and model of equipment to be operated and the requirements of this HSEP.

The equipment must be inspected by the operator prior to each use. Do not use equipment that is not in proper operating condition or is not within the last monthly inspection period. Attach a “Danger — Do Not Use” tag to inoperable equipment and notify the supervisor.

When so equipped, check the “operator presence/seat interlock” prior to starting equipment. Do not operate the equipment if the system is not functioning properly.

Operators must know the capacity and operating characteristics of the equipment to be operated.

Copyright© 2005, Jacobs Engineering Group Inc.

The equipment must be attended at all times or attachments must be placed in the “transport lock position” or lowered to the ground.

The operator must check the work area for slopes, obstructions, potholes, etc. prior to beginning work. Check for overhead obstructions such as power lines, pipe racks, etc. and ensure proper clearances. See HSEP 7.3.3 and HSEP 17.1 for utility line clearance requirements.

Loads must be carried as low as possible to maintain stability of the equipment and operator visibility.

Operations are to be performed only from the operators control station.

When equipped with “roll over protective structures, the operator must wear seat belt at all times.

Never lift loads over people, occupied buildings, or operating equipment.

Use caution when handling objects such as round bales, poles, stumps, cylinders, sheets of plywood, etc. Lifting too high or rolling the bucket too far back could result in objects sliding down the loader arms and falling onto the operator’s control station.

Obey posted speed limits. When operating on the jobsite, take it slow and easy. Give right of way to loaded machines and maintain a safe distance from other machines.

Avoid steep slopes or unstable surfaces. When operating on a slope, keep the load low and use extreme caution. Avoid sudden starts, stops, and turns when operating on inclines. Do not drive across steep slopes, rather, drive up and down the slope. Avoid making turns on inclines. If it is necessary, make turns wide and slowly with load carried low. When traveling up or down inclines, do so with loaded buckets facing uphill and empty buckets facing downhill.

When parking, select a place out of traffic areas. Select a level area whenever possible. When it is necessary to park on an incline, position the machine at right angles to the incline. Secure or lower buckets, blades, and attachments and set the parking brake. Shut down the machine and chock wheels. Cycle the controls to ensure all attachments are secure.

4.3. Transporting or Driving Excavating Equipment on Public Highways

When traveling on public roads, lock dual brake pedals together. Make sure all clearance flags, lights, and warning signs are in place and visible. Make sure the “Slow Moving Vehicle” emblem is visible to traffic approaching from the rear. Use escort vehicles, as required.

When loading or unloading the machine, select a level surface. Chock the transport vehicle to prevent movement. Keep trailer bed and ramps free of oils, mud, snow, ice, and debris. On articulated machines, attach the steering frame lock after loading and remove it before unloading. Chain and block the machine securely. Secure all attachments in the transport mode and lower buckets or blades. Cover or remove “Slow Moving Vehicle” emblems before transporting.

When loading trucks, ensure the driver of the truck is out of the cab and away from the work area before loading unless a falling object protection structure is provided over the operator.

Only the equipment operator and personnel trained and qualified to load equipment shall be allowed in the area during equipment loading or unloading.

Unless qualified as an operator of the specific type of equipment to be transported, the truck driver shall not be allowed to drive the equipment onto or off of the trailer.

4.4. General Requirements for Excavations

The location of underground utilities, i.e., electric, gas lines, water lines, etc. must be identified prior to beginning excavation. Follow all requirements of HSEP 7.3.3 for utility clearance.

Check with the supervisor or the facility owner for permit requirements. If unidentified encumbrances or utilities are struck, stop all work and notify the supervisor.

Precautions must be implemented to keep personnel out of excavations and at least 10 feet away from the equipment and its maximum boom and/or counterweight swing radius when operating.

Copyright© 2005, Jacobs Engineering Group Inc.

Accessible areas within the swing radius of the equipment are to be barricaded to prevent personnel from being struck or crushed.

Vehicles and excavating or materials handling equipment must not approach an excavation while employees are in the excavation.

When excavating, extreme caution should be utilized to avoid hazards caused by cave in, i.e., roll over, tipping, or objects falling from overhead. If equipped with such, use the machine stabilizers. Avoid dangers such as rock or earth slides, when working at the base of excavations, overhangs, or stockpiles. See HSEP 8.4 for additional requirements for working on or near excavations and trenches.

4.5. General Requirements for Fueling and Maintenance

Refueling and/or battery charging must only be done in well-ventilated and designated areas.

Shut down equipment and allow sufficient time for the engine to cool prior to refueling.

Use approved fuel hose with embedded grounding and approved connections or attach a static ground from equipment to fuel transfer equipment to avoid fuel ignition due to static discharge.

Always ensure the availability of safety shower or eyewash facilities near fueling areas. Fire protection equipment must be readily available.

Starting aids, such as jumper cables or ether, may only be used with extreme caution and according to manufacturer's instructions. Always connect the ground cable last. The ground cable should be attached to the engine at a point away from the battery.

Only trained and authorized personnel are permitted to perform equipment maintenance. This includes inflating or changing tires and "jump starting." Control of the sudden release of hazardous energy must be implemented during service or maintenance.

Equipment towing should be avoided. If it is necessary, use a rigid tow bar and consult the manufacturer's requirements.

4.6. Excavating Equipment Operator Qualification Procedure

The qualification and training records will be kept in readily available files at the project site.

The site manager or the designated Competent Person:

- Shall, prior to skills testing, train the operators using the manufacturer's manual for the excavating equipment on which they are to be qualified.
- Shall evaluate the skills of each prospective operator of excavating equipment to ensure that they have the physical abilities and knowledge to safely operate the equipment they are being qualified on.
- Shall, after fulfilling these requirements, complete the Operator Qualification form (Figure 1.)

Operators of dump trucks, tractor/trailer trucks, buses, and any equipment that can be driven on a public roadway must also be licensed by the government/state to operate the vehicles on public roads or property.

Operators of the listed equipment must complete a Medical Evaluation For Equipment Operator's Fitness Determination, Figure 2, prior to being assigned work requiring the use of such equipment. The completed form is to be reviewed by the site manager and the site HSE supervisor. Occupational Health Services or a medical doctor shall resolve any concerns that might affect the ability of the prospective operator to safely operate the equipment.

Copyright© 2005, Jacobs Engineering Group Inc.

4.7. Equipment Specific Precautions

4.7.1. Trencher

When operating a trencher, make sure the machine is ready for the job it must do. Use a digging boom of the right length with a tooth pattern appropriate to soil conditions. Keep guards, personnel restraints, and trench cleaner in proper adjustment in relation to the digging chain.

If the trencher is a riding model, operate the machine only from the operator's seat. The digging chain, auger, or wheel of the trencher can throw rock or debris a considerable distance. Use proper face and eye protection.

Never allow anyone in the trench while digging.

When beginning a new trench, set the digging boom down carefully with the chain moving slowly. The chain will tend to pull the machine. Be prepared to counteract the pull. Dropping a rapidly moving digging chain to the ground can cause the trencher to move quickly and unexpectedly.

Ensure that you understand the stability of the trencher. Use caution when trenching on hillsides. Avoid the potential for roll over or tipping. Always try to dig with the trencher in a level position. Vibration will tend to make the trencher slip sideways down a slope. Thoroughly evaluate the potential hazards and design the job such that equipment will remain stable throughout the course of the job.

Avoid fences, walls, or other obstructions. If the tip of the digging boom makes contact with an obstacle, the machine can climb up and tip backwards onto the operator.

During digging, if the machine strikes an unforeseen encumbrance, begins to labor, or jams, then shut down the machine and inspect the worksite and the chain. Never attempt to free a stuck chain while the trencher is running.

Stop the engine before attempting to service the chain.

4.7.2. Backhoes and Trackhoes

Never operate backhoe controls from the ground. Always operate from the operators control station.

Use stabilizers. Apply enough pressure to the stabilizers to support the machine without raising the machine axles off the ground.

Never enter, or allow anyone to enter the backhoe pivot-point area or the swing radius of the boom. Maintain a clear zone of at least 10 feet beyond the maximum reach of the boom or counterweight.

Do not dig under the machine or stabilizers.

When operating on a slope, swing to the uphill side to dump the load, if possible. If downhill dumping is necessary, swing only as far as required to dump the load. Use extreme caution. Use stabilizers to support the machine.

When using the backhoe bucket for hoisting:

- Consult the manufacturer's manual for lifting capacity.
- Position the machine so that load lowering is done over the front or back of the machine, not the side.
- Always use stabilizers, and in soft soil place pads under each stabilizer.
- Ensure that the load is balanced and move slowly to maintain control of the load. Use tag lines.
- Never lift the load higher than necessary to clear obstacles.

Copyright© 2005, Jacobs Engineering Group Inc.

- Lower the load as soon as the obstacle is cleared and never hoist loads over people.

4.7.3. Skid Steer Loaders

Skid Steer Loaders are inherently dangerous machines due to their short wheelbase and operating characteristics.

Operators must maintain complete control at all times and operate at a slow speed suitable to site conditions.

When changing direction, look both ways to ensure adequate clearance from personnel and equipment.

Extreme caution should be used when operating in and around excavations to avoid tipping. Always travel up and down slopes with the loaded bucket facing up the hill or the empty bucket facing down the hill.

Avoid sudden starts, stops, and turns to avoid tipping or striking other equipment or people.

Attachments used with skid steer loaders must be approved by the manufacturer and used in accordance with manufacturer instructions. Equipment capacities must be adjusted to accommodate such attachments.

On loaders where the operator's seat and controls are between the lift arms and in front of the liftarm pivot points and the operators must enter and exit from the loader through the front of the machine and over the bucket, operators must use great care to avoid contact of foot or hand controls that may be activated and cause movement of the lift arms, bucket, or other attachment.

4.7.4. Compactors

Prior to using compaction equipment, the prospective operator must receive proper training and study the operator’s manual to ensure a comprehensive understanding of the machine operation and controls.

Operators are required to wear safety toe shoes and metatarsal guards while operating hand held compaction equipment. Other types of personal protective equipment may be required, e.g., hearing protection, respiratory protection, etc.

Caution must be exercised when working in or around excavations to avoid tipping or cave in. When in excavations four feet deep and greater, sides must be sloped or shored to prevent cave in. Shoring evaluation must consider the additional load, which may be imposed due to the compaction activity. A remote control compactor should be used in or near excavations, when possible.

4.7.5. Burial Plow Attachment

When transporting a burial plow attachment, raise the plow to its fully elevated position and engage the transport lock. For parking, the plow should be either locked in the transport position or lowered to the ground.

Know the location of underground utilities (refer to HSEP 7.3.3) and clear the area of all obstructions or bystanders before operating the machine.

When plowing on slopes, the machine’s stability is increased due to the blade in the ground. Always enter or exit the ground slowly. Rapid entry or exit may cause the machine to tip.

Copyright© 2005, Jacobs Engineering Group Inc.

4.7.6. Horizontal Boring Attachment

When using an underground boring attachment, you must receive proper training and study the operator's manual to learn the operation of machine controls and operational boring procedures.

Do not guide drill rod or pipe with hands, arms, feet, or other bodily contact. Use only guide tools as recommended by the manufacturer.

Keep bystanders and unauthorized personnel out of the work area and away from exposed drill rod or pipe.

Do not use excessive crowd (pushing) force on drill rod or pipe. Whipping action may result increasing the potential for accident or injury.

Never use fasteners or hardware other than that supplied by the manufacturer to retain drill rod or pipe connectors

Do not service drill rod or pipe while engine is running.

4.7.7. Rock Cutting Attachment

Prior to operating this equipment, the prospective operator must receive proper training and study the operator's manual to ensure a comprehensive understanding of the machine operation and controls.

Read and understand the danger, caution, and warning signs on the equipment prior to beginning work.

Rock cutting may require hearing and/or respiratory protection. Check with your supervisor to determine the proper personal protective equipment.

Keep all unauthorized personnel away from the work area.

4.7.8. Industrial/Agricultural Mower

Prior to operating this equipment, the prospective operator must receive proper training and study the operator's manual to ensure a comprehensive understanding of the machine operation and controls.

Ensure that chain, flexible, or solid deflector shields are in place on the front and rear of the mower deck and are in good repair. Do not operate with damaged or missing shields.

Check for broken, missing, bent, or severely worn blades.

Check work area for debris and foreign objects to avoid them being picked up and thrown out by the mower. Inspect for rough terrain, drop-offs, ditches, potholes, steep slopes, stumps, standing water, mud, soft soil, or slippery conditions.

Keep unauthorized personnel out of the work area. The mower may throw objects up to 300 feet.

Do not operate mower in transport position.

Avoid excessive ground speed for terrain conditions and sudden starts, stops, or turns.

Plan to mow downhill on steep slopes. Avoid overspeed of the power take off.

Ensure that required guards are in place.

Keep clear of rotating blades, parts, and drivelines.

5.0 REFERENCES AND RELATED DOCUMENTS

ANSI B30.5, Mobile and Locomotive Cranes

HSEPs 7.3.3, 8.4, 17.1, 17.2, 17.4, 17.5, 17.9

Copyright© 2005, Jacobs Engineering Group Inc.

6.0 FIGURES

Operator Qualification

Medical Evaluation For Equipment Operator's Fitness Determination

Excavating Equipment Inspection Report

Copyright© 2005, Jacobs Engineering Group Inc.

Figure 1

Operator Qualification

To HSE Department Date:

From (Site Manager):

Site Name and Location:

Through experience, training, and personal observation, the following are a Qualified Operator for the equipment indicated.

Name	Equipment

Site or Project Manager's	
Name Printed	Signature

Copies to Site HSE Department
Site Manager/Competent Person
Area or Regional HSE Manager

Copyright© 2005, Jacobs Engineering Group Inc.

Figure 2

Medical Evaluation For Equipment Operator's Fitness Determination

1. OPERATOR'S INFORMATION (Operator completes Sections 1 and 2)

Operator's Name (Last, First, Middle)	Social Security No.	Birth date (mm/dd/yy)	Age	☐ M ☐ F	☐ New Qualification ☐ Re-qualification
Address	City, State, Zip Code	Work Phone: ( ) Home Phone: ( )			Job Site:

2. HEALTH HISTORY

Yes No
- ☐ ☐ Any illness or injury in last 5 years?
- ☐ ☐ Head/Brain injuries, disorders or illnesses
- ☐ ☐ Seizures, epilepsy
  - ☐ Medication _____
- ☐ ☐ Eye disorders or impaired vision (except corrective lenses)
- ☐ ☐ Ear disorders, loss of hearing or balance
- ☐ ☐ Heart disease or heart attack, other cardiovascular condition
  - ☐ Medication _____
- ☐ ☐ Heart surgery (valve replacement/bypass, angioplasty, pacemaker)
- ☐ ☐ High blood pressure ☐ Medication_____
- ☐ ☐ Muscular disease
- ☐ ☐ Shortness of breath

Yes No
- ☐ ☐ Lung disease, emphysema, asthma, chronic bronchitis
- ☐ ☐ Kidney disease, dialysis
- ☐ ☐ Liver disease
- ☐ ☐ Digestive problems
- ☐ ☐ Diabetes or elevated blood sugar controlled by:
  - ☐ Diet
  - ☐ Pills
  - ☐ Insulin
- ☐ ☐ Nervous or psychiatric disorders, e.g., severe depression
  - ☐ Medication _____
- ☐ ☐ Loss of, or altered, consciousness

Yes No
- ☐ ☐ Fainting, dizziness
- ☐ ☐ Sleep disorders, pauses in breathing while asleep, daytime sleepiness
- ☐ ☐ Stroke or paralysis
- ☐ ☐ Missing or impaired hand, arm, foot, leg, finger, toe
- ☐ ☐ Spinal injury or disease
- ☐ ☐ Chronic low back pain
- ☐ ☐ Regular, frequent alcohol use
- ☐ ☐ Narcotic or habit forming drug use

For any YES answer, indicate onset date, diagnosis, treating physician's name and address, any current limitation. List all medications (including over-the-counter medications) used regularly or recently.

The above information is complete and true. I understand that inaccurate, false, or missing information may invalidate the medical evaluation and my status as a Qualified Equipment Operator.

Operator's Signature: Date:

3. VISION

ACUITY	UNCORRECTED	CORRECTED
Right Eye	20/	20/
Left Eye	20/	20/
Both Eyes	20/	20/

Vision of at least 20/30 Snellen in one eye and 20/50 in the other, with or without corrective lenses.

_____ Vision Screen Technician Signature _____ Date

4. OCCUPATIONAL HEALTH SERVICES

- ☐ Qualified, no follow-up needed
- ☐ Referred to Dr. for follow-up (Name, Address, Phone)
- ☐ Qualified after follow-up
- ☐ Not qualified
- ☐ Qualified with the following restrictions

_____

OHS Reviewer's Signature: Date: _____

Copyright© 2005, Jacobs Engineering Group Inc.

Figure 3

Excavating Equipment Inspection Report

Inspector's Name Printed:	Date:
Equipment Description:	Equipment Number:

Item Inspected	Good	Fair	Poor	N/A	Comments
Brakes & Steering					
Broken, Missing, Damaged Parts					
Chains/Digging Boom (Trenchers)					
Controls Functioning Properly					
Deflectors & Blades (Mowers)					
Engine Oil/Water/Battery					
Falling Object Prot. Structure					
Fire Extinguisher					
Gauges					
Guards/Shields					
Horn and Back Up Alarm					
Hydraulic Fluid Level/Leaks/Hoses					
Lights					
Mirrors					
Operator Presence/Seat Interlock					
Other Interlock Switches					
Roll Over Protective Structure					
Seat Belt					
Signs/Placards					
Tires					
Windshield/Glass/Wipers					

Comments:

Inspector's Signature:

Copyright© 2005, Jacobs Engineering Group Inc.

Project Specific Material Safety Data Sheets and Physical Agent Data Sheets

GRO
DRO
RRO
PCB
Clorox Bleach
Windex
OFF! Insect Repellent
Duracell Alkaline Batteries
Marking paint (all colors)
Motor Oil
Unleaded Gasoline
Leaded Gasoline
Propane
Diesel Fuel
Lead-Acid Battery

Benzene
Ethylbenzene
Toluene
Xylenes
TCE
Naphthalene
Methoxychlor
Arochlor 1260
Cold Stress
Hand-Arm Vibration
Heat Stress
Ionizing Radiation
Lasers
Noise
Radio Frequency/Microwave Radiation
Ultraviolet Radiation

ULTRAMAR AFFIL OF ULTRAMAR AMERICA LTD -- GASOLINE, AUTOMOTIVE, UNLEADED - GASOLINE
MATERIAL SAFETY DATA SHEET
NSN: 9130010550816
Manufacturer's CAGE: 0VZA7
Part No. Indicator: A
Part Number/Trade Name: GASOLINE, AUTOMOTIVE, UNLEADED

General Information

Item Name: GASOLINE, AUTOMOTIVE
Company's Name: ULTRAMAR INC, AFFIL OF ULTRAMAR AMERICA LTD
Company's Street: 1111 W OCEAN BLVD SUITE 1400
Company's P. O. Box: 93102
Company's City: LONG BEACH
Company's State: CA
Company's Country: US
Company's Zip Code: 90809-3102
Company's Emerg Ph #: 310-495-5300/310-435-5832
Company's Info Ph #: 310-495-5300/310-435-5832
Record No. For Safety Entry: 011
Tot Safety Entries This Stk#: 044
Status: SE
Date MSDS Prepared: 15JUL92
Safety Data Review Date: 05JAN93
Supply Item Manager: KY
MSDS Serial Number: BPQWS
Specification Number: VV-G-1690
Spec Type, Grade, Class: CL A-E, GR SPECIAL
Hazard Characteristic Code: F2
Unit Of Issue: GL
Unit Of Issue Container Qty: 55 GAL
Type Of Container: DRUM
Net Unit Weight: 320.6 LBS

Ingredients/Identity Information

Proprietary: NO
Ingredient: GASOLINE
Ingredient Sequence Number: 01
Percent: 100%
NIOSH (RTECS) Number: LX3300000
CAS Number: 8006-61-9
OSHA PEL: 300 PPM/500 STEL
ACGIH TLV: 300 PPM/500STEL;9293
Other Recommended Limit: NONE RECOMMENDED

Proprietary: NO
Ingredient: MAY CONTAIN BENZENE (SARA III)
Ingredient Sequence Number: 02
Percent: >0.1
NIOSH (RTECS) Number: CY1400000
CAS Number: 71-43-2
OSHA PEL: 1PPM/5STEL;1910.1028
ACGIH TLV: 10 PPM; A2; 9293
Other Recommended Limit: NONE RECOMMENDED

Physical/Chemical Characteristics

Appearance And Odor: CLEAR COLORLESS TO AMBER, AROMATIC, VOLATILE LIQUID.
Boiling Point: 100-400F
Melting Point: UNKNOWN
Vapor Pressure (MM Hg/70 F): UNKNOWN
Vapor Density (Air=1): 3.0-4.0

Specific Gravity: 0.7-0.8
Decomposition Temperature: UNKNOWN
Evaporation Rate And Ref: UNKNOWN
Solubility In Water: INSOLUBLE
Percent Volatiles By Volume: UNK
Viscosity: UNKNOWN
pH: UNK
Corrosion Rate (IPY): UNK
Autoignition Temperature: 536F

Fire and Explosion Hazard Data

Flash Point: -45F,-43C
Flash Point Method: CC
Lower Explosive Limit: 1.2
Upper Explosive Limit: 7.6
Extinguishing Media: DRY CHEMICAL, CARBON DIOXIDE, WATER SPRAY OR REGULAR FOAM. FOR LARGE FIRES, USE WATER SPRAY, FOG OR REGULAR FOAM.
Special Fire Fighting Proc: EXTINGUISH ONLY IF FLOW CAN BE STOPPED; USE WATER IN FLOODING AMOUNTS AS FOG. AVOID BREATHING VAPORS, KEEP UPWIND. COOL CONTAINER WITH FLOODING AMOUNTS OF WATER
Unusual Fire And Expl Hazrds: DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME. VAPORS ARE HEAVIER THAN AIR, MAY TRAVEL TO A SOURCE OF IGNITION & FLASHBACK. VAPOR-AIR MIXTURE IS EXPLOSIVE

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HEAT, FLAMES, SOURCES OF IGNITION.
Materials To Avoid: OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.

Health Hazard Data

Precautions for Safe Handling and Use

Control Measures

Transportation Data

Trans Data Review Date: 93005
DOT PSN Code: GTN
DOT Proper Shipping Name: GASOLINE
DOT Class: 3
DOT ID Number: UN1203
DOT Pack Group: II
DOT Label: FLAMMABLE LIQUID
IMO PSN Code: HRV
IMO Proper Shipping Name: GASOLINE
IMO Regulations Page Number: 3141
IMO UN Number: 1203
IMO UN Class: 3.1
IMO Subsidiary Risk Label: -
IATA PSN Code: RMF
IATA UN ID Number: 1203
IATA Proper Shipping Name: MOTOR SPIRIT
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
AFI PSN Code: MUC
AFI Prop. Shipping Name: GASOLINE
AFI Class: 3
AFI ID Number: UN1203

AFI Pack Group: II
AFI Basic Pac Ref: 7-7
MMAC Code: NR
N.O.S. Shipping Name: GASOLINE

Disposal Data

Label Data

Label Required: YES
Technical Review Date: 05JAN93
MFR Label Number: UNKNOWN
Label Status: F
Common Name: GASOLINE, AUTOMOTIVE, UNLEADED
Chronic Hazard: YES
Signal Word: DANGER!
Acute Health Hazard-Severe: X
Contact Hazard-Moderate: X
Fire Hazard-Severe: X
Reactivity Hazard-None: X
Special Hazard Precautions: SPILL: SHUT OFF IGNITION SOURCES. STOP LEAK WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING/FLAMES/FLARES IN HAZARD AREA. KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA & RESTRICT ENTRY. FIRST AID: INHALE-REMOVE FROM EXPOSURE AREA TO FRESH AIR. IF BREATHING HAS STOPPED, DO CPR. MAINTAIN AIRWAY & BLOOD PRESSURE & GIVE OXYGEN IF NEEDED. SKIN-REMOVE CLOTHING. WASH WITH SOAP OR MILD DETERGENT & LARGE AMOUNTS OF WATER. EYE-WASH WITH LARGE AMOUNTS OF WATER OR SALINE FOR 15-20 MIN. INGEST-PREVENT ASPIRATION. GASTRIC LAVAGE WITH A CUFFED ENDOTRACHEAL TUBE IN PLACE SHOULD BE DONE WITHIN 15 MIN.
Protect Eye: Y
Protect Skin: Y
Protect Respiratory: Y
Label Name: ULTRAMAR INC, AFFIL OF ULTRAMAR AMERICA LTD
Label Street: 1111 W OCEAN BLVD SUITE 1400
Label P.O. Box: 93102
Label City: LONG BEACH
Label State: CA
Label Zip Code: 90809-3102
Label Country: US
Label Emergency Number: 310-495-5300/310-435-5832

MOBIL OIL CORP -- DIESEL FUEL (MRDUS)

==========

MSDS Safety Information

==========

FSC: 9140
NIIN: 00-286-5294
MSDS Date: 07/25/1997
MSDS Num: CLHNK
Product ID: DIESEL FUEL (MRDUS)
MFN: 02
Responsible Party
Cage: 6G112
Name: MOBIL OIL CORP
Address: 3225 GALLOWS RD
City: FAIRFAX VA 22037-0001
Info Phone Number: 800-662-4525, 703-849-3451
Emergency Phone Number: 609-737-4411 (COLLECT)
Preparer's Name: NOT PROVIDED
Chemtrec IND/Phone: (800)424-9300
Review Ind: Y
Published: Y

==========

Contractor Summary

==========

Cage: 6G112
Name: MOBIL OIL CORP
Address: 3225 GALLOWS RD
City: FAIRFAX VA 22037
Phone: 800-662-4525, 856-224-4644

==========

Item Description Information

==========

Item Name: DIESEL FUEL
Specification Number: VV-F-800
Type/Grade/Class: GRADE DF-2
Unit of Issue: GL
UI Container Qty: X
Type of Container: BULK

==========

Ingredients

==========

Cas: 68334-30-5
RTECS #: HZ1800000
Name: DIESEL FUEL
Percent by Wt: 100.
Other REC Limits: NOT ESTABLISHED
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

==========

Health Hazards Data

==========

LD50 LC50 Mixture: LD50 (ORAL, RAT) > 2,000 MG/KG
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS. PROLONGED, REPEATED SKIN CONTACT MAY RESULT IN SKIN IRRITATION OR MORE SERIOUS SKIN DISORDERS. NOTE: THIS PRODUCT CONTAINS POLYCYCLIC AROMATIC HYDROCARBONS, SOME OF WHICH HAVE BEEN REPORTED TO CAUSE SKIN CANCER IN HUMANS UNDER CONDITIONS OF POOR PERSONAL HYGIENE, PROLONGED REPEATED CONTACT, AND EXPOSURE TO SUNLIGHT. TOXIC EFFECTS AR E UNLIKELY TO OCCUR IF GOOD PERSONAL HYGIENE IS PRACTICED.
Explanation Of Carcinogenicity: NONE

Signs And Symptions Of Overexposure: RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS. PROLONGED, REPEATED SKIN CONTACT MAY RESULT IN SKIN IRRITATION OR MORE SERIOUS SKIN DISORDERS.

Medical Cond Aggravated By Exposure: NOT PROVIDED

First Aid: EYE CONTACT: FLUSH THOROUGHLY WITH WATER. IF IRRITATION OCCURS, CALL A PHYSICIAN. SKIN CONTACT: REMOVE CONTAMINATED CLOTHING. DRY WIPE EXPOSED SKIN AND CLEANSE WITH WATERLESS HAND CLEANER FOLLOWED B Y WASHING WITH SOAP AND WATER. INHALATION: REMOVE FROM FURTHER EXPOSURE. IF RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, OR UNCONSCIOUSNESS OCCURS, SEEK IMMEDIATE MEDICAL ASSISTANCE. IF BREATHING HAS STOPPED, ASSIST VENTILATION WITH BAG-VALVE-MASK DEVICE OR USE MOUTH-TO-MOUTH RESUSCITATION. INGESTION: SEEK IMMEDIATE MEDICAL ATTENTION. DO NOT INDUCE VOMITING.

Handling and Disposal

Spill Release Procedures: ADSORB ON FIRERETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PR ODUCT CHARACTERISTICS AT TIME OF DISPOSAL. PREVENT SPILLS FROM ENTERING STORM SEWERS OR DRAINS. REPORT AS REQUIRED TO AUTHORITIES.

Neutralizing Agent: NOT RELEVANT

Waste Disposal Methods: PRODUCT IS SUITABLE FOR BURNING FOR FUEL VALUE IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS. DISPOSAL OF UNUSED PRODUCT MAY BE SUBJECT TO RCRA REGULATIONS (40 CFR 261).

Handling And Storage Precautions: STORE IN A COOL AREA. A FLAMMABLE ATMOSPHERE CAN BE PRODUCEDIN STORAGE TANK HEADSPACES. MONITOR AND MAINTAIN HEADSPACE GASCONCENTRATIONS BELOW FLAMMABLE LIMITS. ALLOW NO IGNITION SOURCES IN THE AREA . AVOID SPARKING CONDITIONS. GROUND AND BOND ALL TRANSFER EQUIPMENT.

Other Precautions: HARMFUL IN CONTACT WITH OR IF ABSORBED THROUGH THE SKIN. AVOID INHALATION OF VAPORS OR MISTS. PORTABLE CONTAINERS APPROVED FOR STORING FUEL MUST BE PLACED ON THE GROUND AND THE NOZZEL MUST STAY IN CON TACT WITH THE CONTAINER WHEN FILLING TO PREVENT BUILD UP AND DISCHARGE OF STATIC ELECTRICITY.

Fire and Explosion Hazard Information

Flash Point Method: PMCC

Flash Point: >51.7C, 125.F

Lower Limits: 0.6%

Upper Limits: 7.0%

Extinguishing Media: CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG. USE WATER TO KEEP FIRE EXPOSED CONTAINERS COOL.

Fire Fighting Procedures: IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROTECT PERSONNEL ATTEMPTING TO STOP LEAK. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES. PREVENT RUNOFF FROM FIRE CONTROL OR DILUTION FROM ENTERING STREAMS, SEWERS, OR DRINKING WATER SUPPLY. WEAR SCBA IN ENCLOSED AREAS.

Unusual Fire/Explosion Hazard: MATERIAL IS COMBUSTIBLE.

Control Measures

Respiratory Protection: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

Ventilation: USE IN WELL VENTILATED AREA. VENTILATION DESIRABLE AND EQUIPMENT SHOULD BE EXPLOSION PROOF.

Protective Gloves: IMPERVIOUS GLOVES MUST BE WORN.

Eye Protection: CHEMICAL TYPE GOGGLES SHOULD BE WORN.

Other Protective Equipment: IF CONTACT IS LIKELY OIL IMPERVIOUS CLOTHING MUST BE WORN.

Work Hygienic Practices: NOT PROVIDED

Supplemental Safety and Health: ABBREVIATION: N/A = NOT APPLICABLE. N/AV = NOT AVAILABLE. N/K = UNKNOWN. N/P = NOT PROVIDED. N/R = NOT RELEVANT. N/D = NOT DETERMINED. N/E = NOT ESTABLISHED. CNS = CENTRAL NERVOUS SYSTEM. GI = GASTROI NTESTINAL. SCBA = SELF CONTAINED BREATHING APPARATUS.

==========
Physical/Chemical Properties
==========
HCC: F4
NRC/State LIC No: NOT RELEVANT
Boiling Point: >148.9C, 300.F
Melt/Freeze Pt: <-6.5C, 20.F
M.P/F.P Text: POUR POINT
Decomp Text: NOT PROVIDED
Vapor Pres: MMHG 20C:0.5
Vapor Density: > 2.0
Spec Gravity: 0.82-0.87
Viscosity: >1.0 CST @ 40C/104F
Evaporation Rate & Reference: NOT ESTABLISHED
Solubility in Water: NEGLIGIBLE
Appearance and Odor: LIQUID. CCOLOR: CLEAR(MAY BE DYED). ODOR: HYDROCARBON.
Corrosion Rate: NOT PROVIDED
==========
Reactivity Data
==========
Stability Indicator: YES
Stability Condition To Avoid: HEAT, SPARKS, FLAME AND BUILD UP OF STATIC ELECTRICITY.
Materials To Avoid: HALOGENS, STRONG ACIDS, ALKALIES, AND OXIDIZERS.
Hazardous Decomposition Products: CARBON MONOXIDE.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NONE
==========
Toxicological Information
==========
Toxicological Information: ORAL TOXICITY (RATS): PRACTICALLY NON-TOXIC (LD50): GREATER THAN 2000 MG/KG? BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS. DERMAL TOXICITY (RABBITS): PRACTICALLY NON-TOXIC (LD50): GREATE R THAN 2000 MG/KG?BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS. INHALATION TOXICITY (RATS): PRACTICALLY NON-TOXIC (LC50: GREATER THAN 5 MG/L)... BASED ON TESTING OF SIMILAR PRODUCTS AND/ OR THE COMPONENTS. EYE IRRITATION (RABBITS): PRACTICALLY NON-IRRITATING. (DRAIZE SCORE: > 6 BUT 15 OR LESS). --- BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS. SKIN IRRITATION (RABBITS): PRACTICALLY NON-IRRITATING.
==========
Ecological Information
==========
Ecological: ENVIRONMENTAL FATE AND EFFECTS: NOT ESTABLISED.
==========
MSDS Transport Information
==========
Transport Information: NOTE: THE FLASH POINT IS > 125F. DOT: FLAMMABLE LIQUID OR COMBUSTIBLE LIQUID (49 CFR 173.120 (B) (2)).
==========
Regulatory Information
==========
Sara Title III Information: U.S. SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III: THIS PRODUCT CONTAINS NO "EXTREMELY HAZARDOUS SUBSTANCES". SARA (311/312) REPORTABLE HAZARD CATEGORIES: FIRE, CHRONIC. THIS PRODUCT CONTAINS NO CHEMICALS REPORTABLE UNDER SARA (313) TOXIC RELEASE PROGRAM.
Federal Regulatory Information: ALL COMPONENTS COMPLY WITH TSCA.
State Regulatory Information: THE FOLLOWING PRODUCT INGREDIENTS ARE CITED ON THE LISTS BELOW: DIESEL OIL..C9-20 (CAS # 68334-30-5; LIST CITATION 21, 26. 21 = LA RTK. 26 = RI RTK.
==========
Other Information
==========
Other Information: NOTE TO PHYSICIANS: MATERIAL IF ASPIRATED INTO THE LUNGS MAY CAUSE CHEMICAL PNEUMONITIS. TREAT APPROPRIATELY. MAY CAUSE SKIN CANCER ON

PROLONGED AND REPEATED CONTACT.

==========

Transportation Information

==========

Responsible Party Cage: 6G112
Trans ID NO: 158128
Product ID: DIESEL FUEL (MRDUS)
MSDS Prepared Date: 07/25/1997
Review Date: 08/07/2001
MFN: 2
Net Unit Weight: BULK
Multiple KIT Number: 0
Unit Of Issue: GL
Container QTY: X
Type Of Container: BULK
Additional Data: IMO/IATA: PROPER SHIPPING NAME, UN ID NUMBER, HAZARD CLASS, AND PACKING GROUP PER MSDS.

==========

Detail DOT Information

==========

DOT PSN Code: GTF
DOT Proper Shipping Name: GAS OIL OR DIESEL FUEL OR HEATING OIL, LIGHT
Hazard Class: 3
UN ID Num: UN1202
DOT Packaging Group: III
Label: FLAMMABLE LIQUID
Special Provision: B1,T7,T30
Packaging Exception: 150
Non Bulk Pack: 203
Bulk Pack: 242
Max Qty Pass: 60 L
Max Qty Cargo: 220 L
Vessel Stow Req: A

==========

Detail IMO Information

==========

IMO PSN Code: HRR
IMO Proper Shipping Name: GAS OIL
IMDG Page Number: 3375
UN Number: 1202
UN Hazard Class: 3.3
IMO Packaging Group: III
Subsidiary Risk Label: -
EMS Number: 3-07
MED First Aid Guide NUM: 311

==========

Detail IATA Information

==========

IATA PSN TX
IATA UN ID Num: 1202
IATA Proper Shipping Name: GAS OIL
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
UN Packing Group: III
Packing Note Passenger: 309
Max Quant Pass: 60L
Max Quant Cargo: 220L
Packaging Note Cargo: 310
Exceptions: A3

==========

Detail AFI Information

==========

AFI PSN TX
AFI Proper Shipping Name: GAS OIL OR DIESEL FUEL OR HEATING OIL, LIGHT

AFI Hazard Class: 3
AFI UN ID NUM: UN1202
AFI Packing Group: III
Special Provisions: P5
Back Pack Reference: A7.3
==========
HAZCOM Label
==========
Product ID: DIESEL FUEL (MRDUS)
Cage: 6G112
Company Name: MOBIL OIL CORP
Street: 3225 GALLOWS RD
City: FAIRFAX VA
Zipcode: 22037
Health Emergency Phone: 609-737-4411 (COLLECT)
Label Required IND: Y
Date Of Label Review: 08/07/2001
Status Code: A
MFG Label NO: NOT PROVIDED
Label Date: 07/25/1997
Origination
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: WARNING
Respiratory Protection IND: NO
Health Hazard: Moderate
Contact Hazard: Slight
Fire Hazard: Moderate
Reactivity Hazard: None
Hazard And Precautions: TARGET ORGANS: N/P. WARNING! MAY CAUSE RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS, SKIN CANCER. AVOID CONTACT. WASH THOROUGHLY AFTER HANDLING. FIRST AID: IF INHALED, MOVE TO FRES H AIR. IF BREATHING HAS STOPPED, ASSIST VENTILATION WITH A BAG-VALVE-MASK DEVICE/USE MOUTH-TO-MOUTH RESUSCITATION. IN CASE OF CONTACT, DRY WIPE SKIN, CLEANSE WITH WATERLESS HAND CLEANER, THEN WASH WIT H SOAP AND WATER. IF SWALLOWED, SEEK IMMEDIATE MEDICAL ATTENTION. DO NOT INDUCE VOMITING. ONLY INDUCE VOMITING AT THE INSTRUCTIONS OF A PHYSICIAN. EMPTY CONTAINER RETAINS PRODUCT RESIDUE. READ MATERIA L SAFETY DATA SHEET FOR FURTHER INFORMATION.
==========
Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

BP NORTH AMERICA PETROLEUM INC -- RESIDUAL FUEL OIL, BUNKER C, FUEL OIL NO.4/5/

==========

MSDS Safety Information

==========

FSC: 9140
NIIN: 00-247-4354
MSDS Date: 10/01/1993
MSDS Num: BTVXJ
Product ID: RESIDUAL FUEL OIL, BUNKER C, FUEL OIL NO.4/5/6
MFN: 01
Responsible Party
Cage: 0BF86
Name: BP NORTH AMERICA PETROLEUM INC
Address: 550 WESTLAKE PARK BLVD SUITE 1800
City: HOUSTON TX 77079-2608
Info Phone Number: 713-558-3443
Emergency Phone Number: 713-558-3443
Preparer's Name: BP OIL HSEQ DEPT.
Review Ind: Y
Published: Y

==========

Contractor Summary

==========

Cage: 0NDT1
Name: AIR BP, BP OIL LTD
Address: CLEVELAND HOPKINS INTL AIRPORT
City: CLEVELAND OH 44135
Phone: 216-267-3550
Cage: 0BF86
Name: BP NORTH AMERICA PETROLEUM INC
Address: 550 WESTLAKE PARK BLVD SUITE 1800
City: HOUSTON TX 77079-2608
Phone: 713-558-3443
Cage: 7X331
Name: BP OIL INTERNATIONAL LTD
Address: BRITANNIC HOUSE, MOOR LN
City: LONDON ENGLAND NK 00000
Phone: UNKNOWN

==========

Item Description Information

==========

Item Name: FUEL OIL,BURNER
Specification Number: ASTM-D-396
Type/Grade/Class: 6 GRADE
Unit of Issue: GL
UI Container Qty: X
Type of Container: UNKNOWN

==========

Ingredients

==========

Cas: 68553-00-4
Name: FUEL OIL #6
% Wt: <100
Other REC Limits: NONE RECOMMENDED
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

Cas: 7783-06-4
RTECS #: MX1225000
Name: HYDROGEN SULFIDE (SARA III)
% Wt: TRACE
Other REC Limits: NONE RECOMMENDED
OSHA PEL: C, 20 PPM

ACGIH TLV: 10 PPM/15 STEL; 9394
EPA Rpt Qty: 100 LBS
DOT Rpt Qty: 100 LBS

==========

Health Hazards Data

==========

LD50 LC50 Mixture: ORAL LD50 (RAT) IS UNKNOWN
Route Of Entry Inds - Inhalation: YES
Skin: NO
Ingestion: NO
Carcinogenicity Inds - NTP: NO
IARC: YES
OSHA: NO
Effects of Exposure: ACUTE: MAY BE IRRITATING TO SKIN, EYES AND RESPIRATORY TRACT. POSSIBLE ASPIRATION HAZARD IF SWALLOWED-CAN ENTER LUNGS AND CAUSE DAMAGE. INHALATION MAY CAUSE CNS EFFECTS. TOXIC HYDROGEN SULFIDE GAS MAY BE PRESENT IN CONFINED VAPOR SPACES. CHRONIC: SKIN CANCER HAZARD BASED ON TESTS WITH LABORATORY ANIMALS.
Explanation Of Carcinogenicity: IARC HAS DETERMINED THAT DIESEL ENGINE EXHUST IS PORBABLY CARCINOGENIC TO HUMANS (IARC CLASS 2A).
Signs And Symptions Of Overexposure: INHALED: EUPHORIA, HEADACHE, DIZZINESS, DROWSINESS, BLURRED VISION, FATIGUE, TREMORS, CONVULSIONS, LOSS OF CONSCIOUSNESS, COMA, RESPIRATORY ARREST AND DEATH. SWALLOWED: NAUSEA, VOMITING, DIARRHEA. SKI N: REDNESS, ITCHING, INFLAMMATION, CRACKING, POSSIBLE SECONDARY INFECTION. EYES: REDNESS, TEARING, DISCOMFORT.
Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.
First Aid: INGESTION-DO NOT INDUCE VOMITING!IF SPONTANEOUS VOMITING OCCURS;MONITOR FOR BREATHING DIFFICULTY.GET IMMEDIATE MEDICAL ATTENTION.SKIN-REMOVE CONTAMINATED CLOTHES.WASH WITH SOAP & WATER.GET MEDICAL ATT ENTION IF IRRITATION PERSISTS.EYES-FLUSH WITH LOTS OF WATER FOR 15 MINUTES,HOLD LIDS OPEN.GET MEDICAL ATTENTION.INHALED-REMOVE TO FRESH AIR.RESTORE BREATHING.GET MEDICAL ATTENTION.

==========

Handling and Disposal

==========

Spill Release Procedures: TAKE IMMEDIATE STEPS TO STOP AND CONTAIN THE SPILL. EXERCISE CAUTION-ENSURE PERSONNEL WEAR PROPER CLOTHING/EQUIPMENT. NOTIFY NATIONAL RESPONSE CENTER (800-424-8802), IF REQUIRED. ALSO NOTIFY LOCAL/STA TE REGULATORY AGENCIES, THE LEPC AND THE SERC.
Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.
Waste Disposal Methods: DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE AND FEDERAL REGULATIONS. UNUSED/UNCONTAMINATED PRODUCT IS NOT AN EPA/RCRA WASTE; HOWEVER, IF MIXED WITH OTHER MATERIALS OR HAZARDOUS WASTE, THE PRODUCT MAY B ECOME REGULATED AS SUCH.
Handling And Storage Precautions: AVOID EXTREMES OF TEMPERATURE IN STORAGE. STORE IN TIGHTLY CLSED CONTAINERS IN A COOL, DRY, WELL-VETILATED AREA AWAY FROM HEAT SOURCES OF IGNITION.
Other Precautions: ALSO STORE AWAY FROM INCOMPATIBLE MATERIALS. GROUND LINES AND EQUIPMENT DURING TRANSFER TO REDUCE POSSIBILITY OF STATIC SPARK INITIATED FIRE OR EXPLOSION. USE NON-SPARKING TOOLS. DO NOT STORE IN UNLAB ELED CONTAINERS.

==========

Fire and Explosion Hazard Information

==========

Flash Point Text: 140F,60C
Lower Limits: UNKNOWN
Upper Limits: UNKNOWN
Extinguishing Media: WATER SPRAY, DRY CHEMICAL, FOAM OR CARBON DIOXIDE. USE WATER SPRAY TO COOL FIRE EXPOSED CONTAINERS.
Fire Fighting Procedures: WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL BUNKER GEAR. IF NOT IGNITED, VENTILATE AREA AND USE WATER SPRAY TO DISPERSE VAPOR OR PROTECT PERSONNEL.
Unusual Fire/Explosion Hazard: DANGEROUS WHEN EXPOSED TO HEAT OR FLAME. CONTAINERS MAY EXPLODE IN HEAT OF FIRE. RUNOFF TO SEWER MAY CAUSE FIRE OR

EXPLOSION HAZARD.

==========

Control Measures

==========

Respiratory Protection: IF ENGINEERING CONTROLS FAIL OR NON-ROUTINE USE OR EMERGENCY OCCURS; USE NIOSH/MSHA APPROVED RESPIRATOR OR SUPPLIED AIR RESPIRATOR OR SCBA, AS REQUIRED. USE IAW 29 CFR 1910.134.

Ventilation: USE ADEQUATE EXPLOSION-PROOF MECHANICAL VENTILATION OR LOCAL EXHAUST TO MAINTAIN EXPOSURE BELOW PEL/TLV.

Protective Gloves: CHEMICAL RESISTANT-EG. NITRILE.

Eye Protection: SAFETY GLASSES/CHEMICAL SPLASH GOGGLES

Other Protective Equipment: DEPENDING ON CONDITIONS, ADDITIONAL EQUIPMENT SUCH AS FACE SHIELD, APRON, ARMCOVERS ETC. SHOULD BE WORN. EYEWASH STATION

Work Hygienic Practices: WASH HANDS AFTER USE AND BEFORE EATING, DRINKING, OR SMOKING. LAUNDER CONTAMINATED CLOTHES BEFORE REUSE.

==========

Physical/Chemical Properties

==========

HCC: F4

B.P. Text: >399F,>204C

M.P/F.P Text: 50.0F,10.0C

Decomp Text: UNKNOWN

Vapor Pres: NEGLIGIBLE

Vapor Density: NEGLIGIBLE

Spec Gravity: 0.95-1.01

Viscosity: 10-55 CST

Solubility in Water: NEGLIGIBLE

Appearance and Odor: BLACK VISCOUS LIQUID; PETROLEUM OIL ODOR.

Corrosion Rate: UNKNOWN

==========

Reactivity Data

==========

Stability Indicator: YES

Stability Condition To Avoid: AVOID CONTACT WITH STRONG OXIDIZING AGENTS.

Materials To Avoid: STRONG OXIDIZING AGENTS.

Hazardous Decomposition Products: COMBUSTION MAY PRODUCE CARBON MONOXIDE & CARBON DIOXIDE & REACTIVE HYDROCARBONS.; MAY ALSO PRODUCE OXIDES OF SULFUR, H2S

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization: NONE SPECIFIED BY MANUFACTURER.

==========

Toxicological Information

==========

==========

Ecological Information

==========

==========

MSDS Transport Information

==========

==========

Regulatory Information

==========

==========

Other Information

==========

==========

Transportation Information

==========

Responsible Party Cage: 0BF86

Trans ID NO: 60715

Product ID: RESIDUAL FUEL OIL, BUNKER C, FUEL OIL NO.4/5/6

MSDS Prepared Date: 10/01/1993

Review Date: 09/02/1994

MFN: 1

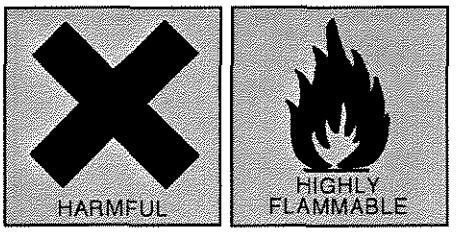
Tech Entry NOS Shipping Nm: CONTAINS RESIDUAL FUEL OIL
Net Unit Weight: UNKNOWN
Multiple KIT Number: 0
Review IND: Y
Unit Of Issue: GL
Container QTY: X
Type Of Container: UNKNOWN
==========
Detail DOT Information
==========
DOT PSN Code: GOD
Symbols: D
DOT Proper Shipping Name: FUEL OIL
DOT PSN Modifier: (NO. 1, 2, 4, 5 OR 6)
Hazard Class: 3
UN ID Num: NA1993
DOT Packaging Group: III
Label: FLAMMABLE LIQUID
Special Provision: B1
Packaging Exception: 150
Non Bulk Pack: 203
Bulk Pack: 242
Max Qty Pass: 60 L
Max Qty Cargo: 220 L
Vessel Stow Req: A
==========
Detail IMO Information
==========
IMO PSN Code: HIA
IMO Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. o
IMDG Page Number: 3345
UN Number: 1993
UN Hazard Class: 3.3
IMO Packaging Group: III
Subsidiary Risk Label: -
EMS Number: 3-07
MED First Aid Guide NUM: T
==========
Detail IATA Information
==========
IATA PSN CA
IATA UN ID Num: 1993
IATA Proper Shipping Name: FLAMMABLE LIQUID, N.O.S. *
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
UN Packing Group: III
Packing Note Passenger: 309
Max Quant Pass: 60L
Max Quant Cargo: 220L
Packaging Note Cargo: 310
==========
Detail AFI Information
==========
AFI PSN TX
AFI Proper Shipping Name: GAS OIL OR DIESEL FUEL OR HEATING OIL, LIGHT
AFI Hazard Class: 3
AFI UN ID NUM: UN1202
AFI Packing Group: III
Special Provisions: P5
Back Pack Reference: A7.3
==========
HAZCOM Label
==========
Product ID: RESIDUAL FUEL OIL, BUNKER C, FUEL OIL NO.4/5/6

Cage: 0BF86
Company Name: BP NORTH AMERICA PETROLEUM INC
Street: 550 WESTLAKE PARK BLVD SUITE 1800
City: HOUSTON TX
Zipcode: 77079-2608
Health Emergency Phone: 713-558-3443
Label Required IND: Y
Date Of Label Review: 09/02/1994
Status Code: C
Label Date: 09/02/1994
Year Procured: 1994
Origination Code: G
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: WARNING
Respiratory Protection IND: YES
Health Hazard: Moderate
Contact Hazard: Slight
Fire Hazard: Moderate
Reactivity Hazard: None
Hazard And Precautions: COMBUSTIBLE!MAY BE IRRITATING TO SKIN,EYES & RESPIRATORY TRACT.POSSIBLE ASPIRATION HAZARD IF SWALLOWED-CAN ENTER LUNGS AND CAUSE DAMAGE.INHALATION MAY CAUSE CNS EFFECTS.TOXIC HYDROGEN SULFIDE GAS MAY BE PRESENT IN CONFINED VAPOR SPACES.SKIN CANCER HAZARD.FIRST AID:INGESTION-DO NOT INDUCE VOMITING!IF SPONTANEOUS VOMITING OCCURS;MONITOR FOR BREATHING DIFFICULTY.GET IMMEDIATE MEDICAL ATTENTION.SKIN-R EMOVE CONTAMINATED CLOTHES.WASH WITH SOAP & WATER.GET MEDICAL ATTENTION IF IRRITATION PERSISTS.EYES-FLUSH WITH LOTS OF WATER FOR 15 MINUTES,HOLD LIDS OPEN.GET MEDICAL ATTENTION.INHALED-REMOVE TO FRESH AIR.RESTORE BREATHING.GET MEDICAL ATTENTION.

==========

Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

Safety (MSDS) data for aroclor 1254



General

Synonyms: arochlor 1254, PCB-1254, polychlorinated biphenyl 1254, chlorodiphenol (54% Cl)
Use: previously widely used as a dielectric fluid; now less widely used
Molecular formula: $C_{12}H_5Cl_5$ (approximate)
CAS No: 11097-69-1
EINECS No:

Physical data

Appearance: light yellow viscous liquid
Melting point: 10 C
Boiling point: ca. 370 C
Vapour density:
Vapour pressure:
Density (g cm^{-3}): 1.51
Flash point:
Explosion limits:
Autoignition temperature:
Water solubility: negligible

Stability

Stable. Highly flammable. Incompatible with strong oxidizing agents. Attacks some forms of plastics and rubber.

Toxicology

Harmful if swallowed. Possible carcinogen. May be a reproductive hazard. Harmful if inhaled or absorbed through the skin. Irritant.

Toxicity data
(The meaning of any toxicological abbreviations which appear in this section is given here.)
ORL-RAT LD50 1010 mg kg^{-1}
IVN-RAT LD50 358 mg kg^{-1}
IPR-MUS LD50 880 mg kg^{-1}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R11 R20 R21 R22 R36 R37 R38.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No. 2315. Packing group II. Hazard class 9.

Personal protection

Safety glasses, gloves, good ventilation. Handle as a possible carcinogen.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S9 S16 S23 S26.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

This information was last updated on February 18, 2005. We have tried to make it as accurate and useful as possible, but can take no responsibility for its use, misuse, or accuracy. We have not verified this information, and cannot guarantee that it is up-to-date.

Material Safety Data Sheet

To comply with OSHA's Hazard Communication Standard, 29 CFR 1910.1200.

PETROFLAG TEST KIT

Section I --- Manufacturer

Manufacturer's Name:
Dexsil Corporation

Address:
One Hamden Park Drive
Hamden, CT 06517

Emergency Telephone Number:
USA (800) 424-9300 (CHEMTREC)
INT'L (202) 483-7616

Telephone Number:
(203) 288-3509

Date Prepared: 09-30-98
Date Reviewed: 09-30-98

Section II --- Identification of Hazardous Ingredient

The PetroFLAG Test Reagent Kit consists of two snap ampules (extraction solvent and calibration solvent) and a screw top vial. Screw top vial contents are non-hazardous.

Component	Contents	TLV/ (PEL)	CAS #	Hazard Class& (Subsidiary-risk)	UN Number
Ampule 1 "Extraction Solvent"	Methanol Solution	200 ppm/ (200 ppm)	67-56-1	3 Flam Liquid &(Poison)	1230
Ampule 2 "Calibration Standard"	Methanol Solution	200 ppm/ (200ppm)	67-56-1	3 Flam Liquid & (Poison)	1230

Section III --- Physical Characteristics

Property	*Ampule 1*	*Ampule 2*
Boiling Pt °C	64.5	64.5
Vapor Pressure mm Hg @ 21°C	97	97
Solubility in Water	miscible	miscible
Specific Gravity	0.79	0.79
Percent Volatile	99.9	99.9
Evaporation Rate Butyl Acetate = 1	5.9	5.9
Appearance	clear, colorless	clear, colorless
Odor	pleasant	pleasant

Section IV --- Fire and Explosion Hazard

Flash Point	Ampule 1	50°F
	Ampule 2	50°F

Flammable Limit Unknown

Extinguishing Media Dry chemical, foam, CO_2.

Special Fire Fighting Procedures None

Section V --- Reactivity Data

Stability
All components are stable.
Incompatible With
None
Hazardous Decomposition Productions
Solutions are stable.
Hazardous Polymerization
Will not occur.
Conditions to Avoid
Excessive heat.

Section VI --- Health Hazard Information

First Aid
In case of contact with reagents, rinse well with water. If swallowed, induce vomiting immediately by giving two glasses of water and sticking finger down throat.

Eye Contact
For all kit components, flush eyes with large amounts of water for 15 minutes. Seek medical attention.

Skin contact
Flush with large amounts of water. Use soap and water to wash away organic components.

Inhalation
In case of inhalation, remove to fresh air.

Toxicological Information
Harmful if inhaled or swallowed. Exposure may cause skin irritation and may be harmful if absorbed through the skin. Ingestion will cause gastrointestinal distrubances. Methanol component is identified on lists in CERCLA, SARA Sec. 313 and TSCA.

Section VII --- Spill, Leak and Disposal Procedures

Spills and Leaks	*Ampule 1 - Methanol solution* Solvent absorbent recommended for spills. Flush area with water.
	Ampule 2 - Methanol solution Solvent absorbent recommended for spills. Flush area with water.
Disposal	Used reagents contain oil and solvent. Dispose of as an organic waste in accordance with all applicable federal, state and local environmental regulations.

Section VIII --- Special Protection Information

Respiratory protection	None required during normal use.
Ventilation	Perform test only in a well ventilated area.
Protective gloves	Always wear rubber gloves when performing the PetroFLAG test.
Eye protection	Wear safety glasses.
Other protective equipment	Wear appropriate safety equipment when performing test on site.

Section IX --- Special Precautions and Comments

Storage and Handling Information
Store test kits in a cool, dry place. Check expiration date prior to performing test.

DOT Class
3 Flammable liquid

NA = Not available or not applicable
NF = Not found
NE = Not established

The information in this Material Safety Data Sheet meets the requirements of the United States OCCUPATIONAL SAFETY AND HEALTH ACT and regulations promulgated thereunder (29 CFR 1910.1200 et. seq.) and the Canadian WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM. This document is intended only as a guide to the appropriate precautionary handling of the material by a person trained in, or supervised by a person trained in, chemical handling. The user is responsible for determining the precautions and danger of these chemicals for his or her particular application. Depending on usage, protective clothing including eye and face guards and respirators must be used to avoid contact with material or breathing chemical vapors/fumes. Exposure to this product may have serious adverse health effects. These chemicals may interact with other substances. Since the potential uses are so varied, Dexsil cannot warn of all of the potential dangers of use or interaction with other chemicals or materials. Dexsil warrants that the chemicals meet the specifications set forth on the label.
DEXSIL DISCLAIMS ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED WITH REGARD TO THE PRODUCT SUPPLIED HEREUNDER, ITS MERCHANTABILITY OR ITS FITNESS FOR A PARTICULAR PURPOSE.
The user should recognize that this product can cause severe injury and even death, especially if improperly handled or the known dangers of use are not heeded. READ ALL PRECAUTIONARY INFORMATION. As new documented general safety information becomes available, Dexsil will periodically revise this Material Safety Data Sheet.
CHEMTREC emergency telephone number is to be used ONLY in the event of CHEMICAL EMERGENCIES involving a spill, leak, fire, exposure, or accident involving chemicals. All non-emergency questions should be directed to the Customer Service Dept. at 1-203-288-3509.

For additional information, contact Dexsil. Rev.0

MATERIAL SAFETY DATA SHEET

SECTION I - PRODUCT IDENTIFICATION

Product identifier: Guard Alaska, 9 oz.
Product use: Self defense
Chemical family: Aerosol

WASHINGTON LABS
1922 26th STREET
CANTON OHIO 44705-2180

Supplier name and address:
CASE-MASON FILLING, INC.
715 S. Haven Street
Baltimore, Maryland 21224

Manufacturer's name and address:
Refer to Supplier

Emergency Telephone #: (301) 249-3045

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Ingredients	CAS #	% (w/w)	OSHA PEL	ACGIH TLV	LC_{50}, ppm (inhalation, rat)	LD_{50}, mg/kg (Oral, rat)
Trade secret						

SECTION III - PHYSICAL DATA

Physical state, odor and appearance: Aerosol, contents are dark amber to light red liquid with irritating odor.
Odor threshold: N/Av
Boiling point: 44.4°F
Melting/freezing point: N/Av
Specific gravity (at °C): 1.12
pH: N/Av
Vapour pressure (mm Hg @ 20°C): N/Av
Vapour density (Air=1.0): N/Av
Evaporation rate (water=1.0): >1
Volatiles, %: N/Av
Solubility in water (w/w): Insoluble.
Coefficient or water/oil distribution: N/Av

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash point (Method): None **Flammable limits (% by volume):** Upper: N/Ap Lower: N/Ap
Conditions of flammability: Material is not combustible.
Extinguishing media: Use media appropriate for surrounding area.
Special fire fighting procedures: Firefighters should wear self-contained breathing apparatus and full protective clothing. Use water spray to cool containers and structures exposed to fires.
Unusual fire and explosion hazards: Do not store in temperatures above 120°F. High internal pressures may cause cylinders to rupture.

Sensitivity to: Mechanical impact ☒ Static discharge ☒
Auto-ignition temperature: N/Ap
Hazardous combustion products: Oxides of carbon.

SECTION V - REACTIVITY DATA

Stability: Stable ☒ Unstable ☐
Incompatibility: Strong acids, alkali, organic acid anhydrides, oxidizing materials, sodium, potassium, and magnesium.
Conditions to avoid: High temperature may induce decomposition.
Hazardous decomposition or byproducts: Oxides of carbon.
Hazardous polymerization: May occur ☐ Will not occur ☒

SECTION VI - HEALTH HAZARD DATA AND TOXICOLOGICAL PROPERTIES

Routes of entry: Inhalation ☒ Skin ☒ Eye ☒ Ingestion ☒
Acute health hazards: INHALATION: Inflammatory. Respiratory irritation may cause feeling of restricted airway. Can cause skin and eye irritation. Cause severe heartburn sensation after ingestion, may cause nausea.
Chronic health hazards: None known for the product.

Carcinogenicity: IARC? ☒ ACGIH ☒ OSHA regulated? ☒
Reproductive effects: None known.
Sensitization to material: Product is not known to cause allergies.
Medical conditions aggravated by exposure: None reported.
Synergistic materials: None known.

SECTION VII - FIRST AID

Inhalation: Remove victim to fresh air as soon as possible.
Skin: Wash affected area with soap and water, rinse with water. Remove any contaminated clothing and clean before reuse. Do not apply any skin dressing (lotion or creams) which may trap the pepper against the skin. If irritation persists, consult a physician.
Eyes: Remove contact lenses. Immediately flush with running water for 15-20 minutes, lifting eyelids. If irritation persists, consult a physicians.
Ingestion: If ingested, DO NOT INDUCE VOMITING. Consult a physician.

SECTION VIII - PREVENTIVE CONTROL MEASURES/PRECAUTIONS FOR HANDLING

*****PRECAUTIONS FOR SAFE HANDLING AND USE*****

Steps to be taken in case material is released or spilled: Ventilate area. Avoid breathing of vapors. Confine spill with inert absorbent material. Wear protective equipment. Keep out of sewers, storm drains, surface water and soil.
Waste disposal methods: Consult federal, state and local regulations for allowed means of disposal.
Precautions to be taken in handling and storing: Avoid eye or skin contact. Avoid sources of ignition. Protect containers from physical damage.
Other precautions: Store in a cool, dry area. Do not store in direct sunlight or at temperatures above 120°F. Follow instructions on product containers.
Special shipping instructions: DOT - Containers can be reclassified as Consumer Commodity ORM-D

*****CONTROL MEASURES*****

Respiratory protection: Normally not required.
Ventilation/Engineering controls: Local or mechanical ventilation recommended.
Protective gloves: Neoprene gloves are recommended.
Eye protection: Chemical splash goggles are recommended.
Other protective clothing or equipment: As required by work place standards.
Work/hygienic practices: Use with adequate ventilation. Prevent contact with eyes, skin and clothing. Have eye wash and safety shower readily available.

SECTION IX - PREPARATION INFORMATION

Prepared by: CASE-MASON FILLING, INC.
Telephone #: (410) 342-6100
Preparation date: March 15, 1999

ADDITIONAL NOTES OR REFERENCES

Abbreviations:

ACGIH:	*American Conference of Governmental Industrial Hygienists*
IARC:	*International Agency for Research on Cancer*
N/Ap	*Not applicable*
N/Av:	*Not available*
NIOSH:	*National Institute for Occupational Safety and Health*
NTP:	*National Toxicology Program*
OSHA:	*Occupational Health and Safety Agency*
TCC:	*Tagliabue Closed Cup*

References:

1. *Van Nostrand Reinhold, Dangerous Properties of Industrial Materials, Seventh Edition, N. Irving Sax.*
2. *RTECS (Registry of Toxic Effects) and CHEMINFO databases.*
3. *ACGIH, Threshold Limit Values and Biological Exposure Indices for 1998.*
4. *International Agency for Research on Cancer Monographs, Supplement 7, 1988.*
5. *MSDS's for ingredients from various suppliers*

The Clorox Company
1221 Broadway
Oakland, CA 94612
Tel. (510) 271-7000

Material Safety Data Sheet

I Product: ULTRA CLOROX REGULAR BLEACH

Description: CLEAR, LIGHT YELLOW LIQUID WITH A CHLORINE ODOR

Other Designations	Distributor	Emergency Telephone Nos.
Laundry Bleach	Clorox Sales Company 1221 Broadway Oakland, CA 94612	For Medical Emergencies call: (800) 446-1014 For Transportation Emergencies Chemtrec (800) 424-9300

II Health Hazard Data

CORROSIVE to the eyes. May cause severe irritation or damage to eyes and skin. Harmful if swallowed; nausea, vomiting, and burning sensation of the *mouth and throat may occur. The following medical conditions may* be aggravated by exposure to high concentrations of vapor or mist: heart conditions, or chronic respiratory problems such as asthma, chronic bronchitis or obstructive lung disease. Some clinical reports suggest a low potential for skin sensitization upon exaggerated exposure to sodium hypochlorite, particularly on damaged or irritated skin. Routine clinical tests conducted on intact skin with Clorox Liquid Bleach found no sensitization in the test subjects. No adverse health effects are expected with recommended use.

FIRST AID: EYE CONTACT: Immediately flush eyes with water for 15 minutes. Contact a physician.
INGESTION: Drink a glassful of water. DO NOT induce vomiting. Immediately contact a physician or Poison Control Center.
SKIN CONTACT: Remove contaminated clothing. Flush skin with water. Contact a physician if irritation or discomfort persists.
INHALATION: Remove from exposure to fresh air.

III Hazardous Ingredients

Ingredient	Concentration	Worker Exposure Limit
Sodium hydroxide CAS #1310-73-2	<0.2%	2 mg/m^3 TLV-C
Sodium hypochlorite CAS #7681-52-9	6-7.35%	not established

None of the ingredients in this product are on the IARC, OSHA or NTP carcinogen lists.
TLV-C=Threshold Limit Value-Ceiling. The worker exposure limit should not be exceeded at any time. Source: ACGIH, 1997.

IV Special Protection and Precautions

The following recommendations are given for production facilities and for other conditions and situations where there is increased potential for accidental, large-scale, or prolonged exposure.

Hygienic Practices: Wear safety glasses and nitrile, neoprene or butyl rubber gloves. The availability of an eye wash and shower is recommended in a manufacturing environment.
Engineering Controls: Use general ventilation to minimize exposure to vapors.
Work Practices: Avoid eye and skin contact and inhalation of vapor or mist.

KEEP OUT OF REACH OF CHILDREN

V Transportation and Regulatory Data

U.S. DOT Hazard Class: Not restricted per 49 CFR 172.101(c)(12)(iv).
U.S. Proper Shipping Name: None
IMDG: Not restricted per IMDG Code Page 40 Paragraph 2.3.1.3.
IATA: Not restricted per IATA DGR special provision A3 and ICAO special provision 223.

EPA - SARA TITLE III/CERCLA: Bottled product is not reportable under Sections 311/312 and contains no chemicals reportable under Section 313. This product does contain chemicals (sodium hydroxide <0.2% and sodium hypochlorite <7.35%) that are regulated under Section 304/CERCLA.

TSCA/DSL STATUS: All components of this product are on the U.S. TSCA Inventory and Canadian DSL.

VI Spill Procedures/Waste Disposal

Spill Procedures: Control spill. Containerize liquid and use absorbents on residual liquid; dispose appropriately. Wash area and let dry. For spills of multiple products, responders should evaluate the MSDS's of the products for incompatibility with sodium hypochlorite. Breathing protection should be worn in enclosed, and/or poorly ventilated areas until hazard assessment is complete.
Waste Disposal: Dispose of in accordance with all applicable federal, state, and local regulations.

VII Reactivity Data

Stable under normal use and storage conditions. Strong oxidizing agent. Reacts with other household chemicals such as toilet bowl cleaners, rust removers, vinegar, acids or ammonia containing products to produce hazardous gases, such as chlorine and other chlorinated species. Prolonged contact with metal may cause pitting or discoloration.

VIII Fire and Explosion Data

Flash Point: None
Special Firefighting Procedures: None
Unusual Fire/Explosion Hazards: None. Not flammable or explosive. Product does not ignite when exposed to open flame.

IX Physical Data

Boiling point ..... approx. 212°F/100°C
Specific Gravity (H_2O=1) ..... ~ 1.1 at 70°F
Solubility in Water ..... complete
pH ..... ~11.4

©1963, 1991 THE CLOROX COMPANY
DATA SUPPLIED IS FOR USE ONLY IN CONNECTION WITH OCCUPATIONAL SAFETY AND HEALTH DATE PREPARED 10/19/01

WINDEX GLASS CLEANER (RTU)

National Fire Protection Association (NFPA)

Fire Hazard
Health 0 — 1 — Reactivity
Specific Hazard

Hazardous Material Information System (HMIS)

Health	0
Fire Hazard	1
Reactivity	0

Protective Clothing None required.

Emergency Overview Clear Blue. Liquid. See Section 9.

Section 1. Chemical Product and Company Identification

Product Name	**WINDEX GLASS CLEANER (RTU)**	**Code**	90122 & 90135 & 90139 & 90940 & 94099
Product Use	*Industrial/Institutional: Cleaning product.*	**PMS#**	455934
MSDS#	126011002	**Validation Date**	4/8/2003
		Print Date	4/8/2003
		Supersedes	10/21/2002.
		In Case of Emergency	(800) 851-7145

U.S. Headquarters
Drackett Professional
A Division of
S.C. Johnson Commercial Markets, Inc.
8310 16th Street
Sturtevant, Wisconsin 53177-0902
Phone: (888) 352-2249

Section 2. Composition and Information on Ingredients

Ingredients	CAS #	% by Weight	Exposure Limits	LC50/LD50
2-Butoxyethanol	111-76-2	0.5-1.5	**OSHA (United States).** TWA: 120 mg/m^3 **ACGIH (United States).** TWA: 97 mg/m^3	ORAL (LD50): Acute: 506 mg/kg [Rat]. DERMAL (LD50): Acute: 406 mg/kg [Rabbit]. VAPOR (LC50): Acute: 450 ppm 4 hour(s) [Rat].
Ethylene glycol hexyl ether	112-25-4	0.5-1.5	Not available.	Not available.
Isopropyl Alcohol	67-63-0	1-5	**OSHA (United States).** TWA: 980 mg/m^3 STEL: 1225 mg/m^3 **ACGIH (United States).** TWA: 983 mg/m^3 STEL: 1230 mg/m^3	ORAL (LD50): Acute: 5045 mg/kg [Rat]. DERMAL (LD50): Acute: 12800 mg/kg [Rabbit]. VAPOR (LC50): Acute: 16000 ppm 8 hour(s) [Rat].
Water	7732-18-5	60-100	Not available.	Not available.

Section 3. Hazards Identification

Routes of Entry Inhalation. Skin contact. Eye contact.

Potential Acute Health Effects

Eyes None known.

Skin None known.

Inhalation None known.

Ingestion None known.

Medical Conditions Aggravated by Overexposure: None known.

See Toxicological Information (section 11)

Continued on Next Page

WINDEX GLASS CLEANER (RTU)

Section 4. First Aid Measures

Eye Contact	Rinse with plenty of running water.
Skin Contact	Rinse with plenty of running water.
Inhalation	No specific first aid measures are required.
Ingestion	No specific first aid measures are required.

Section 5. Fire Fighting Measures

Flammability of the Product	Although this product has a flash point below 200 Deg. F, it is an aqueous solution containing an alcohol and does not sustain combustion.
Flash Points	Closed cup: 51.1°C (124°F).
Products of Combustion	None known.
Fire Fighting Media and Instructions	Extinguish with water spray or carbon dioxide, dry chemical powder or appropriate foam. Normal fire fighting procedure may be used.
Special Remarks on Fire and Explosion Hazards	None known.

Section 6. Accidental Release Measures

Personal Precautions	Put on appropriate personal protective equipment (see Section 8.).
Environmental Precautions and Clean-up Methods	In the event of major spillage: Use appropriate containment to avoid environmental contamination. Sweep or scrape up material. Place in suitable clean, dry containers for disposal by approved methods. Use a water rinse for final clean-up.

Section 7. Handling and Storage

Handling	Avoid contact with eyes. Use appropriate hygiene measures when handling product. FOR INDUSTRIAL USE ONLY
Storage	Store in a dry, cool and well-ventilated area. Protect from freezing. KEEP OUT OF REACH OF CHILDREN.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	No special ventilation requirements. General room ventilation is adequate.
Personal Protection	
Eyes	No special requirements under normal use conditions.
Hands	No special requirements under normal use conditions.
Respiratory	No special requirements under normal use conditions.
Feet	No special requirements under normal use conditions.
Body	No special protective clothing is required.

Section 9. Physical and Chemical Properties

Physical State and Appearance	Liquid.
Odor	Mild. Ammoniacal.
Color	Clear Blue.
pH	10.6 to 11.5 [Basic.]
Specific Gravity	1
Solubility in water	Complete.

Continued on Next Page

Section 10. Stability and Reactivity

Stability and Reactivity	The product is stable.
Conditions of Instability	None known.
Incompatibility with Various Substances	Not available.
Hazardous Decomposition Products	*When exposed to fire: Produces normal products of combustion.*
Hazardous Polymerization	Will not occur.

Section 11. Toxicological Information

Acute toxicity	ORAL (LD50) Estimated to be greater than 5000 mg/kg (rat).
Effects of Chronic Exposure	None known.
Other Toxic Effects	Not available.

Section 12. Ecological Information

Not available.

Section 13. Disposal Considerations

Waste Information	No special precautions. Dispose of according to all federal, state and local regulations.

Section 14. Transport Information

DOT Classification

DOT Proper Shipping Name	- Please refer to the Bill of Lading/receiving documents for up to date shipping information.

TDG Classification

TDG Proper Shipping Name	- Please refer to the Bill of Lading/receiving documents for up to date shipping information.

Section 15. Regulatory Information

Reporting in this section is based on ingredients disclosed in Section 2

US Regulations

Federal SARA 313 toxic chemical notification and release reporting: Isopropyl Alcohol
CERCLA: Hazardous substances.: Isopropyl Alcohol

State New Jersey spill list: Isopropyl Alcohol
New Jersey: Isopropyl Alcohol
Massachusetts spill list: Isopropyl Alcohol
Massachusetts RTK: Isopropyl Alcohol
Pennsylvania RTK: Isopropyl Alcohol

This product is not subject to the reporting requirements under California's Proposition 65.

Registered Product Information Not applicable.

Canadian Regulations

WHMIS Classification	Not controlled under WHMIS (Canada).
WHMIS Icon	
Registered Product Information	Not applicable.
Chemical Inventory Status	All ingredients of this product are listed or are excluded from listing on the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory

Continued on Next Page

Section 16. Other Information

Other Special Considerations	MSDS Serial Range: 2-3
Version	2.1

Notice to Reader

This document has been prepared using data from sources considered technically reliable. It does not constitute a warranty, express or implied, as to the accuracy of the information contained within. Actual conditions of use and handling are beyond seller's control. User is responsible to evaluate all available information when using product for any particular use and to comply with all Federal, State, Provincial and Local laws and regulations.

MATERIAL SAFETY DATA SHEET

 MSDS # 111810025

OFF!® INSECT REPELLENT - FRESH OUTDOOR SCENT

Date Issued: 14Jul1998 **Supersedes: 04Aug1995**

US MANUFACTURER:
S.C. Johnson & Son, Inc.
Phone: (800) 725-6737
Racine, Wisconsin 53403-2236
Emergency Phone: (888) 779-7920
International Emergency Phone:
(262) 886-1480

CANADIAN MANUFACTURER:
S.C. Johnson and Son, Limited
Phone: (800) 725-6737
1 Webster Street
Brantford, Ontario N3T 5R1
Transportation Emergency:
CANUTEC (collect) (613) 996-6666
Poison Control: (888) 779-7920

HAZARD RATING	HMIS	HAZARD	NFPA
4-Very High	1	Health	1
3-High	4	Flammability	4
2-Moderate	0	Reactivity	0
1-Slight		Special	
0-Insignificant			

DISTRIBUTED IN CANADA BY:
S.C. Johnson and Son, Limited
Phone: (800) 725-6737
1 Webster Street
Brantford, Ontario N3T 5R1

SECTION 1 - PRODUCT IDENTIFICATION

PRODUCT NAME..... OFF!® INSECT REPELLENT - FRESH OUTDOOR SCENT
REASON FOR CHANGE..... No significant changes.
PRODUCT USE..... Insect repellent

UPC	SCJ CODE	QUANTITY	US SIZE	CANADIAN SIZE
62300 01912	1256	12		170 GM

SECTION 2 - INGREDIENT INFORMATION

INGREDIENT	WEIGHT%	EXPOSURE LIMIT/TOXICITY
Diethyl toluamide (CAS# 134-62-3).....	10-30	NOT ESTABLISHED
Ethanol (CAS# 64-17-5).....	60-100	1000 ppm ACGIH/OSHA TWA

SECTION 3 - HEALTH HAZARDS IDENTIFICATION (Also See Section 11)

ROUTE(S) OF ENTRY..... Eye contact.
EFFECTS OF ACUTE EXPOSURE:
EYE..... May cause: Moderate eye irritation.
SKIN..... None known.
INHALATION..... None known.
INGESTION..... May cause: Abdominal discomfort.
MEDICAL CONDITIONS..... None known.
GENERALLY RECOGNIZED
AS BEING AGGRAVATED
BY EXPOSURE

SECTION 4 - FIRST AID MEASURES

EYE CONTACT..... Flush immediately with plenty of water for at least 15 to 20 minutes. If irritation persists, get medical attention.
SKIN CONTACT..... No special requirements.
INHALATION..... Remove to fresh air.

MATERIAL SAFETY DATA SHEET

 MSDS # 111810025

OFF!® INSECT REPELLENT - FRESH OUTDOOR SCENT

Date Issued: 14Jul1998 **Supersedes: 04Aug1995**

SECTION 4 - FIRST AID MEASURES (continued)

INGESTION	Immediately drink 1-2 glasses of water or milk. Seek immediate medical attention.

SECTION 5 - FIRE AND EXPLOSION INFORMATION

FLASH POINT	< 20°F (< -7°C) (TCC) (propellant)
FLAMMABLE LIMITS	Not available.
AUTOIGNITION TEMPERATURE	Not available.
EXTINGUISHING MEDIA	Foam. CO2. Dry chemical. Water fog.
SPECIAL FIREFIGHTING PROCEDURES	Fight fire from maximum distance or protected area. Cool and use caution when approaching or handling fire-exposed containers. Fire fighters should wear self-contained breathing apparatus and protective clothing.
UNUSUAL FIRE AND EXPLOSION HAZARDS	Aerosol product - Containers may rocket or explode in heat of fire.

SECTION 6 - PREVENTIVE RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED	Eliminate all ignition sources. Dike large spills. Absorb with oil-dri or similar inert material. Sweep or scrape up and containerize.

SECTION 7 - HANDLING AND STORAGE

PRECAUTIONARY INFORMATION	CAUTION: Keep out of reach of children. Harmful if swallowed. Avoid contact with eyes and lips. Do not allow children to rub eyes if hands have been treated . FLAMMABLE: Do not use near open fire, flames or heat. Do not puncture or incinerate. Do not store at temperatures above 120 °F (50 °C).
OTHER HANDLING AND STORAGE CONDITIONS	Keep out of reach of children. Do not pressurize, cut, heat, weld or expose container to flame; explosion could occur.

SECTION 8 - SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION	No special requirements under normal use conditions.
VENTILATION	General room ventilation adequate.
PROTECTIVE GLOVES	No special requirements under normal use conditions.
EYE PROTECTION	No special requirements under normal use conditions.
OTHER PROTECTIVE MEASURES	No special requirements.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

COLOR	Clear
PRODUCT STATE	Dispensed as a spray mist.
ODOR	Fragrant
pH	Not applicable.
ODOR THRESHOLD	Not available.
SOLUBILITY IN WATER	Appreciable
SPECIFIC GRAVITY (H2O=1)	0.78
VAPOR DENSITY (AIR=1)	Not available.

MATERIAL SAFETY DATA SHEET

 MSDS # 111810025

OFF!® INSECT REPELLENT - FRESH OUTDOOR SCENT

Date Issued: 14Jul1998 **Supersedes: 04Aug1995**

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES (continued)

EVAPORATION RATE (BUTYL ACETATE=1)	Not available.
VAPOR PRESSURE (mm HG).	Not available.
BOILING POINT.....	Not available.
FREEZING POINT.....	Not available.
COEFFICIENT OF..... WATER/OIL	Not available.
PERCENT VOLATILE BY.... VOLUME (%)	Not available.
VOLATILE ORGANIC..... COMPOUND (VOC)	Not available.
THEORETICAL VOC..... (LB/GAL)	Not available.

SECTION 10 - STABILITY AND REACTIVITY

STABILITY.....	Stable
STABILITY - CONDITIONS. TO AVOID	Excessive heat.
INCOMPATIBILITY.....	Avoid contact with: Rubber. Plastic.
HAZARDOUS DECOMPOSITION PRODUCTS	When exposed to fire: Produces normal products of combustion.
HAZARDOUS..... POLYMERIZATION	Will not occur.
HAZARDOUS..... POLYMERIZATION - CONDITIONS TO AVOID	Not applicable.

SECTION 11 - TOXICOLOGY INFORMATION (Also See Section 3)

LD50 (ACUTE ORAL TOX)..	Not available.
LD50 (ACUTE DERMAL TOX)	Not available.
LC50 (ACUTE INHALATION. TOX)	Not available.
EFFECTS OF CHRONIC..... EXPOSURE	None known.
SENSITIZATION.....	None known.
CARCINOGENICITY.....	None known.
REPRODUCTIVE TOXICITY..	None known.
TERATOGENICITY.....	None known.
MUTAGENICITY.....	None known.

SECTION 12 - ECOLOGICAL INFORMATION

ENVIRONMENTAL DATA.....	Not available.

SECTION 13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL..... INFORMATION	If possible, recycle empty aerosol can to nearest steel recycling center. Use up package or give to someone who can.

MATERIAL SAFETY DATA SHEET

 MSDS # 111810025

OFF!® INSECT REPELLENT - FRESH OUTDOOR SCENT

Date Issued: 14Jul1998 **Supersedes: 04Aug1995**

SECTION 14 - TRANSPORTATION INFORMATION

US DOT INFORMATION.....	Insecticides or insect repellents, N.O.I., other than poison Consumer commodity, ORM-D.
CANADIAN SHIPPING NAME.	OFF!® INSECT REPELLENT - FRESH OUTDOOR SCENT
TDG CLASSIFICATION.....	Not applicable.
PIN/NIP.....	Not applicable.
PACKING GROUP.....	Not applicable.
EXEMPTION NAME.....	Consumer commodity

SECTION 15 - REGULATORY INFORMATION

WHMIS CLASSIFICATION... Non-regulated.

All ingredients of this product are listed or are excluded from listing on the U.S. Toxic Substances Control Act (TSCA) Chemical Substance Inventory.

All ingredients in this product comply with the New Substances Notification requirements under the Canadian Environmental Protection Act (CEPA).

This product is not subject to the reporting requirements under California's Proposition 65.

SECTION 16 - OTHER INFORMATION

ADDITIONAL INFORMATION.	NFPA 30B Level 2 Aerosol. PCP NO. 23232
EPA REGISTRATION #.....	4822-10

PREPARATION INFORMATION

PREPARED BY.....	Manufacturer's Technical Support Department. Refer to page 1 (Manufacturer) for contact information.

This document has been prepared using data from sources considered technically reliable. It does not constitute a warranty, express or implied, as to the accuracy of the information contained herein. Actual conditions of use and handling are beyond seller's control. User is responsible to evaluate all available information when using product for any particular use and to comply with all Federal, State, Provincial and Local laws and regulations.

PRINT DATE: 18May2001

Gillette
Environment
Health and Safety

37 A Street
Needham, MA 02492
781.292.8151

MATERIAL SAFETY DATA SHEET

NAME: *DURACELL ALKALINE BATTERIES*

CAS NO: Not applicable **Effective Date:** 06/25/2004 **Rev:** 8

A. — IDENTIFICATION

Composition* (1% or greater)	%
Manganese Dioxide (1313-13-9)	35-40
Zinc (7440-66-6)	10-25
Potassium Hydroxide (35%) (1310-58-3)	5-10
Graphite, natural (7782-42-5) or synthetic (7440-44-0)	1-5

Formula: Mixture

Molecular Weight: NA

Synonyms: Alkaline Manganese Dioxide Batteries
MN1300 (D); MN1400 (C); MN1500 (AA) MN2400 (AAA); MX1300 (D); MX1400 (C); MX1500 (AA); MX2400 (AAA); MX2500 (AAAA); MX1604 (9V); MN908 (Lantern 6V); MN918 (Lantern 4.5V); MN1604 (9V); MN9100 (N), MN1203 (4.5V); 5K69 (Flatpack); 7K67 (Flatpack) (J) and batteries comprised of these cells.

B. — PHYSICAL DATA

Boiling Point	Melting Point	Freezing Point
NA °F NA °C	NA °F NA °C	NA °F NA °C
Specific Gravity (H_2O=1)	Vapor Density (air=1)	Vapor Pressure @ °F
NA	NA	NA mm Hg
Evaporation (Ether =1)	Saturation in Air (by volume @ °F)	Autoignition Temperature
NA	NA	°F °C NA
% Volatiles	Solubility in Water	pH
NA	NA	NA

Appearance/Color: Copper top battery. Contents dark in color.

Flash Point and Test Method(s): NA

Flammable Limits in Air (% by volume): Lower NA % Upper NA %

C. — REACTIVITY

Stability	[X] Stable	[ ] Unstable	Polymerization	[ ] may occur	[X] will not occur

Conditions to Avoid	Conditions to Avoid
Do not heat, crush, disassemble, short circuit or recharge.	Not applicable
Incompatible Materials	**Hazardous Decomposition Products**
Contents incompatible with strong oxidizing agents.	Thermal degradation may produce hazardous fumes of zinc and manganese; hydrogen gas; caustic vapors of potassium hydroxide and other toxic by-products.

Footnotes

NA=Not Available

Please note: Some Duracell alkaline batteries contain the Duracell Power Check™ battery energy gauge which is a small conductive strip located underneath the PVC battery label that indicates the amount of charge in the battery. It is composed of minute quantities of conductive materials. Due to the small quantity of materials and their solid form, a health or environmental risk is unlikely.

D. — HEALTH HAZARD DATA

Occupational Exposure Limits (PELs, TLVs, etc.)

8-Hour TWAs: Manganese Dioxide (as Mn) - 5 mg/m^3 (Ceiling) (OSHA); 0.2 mg/m^3 (ACGIH/Duracell)
Potassium Hydroxide - 2 mg/m^3 (Ceiling) (ACGIH)
Graphite (all kinds except fibrous)-2 mg/ m^3 (ACGIH); (synthetic)-15 mg/m^3 (total, OSHA); 5 mg/m^3 (respirable, OSHA)

These levels are not anticipated under normal consumer use conditions.

Warning Signals

Not applicable

Routes/Effects of Exposure

These chemicals and metals are contained in a sealed can. For consumer use, adequate hazard warnings are included on both the package and on the battery. Potential for exposure should not exist unless the battery leaks, is exposed to high temperatures or is mechanically, physically, or electrically abused. Contains concentrated (35%) potassium hydroxide, which is caustic. Anticipated potential leakage of potassium hydroxide is 2 to 20 ml, depending on battery size. A similar amount of zinc/zinc oxide may also leak.

1. Inhalation — Respiratory (and eye) irritation may occur if fumes are released due to heat or an abundance of leaking batteries.

2. Ingestion — Not anticipated due to size of batteries; choking may occur with the smaller AAA and AAAA batteries. Irritation, including caustic burns/injury, may occur following exposure to a leaking battery.

3. Skin
   a. Contact
   Irritation, including caustic burns/injury, may occur following exposure to a leaking battery.

   b. Absorption
   Not anticipated

4. Eye Contact — Irritation, including caustic burns/injury, may occur following exposure to a leaking battery.

5. Other — Not applicable

E. — ENVIRONMENTAL IMPACT

1. Applicable Regulations - All ingredients listed in TSCA inventory.

2. DOT Hazard Class - Not applicable

3. DOT Shipping Name - Not applicable
   Please note: These batteries are not regulated by U. S. DOT or international agencies as hazardous materials or dangerous goods when shipped. Duracell uses the article name 'Alkaline Batteries - Non-hazardous' on all domestic and international bills of lading.

Environmental Effects

These batteries pass the U. S. EPA's Toxicity Characteristic Leaching Procedure and therefore, may be disposed of with normal waste.

F. — EXPOSURE CONTROL METHODS

Engineering Controls

General ventilation under normal use conditions.

Eye Protection

None under normal use conditions. Wear safety glasses when handling leaking batteries.

Skin Protection

None under normal use conditions. Use neoprene, rubber or latex gloves when handling leaking batteries.

Respiratory Protection

None under normal use conditions.

Other

Keep batteries away from small children.

G. — WORK PRACTICES

Handling and Storage

Store at room temperature. Avoid mechanical or electrical abuse. **DO NOT** short or install incorrectly. Batteries may explode, pyrolize or vent if disassembled, crushed, recharged or exposed to high temperatures. Install batteries in accordance with equipment instructions. Do not mix battery systems, such as alkaline and zinc carbon, in the same equipment. Replace all batteries in equipment at the same time. Do not carry batteries loose in pocket or bag. Do not remove battery tester or battery label.

Normal Clean Up

Not applicable

Waste Disposal Methods

Individual consumers may dispose of spent (used) batteries with household trash. Duracell does not recommend that spent batteries be accumulated (quantities of five gallons or more should be disposed of in a secure landfill), in accordance with appropriate federal, state and local regulations. Do not incinerate, since batteries may explode at excessive temperatures.

H. — EMERGENCY PROCEDURES

Steps to be taken if material is released to the environment or spilled in the work area

Notify safety personnel of large spills. Caustic potassium hydroxide may be released from leaking or ruptured batteries. Avoid eye or skin contact and inhalation of vapors. Increase ventilation. Clean-up personnel should wear appropriate protective gear.

Fire and Explosion Hazard	Extinguishing Media
Batteries may burst and release hazardous decomposition products when exposed to a fire situation. See Sec. C.	As appropriate for surrounding area.

Firefighting Procedures

Use self-contained breathing apparatus and full protective gear.

I. — FIRST AID AND MEDICAL EMERGENCY PROCEDURES

Eyes

Not anticipated. If battery is leaking and material contacts eyes, flush with copious amounts of clear, tepid water for 30 minutes. Contact physician at once.

Skin

Not anticipated. If battery is leaking, irrigate exposed skin with copious amounts of clear, tepid water for at least 15 minutes. If irritation, injury or pain persists, consult a physician.

Inhalation

Not anticipated. If battery is leaking, contents may be irritating to respiratory passages. Remove to fresh air. Contact physician if irritation persists.

Ingestion

Not anticipated. Rinse the mouth and surrounding area with clear, tepid water for at least 15 minutes. Consult a physician immediately for treatment and to rule out involvement of the esophagus and other tissues.

Notes to Physician

1) The primary acutely toxic ingredient is concentrated (35%) potassium hydroxide.
2) Anticipated potential leakage of potassium hydroxide is 2-20 ml, depending on battery size.
3) This MSDS does not include or address the small button cell batteries, which can be ingested.

This MSDS covers the following discontinued product numbers: DAC100, 105,110,116-118,123-124, 130, 200, 610,810,820,918

The information contained in the Material Safety Data Sheet is based on data considered to be accurate, however, no warranty is expressed or implied regarding the accuracy of the data or the results to be obtained from the use thereof.

Get the most comprehensive
MSDS/HazCom program on the market!

Material Safety Data Sheet

SECTION I - Material Identity
SECTION II - Manufacturer's Information
SECTION III - Physical/Chemical Characteristics
SECTION IV - Fire and Explosion Hazard Data
SECTION V - Reactivity Data
SECTION VI - Health Hazard Data
SECTION VII - Precautions for Safe Handling and Use
SECTION VIII - Control Measures
SECTION IX - Label Data
SECTION X - Transportation Data
SECTION XI - Site Specific/Reporting Information
SECTION XII - Ingredients/Identity Information

SECTION I - Material Identity

Item Name	
Part Number/Trade Name	17A MARKING PAINT-ALL COLORS
National Stock Number	8010CSLAB006A
CAGE Code	33451
Part Number Indicator	A
MSDS Number	9558
HAZ Code	B

SECTION II - Manufacturer's Information

Manufacturer Name	AERVOE-PACIFIC COMPANY
Emergency Phone	702-782-0100 INFO:702-782-0100

MSDS Preparer's Information

Date MSDS Prepared/Revised	NONE
Active Indicator	N

Alternate Vendors

SECTION III - Physical/Chemical Characteristics

Specification Number	N/R
Boiling Point	-10 F
Specific Gravity	.8
Container Type	F
Container Pressure Code	2
Temperature Code	8
Product State Code	L

SECTION IV - Fire and Explosion Hazard Data

Flash Point Method	UNK

SECTION V - Reactivity Data

Stability	YES
Stability Conditions to Avoid	HIGH TEMPERATURES
Materials to Avoid	STRONG OXIDIZING AGENTS
Hazardous Decomposition Products	CARBON MONOXIDE & CARBON DIOXIDE
LD50 - LD50 Mixture	N/R

SECTION VI - Health Hazard Data

Route of Entry: Skin	YES
Route of Entry: Inhalation	YES
Health Hazards - Acute and Chronic	ACUTE & CHRONIC:INHALATION:ANESTHETIC,IRRITAT OF THE RESP TRACT OR NERVOUS SYSTEM DEPRESSION,HEADACHE,DIZZINESS,NAUSEA, POSSIBLE UNCONSIOUSNESS. SKIN OR EYE CONTACT:PRIMARY IRRITATION. PROLONGED USE MAY CAUSE DERMITITS EXERCISE DUE CARE
Carcinogenity: NTP	NO
Carcinogenity: IARC	NO
Carcinogenity: OSHA	NO
Symptoms of Overexposure	INHALATION:MAY CAUSE NAUSEA OR DIZZINESS. SKIN & EYE:SKIN:CAUSESIRRITATION OR BURNING SENSATION. EYE:PRIMARY IRRITATION. SK A BSORPTION:MAY CAUSE IRRITATION OR BURNING SENSATION
Medical Cond. Aggrevated by Exposure	NONE KNOWN

SECTION VII - Precautions for Safe Handling and Use

SECTION VIII - Control Measures

Respiratory Protection	OUTDOORS:WE RECOMMEND AN APPROVED PARTICULATE FILTER TO REMOVE ANY AIRBORNE OVERSPRAY. IN RESTRICTED AREAS W/POOR VENTILATION & CLOSE TO THE TLV A NIOSH APPROVED RESP W/ORGANIC VAPOR CARTRIDGE IS RECOMMENDED
Ventilation	ALL APPLICATION AREAS SHOULD BE ADEQUATELY VENTILATED IN ORDER TO KEEP THE ING BELOW THEIR EXPOSURE LIMITS
Protective Gloves	IMPERVIOUS GLOVES
Eye Protection	SAFETY GLASSES W/SIDE SHIELDS
Supplemental Health/Safety Data	1ST AID:VAPORS:REMOVE FROM EXPOSURE & RESTORE BREATHING,SEEK MEDICAL ATTENTION. SPLASH:SKIN WASH AFFECTED AREA,REMOVE CONTAMINATED CLOTHING SEE PHYSICIAN IF ANY IRRITATION PERSISTS. SPLASH:EYES FLUSH IMMEDIATELY W/WATER FOR 15 MIN TAKE TO A PHYSICIAN

SECTION IX - Label Data

Protect Eye	YES
Protect Skin	YES
Protect Respiratory	YES
Chronic Indicator	UNKNOWN
Contact Code	MODERATE
Fire Code	UNKNOWN
Health Code	UNKNOWN
React Code	UNKNOWN

SECTION X - Transportation Data

Container Quantity	20
Unit of Measure	OZF

SECTION XI - Site Specific/Reporting Information

Volatile Organic Compounds (P/G)	5
Volatile Organic Compounds (G/L)	599.1942

SECTION XII - Ingredients/Identity Information

Ingredient #	01
Ingredient Name	MINERAL SPIRITS
CAS Number	8052413
NIOSH Number	N/R
Proprietary	NO
Percent	5.0
OSHA PEL	NR
ACGIH TLV	500 PPM
Recommended Limit	NONE SPECIFIED
Ingredient #	02
Ingredient Name	VM&P NAPTHA
CAS Number	8032324
NIOSH Number	N/R
Proprietary	NO
Percent	5.0
ACGIH TLV	500 PPM
Ingredient #	03
Ingredient Name	TOLUENE
CAS Number	108883
NIOSH Number	N/R
Proprietary	NO
Percent	18
ACGIH TLV	200 PPM
Ingredient #	04
Ingredient Name	HEXANE
CAS Number	110543
NIOSH Number	N/R
Proprietary	NO
Percent	15
ACGIH TLV	50 PPM
Ingredient #	05
Ingredient Name	BENZENE, DIMETHYL-
CAS Number	1330207
NIOSH Number	N/R
Proprietary	NO
Percent	2
ACGIH TLV	100 PPM
Ingredient #	06
Ingredient Name	PROPANE
CAS Number	74986
NIOSH Number	N/R
Proprietary	NO
Percent	15
ACGIH TLV	800 PPM
Ingredient #	07

Ingredient Name	ISOBUTANE
CAS Number	75285
NIOSH Number	N/R
Proprietary	NO
Percent	5
ACGIH TLV	820 PPM
Ingredient #	08
Ingredient Name	NORMAL BUTANE
CAS Number	106978
NIOSH Number	N/R
Proprietary	NO
Percent	5
ACGIH TLV	800 PPM

MATERIAL SAFETY DATA SHEET
Revision Date: 10/10/2002

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

PRODUCT: AC DELCO SAE 30
MSDS NUMBER: 02383E - 0
PRODUCT CODE(S): 02383

MANUFACTURER ADDRESS:Shell Oil Products US, P. O. Box 4453, Houston, TX. 77210-4453

TELEPHONE NUMBERS
Spill Information: (877) 504-9351
Health Information: (877) 276-7285
MSDS Assistance Number: (877) 276-7285

SECTION 2 PRODUCT/INGREDIENTS

CAS#	CONCENTRATION	INGREDIENTS
Mixture	100 %weight	Motor Oil
64742-54-7	90 - 98.99 %weight	Hydrotreated heavy paraffinic distillate
Mixture	1 - 2.99 %volume	Proprietary additives

SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW
Appearance & Odor: Amber liquid. Petroleum oil odor.
Health Hazards: No known immediate health hazards.
Physical Hazards: No known physical hazards.
NFPA Rating (Health, Fire, Reactivity): 0, 1, 0
Hazard Rating:Least - 0 Slight - 1 Moderate - 2 High - 3
Extreme - 4

Inhalation:
Inhalation of vapors (generated at high temperatures only) or oil mist may cause mild irritation of the nose, throat, and respiratory tract.

Eye Irritation:
Lubricating oils are generally considered no more than minimally irritating to the eyes.

Skin Contact:
Lubricating oils are generally considered no more than minimally irritating to the skin. Prolonged and repeated contact may result in defatting and drying

of the skin that may cause various skin disorders such as dermatitis, folliculitis or oil acne.

Ingestion:
Lubricating oils are generally no more than slightly toxic if swallowed.
Other Health Effects:
The International Agency for Research on Cancer (IARC) has determined there is sufficient evidence for the carcinogenicity in experimental animals of used gasoline motor oils. Handling procedures and safety precautions in the MSDS should be followed to minimize exposure to the used product.

Signs and Symptoms:
Irritation as noted above.

Aggravated Medical Conditions:
Pre-existing eye, skin and respiratory disorders may be aggravated by exposure to this product.

For additional health information, refer to section 11.

SECTION 4 FIRST AID MEASURES

Inhalation:
Remove victim to fresh air and provide oxygen if breathing is difficult. Get medical attention.

Skin:
Remove contaminated clothing and shoes and wipe excess from skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned.

Eye:
Flush with water. If irritation occurs, get medical attention.

Ingestion:
Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical attention.

Note to Physician:
In general, emesis induction is unnecessary in high viscosity, low volatility products such as oils and greases.

SECTION 5 FIRE FIGHTING MEASURES

Flash Point [Method]: >450 °F/>232.22 °C [Cleveland Open Cup]

Extinguishing Media:
Material will float and can be re-ignited on surface of water. Use water fog, 'alcohol foam', dry chemical or carbon dioxide (CO_2) to extinguish flames. Do not use a direct stream of water.

Fire Fighting Instructions:

Material will not burn unless preheated. Do not enter confined fire space without full bunker gear (helmet with face shield, bunker coats, gloves and rubber boots), including a positive pressure, NIOSH approved, self-contained breathing apparatus.

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures:
May burn although not readily ignitable.

Wear appropriate personal protective equipment when cleaning up spills. Refer to Section 8.

Spill Management:
FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

Reporting:
CERCLA: Product is covered by EPA's Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) petroleum exclusion. Releases to air, land, or water are not reportable under CERCLA (Superfund).

CWA: This product is an oil as defined under Section 311 of EPA's Clean Water Act (CWA). Spills into or leading to surface waters that cause a sheen must be reported to the National Response Center, 1-800-424-8802.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures:
Wash with soap and water before eating, drinking, smoking, applying cosmetics, or using toilet. Launder contaminated clothing before reuse. Properly dispose of contaminated leather articles such as shoes or belts that cannot be decontaminated. Avoid heat, open flames, including pilot lights, and strong oxidizing agents. Use explosion-proof ventilation to prevent vapor accumulation. Ground all handling equipment to prevent sparking.

Storage:
Store in a cool, dry place with adequate ventilation. Keep away from open flames and high temperatures.

Container Warnings:
Keep containers closed when not in use. Containers, even those that have been emptied, can contain explosive vapors. Do not cut, drill, grind, weld or perform similar operations on or near containers.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

Oil mist, mineral ACGIH TLV TWA: 5 mg/m3 STEL: 10 mg/m3
Oil mist, mineral OSHA PEL TWA: 5 mg/m3

EXPOSURE CONTROLS
Adequate ventilation to control airborne concentrations below the exposure guidelines/limits.

PERSONAL PROTECTION
Personal protective equipment (PPE) selections vary based on potential exposure conditions such as handling practices, concentration and ventilation. Information on the selection of eye, skin and respiratory protection for use with this material is provided below.

Eye Protection:
Chemical Goggles, or Safety glasses with side shields

Skin Protection:
Use protective clothing which is chemically resistant to this material. Selection of protective clothing depends on potential exposure conditions and may include gloves, boots, suits and other items. The selection(s) should take into account such factors as job task, type of exposure and durability requirements.

Published literature, test data and/or glove and clothing manufacturers indicate the best protection is provided by:
Neoprene, or Nitrile Rubber

Respiratory Protection:
If engineering controls do not maintain airborne concentrations to a level which is adequate to protect worker health, an approved respirator must be worn. Respirator selection, use and maintenance should be in accordance with the requirements of the OSHA Respiratory Protection Standard, 29 CFR 1910.134.

Types of respirator(s) to be considered in the selection process include:
For Mist: Air Purifying, R or P style NIOSH approved respirator.
For Vapors: Air Purifying, R or P style prefilter & organic cartridge, NIOSH approved respirator. Self-contained breathing apparatus for use in environments with unknown concentrations or emergency situations.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Appearance & Odor: Amber liquid. Petroleum oil odor.
Substance Chemical Family: Lubricants
Appearance: Amber liquid.

Flash Point: > 450 °F [Cleveland Open Cup]

Odor: Petroleum oil odor.

Specific Gravity: 0.877

Viscosity: 93.8 cSt cSt @ 40 °C

SECTION 10 REACTIVITY AND STABILITY

Stability:
Material is stable under normal conditions.

Conditions to Avoid:
Avoid heat and open flames.

Materials to Avoid:
Avoid contact with strong oxidizing agents.

Hazardous Decomposition Products:
Thermal decomposition products are highly dependent on combustion conditions. A complex mixture of airborne solids, liquids and gases will evolve when this material undergoes pyrolysis or combustion. Aldehydes, Carbon Monoxide, Carbon Dioxide, Ketones
and other unidentified organic compounds may be formed upon combustion.

SECTION 11 TOXICOLOGICAL INFORMATION

Acute Toxicity
Dermal LD50 >5.0 g/kg(Rabbit) OSHA: Non-Toxic Based on components(s)
Oral LD50 >5.0 g/kg(Rat) OSHA: Non-Toxic Based on components(s)

Carcinogenicity Classification
Motor Oil
NTP: Not Reviewed IARC: Not Reviewed ACGIH: No OSHA: No

SECTION 12 ECOLOGICAL INFORMATION

Environmental Impact Summary:
There is no ecological data available for this product. However, this product is an oil. It is persistent and does not readily biodegrade. However, it does not bioaccumulate.

SECTION 13 DISPOSAL CONSIDERATIONS

RCRA Information:

Under RCRA, it is the responsibility of the user of the material to determine, at the time of the disposal, whether the material meets RCRA criteria for hazardous waste. This is because material uses, transformations, mixtures, processes, etc. may affect the classification. Refer to the latest EPA, state

and local regulations regarding proper disposal.

SECTION 14 TRANSPORT INFORMATION

US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

Oil: This product is an oil under 49CFR (DOT) Part 130. If shipped by rail or highway in a tank with a capacity of 3500 gallons or more, it is subject to these requirements. Mixtures or solutions containing 10% or more of this product may also be subject to this rule.

International Air Transport Association
Not regulated under IATA rules.

International Maritime Organization Classification
Not regulated under International Maritime Organization rules.

SECTION 15 REGULATORY INFORMATION

FEDERAL REGULATORY STATUS

OSHA Classification:
Product is hazardous according to the OSHA Hazard Communication Standard, 29 CFR 1910.1200, because it carries the occupational exposure limit for mineral oil mist.

Ozone Depleting Substances (40 CFR 82 Clean Air Act):
This material does not contain nor was it directly manufactured with any Class I or Class II ozone depleting substances.

Superfund Amendment & Reauthorization Act (SARA) Title III:

There are no components in this product on the SARA 302 list.

SARA Hazard Categories (311/312):
Immediate Health:NO Delayed Health:NO Fire:NO Pressure:NO
Reactivity:NO

SARA Toxic Release Inventory (TRI) (313):
There are no components in this product on the SARA 313 list.

Toxic Substances Control Act (TSCA) Status:
All component(s) of this material is(are) listed on the EPA/TSCA Inventory of Chemical Substances.

Other Chemical Inventories:
Component(s) of this material is (are) listed on the Australian AICS, Canadian DSL, Chinese Inventory, European EINECS, Korean Inventory,

State Regulation
The following chemicals are specifically listed by individual states; other product specific health and safety data in other sections of the MSDS may also be applicable for state requirements. For details on your regulatory requirements you should contact the appropriate agency in your state.

SECTION 16 OTHER INFORMATION

Revision#: 0
Revision Date: 10/10/2002
Revisions since last change (discussion): This Material Safety Data Sheet (MSDS) has been newly created to fully comply with the guidance contained in the ANSI MSDS standard (ANSI Z400.1-1998). We encourage you to take the opportunity to read the MSDS and review the information contained therein.

SECTION 17 LABEL INFORMATION

READ AND UNDERSTAND MATERIAL SAFETY DATA SHEET BEFORE HANDLING OR DISPOSING OF PRODUCT. THIS LABEL COMPLIES WITH THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) FOR USE IN THE WORKPLACE. THIS LABEL IS NOT INTENDED TO BE USED WITH PACKAGING INTENDED FOR SALE TO CONSUMERS AND MAY NOT CONFORM WITH THE REQUIREMENTS OF THE CONSUMER PRODUCT SAFETY ACT OR OTHER RELATED REGULATORY REQUIREMENTS.

PRODUCT CODE(S): 02383

AC DELCO SAE 30

ATTENTION!

PROLONGED OR REPEATED SKIN CONTACT MAY CAUSE OIL ACNE OR DERMATITIS. USED GASOLINE ENGINE OIL HAS BEEN SHOWN TO CAUSE CANCER IN LABORATORY ANIMALS.

Precautionary Measures:
Avoid prolonged or repeated contact with eyes, skin and clothing. Wash thoroughly after handling.

FIRST AID

Inhalation: Remove victim to fresh air and provide oxygen if breathing is difficult. Get medical attention.
Skin Contact: Remove contaminated clothing and shoes and wipe excess from skin. Flush skin with water, then wash with soap and water. If irritation occurs, get medical attention. Do not reuse clothing until cleaned.
Eye Contact: Flush with water. If irritation occurs, get medical attention.
Ingestion: Do not induce vomiting. In general, no treatment is necessary unless large quantities of product are ingested. However, get medical

attention.

FIRE

In case of fire, Use water fog, 'alcohol foam', dry chemical or carbon dioxide (CO2) to extinguish flames. Do not use a direct stream of water. Material will float and can be re-ignited on surface of water.

SPILL OR LEAK
Dike and contain spill.
FOR LARGE SPILLS: Remove with vacuum truck or pump to storage/salvage vessels.

FOR SMALL SPILLS: Soak up residue with an absorbent such as clay, sand or other suitable material. Place in non-leaking container and seal tightly for proper disposal.

CONTAINS: Hydrotreated heavy paraffinic distillate, 64742-54-7; Proprietary additives, Mixture

NFPA Rating (Health, Fire, Reactivity): 0, 1, 0

TRANSPORTATION
US Department of Transportation Classification
This material is not subject to DOT regulations under 49 CFR Parts 171-180.

Oil: This product is an oil under 49CFR (DOT) Part 130. If shipped by rail or highway in a tank with a capacity of 3500 gallons or more, it is subject to these requirements. Mixtures or solutions containing 10% or more of this product may also be subject to this rule.

CAUTION: Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting or welding of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flames or heat. Keep container closed and drum bungs in place.

Name and Address
Shell Oil Products US
P. O. Box 4453
Houston, TX 77210-4453

ADMINISTRATIVE INFORMATION
MANUFACTURER ADDRESS: Shell Oil Products US, P. O. Box 4453, Houston, TX. 77210-4453
Company Product Stewardship & Regulatory Compliance Contact: Timothy W Childs
Phone Number: (281) 874-7708

THE INFORMATION CONTAINED IN THIS DATA SHEET IS BASED ON THE DATA AVAILABLE TO US AT THIS TIME, AND IS BELIEVED TO BE ACCURATE BASED UPON THAT : IT IS PROVIDED INDEPENDENTLY OF ANY SALE OF THE PRODUCT, FOR PURPOSE OF HAZARD COMMUNICATION. IT IS NOT INTENDED TO CONSTITUTE PRODUCT PERFORMANCE INFORMATION, AND NO EXPRESS OR IMPLIED WARRANTY OF ANY KIND IS MADE WITH RESPECT TO THE PRODUCT, UNDERLYING DATA OR THE INFORMATION CONTAINED HEREIN. YOU ARE URGED TO OBTAIN DATA SHEETS FOR ALL PRODUCTS YOU BUY, PROCESS, USE OR DISTRIBUTE, AND ARE ENCOURAGED TO ADVISE THOSE WHO MAY COME IN CONTACT WITH

SUCH PRODUCTS OF THE INFORMATION CONTAINED HEREIN.

TO DETERMINE THE APPLICABILITY OR EFFECT OF ANY LAW OR REGULATION WITH RESPECT TO THE PRODUCT, YOU SHOULD CONSULT WITH YOUR LEGAL ADVISOR OR THE APPROPRIATE GOVERNMENT AGENCY. WE WILL NOT PROVIDE ADVICE ON SUCH MATTERS, OR BE RESPONSIBLE FOR ANY INJURY FROM THE USE OF THE PRODUCT DESCRIBED HEREIN. THE UNDERLYING DATA, AND THE INFORMATION PROVIDED HEREIN AS A RESULT OF THAT DATA, IS THE PROPERTY OF SHELL OIL PRODUCTS US AND IS NOT TO BE THE SUBJECT OF SALE OR EXCHANGE WITHOUT THE EXPRESS WRITTEN CONSENT OF SHELL OIL PRODUCTS US.

37592-11420-100R-10/10/2002

MATERIAL SAFETY DATA SHEET

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHS Inc.
P.O. Box 64089
Mail station 525
St. Paul, MN 55164-0089

Transportation Emergency (CHEMTREC): 1-800-424-9300
Technical Information: 1-651-355-8443
MSDS Information: 1-651-355-8438

PRODUCT NAME: Regular, Midgrade & Premium Unleaded Gasoline

MSDS: 0147- M6A0 - Rev. F (12/24/03)

COMMON NAME: Unleaded Gasoline, Premium Unleaded Gasoline

CHEMICAL FORMULA: Mixture

CHEMICAL NAME: Light Petroleum Distillate

CHEMICAL FAMILY: Mixed Petroleum Hydrocarbon

Section 2 - COMPOSITION AND INFORMATION ON INGREDIENTS

INGREDIENTS	PERCENTAGES *(by weight)*	PEL (OSHA)	TLV (ACGIH)	CAS #
Product				
Gasoline (Mixture)	100	300 ppm TWA 500 ppm STEL	300 ppm TWA 500 ppm STEL	8006-61-9
Ingredients				
Toluene	< 20	100 ppm TWA 150 ppm STEL	50 ppm TWA	108-88-3
Xylene Isomers	< 20	100 ppm TWA 150 ppm STEL	100 ppm TWA 150 ppm STEL	1330-20-7
Benzene	< 6	1 ppm TWA 5 ppm STEL	0.5 ppm TWA 2.5 ppm STEL	71-43-2
1,2,4-Trimethylbenzene	< 5	25 ppm TWA	25 ppm TWA	95-63-6
Ethyl Benzene	< 3	100 ppm TWA 125 ppm STEL	100 ppm TWA 125 ppm STEL	100-41-4

(TWA) - Time Weighted Average is the employee's average airborne exposure in any 8-hour work shift of a 40-hour work week which shall not be exceeded.
(STEL) - Short Term Exposure Limit is the employee's 15-minute time weighted average exposure which shall not be exceeded at any time during a work day unless another time limit is specified.

Section 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Reddish golden brown liquid with gasoline odor - HIGHLY FLAMMABLE LIQUID.
DANGER! Contains Benzene. Cancer Hazard. Can cause kidney, liver and blood disorders.

OSHA HAZARD CLASS

Based on OSHA definitions, the following ingredients in this product are hazardous. The OSHA physical and health hazard categories are *shown below.* ***Note:* CHS has not conducted specific toxicity tests on this product. Our hazard evaluation is based on information from similar products, the ingredients, technical literature, and/or professional experience.**

Gasoline - Flammable, toxic, irritant, target organ (CNS)
Toluene - Flammable, toxic, irritant, target organ (CNS)
Xylene - Flammable, toxic, irritant
Benzene - Flammable, irritant, carcinogen, target organ (kidney, liver, blood)
1,2,4-Trimethylbenzene - Flammable, toxic, irritant, target organ (CNS, blood)
Ethylbenzene - Flammable, toxic, irritant

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Dermal, Ingestion.

ACUTE EFFECTS OF OVER EXPOSURE:

Eyes - Slight to moderate eye irritation.

Skin - Moderately irritating; causes redness, drying of skin.

Inhalation - Irritating to mucous membranes and respiratory tract. Causes dizziness, irritation of eyes, nose and throat, signs of intoxications. Can act as a simple asphyxiant.

Ingestion - Burning of the throat and stomach, loss of consciousness, convulsions, cyanosis, congestion and capillary hemorrhaging of the lungs and internal organs. Possible pneumonia (if vomited), loss of consciousness, and death.

CHRONIC EFFECTS OF OVER EXPOSURE: Suspect carcinogen from long term exposure studies on laboratory animals. Recent studies with laboratory animals have shown that gasoline vapors caused kidney damage and kidney cancer in rats and liver cancer in mice.

Mouse skin painting studies have shown that petroleum middle distillates (boiling range of 100-700°F) can cause skin cancer when repeatedly applied and never washed from the animal's skin. The relative significance of this to the skin and the resulting skin effects (irritation, cell damage, etc.) may play a role in the tumorigenic response. Studies have shown that washing the animal's skin with soap and water between treatments greatly reduces the carcinogenic effect of some petroleum oils.

A few studies have indicated that workers exposed many years to high concentrations of benzene have a slightly higher incidence of leukemia. Benzene can also be toxic to the blood and blood-forming tissues. For additional information on employee monitoring, information and training, medical surveillance, methods of compliance, etc., refer to the OSHA benzene standard, CFR 1910.1028.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: May aggravate pre-existing dermatitis, respiratory illness, or other conditions which have the same symptoms or effects as stated above.

CARCINOGENICITY:

Unleaded Gasoline -	**NTP:** No	**IARC:** No	**OSHA:** No
Benzene -	**NTP:** Yes	**IARC:** Yes	**OSHA:** Yes

Section 4 - FIRST AID MEASURES

EMERGENCY AND FIRST AID PROCEDURES:

Eye Contact - If material comes in contact with the eyes, immediately wash the eyes with large amounts of water, occasionally lifting the lower and upper lids until medical attention can be obtained.

Skin Contact - Remove contaminated clothing. Wash affected areas with soap and water. If irritation or redness develops, seek medical attention.

Inhalation - Move person away from source of exposure and into fresh air. If symptoms persist, seek immediate medical attention. Apply artificial respiration or cardiopulmonary resuscitation if not breathing. Get medical attention.

Ingestion - Never give anything by mouth to an unconscious person. Do **not** induce vomiting. Aspiration of material into the lungs due to vomiting can cause chemical pneumonitis which can be fatal. If spontaneous vomiting occurs, keep head below hips to prevent aspiration of liquid into lungs and monitor for breathing difficulty. Seek medical attention immediately. Keep victim warm and quiet.

Section 5 - FIRE - FIGHTING MEASURES

FLASH POINT: -40°F (TCC) **AUTO IGNITION TEMP:** 495-850°F

FLAMMABLE LIMITS IN AIR	**LOWER**	**UPPER**
% BY VOLUME	1.4	7.6

EXTINGUISHING MEDIA: Dry Chemical, Foam, Carbon Dioxide (CO_2), Water (fog pattern).

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective on flames, but should be used to keep fire-exposed containers cool. Large fires, such as tank fires, should be fought with caution. If possible, pump the contents from the tank and keep adjoining structures cool and protect personnel. Avoid spreading burning liquid with water used for cooling purposes. Do not flush down public sewers. The use of a self-contained breathing apparatus and protective clothing is recommended for fire fighters. Avoid inhalation of vapors.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Highly volatile material. Flowing gasoline can be ignited by self-generated static electricity; containers should be bonded and grounded. Vapors may travel along the ground to a source of ignition (pilot light, heater, electric motor) some distance away. Containers, drums (even empty) can explode when heat (welding, cutting, etc.) is applied.

HAZARD RATINGS:	**NFPA 704:**	Health- 1	Fire- 3	Reactivity- 0
	HMIS:	Health- 2	Fire- 4	Reactivity- 0

Section 6 - ACCIDENTAL RELEASE MEASURES

STEPS TO TAKE IF MATERIAL IS RELEASED OR SPILLED: Notify emergency response personnel as appropriate. If facility or operation has an "Oil or Hazardous Substance Contingency Plan", "Spill Prevention Control & Countermeasures (SPCC) Plan" or equivalent, activate its procedures. REMOVE ALL SOURCES OF IGNITION. Keep unnecessary people away; isolate hazard area and deny entry. Contain spill if possible. Small spills can be removed with inert absorbent. Dike area of large spill to prevent run-off to sewers, streams, etc. Ventilate area. Avoid breathing vapors. Use appropriate personal protective equipment during clean up. Contact fire authorities and notify appropriate Federal, State, and Local agencies.

Section 7 - HANDLING AND STORAGE

HANDLING AND STORING: Transport, handle and store in accordance with OSHA Regulation 29 CFR 1910.106, and applicable D.O.T. Regulations. Store in tightly closed containers in a dry cool place, away from sources of heat or ignition. Ground and bond all transfer and storage equipment and equip with self-closing valves, pressure vacuum bungs and flame arrestors. **Caution:** Misuse of empty containers can be hazardous. Empty containers can be hazardous if used to store toxic, flammable, or reactive materials. Cutting, welding or other of empty containers might cause fire, explosion or toxic fumes from residues. Do not pressurize or expose to open flame, heat, sparks or other sources of ignition. Do not siphon gasoline by mouth.

WARNING: Danger! Contains Benzene. Cancer Hazard. Can cause kidney, liver and blood disorders. **Other:** Do not siphon gasoline by mouth. May cause irritation to eyes, skin and respiratory system. Avoid liquid, mist and vapor contact. Harmful or fatal if swallowed. Aspiration hazard, can enter lungs and cause damage. May cause irritation or be harmful if inhaled or absorbed through the skin. Flammable Liquid. Vapors may explode.

Section 8 - EXPOSURE CONTROL - PERSONAL PROTECTION

ENGINEERING CONTROLS: Provide adequate ventilation to keep vapors below permissible concentrations.

RESPIRATORY EQUIPMENT: Use appropriate NIOSH-approved respiratory protection where atmospheric concentrations may exceed acceptable exposure limits. Self-contained breathing apparatus or supplied air respiratory protection required for entry into tanks, vessels, or other confined spaced containing gasoline.

EYE PROTECTION: Chemical type goggles or face shield where contact with liquid or mist may occur.

PROTECTIVE CLOTHING: Wear impervious clothing and gloves when contact with skin may occur. **OTHER (SAFETY SHOWERS, EYE WASH STATIONS, ETC.):** Emergency eye wash station and safety shower where operations and exposure warrant. Loading, unloading, tank gauging, etc., remain upwind.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Reddish golden brown liquid

ODOR: Gasoline odor (odor threshold approximately 10 ppm).

BOILING POINT: *760 mmHg @ 80°F*

SPECIFIC GRAVITY (water=1): .72

VAPOR PRESSURE: 400 mmHg @ 68°F

VAPOR DENSITY (air=1): 4

SOLUBLE IN WATER: Negligible

EVAPORATION RATE (ether=1): Slower

pH: N/D

Section 10 - STABILITY AND REACTIVITY

STABILITY

STABLE _X_ (At room temperature and pressure. See handling and storage section)
UNSTABLE _____

INCOMPATIBILITY -

CONDITIONS TO AVOID: Heat, sparks, flame, build-up of static electricity, and other sources of ignition should be avoided.

MATERIALS TO AVOID: Strong oxidizing agents, halogens, strong acids, and alkalies.

HAZARDOUS DECOMPOSITION PRODUCTS: Carbon monoxide, carbon dioxide, and hydrocarbons.

HAZARDOUS POLYMERIZATION: Has not been reported to occur under normal temperatures and pressures.

Section 11 - TOXICOLOGY INFORMATION

Note: CHS has not conducted specific toxicity tests on this product.

Section 12 - ECOLOGICAL INFORMATION

Note: CHS has not conducted specific ecological tests on this product.

Section 13 - DISPOSAL CONSIDERATION

WASTE DISPOSAL PROCEDURES: *Recycle as much of the recoverable product as possible. Do not flush to drain or storm sewer or* otherwise release to the environment. Dispose of non-recyclable material as a RCRA hazardous waste, complying with federal, state and local regulations. Note: Re-evaluation of this product may be required by the user at the time of disposal, since the product uses, transformations, mixtures and processes may change classification to non-hazardous or hazardous for reasons other than, or in addition to ignitable.

Section 14 - TRANSPORTATION

DOT PROPER SHIPPING NAME: Gasoline*

DOT HAZARD CLASS: Flammable Liquid*

DOT IDENTIFICATION NUMBER: UN 1203

DOT EMER. RESPONSE GUIDE NO.: 128

*EFFECTIVE 10/1/93 DOT's HM-181 changes how materials are classified. Proper Shipping Name-**Gasoline**; Hazard Class-**3**; UN/NA Identification #- **UN 1203**; **Packing Group II**; Placard-**FLAMMABLE**

Section 15 - REGULATORY INFORMATION

This product contains the following toxic chemicals subject to the reporting requirements of SARA Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372:

CAS Number	Chemical Name	Percent by Weight
108-88-3	Toluene	Up to 18.1%
1330-20-7	Xylene	Up to 15.3%
71-43-2	Benzene	Up to 5.3%
95-63-6	1,2,4 Trimethylbenzene	Up to 4.8%
100-41-4	Ethylbenzene	Up to 2.6%

SARA SECTION 311-312 HAZARD CATEGORIES (40 CFR 370.2):

FIRE: Yes **SUDDEN RELEASE OF PRESSURE:** No **REACTIVE:** No **ACUTE:** Yes **CHRONIC:** Yes

Section 16 - OTHER INFORMATION

Updated By: Hue Lam DATE: December 24, 2003

Title: EHS Compliance Specialist Supersedes: September 8, 2003

Reason for Issue: Company Name Change

THE INFORMATION CONTAINED IN THIS MSDS RELATES ONLY TO THE SPECIFIC MATERIAL IDENTIFIED. IT DOES NOT COVER USE OF THAT MATERIAL IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY PARTICULAR PROCESS. IN COMPLIANCE WITH 29 C.F.R. 1910.1200(g), CHS HAS PREPARED THIS MSDS IN SEGMENTS, WITH THE INTENT THAT THOSE SEGMENTS BE READ TOGETHER AS A WHOLE WITHOUT TEXTUAL OMISSIONS OR ALTERATIONS. CHS BELIEVES THE INFORMATION CONTAINED HEREIN TO BE ACCURATE, BUT MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY, EXPRESS OR IMPLIED, ABOUT THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THE INFORMATION OR ABOUT THE FITNESS OF CONTENTS HEREIN FOR EITHER GENERAL OR PARTICULAR PURPOSES. PERSONS REVIEWING THIS MSDS SHOULD MAKE THEIR OWN DETERMINATION AS TO THE MATERIAL'S SUITABILITY AND COMPLETENESS FOR USE IN THEIR PARTICULAR APPLICATIONS.

Cenex® is a registered trademark of CHS Inc.

GASCO GASOLINE -- LEADED REGULAR GASOLINE
MATERIAL SAFETY DATA SHEET
FSC: 9130
Manufacturer's CAGE: 6W116
Part No. Indicator: A
Part Number/Trade Name: LEADED REGULAR GASOLINE

General Information

Company's Name: GASCO GASOLINE INC.
Company's P. O. Box: 1601
Company's City: OXNARD
Company's State: CA
Company's Country: US
Company's Zip Code: 93032-1601
Company's Emerg Ph #: 800-424-9300
Record No. For Safety Entry: 001
Tot Safety Entries This Stk#: 001
Date MSDS Prepared: 01DEC85
Safety Data Review Date: 16MAR88
MSDS Serial Number: BBBNX

Ingredients/Identity Information

Proprietary: NO
Ingredient: COMPLEX MIXTURE OF HYDROCARBONS
Ingredient Sequence Number: 01
Percent: 100%
NIOSH (RTECS) Number: 1002975CH
ACGIH TLV: 300 PPM TWA

Proprietary: NO
Ingredient: LEAD (SARA III)
Ingredient Sequence Number: 02
Percent: 0.1
NIOSH (RTECS) Number: OF7525000
CAS Number: 7439-92-1
OSHA PEL: 0.05 MG/M3;1910.1025
ACGIH TLV: 0.15 MG/M3;DUST 9192

Physical/Chemical Characteristics

Appearance And Odor: AMBER LIQUID,GASOLINE ODOR
Boiling Point: 0 TO 400DEG
Vapor Pressure (MM Hg/70 F): 8-15
Vapor Density (Air=1): 3.6
Specific Gravity: .78
Evaporation Rate And Ref: G.T. 1
Solubility In Water: NEGLIGIBLE

Fire and Explosion Hazard Data

Flash Point: -45DEG
Flash Point Method: N/P
Lower Explosive Limit: 1.3
Upper Explosive Limit: 8.2
Extinguishing Media: FOAM,DRY CHEMICAL AND CO2.WATER FOG OR WATER SPRAY ARE OF VALUE FOR COOLING,BUT MAY NOT ACHIEVE EXTINGUISHMENT.
Special Fire Fighting Proc: FOR FIRES INVOLVING THIS MATERIAL,DO NOT ENTER ANY ENCLOSED FIRE SPACE WITHOUT PROPER PROTECTIVE EQUIPMENT,SUCH AS SELF CONTAINED BREATHING APPARATUS.
Unusual Fire And Expl Hazrds: EXTREMELY FLAMMABLE MATERIAL RELEASES FLAMMABLE VAPORS AT NORMAL ATMOSPHERIC TEMPERATURES & PRESSURES.VAPORS ENTERING SEWERS,CONFINED SPACE MAY CAUSE EXPLOSION.

Reactivity Data

Stability: YES
Cond To Avoid (Stability): HIGH TEMP SOURCES OF IGNITION,OPEN FLAME

Hazardous Decomp Products: CARBON MONOXIDE MAY BE FORMED FROM INCOMPLETE COMBUSTION
Hazardous Poly Occur: N/P

Health Hazard Data

Route Of Entry - Inhalation: YES
Route Of Entry - Skin: YES
Route Of Entry - Ingestion: YES
Health Haz Acute And Chronic: PROLONGED OR REPEATED CONTACT MAY CAUSE DRYNESS OF THE SKIN,WHICH CAN RESULT IN DERMATITIS OR MORE SERIOUS SKIN DISORDERS.VAPORS OR MISTS MAY CAUSE PULMONARY IRRITATION,DIZZINESS,NAUSEA OR UNCONSCIOUSNESS,PARTICULARLY IN CONFINED SPACES.HAS CAUSED SKIN CANCER IN TEST ANIMALS.
Carcinogenicity - NTP: N/P
Carcinogenicity - IARC: N/P
Carcinogenicity - OSHA: N/P
Signs/Symptoms Of Overexp: EYE IRRITATION FROM VAPOR OR LIQUID CONTACT. PROLONGED OR REPEATED CONTACT MAY CAUSE SKIN IRRITATION,DERMATITIS OR OTHER SERIOUS SKIN DISORDERS,RESPIRATORY IRRITATION,BRONCHOPNEUMONIA,DIZZINESS, CENTRAL NERVOUS SYSTEM DEPRESSION,UNCONSCIOUSNESS,GASTROINTESTINAL, IRRITATION,NAUSEA,VOMITING,DIARRHEA,RESTLESSNESS.
Emergency/First Aid Proc: EYE CONTACT-FLUSH WITH LARGE AMOUNTS OF LOW PRESSURE WATER FOR 15 MINUTES. SKIN CONTACT-REMOVE CONTAMINATED CLOTHING. WASH INFECTED AREA WITH SOAP AND WATER. INHALATION-IMMEDIATELY REMOVE FROM CONTAMINATED AREA TO FRESH AIR.IN CASE OF RESPIRATORY DISTRESS GIVE OXYGEN OR ARTIFICIAL RESPIRATION. INGESTION-DO NOT INDUCE VOMITING. ASPIRATION INTO LUNGS WILL CAUSE SEVERE CHEMICAL PNEUMONIA.

Precautions for Safe Handling and Use

Steps If Matl Released/Spill: STOP FLOW OF MATERIAL.REMOVE ALL SOURCES OF IGNITION.CONTAIN SPILL USING SAND OR ABSORBENT MATERIALS.FLUSH CONTAMINATED AREA WITH WATER.RUNOFF MAY CREATE AN EXPLOSION HAZARD.
Waste Disposal Method: USE ABSORBENT MATERIAL,SUCH AS CLAY OR DIATOMACEOUS EARTH TO CLEAN UP SPILL.DISPOSE OF CONTAMINATED MATERIAL IN AN APPROVED DISPOSAL SITE.COMPLY WITH ALL FEDERAL,STATE AND LOCAL WASTE DISPOSAL REGULATIONS.
Precautions-Handling/Storing: KEEP AWAY FROM SPARKS,OPEN FLAMES AND HEAT. KEEP CONTAINERS CLOSED.USE ONLY WITH ADEQUATE VENTILATION.
Other Precautions: USE GOOD PERSONAL HYGIENE PRACTICES. CONTAMINATED CLOTHING SHOULD BE LAUNDERED BEFORE RE-USING.

Control Measures

Respiratory Protection: NONE NEEDED UNDER CONDITIONS WITH ADEQUATE VENTILATION.IF EXPOSURE EXCEEDS TLV,NIOSH-APPROVED RESPIRATORS WHICH MEET GI50 S144 MUST BE WORN.
Ventilation: USE ADEQUATE VENTILATION TO KEEP VAPOR CONCENTRATIONS OF THIS MATERIAL BELOW TLV OF 300 PPM.
Protective Gloves: IMPERVIOUS GLOVES
Eye Protection: CHEMICAL SPLASH GOGGLES OR FACE MASK
Other Protective Equipment: IF CONDITIONS OF USE PRESENT DANGER OF SKIN EXPOSURE,USE RUBBER OR VINYL BOOTS AND CLOTHING.

Transportation Data

Disposal Data

Disposal Data Review Date: 89338
Rec # For This Disp Entry: 01
Tot Disp Entries Per NSN: 001
Landfill Ban Item: YES
Disposal Supplemental Data: N/K IN CASE OF ACCIDENTAL EXPOSURE OR DISCHARGE, CONSULT HEALTH AND SAFETY FILE FOR PRECAUTIONS.
1st EPA Haz Wst Code New: D001
1st EPA Haz Wst Name New: IGNITIBLE
1st EPA Haz Wst Char New: IGNITABILITY

1st EPA Acute Hazard New: NO
2nd EPA Haz Wst Code New: D008
2nd EPA Haz Wst Name New: EP TOXIC (>5.0 MG/L LEAD)
2nd EPA Haz Wst Char New: EP TOXICITY
2nd EPA Acute Hazard New: NO

==========

Label Data

==========

Label Required: YES
Label Status: G
Common Name: LEADED REGULAR GASOLINE
Chronic Hazard: N/P
Special Hazard Precautions: PROLONGED OR REPEATED CONTACT MAY CAUSE DRYNESS OF THE SKIN,WHICH CAN RESULT IN DERMATITIS OR MORE SERIOUS SKIN DISORDERS.VAPORS OR MISTS MAY CAUSE PULMONARY IRRITATION,DIZZINESS,NAUSEA OR UNCONSCIOUSNESS,PARTICULARLY IN CONFINED SPACES.HAS CAUSED SKIN CANCER IN TEST ANIMALS. EYE IRRITATION FROM VAPOR OR LIQUID CONTACT.PROLONGED OR REPEATED CONTACT MAY CAUSE SKIN IRRITATION,DERMATITIS OR OTHER SERIOUS SKIN DISORDERS,RESPIRATORY IRRITATION,BRONCHOPNEUMONIA,DIZZINESS,CENTRAL NERVOUS SYSTEM DEPRESSION,
UNCONSCIOUSNESS,GASTROINTESTINAL,IRRITATION,NAUSEA,VOMITING,DIARRHEA, RESTLESSNESS.
Label Name: GASCO GASOLINE INC.
Label P.O. Box: 1601
Label City: OXNARD
Label State: CA
Label Zip Code: 93032-1601
Label Country: US
Label Emergency Number: 800-424-9300

MATERIAL SAFETY DATA SHEET

Section 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHS Inc.
P.O. Box 64089
Mail station 525
St. Paul, MN 55164-0089

Transportation Emergency (CHEMTREC): 1-800-424-9300
Technical Information: 1-651-355-8443
MSDS Information: 1-651-355-8438

PRODUCT NAME: Propane

MSDS: 0148-M7A0 – Rev. E **(12/24/03)**

COMMON NAME: Propane, Liquefied Petroleum Gas; LP Gas; Dimethyl methane

CHEMICAL FORMULA: C_3H_8

CHEMICAL NAME: Dimethylmethane

CHEMICAL FAMILY: Paraffin Hydrocarbons

Section 2 - COMPOSITION AND INFORMATION ON INGREDIENTS

INGREDIENTS	PERCENTAGES (by weight)	PEL (OSHA)	TLV (ACGIH)	CAS #
Propane	95 - 100%	1000 ppm TWA	2500 ppm TWA Simple Asphyxiant	74-98-6
Propylene	0 - 5%	N/D	Simple Asphyxiant	115-07-1

NOTE: Ethyl Mercaptan added as an odorant.
(TWA) - Time Weighted Average is the employee's average airborne exposure in any 8-hour work shift of a 40-hour work week which shall not be exceeded.
(STEL) - Short Term Exposure Limit is the employee's 15-minute time weighted average exposure which shall not be exceeded at any time during a work day unless another time limit is specified.

Section 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

DANGER! Extremely flammable. Compressed gas. At very high concentrations, can displace the normal air and cause suffocation from lack of oxygen. Liquid can cause burns similar to frostbite. Caution: Ethyl mercaptan used as a warning agent may not be entirely effective in all situations because of a condition commonly referred to as odor fade (see section 10 for more information). If you suspect a leak, use a combustible gas indicator or similar device to check for gas leaks.

OSHA HAZARD CLASS

Based on OSHA definitions, the following ingredients in this product are hazardous. The OSHA physical and health hazard categories are shown below. **Note: CHS has not conducted specific toxicity tests on this product. Our hazard evaluation is based on information from similar ingredients, technical literature, and/or professional experience.**

Propane - Flammable Gas, Compressed Gas, Asphyxiant

POTENTIAL HEALTH EFFECTS

ROUTES OF ENTRY: Inhalation, Dermal.

ACUTE EFFECTS OF OVER EXPOSURE:

Eyes - Liquid can cause burns similar to frostbite.

Skin - Liquid can cause burns similar to frostbite.

Inhalation - At very high concentrations can displace the normal air and cause suffocation from lack of oxygen. Symptoms of lack of oxygen include increase depth and frequency of breathing, dizziness, headache, nausea or loss of consciousness.

Ingestion - Liquid can cause burns similar to frostbite.

CHRONIC EFFECTS OF OVER EXPOSURE: None Determined

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Personnel with pre-existing chronic respiratory diseases should avoid exposure to this material

CARCINOGENICITY: NTP: No **IARC:** No **OSHA:** No **EMERGENCY AND FIRST AID PROCEDURES:**

Section 4 - FIRST AID MEASURES

Eye Contact - If liquid propane contacts the eye, flush thoroughly with water for at least 15 minutes, occasionally lifting the upper and lower lids, until no evidence of chemical remains. Get medical attention as soon as possible.

Skin Contact - Frozen tissue should be flushed with plenty of tepid water. Do not use hot water. Cryogenic (low temperature) burns which result in blistering or deeper tissue freezing should be promptly treated by a physician.

Inhalation - Move person to fresh air. If large amounts have been inhaled, keep victim warm and get medical attention. Apply artificial respiration if not breathing.

Ingestion -

Section 5 - FIRE - FIGHTING MEASURES

FLASH POINT: -156°F **AUTO IGNITION TEMP:** 874°F

FLAMMABLE LIMITS IN AIR	**LOWER**	**UPPER**
% BY VOLUME	2.1	9.5

EXTINGUISHING MEDIA: Do not extinguish gas fire unless the gas leak can be stopped. For small fire use dry chemical or Carbon Dioxide (CO_2). For large fires, use water spray or fog and move containers from fire area if you can do so without risk.

SPECIAL FIRE FIGHTING PROCEDURES: Shut off gas source and allow the fire to burn itself out. Gas fires should not be extinguished unless the gas flow can be stopped immediately. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

FIRE INVOLVING TANK, RAIL CAR, OR TANK TRUCK: Isolate for 1600 meters (1 mile) in all directions; also, consider initial evacuation for 1600 meters (1 mile) in all directions Call CHEMTREC at 1-800-424-9300 as soon as possible, especially if there is no local hazardous materials team available. If gas source cannot be shut off immediately, fight fire from maximum distance or use unmanned hose holders or monitor nozzles. Cool container with flooding quantities of water until well after fire is out to prevent container from exploding. ALWAYS stay away from tanks engulfed in fire. WITHDRAW IMMEDIATELY in case of rising sound from venting safety devices or discoloration of tank. For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Vapors are heavier than air and may travel along the ground and collect in low or confined areas and be exposed to a source of ignition (pilot light, heater, electric motor) some distance away. Withdraw immediately in case of rising sound from venting safety devices or any discoloration of tank due to fire.

HAZARD RATINGS:	**NFPA 704:**	Health- 1	Fire- 4	Reactivity- 0
	HMIS:	Health- 1	Fire- 4	Reactivity- 0

Section 6 - ACCIDENTAL RELEASE MEASURES

STEPS TO TAKE IF MATERIAL IS RELEASED OR SPILLED: ELIMINATE ALL SOURCES OF IGNITION AND STOP LEAK IF YOU CAN DO SO WITHOUT RISK. Notify emergency response personnel as appropriate. Keep unnecessary people away; isolate hazard area and deny entry. Vapors can be dispersed with sustained water spray. Prevent spreading of vapors through sewers, ventilation systems and confined areas. NOTE: Review Section 5 -FIRE-FIGHTING MEASURES before proceeding with clean up. Use appropriate personal protective equipment during emergency response.

Section 7 - HANDLING AND STORAGE

HANDLING AND STORING: Consult the U.S. Department of Transportation regulations on the shipping of petroleum gases. If upon initial receipt inspection a cylinder is found to be in poor condition, contact the supplier. The most common hazard is leakage due to faulty pressure control regulators. Large pressure build-up can result in explosive decompression at the cylinder head, causing the cylinder to rocket like a missile. Prevent entrapment of liquid in closed system. Use check valve to prevent back-flow into storage container. Chain cylinders when not in use. Cylinder storage should be segregated from oxidizers such as oxygen, chlorine, etc. and away from heavy traffic areas to prevent knocking over or damage from falling objects. Valve caps should remain on cylinders.

Section 8 - EXPOSURE CONTROL - PERSONAL PROTECTION

ENGINEERING CONTROLS: Local exhaust and general ventilation may both be necessary in work area to prevent accumulation of explosive mixtures. Provide special ventilation in sumps and confined spaces. If mechanical ventilation is used, electrical equipment must meet National Electrical Code requirements.

RESPIRATORY EQUIPMENT: Personnel should never enter an area of high concentration without proper respiratory protection. Provide NIOSH-approved air-supplied respirator or self-contained breathing apparatus for emergency or non-routine situations where the level is excessive.

EYE PROTECTION: Use face shield or chemical type goggles where contact with material may occur such as when changing valves, hoses, etc.

PROTECTIVE CLOTHING: Use protective clothing, face shield, and gloves when contact with liquid propane is possible.

OTHER (SAFETY SHOWERS, EYE WASH STATIONS, ETC.): Emergency eye wash fountains and safety showers for first aid treatment of potential freeze burns should be available in the vicinity of any significant exposure from compressed gas release.

Section 9 - PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE: Colorless gas (liquid under pressure)

ODOR: If odorized, will have rotten egg odor, otherwise odorless.

BOILING POINT: 760 mmHg @ -44°F

SPECIFIC GRAVITY (water=1): 0.5

VAPOR PRESSURE: 190 psia @ 100°F

VAPOR DENSITY (air=1): 1.5

SOLUBLE IN WATER: Very slightly soluble

EVAPORATION RATE (ether=1): N/A

pH:

Section 10 - STABILITY AND REACTIVITY

STABILITY -

STABLE X (At normal temperature and storage conditions)
UNSTABLE

INCOMPATIBILITY -

CONDITIONS TO AVOID: Propane vapors will form explosive mixtures with air and will easily ignite by heat, sparks, flames, build-up of static electricity, and other sources of ignition. Note: Ethyl mercaptan might, under certain conditions (when oxygen, water, iron oxide or other oxidizers are present in containers and piping) react with oxidizers which diminish or eliminate entirely its distinct smell, therebv reducing or eliminating the ability of a person to detect a leak. The passage of odorized propane through soil because of an underground leak will also diminish or eliminate entirely the smell of odorized propane. If you suspect a leak, use a combustible gas indicator or similar device to check for gas leaks.

MATERIALS TO AVOID: Strong acids, alkalies and oxidizers such as chlorine (gas or liquid) and oxygen.

HAZARDOUS DECOMPOSITION PRODUCTS: Normal combustion produces carbon dioxide; incomplete combustion can produce carbon monoxide.

HAZARDOUS POLYMERIZATION: Has not been reported to occur.

Section 11 - TOXICOLOGY INFORMATION

Note: CHS has not conducted specific toxicity tests on this product.

Section 12 - ECOLOGICAL INFORMATION

Note: CHS has not conducted specific ecological tests on this product.

Section 13 - DISPOSAL CONSIDERATION

WASTE DISPOSAL PROCEDURES: Releases are expected to cause only localized non-persistent environmental damage. Waste mixtures containing these gases should not be allowed to enter drains or sewers where there is danger of vapors being ignited. When it becomes necessary to dispose of these gases, it is preferable to do so as a vapor. These gases may be used as an auxiliary fuel or disposed of by flaring in a properly designed flare or incinerator. Venting of the gases to the atmosphere should be avoided. Treatment, storage, transportation and disposal must be in accordance with applicable federal, state and local regulations.

Section 14 - TRANSPORTATION

DOT PROPER SHIPPING NAME: Propane

DOT HAZARD CLASS: 2.1

DOT IDENTIFICATION NUMBER: UN 1978

DOT EMER. RESPONSE GUIDE NO.: 115 (Formerly #22)

DOT LABEL, PLACARD: Flammable Gas

Section 15 - REGULATORY INFORMATION

This product may contain the following toxic chemicals subject to the reporting requirements of SARA Section 313 of the Emergency Planning and Community Right-To-Know Act of 1986 and of 40 CFR 372.

Cas Number	Chemical Name	Percent By Weight
115-07-1	Propylene	0 - 5%

SARA SECTION *311-312 HAZARD CATEGORIES (40 CFR 370.2)*:

FIRE: Yes **SUDDEN RELEASE OF PRESSURE:** Yes **REACTIVE:** No **ACUTE:** Yes **CHRONIC:** No

Section 16 - OTHER INFORMATION

Updated By: Gary Bourne / Hue Lam DATE: **December 24, 2003**
Title: EHS Compliance Specialists Supersedes: 09/08/03
Reason for issue: company name change

THE INFORMATION CONTAINED IN THIS MSDS RELATES ONLY TO THE SPECIFIC MATERIAL IDENTIFIED. IT DOES NOT COVER USE OF THAT MATERIAL IN COMBINATION WITH ANY OTHER MATERIAL OR IN ANY PARTICULAR PROCESS. IN COMPLIANCE WITH 29 C.F.R. 1910.1200(g), CHS HAS PREPARED THIS MSDS IN SEGMENTS, WITH THE INTENT THAT THOSE SEGMENTS BE READ TOGETHER AS A WHOLE WITHOUT TEXTUAL OMISSIONS OR ALTERATIONS. CHS BELIEVES THE INFORMATION CONTAINED HEREIN TO BE ACCURATE, BUT MAKES NO REPRESENTATION, GUARANTEE, OR WARRANTY, EXPRESS OR IMPLIED, ABOUT THE ACCURACY, RELIABILITY, OR COMPLETENESS OF THE INFORMATION OR ABOUT THE FITNESS OF CONTENTS HEREIN FOR EITHER GENERAL OR PARTICULAR PURPOSES. PERSONS REVIEWING THIS MSDS SHOULD MAKE THEIR OWN DETERMINATION AS TO THE MATERIAL'S SUITABILITY AND COMPLETENESS FOR USE IN THEIR PARTICULAR APPLICATIONS.

CENEX OUR ENERGY COMES THROUGH.

Cenex® is a registered trademark of CHS Inc.

MOBIL OIL CORP -- DIESEL FUEL (MRDUS)

==========

MSDS Safety Information

==========

FSC: 9140
NIIN: 00-286-5294
MSDS Date: 07/25/1997
MSDS Num: CLHNK
Product ID: DIESEL FUEL (MRDUS)
MFN: 02
Responsible Party
Cage: 6G112
Name: MOBIL OIL CORP
Address: 3225 GALLOWS RD
City: FAIRFAX VA 22037-0001
Info Phone Number: 800-662-4525, 703-849-3451
Emergency Phone Number: 609-737-4411 (COLLECT)
Preparer's Name: NOT PROVIDED
Chemtrec IND/Phone: (800)424-9300
Review Ind: Y
Published: Y

==========

Contractor Summary

==========

Cage: 6G112
Name: MOBIL OIL CORP
Address: 3225 GALLOWS RD
City: FAIRFAX VA 22037
Phone: 800-662-4525, 856-224-4644

==========

Item Description Information

==========

Item Name: DIESEL FUEL
Specification Number: VV-F-800
Type/Grade/Class: GRADE DF-2
Unit of Issue: GL
UI Container Qty: X
Type of Container: BULK

==========

Ingredients

==========

Cas: 68334-30-5
RTECS #: HZ1800000
Name: DIESEL FUEL
Percent by Wt: 100.
Other REC Limits: NOT ESTABLISHED
OSHA PEL: NOT ESTABLISHED
ACGIH TLV: NOT ESTABLISHED

==========

Health Hazards Data

==========

LD50 LC50 Mixture: LD50 (ORAL, RAT) > 2,000 MG/KG
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS. PROLONGED, REPEATED SKIN CONTACT MAY RESULT IN SKIN IRRITATION OR MORE SERIOUS SKIN DISORDERS. NOTE: THIS PRODUCT CONTAINS POLYCYCLIC AROMATIC HYDROCARBONS, SOME OF WHICH HAVE BEEN REPORTED TO CAUSE SKIN CANCER IN HUMANS UNDER CONDITIONS OF POOR PERSONAL HYGIENE, PROLONGED REPEATED CONTACT, AND EXPOSURE TO SUNLIGHT. TOXIC EFFECTS AR E UNLIKELY TO OCCUR IF GOOD PERSONAL HYGIENE IS PRACTICED.
Explanation Of Carcinogenicity: NONE

Signs And Symptions Of Overexposure: RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS. PROLONGED, REPEATED SKIN CONTACT MAY RESULT IN SKIN IRRITATION OR MORE SERIOUS SKIN DISORDERS.

Medical Cond Aggravated By Exposure: NOT PROVIDED

First Aid: EYE CONTACT: FLUSH THOROUGHLY WITH WATER. IF IRRITATION OCCURS, CALL A PHYSICIAN. SKIN CONTACT: REMOVE CONTAMINATED CLOTHING. DRY WIPE EXPOSED SKIN AND CLEANSE WITH WATERLESS HAND CLEANER FOLLOWED B Y WASHING WITH SOAP AND WATER. INHALATION: REMOVE FROM FURTHER EXPOSURE. IF RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, OR UNCONSCIOUSNESS OCCURS, SEEK IMMEDIATE MEDICAL ASSISTANCE. IF BREATHING HAS STOPPED, ASSIST VENTILATION WITH BAG-VALVE-MASK DEVICE OR USE MOUTH-TO-MOUTH RESUSCITATION. INGESTION: SEEK IMMEDIATE MEDICAL ATTENTION. DO NOT INDUCE VOMITING.

==========

Handling and Disposal

==========

Spill Release Procedures: ADSORB ON FIRERETARDANT TREATED SAWDUST, DIATOMACEOUS EARTH, ETC. SHOVEL UP AND DISPOSE OF AT AN APPROPRIATE WASTE DISPOSAL FACILITY IN ACCORDANCE WITH CURRENT APPLICABLE LAWS AND REGULATIONS, AND PR ODUCT CHARACTERISTICS AT TIME OF DISPOSAL. PREVENT SPILLS FROM ENTERING STORM SEWERS OR DRAINS. REPORT AS REQUIRED TO AUTHORITIES.

Neutralizing Agent: NOT RELEVANT

Waste Disposal Methods: PRODUCT IS SUITABLE FOR BURNING FOR FUEL VALUE IN COMPLIANCE WITH APPLICABLE LAWS AND REGULATIONS. DISPOSAL OF UNUSED PRODUCT MAY BE SUBJECT TO RCRA REGULATIONS (40 CFR 261).

Handling And Storage Precautions: STORE IN A COOL AREA. A FLAMMABLE ATMOSPHERE CAN BE PRODUCEDIN STORAGE TANK HEADSPACES. MONITOR AND MAINTAIN HEADSPACE GASCONCENTRATIONS BELOW FLAMMABLE LIMITS. ALLOW NO IGNITION SOURCES IN THE AREA . AVOID SPARKING CONDITIONS. GROUND AND BOND ALL TRANSFER EQUIPMENT.

Other Precautions: HARMFUL IN CONTACT WITH OR IF ABSORBED THROUGH THE SKIN. AVOID INHALATION OF VAPORS OR MISTS. PORTABLE CONTAINERS APPROVED FOR STORING FUEL MUST BE PLACED ON THE GROUND AND THE NOZZEL MUST STAY IN CON TACT WITH THE CONTAINER WHEN FILLING TO PREVENT BUILD UP AND DISCHARGE OF STATIC ELECTRICITY.

==========

Fire and Explosion Hazard Information

==========

Flash Point Method: PMCC

Flash Point: >51.7C, 125.F

Lower Limits: 0.6%

Upper Limits: 7.0%

Extinguishing Media: CARBON DIOXIDE, FOAM, DRY CHEMICAL AND WATER FOG. USE WATER TO KEEP FIRE EXPOSED CONTAINERS COOL.

Fire Fighting Procedures: IF A LEAK OR SPILL HAS NOT IGNITED, USE WATER SPRAY TO DISPERSE THE VAPORS AND TO PROTECT PERSONNEL ATTEMPTING TO STOP LEAK. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES. PREVENT RUNOFF FROM FIRE CONTROL OR DILUTION FROM ENTERING STREAMS, SEWERS, OR DRINKING WATER SUPPLY. WEAR SCBA IN ENCLOSED AREAS.

Unusual Fire/Explosion Hazard: MATERIAL IS COMBUSTIBLE.

==========

Control Measures

==========

Respiratory Protection: NO SPECIAL REQUIREMENTS UNDER ORDINARY CONDITIONS OF USE AND WITH ADEQUATE VENTILATION.

Ventilation: USE IN WELL VENTILATED AREA. VENTILATION DESIRABLE AND EQUIPMENT SHOULD BE EXPLOSION PROOF.

Protective Gloves: IMPERVIOUS GLOVES MUST BE WORN.

Eye Protection: CHEMICAL TYPE GOGGLES SHOULD BE WORN.

Other Protective Equipment: IF CONTACT IS LIKELY OIL IMPERVIOUS CLOTHING MUST BE WORN.

Work Hygienic Practices: NOT PROVIDED

Supplemental Safety and Health: ABBREVIATION: N/A = NOT APPLICABLE. N/AV = NOT AVAILABLE. N/K = UNKNOWN. N/P = NOT PROVIDED. N/R = NOT RELEVANT. N/D = NOT DETERMINED. N/E = NOT ESTABLISHED. CNS = CENTRAL NERVOUS SYSTEM. GI = GASTROI NTESTINAL. SCBA = SELF CONTAINED BREATHING APPARATUS.

==========
Physical/Chemical Properties
==========
HCC: F4
NRC/State LIC No: NOT RELEVANT
Boiling Point: >148.9C, 300.F
Melt/Freeze Pt: <-6.5C, 20.F
M.P/F.P Text: POUR POINT
Decomp Text: NOT PROVIDED
Vapor Pres: MMHG 20C:0.5
Vapor Density: > 2.0
Spec Gravity: 0.82-0.87
Viscosity: >1.0 CST @ 40C/104F
Evaporation Rate & Reference: NOT ESTABLISHED
Solubility in Water: NEGLIGIBLE
Appearance and Odor: LIQUID. CCOLOR: CLEAR(MAY BE DYED). ODOR: HYDROCARBON.
Corrosion Rate: NOT PROVIDED
==========
Reactivity Data
==========
Stability Indicator: YES
Stability Condition To Avoid: HEAT, SPARKS, FLAME AND BUILD UP OF STATIC ELECTRICITY.
Materials To Avoid: HALOGENS, STRONG ACIDS, ALKALIES, AND OXIDIZERS.
Hazardous Decomposition Products: CARBON MONOXIDE.
Hazardous Polymerization Indicator: NO
Conditions To Avoid Polymerization: NONE
==========
Toxicological Information
==========
Toxicological Information: ORAL TOXICITY (RATS): PRACTICALLY NON-TOXIC (LD50): GREATER THAN 2000 MG/KG? BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS. DERMAL TOXICITY (RABBITS): PRACTICALLY NON-TOXIC (LD50): GREATE R THAN 2000 MG/KG?BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS. INHALATION TOXICITY (RATS): PRACTICALLY NON-TOXIC (LC50: GREATER THAN 5 MG/L)... BASED ON TESTING OF SIMILAR PRODUCTS AND/ OR THE COMPONENTS. EYE IRRITATION (RABBITS): PRACTICALLY NON-IRRITATING. (DRAIZE SCORE: > 6 BUT 15 OR LESS). --- BASED ON TESTING OF SIMILAR PRODUCTS AND/OR THE COMPONENTS. SKIN IRRITATION (RABBITS): PRACTICALLY NON-IRRITATING.
==========
Ecological Information
==========
Ecological: ENVIRONMENTAL FATE AND EFFECTS: NOT ESTABLISED.
==========
MSDS Transport Information
==========
Transport Information: NOTE: THE FLASH POINT IS > 125F. DOT: FLAMMABLE LIQUID OR COMBUSTIBLE LIQUID (49 CFR 173.120 (B) (2)).
==========
Regulatory Information
==========
Sara Title III Information: U.S. SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III: THIS PRODUCT CONTAINS NO "EXTREMELY HAZARDOUS SUBSTANCES". SARA (311/312) REPORTABLE HAZARD CATEGORIES: FIRE, CHRONIC. THIS PRODUCT CONTAINS NO CHEMICALS REPORTABLE UNDER SARA (313) TOXIC RELEASE PROGRAM.
Federal Regulatory Information: ALL COMPONENTS COMPLY WITH TSCA.
State Regulatory Information: THE FOLLOWING PRODUCT INGREDIENTS ARE CITED ON THE LISTS BELOW: DIESEL OIL..C9-20 (CAS # 68334-30-5; LIST CITATION 21, 26. 21 = LA RTK. 26 = RI RTK.
==========
Other Information
==========
Other Information: NOTE TO PHYSICIANS: MATERIAL IF ASPIRATED INTO THE LUNGS MAY CAUSE CHEMICAL PNEUMONITIS. TREAT APPROPRIATELY. MAY CAUSE SKIN CANCER ON

PROLONGED AND REPEATED CONTACT.

==========

Transportation Information

==========

Responsible Party Cage: 6G112
Trans ID NO: 158128
Product ID: DIESEL FUEL (MRDUS)
MSDS Prepared Date: 07/25/1997
Review Date: 08/07/2001
MFN: 2
Net Unit Weight: BULK
Multiple KIT Number: 0
Unit Of Issue: GL
Container QTY: X
Type Of Container: BULK
Additional Data: IMO/IATA: PROPER SHIPPING NAME, UN ID NUMBER, HAZARD CLASS, AND PACKING GROUP PER MSDS.

==========

Detail DOT Information

==========

DOT PSN Code: GTF
DOT Proper Shipping Name: GAS OIL OR DIESEL FUEL OR HEATING OIL, LIGHT
Hazard Class: 3
UN ID Num: UN1202
DOT Packaging Group: III
Label: FLAMMABLE LIQUID
Special Provision: B1,T7,T30
Packaging Exception: 150
Non Bulk Pack: 203
Bulk Pack: 242
Max Qty Pass: 60 L
Max Qty Cargo: 220 L
Vessel Stow Req: A

==========

Detail IMO Information

==========

IMO PSN Code: HRR
IMO Proper Shipping Name: GAS OIL
IMDG Page Number: 3375
UN Number: 1202
UN Hazard Class: 3.3
IMO Packaging Group: III
Subsidiary Risk Label: -
EMS Number: 3-07
MED First Aid Guide NUM: 311

==========

Detail IATA Information

==========

IATA PSN TX
IATA UN ID Num: 1202
IATA Proper Shipping Name: GAS OIL
IATA UN Class: 3
IATA Label: FLAMMABLE LIQUID
UN Packing Group: III
Packing Note Passenger: 309
Max Quant Pass: 60L
Max Quant Cargo: 220L
Packaging Note Cargo: 310
Exceptions: A3

==========

Detail AFI Information

==========

AFI PSN TX
AFI Proper Shipping Name: GAS OIL OR DIESEL FUEL OR HEATING OIL, LIGHT

AFI Hazard Class: 3
AFI UN ID NUM: UN1202
AFI Packing Group: III
Special Provisions: P5
Back Pack Reference: A7.3
==========
HAZCOM Label
==========
Product ID: DIESEL FUEL (MRDUS)
Cage: 6G112
Company Name: MOBIL OIL CORP
Street: 3225 GALLOWS RD
City: FAIRFAX VA
Zipcode: 22037
Health Emergency Phone: 609-737-4411 (COLLECT)
Label Required IND: Y
Date Of Label Review: 08/07/2001
Status Code: A
MFG Label NO: NOT PROVIDED
Label Date: 07/25/1997
Origination
Chronic Hazard IND: Y
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: WARNING
Respiratory Protection IND: NO
Health Hazard: Moderate
Contact Hazard: Slight
Fire Hazard: Moderate
Reactivity Hazard: None
Hazard And Precautions: TARGET ORGANS: N/P. WARNING! MAY CAUSE RESPIRATORY IRRITATION, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS, SKIN CANCER. AVOID CONTACT. WASH THOROUGHLY AFTER HANDLING. FIRST AID: IF INHALED, MOVE TO FRES H AIR. IF BREATHING HAS STOPPED, ASSIST VENTILATION WITH A BAG-VALVE-MASK DEVICE/USE MOUTH-TO-MOUTH RESUSCITATION. IN CASE OF CONTACT, DRY WIPE SKIN, CLEANSE WITH WATERLESS HAND CLEANER, THEN WASH WIT H SOAP AND WATER. IF SWALLOWED, SEEK IMMEDIATE MEDICAL ATTENTION. DO NOT INDUCE VOMITING. ONLY INDUCE VOMITING AT THE INSTRUCTIONS OF A PHYSICIAN. EMPTY CONTAINER RETAINS PRODUCT RESIDUE. READ MATERIA L SAFETY DATA SHEET FOR FURTHER INFORMATION.
==========
Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

Panasonic®

BATTERY SALES GROUP

MATERIAL SAFETY DATA SHEET

LC SEALED LEAD ACID BATTERY SERIES

Section I: Chemical Product and Company Identification

Product Identity:
Sealed Lead Acid Battery

Trade Name:
Panasonic LC Valve Regulated Lead Acid Battery Series

Distributor:
Panasonic Industrial Company - Battery Sales Group
Two Panasonic Way/7A-1, Secaucus, New Jersey 07094

Manufacturer:
Matsushita Battery Industrial
Osaka, 570, Japan

For Chemical Emergency
Spill, Leak, Fire, Exposure or Accident
Call CHEMTREC - Day or Night - 24 hours
1-800-424-9300
Outside the USA: 1-703-527-3887 (collect)

Telephone Number for General Information
Toll Free 1-800-793-3772
Internet: www.panasonic.com/batteries

Section II: Hazardous Ingredients / Identity Information

Component	Common Name	Chemical Name	Approximate % by wt. or vol.	OSHA PEL	ACGIH TLV	CAS#
Lead	(Negative Electrode and Grid)	Pb	48~53 wt%	0.05 mg/m^3	0.15 mg/m^3	7439-92-1
Lead Oxide	(Positive Electrode)	PbO_2	23~26%	0.05 mg/m^3	0.15 mg/m^3	1309-60-0
Lead Sulfate	(Positive and Negative Electrode)	$PbSO_4$	< 1. wt%	0.05 mg/m^3	0.15 mg/m^3	7446-14-2
Sulfuric Acid	(Electrolyte)	H_2SO_4	7~10 wt%	1.0 mg/m^3	1.0 mg/m^3	7664-93-9

Percentages of components are dependant both on the model of the battery and state of charge/discharge of the battery. Sulfuric Acid is reportable under Sections 302, 311, 312 and 313 of the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA). Reportable Quantity: 500 lbs for sulfuric acid and 10,000 lbs for lead. See Section XII, Page 3 for more information.

Overall Chemical Reaction: $PbO2 + Pb + 2H_2SO_4 \rightleftharpoons 2PbSO_4 + 2H_2O$

Note: Panasonic Sealed Lead Acid batteries are a sealed, non-spillable design. Under normal use and handling the customer has no contact with the internal components of the battery or the chemical hazards. Under normal use and handling these batteries do not emit regulated or hazardous substances. Warning: Battery terminals/posts and related accessories contain lead and lead compounds, chemicals known to the State of California to cause cancer and reproductive harm. Wash hands thoroughly after working with batteries and before eating, drinking or smoking.

Section III: Physical / Chemical Characteristics

Boiling Point:	Electrolyte 110°C - 112°C
Vapor Pressure:	Electrolyte 11.7 mm Hg. at 20°C
Vapor Density (AIR = 1):	Electrolyte 3.4
Solubility in Water:	Lead, Lead Oxide and Lead Sulfate are insoluble in water. Sulfuric Acid is 100% soluble in water.
Appearance and Odor:	The entire battery is a solid article consisting of an opaque plastic case with two protruding lead terminals. The battery is odorless. Sulfuric Acid is a liquid.
Specific Gravity (H2O = 1)	Electrolyte 1.300

Health Hazard Information (Acute and Chronic) - Sulfuric Acid only.

The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mist containing sulfuric acid" as a Category I carcinogen, a substance that is carcinogenic to humans. This classification does not apply to liquid forms of sulfuric acid or sulfuric acid solutions contained within the battery. Inorganic acid mist (sulfuric acid mist) is not generated under normal use of this product. Misuse of the product, such as overcharging, may however result in the generation of sulfuric acid mist.

Routes of Entry:	By inhalation (mist), skin and eyes, ingestion.
Acute:	Tissue destruction on contact. May cause 2nd and 3rd degree burns or blindness. Ingestion will cause corrosive burns on contact. May be fatal if swallowed.
Chronic:	Inhalation of mists may cause upper respiratory irritation.
Signs and Symptoms:	Irritation and burning of exposed tissues.
Medical Conditions:	Respiratory disorders may be aggravated by prolonged inhalation of mists.

Section IV: Emergency and First Aid Procedures

Battery Electrolyte

Inhalation:	Remove to fresh air. Give oxygen or artificial respiration if needed. **Get immediate medical attention.**
Eye Contact:	*Flush with plenty of water for at least 15 minutes.* **Get immediate medical attention.**
Skin Contact:	Remove contaminated clothing and flush affected areas with plenty of water for at least 15 minutes.
Ingestion:	Do not induce vomiting. Dilute by giving large quantities of water. If available give several glasses of milk. Do not give anything by mouth to an unconscious person. **Give CPR if breathing has stopped. Get immediate medical attention.**

Section V: Fire and Explosion Hazard Data

Flash Point:	Not Applicable
Flammable Limits:	Lower 4.10% (Hydrogen gas) Upper 74.20%
Extinguishing Media:	Dry chemical, foam, halon or CO_2.

Special Fire Fighting Procedures:
If batteries are on charge, turn off power. Use positive pressure, self-contained breathing apparatus in fighting fire. Water applied to electrolyte generates heat and causes it to splatter. Wear acid resistant clothing. Ventilate area well.
Unusual Fire and Explosion Hazards:
Hydrogen and oxygen gases are generated in cells during normal battery operation or when on charge. (Hydrogen is flammable and oxygen supports combustion). These gases enter the air through the vent caps during battery overcharging. To avoid risk of fire or explosion, keep sparks and other sources of ignition away from the battery. Do not allow metal objects to simultaneously contact both positive and negative terminal of batteries. Ventilate area well.

Section VI: Reactivity Data

Stability:	Stable under normal conditions.
Conditions to Avoid:	Sparks and other sources of ignition. Prolonged overcharge. Fire or explosion hazard due to possible hydrogen gas generation.

Incompatibility:
Combination of sulfuric acid with combustibles and organic materials may cause fire and explosion. Avoid strong reducing agents, most metals, carbides, chlorates, nitrates, picrate.
Hazardous Decomposition Products: Hydrogen gas may be generated in an overcharged condition, in fire or at very high temperatures. CO, CO_2 and sulfur oxides may emit in fire.
Hazardous polymerization will not occur.

Section VII: Precautions for Safe Handling and Use

Steps to be Taken in Case of Broken Battery Case or Electrolyte Leakage:
Neutralize any electrolyte or exposed internal battery parts with soda ash (sodium bicarbonate) until fizzing stops. Keep untrained personnel away from electrolyte and broken battery. Place broken battery and clean-up materials in a plastic bag or non-metallic container. Dispose of clean-up materials as a hazardous waste. Ventilate area as hydrogen gas may be given off during neutralization.
Waste Disposal Method:
Federal and State laws prohibit the improper disposal of all lead acid batteries. The battery end users (owners) are responsible for their batteries from the date of purchase through their ultimate disposal. The only legally acceptable method of disposal of lead acid batteries is to recycle them at a Resource Conservation and Recovery Act (RCRA) approved secondary lead smelter. The Panasonic SAV-LEAD Recycling Program allows for the recycling of lead-acid batteries in an environmentally sound manner. *For more information on the SAV-LEAD Recycling Program call toll-free,* 1-800-SAV-LEAD (1800-728-5323). These batteries are chemically identical to common automotive starter batteries and can be recycled with automotive lead-acid batteries.
HAZARDOUS WASTE CODES: D002, D008.
Precautions to be Taken in Handling, Storing and Transportation:
Store in cool, dry area away from combustible materials. Do not store in sealed, unventilated areas. Avoid overheating and overcharging.
Other Precautions:
Do not charge in unventilated areas. Do not use organic solvents or other than recommended chemical cleaners on battery.

Section VIII: Control Measures / Personal Protection

General:

Normal room ventilation is sufficient during normal use and handling. Recommend 2 to 3 room air changes per hour to prevent buildup of hydrogen gas.

Personal Protective Equipment (In the Event of Battery Case Breakage):

Always wear safety glasses with side shields or full face shield.

Use rubber or neoprene gloves.

Wear acid resistant boots, apron or clothing.

Work/Hygienic Practices:

Remove jewelry, rings, watches and any other metallic objects while working on batteries. All tools should be adequately insulated to avoid the possibility of shorting connections. DO NOT lay tools on top of battery. Be sure to discharge static electricity from tools and individual person by touching a grounded surface in the vicinity of the batteries, but away from cells. Batteries are heavy. Serious injury can result from improper lifting or installation. DO NOT lift, carry, install or remove cells by lifting or pulling the terminal posts for safety reasons and because terminal posts and post seals may be damaged. DO NOT wear nylon clothes or overalls as they can create static electricity. DO KEEP a fire extinguisher and emergency communications device in the work area.

IMPORTANT:

Wash hands thoroughly after working with batteries and before eating, drinking or smoking.

Section IX: Regulatory Information

NFPA Hazard Rating for Sulfuric Acid:

Flammability (Red) = 0 Health (Blue) = 3 Reactivity (Yellow) = 2

Section X: Transportation Information

Identification and Proper Shipping Name:

Batteries – Wet, Non-Spillable, Electric Storage, UN 2800.

DOT - Unregulated, meets the requirements of 49 CFR 173, 159 (d).

IATA/ICAO - Unregulated, meets the requirements of Special Provision A67.

IMO - Unregulated.

***For all modes of transportation, each battery and outer package must be labeled: "Non-Spillable" or "Non-Spillable Battery." This label must be visible during transportation. * Batteries must be securely packed to prevent short-circuiting.**

Section XI: California Proposition 65 Information

The State of California has determined that certain battery terminals contain lead and lead compounds, *and handling this product may also expose you to sulfuric acid mist*, chemicals known to the State of California to cause cancer and reproductive harm. IMPORTANT: WASH HANDS THOROUGHLY AFTER WORKING WITH BATTERIES AND BEFORE EATING, DRINKING OR SMOKING.

Section XII: Other Information - Notice to Readers

General Product Description – LC VRLA Batteries

Panasonic LC Batteries are **sealed** (valve regulated) non-spillable lead-acid batteries with pasted lead-calcium plates. The electrolyte is held captive in an Absorbed Glass Mat (AGM) separator between plates that immobilize the electrolyte in the cell. AGM separator material is a highly porous, absorbent micro fiberglass mat mixed with polymer fibers. There is no "free" electrolyte to leak out if the cell is tipped over (cell case and cover are sealed together) or if the cell is punctured. The AGM separator material immobilizes the electrolyte and creates a situation where the spill of electrolyte is highly unlikely. Typical accidents where a battery case is punctured results in a slight drip or a slow ooze of material out of the cell that cannot be characterized as a spill.

Panasonic LC VRLA batteries are also different from conventional **unsealed** (wet/flooded) cells because they contain only a minimum amount of electrolyte. VRLA battery electrolyte is a dilute mixture of sulfuric acid in water, which typically has a specific gravity between 1.270 and 1.3. Specific Gravity is a measure of the density of a liquid as compared to that of water, which has a specific gravity of 1.000. Pure sulfuric acid has a specific gravity of 1.835.

NOTE: Panasonic LC batteries do not contain a gel electrolyte.

General Product Description - LC VRLA Batteries (continued)

During normal battery installation, operation and maintenance, the user has NO contact with the internal components of the battery or its internal hazardous chemicals.

Panasonic LC batteries are UL recognized under the file number: Matsushita Electric Industrial Co. Ltd., Matsushita Electric Corp. of America, File #MH13723, 1 Panasonic Way, Secaucus, NJ 07094.

NOTICE TO READERS: DISCLAIMER

This information has been compiled from sources considered to be dependable and is, to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty (either expressed or implied) or guarantee is made to the accuracy, reliability or completeness of the information contained herein. This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. It is the user's responsibility to satisfy himself as to the suitability and completeness of this information for his own particular use. Matsushita Battery Industrial Co., Ltd., Panasonic Industrial Company and Panasonic Sales Companies do not accept liability for any loss or damage that may occur, whether direct, indirect, incidental or consequential, from the use of this information nor do we offer warranty against patent infringement. Cell and battery product(s) or information contained herein are subject to change without notice. No liability is assumed as a result of their use or application.

Copyright©2001 Matsushita Battery Industrial Co., Ltd. All rights reserved.

Panasonic® is a registered trademark of Matsushita Electric Industrial Co., Ltd.

MSDS Preparation Date: 9/2005 Supersedes: 5/2001
Preparer: Charles P. Monahan Director, Regulatory Compliance 201-392-6464
Printed in the U.S.A.

Supplemental Information on Panasonic Valve-Regulated Lead Acid Batteries

Transportation

All Panasonic valve-regulated lead acid batteries are considered "non-spillable" for purposes of transportation by the U.S. Department of Transportation (DOT), International Civil Aviation Administration (ICAO), the International Air Transport Association (IATA) and the International Maritime Dangerous Goods regulations (IMDG). They are considered "non-spillable" by DOT by passing the Vibration Test and Pressure Differential Test as required in 49 CFR 173.159(d). They are also considered to be "non-spillable" by both ICAO and IATA by exceeding the requirements of Special Provisions "A67" as defined in their 1998 Handbooks.

Our batteries are authorized for transportation on deck or under deck storage on either a passenger or cargo vessel by passing the Vibration and Pressure Differential Tests as described in the International Maritime Dangerous Goods Regulations (IMDG).

To transport these batteries as "non-spillable" they must be shipped in a condition that would protect them from short-circuits and be securely packaged so as to withstand conditions normal to transportation. For transportation by a consumer, in or out of a device, they are unregulated thus requiring no additional special handling or packaging.

All of our lead acid batteries and their outside packaging, manufactured after September 30, 1995 are labeled "NON-SPILLABLE" per 49 CFR 173.159(d). If you repackage our batteries either as batteries or as a component of another product you must label the outer package "NON-SPILLABLE" per 49 CFR 173.159(d).

Assure Proper Recycling!

Valve-Regulated Lead Acid batteries destined for recycling can be managed under the federal *Universal Waste Rule* codified at 40 CFR Part 273.

In the event of disposal, dispose only in accordance with federal, state and local regulation. Batteries generated as a waste are subject to the Resource Conservation and Recovery Act (RCRA) as a D008 (lead) hazardous waste.

Panasonic VRLA Recycling Program

The Panasonic 1-800-SAV-LEAD Recycling Program for the collection and recycling of valve-regulated lead acid batteries (VRLA) covers all Panasonic Valve-Regulated Lead Acid Batteries. The proper disposal of spent VRLA batteries is becoming more of a critical issue, both from the viewpoint of environmental stewardship and from compliance with federal and state environmental regulations. Panasonic recognizes the burdens and responsibilities that have been placed on our customers to properly dispose of spent VRLA batteries and is proud to offer this voluntary nationwide battery recycling program.

Federal and State Requirements for Proper Disposal

Federal and State laws prohibit the improper disposal of all lead acid batteries. The battery end users (owners) are responsible for their batteries from the date of purchase through their ultimate disposal. The only legally acceptable method of disposal of lead acid batteries is to recycle them at Resource Conservation and Recovery Act (RCRA) approved secondary lead smelter. This Panasonic 1-800-SAV-LEAD Recycling Program will allow for you to arrange for the recycling of your VRLA batteries from anywhere in the United States. The Program will accept Panasonic and other VRLA batteries regardless of manufacturer. Panasonic will handle all VRLA batteries returned in an environmentally sound manner designed to comply with all applicable Federal and State laws and regulations. Panasonic will send batteries only to fully-permitted secondary lead smelters that we believe meet the highest environmental standards. Once the VRLA batteries are received by Panasonic, the cost to transport the batteries to the secondary lead smelter and the actual recycling costs will be borne by Panasonic.

See the next page for How the 1-800-SAV-LEAD Recycling Program Works

Supplemental Information on Panasonic Valve-Regulated Lead Acid Batteries (Cont.)

How the 1-800-SAV-LEAD Recycling Program Works

1) We encourage all of our customers to serve as VRLA collection centers for your customers, thereby establishing a reverse distribution network between the end user and the secondary lead recycling facility.
2) All shipments to our national consolidation facility must be prepaid. No freight collect shipments will be accepted. All freight collect and non-VRLA batteries will be returned to the shipper.
3) Panasonic will maintain on file all necessary documentation for EPA reference. A copy will be provided upon request.
4) All batteries must be shipped, prepaid to Ebco Battery Company that serves as our national consolidation facility. (See *exception* below).

   SHIPPING ADDRESS:
   Ebco Battery Company
   4017 Warm Springs Road
   Columbus, Georgia 31909

5) Only VRLA batteries that meet the U.S. Department of Transportation (DOT) "NON-SPILLABLE" (49 CFR 173.159d) requirements will be accepted by this program.
6) Panasonic reserves the right to alter or discontinue this program at any time.

Packaging Requirements

1) All VRLA batteries must be fully discharged and packaged in a manner as to insure safe handling and conform to all applicable DOT regulations. (49 CFR 173.159d). A dab of silicon caulking or non-conductive tape on each terminal will ensure that no direct shorts occur during shipment.
2) VRLA battery shipments should be made in pallet quantities whenever possible.
3) Palletized shipments should be secured with metal bands or poly-wrapped with stack height limited to *four (4) feet.*
4) VRLA batteries shipped on pallets should be of uniform size or be stacked with the larger batteries on the bottom.
5) VRLA batteries should be stacked upright in a head-to-base arrangement. Each layer should be separated by cardboard to prevent accidental shorting.
6) Smaller quantities of VRLA batteries may be shipped via standard UPS. Be sure that each box does not exceed the UPS weight limit of 70 lbs. A dab of silicon caulking or non-conductive tape on each terminal will ensure that no shorts occur during shipment.
7) The outside of every pallet and individual box must be labeled "NON-SPILLABLE" as required by DOT regulations. This label must be visible during transportation.

Exception:

Full-Truck-Loads – All full-truck-load shipments of VRLA batteries must be scheduled 48 hours in advance. To schedule shipments to our consolidation site, please be sure to fax a scheduling request (including contact name and phone number) to Ebco Battery Company at fax: (706) 569-6774.

Consumer Users of Panasonic VRLA Batteries

All Panasonic VRLA batteries are chemically identical to common automotive starter batteries and can be returned to any site that accepts automotive lead acid batteries for recycling. Examples include retailers of automotive batteries, automotive service centers, scrap metal dealers, etc...

For additional information on this program or information on how to recycle other Panasonic batteries please call your local Panasonic Battery Sales Group sales office.

Panasonic Batteries
Panasonic Industrial Company
A Division of Panasonic Corporation of North America
Two Panasonic Way
Secaucus, NJ 07094
Toll Free: 877-726-2228
Fax: 847-468-5750
e-mail: oembatteries@us.panasonic.com
Internet: www.panasonic.com/batteries

Print MSDS Sheet

SECTION 1 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MG INDUSTRIES
3 GREAT VALLEY PARKWAY
MALVERN, PENNSYLVANIA 19355
PHONE: 610-695-7400
FAX: 610-695-7596

EMERGENCY CONTACT:
CHEMTREC:
1-800-424-9300

SUBSTANCE: BENZENE
TRADE NAMES/SYNONYMS:
BENZOL; CYCLOHEXATRIENE; BENZOLE; PHENE; PYROBENZOL; PYROBENZOLE; CARBON OIL; COAL TAR NAPHTHA; PHENYL HYDRIDE; BENZOLENE; BICARBURET OF HYDROGEN; COAL NAPHTHA; MOTOR BENZOL; ANNULENE; (6)ANNULENE; RCRA U019; STCC 4908110; UN 1114; C6H6; MGI02610; RTECS CY1400000
CHEMICAL FAMILY: hydrocarbons, aromatic
CREATION DATE: May 04 1990
REVISION DATE: Jun 02 1999

SECTION 2 COMPOSITION, INFORMATION ON INGREDIENTS

COMPONENT: BENZENE
CAS NUMBER: 71-43-2
EC NUMBER (EINECS): 200-753-7
EC INDEX NUMBER: 601-020-00-8
PERCENTAGE: >99
OTHER CONTAMINANTS:
0.15% NON-AROMATICS; 1 PPM THIOPHENE

SECTION 3 HAZARDS IDENTIFICATION

NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=3 REACTIVITY=0
EC CLASSIFICATION (ASSIGNED):
F Highly Flammable
T Toxic
Carcinogen Category 1
R 11-45-48/23/24/25
EC Classification may be inconsistent with independently-researched data.
EMERGENCY OVERVIEW:
PHYSICAL DESCRIPTION: Colorless to light-yellow liquid with an aromatic odor
MAJOR HEALTH HAZARDS: respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, cancer hazard (in humans)

PHYSICAL HAZARDS: Flammable liquid and vapor. Vapor may cause flash fire.
POTENTIAL HEALTH EFFECTS:
INHALATION:
SHORT TERM EXPOSURE: irritation, ringing in the ears, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, symptoms of drunkenness, disorientation, blurred vision, lung congestion, blood disorders, paralysis, convulsions, coma
LONG TERM EXPOSURE: hearing loss, visual disturbances, reproductive effects, brain damage, cancer
SKIN CONTACT:
SHORT TERM EXPOSURE: irritation, blisters
LONG TERM EXPOSURE: tingling sensation
EYE CONTACT:
SHORT TERM EXPOSURE: irritation
LONG TERM EXPOSURE: no information on significant adverse effects
INGESTION:
SHORT TERM EXPOSURE: nausea, vomiting, chest pain, headache, drowsiness, symptoms of drunkenness, disorientation, visual disturbances, lung congestion, paralysis, convulsions, coma

LONG TERM EXPOSURE: impotence, cancer
CARCINOGEN STATUS:
OSHA: Y
NTP: Y
IARC: Y

SECTION 4 FIRST AID MEASURES

INHALATION: When safe to enter area, remove from exposure. Use a bag valve mask or similar device to perform artificial respiration (rescue breathing) if needed. Keep warm and at rest. Get medical attention immediately.
SKIN CONTACT: Remove contaminated clothing, jewelry, and shoes immediately. Wash with soap or mild detergent and large amounts of water until no evidence of chemical remains (at least 15-20 minutes). Get medical attention, if needed.
EYE CONTACT: Wash eyes immediately with large amounts of water or normal saline, occasionally lifting upper and lower lids, until no evidence of chemical remains. Get medical attention immediately.
INGESTION: Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.
NOTE TO PHYSICIAN: For inhalation, consider oxygen. For ingestion, consider gastric lavage.

SECTION 5 FIRE FIGHTING MEASURES

FIRE AND EXPLOSION HAZARDS: Severe fire hazard. Moderate explosion hazard. Vapor/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.
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. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles until well after fire is out. If this is impossible then take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.
FLASH POINT: 12 F (-11 C) (CC)
LOWER FLAMMABLE LIMIT: 1.2%
UPPER FLAMMABLE LIMIT: 7.8%
AUTOIGNITION: 928 F (498 C)
FLAMMABILITY CLASS (OSHA): IB

SECTION 6 ACCIDENTAL RELEASE MEASURES

AIR RELEASE:
Reduce vapors with water spray. Stay upwind and keep out of low areas.
SOIL RELEASE:
Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.
WATER RELEASE:
Cover with absorbent sheets, spill-control pads or pillows. Apply detergents, soaps, alcohols or another surface active agent. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.

OCCUPATIONAL RELEASE:
Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or other non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area

and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Commission for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800)424-8802 (USA) or (202)426-2675 (USA).

SECTION 7 HANDLING AND STORAGE

Store and handle in accordance with all current regulations and standards. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Protect from physical damage. Store outside or in a detached building. Store with flammable liquids. Keep separated from incompatible substances. Keep separated from incompatible substances.

SECTION 8 EXPOSURE CONTROLS, PERSONAL PROTECTION

EXPOSURE LIMITS:
BENZENE:
1 ppm OSHA TWA
5 ppm OSHA STEL 15 minute(s)
0.5 ppm OSHA action level
0.5 ppm (1.6 mg/m3) ACGIH TWA
2.5 ppm (8 mg/m3) ACGIH STEL
0.1 ppm (0.32 mg/m3) NIOSH recommended TWA 8 hour(s)
1 ppm (3.2 mg/m3) NIOSH recommended ceiling 15 minute(s)
3.2 mg/m3 (1 ml/m3) AGS MAK 4 times/shift
5 ppm (16 mg/m3) UK OES TWA
MEASUREMENT METHOD: Charcoal tube; Carbon disulfide; Gas chromatography with flame ionization detection; NIOSH III # 1500, Hydrocarbons; ALSO NIOSH III # 3700

VENTILATION: Provide local exhaust or process enclosure ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits.

EYE PROTECTION: Wear splash resistant safety goggles. 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. OSHA REGULATED SUBSTANCES: U.S. OSHA 29 CFR 1910.1028.

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

10 ppm
Any air-purifying respirator with a full facepiece and an organic vapor canister.

50 ppm

Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).
Any air-purifying respirator with a full facepiece and a canister providing protection against this substance.

100 ppm
Any powered, air-purifying respirator with a full facepiece and organic vapor cartridge(s).

1000 ppm
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.

For Unknown Concentrations or Immediately Dangerous to Life or Health -

Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode.
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.

Escape -
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any self-contained breathing apparatus with a full facepiece.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION: Colorless to light-yellow liquid with an aromatic odor
MOLECULAR WEIGHT: 78.11
MOLECULAR FORMULA: C6-H6
BOILING POINT: 176 F (80 C)
FREEZING POINT: 43 F (6 C)
VAPOR PRESSURE: 75 mmHg @ 20 C
VAPOR DENSITY (air=1): 2.8
SPECIFIC GRAVITY (water=1): 0.8765 @ 20 C
WATER SOLUBILITY: 0.18% @ 25 C
PH: Not available
VOLATILITY: 100%
ODOR THRESHOLD: 4.68 ppm
EVAPORATION RATE: 5.1 (butyl acetate=1)
VISCOSITY: 0.6468 cP @ 20 C
COEFFICIENT OF WATER/OIL DISTRIBUTION: Not available
SOLVENT SOLUBILITY:
Soluble: acetone, alcohol, carbon disulfide, acetic acid, carbon tetrachloride, chloroform, ether, oils

---

SECTION 10 STABILITY AND REACTIVITY

REACTIVITY: Stable at normal temperatures and pressure.
CONDITIONS TO AVOID: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.
INCOMPATIBILITIES: acids, bases, halogens, oxidizing materials, metal salts

BENZENE:
ACIDS (STRONG): Incompatible.
ALLYL CHLORIDE WITH DICHLOROETHYL ALUMINUM OR ETHYLALUMINUM SESQUICHLORIDE: Possible explosion.
ARSENIC PENTAFLUORIDE + POTASSIUM METHOXIDE: Explosive interaction.
BASES (STRONG): Incompatible.
BROMINE + IRON: Incompatible.
BROMINE PENTAFLUORIDE: Fire and explosion hazard.
BROMINE TRIFLUORIDE: Possible explosion or ignition.
CHLORINE: Explosion in the presence of light.
CHLORINE TRIFLUORIDE: Violent reaction with possible explosion.
CHROMIC ANHYDRIDE (POWDERED): Ignition.
DIBORANE: Spontaneously explosive reaction in air.
DIOXYGEN DIFLUORIDE: Ignition, even at reduced temperatures.
DIOXYGENYL TETRAFLUOROBORATE: Ignition reaction.
INTERHALOGEN COMPOUNDS: Ignition or explosion.
IODINE HEPTAFLUORIDE: Ignition on contact.
IODINE PENTAFLUORIDE: Violent interaction above 50 C.
NITRIC ACID: Violent or explosive unless properly agitated and cooled.
NITRYL PERCHLORATE: Explosive interaction.
OXIDIZERS (STRONG): Fire and explosion hazard.
OXYGEN (LIQUID): Explosive mixture.
OZONE: Formation of explosive gelatinous ozonide.
PERCHLORATES (METAL): Formation of explosive complex.
PERCHLORYL FLUORIDE + ALUMINUM CHLORIDE: Formation of shock sensitive

compound.
PERMANGANATES + SULFURIC ACID: Possible explosion.
PERMANGANIC ACID: Explosion hazard.
PEROXODISULFURIC ACID: Explosion hazard.
PEROXOMONOSULFURIC ACID: Explosive interaction.
POTASSIUM PEROXIDE: Ignition.
SILVER PERCHLORATE: Formation of explosive complex.
SODIUM PEROXIDE + WATER: Ignition.
URANIUM HEXAFLUORIDE: Violent reaction.
HAZARDOUS DECOMPOSITION:
Thermal decomposition products: oxides of carbon
POLYMERIZATION: Will not polymerize.

SECTION 11 TOXICOLOGICAL INFORMATION

BENZENE:
IRRITATION DATA:
15 mg/24 hour(s) open skin-rabbit mild; 20 mg/24 hour(s) skin-rabbit moderate; 88 mg eyes-rabbit moderate; 2 mg/24 hour(s) eyes-rabbit severe
TOXICITY DATA:
2 pph/5 minute(s) inhalation-human LCLo; 50 mg/kg oral-man LDLo; 150 ppm/1 year(s) intermittent inhalation-man TCLo; 100 ppm inhalation-human TCLo; 65 mg/m3/5 year(s) inhalation-human LCLo; 194 mg/kg unreported-man LDLo; 930 mg/kg oral-rat LD50; 10000 ppm/7 hour(s) inhalation-rat LC50; 1100 ug/kg intraperitoneal-rat LD50; 4700 mg/kg oral-mouse LD50; 9980 ppm

inhalation-mouse LC50; 48 mg/kg skin-mouse LD50; 340 mg/kg intraperitoneal-mouse LD50; 2 gm/kg oral-dog LDLo; 146000 mg/m3 inhalation-dog LCLo; 170000 mg/m3 inhalation-cat LCLo; 45000 ppm/30 minute(s) inhalation-rabbit LCLo; >9400 ul/kg skin-rabbit LD50; 88 mg/kg intravenous-rabbit LDLo; >9400 ul/kg skin-guinea pig LD50; 527 mg/kg intraperitoneal-guinea pig LDLo; 1400 mg/kg subcutaneous-frog LDLo; 5700 mg/kg oral-mammal LD50; 20000 ppm/5 minute(s) inhalation-mammal LCLo; 1500 mg/kg intraperitoneal-mammal LDLo; 6600 mg/kg/27 week(s) intermittent oral-rat TDLo; 23 mg/m3/4 hour(s)-8 day(s) intermittent inhalation-rat TCLo; 300 ppm/6 hour(s)-13 week(s) intermittent inhalation-rat TCLo; 17 gm/kg/17 week(s) intermittent oral-rat TDLo; 1000 ppm/7 hour(s)-28 week(s) intermittent inhalation-rat TCLo; 500 ppm/6 hour(s)-3 week(s) intermittent inhalation-rat TCLo; 18 mg/kg/21 day(s) intermittent subcutaneous-rat TDLo; 2197 mg/kg/5 day(s) intermittent subcutaneous-rat TDLo; 13536 mg/kg/12 week(s) intermittent subcutaneous-rat TDLo; 4250 mg/kg/17 week(s) intermittent oral-mouse TDLo; 300 ppm/6 hour(s)-13 week(s) intermittent inhalation-mouse TCLo; 25 ppm/6 hour(s)-5 day(s) intermittent inhalation-mouse TCLo; 10 ppm/6 hour(s)-10 week(s) intermittent inhalation-mouse TCLo; 211 ppm/6 hour(s)-7 day(s) intermittent oral-mouse TCLo; 48 ppm/6 hour(s)-14 day(s) intermittent inhalation-mouse TCLo; 2197 mg/kg/5 day(s) intermittent subcutaneous-mouse TDLo; 100 ppm/6 hour(s)-72 week(s) intermittent inhalation-mouse TCLo; 500 mg/m3/3 hour(s)-13 week(s) intermittent inhalation-rabbit TCLo; 100 ppm/6 hour(s)-3 week(s) intermittent inhalation-pig TCLo
CARCINOGEN STATUS: OSHA: Carcinogen; NTP: Known Human Carcinogen; IARC: Human Sufficient Evidence, Animal Sufficient Evidence, Group 1; ACGIH: A1 -Confirmed Human Carcinogen; EC: Category 1; TRGS 905: K 1
Numerous case reports and series have suggested a relationship between exposure to benzene and the occurrence of various types of leukemia. Several case-control studies have also shown increased odds ratios for exposure to benzene, but mixed exposure patterns and poorly defined exposures render their interpretation difficult. Three independent cohort studies have demonstrated an increased incidence of acute nonlymphocytic leukemia in workers exposed to benzene.
LOCAL EFFECTS:
Irritant: inhalation, skin, eye
ACUTE TOXICITY LEVEL:
Highly Toxic: dermal absorption

Moderately Toxic: ingestion
Slightly Toxic: inhalation
TARGET ORGANS: immune system (blood), central nervous system
MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: blood system disorders, immune system disorders or allergies
TUMORIGENIC DATA:
200 mg/m3 inhalation-man TCLo/78 week(s) intermittent; 10 ppm inhalation-human TCLo/8 hour(s)-10 year(s) intermittent; 52 gm/kg oral-rat TDLo/52 week(s) intermittent; 1200 ppm inhalation-rat TCLo/6 hour(s)-10 week(s) intermittent; 18250 mg/kg oral-mouse TDLo/2 year(s) continuous; 300 ppm inhalation-mouse TCLo/6 hour(s)-16 week(s) intermittent; 1200 gm/kg skin-mouse TDLo/49 week(s) intermittent; 1200 mg/kg intraperitoneal-mouse TDLo/8 week(s) intermittent; 600 mg/kg subcutaneous-mouse TDLo/17 week(s) intermittent; 670 mg/kg parenteral-mouse TDLo/19 week(s) intermittent; 150 ppm inhalation-human TC/15 minute(s)-8 year(s) intermittent; 52 gm/kg oral-rat TD/1 year(s) intermittent; 10 gm/kg oral-rat TD/52 week(s) intermittent; 600 mg/m3 inhalation-man TC/4 year(s) intermittent; 150 ppm

inhalation-man TC/11 year(s) intermittent; 1200 ppm inhalation-mouse TC/6 hour(s)-10 week(s) intermittent; 2400 mg/kg oral-mouse TD/8 week(s) intermittent; 8 ppb inhalation-human TC/4 week(s) intermittent; 10 mg/m3 inhalation-human TC/11 year(s) intermittent; 300 ppm inhalation-mouse TC/6 hour(s)-16 week(s) intermittent
MUTAGENIC DATA:
mutation in microorganisms - Salmonella typhimurium 10 ppm (-S9); specific locus test - Drosophila melanogaster oral 11250 umol/L; sex chromosone loss and non disjunction - Drosophila melanogaster oral 7500 ppm; sex chromosone loss and non disjunction - Drosophila melanogaster multiple 27000 ppm; mutation in microorganisms - Saccharomyes cerevisae 549 mg/L (+S9); mutation in microorganisms - Saccharomyes cerevisae 275 mg/L (-S9); gene conversion and miotic recombination - Saccharomyes cerevisae 275 mg/L; sex chromosone loss and non disjunction - Aspergillus nidulans 35000 ppm; other mutation test systems - grasshopper inhalation 14 pph 16 hour(s); other mutation test systems - non-mammalian species intraperitoneal 75 gm/kg; DNA inhibition - human leukocyte 2200 umol/L; DNA inhibition - human HeLa cell 2200 umol/L; other mutation test systems - human lymphocyte 5 umol/L; cytogenetic analysis - human inhalation 125 ppm 1 year(s); cytogenetic analysis - human leukocyte 1 mmol/L 72 hour(s); cytogenetic analysis - human lymphocyte 1 mg/L; cytogenetic analysis - human unreported 10 ppm 4 week(s); sister chromatid exchange - human lymphocyte 200 umol/L; mutation in mammalian somatic cells - human lymphocyte 1 gm/L; micronucleus test - rat inhalation 1 ppm 6 hour(s); unscheduled DNA synthesis - rat liver 1 mmol/L; DNA inhibition - rat inhalation 400 ppm; other mutation test systems - rat liver 1 mmol/L; other mutation test systems - rat bone marrow 1 mmol/L; other mutation test systems - rat subcutaneous 1 gm/L; other mutation test systems - rat subcutaneous 2200 mg/kg; cytogenetic analysis - rat inhalation 300 mg/m3 16 week(s)-intermittent; cytogenetic analysis - rat subcutaneous 2400 mg/kg 12 day(s)-intermittent; cytogenetic analysis - rat intraperitoneal 234 mg/kg; cytogenetic analysis - rat oral 39060 ug/kg; sister chromatid exchange - rat inhalation 3 ppm 6 hour(s); sister chromatid exchange - rat leukocyte 1 mmol/L; micronucleus test - mouse embryo 12500 nmol/L; micronucleus test - mouse subcutaneous 440 mg/kg; micronucleus test - mouse oral 40 mg/kg; micronucleus test - mouse intraperitoneal 264 mg/kg 24 hour(s); micronucleus test - mouse inhalation 10 ppm 6 hour(s); mutation in microorganisms - mouse lymphocyte 62500 ug/L (+S9); mutation in microorganisms - mouse embryo 2500 mg/L (+S9); morphological transformation - mouse embryo 1 gm/L; morphological transformation - mouse fibroblast 150 gm/L; DNA damage - mouse lymphocyte 3840 umol/L; DNA adduct - mouse intraperitoneal 2640 mg/kg 3 day(s)-continuous; other mutation test systems - mouse oral 2 gm/kg; other mutation test systems - mouse other cell types 5 mmol/L; DNA inhibition - mouse oral 20 gm/kg; other mutation test systems - mouse lymphocyte 10 mmol/L; DNA inhibition - mouse intraperitoneal 880 mg/kg; DNA inhibition - mouse inhalation 3000 ppm 4 hour(s)-continuous; DNA inhibition - mouse bone marrow 3 mmol/L; sister chromatid exchange - mouse

inhalation 10 ppm 6 hour(s); sister chromatid exchange - mouse intraperitoneal 5 gm/kg; cytogenetic analysis - mouse oral 20 mg/kg; cytogenetic analysis - mouse intraperitoneal 264 mg/kg 3 day(s)-continuous; cytogenetic analysis - mouse inhalation 3000 ppm; dominant lethal test - mouse oral 1 mg/kg; dominant lethal test - mouse intraperitoneal 5 mg/kg; mutation in mammalian somatic cells - mouse lymphocyte 12500 ug/L; mutation in mammalian somatic cells - mouse inhalation 40 ppb 6 week(s)-continuous; morphological transformation - hamster embryo 100 ug/L; DNA damage - hamster ovary 17 mmol/L; cytogenetic analysis - hamster lung 550 mg/L; cytogenetic

analysis - hamster ovary 600 mg/L; sister chromatid exchange - hamster ovary 750 mg/L; sex chromosone loss and non disjunction - hamster liver 62500 ug/L; sex chromosone loss and non disjunction - hamster embryo 30 umol/L; mutation in mammalian somatic cells - hamster embryo 10 umol/L; DNA damage - rabbit subcutaneous 2344 mg/kg; DNA inhibition - rabbit subcutaneous 2 gm/kg; other mutation test systems - rabbit bone marrow 1 mmol/L; other mutation test systems - cat bone marrow 1 mmol/L; cytogenetic analysis - rabbit subcutaneous 8400 mg/kg

REPRODUCTIVE EFFECTS DATA:

670 mg/m3 inhalation-rat TCLo/24 hour(s) 15 day(s) pre pregnancy/1-22 day(s) pregnant female continuous; 56600 ug/m3 inhalation-rat TCLo/24 hour(s) 1-22 day(s) pregnant female continuous; 50 ppm inhalation-rat TCLo/24 hour(s) 7-14 day(s) pregnant female continuous; 150 ppm inhalation-rat TCLo/24 hour(s) 7-14 day(s) pregnant female continuous; 9 gm/kg oral-mouse TDLo 6-15 day(s) pregnant female continuous; 12 gm/kg oral-mouse TDLo 6-15 day(s) pregnant female continuous; 6500 mg/kg oral-mouse TDLo 8-12 day(s) pregnant female continuous; 500 ppm inhalation-mouse TCLo/7 hour(s) 6-15 day(s) pregnant female continuous; 500 mg/m3 inhalation-mouse TCLo/12 hour(s) 6-15 day(s) pregnant female continuous; 5 ppm inhalation-mouse TCLo 6-15 day(s) pregnant female continuous; 20 ppm inhalation-mouse TCLo/6 hour(s) 6-15 day(s) pregnant female continuous; 5 mg/kg intraperitoneal-mouse TDLo 1 day(s) male; 219 mg/kg intraperitoneal-mouse TDLo 14 day(s) pregnant female continuous; 1100 mg/kg subcutaneous-mouse TDLo 12 day(s) pregnant female continuous; 7030 mg/kg subcutaneous-mouse TDLo 12-13 day(s) pregnant female continuous; 13200 ug/kg intravenous-mouse TDLo 13-16 day(s) pregnant female continuous; 4 gm/kg parenteral-mouse TDLo 12 day(s) pregnant female continuous; 1 gm/m3 inhalation-rabbit TCLo/24 hour(s) 7-20 day(s) pregnant female continuous; 1 gm/m3 inhalation-rabbit TCLo/24 hour(s) 7-20 day(s) pregnant female continuous

ADDITIONAL DATA: May cross the placenta. Alcohol may enhance the toxic effects. Interactions with drugs may occur.

Use of stimulants such as epinephrine may cause cardiac arrhythmias.

HEALTH EFFECTS:

INHALATION:

ACUTE EXPOSURE:

BENZENE: Concentrations of 3000 ppm may cause respiratory tract irritation; more severe exposures may result in pulmonary edema. Systemic effects are mainly on the central nervous system and depend on exposure time and concentration. No effects were noted at 25 ppm for 8 hours; signs of intoxication began at 50-150 ppm within 5 hours; at 500-1500 ppm, within 1 hour; were severe at 7500 ppm, within 30-60 minutes; and 20,000 ppm was fatal within 5-10 minutes. Effects may include nausea, vomiting, headache, dizziness, drowsiness, weakness, sometimes preceded by a brief period of exhilaration or euphoria, irritability, malaise, confusion, ataxia, staggering, weak, rapid pulse, chest pain and tightness with breathlessness, pallor, cyanosis of the lips and fingertips, and tinnitus. In severe exposures there may be blurred vision, shallow, rapid breathing, delirium, cardiac arrhythmias, unconsciousness, deep anesthesia, paralysis, and coma characterized by motor restlessness, tremors and hyperreflexia, sometimes preceded by convulsions. Recovery depends on the severity of exposure. Polyneuritis may occur and there may be persistent nausea, anorexia, muscular weakness, headache, drowsiness, insomnia, and agitation. Nervous irritability, breathlessness, and unsteady gait may persist for 2-3 weeks; a peculiar skin color and cardiac distress may

persist for 4 weeks. Liver and kidney effects may occur, but are usually mild, temporary impairments. Chromosomal damage has been found after exposure to toxic levels. Although generally hematotoxicity is not a significant concern in acute exposure, delayed hematological effects, including anemia and thrombocytopenia, have been reported, as have petechial hemorrhages, spontaneous internal bleeding and secondary infections. In fatal exposures, death may be due to asphyxia, central nervous system depression, cardiac or respiratory failure and circulatory collapse, or occasionally, sudden ventricular fibrillation. It may occur within a few minutes to several hours, or cardiac arrythmia may occur at anytime within 24 hours. Also, death from central nervous system, respiratory or hemorrhagic complications may occur up to 5 days after exposure. Pathologic findings have included respiratory inflammation with edema and hemorrhage of the lungs, renal congestion, cerebral edema, and extensive petechial hemorrhages in the brain, pleurae, pericardium, urinary tract, mucous membranes, and skin.

CHRONIC EXPOSURE:

BENZENE: Longterm exposure may cause symptoms referable to the central nervous, hematopoietic and immune systems. Early effects are vague and varied and may include headache, light-headedness, dizziness, nausea, anorexia, abdominal discomfort, and fatigue. Sore, dry throat, weakness, lethargy, malaise, drowsiness, nervousness, and irritability have also been reported. Later there may be dyspnea, pallor, slightly increased temperature, decreased blood pressure, rapid pulse, palpitations, and visual disturbances. Dizziness when cold water is placed in the ear and hearing impairment have been reported, as have diffuse cerebral atrophy associated with ataxia, tremors and emotional lability. Workers exposed to benzene in combination with other solvents have exhibited polyneuritis. Several case reports, one of them an acute exposure, suggest the possibility that systemic exposure may be associated with retrobulbar or optic neuritis. Occasionally hemorrhages in retina and conjunctiva occur and rarely neuroretinal edema and papilledema have accompanied the retinal hemorrhages. Hematological effects vary widely and may appear after a few weeks or many years of exposure or even many years after exposure has ceased. The degree of exposure below which no blood effects will occur cannot be established with certainty. In the early stages, there may be blood clotting defects due to morphological, functional and quantitative platelet alteration with resultant bleeding from the nose and gums, easy bruising and petechiae; leukopenia with predominant lymphocytopenia or neutropenia; and anemia which may be normochromic or macrocytic and hypochromic. Extramedullary hematopoiesis, splenomegaly, circulating immature marrow cells, and an initial increase in leukocytes, erythrocytes and platelets have also been reported. The bone marrow may be hyper-, hypo- or normoplastic and does not always correlate with the peripheral blood picture. Also, the symptoms do not always parallel the laboratory findings. If treated at this stage, the effects appear reversible, although recovery may be protracted and there may be relapses. Decreased erythrocyte survival, hemolysis, capillary fragility, internal hemorrhages, iron metabolism disturbances, and hyperbilirubinemia have also been reported. Exposure to high levels for longer periods may result in aplasia and fatty degeneration of the bone marrow with pancytopenia. The most serious cases of aplastic anemia may be fatal due to hemorrhage and infection; death may occur within 3 months of diagnosis. Enormous variability in individual response, including non-dose dependent aplasia,

and the finding of eosinophilia suggests that, in some cases, the blood dyscrasia may partially be an allergic reaction. Numerous case reports and series have suggested a relationship between exposure to benzene and the occurrence of various types of leukemia. Several case-control studies have also shown increased odds ratios for exposure to benzene, but mixed exposure patterns and poorly defined exposures render their interpretation difficult. Three independent cohort studies have demonstrated an increased incidence of acute nonlymphocytic leukemia in workers exposed to benzene.

Several studies have also suggested a link between occupational exposure and multiple myeloma and lymphoma, both Hodgkin's and nonhodgkin's. Although aplastic anemia is probably the more likely consequence of longterm exposure, it is not uncommon for an individual surviving this, to go through a preleukemic phase into frank leukemia. Conversely, leukemia without precedent aplastic anemia can occur. In one study the range of time from the start of the exposure to the diagnosis of leukemia was 3-24 years. It has been suggested that the chromosomal aberrations which can arise in peripheral blood and bone marrow cells and persist for a long time after exposure ceases, may be associated with the increased incidence of leukemia. The immunosuppressive effect has also been suggested as being associated with the leukemogenesis. Adverse effects on the immunological system have been shown to make rabbits more susceptible to tuberculosis and pneumonia and may explain why the terminal event in some cases of benzene intoxication may be overwhelming infection. Exposed mice exhibited a tendency toward induction of lymphoid neoplasms. Rats exhibited an increased incidence of neoplasms, mainly carcinomas, at various sites. Menstrual disturbances have been reported more frequently in exposed women. Testicular damage has been reported in rats, rabbits and guinea pigs. Some animal studies have demonstrated embryo/fetotoxicity, sometimes at levels as low as 10 ppm and the potential for teratogenic effects such as decreased body weight and skeletal variants, have also been shown. Other studies have not produced any abnormalities or embryolethality.

SKIN CONTACT:

ACUTE EXPOSURE:

BENZENE: Direct contact may cause irritation. Effects may include erythema, a burning sensation, and with prolonged contact, blistering and edema. Under normal conditions, significant signs of systemic toxicity are unlikely from skin contact alone due to the slow rate of absorption; it may however, contribute to the toxicity from inhalation. Application to guinea pigs resulted in increased dermal permeability.

CHRONIC EXPOSURE:

BENZENE: Repeated or prolonged contact defats the skin and may result in dermatitis with erythema, scaling, dryness, vesiculation, and fissuring, possibly accompanied by paresthesias of the fingers which may persist several weeks after the dermatitis subsides. Peripheral neuritis has also been reported. Secondary infections may occur. Tests on guinea pigs indicate sensitization is possible. Although animal studies have failed to establish a relationship between skin contact and a carcinogenic effect, most of the studies were inadequate; some papillomas and hematopoietic effects have been reported.

EYE CONTACT:

ACUTE EXPOSURE:

BENZENE: May cause irritation. Vapor concentrations of 3000 ppm are very

irritating, even on brief exposure. Droplets cause a moderate burning sensation, but only a slight, transient corneal epithelial injury with rapid recovery.

CHRONIC EXPOSURE:

BENZENE: Repeated or prolonged exposure may cause conjunctivitis. 50% of rats exposed to 50 ppm for more than 600 hours developed cataracts.

INGESTION:

ACUTE EXPOSURE:

BENZENE: May cause local irritation and burning sensation in the mouth, throat and stomach, and hemorrhagic inflammatory lesions of the mucous membranes in contact with the liquid. Signs and symptoms of systemic intoxication may include nausea, vomiting, headache, dizziness, weakness, staggering, chest pain and tightness, shallow, rapid pulse and respiration, breathlessness, pallor followed by flushing, and a fear of impending death. There may be visual disturbances, tremors, convulsions, ventricullar irregularities, and paralysis. Excitement, euphoria or delirium may precede weariness, fatigue, sleepiness and followed by stupor and unconsciousness, coma and death from respiratory failure. Those who survive the central nervous system effects may develop bronchitis,

pneumonia, pulmonary edema, and intrapulmonary hemorrhage. Aspiration may cause immediate pulmonary edema and hemorrhage. The usual lethal dose in humans is 10-15 milliliters, but smaller amounts have been reported to cause death. A single exposure may produce longterm effects with pancytopenia persisting up to a year.

CHRONIC EXPOSURE:

BENZENE: Daily administration to humans of 2-5 grams in olive oil caused headache, vertigo, bladder irritability, impotence, gastric disturbances, and evidence of renal congestion. In female rats treated with 132 single daily doses over 187 days, no effects were observed at 1 mg/kg; slight leukopenia at 10 mg/kg; and both leukopenia and anemia at 50 and 100 mg/kg. Oral administration to rats and mice at various dose levels induced neoplasms at multiple sites in males and females. In a one year gavage study, rats given 50 or 250 mg/kg, 4-5 days/week for 52 weeks did not exhibit acute or subacute toxic effects, but a dose correlated increase of leukemias and mammary carcinomas was observed; some other tumor types were also reported. Reproductive effects have been reported in animals.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY DATA:

FISH TOXICITY: 9200 ug/L 96 hour(s) LC50 (Mortality) Rainbow trout,donaldson trout (Oncorhynchus mykiss)

INVERTEBRATE TOXICITY: 10000 ug/L 48 hour(s) EC50 (Immobilization) Water flea (Daphnia magna)

ALGAL TOXICITY: 41000 ug/L 8 hour(s) EC50 (Growth) Green algae (Selenastrum capricornutum)

OTHER TOXICITY: 25 ug/L 24 day(s) (Residue) Wood frog (Rana sylvatica)

FATE AND TRANSPORT:

BIOCONCENTRATION: 4360 ug/L 24 day(s) BCF (Residue) Northern anchovy (Engraulis mordax) 97 ug/L

SECTION 13 DISPOSAL CONSIDERATIONS

Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U019. Hazardous Waste Number(s): D018. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 0.5 mg/L. Dispose in accordance with all applicable regulations.

SECTION 14 TRANSPORT INFORMATION

U.S. DOT 49 CFR 172.101 SHIPPING NAME-UN NUMBER:
Benzene-UN1114
U.S. DOT 49 CFR 172.101 HAZARD CLASS OR DIVISION:
3
U.S. DOT 49 CFR 172.101 PACKING GROUP:
II
U.S. DOT 49 CFR 172.101 AND SUBPART E LABELING REQUIREMENTS:
Flammable liquid
U.S. DOT 49 CFR 172.101 PACKAGING AUTHORIZATIONS:
EXCEPTIONS: 49 CFR 173.150
NON-BULK PACKAGING: 49 CFR 173.202
BULK PACKAGING: 49 CFR 173.242
U.S. DOT 49 CFR 172.101 QUANTITY LIMITATIONS:
PASSENGER AIRCRAFT OR RAILCAR: 5 L
CARGO AIRCRAFT ONLY: 60 L
LAND TRANSPORT ADR/RID:
SUBSTANCE NAME: Benzene
UN NUMBER: UN1114
ADR/RID CLASS: 3
ITEM NUMBER: 3(b)
WARNING SIGN/LABEL: 3

HAZARD ID NUMBER: 33
AIR TRANSPORT IATA/ICAO:
CORRECT TECHNICAL NAME: Benzene
UN/ID NUMBER: UN1114
IATA/ICAO CLASS: 3
PACKAGING GROUP: II
LABEL: Flammable liquid
MARITIME TRANSPORT IMDG:
CORRECT TECHNICAL NAME: Benzene
UN/ID NUMBER: UN1114

IMDG CLASS: 3.2
PACKAGING GROUP: II
EmS No.: 3-03
MFAG Table No.: 312
MARINE POLLUTANT: N

SECTION 15 REGULATORY INFORMATION

U.S. REGULATIONS:
TSCA INVENTORY STATUS: Y
TSCA 12(b) EXPORT NOTIFICATION: Not listed.
CERCLA SECTION 103 (40CFR302.4): Y
Benzene: 10 LBS RQ
SARA SECTION 302 (40CFR355.30): N
SARA SECTION 304 (40CFR355.40): N
SARA SECTION 313 (40CFR372.65): Y
Benzene
SARA HAZARD CATEGORIES, SARA SECTIONS 311/312 (40CFR370.21):
ACUTE: Y
CHRONIC: Y
FIRE: Y
REACTIVE: N
SUDDEN RELEASE: N
OSHA PROCESS SAFETY (29CFR1910.119): N
STATE REGULATIONS:
California Proposition 65: Y
Known to the state of California to cause the following:
Benzene
Cancer (Feb 27, 1987)
Developmental toxicity (Dec 26, 1997)
Male reproductive toxicity (Dec 26, 1997)
EUROPEAN REGULATIONS:
EC NUMBER (EINECS): 200-753-7
EC RISK AND SAFETY PHRASES:

R 11	Highly flammable.
R 45	May cause cancer.
R 48/23/24/25	Toxic: danger of serious damage to health by prolonged exposure through inhalation, in contact with skin and if swallowed.
S 45	In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 53	Avoid exposure - obtain special instructions before use.

GERMAN REGULATIONS:
WATER HAZARD CLASS (WGK): 3 (Official German Classification)

SECTION 16 OTHER INFORMATION

COPYRIGHT 1984-1999 MDL INFORMATION SYSTEMS, INC. ALL RIGHTS RESERVED.
THIS MSDS IS SUPPLIED PURSUANT TO OSHA REGULATIONS. OTHER GOVERNMENT REGULATIONS MUST BE REVIEWED FOR APPLICABILITY TO THIS PRODUCT. WE BELIEVE THE INFORMATION SOURCE IS RELIABLE AND THE INFORMATION IS ACCURATE AS OF THE DATE HEREOF, HOWEVER, ACCURACY OR COMPLETENESS IS NOT GUARANTEED AND NO WARRANTY OF

ANY TYPE IS GRANTED. THE INFORMATION RELATES ONLY TO THIS SPECIFIC PRODUCT. IF COMBINED WITH OTHER MATERIALS, ALL COMPONENT PROPERTIES MUST BE CONSIDERED.

Print MSDS Sheet

Copyright © 2000 MG Industries

POLYSCIENCE -- ETHYLBENZENE, 251C-6

==========

MSDS Safety Information

==========

FSC: 6810
MSDS Date: 03/01/1992
MSDS Num: BTQWW
LIIN: 00N047370
Product ID: ETHYLBENZENE, 251C-6
MFN: 01
Responsible Party
Cage: I0526
Name: POLYSCIENCE
Address: 7800 MERRIMAC AVE
City: NILES IL 60648
Info Phone Number: 312-956-0611
Emergency Phone Number: 312-965-0611
Published: Y

==========

Contractor Summary

==========

Cage: I0526
Name: POLYSCIENCE
Address: 7800 MERRIMAC AVE
City: NILES IL 60714
Phone: 708-965-0611
Cage: 58378
Name: POLYSCIENCE CORP
Address: 7800 N MERRIMAC AVE
Box: 48312
City: NILES IL 60714-3426
Phone: 708-965-0611

==========

Ingredients

==========

Cas: 100-41-4
RTECS #: DA0700000
Name: BENZENE, ETHYL-; (ETHYLBENZENE) (SARA III)
OSHA PEL: 100 PPM; 125 STEL
ACGIH TLV: 100 PPM; 125 STEL
EPA Rpt Qty: 1000 LBS
DOT Rpt Qty: 1000 LBS

==========

Health Hazards Data

==========

LD50 LC50 Mixture: LD50: (ORAL, RAT): 3500 MG/KG
Route Of Entry Inds - Inhalation: YES
Skin: YES
Ingestion: YES
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO
Effects of Exposure: ACUTE: MAY BE HARMFUL BY INHALATION, INGESTION OR SKIN ABSORPTION. CAUSES SKIN IRRITATION. VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES & UPPER RESPIRATORY TRACT. CAN CAUSE CNS DEPRESSION . EXPOSURE CAN CAUSE NAUSEA, HEADACHE &VOMITING. TARGET ORGAN:CNS.
Explanation Of Carcinogenicity: NOT RELEVANT
Signs And Symptions Of Overexposure: SEE HEALTH HAZARDS.
Medical Cond Aggravated By Exposure: NONE SPECIFIED BY MANUFACTURER.
First Aid: EYES: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES. SKIN: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING & SHOE S. INHAL: REMOVE TO FRESH AIR. INGEST: WASH OUT MOUTH WITH WATER PROVIDED PERSON IS

CONSCIOUS. CALL MD. WASH CONTAMINATED CLOTHING BEFORE REUSE.

==========

Handling and Disposal

==========

Spill Release Procedures: EVACUATE AREA. SHUT OFF ALL SOURCES OF IGNIT. WEAR NIOSH/MSHA APPRVD SCBA, RUB BOOTS & HEAVY RUB GLOVES. USE NONSPK TOOLS. COVER W/ACTIVATED CARBON ABSORB, TAKE UP & PLACE IN CLSD CNTNRS. TRANSPORT OU TDOORS. VENT AREA & WASH SPILL SITE AFTER (SUPDAT)

Neutralizing Agent: NONE SPECIFIED BY MANUFACTURER.

Waste Disposal Methods: BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER & SCRUBBER BUT EXERT EXTRA CARE IN IGNITING AS THIS MATERIAL IS HIGHLY FLAMMABLE. OBSERVE ALL FEDERAL, STATE & LOCAL LAWS.

Handling And Storage Precautions: KEEP TIGHTLY CLOSED. KEEP AWAY FROM HEAT, SPARKS & OPEN FLAME. STORE IN A COOL, DRY PLACE. KEEP AWAY FROM SOURCES OF IGNITION. NO SMOKING.

Other Precautions: IRRITATING TO EYES, RESPIRATORY SYSTEM & SKIN.

==========

Fire and Explosion Hazard Information

==========

Flash Point Text: 72.0F,22.2C

Lower Limits: 1%

Upper Limits: 6.7%

Extinguishing Media: CARBON DIOXIDE, DRY CHEMICAL POWDER/APPROP FOAM. WATER MAY BE EFTIVE FOR COOLING, BUT MAY NOT EFFECT EXTINGUISHMENT.

Fire Fighting Procedures: USE NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT (FP N). USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS. WARNING:FLAMMABLE LIQUID.

Unusual Fire/Explosion Hazard: VAPOR MAY TRAVEL CONSIDERABLE DISTANCE TO SOURCE OF IGNITION & FLASH BACK. CONTAINER EXPLOSION MAY OCCUR UNDER FIRE CONDITIONS.

==========

Control Measures

==========

Respiratory Protection: NIOSH/MSHA APPROVED RESPIRATOR.

Ventilation: MECHANICAL EXHAUST REQUIRED.

Protective Gloves: RUBBER GLOVES.

Eye Protection: ANSI APPRVD CHEM WORKER GOGGLES (FP N).

Other Protective Equipment: WEAR SUITABLE PROTECTIVE CLOTHING. ANSI APPRV SAFETY SHOWER & EYE BATH.

Work Hygienic Practices: DO NOT GET IN EYES, ON SKIN, ON CLOTHING. DO NOT BREATHE VAPOR. WASH THOROUGHLY AFTER HANDLING.

Supplemental Safety and Health: VP:10 @ 20C, 19 @ 37.7C. SPILL PROC:MATERIAL PICKUP IS COMPLETE.

==========

Physical/Chemical Properties

==========

HCC: F3

B.P. Text: 277F,136C

M.P/F.P Text: -139F,-95C

Vapor Pres: SUPDAT

Vapor Density: 3.7

Spec Gravity: 0.867

Appearance and Odor: COLORLESS LIQUID.

==========

Reactivity Data

==========

Stability Indicator: YES

Stability Condition To Avoid: NONE SPECIFIED BY MANUFACTURER.

Materials To Avoid: OXIDIZING AGENTS.

Hazardous Decomposition Products: TOXIC FUMES OF: CARBON MONOXIDE, CARBON DIOXIDE.

Hazardous Polymerization Indicator: NO

Conditions To Avoid Polymerization: NOT RELEVANT

==========

Toxicological Information
==========
==========
Ecological Information
==========
==========
MSDS Transport Information
==========
==========
Regulatory Information
==========
==========
Other Information
==========
==========
HAZCOM Label
==========
Product ID: ETHYLBENZENE, 251C-6
Cage: I0526
Assigned IND: Y
Company Name: POLYSCIENCE
Street: 7800 MERRIMAC AVE
City: NILES IL
Zipcode: 60714
Health Emergency Phone: 312-965-0611
Label Required IND: Y
Date Of Label Review: 01/11/1994
Status Code: C
Label Date: 01/11/1994
Origination Code: G
Eye Protection IND: YES
Skin Protection IND: YES
Signal Word: DANGER
Respiratory Protection IND: YES
Health Hazard: Moderate
Contact Hazard: Slight
Fire Hazard: Severe
Reactivity Hazard: None
Hazard And Precautions: DANGER! FLAMMABLE. IRRITANT. KEEP AWAY FROM SOURCES OF IGNITION. ACUTE: CAUSES SKIN IRRITATION. VAPOR OR MIST IS IRRITATING TO THE EYES, MUCOUS MEMBRANES & UPPER RESPIRATORY TRACT. CAN CAUSE CNS DEPRE SSION. EXPOSURE CAN CAUSE NAUSEA, HEADACHE & VOMITING. TARGET ORGAN:CNS. CHRONIC: NONE LISTED BY MANUFACTURER.
==========
Disclaimer (provided with this information by the compiling agencies): This information is formulated for use by elements of the Department of Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

MATERIAL SAFETY DATA SHEET

TOLUENE (AMOCO/TOTAL)

MSDS No. 11699000 ANSI/ENGLISH

1.0 CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: TOLUENE (AMOCO/TOTAL)

MANUFACTURER/SUPPLIER:

Amoco Chemical Company
200 East Randolph Drive
Chicago, Illinois 60601 U.S.A.

EMERGENCY HEALTH INFORMATION:
1 (800) 447-8735

EMERGENCY SPILL INFORMATION:
1 (800) 424-9300 CHEMTREC (USA)

OTHER PRODUCT SAFETY INFORMATION:
(312) 856-3907

2.0 COMPOSITION/INFORMATION ON INGREDIENTS

Component	CAS#	Range % by Wt.
Toluene	108-88-3	80
C9 Isoparaffins		9
C8 Isoparaffins		5
Benzene	71-43-2	2
Xylenes		2
Ethylbenzene	100-41-4	2

(See Section 8.0, "Exposure Controls/Personal Protection", for exposure guidelines)

3.0 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Warning! Flammable. Causes eye irritation. Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis. Inhalation causes headaches, dizziness, drowsiness, nausea, and respiratory irritation. If swallowed, causes headaches, dizziness, drowsiness and nausea, and may lead to unconsciousness. Harmful or fatal if liquid is aspirated into lungs. Danger! Contains Benzene. Cancer hazard. Can cause blood disorders. Harmful when absorbed through the skin.

POTENTIAL HEALTH EFFECTS:

EYE CONTACT: Causes mild eye irritation.

SKIN CONTACT: Prolonged or repeated contact can defat the skin and lead to irritation and/or dermatitis. Harmful when absorbed through the skin. Cancer hazard. Can cause blood disorders.

INHALATION: Inhalation causes headaches, dizziness, drowsiness, nausea, and respiratory irritation. See "Toxicological Information" section (Section 11.0).

INGESTION: If swallowed, causes headaches, dizziness, drowsiness and nausea, and may lead to unconsciousness. Harmful or fatal if liquid is aspirated into lungs.

HMIS CODE: (Health:2) (Flammability:3) (Reactivity:0)

NFPA CODE: (Health:2) (Flammability:3) (Reactivity:0)

4.0 FIRST AID MEASURES

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

SKIN: Wash exposed skin with soap and water. Remove contaminated clothing and thoroughly clean and dry before reuse.

INHALATION: If adverse effects occur, remove to uncontaminated area. Give artificial respiration if not breathing. Get immediate medical attention.

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

5.0 FIRE FIGHTING MEASURES

FLASHPOINT: 40°F(4°C)

UEL: 6.8%

LEL: 1.3%

AUTOIGNITION TEMPERATURE: 997°F (536°C)

FLAMMABILITY CLASSIFICATION: Flammable Liquid.

EXTINGUISHING MEDIA: Agents approved for Class B hazards (e.g., dry chemical, carbon dioxide, foam, steam) or water fog.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Flammable liquid. Vapor may explode if ignited in enclosed area.

FIRE-FIGHTING EQUIPMENT: Firefighters should wear full bunker gear, including a positive pressure self-contained breathing apparatus.

PRECAUTIONS: Keep away from sources of ignition (e.g., heat and open flames). Use with adequate ventilation. Keep container closed.

HAZARDOUS COMBUSTION PRODUCTS: Incomplete burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

6.0 ACCIDENTAL RELEASE MEASURES

Remove or shut off all sources of ignition. Remove mechanically or contain on an absorbent material such as dry sand or earth. Keep out of sewers and waterways.

7.0 HANDLING AND STORAGE

HANDLING: Do not breathe vapors. Do not get in eyes. Do not get on skin or clothing.

STORAGE: Store in flammable liquids storage area. Store away from heat, ignition sources, and open flame in accordance with applicable regulations. Keep container closed.

8.0 EXPOSURE CONTROLS / PERSONAL PROTECTION

EYE: Do not get in eyes. Wear chemical goggles.

SKIN: Avoid skin contact. Wear protective clothing and gloves.

INHALATION: Do not breathe mist or vapor. Use with adequate ventilation. If ventilation is inadequate, use NIOSH certified respirator that will protect against organic vapor and dust/mist.

ENGINEERING CONTROLS: Control airborne concentrations below the exposure guidelines.

EXPOSURE GUIDELINES:

Component	CAS#	Exposure Limits
Toluene	108-88-3	OSHA PEL: 100 ppm (1989); 200 ppm (1971) OSHA STEL: 150 ppm (1989); Not established. (1971) OSHA Ceiling: 300 ppm (1971) ACGIH TLV-TWA: 50 ppm (skin)
C9 Isoparaffins		No exposure limit established
C8 Isoparaffins		No exposure limit established
Benzene	71-43-2	OSHA PEL: 1 ppm OSHA STEL: 5 ppm ACGIH TLV-TWA: 10 ppm
Xylenes		No exposure limit established
Ethylbenzene	100-41-4	OSHA PEL: 100 ppm (1989)(1971) OSHA STEL: 125 ppm(1989); Not established. (1971) ACGIH TLV-TWA: 100 ppm ACGIH TLV-STEL: 125 ppm

9.0 CHEMICAL AND PHYSICAL PROPERTIES

APPEARANCE AND ODOR: Liquid. Clear. Colorless. Aromatic odor.

pH: Not determined.

VAPOR PRESSURE: 26 mm Hg at 25 °C

VAPOR DENSITY: 3.2

BOILING POINT: 231°F(111°C)

MELTING POINT: Not determined.

SOLUBILITY IN WATER: Negligible, below 0.1%.

SPECIFIC GRAVITY (WATER=1): 0.87

EVAPORATION RATE:

10.0 STABILITY AND REACTIVITY

STABILITY: Burning can be started easily.

CONDITIONS TO AVOID: Keep away from ignition sources (e.g. heat, sparks, and open flames).

MATERIALS TO AVOID: None identified.

HAZARDOUS DECOMPOSITION: Burning can produce carbon monoxide and/or carbon dioxide and other harmful products.

HAZARDOUS POLYMERIZATION: Will not occur.

11.0 TOXICOLOGICAL INFORMATION

ACUTE TOXICITY DATA:

EYE IRRITATION: Testing not conducted. See Other Toxicity Data.

SKIN IRRITATION: Testing not conducted. See Other Toxicity Data.

DERMAL LD50: Testing not conducted. See Other Toxicity Data.

ORAL LD50: Testing not conducted. See Other Toxicity Data.

INHALATION LC50: Testing not conducted. See Other Toxicity Data.

OTHER TOXICITY DATA: Specific toxicity tests have not been conducted on this product. Our hazard evaluation is based on information from similar products, the ingredients, technical literature, and/or professional experience.

This stream contains benzene, toluene, xylene and ethylbenzene.

Toluene: Toluene is readily absorbed via inhalation, ingestion, and somewhat through skin contact. In the liquid form, it causes mild skin irritation with a single exposure (PDIS: 4.8/8.0) and dermatitis following repeated exposures. Toluene also produces mild eye irritation (Draise score at 1.0 hour 13.7/110.0) which includes reversible corneal opacity and iritis. It is not a dermal sensitizer. Inhalation in humans has caused mild respiratory irritation (200 ppm), mild eye irritation (400 ppm), and lassitude and slight nausea (600 ppm). Drowsiness occurs at 800 ppm. Very high concentrations may result in paresthesia, dizziness, disturbances of vision, nausea, narcosis, and collapse. It does not induce the hematopoietic effects seen with benzene exposure. Rat oral LD50: 5000 mg/kg; rat inhalation LC50: 4000 ppm (4 hours).

Acute toxicity of benzene results primarily from depression of the central nervous system (CNS). Inhalation of concentrations over 50 ppm can produce headache, lassitude, weariness, dizziness,

drowsiness, or excitation. Exposure to very high levels can result in unconsciousness and death.

Long-term overexposure to benzene has been associated with certain types of leukemia in humans. In addition, the International Agency for Research on Cancer (IARC) and OSHA consider benzene to be a human carcinogen. Chronic exposures to benzene at levels of 100 ppm and below have been reported to cause adverse blood effects including anemia. Benzene exposure can occur by inhalation and absorption through the skin.

Inhalation and forced feeding studies of benzene in laboratory animals have produced a carcinogenic response in a variety of organs, including possibly leukemia, other adverse effects on the blood, chromosomal changes and some effects on the immune system. Exposure to benzene at levels up to 300 ppm did not produce birth defects in animal studies; however, exposure to the higher dosage levels (greater than 100 ppm) resulted in a reduction of body weight of the rat pups (fetotoxicity). Changes in the testes have been observed in mice exposed to benzene at 300 ppm, but reproductive performance was not altered in rats exposed to benzene at the same level.

This product contains xylene. Xylene is readily absorbed through the skin. It is also absorbed when inhaled or ingested. Overexposure to xylene can cause eye and respiratory irritation, drowsiness, headache, fatigue, irritability, and gastrointestinal disturbances. Some liver damage and lung inflammation were seen in chronic studies in guinea pigs but not in rats. In rat reproduction studies, xylenes did not produce birth defects but were toxic to the embryo when toxicity to the mother was produced. In a mouse study, xylenes caused birth defects at doses that threatened the life of the mother. The doses which produced these effects were greatly in excess of the TLV. Rat oral LD50: 4300 mg/kg; rat inhalation LC50: 5000 ppm/4 hours.

Aspiration of this product into the lungs can cause chemical pneumonia and can be fatal. Aspiration into the lungs can occur while vomiting after ingestion of this product. Do not siphon by mouth.

12.0 ECOLOGICAL INFORMATION

Ecological testing has not been conducted on this product.

13.0 DISPOSAL INFORMATION

Disposal must be in accordance with applicable federal, state, or local regulations. Residues and spilled material are hazardous waste due to ignitability. Incineration at an EPA-permitted hazardous waste management facility as required by law. Do not landfill.

14.0 TRANSPORTATION INFORMATION

U.S. DEPT OF TRANSPORTATION

Shipping Name	Toluene
Hazard Class	3
Identification Number	UN1294
Packing Group	II
RQ	RQ

INTERNATIONAL INFORMATION:

Sea (IMO/IMDG)

Shipping Name Not determined.

Air (ICAO/IATA)

Shipping Name Not determined.

European Road/Rail (ADR/RID)

Shipping Name Not determined.

Canadian Transportation of Dangerous Goods

Shipping Name Not determined.

15.0 REGULATORY INFORMATION

CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR Part 302.4): This product is reportable under 40 CFR Part 302.4 because it contains the following substance(s):

Component/CAS Number	Weight %	Component Reportable Quantity (RQ)
Benzene 71-43-2	2	10 lbs.
Ethylbenzene 100-41-4	2	1,000 lbs.
Xylenes	2	100 lbs.
Toluene 108-88-3	80	1,000 lbs.

SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR Part 355): This product is not regulated under Section 302 of SARA and 40 CFR Part 355.

SARA TITLE III SECTIONS 311/312 HAZARDOUS CATEGORIZATION (40 CFR Part

370): This product is defined as hazardous by OSHA under 29 CFR Part 1910.1200(d).

SARA TITLE III SECTION 313 (40 CFR Part 372): This product contains the following substance(s), which is on the Toxic Chemicals List in 40 CFR Part 372:

Component/CAS Number	Weight Percent
Benzene 71-43-2	2
Ethylbenzene 100-41-4	2
Xylenes	2
Toluene 108-88-3	80

U.S. INVENTORY (TSCA): Listed on inventory.

OSHA HAZARD COMMUNICATION STANDARD: Flammable liquid. CNS Effects.

EC INVENTORY (EINECS/ELINCS): In compliance.

JAPAN INVENTORY (MITI): Not determined.

AUSTRALIA INVENTORY (AICS): Not determined.

KOREA INVENTORY (ECL): Not determined.

CANADA INVENTORY (DSL): Not determined.

PHILIPPINE INVENTORY (PICCS): Not determined.

16.0 OTHER INFORMATION

Prepared by:

Environment, Health and Safety Department

Issued: April 14, 1997

Supersedes: April 10, 1997

This material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

This material safety data sheet and the information it contains is offered to you in good faith as accurate. We have reviewed any information contained in this data sheet which we received from sources outside our company. We believe that information to be correct but cannot guarantee its accuracy or completeness. Health and safety precautions in this data sheet may not be adequate for

all individuals and/or situations. It is the user's obligation to evaluate and use this product safely and to comply with all applicable laws and regulations. No statement made in this data sheet shall be construed as a permission or recommendation for the use of any product in a manner that might infringe existing patents. No warranty is made, either express or implied.

MSDS - XYLENES

---

1 - PRODUCT IDENTIFICATION

PRODUCT NAME: XYLENES
FORMULA: C6H4(CH3)2
FORMULA WT: 106.17
CAS NO.: 1330-20-7
NIOSH/RTECS NO.: ZE2100000
COMMON SYNONYMS: DIMETHYLBENZENE; XYLOL
PRODUCT CODES: 9489,9499,5377,9491,9493,9490,X516,9492,9516
EFFECTIVE: 09/11/86
REVISION #03

PRECAUTIONARY LABELLING

BAKER SAF-T-DATA(TM) SYSTEM

HEALTH	-	2	MODERATE
FLAMMABILITY	-	3	SEVERE (FLAMMABLE)
REACTIVITY	-	0	NONE
CONTACT	-	2	MODERATE

HAZARD RATINGS ARE 0 TO 4 (0 = NO HAZARD; 4 = EXTREME HAZARD).

LABORATORY PROTECTIVE EQUIPMENT

SAFETY GLASSES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER

PRECAUTIONARY LABEL STATEMENTS

WARNING
FLAMMABLE
CAUSES IRRITATION
HARMFUL IF SWALLOWED OR INHALED

KEEP AWAY FROM HEAT, SPARKS, FLAME. AVOID CONTACT WITH EYES, SKIN, CLOTHING. AVOID BREATHING VAPOR. KEEP IN TIGHTLY CLOSED CONTAINER. USE WITH ADEQUATE VENTILATION. WASH THOROUGHLY AFTER HANDLING. IN CASE OF FIRE, USE ALCOHOL FOAM, DRY CHEMICAL, CARBON DIOXIDE - WATER MAY BE INEFFECTIVE. FLUSH SPILL AREA WITH WATER SPRAY.

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

---

2 - HAZARDOUS COMPONENTS

COMPONENT	%	CAS NO.
M-XYLENE	40-65	108-38-3
O-XYLENE	15-20	95-47-6
P-XYLENE	0-20	106-42-3
ETHYL BENZENE	15-25	100-41-4

---

3 - PHYSICAL DATA

BOILING POINT: 137 C (279 F)
MELTING POINT: -48 C (-54 F)
SPECIFIC GRAVITY: 0.87
VAPOR PRESSURE(MM HG): 5.1
VAPOR DENSITY(AIR=1): 3.7
EVAPORATION RATE: 0.7

(H2O=1) (BUTYL ACETATE=1)

SOLUBILITY(H2O): NEGLIGIBLE (LESS THAN 0.1 %) % VOLATILES BY VOLUME: 100

APPEARANCE & ODOR: COLORLESS LIQUID WITH SWEET PLEASANT ODOR.

---

4 - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (CLOSED CUP 27 C (80 F) NFPA 704M RATING: 2-3-0

FLAMMABLE LIMITS: UPPER - 7.0 % LOWER - 1.1 %

FIRE EXTINGUISHING MEDIA
USE ALCOHOL FOAM, DRY CHEMICAL OR CARBON DIOXIDE.
(WATER MAY BE INEFFECTIVE.)

SPECIAL FIRE-FIGHTING PROCEDURES
FIREFIGHTERS SHOULD WEAR PROPER PROTECTIVE EQUIPMENT AND SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN POSITIVE PRESSURE MODE. MOVE CONTAINERS FROM FIRE AREA IF IT CAN BE DONE WITHOUT RISK. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL.

UNUSUAL FIRE & EXPLOSION HAZARDS
VAPORS MAY FLOW ALONG SURFACES TO DISTANT IGNITION SOURCES AND FLASH BACK. CLOSED CONTAINERS EXPOSED TO HEAT MAY EXPLODE. CONTACT WITH STRONG OXIDIZERS MAY CAUSE FIRE.

TOXIC GASES PRODUCED
CARBON MONOXIDE, CARBON DIOXIDE

---

5 - HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE (TLV/TWA): 435 MG/M3 (100 PPM)

SHORT-TERM EXPOSURE LIMIT (STEL): 655 MG/M3 (150 PPM)

PERMISSIBLE EXPOSURE LIMIT (PEL): 435 MG/M3 (100 PPM)

TOXICITY: LD50 (ORAL-RAT)(MG/KG) - 4300
LD50 (IPR-MOUSE)(MG/KG) - 1.6
LD50 (SCU-RAT)(MG/KG) - 1700

CARCINOGENICITY: NTP: NO IARC: NO Z LIST: NO OSHA REG: NO

EFFECTS OF OVEREXPOSURE
INHALATION AND INGESTION ARE HARMFUL AND MAY BE FATAL.
INHALATION OF VAPORS MAY CAUSE HEADACHE, NAUSEA, VOMITING, DIZZINESS, DROWSINESS, IRRITATION OF RESPIRATORY TRACT, AND LOSS OF CONSCIOUSNESS.
INHALATION OF VAPORS MAY CAUSE NARCOSIS.
CONTACT WITH SKIN OR EYES MAY CAUSE IRRITATION.
INGESTION MAY CAUSE NAUSEA, VOMITING, HEADACHES, DIZZINESS, GASTRO-INTESTINAL IRRITATION, BLURRED VISION, LOWERING OF BLOOD PRESSURE.
CHRONIC EFFECTS OF OVEREXPOSURE MAY INCLUDE KIDNEY AND/OR LIVER DAMAGE.

TARGET ORGANS
CENTRAL NERVOUS SYSTEM, EYES, SKIN, GI TRACT, BLOOD, LIVER AND KIDNEYS

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE
NONE IDENTIFIED

ROUTES OF ENTRY
INGESTION, INHALATION, SKIN CONTACT, EYE CONTACT, ABSORPTION

EMERGENCY AND FIRST AID PROCEDURES
CALL A PHYSICIAN.
IF SWALLOWED, DO NOT INDUCE VOMITING.
IF INHALED, REMOVE TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN.
IN CASE OF CONTACT, IMMEDIATELY FLUSH EYES OR SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES.

---

6 - REACTIVITY DATA

STABILITY: STABLE HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID: HEAT, FLAME, OTHER SOURCES OF IGNITION

INCOMPATIBLES: STRONG OXIDIZING AGENTS

DECOMPOSITION PRODUCTS: CARBON MONOXIDE, CARBON DIOXIDE

---

7 - SPILL AND DISPOSAL PROCEDURES

STEPS TO BE TAKEN IN THE EVENT OF A SPILL OR DISCHARGE
WEAR SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE CLOTHING.
SHUT OFF IGNITION SOURCES; NO FLARES, SMOKING OR FLAMES IN AREA. STOP LEAK IF YOU CAN DO SO WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. TAKE UP WITH SAND OR OTHER NON-COMBUSTIBLE ABSORBENT MATERIAL AND PLACE INTO CONTAINER FOR LATER DISPOSAL. FLUSH AREA WITH WATER.
J. T. BAKER SOLUSORB(R) SOLVENT ADSORBENT IS RECOMMENDED FOR SPILLS OF THIS PRODUCT.

DISPOSAL PROCEDURE
DISPOSE IN ACCORDANCE WITH ALL APPLICABLE FEDERAL, STATE, AND LOCAL ENVIRONMENTAL REGULATIONS.

EPA HAZARDOUS WASTE NUMBER: U239 (TOXIC WASTE)

---

8 - PROTECTIVE EQUIPMENT

VENTILATION: USE GENERAL OR LOCAL EXHAUST VENTILATION TO MEET TLV REQUIREMENTS.

RESPIRATORY PROTECTION: RESPIRATORY PROTECTION REQUIRED IF AIRBORNE CONCENTRATION EXCEEDS TLV. AT CONCENTRATIONS UP TO 1000 PPM, A CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE IS RECOMMENDED. ABOVE THIS LEVEL, A SELF-CONTAINED BREATHING APPARATUS IS RECOMMENDED.

EYE/SKIN PROTECTION: SAFETY GOGGLES, UNIFORM, APRON, NITRILE GLOVES ARE RECOMMENDED.

---

9 - STORAGE AND HANDLING PRECAUTIONS

SAF-T-DATA(TM) STORAGE COLOR CODE: RED (FLAMMABLE)

SPECIAL PRECAUTIONS

BOND AND GROUND CONTAINERS WHEN TRANSFERRING LIQUID. KEEP CONTAINER TIGHTLY CLOSED. STORE IN A COOL, DRY, WELL-VENTILATED, FLAMMABLE LIQUID STORAGE AREA.

---

10 - TRANSPORTATION DATA AND ADDITIONAL INFORMATION

DOMESTIC (D.O.T.)

PROPER SHIPPING NAME	XYLENE
HAZARD CLASS	FLAMMABLE LIQUID
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID
REPORTABLE QUANTITY	1000 LBS.

INTERNATIONAL (I.M.O.)

PROPER SHIPPING NAME	XYLENES
HAZARD CLASS	3.3
UN/NA	UN1307
LABELS	FLAMMABLE LIQUID

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

NOTE: CHEMTREC, CANUTEC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

TRICHLOROETHYLENE

MSDS Number: T4940 --- *Effective Date: 09/14/00*

1. Product Identification

Synonyms: Trichloroethene; TCE; acetylene trichloride; Ethinyl trichloride
CAS No.: 79-01-6
Molecular Weight: 131.39
Chemical Formula: C2HCl3
Product Codes:
J.T. Baker: 5376, 9454, 9458, 9464, 9473, 9474
Mallinckrodt: 8598, 8600, 8633

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Trichloroethylene	79-01-6	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN

IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.

J.T. Baker SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 3 - Severe (Cancer Causing)
Flammability Rating: 1 - Slight
Reactivity Rating: 1 - Slight
Contact Rating: 2 - Moderate
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: Blue (Health)

Potential Health Effects

Inhalation:
Vapors can irritate the respiratory tract. Causes depression of the central nervous system with symptoms of visual disturbances and mental confusion, incoordination, headache, nausea, euphoria, and dizziness. Inhalation of high concentrations could cause unconsciousness, heart effects, liver effects, kidney effects, and death.
Ingestion:
Cases irritation to gastrointestinal tract. May also cause effects similar to inhalation. May cause coughing, abdominal pain, diarrhea, dizziness, pulmonary edema, unconsciousness. Kidney failure can result in severe cases. Estimated fatal dose is 3-5 ml/kg.
Skin Contact:
Cause irritation, redness and pain. Can cause blistering. Continued skin contact has a defatting action and can produce rough, dry, red skin resulting in secondary infection.
Eye Contact:
Vapors may cause severe irritation with redness and pain. Splashes may cause eye damage.
Chronic Exposure:
Chronic exposures may cause liver, kidney, central nervous system, and peripheral nervous system effects. Workers chronically exposed may exhibit central nervous system depression, intolerance to alcohol, and increased cardiac output. This material is linked to mutagenic effects in humans. This material is also a suspect carcinogen.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, cardiovascular disorders, impaired liver or kidney or respiratory function, or central or peripheral nervous system disorders may be more susceptible to the effects of the substance.

---

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.

---

5. Fire Fighting Measures

Fire:
Autoignition temperature: 420C (788F)
Flammable limits in air % by volume:
lel: 8; uel: 12.5
Explosion:
A strong ignition source, e. g., a welding torch, can produce ignition. Sealed containers may rupture when heated.
Fire Extinguishing Media:
Use water spray to keep fire exposed containers cool. If substance does ignite, use CO_2, dry chemical or foam.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Combustion by-products include phosgene and hydrogen chloride gases. Structural firefighters' clothing provides only limited protection to the combustion products of this material.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! US Regulations (CERCLA) require reporting

spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Isolate from any source of heat or ignition. Isolate from incompatible substances. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Trichloroethylene:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA), 200 ppm (Ceiling),
300 ppm/5min/2hr (Max)

-ACGIH Threshold Limit Value (TLV):
50 ppm (TWA) 100 ppm (STEL);
listed as A5, not suspected as a human carcinogen.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Breathing air quality must meet the requirements of the OSHA respiratory protection standard (29CFR1910.134). This substance has poor warning properties. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact. Neoprene is a recommended material for personal protective equipment.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Chloroform-like odor.
Solubility:
Practically insoluble in water. Readily miscible in organic solvents.
Specific Gravity:
1.47 @ 20C/4C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
87C (189F)
Melting Point:
-73C (-99F)
Vapor Density (Air=1):
4.5
Vapor Pressure (mm Hg):
57.8 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Will slowly decompose to hydrochloric acid when exposed to light and moisture.
Hazardous Decomposition Products:
May produce carbon monoxide, carbon dioxide, hydrogen chloride and phosgene when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong caustics and alkalis, strong oxidizers, chemically active metals, such as barium, lithium, sodium, magnesium, titanium and beryllium, liquid oxygen.
Conditions to Avoid:
Heat, flame, ignition sources, light, moisture, incompatibles

---

11. Toxicological Information

Toxicological Data:
Trichloroethylene: Oral rat LD50: 5650 mg/kg; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
This material has been linked to mutagenic effects in humans.

```
--------\Cancer Lists\-------------------------------------------------------
                                        ---NTP Carcinogen---
Ingredient                              Known    Anticipated    IARC Category
-------------------------------------   -----    -----------    -------------
Trichloroethylene (79-01-6)              No          Yes            2A
```

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the soil, this material is expected to quickly evaporate. When released to water, this material is expected to quickly evaporate. This material has an experimentally-determined bioconcentration factor (BCF) of less than 100. This material is not expected to significantly bioaccumulate. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life between 1 and 10 days.
Environmental Toxicity:
The LC50/96-hour values for fish are between 10 and 100 mg/l. This material is expected to be slightly toxic to aquatic life.

---

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

---

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710

Packing Group: III
Information reported for product/size: 5GL

International (Water, I.M.O.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 5GL

International (Air, I.C.A.O.)

Proper Shipping Name: TRICHLOROETHYLENE
Hazard Class: 6.1
UN/NA: UN1710
Packing Group: III
Information reported for product/size: 5GL

---

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                        TSCA  EC   Japan  Australia
----------------------------------------------    ----  ---  -----  ---------
Trichloroethylene (79-01-6)                        Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                          --Canada--
Ingredient                                        Korea  DSL   NDSL  Phil.
----------------------------------------------    -----  ---   ----  -----
Trichloroethylene (79-01-6)                        Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                             -SARA 302-    ------SARA 313------
Ingredient                                   RQ    TPQ     List  Chemical Catg.
----------------------------------------    ---   -----   ----  --------------
Trichloroethylene (79-01-6)                  No    No      Yes        No

--------\Federal, State & International Regulations - Part 2\----------------
                                                         -RCRA-    -TSCA-
Ingredient                                   CERCLA     261.33     8(d)
----------------------------------------    ------     ------    ------
Trichloroethylene (79-01-6)                  100        U228       No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: No          (Pure / Liquid)
```

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: No information found.
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

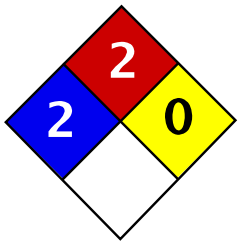
16. Other Information

NFPA Ratings: Health: **2** Flammability: **1** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS HEART, CENTRAL NERVOUS SYSTEM, LIVER AND KIDNEYS. CAUSES SEVERE SKIN IRRITATION. CAUSES IRRITATION TO EYES AND RESPIRATORY TRACT. SUSPECT CANCER HAZARD. MAY CAUSE CANCER. Risk of cancer depends on level and duration of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep away from heat and flame.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician. Note to physician: Do not administer adrenaline or epinephrine to a victim of chlorinated solvent poisoning.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8, 11.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A

PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

Prepared by: Strategic Services Division
Phone Number: (314) 539-1600 (U.S.A.)



Health	2
Fire	2
Reactivity	0
Personal Protection	E

Material Safety Data Sheet
Naphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Naphthalene

Catalog Codes: SLN1789, SLN2401

CAS#: 91-20-3

RTECS: QJ0525000

TSCA: TSCA 8(b) inventory: Naphthalene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C10H8

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Naphthalene	91-20-3	100

Toxicological Data on Ingredients: Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].
The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:
Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:
After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:
Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. WARNING: It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:
Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:
Risks of explosion of the product in presence of mechanical impact: Not available.
Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:
Flammable solid.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:
Flammable solid.
Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:
Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:
Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:
Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:
Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:
Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:
Israel: TWA: 10 (ppm)
TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995]
TWA: 52 STEL: 79 (mg/m3) from ACGIH [1995]
Australia: STEL: 15 (ppm)
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:
Partially dispersed in hot water, methanol, n-octanol.
Very slightly dispersed in cold water.
See solubility in methanol, n-octanol.

Solubility:
Partially soluble in methanol, n-octanol.
Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:
WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.
Acute oral toxicity (LD50): 490 mg/kg [Rat].
Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].
Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].
The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Other Toxic Effects on Humans:
Very hazardous in case of ingestion.
Hazardous in case of inhalation.
Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

BOD5 and COD: Not available.

Products of Biodegradation:
Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Rhode Island RTK hazardous substances: Naphthalene
Pennsylvania RTK: Naphthalene
Florida: Naphthalene
Minnesota: Naphthalene
Massachusetts RTK: Naphthalene
TSCA 8(b) inventory: Naphthalene
TSCA 8(a) PAIR: Naphthalene
TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87
SARA 313 toxic chemical notification and release reporting: Naphthalene: 1%
CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

Other Regulations:
OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):
CLASS B-4: Flammable solid.
CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).
CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R36- Irritating to eyes.
R40- Possible risks of irreversible effects.
R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed.
R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation.
R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:30 PM

Last Updated: 10/11/2005 01:30 PM

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall ScienceLab.com be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if ScienceLab.com has been advised of the possibility of such damages.

MATERIAL SAFETY DATA SHEET

Date Printed: 05/10/2006
Date Updated: 01/31/2006
Version 1.3

Section 1 - Product and Company Information

Product Name	METHOXYCHLOR
Product Number	M1501
Brand	SIGMA
Company	Sigma-Aldrich
Address	3050 Spruce Street SAINT LOUIS MO 63103 US
Technical Phone:	800-325-5832
Fax:	800-325-5052
Emergency Phone:	314-776-6555

Section 2 - Composition/Information on Ingredient

Substance Name	CAS #	SARA 313
METHOXYCHLOR	72-43-5	Yes

Formula C16H15Cl3O2

Synonyms Benzene, 1,1'-(2,2,2-trichloroethylidene)bis(4-methoxy- * 2,2-Bis(p-anisyl)-1,1,1-trichloroethane * 1,1-Bis(p-methoxyphenyl)-2,2,2-trichloroethane * 2,2-Bis(p-methoxyphenyl)-1,1,1-trichloroethane * Dianisyltrichlorethane * 2,2-Di-p-anisyl-1,1,1-trichloroethane * Dimethoxy-DDT * p,p'-Dimethoxydiphenyltrichloroethane * 2,2-Di-(p-methoxyphenyl)-1,1,1-trichloroethane * Di(p-methoxyphenyl)-trichloromethyl methane * DMDT * p,p'-Dwumetoksydwufenylotrojchloroetan (Polish) * ENT 1,716 * Ethane, 2,2-bis(p-anisyl)-1,1,1-trichloro- * Higalmetox * Marlate * Methoxcide * Methoxychlor (ACGIH:OSHA) * p,p'-Methoxychlor * Methoxychlor 2 EC * Methoxy-DDT * Metoksychlor (Polish) * Metox * Mezox K * Moxie * NCI-C00497 * OMS 466 * RCRA waste number U247 * 1,1,1-Trichlor-2,2-bis(4-methoxy-phenyl)-aethan (German) * 1,1,1-Trichloro-2,2-bis(p-anisyl)ethane * 1,1'-(2,2,2-Trichloroethylidene)bis(4-methoxybenzene) *

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Harmful.
Harmful by inhalation, in contact with skin and if swallowed.
Limited evidence of a carcinogenic effect.
Possible mutagen. Reproductive hazard. Target organ(s): Nerves. Kidneys.

For additional information on toxicity, please refer to Section 11.

Section 4 - First Aid Measures

ORAL EXPOSURE
If swallowed, wash out mouth with water provided person is conscious. Call a physician.

INHALATION EXPOSURE
If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

EYE EXPOSURE
Assure adequate flushing of the eyes by separating the eyelids with fingers.

Section 5 - Fire Fighting Measures

FLASH POINT
N/A

AUTOIGNITION TEMP
N/A

FLAMMABILITY
N/A

EXTINGUISHING MEDIA
Suitable: Water spray. Carbon dioxide, dry chemical powder, or appropriate foam.

FIREFIGHTING
Protective Equipment: Wear self-contained breathing apparatus and protective clothing to prevent contact with skin and eyes.
Specific Hazard(s): Emits toxic fumes under fire conditions.

EXPOSURE HAZARD(S)
Material: Harmful solid.

Section 6 - Accidental Release Measures

PROCEDURE(S) OF PERSONAL PRECAUTION(S)
Wear self-contained breathing apparatus, rubber boots, and heavy rubber gloves.

METHODS FOR CLEANING UP
Sweep up, place in a bag and hold for waste disposal. Avoid raising dust. Ventilate area and wash spill site after material pickup is complete.

Section 7 - Handling and Storage

HANDLING
User Exposure: Avoid inhalation. Do not get in eyes, on skin, on clothing. Avoid prolonged or repeated exposure.

STORAGE
Suitable: Keep tightly closed. Store in a cool dry place.

Section 8 - Exposure Controls / PPE

ENGINEERING CONTROLS
Use only in a chemical fume hood. Safety shower and eye bath.

PERSONAL PROTECTIVE EQUIPMENT
Other: Wear appropriate government approved respirator, chemical-resistant gloves, safety goggles, other protective clothing.

GENERAL HYGIENE MEASURES
Wash thoroughly after handling. Wash contaminated clothing before reuse.

EXPOSURE LIMITS, RTECS

Country	Source	Type	Value
USA	ACGIH	TWA	10 MG/M3
USA	MSHA Standard-air	TWA	10 MG/M3
USA	OSHA.	PEL	8H TWA 15 MG/M3, TOTAL DUST
New Zealand OEL			
Remarks: check ACGIH TLV			
USA	NIOSH		(0.07 MG/M3 LOQ)

EXPOSURE LIMITS

Country	Source	Type	Value
Poland		NDS	10 MG/M3
Poland		NDSCh	-
Poland		NDSP	-

Section 9 - Physical/Chemical Properties

Appearance N/A

Property	Value	At Temperature or Pressure
Molecular Weight	345.66 AMU	
pH	N/A	
BP/BP Range	N/A	
MP/MP Range	86.0 - 88.0 °C	
Freezing Point	N/A	
Vapor Pressure	N/A	
Vapor Density	N/A	
Saturated Vapor Conc.	N/A	
SG/Density	N/A	
Bulk Density	N/A	
Odor Threshold	N/A	
Volatile%	N/A	
VOC Content	N/A	
Water Content	N/A	
Solvent Content	N/A	
Evaporation Rate	N/A	
Viscosity	N/A	
Surface Tension	N/A	
Partition Coefficient	N/A	
Decomposition Temp.	N/A	
Flash Point	N/A	
Explosion Limits	N/A	
Flammability	N/A	
Autoignition Temp	N/A	
Refractive Index	N/A	
Optical Rotation	N/A	
Miscellaneous Data	N/A	
Solubility	N/A	

N/A = not available

Section 10 - Stability and Reactivity

STABILITY
Materials to Avoid: Strong oxidizing agents.

HAZARDOUS DECOMPOSITION PRODUCTS
Hazardous Decomposition Products: Carbon monoxide, Carbon dioxide, Hydrogen chloride gas.

Section 11 - Toxicological Information

ROUTE OF EXPOSURE
Multiple Routes: May cause irritation. Harmful if swallowed, inhaled, or absorbed through skin.

TARGET ORGAN(S) OR SYSTEM(S)
Kidneys. Central nervous system.

TOXICITY DATA

Oral
Human
6430 mg/kg
LDLO

Oral
Rat
1855 mg/kg
LD50
Remarks: Behavioral:Excitement. Behavioral:Convulsions or effect on seizure threshold. Behavioral:Ataxia.

Skin
Rat
> 6000 mg/kg
LD50

Oral
Mouse
510 mg/kg
LD50
Remarks: Behavioral:Convulsions or effect on seizure threshold. Behavioral:Ataxia. Behavioral:Excitement.

Oral
Rabbit
> 6000 mg/kg
LD50

Skin
Rabbit
> 6000 mg/kg
LD50

Intraperitoneal
Hamster
500 MG/KG
LD50

Oral

Duck
> 2000 mg/kg
LD50

CHRONIC EXPOSURE - CARCINOGEN

Species: Rat
Route of Application: Oral
Dose: 18200 MG/KG
Exposure Time: 2Y
Frequency: C
Result: Tumorigenic:Carcinogenic by RTECS criteria. Tumorigenic Effects: Prostate tumors.

Species: Mouse
Route of Application: Oral
Dose: 56700 MG/KG
Exposure Time: 90W
Frequency: C
Result: Tumorigenic:Carcinogenic by RTECS criteria. Lungs, Thorax, or Respiration:Tumors. Tumorigenic Effects: Testicular tumors.

Species: Dog
Route of Application: Oral
Dose: 383 GM/KG
Exposure Time: 3Y
Frequency: C
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Liver:Tumors.

Species: Rat
Route of Application: Oral
Dose: 41 GM/KG
Exposure Time: 2Y
Frequency: C
Result: Tumorigenic:Equivocal tumorigenic agent by RTECS criteria. Liver:Multiple effects. Lungs, Thorax, or Respiration:Other changes.

Species: Mouse
Route of Application: Oral
Dose: 62622 MG/KG
Exposure Time: 2Y
Frequency: C
Result: Liver:Tumors. Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Species: Rat
Route of Application: Oral
Dose: 80 GM/KG
Exposure Time: 2Y
Frequency: C
Result: Liver:Tumors. Tumorigenic:Carcinogenic by RTECS criteria. Tumorigenic Effects: 0varian tumors.

Species: Rat
Route of Application: Oral
Dose: 72800 MG/KG
Exposure Time: 2Y
Frequency: C
Result: Liver:Tumors. Tumorigenic:Carcinogenic by RTECS criteria.

Species: Rat
Route of Application: Oral
Dose: 87360 MG/KG
Exposure Time: 2Y
Frequency: C
Result: Tumorigenic:Carcinogenic by RTECS criteria. Liver:Tumors.

Species: Rat
Route of Application: Oral
Dose: 10920 MG/KG
Exposure Time: 1Y
Frequency: C
Result: Blood:Lymphomas including Hodgkin's disease.
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

Species: Rat
Route of Application: Oral
Dose: 45500 MG/KG
Exposure Time: 1Y
Frequency: C
Result: Blood:Lymphomas including Hodgkin's disease.
Tumorigenic:Equivocal tumorigenic agent by RTECS criteria.

IARC CARCINOGEN LIST

Rating: Group 3

NTP CARCINOGEN LIST

Rating: No evidence.
Species: Mouse/rat
Route: Feed

ACGIH CARCINOGEN LIST

Rating: A4

CHRONIC EXPOSURE - TERATOGEN

Species: Rat
Dose: 2 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Specific Developmental Abnormalities: Musculoskeletal system.

Species: Mouse
Dose: 3 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Embryo or Fetus: Fetal death.

CHRONIC EXPOSURE - MUTAGEN

Species: Rat
Dose: 150 UMOL/L
Cell Type: liver
Mutation test: DNA damage

Species: Rat
Route: Oral

Dose: 28 GM/KG
Exposure Time: 10W
Mutation test: sperm

Species: Mouse
Dose: 10 MG/L (+S9)
Cell Type: lymphocyte
Mutation test: Mutation in microorganisms

Species: Mouse
Dose: 2 MG/L
Cell Type: fibroblast
Mutation test: Morphological transformation.

Species: Mouse
Route: Oral
Dose: 6 MG/KG
Exposure Time: 50D
Mutation test: Cytogenetic analysis

Species: Hamster
Dose: 10 MG/L
Cell Type: Embryo
Mutation test: Morphological transformation.

Species: Hamster
Route: Intraperitoneal
Dose: 50 MG/KG
Mutation test: Cytogenetic analysis

CHRONIC EXPOSURE - REPRODUCTIVE HAZARD
Result: Overexposure may cause reproductive disorder(s) based on tests with laboratory animals.

Species: Rat
Dose: 66 GM/KG
Route of Application: Oral
Exposure Time: (33D MALE)
Result: Paternal Effects: Testes, epididymis, sperm duct. Paternal Effects: Prostate, seminal vessicle, Cowper's gland, accessory glands.

Species: Rat
Dose: 2 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Effects on Fertility: Litter size (e.g.; # fetuses per litter; measured before birth). Effects on Fertility: Post-implantation mortality (e.g., dead and/or resorbed implants per total number of implants). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Rat
Dose: 4250 MG/KG
Route of Application: Oral
Exposure Time: (42D PRE-21D POST)
Result: Effects on Newborn: Physical. Maternal Effects: Ovaries, fallopian tubes. Effects on Newborn: Delayed effects.

Species: Rat
Dose: 10625 MG/KG
Route of Application: Oral

Exposure Time: (42D PRE-21D POST)
Result: Effects on Fertility: Mating performance (e.g., # sperm positive females per # females mated; # copulations per # estrus cycles). Maternal Effects: Uterus, cervix, vagina. Effects on Fertility: Female fertility index (e.g., # females pregnant per # sperm positive females; # females pregnant per # females mated).

Species: Rat
Dose: 7 GM/KG
Route of Application: Unreported
Exposure Time: (70D MALE)
Result: Paternal Effects: Spermatogenesis (including genetic material, sperm morphology,motility, and count).

Species: Rat
Dose: 2100 MG/KG
Route of Application: Unreported
Exposure Time: (21D PRE)
Result: Maternal Effects: Oogenesis.

Species: Rat
Dose: 9100 MG/KG
Route of Application: Unreported
Exposure Time: (70D MALE/21D PRE)
Result: Effects on Fertility: Mating performance (e.g., # sperm positive females per # females mated; # copulations per # estrus cycles).

Species: Mouse
Dose: 1 GM/KG
Route of Application: Oral
Exposure Time: (20D PREG)
Result: Maternal Effects: Ovaries, fallopian tubes.

Species: Mouse
Dose: 900 MG/KG
Route of Application: Oral
Exposure Time: (6-8D PREG)
Result: Maternal Effects: Uterus, cervix, vagina.

Species: Mouse
Dose: 2 GM/KG
Route of Application: Oral
Exposure Time: (6-15D PREG)
Result: Maternal Effects: Parturition.

Species: Mouse
Dose: 800 MG/KG
Route of Application: Intraperitoneal
Exposure Time: (1D PREG)
Result: Effects on Fertility: Pre-implantation mortality (e.g., reduction in number of implants per female; total number of implants per corpora lutea). Effects on Embryo or Fetus: Fetotoxicity (except death, e.g., stunted fetus).

Species: Mouse
Dose: 99 MG/KG
Route of Application: Subcutaneous
Exposure Time: (5-7D PREG)
Result: Effects on Newborn: Behavioral. Effects on Newborn: Biochemical and metabolic.

Species: Rabbit
Dose: 330 MG/KG
Route of Application: Oral
Exposure Time: (6-27D PREG)
Result: Maternal Effects: Other effects. Specific Developmental Abnormalities: Musculoskeletal system.

Section 12 - Ecological Information

No data available.

Section 13 - Disposal Considerations

APPROPRIATE METHOD OF DISPOSAL OF SUBSTANCE OR PREPARATION
Dissolve or mix the material with a combustible solvent and burn in a chemical incinerator equipped with an afterburner and scrubber. Observe all federal, state, and local environmental regulations.

Section 14 - Transport Information

DOT
Proper Shipping Name: Toxic solids, organic, n.o.s.
UN#: 2811
Class: 6.1
Packing Group: Packing Group III
Hazard Label: Toxic substances.
PIH: Not PIH

IATA
Proper Shipping Name: Toxic solid, organic, n.o.s.
IATA UN Number: 2811
Hazard Class: 6.1
Packing Group: III

Section 15 - Regulatory Information

EU ADDITIONAL CLASSIFICATION
Symbol of Danger: Xn
Indication of Danger: Harmful.
R: 20/21/22-40
Risk Statements: Harmful by inhalation, in contact with skin and if swallowed. Limited evidence of a carcinogenic effect.
S: 7-23-36/37/39-45
Safety Statements: Keep container tightly closed. Do not breathe fumes. Wear suitable protective clothing, gloves, and eye/face protection. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

US CLASSIFICATION AND LABEL TEXT
Indication of Danger: Harmful.
Risk Statements: Harmful by inhalation, in contact with skin and if swallowed. Limited evidence of a carcinogenic effect.
Safety Statements: Keep container tightly closed. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Do not breathe fumes. Wear suitable protective clothing, gloves, and eye/face protection.
US Statements: Possible mutagen. Reproductive hazard. Target organ(s): Nerves. Kidneys.

UNITED STATES REGULATORY INFORMATION

SARA LISTED: Yes
NOTES: This product is subject to SARA section 313 reporting requirements.

CANADA REGULATORY INFORMATION
WHMIS Classification: This product has been classified in accordance with the hazard criteria of the CPR, and the MSDS contains all the information required by the CPR.
DSL: Yes
NDSL: No

Section 16 - Other Information

DISCLAIMER
For R&D use only. Not for drug, household or other uses.

WARRANTY
The above information is believed to be correct but does not purport to be all inclusive and shall be used only as a guide. The information in this document is based on the present state of our knowledge and is applicable to the product with regard to appropriate safety precautions. It does not represent any guarantee of the properties of the product. Sigma-Aldrich Inc., shall not be held liable for any damage resulting from handling or from contact with the above product. See reverse side of invoice or packing slip for additional terms and conditions of sale.
Copyright 2006 Sigma-Aldrich Co. License granted to make unlimited paper copies for internal use only.

Back

Chem Service Inc.
Material Safety Data Sheet
Date: Tuesday, December 27, 2005
Last Revised Date: 3/23/05

SECTION 1 - CHEMICAL PRODUCT and COMPANY IDENTIFICATION

Catalog Number: F112
Description: Arochlor 1260
Other Name(s): Polychlorinated biphenyl-60% chlorine

Supplied by CHEM SERVICE, Inc. PO BOX 599, WEST CHESTER, PA 19381 (610)-692-3026
EMERGENCY PHONE: 1-610-692-3026

SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

CAS No.: 11096-82-5
Description: Arochlor 1260
EINECS No.: Not Available
Hazard Symbols: Not Available

SECTION 3 - HAZARDS IDENTIFICATION

Contact lenses should not be worn in the laboratory.All chemicals should be considered hazardous - Avoid direct physical contact!
Suspected Carcinogen-may produce cancer. Can cause chloracne. Can cause eye irritation. Vapors can cause severe eye inflammation and swelling of adjoining tissues. Can cause gastro-intestinal disturbances. Can cause discoloration of nails/skin/etc. Exposure can cause liver damage. Can cause delayed adverse health effects.
This chemical is considered to be a CARCINOGEN by the state of California. This chemical is considered to cause DEVELOPMENTAL TOXICITY by the state of California.

SECTION 4 - FIRST AID MEASURES

An antidote is a substance intended to counteract the effect of a poison. It should be administered only by a physician or trained emergency personnel. Medical advice can be obtained from a POISON CONTROL CENTER.
In case of contact: Flush eyes continuously with water for 15-20 minutes. Flush skin with water for 15-20 minutes. If no burns have occurred-use soap and water to cleanse skin. If inhaled remove patient to fresh air. Administer oxygen if patient is having difficulty breathing. If patient has stopped breathing administer artificial respirations. If patient is in cardiac arrest administer CPR. Continue life supporting measures until medical assistance has arrived. Remove and wash contaminated clothing. If patient is exhibiting signs of shock - Keep warm and quiet. Contact Poison Control Center immediately if necessary. Do not administer liquids or induce vomiting to an unconscious or convulsing person. Induce vomiting if swallowed. If patient is vomiting-watch closely to make sure airway does not become obstructed by vomit. Get medical attention if necessary.

SECTION 5 - FIRE AND EXPLOSION DATA

Flash Point: 200< C This is a flammable chemical.
Extinguishing Media: Carbon dioxide, dry chemical powder or spray.
Upper Explosion Limit: Not Available
Lower Explosion Limit: Not Available
Autoignition Temperature: Not Available
NFPA Hazard Rating: Not Available

SECTION 6 - ACCIENTAL RELEASE MEASURES

Spills or leaks: Evacuate area. Wear appropriate OSHA regulated equipment. Ventilate area. Sweep up and place in an appropriate container. Hold for disposal.

Wash contaminated surfaces to remove any residues. Remove contaminated cloting and wash before reuse.

SECTION 7 - HANDLING AND STORAGE

Handling:
This chemical should be handled only in a hood. Eye shields should be worn.
Use appropriate OSHA/MSHA approved safety equipment.
Avoid contact with skin, eyes and clothing. Avoid ingestion and inhalation
Wash thoroughly after handling.

Storage:
Store in a cool dry place. Store only with compatible chemicals.
Keep tightly closed.

SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION
OSHA PEL (TWA): Not Available
ACGIH TLV (TWA): Not Available
ACGIH TLV (STEL): Not Available

Personal Protective Equipment
Eyes: Wear Safety Glasses.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to minimize contact with skin.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 requirements must be followed whenever workplace conditions warrant a respirator's use.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Color: Light Yellow
Phase: Amorphous solid
Melting Point: Not Available
Boiling Point: 385-420 C
Specific Gravity: 1.57
Vapor Density: <0.1 mm@38
Vapor Preasure: Not Available
Solubility in Water: Insoluble (immiscible)
Odor: Not Available
Evaporation Rate (Butyl acetate=1): Not Available

SECTION 10 - STABILITY AND REACTIVITY

Incompatible with strong oxidizing agents. Incompatible with active metals (e.g. Sodium).

SECTION 11 - TOXICOLOGY INFORMATION

RTECS: TQ1362000
Oral Rat or Mouse LD50: 1315mg/kg
Dermal Rat or Mouse LD50: Not Available
Rat or Mouse LC50 : Not Available

Carcinogenicity
OSHA: No
IARC: Yes
NTP: Yes
ACGIH: No
NIOSH: No
Other: Yes
This chemical is considered to be a CARCINOGEN by the state of California. This chemical is considered to cause DEVELOPMENTAL TOXICITY by the state of California.

SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity: Not Available
Environmental Fate: Not Available

SECTION 13 - DISPOSAL CONSIDERATIONS

DISPOSAL: Burn in a chemicals incinerator equipped with an afterburner and scrubber.

SECTION 14 - TRANSPORTATION INFORMATION

UN Number: UN2315
Class: 9
Packing Group: II
Proper Shipping Name: Polychlorinated biphenyls

SECTION 15 - REGULATORY INFORMATION

European Labeling in Accordance with EC Directives
Hazard Symbols: Not Available

Risk Phrases: Not Available

Safety Phrase: Not Available

SECTION 16 - OTHER INFORMATION

The above information is believed to be correct on the date it was last revised and must not be considered all inclusive. The information has been obtained only by a search of available literature and is only a guide for handling the chemicals. OSHA regulations require that if other hazards become evident, an upgraded MSDS must be made available to the employee within three months. RESPONSIBILITY for updates lies with the employer and not with CHEM SERVICE, Inc.

Persons not specifically and properly trained should not handle this chemical or its container. This product is furnished FOR LABORATORY USE ONLY! Our products may NOT BE USED as drugs, cosmetics, agricultural or pesticide products, food additives or as household chemicals.

This Material Safety Data Sheet (MSDS) is intended only for use with Chem Service, Inc. products and should not be relied on for use with materials from any other supplier even if the chemical name(s) on the product are identical! Whenever using an MSDS for a solution or mixture the user should refer to the MSDS for every component of the solution or mixture. Chem Service warrants that this MSDS is based upon the most current information available to Chem Service at the time it was last revised. THIS WARRANTY IS EXCLUSIVE, AND CHEM SERVICE, INC. MAKES NO OTHER WARRANTY,
EXPRESSED OR IMPLIED, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR ANY PARTICULAR PURPOSE. This MSDS is provided gratis and CHEM SERVICE, INC. SHALL NOT BE LIABLE FOR ANY INCIDENTAL, CONSEQUENTIAL OR CONTINGENT DAMAGES.

Copyright © 2000-2004 Chem Service, Inc. All rights reserved except that this MSDS may be printed for the use of a customer or prospective customer of Chem Service, Inc provided the entire MSDS is printed. The MSDS may not be placed in any database or otherwise stored or distributed in electronic or any other form.

This product is furnished FOR LABORATORY USE ONLY!

Alaska Department of Labor and Workforce Development
Labor Standards and Safety
3301 Eagle Street/PO Box 107022
Anchorage, Alaska 99510-7022
(907) 269-4955

PHYSICAL AGENT DATA SHEET

COLD STRESS

HYPOTHERMIA

FROSTBITE

Alaska Department of Labor and Workforce Development
Labor Standards and Safety
3301 Eagle Street/PO Box 107022
Anchorage, 99510-7022
(907) 269-4955

Physical Agent Data Sheet

HYPOTHERMIA

Hypothermia is a temperature-related disorder. Therefore it is necessary to understand human physiology as it pertains to temperature stress.

Man is considered a tropical animal. Normal functioning of the human animal requires a body temperature of 37 degrees Celsius (98.6 degrees Fahrenheit). The body can self-compensate for small upward or downward variations in temperature through the activation of built-in thermoregulatory system, controlled by temperature sensors in the skin. The response to an upward variation in body temperature is the initiation of perspiration, which moves moisture from the body tissues to the body surface. When the moisture reaches the surface it evaporates, carrying with it a quantity of heat. The response to downward variation in body temperature is shivering, which is the body's attempt to generate heat. Shivering is an involuntary contraction and expansion of muscle tissue occurring on a large scale. This muscle action creates heat through friction.

THE DISORDER

Hypothermia is defined as a core temperature of the body less than 35 degrees Celsius (95 degrees Fahrenheit). Hypothermia is also considered the clinical state of sub-normal temperature when the body is unable to generate sufficient heat to efficiently maintain functions.

Many variables contribute to the development of hypothermia. Age, health, nutrition, body size, exhaustion, exposure, duration of exposure, wind, temperature, and wetness of body or clothes, medication and intoxicants (alcohol) may decrease heat production or increase heat loss.

The healthy individual's compensatory responses to heat loss via conduction, convection, radiation, evaporation and respiration may be overwhelmed by exposure. Medication may also interfere with heat generation or regulation. Children will have different symptoms than adults depending on the severity of the cold.

Definitions:

Conduction: Direct transfer of heat by contact with a cooler object
Convection: Cool air moving across the surface of the body, heat is transferred to the cool air warming the air.
Radiation: Heat radiated outward from the warm body to the cooler environment.
Evaporation: The process of losing heat from the body by vaporization of water from the body surface.
Respiration: Inspired air raised to body temperature that is then exhaled.

Each of these causes of heat loss can play a large or small role in the development of hypothermia, *depending on clothing, head cover, wind, weather, etc.*

Once hypothermia develops, two body compartments, the shell (skin) and the core (the remainder of the body) share the heat deficit. The skin constitutes about 10% of a 150 pound mass.

Hypothermia can be recognized as impending, mild, moderate and severe. Below is a brief description of the various stages:

> Impending: Person's core temperature has decreased to 96.8 degrees Fahrenheit (36 degrees C). Individual will increase exercise in an attempt to warm up. The skin may become pale, numb and waxy. Muscles can become tense and shivering may begin. Fatigue and weakness may begin to show.
>
> Mild: Core temperature has dropped to 93.2 degrees Fahrenheit (34 degrees C). Intense, uncontrolled shivering has begun. The individual may still be alert and able to help self; however, movements become less coordinated and the coldness is *causing some pain and discomfort.*
>
> Moderate: Core temperature has dropped to 87.7 degrees Fahrenheit (31 degrees C). Shivering slows or stops completely, mental confusion and apathy set in. Speech is slow and slurred. Breathing becomes slow and shallow followed by with drowsiness.
>
> Severe: Core temperature is below 87.7 degrees Fahrenheit (31 degrees C). Skin may have a blue-gray color; iris of the eyes may be dilated, may appear drunk, denies problems and may refuse help. This leads to a gradual loss of consciousness. There may be little or no breathing, lack of response to verbal or painful stimuli and may appear dead.

(Temperatures used in above descriptions are approximate. Symptoms may start at different temperatures depending on the individual and circumstances.)

Treatment Preface

Always act on the fact that **"no one is dead until warm and dead."**

Think ABCD – Airway, Breathing, Circulation and Degrees.

In sudden exposure to cold water there is a greater chance for resuscitation with sudden submersion and with prolonged exposure to cold water. Quick onset of hypothermia, easy to reverse. Slow onset, the harder to reverse the process.

The sole consensus regarding prehospital treatment is that all patients at some point should be rewarmed. Core first then extremities. The best way to rewarm the core is by warm air and warm IV solutions.

Initial management principles emphasize prevention of further heat loss, rewarnimg as soon as is safely possible at a "successful" rate and rewarming the core before the shell, in an attempt to avoid inducing lethal side effects during rewarming. This treatment goal is important, since hypothermia itself may not be fatal above 77 degrees Fahrenheit (25 degrees C) core temperature.

The person must be handled very carefully and gently and not be allowed to exercise, as muscular action can pump cold blood to the heart.

Cold blood going to the heart can cause ventricular fibrillation

Hypothermia causes several reactions within the body as it tries to protect itself and retain its heat. The most important of these is vasoconstriction, which halts blood flow to the extremities in order to conserve heat in the core of the body.

Treatment of Hypothermia

Be able to recognize the symptoms of hypothermia in yourself and others. The victim may deny he/she is in trouble. Even mild symptoms demand attention:

> Impending: Seek or build a shelter to get the person out of the cold, windy, wet environment.
> Start a fire or get a cookstove going to provide warmth. Provide the person with a hot drink (no alcohol, coffee or tea). Insulate the person with extra clothes.
>
> Mild: Remove or insulate the patient from the cold ground, protect from the wind, eliminate evaporative heat loss with a vapor barrier. Keep the head and neck covered, remove to a warm environment. Consider covering patient's mouth and nose with a light fabric to reduce heat loss through breathing. Provide the person with a warm, sweetened drink (no alcohol, coffee or tea) and some high-energy food. Limited exercise may help to generate some internal heat, but it depletes energy reserves.
>
> Moderate: Remove the person from the cold environment, keeping the head and neck covered. Apply mild heat (comfortable to your elbow) to the head, neck chest, armpits and groin of the patient. Use hot water bottles, wrapped Thermo-pads, or warm moist towels. Do not place the hot water bottles next to the skin, wrap in cloth first. Offer sips of warm, sweetened liquids (no alcohol, coffee or tea) if the patient is fully conscious, beginning to rewarm and is able to swallow. Patient should be seen by a physician ASAP.
>
> Severe: Place person in a prewarmed sleeping bag with one or two other people. Skin to skin contact in the areas of the chest (ribs) and neck is effective. Exhale warm air near the patient's nose and mouth, or introduce steam into the area. Keep the patient awake. Apply mild heat, with the aim of stopping temperature drop, not rewarming. If patient has lost consciousness be very gentle, as the heart is extremely sensitive. Check for pulse at the carotid artery. If there is any breathing *or pulse, no matter how faint, do not give CPR but keep a very close watch for* changes in breathing and heart beat (vital signs). If no pulse can be found begin CPR immediately, stopping only when the heart begins to beat or the person applying CPR cannot carry on any longer without endangering themselves.

In all of the above, it is imperative that the victim be removed out of the wet and windy weather, remove all wet clothing, and put the victim into dry clothing and a warm sleeping bag.

Recent research has concluded that the safest and most effective method of treating hypothermia is through inhalation rewarming. Equipment is available; however, out in the field, alternative methods which have been described must be used where equipment is lacking.

Alaska Department of Labor and Workforce Development
Labor Standards and Safety
301 Eagle Street, PO Box 107022
Anchorage, Alaska 99510-7022
(907) 269-4955

Physical Agent Data Sheet

FROSTBITE

GENERAL INFORMATION

Frostbite is the freezing of some part of the body. Fingers, toes, and even whole arms and legs can be lost as a result of frostbite. Injuries can happen at home, in the cities and also in more isolated areas of the State.

In extreme cold it is important to prevent heat loss from as many areas of the body as possible. Exposed limbs and head are major areas of heat loss, but keeping enough blood flowing to the hands and feet is the key to preventing frostbite. The trunk and the head should be warm enough so that the brain is able to command the blood vessels in the hands and feet to open up and keep the extremities warm.

ESSENTIAL CLOTHING

This includes thermal underwear, insulated footwear or mukluks with liners; double mittens and a parka, preferably down-filled with a good ruff. A parka that can be opened at the neck to allow heat to escape will prevent overheating and sweating. Quilted or skin pants are necessary if no warm shelter is immediately available. Tight cloths, especially tight gloves or tight boots should not be worn. The tightness interferes with good circulation in the hands and feet. If there is a reduction in blood flow to these areas, then the possibility of frostbite increases as the extremity cools down.

FACTORS LEADING TO FROSTBITE

Tall thin persons are more likely to get frostbite than those of stocky build.

People in poor physical condition are more susceptible than those in good health.

Certain diseases slow down the blood flow in the hands and feet especially in elderly people.

Heavy smokers often have poor circulation in the vital organs and decreased circulation in the arms and legs.

Children and elderly people who cannot produce large amounts of body heat for long periods of time can experience a lowering of deep body temperature and frostbite.

Alcohol causes the blood vessels to dilate (become larger). This leads to a false sense of warmth. This also leads to faster loss of heat from the body because of dilation of blood vessels. More important, people act with poor judgment after drinking.

Don't touch cold metal with bare or wet hands. You will freeze to the metal and tear the skin if pulled away without proper thawing with warm water, heat or urine.

Be careful when handling gasoline, kerosene or liquids other than water. Contact with bare skin in cold temperatures can cause instant frostbite.

> *Frostbite is more likely to occur when you are injured, frightened or careless.*

HOW TO RECOGNIZE FROSTBITE

Exposed parts of the body should be inspected routinely. This is done best with a partner. Just before freezing, the skin, especially the face with its many blood vessels, becomes bright red. Then small patches of white appear, as freezing actually occurs.

The loss of the sensations of touch, pressure and pain may occur without awareness of any numbness or other sensations. Therefore, it is important to test these sensations often. Wear clothing that is not restrictive but loose.

There may be no pain associated with frostbite if the freezing or temperature change is slow. Only if there is a rapid change in temperature does the body register pain.

The skin becomes less elastic. This is best noted in the finger pads. If touched or squeezed the pads will remain pitted. Any further cooling will result in frostbite.

Serious freezing is most common in the feet, followed by the hands and then the head (nose, ears). This is because of the poorer circulation in the feet and hands. Also with the poorer circulation there is in conjunction less sensation to these areas. Exposed head areas are less likely to freeze because of a better blood supply.

EARLY TREATMENT OF FROSTBITE

Early rewarming.

Thawing and refreezing should always be avoided.

Limbs should be rewarmed in stirred water just above normal body temperature (100 – 105 degrees Fahrenheit). Always use a thermometer to get accurate temperatures. Never try to thaw in cold water or snow. Since feeling is lost, fires, stoves, exhaust pipes, etc., should never be used. Serious damage to the skin could result.

Rewarming is an acutely painful experience and medication to alleviate pain should be given if available. After thawing, a deep aching pain may persist for several days, depending upon severity of the injury. Pain is a good sign; this tells us that the nerves are still alive and functioning.

A dull purple color, swelling and/or blistering of the extremity after thawing indicate a more serious injury and require medical attention.

SUMMARY

Poor circulation and poor production of body heat will lower resistance to frostbite.

Most cases of frostbite occur as a result of lack of knowledge, careless preparation, unavoidable accident, or the effects of alcohol on judgment. Forethought can prevent injury.

If freezing does occur, proper rewarming in warm water will give maximum benefit. The injured limb should be handled gently and a medical judgment made of the extent of injury and the need for further treatment.

Labor Standards and Safety Division

Physical Agent Data Sheet (PADS) - Hand-Arm Vibration

Description
Health Hazards
Vibration Syndrome
Vibration Induced White Finger
Stages
Carpal Tunnel Syndrome
Preventing Hand-Arm Vibration Diseases
Recommended Exposure Limits

Description

Hand-arm vibration is caused by the use of vibrating hand-held tools, such as pneumatic jack hammers, drills, gas powered chain saws, and electrical tools such as grinders. The nature of these tools involves vibration (a rapid back and forth type of motion) which is transmitted from the tool to the hands and arms of the person holding the tool.

Health Hazards

Vibration Syndrome and Vibration-Induced White Finger (VWF) are the major health hazards related to the use of vibrating tools. Carpal Tunnel Syndrome is another health problem that has been linked in one study to the use of smaller hand-held vibrating tools.

^back to the top

Vibration Syndrome

Vibration Syndrome is a group of symptoms related to the use of vibrating tools and includes -some or all of the following: muscle weakness, muscle fatigue, pain in the arms and shoulders, and vibration-induced white finger. Many researchers believe that other symptoms--headaches, irritability, depression, forgetfulness, and sleeping problems--should also be included in descriptions of Vibration Syndrome.

Vibration-Induced White Finger

Vibration-Induced White Finger (VWF), also known as "Dead Finger" or "Dead Hand" is the result of impaired circulation (poor blood supply in the fingers, caused by the prolonged use of vibrating tools. VWF may appear after only several months on the job, or may not appear until twenty to forty years on the job.

The harmful health effects of vibrating tools are related to the length of time that a worker has been using vibrating tools and to the frequency of the vibration (how fast the tool goes back and forth). The longer a person uses a vibrating tool, and the faster the tool vibrates, the greater the risk of health effects. The length of the initial symptom-free period of vibration exposure (i.e., from first exposure to the first appearance of a white finger) is known as the latent interval. It is related to the intensity of the vibration - the shorter the latent period, the more severe the resulting VWF if vibration exposure continues.

Temporary tingling or numbness during or soon after use of a vibrating hand tool is not considered to be VWF, however tingling and numbness in the fingers lasting more than an hour after finishing work may indicate early stages of VWF. Table 1 lists the stages that Vibration White Finger may progress through if exposure continues.

^back to the top

Table 1
Stages of Vibration White Finger
(Taylor-Pelmear System)

Stage	Condition of Fingers	Work & Social Interference
00	No tingling, numbness or blanching of fingers	No complaints
OT	Intermittent tingling	No interference with activities
ON	*Intermittent numbness*	*No interference with activities*
TN	Intermittent tingling and numbness	No interference with activities
1	Blanching of a fingertip with or without tingling and/or numbness	No interference with activities
2	Blanching of one or more fingers beyond tips, usually during winter	Possible interference with activities outside work, no interference at work
3	Extensive blanching of fingers; frequent episodes in both summer and winter	Definite interference at work, at home, and with social activities; restriction of hobbies
4	Extensive blanching of most fingers; frequent episodes in both summer and winter	Occupation usually changed because of severity of signs and symptoms

The technical name for VWF is Raynaud's Syndrome of Occupational Origin. Raynaud's Syndrome may also occur in people who do not use vibrating hand-held tools. Several different kinds of medical illnesses can cause Raynaud's Syndrome. Raynaud's Syndrome also appears in some people who are otherwise entirely healthy.

It is important that people with Raynaud's Syndrome avoid the extensive use

of vibrating tools because they can develop the most severe complications of VWF very quickly.

Many of the symptoms of Vibration Syndrome will disappear shortly after a worker stops using the types of tools which transmit vibration to the hands and arms. Fatigue and muscular pain in the arms and shoulders will generally disappear. In the early stages, if a worker stops using vibrating tools, VWF will not get any worse and may get slightly better.

Carpal Tunnel Syndrome

Carpal Tunnel Syndrome (CTS) is a group of symptoms in the hand which arise from pressure on one of the nerves which passes through the palm side of the wrist. The early symptoms are similar to the early symptoms of white finger and consist of tingling in the fingers. For the most part only the thumb, index, and middle fingers are affected in CTS. Later, symptoms can progress to numbness. Pain in the wrist and fingers may also develop. CTS may occur in people using small hand tools like pneumatic screwdrivers. Carpal Tunnel Syndrome also occurs among people having repetitive motion of the wrist or fingers, such as using a cash register, or picking fish from a net; or with forceful motion of the wrist, such as in using a wrench. Pinching or flexing with the wrist bent upwards, downwards, or sideways increases the occurrence of CTS.

The symptoms of CTS are frequently worse at night and a person may be awakened from sleep by pain or the feeling of pins and needles in fingers, hand or wrist.

Carpal Tunnel Syndrome may improve if diagnosed in the early stages and exposure to the type of activity which caused it is stopped. In moderate cases most of the symptoms of CTS can be relieved by a surgical operation which relieves the pressure on the nerve which causes the CTS symptoms. If the surgery is performed too late, only some of the symptoms may be relieved. In very severe cases the symptoms are irreversible and may include weakness of the hand due to loss of muscle function.

^back to the top

Preventing Hand-Arm Vibration Diseases

Job Modification to Reduce Vibration Exposure

Wherever possible, jobs should be redesigned to minimize the use of hand-held vibrating tools. Where job redesign is not feasible, ways to reduce tool vibration should be found. Where practical, substitute a manual tool for a vibrating tool. Whenever possible, high vibration tools should be replaced by improved, low vibration tools designed to absorb vibration before it reaches the handgrip.

Determine vibration exposure times and introduce work breaks to avoid constant, continued vibration exposure. A worker who is using a vibrating tool continuously should take a 10 minute break after each hour of using the tool.

Medical Evaluation

Workers whose occupations place them at risk for developing VWF should have pre-employment physicals and thereafter should be checked at least annually by doctors who know about the diagnosis and treatment of VWF. Diagnostic tests which can be used include plethysmography, arteriography, skin thermography, and sensory tests,, such as two point discrimination depth sense, pinprick touch and temperature sensation. X-rays may also be useful.

Workers that have a past history of abnormalities in blood circulation and especially workers who have Raynaudis Syndrome should not be permitted to use vibrating hand-held tools. Workers who have moderate to severe symptoms of VWF should be reassigned to work which removes them from further direct exposure to vibrating tools.

If workers develop symptoms of tingling or numbness, or if their fingers occasionally become white or blue, or painful especially when cold, they should be examined by a doctor who knows about the diagnosis and treatment of VWF and CTS.

Work Practices

Workers using vibrating hand-held tools should wear multiple layers of warm gloves and should wear anti-vibration gloves whenever possible. Before starting the job, warm the hands. This is especially important when it is cold. workers using vibrating tools should not allow the hands to become chilled. If the hands of a worker using vibrating tools become wet or chilled, he should dry them and put on dry, warm gloves before resuming exposure to vibration. Workers exposed to cold should dress adequately to keep the whole body warm because low body temperature can make a worker more susceptible to VWF.

A worker using a vibrating hand-held tool should let the tool do the work by grasping it as lightly as possible, consistent with safe work practice. The tighter the tool is held, the more vibration is transmitted to the fingers and hand. The tool should rest on a support or on the workpiece as much as possible. The tool should be operated only when necessary and at the minimum speed (and impact force) to reduce vibration exposure.

Tools should be regularly maintained to keep vibration to a minimum. Keeping chisels and chainsaws sharp, for example, will reduce vibration. Using new grinder wheels will also reduce vibration.

Education

Employees who use or will be using vibrating hand-held tools should receive training about the hazards of vibration and they should be taught how to minimize the ill effects of vibration.

Smokers are much more susceptible to VWF that non-smokers, and the VWF in smokers is usually more severe, therefore workers who use vibrating hand-held tools should not smoke.

^back to the top

Recommended Exposure Limits

Table 2 contains the American Conference of Governmental Industrial Hygienists (ACGIH) recommendations on the limits for exposure of the hand to vibration.

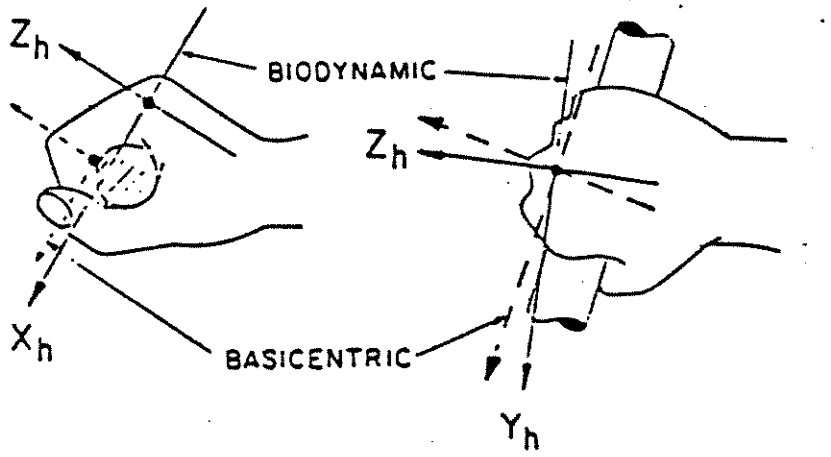
Table 2
Threshold Limit Values for Exposure of the Hand to Vibration in Either X_h, Y_h, Z_h, Directions

Total Daily Exposure Duration[a]	Values of the Dominant,[b] Frequency-Weighted, rms, Component Acceleration Which Shall Not be Exceeded a_k, (a_{keg})	
	m/s^2	g[c]
4 hours and less than 8	4	0.40
2 hours and less than 4	6	0.61
1 hour and less than 2	8	0.81
less than 1 hour	12	1.22

[a] The total time vibration enters the hand per day, whether continuously or intermittently.

[b] Usually one axis of vibration is dominant over the remaining two axes. If one or more vibration axes exceeds the Total Daily Exposure then the TLV has been exceeded.

[c] g = 9.81 m/s . d



Biodynamic and basicentric coordinate systems for the hand, showing the directions of the acceleration components (ISO 5349 and ANSI S3.34-1986).

^back to the top

Labor Standards and Safety || Labor and Workforce Development
Job Seeker || Employer || Worker

Labor Standards and Safety Division

Physical Agent Data Sheet (PADS) - Heat Stress

Other PADS:
Cold Stress
Hand-Arm Vibration
Heat
Ionizing Radiation (PDF)
Lasers
Noise
Radio Waves
Ultraviolet Radiation

Description
Health Effects—Heat Disorders
Medical Conditions Aggravated By Exposure to Heat
Preventing Heat Disorders
Acclimatization
Lessening Stressful Conditions
Thermal Conditions in the Workplace
Rest Areas
Drinking Water

Description

Heat stress is caused by working in hot environments like laundries, bakeries, or around boilers or incinerators. Four environmental factors affect the amount of heat stress felt by employees in hot work areas: temperature, humidity, radiant heat (such as from the sun or a furnace), and air velocity. How well or how poorly an individual reacts to heat stress is dependent on personal characteristics such as age, weight, fitness, medical condition, and acclimatization.

The body has several methods of maintaining the proper internal body temperature. When internal body temperature increases, the circulatory system reacts by increasing the amount of blood flow to the skin so the extra heat can by given off.

Sweating is another means the body uses to maintain stable internal temperatures. When sweat evaporates, cooling results. However, sweating is effective only if the humidity level is low enough to permit evaporation and if the fluids and salts lost are replaced.

^back to the top

Health Effects—Heat Disorders

Heat stroke, the most serious health problem for workers in hot environments is caused by the failure of the body's internal mechanism to regulate its core temperature. Sweating stops and the body can no longer rid itself of excess heat. Signs include: mental confusion, delirium, loss of consciousness, convulsions or coma; a body temperature of 106 degrees Fahrenheit or higher; and hot dry skin which may be red, mottled or bluish. Victims of heat stroke will die unless treated promptly. While medical help should be called, the victim

must be removed immediately to a cool area and his/her clothing soaked with cool water. He/she should be fanned vigorously to increase cooling. Prompt first aid can prevent permanent injury to the brain and other vital organs.

Heat exhaustion develops as a result of loss of fluid through sweating when a worker has failed to drink enough fluids or take in enough salt, or both. The worker with heat exhaustion still sweats, but experiences extreme weakness or fatigue, giddiness, nausea, or headache. The skin is clammy and moist, the complexion pale or flushed, and the body temperature normal or slightly higher. Treatment is usually simple: the victim should rest in a cool place and drink salted liquids. Salt tablets are not recommended. Severe cases involving victims who vomit or lose consciousness may require longer treatment under medical supervision.

Heat cramps, painful spasms of the bone muscles, are caused when workers drink large quantities of water but fail to replace their bodies' salt loss. Tired muscles, those used for performing the work, are usually the ones most susceptible to cramps. Cramps may occur during or after working hours and may be relieved by taking salted liqids by mouth or saline solutions intravenously for quicker relief, if medically determined to be required.

Fainting may be a problem for the worker unacclimatized to a hot environment who simply stands still in the heat. Victims usually recover quickly after a brief period of lying down. Moving around, rather that standing still, will usually reduce the possibility of fainting.

Heat rash, also known as prickly heat, may occur in hot and humid environments where sweat is not easily removed from the surface of the skin by evaporation. When extensive or complicated by infection, heat rash can be so uncomfortable that it inhibits sleep and impairs a worker's performance or even results in temporary total disability. It can be prevented by showering, resting in a cool place, and allowing the skin to dry.

^back to the top

Medical Conditions Aggravated By Exposure to Heat

Persons with heart or circulatory diseases or those who are on "low salt" diets should consult with their physicians prior to working in hot environments.

Preventing Heat Disorders

One of the best ways to reduce heat stress on workers is to minimize heat in the workplace. However, there are some work environments where heat production is difficult to control, such as when furnaces or sources of steam or water are present in the work area, or when the workplace itself is outdoors and exposed to varying warm weather conditions.

Acclimatization

Humans are, to a large extent, capable of adjusting to the heat. This adjustment to heat, under normal circumstances, usually takes about 5 to 7

days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

On the first day of work in a hot environment, the body temperature, pulse rate, and general discomfort will be higher. With each succeeding daily exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body becomes acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

Gradual exposure to heat gives the body time to become accustomed to higher environmental temperatures. Heat disorders in general are more likely to occur among workers who have not been given time to adjust to working in the heat or among workers who have been away from hot environments and who have gotten accustomed to lower temperatures. Hot weather conditions of the summer are likely to affect the worker who is not acclimatized to heat. Likewise, workers who return to work after a leisurely vacation or extended illness may be affected by the heat in the work environment. Whenever such circumstances occur, the worker should be gradually reacclimatized to the hot environment.

^back to the top

Lessening Stressful Conditions

Many industries have attempted to reduce the hazards of heat stress by introducing engineering controls, training workers in the recognition and prevention of heat stress, and implementing work-rest cycles. Heat stress depends, in part, on the amount of heat the worker's body produces while a job is being performed. The amount of heat produced during hard, steady work is much higher than that produced during intermittent or light work. Therefore, one way of reducing the potential for heat stress is to make the job easier or lessen its duration by providing adequate rest time. Mechanization of work procedures can often make it possible to isolate workers from the heat source (perhaps in an air-conditioned booth) and increase overall productivity by decreasing the time needed for rest. Another approach to reducing the level of heat stress is the use of engineering controls which include ventilation and heat shielding.

Number and Duration of Exposures

Rather than be exposed to heat for extended periods of time during the course of a job, workers should, wherever possible, be permitted to distribute the workload evenly over the day and incorporate work-rest cycles. Work-rest cycles give the body an opportunity to get rid of excess heat, slow down the production of internal body heat, and provide greater blood flow to the skin.

Workers employed outdoors are especially subject to weather changes. A hot spell or a rise in humidity can create overly stressful conditions. The following practices can help to reduce heat stress:

Postponement of nonessential tasks

Permit only those workers acclimatized to heat to perform the more strenuous tasks, or

Provide additional workers to perform the task keeping in mind that all workers should have the physical capacity to perform the task and that they should be accustomed to the heat.

^back to the top

Thermal Conditions in the Workplace

A variety of engineering controls can be introduced to minimize exposure to heat. For instance, improving the insulation on a furnace wall can reduce its surface temperature and the temperature of the area around it. In a laundry room, exhaust hoods installed over those sources releasing moisture will lower the humidity in the work area. In general, the simplest and least expensive methods of reducing heat and humidity can be accomplished by:

Opening windows in hot work areas,

Using fans, or

Using other methods of creating airflow such as exhaust ventilation or air blowers.

Rest Areas

Providing cool rest areas in hot work environments considerably reduces the stress of working in those environments. There is no conclusive information available on the ideal temperature for a rest area. However, a rest area with a temperature near 76 degrees Fahrenheit appears to be adequate and may even feel chilly to a hot, sweating worker, until acclimated to the cooler environment. The rest area should be as close to the workplace as possible. Individual work periods should not be lengthened in favor of prolonged rest periods. Shorter but frequent work-rest cycles are the greatest benefit to the worker.

^back to the top

Drinking Water

In the course of a day's work in the heat, a worker may produce as much as 2 to 3 gallons of sweat. Because so many heat disorders involve excessive dehydration of the body, it is essential that water intake during the workday be about equal to the amount of sweat produced.

Most workers exposed to hot conditions drink less fluids than needed because of an insufficient thirst drive. A worker, therefore, should not depend on thirst to signal when and how much to drink. Instead, the worker should drink 5 to 7 ounces of fluids every 15 or 20 minutes to replenish the necessary fluids in the body. There is no optimum temperature of drinking water, but most people tend not to drink warm or very cold fluids as readily as they will cool ones.

whatever the temperature of the water, it must be palatable and readily available to the worker. Individual drinking cups should be provided, never use a common drinking cup.

Heat acclimatized workers lose much less salt in their sweat than do workers who are not adjusted to the heat. The average American diet contains sufficient salt for acclimatized workers even when sweat production is high. If, for some reason, salt replacement is required, the best way to compensate for the loss is to add a little extra salt to the food. Salt tablets should not be used. CAUTION: PERSONS WITH HEART PROBLEMS OR THOSE ON A "LOW SODIUM" DIET WHO WORK IN HOT ENVIRONMENTS SHOULD CONSULT A PHYSICIAN ABOUT WHAT TO DO UNDER THESE CONDITIONS.

^back to the top

Protective Clothing

Clothing inhibits the transfer of heat between the body and the surrounding environment. Therefore, in hot jobs where the air temperature is lower than skin temperature, wearing clothing reduces the body's ability to lose heat into the air.

When air temperature is higher than skin temperature, clothing helps to prevent the transfer of heat from the air to the body. The advantage of wearing clothing, however, may be nullified if the clothes interfere with the evaporation of sweat.

In dry climates, adequate evaporation of sweat is seldom a problem. In a dry work environment with very high air temperatures, the wearing of clothing could be an advantage to the worker. The proper type of clothing depends on the specific circumstance. Certain work in hot environments may require insulated gloves, insulated suits, reflective clothing, or infrared reflecting face shields. For extremely hot conditions, thermally-conditioned clothing is available. One such garment carries a self-contained air conditioner in a backpack, while another is connected to a compressed air source which feeds cool air into the jacket or coveralls through a vortex tube. Another type of garment is a plastic jacket which has pockets that can be filled with dry ice or containers of ice.

^back to the top

Recommended Exposure Limits

These Threshold Limit Values (TLVS) refer to heat stress conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse health effects. The TLVs shown in Table I are based on the assumption that nearly all acclimatized, fully clothed workers with adequate water and salt intake should be able to function effectively under the given working conditions without exceeding a deep body temperature of 38 degrees Celsius (100.4 degrees Fahrenheit).

Since measurement of deep body temperature is impractical for monitoring the

workers' heat load, the measurement of environmental factors is required which most nearly correlate with deep body temperature and other physiological responses to heat. At the present time, Wet Bulb Globe Temperature Index (WBGT) is the simplest and most suitable technique to measure the environmental factors. WBGT values are calculated by the following equations:

Outdoors with solar load: WBGT = 0.7 NWB + 0.2 GT + 0.1 DB

Indoors or Outdoors with no solar load: WBGT = 0.7 NWB + 0.3 GT

Where: WBGT = Wet Bulb Globe Temperature Index
NWB = Natural Wet Bulb Temperature
DB = Dry Bulb Temperature
GT = Globe Temperature

The determination of WBGT requires the use of a black globe thermometer, a natural (static) wet-bulb thermometer, and a dry bulb thermometer.

Higher heat exposures that shown in Table I are permissible if the workers have been undergoing medical surveillance and it has been established that they are more tolerant at work in heat than the average worker. Workers should not be permitted to continue their work when their deep body temperature exceeds 38.0 degrees Celsius (100.4 degrees Fahrenheit).

^back to the top

Table 1
Permissible Heat Exposure Threshold Limit Values
(Values are given in degrees Centigrade WBGT (Fahrenheit)]

	Work Load		
Work- Rest Regimen	**Light**	**Moderate**	**Heavy**
Continuous work	30.0 (86.0)	26.7 (80.1)	25.0 (77.0)
75% Work, 25% Rest/Hour	30.6 (87.1)	28.0 (82.4)	25.9 (78.6)
50% Work, 50% Rest/Hour	31.4 (88.5)	29.4 (85.0)	27.9 (82.2)
25% Work, 75% Rest/Hour	32.2 (90.0)	31.1 (88.0)	30.0 (86.0)

References

1. "Working in Hot Environments," US Department of Health and Human Services, Public Health Service, Centers for Disease Control, National Institute for Occupational Safety and Health, 1986.

2. "Threshold Limit Values and Biological Exposure Indices for 1986 - 1987," American Conference of Governmental Industrial, Hygienists, 6500 Glenway Avenue, Building D-7, Cincinnati, OH 45211-4438.

^back to the top

Labor Standards & Safety Division
Alaska Department of Labor & Workforce Development
Occupational Safety and Health

Revised: September 2004

Physical Agent Data Sheet (PADS)
- Ionizing Radiation

- Description
- Occupations with Exposure to Ionizing Radiation
- Health Effects
- Emergency Procedures
  - Spills
  - Loss of a sealed source
  - Rupture or broken sealed source
  - Major Calamity
- Medical Treatment
- Safety Procedures and Control Measures
- Licensing, Registration, Consultation
- Personal Protective Equipment
- Permissible Exposure Limit
- References and Resources

Description

Ionizing Radiation is the name given to a band of energy on the electromagnetic spectrum. X-rays and radioactive substances are examples of ionizing radiation. In order to understand the difference between ionizing and non-ionizing radiation it is necessary to review the structure of an atom.

All matter is made up of atoms. Molecules are collections of atoms hooked together in various combinations and shapes. An atom is the smallest unit of an element (like helium, oxygen or carbon) that still has all the properties of that element. Atoms are so small they cannot be seen with even the most powerful microscope.

All atoms are made up of three major subatomic particles: protons, neutrons, and electrons. Protons and neutrons make up the nucleus or center of the atom. Protons have a positive electric charge but neutrons have no electric charge. Electrons circle the nucleus and have a negative charge. In the neutral atom the negative charges of the electrons exactly balance the positive charges of the protons in the nucleus. If an atom has too many or too few electrons in orbit to balance the charge of the protons, the atom is called an ion.

The number of protons in the nucleus of an atom determines which element it is. Isotopes of the same element have the same number of protons but varying numbers of neutrons. The helium atom ($^{4}He_{2}$) has two protons and two neutrons in the nucleus. The carbon atom ($^{12}C_{6}$) has six protons and six neutrons in the nucleus. An example of

an unstable isotope of carbon is carbon-14 ($^{14}C_6$). The superscript indicates the atomic weight while the subscript number indicates the number of protons. If the atom has too many or too few neutrons for the number of protons, the atom may be unstable. If unstable the nucleus will give off bursts of energy (radiation) in an attempt to become stable.

These bursts of energy or disintegrations may be in the form of alpha particles (two protons and two neutrons - positively charged), beta particles (a negatively-charged electron), x-rays, or gamma rays (types of high energy electromagnetic waves). If these charged particles or waves interact with another atom, they have enough energy to knock an electron out of its orbit, creating an ion. That is why this type of radiation is called ionizing radiation.

Other forms of energy, like visible light, radio waves, and infrared light, do not have enough power to knock electrons out of their orbits so they are called non-ionizing radiation.

Amounts of ionizing radiation can be expressed in several different units. A **roentgen** (R) is an amount of x-rays or gamma radiation that causes a specified amount of ionization among the atoms and molecules in a cubic centimeter of air. Another unit is the **rad**, which applies to all ionizing radiation. It is a measure of the amount of energy absorbed from radiation in a specific volume of material.

A third unit, which is more useful and used more commonly, is the **REM** (Roentgen Equivalent Man). Measuring radiation in rems or millirems (one thousandth of a rem) allows direct comparison of the biological effects of different types of radiation. Alpha particles, beta particles, and x-rays or gamma radiation, differ in their ability to cause damage in tissues due to their differences in ionizing and penetrating ability. Alpha particles are 20 times more damaging in tissue then the same amount of x-rays. Measuring radiation in rems takes this difference into account so that one rem of alpha radiation in tissues has the same effect as one rem of beta radiation or one rem of x-rays. A rem is a relatively large quantity of radiation so most human exposures are measured in millirems. An easy way to remember the difference between these units is that a roentgen is a measure of how much you are exposed to, the rad is how much you absorb, and the rem is how much damage it does.

All people receive ionizing radiation from naturally occurring sources. Depending on where you live, most people receive an exposure in the range of 100 millirems per year from cosmic radiation from outer space and from naturally occurring isotopes (excluding radon) in the ground, air, food, and water. Radon is estimated to add another 200 millirems per year to our background. Medical and dental uses of x-rays can also contribute to a person's yearly radiation exposure. A typical well-conducted chest x-ray involves an exposure of 30 milliroentgens.

OCCUPATIONS WITH EXPOSURE TO IONIZING RADIATION

With the use of radioactive isotopes in industry and the increasing use of x-ray sources, ionizing radiation exposures may occur in a wide variety of occupations. The following examples show the diversity of occupations potentially exposed to ionizing radiation.

Aircraft workers	Military personnel
Atomic energy plant workers	Nuclear medicine workers with exposure to energetic radiation from selected radioisotopes (e.g. technetium-99m, iodine-131, tritium-3, etc.)
Biologists	Nurses
Cathode ray tube makers	Oil well loggers
Ceramic workers	Ore assayers
Chemists	Pathologists
Density testers	Petroleum refinery workers
Dental assistants	Physicians
Dentists	Physicists
Dermatologists	Pipeline oil flow testers
Drug makers	Pipeline weld radiographers
Drug sterilizers	Plasma torch operators
Electron microscope makers	Plastic technicians
Electron microscopists	Prospectors
Electrostatic eliminator operators	Radar tube makers
Embalmers	Radiologists
Fire alarm makers	Radium laboratory workers
Food preservers	Radium refinery workers
Food sterilizers	Research workers
Gas mantle makers	Television tube makers
High voltage television repairmen	Thickness gauge operators
High voltage vacuum tube makers	Thorium-aluminum alloy workers
High voltage vacuum tube users	Thorium-magnesium alloy workers
Industrial fluoroscope operators	Thorium ore producers
Industrial radiographers	Tile glaziers
Inspectors using, and workers in proximity to, sealed gamma ray Uranium sources (e.g. cesium-137, cobalt-60, and iridium-192)	Uranium dye workers
Klystron tube operators	Uranium mill workers
Liquid level gauge operators	Veterinarians
Luminous dial painters	X-ray technicians / aides
Machinists	X-ray diffraction apparatus operators
	X-ray tube makers, fabricated metal product

Health Effects
The health risks and effects of exposure to ionizing radiation are dependent on the type of radiation (alpha, beta, gamma or x-ray), the energy, the dose rate, the quantity, and the body part exposed.

Alpha particles, due to their relatively large size and mass, do not travel very far in air (a few centimeters) and cannot pass through skin or even a sheet of paper. Alpha radiation is only hazardous if inhaled or ingested. It is the most damaging to tissue if it is inhaled or ingested. Beta particles are more penetrating than alpha; a thin sheet of aluminum will stop beta radiation, but beta radiation is not as damaging to tissue.

X-rays (and gamma rays) are the most penetrating and least damaging to tissue. Their penetrating capability makes them useful for medical diagnoses.

Some body parts are more sensitive to damage from ionizing radiation than other body parts. The reproductive and blood-forming organs and the eyes are the most sensitive while the extremities such as arms, hands, and feet are less sensitive.

The quantity of ionizing radiation to which a person is exposed is the greatest factor in the risk and severity of a radiation-related injury. Information on the health effects of a single large dose of ionizing radiation is readily available from studies of the casualties and survivors of the atomic explosions in Hiroshima and Nagasaki, from studies of people exposed to radioactive fallout from the early atom bomb testing and from accidents involving ionizing radiation.

Health effects of a single acute dose of whole body radiation.	
Dose	**Acute Effects**
less than 25 rems	No detectable effect
25 - 50 rems	Drop in white blood cell count, no serious injury
50 - 100 rems	Possible injury and sickness; no disability
100 - 200 rems	Acute radiation sickness (nausea, vomiting, diarrhea, weakness, shock, skin sores, hair loss); possible disability
200 - 400 rems	Acute radiation sickness; disability certain, possible death without treatment
400 - 500 rems	50% death rate without treatment
> 600 rems	100% death rate

Occupational exposure to ionizing radiation is usually limited to a small area of the body such as the hands, resulting in reddening of the skin or dermatitis. Whole body radiation and acute radiation sickness occurs very rarely in occupational settings.

The health effects of long-term exposure to low levels of ionizing radiation are less easily studied and documented. The concern about possible health effects, cancer and genetic effects in particular, from low level radiation stems from the known health effects of high doses of radiation and the assumption that the degree of risk is directly related to the degree of exposure. It is assumed (not proven) for safety sake, that any exposure to radiation above natural background levels contributes to small increases in the risk of developing cancer. Reducing exposure to the lowest level possible will, therefore, reduce the risk to the lowest level possible.

Emergency Procedures

The following emergency procedures were developed for medical facilities but can be generally applied to any workplace where radioactive substances are used.

Initial report: All incidents involving environmental contamination should be reported first to the Alaska Department of Environmental Conservation Area Response Team (SOSC).

Southeast Alaska:	Bob Mattson (Juneau) Bob_mattson@dec.state.ak.us	907-465-5349
Central Alaska:	Gary Folley (Soldotna) Gary_folley@dec.state.ak.us	907-262-5210 ext 234
Northern Alaska:	Ed Meggert (Fairbanks) Ed_meggert@dec.state.ak.us	907-451-2124
Secondary report:	Doug Dasher (Fairbanks) Doug_dasher@dec.state.ak.us	907-451-2172

A. Spills

Accidental spillage of radioactive material is rare, but cannot be prevented absolutely, and may occur in any laboratory, in any hall or passageway traversed by messengers transporting such material.

Except for a major accident to a shipping container or a serious spill in the hot laboratory, the amount of radioactive material involved in a spill will usually be small and the radiation from it will not constitute a serious hazard. The real danger is the spread of the contamination on shoes or other contaminated garments. The following is a *general outline of the procedure to be followed in the event of a spill.*

- Confine the spill immediately by dropping paper towels or other absorbent material onto it.

- Put on waterproof gloves.

- Check shoes for visible signs of contamination. If it appears
- possible that they are contaminated, remove shoes when leaving the contaminated region.

- If fans, ventilators, or air conditioners are operating in the area, they should be shut off. Preferably this should be done by someone not involved in the spill and therefore not likely to spread contamination.

- Mark off or isolate in some way the entire suspect area and police it to be sure *that no one walks through it.*

- **CALL THE RADIATION PROTECTION SUPERVISOR (RPS)** (aka Radiological Safety Officer) designated by the employer. If the number is not posted in a convenient place, and you do not know it, call the company telephone operator, report an emergency and ask the operator to find the supervisor.

- In general, inexperienced personnel should not attempt to clean up a spill. It is better to wait a little while for the RPS than to risk spreading the contamination by erroneous procedures. If the spilled material is covered and bystanders are kept a few feet away, there is little or no danger from the radiation.

- If any of the spilled material has splashed onto a person or clothing, immediate steps should be taken to remove it. Laboratory coats or outer garments should be taken off and left in the contaminated area. Hands or other skin areas should be washed thoroughly with soap. If it is certain that shoes or feet are not contaminated, it is permissible to walk to a washing facility, which subsequently, however, must be treated as a contaminated area until cleared by the RPS. If there is doubt about contamination of the feet, a washbowl and soap should be brought to the suspect area for cleaning them.

- The RPS should bring decontamination materials and a survey meter, and the clean-up operation will proceed under the supervision of the RPS.

- If the RPS is not immediately available, or cleanup must proceed without him or her, one person should do the work. This person should put on waterproof

gloves, shoe covers and a surgical facemask if it is available. He will then take up the spilled material with absorbent paper, which must be handled with forceps or tongs, and deposit it immediately in a waterproof container. After as much as possible has been removed in this way, the surface should be washed with damp, not wet, rags held in forceps, always working toward the center of the contaminated area rather than away from it.

- A survey meter should have been obtained from the office of the RPS, and careful monitoring carried out during this procedure, on area and personnel. Preferably, the meter should be operated by someone not involved in the spill, so that the instrument is not likely to be contaminated.

- Reduction of counting rate to five times background, over an area of 1 or 2 square feet or to ten times background over a few square inches is usually satisfactory, especially for short-lived nuclides. Eventually, the RPS should check the area and give it clearance.

- When the operation is finished, gloves and other protective garments should be carefully checked for residual contamination. If any is found, the garments should be left with the other contaminated material for ultimate clearance or disposal by the RPS.

B. *Loss of a Sealed Source*

The following is a general outline of the procedure to be followed in the event of loss of a sealed source:

- Call the Radiation Protection Supervisor (RPS).

- If all sources are supposed to have been removed from the patient, he or she should be checked with a survey meter to make sure that none has inadvertently been left behind.

- Try to make sure that all bandages, linen, and bedding have been kept in the patient's room. If this is not the case, try to stop them on the way to the laundry or the incinerator.

- Check all this material, a little at a time. Then check the room, to be sure the source is not on the floor or furniture.

- Check the drain tap of any accessible plumbing facility.

- Check the incinerator.

- Check all barrels of ashes or garbage. The more active the source, the easier it should be to find it.

C. A Ruptured or Broken Sealed Source

- Shut off all fans and ventilators.
- Drop damp towels on the suspect material; throw nothing away.
- Call the Radiation Protection Supervisor. The RPS will remove the questionable material and check the area for contamination.
- If possible, evacuate the room. If not, keep all personnel several feet from the suspect material until the RPS arrives.

D. A Major Calamity: Fire, Earthquake, A Massive Spill

- Call the Radiation Protection Supervisor.
- Report the incident to the Alaska Department of Environmental Conservation Area Response Team (SOSC)
- Prevent access to suspect areas, or removal of anything from them. Shut off ventilating system; close drains if possible.
- Do not try to do anything until the RPS arrives. The RPS must be given complete charge.
- If for any reason the RPS cannot take charge, wait for the Alaska Department of Environmental Conservation Area Response Team (SOSC) or follow their instructions.

Medical Treatment

Medical treatment of a person who has been accidentally over exposed to ionizing radiation will depend on the dose. Exposures less than 25 rems generally do not require treatment. The treatment will also depend on whether the source of the radiation is outside the body such as from x-ray equipment or a gamma emitter, or from inside the body such as when a radioactive dust is inhaled or ingested.

When the source of radiation is outside the body, and treatment is considered necessary, it is started after the entire radiation dose has been received. The dose cannot be lessened, therefore the objective of the treatment is to lessen the acute effects of radiation sickness, prevent secondary infections and provide transfusions to supplement weakened and damaged blood cells.

When the source of the radiation (the emitter) has been inhaled or swallowed, radiation exposure will continue and the goal of treatment is to reduce the quantity of the emitter in the body. This may be accomplished by speeding up the excretion of the emitter by chelating therapy. A chelating agent is a chemical which binds with radioactive heavy metals enabling the body to excrete them faster. Chelating therapy is effective for internal emitters which are soluble in body fluids. Insoluble emitting substances which have been inhaled can be removed to some extent by bronchopulmonary lavage, a procedure which rinses out the lung's air sacs and airways.

Safety Procedures and Control Measures

The specific aspects, equipment, and procedures of a workplace radiation safety program will depend on the nature of the source, the type of radiation emitted, and the circumstances of its use. Only general concepts of protection and control can be covered in a data sheet of this scope. The National Council on Radiation Protection and Measurements (NCRP) offers recommendations for specific uses of radiation emitting substances and equipment. Publications from NCRP are available from their website: http://www.ncrp.com

Restricted Access: Only authorized trained personnel should be allowed in work areas where radiation emitting substances or equipment are used. Signs and warning notices using the standard radiation symbol must be posted.

Shielding: The selection of materials and designs for shielding will depend on the type of radiation, the use factor of the equipment, occupancy times, and workload.

Ventilation: Operations that routinely produce airborne contamination should utilize engineered containment and ventilation systems to prevent airborne releases. Appropriate respirators may be used but only when effective engineering controls are not feasible.

Radiation Monitoring: Radiation survey equipment appropriate for the type of radiation to be measured must be maintained and used to evaluate exposure conditions for employees. Working areas must be monitored at a frequency that will ensure safe working conditions. Individuals working in most industrial settings and many medical facilities must wear appropriate radiation monitoring devices to measure actual occupational exposures. Records of results for area and personal monitoring must be maintained.

Licensing and Registration: All by-product radioactive material and special nuclear material must be licensed by the Nuclear Regulatory Commission, and conditions of that license must be met by the user. Radioactive materials not under the jurisdiction of the Nuclear Regulatory commission and all x-ray sources must be registered with the

Alaska Department of Health and Social Services (H&SS), Radiological Health program. Use must meet requirements of the Alaska Radiation Protection Regulations, H&SS, in addition to the Occupational Safety and Health regulations of the Alaska Department of Labor & Workforce Development and the Environmental regulations of the Department of Environmental Conservation. The NRC and the state may conduct inspections of licensees and registrants to ensure compliance.

Consultation: Radiological Health is a program within the Department of Health and Social Services, State Public Health Laboratories. This program is responsible for safe use of radiation sources within the State of Alaska. Under Alaska statute, the program is responsible for Radiation Protection including the development of policies for evaluating radiation hazards, conducting surveys/investigations and training. This includes measurement and safe use of radiation, reviewing plans and shielding specifications for radiation sources, inspecting facilities where radiation sources are used, and contracting with other agencies where a cooperative effort is required in order to address radiation hazards. These responsibilities include both ionizing and non-ionizing sources, and radiation producing devices as well as radioactive materials. The main office is in Anchorage, however radon related activities are conducted out of the University of Alaska Fairbanks.

Contact:	Clyde E. Pearce, RHS
Telephone:	(907) 334-2107
Facsimile:	(907) 334-2161
E-mail:	clyde_pearce@health.state.ak.us

Emergency Response: Environmental surveys and disaster response to radiation in the environment are the responsibility of the Department of Environmental Conservation.

Initial report: All incidents involving environmental contamination should be reported first to the Alaska Department of Environmental Conservation Area Response Team (SOSC).

Southeast Alaska:	Bob Mattson (Juneau) Bob_mattson@dec.state.ak.us	907-465-5349
Central Alaska:	Gary Folley (Soldotna) Gary_folley@dec.state.ak.us	907-262-5210 ext 234
Northern Alaska:	Ed Meggert (Fairbanks) Ed_meggert@dec.state.ak.us	907-451-2124
Secondary report:	Doug Dasher (Fairbanks) Doug_dasher@dec.state.ak.us	907-451-2172

Personal Protective Equipment
Respirators used for protection against airborne contamination should be approved by the National Institute of Occupational Safety and Health (NIOSH). If air-purifying respirators are used, only high efficiency (HEPA) cartridges approved for dusts, fumes, mists, and radionuclides or radon daughters (progeny) may be used. A good respirator program must include consideration of respirator type, fit, maintenance, testing, and training.

Protective clothing must be provided if the potential for skin or clothing contamination exists. Selection must be based on the nature of the contaminant (liquid or dry material) and the type of radiation emitted. Appropriate methods of laundering or disposal are also required. Contaminated clothing must not be taken home.

Permissible Exposure Limit
The US DOL Occupational Safety and Health Administration (OSHA) regulations 29 CFR 1910.1096, adopted by reference by the State of Alaska under Alaska Administrative Code 8 AAC 61.1010(b), state that:

... (b) Exposure of individuals to radiation in restricted areas.
(1) No employer shall possess, use, or transfer sources of ionizing radiation in such a manner as to cause any individual in a restricted area to receive in any period of one calendar quarter from sources in the employer's possession or control a dose in excess of the limits specified in Table 1-18.

Table 1-18 Rems per calendar quarter	
Whole body: Head and trunk; active blood-forming organs; lens of eyes; or gonads	1 1/4
Hands and forearms; feet and ankles	18 3/4
Skin of whole body	7 1/2

(2) An employer may permit an individual in a restricted area to receive doses to the whole body greater that those permitted under 29 CFR 1910.1096 (b) (1) so long as:

(A) During any calendar quarter the dose to the whole body shall not exceed three rems; and

(B) The dose to the whole body, when added to the accumulated occupational dose to the whole body, shall not exceed five (N-18) rems, where "N" equals the individual's age in years at his last birthday; and

(C) The employer maintains adequate past and current exposure records that show that the addition of such a dose will not cause the individual to exceed the amount authorized in this form. "Dose to the whole body" shall be deemed to include any dose to the whole body, gonad, active blood forming organs, head and trunk, or lens of the eye.

(3) No employer shall permit any employee who is under 18 years of age to receive in any period of one calendar quarter a dose in excess of 10 percent of the limits specified in Table 1-18.

These regulations (29 CFR 1910.1096) also cover definitions, exposure to airborne radioactive material, precautionary measures and personal monitoring, caution signs, labels and symbols, evacuation warnings, instruction of personnel, waste disposal, notification of incidents, reports of overexposure, records and disclosure.

References and Resources

1. Occupational Diseases - A Guide to Their Recognition, DHEW (NIOSH) Publication No. 77-181. 1978.

2. Radiation Protection for Medical and Allied Health Personnel, National Council on Radiation Protection and Measurements (NCRP) Report No. 48. 1986. Access NCRP publications at: http://www.ncrp.com

3. Cralley, Lewis J. and Cralley, Lester V. Patty's Industrial Hygiene and Toxicology Volume III, pg. 359 - 404, John Wiley and Sons, Inc. 1979.

4. OSHA General Industry Regulations, 29 CFR 1910, as amended, and adopted by the State of Alaska in Alaska Administrative Code, 8 AAC 61.1010(b) under the authority of AS 18.60.030, and specifically 29 CFR 1910.1096

   http://www.osha.gov/pls/oshaweb/owastand.display_standard_group?p_toc_level=1&p_part_number=1910

Labor Standards and Safety Division

Physical Agent Data Sheet (PADS) - Lasers

Other PADS:
Cold Stress
Hand-Arm Vibration
Heat
Ionizing Radiation (PDF)
Lasers
Noise
Radio Waves
Ultraviolet Radiation

Hazards
Health
Hazards
Electrical
Hazards
Chemical
Hazards
Safety
Classifications
of lasers

Safety
Precautions
Emergency
Procedures
Permissible
Exposure
Limits

Description

A laser is a device which produces a concentrated beam of electromagnetic energy. The beam of energy can be in the form of visible light or in the form of invisible infrared or ultraviolet radiation.

Lasers differ in many ways, but there are certain characteristics which all lasers have in common. For all lasers, the production of the concentrated beam of energy requires three basic processes. First, an energy source is applied to a solid, gaseous or liquid substance called the lasing material. The lasing material then produces radiation having a specific wavelength. Then by using mirrors, lenses and shutters, the light or infrared waves or ultraviolet rays are magnified and focused to produce the laser beam.

Lasers may be different from one another in several specific ways. The basic categories are:

1. Type of lasing material used.

   The lasing material may be solid, like ruby crystals or glass; may be a gas or mixture of gases, such as carbon dioxide or a helium-neon mixture; or liquid containing special dyes.

2. Source of energy applied.

   The energy applied to the lasing material may come from a powerful light source, electric

current, or a chemical reaction.

3. Continuous or pulsed emission of the laser beam.

   The energy applied to the lasing material may be continuous or applied on pulses. Some lasers can produce hundreds of thousands of pulses per second.

^back to top

Hazards

The hazards related to the use of lasers vary depending on the type of laser, the power of the laser, the purpose and manner in which the laser is used, and the safety features of the laser.

Health Hazards

Eye injuries are the most serious danger from laser beams. The cornea of the eye is like a glass window that allows light to enter the eye. It is located in the very front part of the eyeball. The cornea is very sensitive and injuries to the cornea can be very painful. most injuries to the cornea heal without permanent damage. If the deep layers of the cornea are affected, permanent injuries can occur. The types of eye injuries which occur from improper use of lasers depend on the wavelengths of the laser beams. Laser injuries to the cornea are usually caused by lasers having short wavelengths in the ultraviolet and long wavelengths in the infrared ranges.

The lens of the eye is located toward the front of the eyeball but behind the cornea. Injuries to the lens can result in loss of transparency of the lens. The lens becomes cloudy and then blocks some of the light rays entering the eye, thus making it hard to create clear images on the retina. When the lens of the eye becomes cloudy, it is called a cataract. While damage to the cornea usually heals completely in a day or two, damage to the lens almost always persists. Very slight damage to the lens may go unnoticed, but repeated minimal damage can add up to serious damage later on. Damage to the lens may not cause problems until many years after the injuries to the lens occurred.

Lens damage is most likely to occur with certain lasers that produce beams in the near-ultraviolet and near-infrared wavelength range.

The retina of the eye is the surface upon which visual images are produced. It is located in the back of the eyeball. Certain lasers in the wavelength ranges of visible light and near-infrared wavelength ranges can burn permanent blind spots in the retina causing partially or totally obscured vision.

Skin burns may also occur from the use of lasers but are less likely to occur and are less serious than eye injuries. When skin is exposed to a potentially dangerous laser beam, a person will usually feel the heat and remove the exposed part of the body from the path of the laser beam.

^back to top

Electrical Hazards

Some lasers require high voltage power supplies and some workers have received electrical shock because of carelessness while working around these power supplies. Almost all laser power supplies under certain circumstances, could possible cause electrical shock or electrocution. Following the general safety standards for other electrical or electronic equipment provides protection against the dangers of electrical shock or electrocution.

Chemical Hazards

Laser welding or cutting of metals will cause formation of many of the same metal oxides and other fumes that are produced in conventional welding processes. Explosions can occur when ice collects in valves or connectors in lasers which require very cold liquids, such as liquid nitrogen.

Lasers are commonly used in the workplace to perform the following functions:

- Welding and machining
- Surgery
- Communication: via fiber optic technology
- Shock hardening, glazing, drilling
- Cutting textiles
- Leveling and alignment of building sites

^back to top

Safety Classifications of Lasers

For safety purposes, lasers are divided into Classes I, II, III, and IV; Class I being least hazardous and Class IV most hazardous. Almost all reported eye injuries have been from Class IV lasers.

Almost all lasers that produce visible light beams are so bright that they can produce eye injuries. Therefore, to reduce risk of health hazards to the eye, many are designed in a way, such as enclosing the laser beam in a box, which prevents direct eye exposure to the beam.

Any laser which by itself is in Class II, III, or IV may be reclassified to a lower risk category if the laser beam is enclosed in such a way to decrease the risk of hazardous exposure to people.

Class I lasers are considered entirely safe even if used improperly. Class I lasers do not require any warning labeling. Some more hazardous lasers may be placed in the Class I category when they are part of a consumer or office machine which shields the user from the hazards of the laser beam. These machines, however, must have some type of warnings which are visible if the shields are removed.

Class II lasers are often referred to as "low-power" or "low-risk" lasers. These lasers are hazardous only when someone stares directly into the laser beam even though the beam hurts the eyes. Class II lasers require warnings to avoid staring directly into the beam.

Class III lasers are Moderate Risk or Medium Power lasers. They can produce eye injuries when the laser beams are viewed directly or when a sharp reflection is viewed directly. Class III is subdivided into Class IIIA and IIIB. Class IIIA is considered to be hazardous only when the laser beam is collected and focused by optical instruments, for example when surveyors look into a laser beam with a telescope-like instrument. Class IIIA lasers require warnings to prevent such hazardous practices. These lasers can cause serious eye injuries before someone who accidentally looks directly into the beam has a chance to blink.

Class IV lasers produce beams that when reflected, even if it is not a sharp reflection, may cause serious eye and skin injuries, and where the beam may be a fire hazard. It is critical that the dangers of Class IV lasers are clearly marked with warning signs.

^back to top

Safety Precautions

Class I Controls

No user safety rules are necessary.

Class II Controls

1. Never permit a person to continuously stare into the laser source if exposure levels exceed the applicable permissible exposure level for the duration of intended staring.
2. Never point the laser at an individual's eye unless a useful purpose exists and the exposure level and duration will not exceed the permissible limit.

Class III Controls

1. Do not aim the laser at an individual's eye.
2. Permit only experienced personnel to operate the laser.
3. Enclose as much of the beam path as possible. Even a transparent enclosure will prevent individuals from placing their head or reflecting objects within the beam path. Terminations should be used at the end of the useful path of the direct and any secondary beams.
4. Shutters, polarizers and optical filters should be placed at the laser exit port to reduce the beam power to the minimal useful level.
5. Control spectators.
6. A warning light or buzzer should indicate laser operation. This is especially needed if the beam is not visible, e.g., for infrared lasers.
7. Do not permit laser tracking of nontarget vehicles or aircraft.
8. Operate the laser only in a restricted area, for example, in a closed room without windows, and place a warning sign on the door.
9. Place the laser beam path well above or well

below the eye level of any sitting or standing observers whenever possible. The laser should be mounted firmly to assure that the beam travels only along its intended path.

10. Always use proper laser eye protection if a potential hazard exists for the direct beam or a specular reflection.
11. A key switch should be installed to minimize tampering by unauthorized individuals.
12. The beam or its specular reflection should never be directly viewed with optical instruments such as binoculars or telescopes without sufficient protective filters.
13. Remove all unnecessary mirror-like surfaces from within the vicinity of the laser beam path.

^back to top

Class IV Controls

Fortunately, these high-power lasers are seldom used outside of research laboratories and restricted industrial environments where personnel access is carefully controlled.

These lasers should only be operated within a localized enclosure, or in a controlled workplace, or where the beam is directed into outer space. If a complete local enclosure is not possible, laser operation indoors should be in a light-tight room with interlocked entrances to assure that the laser cannot emit while a door is open.

1. Eye protection is needed for all individuals working within the controlled area. If the laser beam irradiance is sufficient to be a serious skin or fire hazard, a suitable shielding should be used between the laser beam and any personnel.
2. Remote firing with video monitoring or other remote (safe) viewing techniques should be chosen when feasible.
3. Outdoor high-power laser devices such as satellite laser transmission systems and laser radar (LIDAR) should have positive stops on the azimuth and elevation transverse to assure that the beam cannot intercept occupied areas or nontarget aircraft.
4. Beam shutters, beam polarizers, and beam filters should always be used to limit use to authorized personnel only. The flashlamps in optical pump systems should be shielded to eliminate any direct viewing.

5. Backstops should be diffusely reflecting-fire resistant target materials where feasible. Safety enclosures should be used around microwelding and microdrilling work pieces to contain hazardous reflections from the work area. Microscopic viewing systems used to study the work piece should ensure against hazardous levels of reflection of laser irradiation back through the optics.

^back to top

Emergency Procedures

Anyone who is suspected of having a laser-related eye injury should be examined as soon as possible by an ophthalmologist, a physician who specializes in the care of eye injuries and diseases.

Laser-related skin burns should be treated as any other skin burns. Cold water should be applied immediately to the burn area for first and second degree burns (reddened skin or blistering skin). Third degree burns (open wound) should be covered with a sterile dressing and the person taken to a medical facility. Never put ointments, creams or butter on burns.

Permissible Exposure Limits

Lasers used in construction shall comply with the Alaska Construction Code, Section 05.040(e):

Nonionizing radiation

1. Only qualified and trained employees shall be assigned to install, adjust, and operate laser equipment.
2. Proof of qualification of the laser equipment operator shall be available and in posession of operator at all times.
3. The employer shall provide antilaser eye protection as specified in section 50 of this subchapter for employees working in areas where a potential exposure to direct or reflected laser light greater than 5 milliwatts exist.
4. Areas in which lasers are used shall be posted with standard laser warning placards.
5. Beam shutters or caps shall be utilized, or the laser turned off, when laser transmission is not actually required. The laser shall be turned off

whenever the laser is left unattended.

6. Only mechanical or electronic means shall be used as a detector for guiding the internal alignment of the lasers.
7. The laser beam shall not be directed at employees.
8. Under conditions of rain, snow, fog or dust the use of laser systems is prohibited.
9. Laser equipment shall bear a label to indicate maximum output.
10. Employees shall not be exposed to light intensities above:
    a. Direct staring: one microwatt per square centimeter.
    b. Incidental observing: two and one-half watts per square centimeter.
    c. Diffused reflected light: two and one-half watts per square centimeter.
11. Laser units in operation shall be set up above the heads of the employees.

^back to top

References

1. Sliney, D. & Walbarsht, M., Safety with Lasers and Other Optical Sources. Plenum Press, New York, NY 10013.

Labor and Workforce Development || Job Seeker || Employer || Worker

Labor Standards and Safety Division

Physical Agent Data Sheet (PADS) - Noise

Other PADS:
Cold Stress
Hand-Arm Vibration
Heat
Ionizing Radiation (PDF)
Lasers
Noise
Radio Waves
Ultraviolet Radiation

Description
Health Effects
Hearing
Other Effects
Permissible Exposure Limit
Protective Measures

Description

Sound is created when a vibrating source (like a bell, motor or a stereo speaker) sends sound waves through the air to your ear. Every sound has two aspects: its pitch (frequency) and its loudness (intensity). On a stereo, frequency is determined by the bass/treble control. Intensity is determined by the volume control. Noise (unwanted sound) is usually made up of many frequencies. The disturbing and harmful effects of noise depend both on the loudness and the frequency of the tones making up noise.

Loudness is measured in units called decibels (dB). A conversational voice is about 65 dB. A shout is 90 dB or greater.

Frequency is measured in units called Hertz (Hz). The frequency of a locomotive horn is about 250 Hz. The frequency of a table saw is about 4,000 Hz.

^back to the top.

Health Effects

Excessive noise can destroy the ability to hear, and may also put stress of other parts of the body, including the heart.

For most effects of noise, there is no cure, so that prevention of excessive noise exposure is the only way to avoid health damage.

Hearing

The damage done by noise depends mainly on how loud it is and on the length of exposure. The frequency or pitch can also have some effect, since high-pitched sounds are more damaging than low-pitched sounds.

Noise may tire out the inner ear, causing temporary hearing loss. After a period of time away from the noise hearing may be restored. Some workers who suffer temporary hearing loss may find that by the time their hearing returns to normal, it is time for another work shift so, in that sense, the problem is "permanent."

With continual noise exposure, the ear will lose its ability to recover from temporary hearing loss, and the damage will become permanent. Permanent hearing loss results from the destruction of cells in the inner ear, cells which can never be replaced or repaired. Such damage can be caused by long-term exposure to loud noise or, in some cases" by brief exposures to very loud noises.

Normally, workplace noise first affects the ability to hear high frequency (high-pitched) sounds. This means that even though a person can still hear some noise, speech or other sounds may be unclear or distorted.

Workers suffering from noise-induced hearing loss may also experience continual ringing in their ears, called "tinnitus." At this time, there is no cure for tinnitus, although some doctors are experimenting with treatment.

^back to the top.

Other Effects

Although research on the effects of noise is not complete, it appears that noise can cause quickened pulse rate, increased blood pressure and a narrowing of the blood vessels over a long period of time, these may place an added burden on the heart.

Noise may also put stress on other parts of the body by causing the abnormal secretion of hormones and tensing of the muscles.

Workers exposed to noise sometimes complain of nervousness, sleeplessness and fatigue. Excessive noise exposure also can reduce job performance and may cause high rates of absenteeism.

^back to the top.

Permissible Exposure Limit

The Action level for noise is an average noise level of 85 dB for an eight-hour day. When employees are exposed to noise levels, which exceed the Permissible Exposure Limit, the employer must install or use engineering or administrative controls to lower the noise levels. While these controls are being designed or installed employees must wear hearing protection. If the controls still do not reduce noise exposures to below 90 dB, hearing

protection must continue to be worn.

^back to the top.

Protective Measures

Suitable hearing protectors (earplugs or muffs) must be made available at no cost to employees who are exposed to an average of 85 dB or greater for an eight-hour day. Employees must be given the opportunity to select from three different types of appropriate hearing protectors.

Hearing tests (audiometric exams) must be given to employees who are exposed to an average of 85 dB or greater for an eight-hour day. Hearing tests will show whether employees are experiencing any hearing losses. Hearing tests are also useful in showing how well the earplugs and earmuffs are working. Hearing tests must be given annually.

Employees should also receive training in the effects of noise on hearing, an explanation of the hearing tests, and instruction on the proper fitting and care of earplugs or muffs.

Noise away from work can also cause hearing loss. Hearing protectors should be worn when operating noisy equipment or tools such as chain saws, brush cutters, power lawn mowers, or when using firearms.

Refer to Alaska Administrative Code, Occupational Health and Environmental Control 04.0104 for specific regulations on Noise Exposure and Hearing Conservation Programs.

^back to the top.

Labor and Workforce Development || Job Seeker || Employer || Worker

Labor Standards and Safety Division

Physical Agent Data Sheet (PADS) - Radio Frequency/Microwave Radiation

Other PADS:
Cold Stress
Hand-Arm Vibration
Heat
Ionizing Radiation (PDF)
Lasers
Noise
Radio Waves
Ultraviolet Radiation

- Health Hazards
- Safety and Health Precautions
- Permissible Exposure Limits
- Microwave Ovens

Description

Radiofrequency and microwave radiation are both forms of energy called electromagnetic radiation. Sunshine contains three other forms of electromagnetic radiation: ultraviolet rays, infrared (heat) waves, and visible light waves.

These forms of energy are transmitted by waves. The distance between wave peaks is the "wavelength." The number of wave peaks passing a given point in one second is the "frequency."

Radiofrequency or radiowaves have a range of frequencies and wavelengths. Very High Frequency (VHF) radiowaves are used for TV and FM radio. Medium Frequency (MF) radiowaves are used for AM radio. Radiofrequency is used in heat sealers and glue driers.

Microwaves are actually just radiowaves of higher frequencies. Microwaves are used for radar and satellite communications, for telephone and TV transmissions, for microwave ovens, and for diathermy in medical clinics.

Electromagnetic radiation can interact with objects (or people) in three different ways. The energy waves can pass through an object without being changed, like light through a window. It can be reflected, like light off a mirror, or it can be absorbed and cause the object to heat up, like a sidewalk in the sun.

The health hazards of electromagnetic radiation are related only to the absorption of energy. The effects of absorbed energy depend on many different factors such as its wavelength and frequency, its intensity and duration. Different materials also absorb energy differently.

^back to the top.

Health Hazards

When microwaves or radiowaves are absorbed by body tissues, localized or spot

heating can occur. The increased temperature can damage tissues, especially those with poor temperature control such as the lens of the eye.

Cataracts, clouding of the lens of the eye, may occur at the very high energy levels encountered close to radiating radar antennas. Heat damage to tissues is caused by high levels of exposure for short periods of time.

The health effects of low levels of exposure to radiowaves or microwaves for long periods of time are much harder to find and to prove. Some scientific studies show health effects from long-term, lowlevel exposure, other studies do not.

The following list includes health effects which some researchers suspect may be related to excessive radiofrequency/microwave exposure:

- Psychological changes, e.g., insomnia, irritability, mood swings,
- depression
- Headaches
- Nervous system abnormalities
- Hormonal changes
- Miscarriages and birth defects
- Male Infertility
- Altered immunity
- Leukemia

Of course, many of these health effects are relatively common, and most people having these problems have NOT had excessive exposure to radiofrequency/microwave radiation.

^back to the top.

Safety and Health Precautions

Employers who have people working around devices which produce radiofrequency/microwave radiation need to be sure that those devices are properly shielded to prevent leakage of radiation. Safety information regarding proper use and shielding of those devices can usually be obtained from owner/operators manuals, manufacturers, and the Alaska Department of Labor Occupational Safety and Health Section.

Radiofrequency sealers and heaters have been among the major sources of employee exposure to radiofrequency/microwave radiation. When these machines are used, employees should use mechanical or electrical devices that allow them to stay as far away form the source of radiation as possible. Whenever possible, these sealers should be turned off when not being used. Maintenance and adjustment of this type of equipment should be performed only by trained technicians and only when the machines are turned off.

Warnings should be posted to keep everyone away from the source of radiation except for those workers who are absolutely essential to performing the job.

People who are regularly exposed to significant levels of radiofrequency/microwave radiation should have preemployment and annual

physical exams. The doctors should pay careful attention to the eyes to look for cataracts, to the nervous system for any abnormalities to the blood, to detect any early evidence of leukemia, and to the reproductive system to detect any abnormalities. Information concerning the frequency and intensity of the radiation exposures and duration of exposures should be provided to the physician.

In work areas where there is known or suspected to be significant amounts of radiofrequency/microwave radiation present, specialists should measure the amounts of radiation present. If excessive radiofrequency/microwave radiation is detected, modifications in the workplace should be made to reduce radiation exposure of workers. Afterwards, additional measurements should be made to determine if the radiation exposure has been reduced.

^back to the top.

Permissible Exposure Limits

The State of Alaska's permissible exposure limit is specified in Article I of Subchapter 4, Occupational Health and Environmental Control Code [04.0106 (a)], Alaska Occupational Safety and Health Standards. For normal environmental conditions and for incident electromagnetic energy of frequencies from 10 MHz to 100 GHz, the radiation protection guide is 10 mW/cm (milliwatts per square centimeter) as averaged over any possible six-minute period.

Further information can be obtained from the Alaska Department of Labor, Occupational Safety and Health Section.

Microwave Cooking Ovens

Microwave ovens used for heating food, when used in accordance with manufacturer's instructions, do not expose personnel to microwave radiation.

Microwave ovens do not need to be included in an employer's Hazard Communication program.

^back to the top.

Labor and Workforce Development || Job Seeker || Employer || Worker

Labor Standards and Safety Division

Physical Agent Data Sheet (PADS) - Ultraviolet Radiation

Other PADS:
Cold Stress
Hand-Arm Vibration
Heat
Ionizing Radiation (PDF)
Lasers
Noise
Radio Waves
Ultraviolet Radiation

Description
Health Hazards
Skin Safety and Health Precautions
First Aid Procedures
Recommended Exposure Limits
Recommended Values
Reference

Description

Ultraviolet (UV) is the name for a band of energy on the electromagnetic spectrum that lies between visible light and x-rays. UV has some of the properties of visible light and other properties of the x-rays. Like visible light, some UV is actually visible but most is invisible like x-rays. UV, like light, cannot penetrate very far into most solids. Some UV, like x-rays, can ionize atoms or molecules which visible light cannot do.

Common sources of UV include the sun (especially when reflected by water, snow or ice), sun tanning lamps, mercury discharge lamps, welding arcs, plasma torches, and some lasers.

Health Hazards

The nature and seriousness of UV injuries depend on the length of exposure, the intensity of the UV, the type or wavelength of UV, the sensitivity of the individual, and the presence of certain chemicals (photosensitizers).

Skin

UV from the sun causes sunburns and skin cancer. UV from other sources can also cause skin burns varying in degree from mild reddening of the skin (first degree burns) to more severe and painful blistering (second degree burns). Long-term skin exposure to UV can cause actinic skin (a dry, brown, inelastic wrinkled skin) and skin cancer. Fair skinned individuals are more likely to develop both sunburns and skin cancer.

Some drugs, such as the antibiotic tetracycline, can cause skin burns from UV to happen faster and to be more severe. Products containing coal tar can also cause this reaction. These substances are called photosensitizers.

UV exposure may trigger cold sores (Herpes Simplex) in some individuals.

Eyes

When UV is absorbed by the eyes and eyelids, it can cause keratoconjunctivitis or "welders' flash." This is a very painful condition that feels like grit in the eyes and may make the eyes water and very sensitive to light. The condition usually occurs 6-12 hours after exposure and may last 6-24 hours. The painful injury may make a person unwilling or unable to open his/her eyes during this time period, but most discomfort is gone within 48 hours with no lasting injury. The maximum sensitivity of the eye occurs at a UV wavelength of 270 manometers. Cataracts or clouding of the lens of the eye can occur during high exposures to wavelengths in the range of 295-300 nanometers.

Skin Safety and Health Precautions

Skin burns from high, short-term exposure to UV and skin cancer from long-term exposure can be prevented by covering exposed skin with clothing and protective equipment such as gloves and face shields.* Barrier creams or lotions with sun protection factors (SPF) of 15-18 will also help prevent skin burns.

* Welders' helmets should provide protection for the neck area as well as the face and eyes.

Eyes

Tinted goggles and/or face shields should be worn to prevent burns of the cornea and eyelids. Selection of the appropriate degree of tint should be based on the anticipated wavelength and intensity of the UV source. (see Table 1)

Table 1
Shade No. 3.0: is for glare of reflected sunlight from snow, water, sand, etc.; stray light from cutting and welding, metal pouring and work around furnaces and foundries; and soldering (for goggles or spectacles with side shields worn under helmets in arc welding operations, particularly gas-shielded arc welding operations).
Shade Nos. 4.0 and 5.0: are for light acetylene cutting and welding; light electric spot welding.
Shade Nos. 6.0 and 7.0: are for gas cutting, medium gas welding, and non-gas-shielded arc welding using current values up to 30 amperes.
Shade Nos. 8.0 and 9.0: are for heavy gas cutting and nongas-shielded arc welding and cutting using current values from 30 to 75 amperes.
Shade Nos. 10.0 and 11.0: are for arc welding and cutting using current values from 75 to 200 amperes.
Shade Nos. 12.0 and 13.0: are for arc welding and cutting using current values from 200 to 400 amperes.

Shade No. 14.0: is for arc welding and cutting using current values over 400 amperes (including carbon arc welding and cutting), and for atomic hydrogen welding.
NOTE: ordinary window glass, 1/811 in thickness, is sufficient protection for the eyes and skin against the ultraviolet radiation from ordinary sources such as sunlight. In cases of extremely intense sources of ultraviolet and visible radiation, it is not adequate.

In sunny conditions on water, snow and ice, extra precautions should be taken to protect against reflected sunlight. Sunglasses with side shields should be worn. When applying protective ointments or lotions, special attention should be paid to the nose, lips, underside of the chin, and tops of the ears.

In workplaces, operations such as welding which produce high levels of UV should be performed behind enclosures or barriers to absorb the radiation and shield nearby workers.

UV sources like mercury discharge lamps should be operated only with all safety devices in place and in accordance with manufacturer's instructions.

First Aid Procedures

Skin burns: immediate application of cold (cold water, ice, cold clean cloths) to the affected area will reduce the severity and relieve pain associated with first and second degree burns. Do not apply any burn ointments, creams, or butter to skin burns.

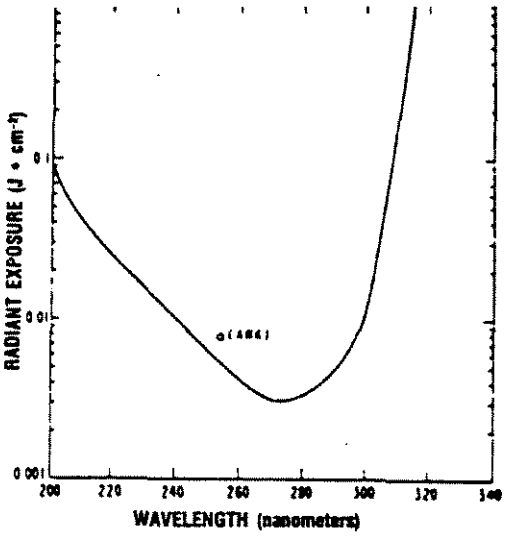
Eyes: place sterile dressings over the eyes of a person suffering from UV burns of the eyes and seek medical attention.

Recommended Exposure Limits[2]

The following section is very technical and is included for the use of safety and health professionals who have the skills and equipment to measure UV levels.

These threshold limit values (TLVS) refer to ultraviolet radiation in the spectral region between 200 and 400 nm and represent conditions under which it is believed that nearly all workers may be repeatedly exposed without adverse effect. These values for exposure of the eye or skin apply to ultraviolet radiation from arcs, gas and vapor discharges, flourescent and incandescent sources, and solar radiation, but do not apply to ultraviolet lasers. These values do not apply to ultraviolet radiation exposure of photosensitive individuals or of individuals concomitantly exposed to photosensitizing agents. These values should be used as guides in the control of exposure to continuous sources where the exposure duration shall not be less that 0.1 sec (Figure 1).

Figure 1



These values should be used as guides in the control of exposure to ultraviolet sources and should not be regarded as a fine line between safe and dangerous levels.

Recommended Values

The threshold limit value for occupational exposure to ultraviolet radiation incident upon skin or eye where irradiance values are known and exposure time is controlled are as follows:

1. For the near ultraviolet spectral region (320 to 400 nm), total radiance incident upon the unprotected skin or eye should not exceed 1 mW/cm for periods greated than 110 seconds (approximately 16 minutes) and for exposure times less than 10 seconds should not exceed one J/cm.

2. For the *actinic ultraviolet spectral region (200 to 315 nm), radiant exposure* incident upon the unprotected skin or eye should not exceed the values given in Table 2 within an 8-hour period.

Table 2
Relative Spectral Effectiveness by Wavelength*

Wavelength (nm)	TLV (mJ/cm^2)	Relative Special Effectiveness S□
200	100	0.03
210	40	0.075
220	25	0.12
230	16	0.19
240	10	0.30

250	7	0.43
254	6	0.5
260	4.6	0.65
270	3.0	1.0
280	3.4	0.88
290	4.7	0.64
300	10	0.30
305	50	0.60
310	200	0.015
315	1000	0.003

* See Laser TLVS.

3. To determine the effective irradiance of a broadband source weighted against the peak of the spectral effectiveness curve (270 nm), the following weighting formula should be used:

$$E_{eff} = \Sigma E\lambda \, S\lambda \, \Delta \lambda$$

where:

E_{eff} = effective irradinace relative to a monochromatic source at 270 nm in W/cm^2 [J/ (s cm^2)]

$E\lambda$ = spectral irradiance in W/(cm nm)

$S\lambda$ = relative spectral effectiveness (unitless)

$\Delta \lambda$ = band width in manometers

4. Permissible exposure time in seconds for exposure to actinic ultraviolet radiation incident upon the unprotected skin or eye may be computed by dividing 0.003 J/cm^2 by E_{eff} in W/cm^2. The exposure time may also be determined using Table 3 which provides exposure times corresponding to effective irradiances in μ W/cm^2.

Table 3 ***Permissible Ultraviolet Exposures***	
Duration of Exposure Per Day	**Effective Irradiance**

	E_{eff} (□ W/cm^2)
8 hrs	0.1
4 hrs	0.2
2 hrs	0.4
1 hr	0.8
30 min	1.7
15 min	3.3
10 min	5.0
5 min	10.0
1 min	50.0
30 sec	100.0
10 sec	300.0
1 sec	3,000.0
0.5 sec	6,000.0
0.1 sec	30,000.0

5. All the preceding TLVs for ultraviolet energy apply to sources which subtend an angle less than 80 degrees. Sources which subtend a *greater angle need to be measured only over an angle of 80 degrees.*

Conditioned (tanned) individuals can tolerate skin exposure in excess of the TLV without erythemal effects. However, such conditioning may not protect persons against cancer.

Reference

1. Sunlight and Man. Fitzpatrick et all Eds. University of Tokyo Press, Tokyo, Japan (1974).

2. Threshold Limit Values and Biological Exposures Indices for 1986 - 1987. American Conference of Governmental Industrial Hygienists, 6500 Glenway Avenue, Building D-7, Cincinnati, Ohio 45211-4438.

ATTACHMENT 4

FCS Activity Hazard Analysis

FORMER COMMUNICATIONS SITE
SAFE PLAN OF ACTION/ACTIVITY HAZARD ANALYSIS PROCEDURE

1.0 PURPOSE

To describe the use and benefits of developing and using Safe Plan of Action (SPA)/Activity Hazard Analysis (AHA). Statistics demonstrate that faithful use of the SPA/AHA is a best practice that can minimize workplace injuries and illnesses.

2.0 ACTIVITY HAZARD ANALYSIS BENEFITS

- Provide a written Health, Safety, and Environment (HSE) plan for each task.
- Require participation by each member of the crew in identifying hazards and control measures.
- Serve as a documented hazard assessment plan.
- Serve as a reference document for similar future work.

3.0 APPLICATION

SPA/AHA should be used for any task that could reasonably present a risk of injury, illness or environmental damage—specifically, before proceeding with any field task.

4.0 SPA/AHA METHOD

SPA/AHA is a task planning procedure conducted for each task to help the workgroup and its supervisor to collaboratively ensure proper HSE planning before beginning work and to identify:

- Potential chemical and physical hazards associated with a task
- Controls for the hazards
- Appropriate personal protective equipment (PPE)
- Necessary resources to efficiently complete the task without incident

Team members sign the completed AHA Attendance Record form to indicate their participation, understanding, and agreement to follow the plan. When signed by the supervisor, the SPA/AHA

becomes a documented hazard assessment plan. Completion of the SPA/AHA form is performed in the following manner:

- The SPA/AHA analysis is completed first. Determine the specific, individual steps involved with the task and record them in the "Steps of Task" column. Next, analyze each step for any potential physical or chemical hazards and record them in the "Hazard" column.
- Identify appropriate controls for each potential hazard and record in the "Safe Plan" column.
- Record resources or positions assigned to the job.
- Record equipment to be used, inspection requirements, and training requirements in the appropriate columns.
- After thorough analysis of the foregoing information, complete the checklist on the reverse side of the form.

Subcontractors are required to follow this same procedure.

5.0 COMMUNICATION AND REVIEW OF ACTIVITY HAZARD ANALYSIS

Safety Tailgate Meeting Awareness is a collaborative review of the SPA/AHA by the entire crew and supervisor before performing the task. These are conducted:

- At the beginning of the work shift
- After any change in personnel
- When there is a change of hazards or work conditions
- The SPA/AHA shall be modified in the field to reflect any tasks or hazards not identified
- SPA/AHA Form Attachment

Activity Hazard Analysis/Safe Plan of Action

(HSEP 21.2 f1)

Project No. _____
Job/Task _____ **Work Area** _____ **Date** _____

Steps of Task	Hazard/Reaction to Change	Safe Plan	Resources

Team Members' Signatures

_____ _____ _____ _____

_____ _____ _____ _____

THE SIGNATURE OF THE SUPERVISOR CONFIRMS THE COMPLETION OF THE HAZARD ASSESSMENT AND SAFE PLAN OF ACTION BY THE CREW.

Employee's Signature: _____ Date_____

INSTRUCTIONS: 1. WRITE NAME OF JOB OR TASK IN SPACE PROVIDED. 2. CONDUCT WALK-THROUGH SURVEY OF WORK AREA. 3. WRITE THE STEPS OF THE TASK IN A SAFE SEQUENCE. 4. LIST ALL POSSIBLE HAZARDS INVOLVED IN EACH STEP AND REACTION TO CHANGE. 5. IN THE SAFE PLAN COLUMN, STATE ACTIONS THAT WILL BE TAKEN TO PREVENT THE HAZARDS OR INJURY FROM REACTION TO CHANGE. 6. IN RESOURCES COLUMN, LIST EQUIPMENT, TOOLS, ETC. NEEDED TO DO THE JOB. 8. ASK EACH TEAM MEMBER, WHO HELPED DEVELOP AND WILL USE THIS SPA, TO SIGN IN SPACES PROVIDED. 9. REVIEW THE SPA AT THE END OF THE TASK FOR IMPROVEMENTS.

WORK SHALL STOP WHEN CONDITIONS CHANGE, THE JOB CHANGES, OR A DEFICIENCY IN THE PLAN IS DISCOVERED, AND THE CURRENT SPA WILL BE MODIFIED OR A NEW SPA CREATED

CONTINUATION AND OR ADDITIONS TO AHA DISCUSSED DURING PREPARATORY INSPECTION AND CREW BRIEFING

EQUIPMENT TO BE USED	INSPECTIONS REQUIREMENTS	TRAINING REQUIREMENTS

ACTIVITY HAZARD ANALYSIS ATTENDANCE RECORD		
Personnel Present (print):	Representing	Signature

Activity Hazard Analysis Checklist (check all that apply)

(Review checklist while completing second page of Activity Hazard Analysis)

A new AHA is required if the job scope, employee staffing or work conditions change.

Required Permits	Hazards	Safe Plan
☐ Confined Space	☐ Overhead Utilities	☐ Power de-energization required ☐ Insulation blankets required ☐ Wire watcher required
☐ Critical Lift		☐ Required clearance distance = _20___Ft. ☐ Safe work zone marked
☐ Hot Work	☐ Crane or other	☐ Signalman assigned ☐ Tag lines in use ☐ Area around crane barricaded
☐ Lock Out/Tag Out	Lifting Equipment	☐ Lifting equipment inspected ☐ Personnel protected from overhead load
☐ Soil Disturbance (Over 12")	☐ Underground Utilities☐	☐ Reviewed as-builts ☐ Subsurface surveys ☐ Received dig permit
☐ Utility Clearance		Required clearance distance = _____ Ft. ☐ Safe work zone Marked
Required PPE	☐ Electrical	☐ Lock Out/Tag Out/Try Out ☐ Permit required? ☐ Confirm that equipment is de-energized
☐ Hard Hat, Class C		☐ Reviewed electrical safety procedures
☐ Hard Hat, Class E *(Elect. Protect)*	☐ Excavations	☐ Permits ☐ Inspected prior to entering ☐ Proper sloping/shoring
☐ Ear Plugs/Ear Muffs		☐ Barricades provided ☐ Access/egress provided ☐ Protection from accumulated water
Eye Protection:	☐ Fire Hazard	☐ Hot Work Permit ☐ Fire Extinguishers ☐ Fire watch
☐ Safety Glasses		☐ Adjacent area protected ☐ Unnecessary flammable material removed
☐ Face Shield	☐ Vehicular Traffic or	☐ Traffic Barricades ☐ Cones ☐ Signs ☐ Flagmen ☐ Lane closure
☐ Chemical Goggles	Heavy Equipment	☐ Communication with equipment operator
☐ Welding Hood	☐ Noise >85 dB	Hearing protection is required: ☐ Ear plugs ☐ Ear Muffs ☐ Both
Hand Protection:	☐ Hand & Power Tools:	☐ Inspect general cond. ☐ GFCI in use ☐ Identified PPE required for each tool
☐ Cut Resistant Gloves		☐ Reviewed safety requirements in operators manual(s) ☐ Guarding OK
☐ Welders Gloves	☐ Hand Hazards	List sharp tools, material, equipment: _____
☐ Nitrile Gloves		☐ PPE gloves, etc. ☐ Protected sharp edges as necessary
☐ Surgical Gloves	☐ Manual Lifting	☐ Reviewed proper lifting tech. ☐ Identified material requiring lifting equipment
☐ Rubber Gloves		☐ Hand protection required ☐ Back support belts
☐ Elect. Insulated Gloves	☐ Ladders	☐ Inspect general cond. before use ☐ Ladder inspected with in last quarter
☐ Arm Sleeves		☐ Ladder tied off or held ☐ Proper angle and placement ☐ Reviewed ladder safety
Foot Protection:	☐ Scaffolds	☐ Inspect general condition before use ☐ Tags in place ☐ Properly secured
☐ Sturdy Work Boots		☐ Toe boards used ☐ Footings adequate ☐ Materials properly stored on scaffold
☐ Safety Toe Boots	☐ Slips, Trips Falls	☐ Inspect for trip hazards ☐ Hazards marked ☐ Tools & material properly stored
☐ Rubber Boots		☐ Extension cords properly secured ☐ Work zone free of debris
☐ Rubber Boot Covers	☐ Pinch Points	List potential pinch points: _____
☐ Dielectric Footwear		☐ Working near operating equipment ☐ Hand/Body positioning
Respiratory. Protection: ☐ N/A	☐ Working w/ Chemicals	☐ The task creates potential for direct contact with hazardous chemicals.
☐ Dust Mask		☐ Reviewed MSDS hazards and precautions ☐ Have proper containers and labels.
		☐ Have identified proper PPE (respirators, clothing, gloves, etc.)
☐ Air Purifying Respirator	☐ Heat Stress Potential	☐ Heat stress monitoring (>85°) ☐ Liquids available ☐ Cool down periods
☐ Supplied Air Respirator		☐ Sun Screen ☐ Reviewed Heat Stress symptoms
☐ SCBA	☐ Cold Stress Potential	☐ Proper clothing (i.e.. gloves, coat, coveralls) ☐ Wind chill <32°
☐ Emergency Escape Respirator		☐ Reviewed Cold Stress symptoms ☐ Warm up periods
Special Clothing: ☐ N/A	☐ Environmental	☐ Air emissions ☐ Water discharge ☐ Hazardous wastes ☐ Other wastes
		☐ Pollution prevention ☐ Waste minimization
☐ Tyvek ®	☐ Natural or Site Hazards	☐ Weather ☐ Terrain ☐ Adjacent operations or processes ☐ Biological hazards
☐ Poly Coated Tyvek ®		☐ Animals/reptiles/insects hazards
☐ Fire Resistant Coveralls	☐ Adjacent Work/Processes	☐ Notified them of our presents ☐ Other workers adjacent, above, or below.
☐ Rain Suit	and/or co occupancy	☐ Coordinated with adjacent work supervisor/customer operator ☐ Can work safely
☐ Safety Vest	☐ Barricades/covers	☐ Caution barricade tape required ☐ Danger barricade tape required ☐ Rigid railing required
Fall Protection: ☐ N/A		☐ Covers over opening ☐ Warning signs required
	Additional Information:	
☐ Harness		
☐ Double Lanyard Required		
☐ Anchorage Point Available		
☐ Additional Anchorage Connector Needed e.g. Cross Arm Strap, etc.		
☐ Retractable Device Needed		
☐ Horizontal Life Line System Req'd.		
☐ Fall Clearance Distance Adequate		
☐ Fall Rescue/Retrieval Plan Set Up		

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Mobilization and Site Set-Up**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shield, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: All Site Personnel

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Use of loaders, loaders with forks, excavators, end dumps, and water trucks	Equipment failure	Equipment shall be inspected prior to use for any defects. Defects that effect the safe operation of the equipment shall be tagged out-of-service until repairs are conducted.
Material handling	Not operated by qualified operators	Only qualified operators with experience and knowledge of the equipment can operate machinery. Jacobs Procedure 8.3, Equipment Operator Qualification, shall be followed which includes completing an Equipment Qualification Form. Equipment shall not be overloaded and operated within the manufacturer's specifications. Special custom design grabs, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125 percent of their rated load.
	Rigging failure	Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service. Welded alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity, and sling manufacturer. Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links, or other attachments, when used with alloy steel chains, shall have a rated capacity at least equal to that of the chain.
	Being struck by equipment	Where the movement of materials can be hazardous to persons, taglines shall be used to control the load. No one shall be permitted to be under a suspended load.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Mobilization and Site Set-Up**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shield, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: All Site Personnel

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
		Personnel shall wear orange high visibility vests. Only the personnel need in the area shall be present when working around operating machinery. Signal persons shall be used when operator's vision is obstructed. Equipment travel routes should be marked and operators notified of them.
	Back injury	Persons shall not walk directly behind or next to machinery unless the operator has your full vision and acknowledges your presence. When unloading equipment get help if the object is too heavy. Generally 50 pounds is the maximum anyone should handle. Use good lifting techniques. Use dollies, hand trucks to assist movement of the material.
	Objects stacked	All materials in bags, containers, bundles or stored in tiers shall be limited in height.
	Unsecured loads	Loads carried in trucks or vehicles shall be secured from movement.
Setting up job site trailer, wash facilities, and toilets	Excavation for utilities and/or tie downs	Utility locates will be conducted in accordance with HSEP 7.3.3. Trailers and portable toilets will be tied down to prevent overturning in high winds.
	Electrical shock/fire	All circuits will be protected against overload. All flexible cords shall be hard usage or extra hard usage based. Cords passing through work areas shall be protected. Grounds shall be installed as per EM-385-1-1 Section 11 and the National Electric Code. Only qualified electricians are permitted to install electrical equipment.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Mobilization and Site Set-Up**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shield, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: All Site Personnel

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Setting up job site trailer, wash facilities, and toilets (continued)		Electrical equipment shall be suitability for installation and use. Suitability of equipment for an identified purpose may be evidenced by listing, labeling, or certification for that identified purpose.
	Crushing/ pinching injuries	Trailers shall be blocked and secured to prevent movement. Personnel shall ensure that while blocking, protection against collapse is provided by the use of cribbing and blocking.
	Poor hygiene	Wash facilities shall be provided for crews as outlines in EM 385-1-1 and specific areas shall be provided on projects. Warm tepid water shall be provided, along with soap and individual towels for drying. Personnel should wash hands after being in contaminated POL sites and prior to eating or smoking.
	Misuse of hand and power tools	Use the right tool for the job. Hand and power tools shall be inspected, tested, and determined to be in safe operating condition before use. Continued periodic inspections shall be made to assure safe operating condition and proper maintenance. Hand and power tools shall be in good repair and with all required safety devices installed and properly adjusted. Tools having defects that will impair their strength or render them unsafe shall be removed from service. Power tools designed to accommodate guards shall be equipped with such guards. Reciprocating, rotating, and moving parts of equipment shall be guarded if exposed to contact by employees or otherwise create a hazard.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Mobilization and Site Set-Up**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shield, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: All Site Personnel

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Use of hand and power tools	Electrical shock	Power tools shall be double insulted or provided with ground prong. Power tools used with extension cords (flexible cords) shall be provided with a ground fault circuit interrupter.
Designated smoking area	Fire and inhalation of contaminates found at the site	The designated smoking area will be cleared of flammable and/or combustible materials that may be ignited and be located outside of contaminated areas. The area shall be provided with a cigarette butt container. Portable fire extinguisher shall be located not more than 25 feet away.
	Smoking in office facilities	Smoking is only allowed in designated area, outside of facilities and away from entrances to buildings.
Setting up and demarcating areas and site control	Not separating clean (support) areas from POL-contaminated areas	Each POL-contaminated area on this project shall be marked and clearly identified. Control shall be established and maintained to prevent persons not needing to perform work to walk into POL-contaminated areas.
First aid	Not having required first aid equipment available	A minimum of a 16-unit first aid kit shall be provided at the work site. Communication and emergency number shall be posted onsite. Each site is required to have at least two persons qualified in first aid/CPR.
	Not identifying physical hazards located on the site	The site shall be inspected for physical hazards such as pits, holes, and protruding objects from the ground. Areas of concern shall be identified by barricading with construction fence or yellow or red barricade tape RED DANGER, YELLOW CAUTION, and/or posted if needed. Hazards will be communicated to personnel during daily pre-job briefings.
Fuel storage areas	Fire/open flames	Above ground fuel storage areas shall be free of combustible material. The area should be posted to warn of combustible or flammable material with “No Smoking

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Mobilization and Site Set-Up**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shield, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: All Site Personnel

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
		or Open Flames". The AST shall be labeled to its contents. At least one portable fire extinguisher, having a rating of not less than 20 B-C units, shall be located not less than 25 feet and not more than 75 feet from any flammable liquid storage area located outside. Small quantities of flammable liquids shall be kept in approved metal safety cans and stored in a designated area after use.
	Spills	The area under the AST shall be lined with plastic to capture any material spilled when transferring liquids. A means to clean up spills shall be available for all storage and dispensing areas.
Establishing communications	Not having adequate communication with emergency response, medical facilities, personnel	Communications with emergency medical personnel shall be established immediately upon mobilization of the site. Communication with all site personnel discussing emergency requirements contained in the SSHP and identifying any areas of concern shall be conducted.
Overhead power lines	Electrical shock/death	Any overhead wire shall be considered energized unless the person owning such line or operating officials of the electrical utility supplying the line assures that it is not energized and it has been visibly grounded. Operations adjacent to overhead lines are prohibited unless at least one of the following conditions is satisfied: a. Power has been shut off and positive means taken to prevent the lines from being energized. b. Equipment, or any part, does not have the capability of coming within the minimum clearance from energized overhead lines as specified in c. or the equipment has been positioned and blocked to assure no part, including cables,

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Mobilization and Site Set-Up**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shield, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: All Site Personnel

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
		can come within the minimum clearances as specified in c. A notice of the minimum required clearance has been posted at the operator's position (electric line derrick trucks and aerial lifts are not required to comply with this requirement), or c. The equipment clearance is at least 10 feet for voltages of 50 kV or less. Work activities that could affect or be affected by overhead lines shall not be initiated until coordinated with the appropriate utility officials.

CONTINUATION AND/OR ADDITIONS TO AHA DISCUSSED DURING PREPARATORY INSPECTION AND CREW BRIEFING

EQUIPMENT TO BE USED	INSPECTIONS REQUIREMENTS	TRAINING REQUIREMENTS
Power tools/hand tools	Prior to each use	Qualified by experience and/or training
Loader	Prior to use and equipment inspection forms completed at initial mobilization	Qualified by experience and/or training
Excavator	Prior to use and equipment inspection forms completed at initial mobilization	Qualified by experience and/or training
Water truck	Prior to use and equipment inspection forms completed at initial mobilization	Qualified by experience and/or training, licensed as required for tonnage of vehicle
Slings	Prior to each use	Qualified by experience and/or training

ACTIVITY HAZARD ANALYSIS ATTENDANCE RECORD

Personnel Present (print)	Representing	Signature

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **PCB Excavation and Transportation**

(Include photographs of work area if possible)

DATE: July 2007

ESTIMATED STARTING DATE: August 2007

RECOMMENDED PROTECTIVE CLOTHING:
MODIFIED LEVEL D
Hard hat, safety glasses w/side shield, Tyvek coveralls, booties or rubber boots to prevent contact with soil, steel-toed boots w/Tyvek booties or rubber steel-toed boots, orange vest, nitrile gloves, full face or ½ face air purifying respirator w/P100 cartridges is optional based upon site conditions, and hearing protection

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Obtain required excavation permits	Not having required permits required for excavation (digging up utilities)	Coordinate utility locates with local utility company and/or landowners. Follow requirements of Jacobs HSEP 7.3.3 (Attachment B-3) and utility locates. Use magnetometers as required by the procedure. Also ensure that active utilities are marked.
Provide pre-job tailgate meeting	Not providing adequate planning and communication of this task	Discuss AHA/SPA requirements and develop additional SPA/JHA for site specific site conditions that have not been identified with all employees responsible for this work activity. All potential contaminated areas need to be identified by establishing appropriate site control work zones and decontamination stations shall be set up as described in accordance with this SSHP. Truck loading areas shall also be marked to prevent the spread of POL and PCB contamination. Keep non-essential personnel, vehicles and equipment out of the work areas.
Monitor the area around the site for personnel's exposure to PCBs and other potential VOC's	Not determining personnel exposure limits Not following monitoring requirements	Monitoring for POLs and PCBs shall be conducted as required in the SSHP monitoring section. PPE shall be worn as described above. Personnel not needing to get off the clean area of the site (backfill clean soil) are required to wear level D, hard hat , safety glasses, steel toed boots, orange vest. Respirators should be used by site personnel when the action levels in the SSHP, Appendix C, Table C1 are exceeded, dust emissions cannot be controlled or when personnel are bothered by the chlorinated odor.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **PCB Excavation and Transportation**

(Include photographs of work area if possible)

DATE: July 2007

ESTIMATED STARTING DATE: August 2007

RECOMMENDED PROTECTIVE CLOTHING:
MODIFIED LEVEL D
Hard hat, safety glasses w/side shield, Tyvek coveralls, booties or rubber boots to prevent contact with soil, steel-toed boots w/Tyvek booties or rubber steel-toed boots, orange vest, nitrile gloves, full face or ½ face air purifying respirator w/P100 cartridges is optional based upon site conditions, and hearing protection

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Excavate PCB-contaminated material in established contaminated areas	Not following best management practices	Excavations shall not be entered unless properly sloped 1 ½ to 1 or shored. Place excavated material on plastic barrier to prevent contamination or load into trucks.
	Contaminate surrounding soil	Barricade the swing radius of excavators. Personnel shall ensure they have eye contact with operators and truck when walking around them. Equipment has the right away so extreme caution and communication is required. Personnel shall stay away from trucks when they are being loaded.
	Personnel struck by equipment or soil during loading	Truck drivers shall remain in their trucks if the cab is provided with protection from falling debris. If this is not possible, brakes shall be set, wheels chalked and truck operators shall remain a safe distance from truck loading operations until truck is loaded and excavator or loader operator has signaled to proceed to cab.
PCB and contaminated soil sampling	Contact with POL-contaminated soil and potential VOC's	Wear nitrile gloves when handling methanol. Keep upwind and do not use inside a enclosed area. Samplers shall wear Tyvek coveralls, booties, nitrile gloves (two layers), steel toed boots, safety glasses when sampling. Air purifying respirator with organic cartridges shall be worn when: action levels are exceeded, dust emissions are visible or the chlorinated odor bothers them. Gloves should be taped to Tyvek's to prevent contact with PCB contaminated soil
Soil being staged after excavation and not immediately being hauled away	Spread of POL-contaminated material	Soil that is staged for transportation shall be placed on plastic tarps and covered each night.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **PCB Excavation and Transportation**

(Include photographs of work area if possible)

DATE: July 2007

ESTIMATED STARTING DATE: August 2007

RECOMMENDED PROTECTIVE CLOTHING:
MODIFIED LEVEL D
Hard hat, safety glasses w/side shield, Tyvek coveralls, booties or rubber boots to prevent contact with soil, steel-toed boots w/Tyvek booties or rubber steel-toed boots, orange vest, nitrile gloves, full face or ½ face air purifying respirator w/P100 cartridges is optional based upon site conditions, and hearing protection

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Tarping bins for transport	Falls Contact with PCB or VOC contaminated soil	A bin tarping area shall be constructed from truck flats and soil brought up to the sides to prevent fall hazard. Ends shall have guardrails installed and when bins are not in the bin tarping area personnel need to stay away from edges (administrative control) Personnel tarping shall wear nitrile gloves and respirators if above action levels or the chlorinated odor bothers them. A area for placing contaminated gloves shall be designated. Personnel working from ladders shall secure them or have another person hold them. A signal person shall be used when positioning bins into the tarping area.

CONTINUATION AND/OR ADDITIONS TO AHA DISCUSSED DURING PREPARATORY INSPECTION AND CREW BRIEFING

EQUIPMENT TO BE USED	INSPECTIONS REQUIREMENTS	TRAINING REQUIREMENTS
Truck and trailer	Pre operation, Daily	Class A CDL, DOT medical certification, Qualified operator
Excavator	Pre operation, Daily,	Qualified operator, Competent person for trenching and excavating
Loader	Pre operation, Daily	Qualified operator
Magnatometer		
PID and Combustible gas meter	Pre and post calibration	Trained to manufacturers requirements and experience in the use of equipment
Air monitoring pumps	Pre and post calibration	Trained to manufacturers requirements and experience in the use of equipment

ACTIVITY HAZARD ANALYSIS ATTENDANCE RECORD

Personnel Present (print)	Representing	Signature

ACTIVITY HAZARD ANALYSIS

(Also meets requirements of Jacobs Safe Plan of Action [SPA])

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **Test Pit and POL Excavation**

(Include photographs of work area if possible)

DATE: May 2007

ESTIMATED STARTING DATE: June 2007

RECOMMENDED PROTECTIVE CLOTHING:
MODIFIED LEVEL D
Hard hat, safety glasses w/side shield, Tyvek coveralls, booties or rubber boots to prevent contact with soil, steel-toed boots w/Tyvek booties or rubber steel-toed boots, orange vest, nitrile gloves, full face or half-face air purifying respirator w/P100 cartridges is optional based upon site conditions, and hearing protection

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Obtain required excavation permits	Not having required permits required for excavation (digging up utilities)	Coordinate utility locates with local utility company and/or landowners. Follow requirements of Jacobs HSEP 7.3.3, Utility Clearance (provided in Attachment B-3) and utility locates. Use magnetometers as required by the procedure. Also ensure that active utilities are marked.
Provide pre-job tailgate meeting	Not providing adequate planning and communication of this task	Discuss AHA/SPA requirements and develop additional SPA/AHA for site-specific site conditions that have not been identified with all employees responsible for this work activity. All potential contaminated areas need to be identified by establishing appropriate site control work zones and decontamination stations shall be set up as described in accordance with this SSHP. Truck loading areas shall also be marked to prevent the spread of contamination. Keep non-essential personnel, vehicles and equipment out of the work areas.
Monitor the area around the site for personnel's exposure to benzene and chlorinated compounds	Not determining personnel exposure limits Not following monitoring requirements	Monitoring shall be conducted as required in the SSHP monitoring section. PPE shall be worn as described above. Personnel not needing to get off the clean area of the site (backfill clean soil) are required to wear level D, hard hat, safety glasses, steel toed boots, orange vest. Respirators should be used by site personnel when the action levels in this SSHP are exceeded, or dust emissions cannot be controlled.

ACTIVITY HAZARD ANALYSIS

(Also meets requirements of Jacobs Safe Plan of Action [SPA])

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **Test Pit and POL Excavation**

(Include photographs of work area if possible)

DATE: May 2007

ESTIMATED STARTING DATE: June 2007

RECOMMENDED PROTECTIVE CLOTHING:
MODIFIED LEVEL D
Hard hat, safety glasses w/side shield, Tyvek coveralls, booties or rubber boots to prevent contact with soil, steel-toed boots w/Tyvek booties or rubber steel-toed boots, orange vest, nitrile gloves, full face or half-face air purifying respirator w/P100 cartridges is optional based upon site conditions, and hearing protection

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
	Contaminate surrounding soil	Each contaminated area on this project shall be marked and clearly identified. Control shall be established and maintained to prevent transfer of contamination to un-contaminated soils.
	Personnel struck by equipment or soil during loading	Truck drivers shall remain in their trucks if the cab is provided with protection from falling debris. If this is not possible, brakes shall be set, and truck operators shall remain a safe distance from truck loading operations until truck is loaded and excavator or loader operator has signaled to proceed to cab. Personnel shall ensure they have eye contact with operators and truck when walking around them. Equipment has the right away so extreme caution and communication is required. Personnel shall stay away from trucks when they are being loaded.
Contaminated soil sampling	Contact with POL-contaminated soil	Samplers shall wear nitrile gloves (two layers), steel toed boots, safety glasses when sampling. Air purifying respirator with organic cartridges shall be worn when: action levels are exceeded, or dust emissions are visible.
Tarping trucks for transport	Falls Contact with contaminated soil	A tarping area will be established. Personnel tarping shall wear gloves. Respirators will be worn if activity could result in exposures in excess of action levels. To the extent possible trucks shall be equipped with pull tarps to avoid any need for climbing on trucks.

CONTINUATION AND/OR ADDITIONS TO AHA DISCUSSED DURING PREPARATORY INSPECTION AND CREW BRIEFING

EQUIPMENT TO BE USED	INSPECTIONS REQUIREMENTS	TRAINING REQUIREMENTS
Truck and trailer	Pre operation, Daily	Class A CDL, DOT medical certification, Qualified operator
Excavator	Pre operation, Daily	Qualified operator, Competent person for trenching and excavating
Loader	Pre operation, Daily	Qualified operator
Magnetometer		
PID and Combustible gas meter	Pre and post calibration	Trained to manufacturers requirements and experience in the use of equipment
Air monitoring pumps	Pre and post calibration	Trained to manufacturers requirements and experience in the use of equipment

ACTIVITY HAZARD ANALYSIS ATTENDANCE RECORD

Personnel Present (print)	Representing	Signature

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **Soil Stockpiling Operations and Maintenance and Decommissioning**

(Include photographs of work area if possible)

DATE: July 2007

ESTIMATED STARTING DATE: August 2007

RECOMMENDED PROTECTIVE CLOTHING:
Hard hat, safety glasses w/side shield, Tyvek coveralls or cotton coveralls to prevent contact with soil, steel-toed boots, orange vest, gloves, leather (nitrile liners optional), and hearing protection when working around heavy equipment

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Soil stockpiling operation and maintenance	Slips, trips, and falls / sharp objects POL contaminates	Inspect area for debris and other hazards. Use caution when climbing on or around tarps. When working with two people or more communicate together and work as a team. Personnel should wear leather gloves when handling tarps to prevent cuts from sharp objects. When handling POL-contaminated soil nitrile gloves should be worn under leather gloves to prevent material from absorbing into gloves and then into your hands. Always look for protruding objects that could puncture boots. Use PID to monitor for vapors and follow exposure limits and action levels outlined in SSHP.
Using excavator, loader, and personnel to remove stockpile covers and/or maintain existing covers	Working around heavy equipment and being struck	Ensure the equipment is in good condition by conducting proper equipment operation check. Operator shall be qualified to operate the specified equipment.
	Back injury from pulling and lifting tarps and weights	Personnel shall wear orange vests and non-essential personnel shall not be permitted within the vicinity of operating heavy equipment. Essential personnel working around heavy equipment shall make eye contact with operator and ensure the operator understands your intention when walking or working around such equipment. Backup alarms shall be provided. Equipment swing radius should be marked to keep personnel out of the swing radius hazard area.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **Soil Stockpiling Operations and Maintenance and Decommissioning**

(Include photographs of work area if possible)

DATE: July 2007

ESTIMATED STARTING DATE: August 2007

RECOMMENDED PROTECTIVE CLOTHING:
Hard hat, safety glasses w/side shield, Tyvek coveralls or cotton coveralls to prevent contact with soil, steel-toed boots, orange vest, gloves, leather (nitrile liners optional), and hearing protection when working around heavy equipment

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Using excavator, loader, and personnel to remove stockpile covers and/or maintain existing covers (continued)	Back injury from pulling and lifting tarps and weights (continued)	Use lifting aids when possible such as hand carts and/or have excavator assist with heavy equipment. Use two people when handling stockpile covers and weights. Use good lifting practices by using you legs, keeping your back straight and carrying objects close to your body.
Medical emergencies/fire	Not having adequate emergency medical supplies or communication	A first aid kit shall be available onsite. Personnel working remotely shall carry a radio or cell phone to communicate medical emergencies. A first aid, CPR trained personnel shall always be on site. Personnel shall ensure that prior to going to any work location they understand the emergency notification procedures. Fire extinguishers shall be provided.
Stockpile decommissioning by separating plastic, liners, felt, ropes, net, and sandbags	Slips, trips, and falls / sharp objects POL contaminates	Personnel should wear leather gloves when handling tarps to prevent cuts from sharp objects. When handling POL-contaminated soil nitrile gloves should be worn under leather gloves to prevent material from absorbing into gloves and then into your hands. Always look for protruding objects that could puncture boots. Use PID to monitor for vapors and follow exposure limits and action levels outlined in SSHP.
	Back injury from pulling and lifting tarps and weights	Have excavator or loader assist with heavy lifting. Use two people when handling stockpile covers, weights, etc. Use good lifting practices by using you legs, keeping your back straight and carrying objects close to your body.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **Soil Stockpiling Operations and Maintenance and Decommissioning**

(Include photographs of work area if possible)

DATE: July 2007

ESTIMATED STARTING DATE: August 2007

RECOMMENDED PROTECTIVE CLOTHING:
Hard hat, safety glasses w/side shield, Tyvek coveralls or cotton coveralls to prevent contact with soil, steel-toed boots, orange vest, gloves, leather (nitrile liners optional), and hearing protection when working around heavy equipment

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Loading trucks debris and soil	Personnel struck by equipment or soil during loading	Barricade the swing radius of excavators. Personnel shall ensure they have eye contact with operators and truck when walking around them. Equipment has the right away so extreme caution and communication is required. Personnel shall stay away from trucks when they are being loaded. Truck drivers shall remain in their trucks if the cab is provided with protection from falling debris. If this is not possible, brakes shall be set, wheels chalked and truck operators shall remain a safe distance from truck loading operations until truck is loaded and excavator or loader operator has signaled to proceed to cab.

CONTINUATION AND/OR ADDITIONS TO AHA DISCUSSED DURING PREPARATORY INSPECTION AND CREW BRIEFING

EQUIPMENT TO BE USED	INSPECTIONS REQUIREMENTS	TRAINING REQUIREMENTS
Forklift	Pre operation, Daily	Forklift operator training, Qualified operator
Truck and trailer	Pre operation, Daily, DOT Annually	Class A CDL, DOT medical certification, Competent operator
Excavator	Pre operation, Daily	Competent operator, Competent person for trenching and excavating
Visual inspection	Weekly, Monthly stockpile inspection	Qualified Operator
Loader	Pre operation, Daily	Qualified Operator
PID	Pre and Post Calibration	Follow manufacturer instructions

ACTIVITY HAZARD ANALYSIS ATTENDANCE RECORD

Personnel Present (print)	Representing	Signature

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **Site Backfill, Grade, and Restoration**

(Include photographs of work area if possible)

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

DATE: July 2007

ESTIMATED STARTING DATE: August 2007

RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Safety glasses w/side shield, rubber steel-toed boots or steel-toed boots, orange vest, and gloves (leather)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Trucks transporting clean backfill soil to site	Personnel entering excavations	Excavations shall not be entered by personnel unless properly sloped 1 ½ to 1 or shored.
	Personnel struck by trucks entering and existing the site	Established truck routes will be identified and communicated to personnel. Signal persons will be identified to guide vehicles to excavations if needed.
	Trucks tipping over when approaching excavation or when dumping load	Stop blocks will be provided for trucks at the side of vertical excavations to prevent trucks from tipping over or the excavation caving in under the load of the truck.
Operation of, loaders or excavators to place soil	Personnel struck by equipment	Personnel shall ensure they have eye contact with operators when walking around them. Equipment has the right away so extreme caution and communication is required. Personnel shall stay away from trucks when they are being unloaded. All unnecessary personnel shall be removed from the area.
Personnel reseeding soil with push and/or hand held grass seeders	Seeds coming into contact with eyes	The established PPE as stated above shall be worn.

CONTINUATION AND/OR ADDITIONS TO AHA DISCUSSED DURING PREPARATORY INSPECTION AND CREW BRIEFING

EQUIPMENT TO BE USED	INSPECTIONS REQUIREMENTS	TRAINING REQUIREMENTS
Vehicle or ATV	Prior to use	Have valid drivers license and trained to manufacturers recommendations for safe operation
Pumps	Prior to use	Trained to manufacturers recommendations for safe operation

ACTIVITY HAZARD ANALYSIS ATTENDANCE RECORD

Personnel Present (print)	Representing	Signature

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska

JOB: **Waste Management / IDW Management**

(Include photographs of work area if possible)

PREPARED BY: B. Roberts

REVIEWED BY: (Supervisor or SSHO)

DATE: July 2007

ESTIMATED STARTING DATE: August 2007

RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shield, steel-toed boots, orange vest, and gloves (leather)

POSITION ASSIGNED TO DO JOB: _____

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Minimize all waste	Not using best management practice by creating unnecessary waste	Define waste streams at the beginning of the project to discover safer and more cost effective ways to minimize waste.
Segregate and control of waste	Mixing waste and storing incompatible waste streams together	Provide segregation of waste, solids, liquids combustibles, flammables, hazardous, and highly hazardous, and compatibility of storage and packaging. Placard waste streams as required by state, federal, and best management practices. Provide required container storage and manifests. Store in a segregated area by using barricades.
Prevention of spills and fire	Spills and fire	Only personnel trained to understand the hazards, safe handling, segregation and packaging shall be responsible for waste handling. Everyone should participate in identifying better methods and controls.
IDW management	Pinch points	Use caution and watch the placement of your hands, wear nitrile gloves w/ leather gloves over them and Tyvek suit to keep potentially contaminated soil or water off clothes and handling drum lids.
	Back injury loading drums	Use lifting aids or get help moving materials.

CONTINUATION AND/OR ADDITIONS TO AHA DISCUSSED DURING PREPARATORY INSPECTION AND CREW BRIEFING

EQUIPMENT TO BE USED	INSPECTIONS REQUIREMENTS	TRAINING REQUIREMENTS
Vehicle or ATV	Prior to use	Have valid drivers license and trained to manufacturers recommendations for safe operation
Pumps	Prior to use	Trained to manufacturers recommendations for safe operation

ACTIVITY HAZARD ANALYSIS ATTENDANCE RECORD

Personnel Present (print)	Representing	Signature

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Demobilization**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shields, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: Site Project Manager, Contractor Quality Control, Site Safety and Health Officer, Operators, Signal Persons, Laborers

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Use of loaders, loaders with forks, trackhoes (excavators), end dumps, and water trucks	Equipment failure	Equipment shall be inspected prior to use for any defects. Defects that effect the safe operation of the equipment shall be tagged out-of-service until repairs are conducted.
Material handling	Not operated by qualified operators	Only qualified operators with experience and knowledge of the equipment can operate machinery. Jacobs Procedure 8.3, Equipment Operator Qualification, shall be followed which includes completing an Equipment Qualification Form HSEP 8.3 in Attachment B-3). Equipment shall not be overloaded and operated within the manufacturer's specifications.
	Not operated by qualified operators	Special custom design grabs, hooks, clamps, or other lifting accessories shall be marked to indicate the safe working loads and shall be proof-tested prior to use to 125 percent of their rated load.
	Rigging failure	Rigging equipment for material handling shall be inspected prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service.
Material handling (continued)	Rigging failure (continued)	Welded alloy steel chain slings shall have permanently affixed durable identification stating size, grade, rated capacity, and sling manufacturer. Hooks, rings, oblong links, pear-shaped links, welded or mechanical coupling links, or other attachments, when used with alloy steel chains, shall have a rated capacity at least equal to that of the chain.
	Being struck by equipment	Where the movement of materials can be hazardous to persons, taglines shall be used to control the load.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Demobilization**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shields, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: Site Project Manager, Contractor Quality Control, Site Safety and Health Officer, Operators, Signal Persons, Laborers

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
		No one shall be permitted to be under a suspended load. Personnel shall wear orange high visibility vests. Only the personnel need in the area shall be present when working around operating machinery. Signal persons shall be used when operator's vision is obstructed. Equipment travel routes should be marked and operators notified of them.
	Back injury	Persons shall not walk directly behind or next to machinery unless the operator has your full vision and acknowledges your presence. When loading equipment get help if the object is too heavy. Generally 50 pounds is the maximum anyone should handle. Use good lifting techniques. Use dollies, hand trucks to assist movement of the material.
Material handling (continued)	Objects stacked	All materials in bags, containers, bundles or stored in tiers shall be limited in height.
	Unsecured loads	Loads carried in trucks, or vehicles shall be secured from movement
Tear down job site trailer, wash facilities, and toilets	Electrical shock/fire	All circuits will be protected against overload. All flexible cords shall be hard usage or extra hard usage based. Cords passing through work areas shall be protected.
	Crushing/pinching injuries	Trailers shall be blocked and secured to prevent movement. Personnel shall ensure that while blocking, protection against collapse is provided by the use of cribbing and blocking.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Demobilization**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shields, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: Site Project Manager, Contractor Quality Control, Site Safety and Health Officer, Operators, Signal Persons, Laborers

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
	Misuse of hand and power tools	Use the right tool for the job. Hand and power tools shall be inspected, tested, and determined to be in safe operating condition before use. Continued periodic inspections shall be made to assure safe operating condition and proper maintenance.
	Misuse of hand and power tools	Hand and power tools shall be in good repair and with all required safety devices installed and properly adjusted. Tools having defects that will impair their strength or render them unsafe shall be removed from service. Power tools designed to accommodate guards shall be equipped with such guards. Reciprocating, rotating, and moving parts of equipment shall be guarded if exposed to contact by employees or otherwise create a hazard.
Use of hand and power tools	Electrical shock	Power tools shall be double insulted or provided with ground prong. Power tools used with extension cords (flexible cords) shall be provided with a ground fault circuit interrupter.
	Not identifying physical hazards located on the site	The site shall be inspected for physical hazards such as pits, holes, and protruding objects from the ground. Areas of concern shall be identified by barricading with construction fence or yellow or red barricade tape RED DANGER, YELLOW CAUTION, and/or posted if needed. Hazards will be communicated to personnel during daily pre-job briefings.
First aid	Not having required first aid equipment available	A minimum of a 16-unit first aid kit shall be provided at the work site. Communication and emergency number shall be posted on-site. Each site is required to have at least two persons qualified in first aid/CPR.

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Demobilization**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shields, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: Site Project Manager, Contractor Quality Control, Site Safety and Health Officer, Operators, Signal Persons, Laborers

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
Fuel storage areas	Fire/open flames	Above ground fuel storage areas shall be free of combustible material. The area should be posted to warn of combustible or flammable material with "No Smoking or Open Flames". The AST shall be labeled to its contents. At least one portable fire extinguisher, having a rating not less than 20 B-C units, shall be located not less than 25 feet and not more than 75 feet from any flammable liquid storage area located outside. Small quantities of flammable liquids shall be kept in approved metal safety cans and stored in a designated area after use.
Fuel storage areas (continued)	Spills	The liner shall be removed and disposed of in accordance with state and federal regulations. A means to clean up spills shall be available for all storage and dispensing areas.
Establishing communications	Not having adequate communication with emergency response, medical facilities, personnel	Communications with emergency medical personnel shall be maintained during demobilization of the site. Communication with all site personnel discussing emergency requirements contained in the SSHP and identifying any areas of concern shall be conducted.
Overhead power lines	Electrical shock/death	Any overhead wire shall be considered energized unless the person owning such line or operating officials of the electrical utility supplying the line assures that it is not energized and it has been visibly grounded. Operations adjacent to overhead lines are prohibited unless at least one of the following conditions is satisfied:

ACTIVITY HAZARD ANALYSIS

PROJECT: Former Communications Site, Fort Wainwright, Alaska
JOB: **Demobilization**
(Include photographs of work area if possible)

DATE: July 2007
ESTIMATED STARTING DATE: August 2007
RECOMMENDED PROTECTIVE CLOTHING: LEVEL D
Hard hat, safety glasses w/side shields, high visibility orange vests, and steel-toed boots

PREPARED BY: B. Roberts
REVIEWED BY: (Supervisor or SSHO)

POSITION ASSIGNED TO DO JOB: Site Project Manager, Contractor Quality Control, Site Safety and Health Officer, Operators, Signal Persons, Laborers

PART I (JOB STEPS)	PART II (HAZARDS)	PART III (ACTION TO ELIMINATE OR MINIMIZE HAZARD)
		a. Power has been shut off and positive means taken to prevent the lines from being energized. b. Equipment, or any part, does not have the capability of coming within the minimum clearance from energized overhead lines as specified in c. or the equipment has been positioned and blocked to assure no part, including cables, can come within the minimum clearances as specified in c. A notice of the minimum required clearance has been posted at the operator's position (electric line derrick trucks and aerial lifts are not required to comply with this requirement), or
Overhead power lines (continued)	Electrical shock/death (continued)	c. The equipment clearance is at least 10 feet for voltages of 50 kV or less and 15 feet for voltages 51Kv to 200 Kv. Additional clearances are provided in EM 385-1-1. Work activities which could affect or be affected by overhead lines shall not be initiated until coordinated with the appropriate utility officials.

CONTINUATION AND/OR ADDITIONS TO AHA DISCUSSED DURING PREPARATORY INSPECTION AND CREW BRIEFING

EQUIPMENT TO BE USED	INSPECTIONS REQUIREMENTS	TRAINING REQUIREMENTS
Power tools/hand tools	Prior to each use	Qualified by experience and/or training
Loader	Prior to use and equipment inspection forms completed at initial mobilization	Qualified by experience and/or training
Excavator (trackhoe)	Prior to use and equipment inspection forms completed at initial mobilization	Qualified by experience and/or training
Water truck	Prior to use and equipment inspection forms completed at initial mobilization	Qualified by experience and/or training, licensed as required for tonnage of vehicle
Slings	Prior to each use	Qualified by experience and/or training

ACTIVITY HAZARD ANALYSIS ATTENDANCE RECORD

Personnel Present (print)	Representing	Signature

ATTACHMENT 5

FCS-Specific Hazard Communication Program

FORMER COMMUNICATIONS SITE HAZARD COMMUNICATION PROGRAM

1.0 PURPOSE AND SCOPE

The purpose of this Health, Safety, and Environment Program (HSEP) is to provide the minimum requirements to Former Communications Site (FCS) Environmental Remediation Services (ERS) contract employees for maintaining and implementing this site-specific Hazard Communication Program.

This program applies to all FCS ERS project.

2.0 RESPONSIBILITIES

Responsibilities specific to this HSEP include the following:

2.1 Site Management

Site Management is responsible for ensuring that this site-specific Hazard Communication Program has been effectively communicated and implemented to all employees assigned to the site.

Site Management must ensure that Material Safety Data Sheet (MSDS) are maintained in the FCS ERS office and employee know and understand to request and/or access them.

Ensure employees are trained in the recognition of hazardous materials and the method and means to protect themselves from these hazards.

Continuously monitor the work to assure compliance with this program.

Confirm each job is properly prepared and that employees are aware of any hazardous substances that may be encountered as part of their work or as a result of someone else's work in the area.

Maintain a list of all workplace chemicals.

Label workplace chemical containers.

Maintain MSDSs for the workplace chemicals.

2.2 Site Safety and Health Officer

The Site Safety and Health Officer (SSHO) shall assist site management in compliance with this Hazard Communication Program.

2.3 Subcontractors

Will comply with the provisions of this program and communicate hazards associated with their work during daily pre-job meetings.

Provide copies to the SSHO of MSDS for hazardous chemicals brought onsite.

Attend site-specific orientation.

2.4 Employees

Employees must know and be able to recognize hazards associated with their work and to ensure that these hazards are properly addressed according to this program and the training received.

Employees must know where the MSDSs are located for chemicals used in the workplace.

Employees must be able to understand all forms of labeling and warning for hazards in the workplace.

3.0 DEFINITIONS

Acute	Severe, often dangerous conditions in which relatively rapid changes occur.
Acute Exposure	An intense exposure over a relatively short period of time.
Asphyxiant	A chemical (gas or vapor) that can cause death or unconsciousness by suffocation. Simple asphyxiants, such as nitrogen, either use up or displace oxygen in the air. They become especially dangerous in confined or enclosed spaces. Chemical asphyxiants, such as carbon monoxide and hydrogen sulfide, interfere with the body's ability to absorb or transport oxygen to the tissues.
Boiling Point	The temperature at which the vapor pressure of a liquid equals atmospheric pressure or at which the liquid changes to a vapor. The boiling point is usually expressed in degrees Fahrenheit. If a flammable material has a low boiling point, it indicates a special fire hazard.
"C" or Ceiling	A description usually seen in connection with a published exposure limit. It refers to the concentration that should not be exceeded, even for an instant. It may be written as TLV-C or Threshold Limit Value - Ceiling. (See Threshold Limit Value)
Carcinogen	A substance or physical agent that may cause cancer in animals or humans.
C.A.S. Number	Identifies a particular chemical by the Chemical Abstracts Service, a service of the American Chemical Society that indexes and compiles summaries of worldwide chemical literature called "Chemical Abstracts."
CC – Cubic Centimeter	A volumetric measurement, which, in the case of water, is also equal to one milliliter (mL).
Chemical	As broadly applied to the chemical industry, a naturally occurring substance or a compound produced by chemical reactions for either direct industrial and consumer use or for reaction with other chemicals.
Chemical Reaction	A change in the arrangement of atoms or molecules to yield substances of different composition and properties. (See Reactivity)

Chronic	Persistent, prolonged, or repeated conditions.
Chronic Exposure	A prolonged exposure occurring over a period of days, weeks, or years.
Combustible Liquid	According to the Department of Transportation (DOT) and the National Fire Protection Association (NFPA), combustible liquids are those having a flash point at or above 100 ºF (37.8 ºC). Combustible liquids do not ignite as easily as flammable liquids. However, combustible liquids can be ignited under certain circumstances and must be handled with caution. Substances, such as wood, paper, etc., are termed "ordinary combustibles."
Concentration	The amount of one substance mixed with, and in the presence of, another substance. For example, 5 parts (of acetone) per million (parts of air).
Corrosive	A substance that, according to the DOT, causes visible destruction or permanent changes in human skin tissue at the site of contact.
Dermatitis	An inflammation or irritation of the skin.
Dyspnea	Shortness of breath; difficult or labored breathing.
EPA	The U.S. Environmental Protection Agency (EPA) is the governmental agency responsible for administration of laws to control and/or reduce pollution of air, water, and land systems.
EPA Number	The number assigned to chemicals regulated by the EPA.
Flammable Liquid	By DOT and NFPA, a flammable liquid is one that has a flash point below 100 ºF. (See Flash Point)
Flash Point	The lowest temperature at which a liquid gives off enough vapor to form an ignitable mixture and burn when a source of ignition (sparks, open flames, cigarettes, etc.) is present. Two tests are used to determine the flash point: open and closed cup. The test method is indicated on the MSDS after the flash point.
Hazardous Material	Any substance or compound that may produce adverse effects on the health and safety of humans.
Ingestion	Taking a substance into the body through the mouth as food, drink, medicine, or unknowingly as on contaminated hands or cigarettes, etc.
Inhalation	The breathing in of an airborne substance that may be in the form of gases, fumes, mists, vapors, dusts, or aerosols.
Irritant	A substance that produces an irritating effect when it contacts the skin, eyes, nose, or respiratory system.

Lower Explosive Limit (LEL)	(Also known as Lower Flammable Limit.) The lowest concentration of a substance that will produce a fire or flash when an ignition source (flame, spark, etc.) is present. It is expressed in percent of vapor or gas in the air by volume. Below the LEL or LFL, the air/contaminant mixture is theoretically too "lean" to burn. (See also UEL)
Odor Threshold	The minimum concentration of a substance at which a majority of test subjects can detect and identify the substance's characteristic odor.
Occupational Safety and Health Administration (OSHA)	OSHA is a Federal Agency under the Department of Labor that publishes and enforces safety and health regulations for most business and industries in the United States.
Oxygen Deficiency	An atmosphere having less than the normal percentage of oxygen found in normal air. Normal air contains 20.8% oxygen at sea level.
Reactivity	A substance's propensity to under a chemical reaction or change that may result in effects, which can be dangerous, such as explosion, burning, or generation of corrosive or toxic emissions. Reaction initiators, such as heat, other chemicals, dropping, etc., will usually be specified as "Conditions to Avoid" when a chemical's reactivity is described in an MSDS.
Time Weighted Average (TWA)	The average concentration, over a given work period, e.g., 8-hour workday, of a person's exposure to a chemical or a potentially harmful agent. The average is determined by sampling for the contaminant during the period of exposure.
Upper Explosive Limit (UEL)	(Also known as Upper Flammable Limit.) The UEL is the highest concentration of a mixture that will burn or explode when an ignition source is present. Theoretically, above this limit, the mixture is said to be too "rich" to support combustion. The airborne concentration range between the LEL and the UEL constitutes the flammable range or explosive range.

4.0 PROGRAM

4.1 General

The purpose of Hazard Communication program is to communicate the hazards of workplace chemicals and communicate protective measures to control the hazards. Hazard Communication is accomplished by:

- Maintaining a list of all workplace chemicals
- Labeling workplace chemical containers
- Maintaining Material Safety Data Sheets for the workplace chemicals
- Implementing a training program to communicate the hazards of chemicals and appropriate protective measures

Upon completion of Hazard Communication training, Jacobs employees and subcontractors will understand the components of Hazard Communication, will understand the hazards of the chemicals in their workplace and the protective measures to control the hazards

4.2 Hazard Evaluation

Chemical manufacturers are responsible for assessing a chemical's:

- Physical hazards, such as flammability, combustibility, explosion, reaction, radioactivity
- Health hazards, such as irritation, corrosion, sensitization, or toxicity

The Company relies on our clients for chemical, product, and process unit intermediate stream hazard information.

MSDSs shall be requested for chemicals and products purchased or brought onto the site. The site relies on the evaluation performed by the chemical manufacturers or importers, who originated the MSDS, for the accuracy of this information.

MSDSs will be maintained at the FCS office.

4.3 Written Hazard Communication

A list of the chemicals used on FCS ERS will be maintained and updated at least annually or when there are new chemicals. The Site Project Manager/designee is expected to maintain the list of chemicals.

4.4 Labels

Labels and other forms of warnings are to be conspicuously placed on containers so the message is readily visible.

The chemical manufacturer, importer or distributor will label, tag or mark the chemical container identifying the hazardous chemicals, appropriate hazard warnings, and name and address of the chemical manufacturer, importer or responsible party.

4.1.1 Labeling Systems

There are multiple labeling systems currently in use including the NFPA 704M labeling system, the Hazardous Materials Information System (HMIS), DOT labeling system, the United Nations Hazard Class Number system and others.

The National Paint & Coatings Association (NPCA) HMIS uses standard labels to communicate hazards through the use of colors, numbers, letters of the alphabet, and symbols.

The HMIS is a five-part rectangle that provides identification of the chemical, acute health hazard, flammability, reactivity, personal protective equipment (PPE) designations, and chronic health hazard information.

The chemical identity is conveyed by the chemical name and should be the same as the name on the MSDS. The acute health (blue), flammability (red), reactivity (yellow) hazards are communicated by numerical ratings similar to the NFPA system.

An alphabetical designation is used to denote recommended PPE.

Chronic health hazards may be any abbreviated technique such as an asterisk communicated by placed on the label denoting reference to the specific MSDS, or the actual chronic information may be written on the label if space allows.

4.1.2 Labels for Transfer Containers

When hazardous materials are transferred from one container to another, the new container will be marked appropriately with the hazard warning.

4.5 Material Safety Data Sheets (MSDS)

An MSDS will maintained be at the FCS office for each hazardous chemical used by an employee. The MSDS will include:

- The chemical name and common name of all ingredients, which are health hazards
- The chemical name and common name of all ingredients which are physical hazards
- The physical and chemical characteristics of the hazardous chemical such as vapor pressure, flash point
- The physical hazards of the hazardous chemical including fire, explosion, reactivity
- The primary routes of entry
- The Permissible Exposure Limit, Threshold Limit Value, and other exposure limit used by the manufacturer
- Whether the hazardous chemical is listed in the National Toxicology Program Annual report on Carcinogens, International Agency for the Research on Cancer Monographs or by OSHA
- Applicable precautions for safe handling and use
- Applicable engineering controls, work practices, or personal protective equipment control measures known to the manufacturer
- Emergency and first aid procedures
- Date the MSDS was prepared and name, address and telephone number of the manufacturer

4.6 Work Place Inventory

An up-to-date hazardous chemical inventory must be maintained.

4.7 Employee Information and Training

Employees shall be informed of operations in their work area where hazardous chemicals are present, the location of the written Hazard Communication Program, list of hazardous chemicals, and MSDSs.

Training will include methods and observations to detect a hazardous chemical in the workplace, the physical and health hazards of the hazardous chemicals in the workplace, the

measures employees can take to protect themselves, an explanation of the labeling system and MSDSs.

Training will be documented using the Hazard Communication and Right-To-Know Training Form, of this document.

4.8 Trade Secrets

The chemical manufacturer may withhold specific chemical identity from the MSDS. For emergency or first aid treatment or non-emergency conditions, the chemical manufacturer will disclose the specific chemical identity to a health professional.

5.0 REFERENCES AND RELATED DOCUMENTS

29 CFR 1910.1200, Hazard Communication
29 CFR 1926.59, Hazard Communication
Jacobs HSEP 1.3, Hazard Communication

JACOBS ENGINEERING GROUP INC.

HAZARD COMMUNICATION
and
RIGHT TO KNOW STANDARDS TRAINING FORM

Name: _____ S.S. No.: _____

Company: _____

1. I have been informed about the Hazard Communication Program, Material Safety Data Sheets (MSDS), and Physical Agent Data Sheets (PADS) their use, location, and procedures for obtaining copies.

2. I have been informed that some of my work may involve exposure to toxic substances.

3. I have been informed about the right of employees to have access to relevant exposure and medical records, and the procedures for requesting access.

4. I understand that the employer must act upon a request in a reasonable amount of time to avoid the interruption of normal work operations but within 15 days.

Signature: _____

Date: _____

ATTACHMENT 6

Project-Specific Forms

Safety Observation Report

Visitor Check-in Log

Air Monitoring Record Form

Health and Safety Calibration Log

Exposure Monitoring Log

Hazardous Material Exposure and Field Activities Report

Daily Health and Safety Report

USACE Equipment Inspection Forms

BCC-Jacobs Equipment Inspection Forms

Welding/Brazing/Hot Work Permit

Authorization for Medical Treatment

USACE Accident Investigation Report (3394)

USACE Report of Accident (265-R)

ERS Incident Reporting Flowchart

Safety Tailgate Meeting Log

CESPOD-SO

POD AND HED
IMMEDIATE REPORT OF ACCIDENT

SOHO USE ONLY
Date Recd': _____
Time Recd:_____

TO: _____ FROM: _____ DATE: _____
(COE OFFICE)

1. Name of Person Reporting: _____ Phone No.: _____
(Print)
2. Location of Accident: _____
3. Date and Time of Accident: _____

   If this accident is being reported late (24 hrs), Why? _____
4. Name of Injured (if any): _____
5. Nature of Injury: _____
6. Occupation (Injured Person): _____
7. Age (Injured Person): _____
8. Estimated Lost Time (Days): _____

   Was return to light duty emphasized to the doctor? _____
9. Estimated Property Damage: _____
10. Contractor & Contract No.: _____
11. Board of Investigation Required? YES _____ NO _____

    1. Fatal? (See First Page)
    2. Three or more admitted to a hospital?
    3. Property damage of $200,000 or more?

    If yes, was immediate phone notifications to the Commander, Directorate and safety made? _____
12. Description of Accident: (continue on back if needed) Provide a narrative (Where, What, Why, How it Happened) so the Commander can get a understanding of the situation.

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

Who Investigated This Accident (Name): _____

Signature of Person Making Report: _____ Print Name: _____

Title of Person Making Report: _____ Phone No. to Reach: _____

Location of Person Making Report: _____

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

RIGGING AND WIRE ROPE CHECKLIST NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1 Has all defective rigging as specified in Appendix F been removed from service? (15.A.01)			
2 Is the hoist rope being wrapped around the load? (15.A.02)			
3 Are running lines located within 6'6" of ground or working level guarded? (15.A.03)			
4 When hoisting loads, is a positive latching device used? (15.A.05)			
5 Have hooks, shackles, rings, pads, etc. showing excessive wear or been bent, twisted, or damaged been removed from service? (15.A.06)			
6 When two wires are broken, rusty, or corrosion is found adjacent to a socket or end fitting, is the wire rope removed? (15.B.01) **Note:** Check end fittings on boom support, pendants, guy ropes, etc.)			
7 Is the clip attached to the live wire on wedge sockets? (15.B.04)			
8 Except for eye splices in ends of wire for wire rope slings, is wire rope used in hoisting, lowering, or pulling load one continuous piece without knot or splice? (15.B.07)			
9 Are wire rope clips used to splice wire rope? (15.B.09)			
10 Are only alloyed type chains used in rigging? (15.C.01)			
11 Are hooks, links, or fasteners made from bolts and rods used? (15.C.04)			
12 Is protection provided between the sling and sharp surfaces of the load to be lifted? (15.E.02)			
13 Are open hooks used in rigging to hoist loads? (15.F.07)			
14 Are shoulderless eye bolts loaded at an angle? (15.F.10)			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	FORMS, FALSEWORK AND CONRETE OPERATIONS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Have the forms been planned and designed in accordance with pertinent provisions of **ACI Publication 34FR and ANSI A 10.97?** (27.B.02)			
2	Has the design of formwork and falsework been submitted for review to designated authority? (27.B.02)			
3	Is sufficient bracing provided to prevent buckling or displacement? (27.B.05)			
4	Is safe access to the operations provided? (21.A.01)			
5	Are portable ladders secured top and botton? (21.D.08)			
6	Do the portable ladders extend at least 3 feet above platform, roof, or landing? (21.D.01 (b))			
7	Do ramps, stairs, walkways have guard and intermediate rails complete with toe boards? (21.B.01)			
8	Are floor openings, ladderways, roof openings guarded with rails and intermediate rails? (21.A.05)			
9	Where inclined ramps exceed 1'/5', are transverse cleats provided? (21.F.01 and 21.F.04)			
10	Is overhead protection provided to prevent falling objects from striking workers or public? (05.A.12 and 05.D)			
12	Is a flagman provided when the point of operations is not in view of the operator? (08.B.03 and 08.B.04)			
13	Are blade guards provided for power screeds or concrete finishers? (27.A.04)			
14	Are vibrators, concrete finishers, portable electric tools properly grounded? (11.C.01 (b))			
15	Are protective clothes and equipment (boots, gloves, goggles, etc.) provided when pouring concrete? (05.A.01)			
16	Are good houskeeping practices enforced during construction? (14.C.01)			
16a	Tools, material, extension cords, hoses, and debris shall not cause tripping or other hazards. (14.C.04)			
16b	Protuding nails, rods, wires shall be removed, hammered down, or bent over. (14.C.08)			
17	Is shoring inspected prior to, during, and immediately after placement of concrete? (27.B.06)			
18.	During welding or cutting operations, is protection from arc flashes, sparks, slags, etc., provided? (10.A.04)			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	CRANE/DERRICK INSPECTION CHECKLIST NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Are the following documents with the crane at all times? (16.C.01)			
1a	Operating manual from the manufacturer for the specific crane being inspected.			
	(1) Any operator aids for which the crane is equipped?			
1b	Load rating chart for the crane which shall include:			
	(1) the crane make and model, serial number, and year of manufacturer			
	(2) load ratings for all crane operating configurations: including optional equipment			
	(3) wire rope type, size, and reeving; line pull, line speed and drum capacity			
	(4) operating limits in windy or cold conditions			
1c	Crane log book that shows operating hours, inspections, tests, maintenance & repair. **Note:** Has log been updated daily when crane is used, and is signed by operator & supervisor? **Note:** Mechanics shall sign after conducting maintenance or repairs.			
2	Does operator have certification that he meets operator qualification and training as stated in 16.C.04 and Appendix G?			
3	Has a hazard analysis for set-up and set-down procedures (mobilization, assembly, dismantling, etc.). (16.C.07)			
4	Are adequate clearances provided from electrical sources, fixed objects, and swing radius. (16.C.08)			
5	Is communications provided as required? (16.C.10)			
6	Has inspection been performed in accordance with 16.C.11 and Appendix H?			
7	Have performance load tests been in accordance with 16.C.12?			
8	Are tag lines used to control loads? (16.C.15)			
9	Is critical lift plan required? (16.C.17 and page 285)			
10	Are all environmental considerations of 16.C.18 being met?			
11	Is crane equipped with boom angle indicator, load indicating device, means to visually determine levelness, and anti-two block devices. (16.D.01)			
12	Are cable supported booms equipped with boom stops? (16.D.02)			
13	Are booms lowered to ground or secured when not in use? (16.D.07)			
14	Do all floating cranes and derricks meet the requirements of 16.F?			
15	Are all moving parts (gears, drums, shafts, belts, etc.) and all hot surfaces (exhaust lines, pipes, etc.) guarded? (16.B.03)			
16	Does the unit have a suitable fire extinguisher? (16.A.26) **NOTE:** Minimum 5 BC			

Remarks:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	CRAWLER TRACTORS-DOZERS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Are inspection records kept available as part of the project files? (16.A.01 (b))			
2	Has equipment been inspected and tested by a competent person and certified to be safe? (16.A.02 (a) (b))			
3	Are only designated qualified operators assigned to operate mechanized equipment? (16.A.04)			
4	Are sufficient lights provided for night operations? (16.A.11)			
5	Is the unit shut down before refueling? (16.A.14)			
6	Does the unit have a suitable fire extinguisher - 5 BC min.? (16.A.26)			
7	Is there an effective, working, reverse alarm? (16.B.01)			
8	Are moving parts, shafts, sprockets, belts, etc., guarded? (16.B.03 (a) and 16.B.07 and 16.B.13)			
9	Is protection against contact with hot surfaces, exhaust, etc., provided? (16.B.03 (b))			
10	Are all fuel tanks located in a manner to prevent spills or overflows from running onto engine exhaust or electrical equipment? (16.B.04)			
11	Are exhaust discharges from equipment so directed that they do not endanger persons or obstruct the view of the operator? (16.B.05)			
12	Are seat belts provided? (16.B.08)			
13	Is protection (grills, canopies, screens) provided to shield operator from falling or flying objects? (16.B.10 and 16.B.11)			
14	Is adequate roll over protection provided? (16.B.12)			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	DRAGLINE INSPECTION CHECKLIST NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Are the following documents with the crane at all times? (16.C.01)			
1a	Operating manual from the manufacturer for the specific crane being inspected.			
	(1) Any operator aids for which the crane is equipped?			
1b	Load rating chart for the crane which shall include:			
	(1) the crane make and model, serial number, and year of manufacturer			
	(2) load ratings for all crane operating configurations: including optional equipment			
	(3) wire rope type, size, and reeving; line pull, line speed and drum capacity			
	(4) operating limits in windy or cold conditions			
1c	Crane log book that shows operating hours, inspections, tests, maintenance & repair. **Note:** Has log been updated daily when crane is used, and is signed by operator & supervisor? **Note:** Mechanics shall sign after conducting maintenance or repairs.			
2	Does operator have certification that he meets operator qualification and training as stated in 16.C.04 and Appendix G?			
3	Has a hazard analysis for set-up and set-down procedures (mobilization, assembly, dismantling, etc.). (16.C.07)			
4	Are adequate clearances provided from electrical sources, fixed objects, and swing radius. (16.C.08)			
5	Has inspection been performed in accordance with 16.C.11 and Appendix H?			
6	Are cable supported booms equipped with boom stops? (16.D.02)			
7	Is boom lowered to ground or secured when not in use? (16.D.07)			
8	Are all moving parts (gears, drums, shafts, belts, etc.) and all hot surfaces (exhaust lines, pipes, etc.) guarded? (16.B.03)			
9	Does the unit have a suitable fire extinguisher? (16.A.26) **NOTE:** Minimum 5 BC			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	CLEARING, GRUBBING, AND SNAGGING NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Are adequate first aid kits provided? (03.A.03 and 06.D.01)			
2	Does each work group have two qualified first aid & CPR persons? (03.A.02)			
3	Where workers are exposed to water hazard, are life vests worn? (05.I.01)			
4	Is the following protective equipment provided and used when necessary? (05.A) Head Foot Eye Hand Leg chaps			
5	Have dozers and clearing equipment been provided with suitable protection for operators (canopies, grills, etc.) ? (16.B.10 and 16.B.11)			
6	Is rollover protection provided when necessary? (16.B.12)			
7	Are suitable fire extinguishers available? (16.A.26)			
8	When machines are idle, are dozier blades, crane booms, etc., lowered to the ground or deck? (16.A.09)			
9	When being fueled or serviced are the machines shut down? (16.A.08 , 14)			
10	Are operators qualified? (16.A.04)			
11	Is gasoline and other fuel stored and dispensed in a safe manner? (09.B)			
12	Are fuel tanks properly vented and identified as to contents? (09.B.01 , 12)			
13	Do fuel tanks above ground have UL listed auto-closing valve without a latch-open device? (09>b.29 (a))			
14	Is gasoline for power saws transported in safety cans or approved containers? (09.B.12)			
15	Where floating cranes or draglines are used in snagging, is the barge of sufficient size so as to be comparatively stable during operations? (16.F.03)			
16	Are lists of standard hand signals and load rating plates posted in view of the operator? (8.B.02 and 16.C.01) **NOTE:** All test & requirements for cranes, derricks, draglines are applicable.			
17	On barge-mounted cranes not secured to the deck, has the C.O.R. authorized a travel limit or barrier to prevent overtipping or instability? (16.F.06 and 16.A.20)			
18	Is safe access provided? (16.B.03 (e) and 26.B.01) **NOTE:** Riding on hooks, buckets, etc., is prohibited. (16.C.04)			
19	Is a properly equipped life boat available for operations over or near water? (05.J.01)			
20	Have power saws, hand axes, brush blades been inspected for safe operating condition and use? (13.A.02) **NOTE:** Unsafe tools shall be removed from service.			
21	Are moving parts and lines adequately guarded? (15.A.03 and 16.B.03)			
22	When burning is necessary on clearing contracts, are the prohibitions and requirements listed below followed: a. Approved by the Government representative. (09.A.13 (a)) b. Contact with proper authorities? (09.B.13) c. No burning during periods of high fire hazard. (09.A.13 (b)) d. Sufficient equipment & men available for fire control. (09.A.13 (c)) e. No flammable liquid with flash point below 100 F shall be used to kindle fires. (09.B.06)			
23	Are crane operators qualified and has the required training been done? (16.C.04)			

SAFETY INSPECTION FOR CONSTRUCTION ACTIVITY
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	BUILDING CONSTRUCTION NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is safe access provided to all work areas? (21.A.01)			
2	Are guardrails, intermediate rails, and toe boards installed on ramps, steps, runways, scaffolds, and other working surfaces 6 feet or more in height? (21.B.01 and 30.A.07)			
3	Does the free-standing metal scaffold or tower working platform height exceed 3 times the smallest base dimension? (22.C.06)			
4	Does planking meet the requirements listed in 22.B.06?			
5	Are all planks on metal scaffolds cleated at both ends to prevent movement? (22.B.06)			
6	Are supporting members of scaffolds placed on unstable objects such as barrels, boxes, loose bricks, concrete blocks, etc.? **THIS IS A VIOLATION.** (22.B)			
7	Do rolling scaffolds have a positive locking device to prevent accidental movement? (22.C.06 (c))			
8	Are rolling scaffolds moved only from the base? (22.C.06 (c))			
9	Are safety nets used where scaffolds, catch platforms, or temporary floors are impractical? (21.C.10)			
10	Have the nets been tested and are they inspected daily? (05.G.01)			
11	Are safety belts and life lines furnished workers on structural steel erection, bins, hoppers, steep slopes, swinging scaffolds, etc? **NOTE:** Life lines shall be separately attached of attended. (21.C)			
12	Are portable ladders secured top and bottom so as to be stable? (21.D.08 (d))			
13	Do portable ladders have a safe pitch? (21.D.08 (b))			
14	Have guardrails been provided for all floors, roof holes and wall openings 4 feet above adjacent floor? (24.A.01 and 24.A)			
15	Are means provided to prevent tools, materials, etc. from falling when work is performed overhead? (13.A.04)			
16	When welding and torch work is being performed, is protection from arc flashes, slag, and heat provided? (10.A.04)			
17	Are ladders, stairways, & passageways kept clear of hoses, cables, & other equipment? (10.A.05)			
18	Are compressed gas cylinders secured in an upright position? (20.D.10)			
19	Is fire extinguishing equipment provided? (09.E.01-06 & 13.A.06-09 & 14.A.05)			
20	Are provisions made to prevent welding cables from being used near high tension wires? (10.E.08)			
21	Are provisions made to prevent welding leads from contacting metal parts of supporting suspended scaffolds? (10.E.09)			
22	Is welding equipment shutdown when not used or leads are unattended? (10.E.11)			
23	Are circular portable power saws equipped with automatic blade guards? (13.C.01 (a))			
24	Are personal protective devices and equipment provided and their use enforced? (05.A)			
25	Is all welding apparatus and equipment being inspected daily? (10.A.02 & 10.D.04)			
26	Are all fuel gas-oxygen units used in welding or cutting operations equipped with reverse-flow check valves installed between torch and hoses? (10.D.07 (b))			

27	Are oxygen/acetylene units permitted to be used with the acetylene regulator adjusted to permit a discharge of greater than 15 psig? (10.D.12) **THIS IS A VIOLATION.**			
28	Are safety lashings provided at quick make up connections between tool and hoses when using pressurized equipment? (20.A.16)			
29	Do manually operated air tools with flexible hoses have an automatic shut-off valve to prevent whipping and lashing? (20.A.15)			
30	Is the temporary wiring guarded, elevated, buried, or isolated so as to prevent contact? (11.D)			
31	Are wire guards provided for light bulbs? (11.O.06)			
32	Are all 120 volt, single phase, 15 & 20 ampere, receptacle outlet circuits which are not a part of the building's permanent wiring provided with ground fault circuit interrupters for personnel protection? (11.C.05)			
33	Are all flood and/or work lights grounded? (11.C.01 (c))			
34	Is a signal person provided when work area is hidden from equipment operators? (08.B.03)			
35	Are crawling boards, life lines, temporary decking, etc. furnished to prevent workmen on roofs from falling? (27.H.01)			
36	Is hoist lift or other approved means used to raise materials and tools to roofs over 16 feet high? (27.H.02)			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	CRAWLER MOUNTED BACKHOES, POWER SHOVELS, EXCAVATORS, FRONT-END LOADERS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is the unit equipped with a suitable fire extinguisher (5BC)? (16.A.26)			
2	Is a safe means of access to the cab provided (steps, grab bars, non-slip surfaces)? (16.B.03 (d))			
3	Is the operator protected against weather, falling or flying objects? (16.B.10 and 16.B.11)			
4	Are seat belts and adequate rollover protection provided where applicable? (16.B.08 & 16.B.12)			
5	Are sufficient lights provided for night operations? (16.A.11)			
6	Have brakes been tested and found satisfactory? (16.A.07 (d))			
7	Does the unit have an emergency brake system? (16.A.07 (d))			
8	Can the emergency system be activated from cab? (16.A.07 (d))			
9	Have air tanks been tested and certified? (20.A.01 (b) (c)			
10	Is an air pressure gage in working condition installed on the unit? (20.A.12)			
11	Does the air tank have an accessible drain valve? (20.B.18)			
12	Are the units equipped with windshield wipers, defrosting and defogging equipment that are in good operating condition? (16.A.07)(c)			
13	Is there an effective reverse signal where applicable? (16.B.01)			
14	Has the unit been inspected and certified mechanically safe by a qualified person before being placed in use? (16.A.01)			
15	Is the record of the test available? (16.A.01 (b))			
16	Are pressurized cylinders, actuating booms, outriggers, etc., equipped with pilot check valves? (20.A.17)			
17	Are only designated qualified operators being assigned to operate mechanized equipment? (16.A.04)			
18	Are fuel tanks located in a manner to prevent spills or overflows from running onto engine, exhause, or electrical equipment? (16.B.04)			
19	Are exhaust discharges from equipment so directed that they do not endanger persons or obstruct the view of the operator? (16.B.05)			

REMARKS:

SAFETY INSPECTION CHECKLIST FOR DREDGES
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	If there are taps for non-portable water, are they identified? (02.A.07)(a)			
2	Are there the proper number of toilets, washbasins and showers? (02.B.02 (c))(02.C.03)			
3	Is water, soap, individual towels and metal covered waste cans provided in washrooms? (02.C)			
4	Do all mess facilities meet the requirements of (02.D.01)			
5	Is protection provided against insects, vermin, or stakes? (02.F.01)			
6	Are adequate means of communications and transportation to effectively care for disabled workers provided? **NOTE:** Name of doctor or clinic, address and telephone number should be on the job site. (03.A.01)			
7	Do the proper number of employees hold current first-aid & CPR certificated? **NOTE:** Check certificates to ascertain that they are current. (03.A.02)			
8	Are appropriate first-aid kits located in a readily accessible location and adequately stocked? (03.A.03)(03.B.)(03.B.02)			
9	Is eye protection available and of the correct type for the work involved? (05.B)			
10	Are ring buoys, lifelines and water lights in good condition and properly located? (05.I.03 (c) & 05.I.04)			
11	Is properly equipped life-saving skiff provided? (05.J)			
12	Are flammable items such as paint, turpentine, thinners, etc. properly stored? (09.B)(19.A.06.g)			
13	Is gasoline and other flammable liquids properly stored, dispensed and handled? (09.B.28)			
14	Is switchboard and transformer banks adequately protected and marked to keep unauthorized personnel out of the danger area? (11.A.02)(d)			
15	Is switchboard area provided with an insulated floor mat if necessary? (11.A.07)			
16	Is a positive means available to insure that machinery will not be operated while greasing or making repairs? (12.A.01)			
17	Are portable electric tools inspected and tested? (13.A.02)(a)(b)			
18	Are spuds, rotating machinery, hot pipes and moving cables guarded against accidental contact? (16.B.03)			
19	Is proper access provided for greasing sheaves on spuds, booms, and ladders? (16.B.03(d,e)			
20	Is a valid Coast Guard Certificate or Marine Survey available? (19.A.01 (a & b)			
21	Are the following drills held and logged at least monthly: (19.A.04 (d)) 1. Boat or abandon ship drill 2. Fire drill 3. Man overboard or rescue drill			
22	Is emergency lightning and power system inspected and operated monthly? (19.A.04 (g)			
23	Does the operator have a valid Coast Guard Certificate or correctly endorsed document? (19.A.02)(a)			

24	Does dredge have an approved hurricane plan for both crew and plant? (19.A.03)			
25	Are records of test, drills, system checks made in the station log? (19.A.04 (h)			
26	Are smoke alarms provided in all living quarters? (19.A.05 (h)			
27	Is there a shutoff valve at each end of the fuel line and are there arrangements for operating tank connection valve from outside engine compartment? (19.A.06 (b & c))			
28	Are tripping hazard, deck fittings, etc., painted yellow? (19.A.07 (i))			
29	Is convenient guarded access given to employees in cleaning out pump? (19.B.01)(a)			
30	Are guard rails provided on landings, stairs, and openings? (19.B.01)			
31	Are fire extinguishers of the proper type properly placed? (09.E) Type Capacity Location			
32	Are walkways clean, free from oil, grease, or smooth slick spots? (19.B.01 (b))			
33	When crews are quartered, are two ways of exit provided? (19.B.04 (b))			
34	Is pontoon line equipped with proper walkway and handrail, if applicable? (19.B.05)			
35	Do fired and unfired pressure vessels have proper certificate of inspection? Annual if fired, every 3 years if unfired? (20.A.01 & 20.A.02)			
36	Are acetylene, oxygen, and other compressed gas cylinders and equipment properly stored, used, and handled? (20.D.03 (d))			
37	Are safety belts and ladder climbing safety devices provided for the greasing of spud sheaves and changing spud pins? (21.C.01 & 21.G.09)			

REMARKS:

SAFETY INSPECTION CHECKLIST FOR COFE OWNED & OCCUPIED WORKSPACE
U.S. Army Engineer District, New Orleans

	Date of Inspection:
Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
	SANITATION - MEDICAL			
1	Are all outlets dispensing non-potable water posted "CAUTION-WATER UNFIT FOR DRINKING, WASHING, OR COOKING?" (02.A.07)			
2	Are paper cups dispensed from a sanitary container? (02.A.06)			
3	Are waste containers provided for used cups at each drinking fountain? (02.A.06)			
4	Is each washroom maintained in a sanitary condition and provided with water, soap, and individual means of drying? (02.C.02)			
5	Are 16 unit first-aid kits provided in each place of employment in the ratio 1 for each 25 persons or less? (03.A.03)			
	FIRE PREVENTION AND PROTECTION			
6	Are "NO SMOKING" signs posted and observed in all areas where flammable or combustible materials are stored? (09.B.02)			
7	Is there a proper fire extinguisher within 75 ft. of any point in the protected area? (09.B.03 (b))			
8	Are surveys being made at least annually in accordance with Para 09.A.01?			
9	Are all employees aware of the locations of all fire extinguishers and their proper use? (09.E.04)			
10	Have fire excavation routes been posted for each working area and the routes clearly marked with proper "EXIT" signs? (07.A.02)			
	ELECTRICAL			
11	Do electrical plugs and receptacles have the proper configuration for the circuit voltage and current? (15.A.11)			
12	Are all circuits properly protected against overload? (15.A.13)			
13	Aluminum conductors should not be connected to copper terminals, Are all connections tight and proper?			
14	Are adequate outlet receptacles provided so that there is no need for multiple outlet fixtures or extension cords?			
15	Are all electrical wires properly insulated with no bare wires visible?			
16	Are all fuse cabinets or circuit breaker boxes provided with a proper door that can be locked? (15.B.03)			
17	Are all 110-120V electrical outlets properly phased?			
18	Are all electrical receptacles in washroom of the grounding type and are those on 120 volt, single phase, 15 and 20 ampere circuits provided with ground fault circuit protection? (11.C.04)			
	PASSAGEWAYS AND ACCESS FACILITIES			
19	Are offices, workrooms, stairways, corridors, and passageways adequately lighted? (07.A)			

20	Does every flight of stairs having four or more risers also have a standard handrail? (21.B.08)			
21	Are all accessways kept clear of operating materials or debris that would obstruct passage or cause a tripping or slipping hazard? (21.A.01 (c))			
22	Are filing cabinet and desk drawers kept closed when not in actual use and then only one drawer opened at a time?			
23	Are carpets or rugs maintained so as to provide good protection against slips, trips, and falls?			
24	Are stepoffs from one level to another marked and guarded with a railing and adequately lighted?			
25	Are all telephone and electrical wires secured in a manner to prevent falls?			
26	Are all typewriter desks situated to prevent the moving carriage from entering aisle space?			
27	Have fire evacuation routes been posted for each work area and the routes clearly marked with the proper "EXIT" signs?			
	GENERAL			
28	Are office machines placed away from the edge of tables or desks on which they are used?			
29	Are files, bookcases, etc., placed so that they cannot be tipped over?			
30	Are proper stools provided to eliminate the necessity of using chairs or stools with casters for gaining extra height to retrieve items from high shelves, etc.?			
31	Are heavy or bulky materials stored at lower levels than lighter, easy to handle items?			
32	Are all office fans guarded, front and back, with not over ½-inch mesh to prevent fingers getting inside guard?			
33	Are pencils on desks stored with their points down?			
34	Have all spindle (spike) files been removed from service?			
35	Are chairs inspected regularly and broken ones removed from service?			
36	Is the Occupational Safety and Health Protection for Federal Employees posted in a prominent location? DD Form 2272			

REMARKS:

U.S. ARMY CORPS OF ENGINEERS - NEW ORLEANS DISTRICT
RESPIRATOR MEDICAL CLEARANCE

Name:	Date of Birth:
Crew:	Office Symbol:

PART I - TO BE FILLED OUT BY SUPERVISOR

A. CHECK TYPE OR TYPES OF RESPIRATOR(S) TO BE USED:

	Half-face Air-purifying cartridge		Full-face cartridge
	Full-face Powered Air-supply		Self-contained (Scott Air)

B. LEVEL OF WORK EFFORT (CHECK ONE):

	Light		Moderate
	Heavy		Strenuous

C. Extent of Usage:

	Daily		Weekly, average number hours per week
	Rarely -- or for emergency situations only		

D. SPECIAL WORK CONSIDERATIONS (CHECK ALL THAT APPLY):

	High Places		Protective Clothing
	Elevated Temperatures		Confined Spaces
	Hazardous Material		Other (Specify)
	Approximate weight of respirator equipment (pounds)		

Supervisor's Signature

PART II - TO BE FILLED OUT BY EMPLOYEE

Have you had, or do you now have any of the following	No	Yes	Examiner's Comments
Used a half-face respirator			
History of fainting spells or unconsciousness			
High blood pressure			
Fear of tight or enclosed places			
Sensation of smothering			
Dizziness			
Heat exhaustion or stroke			
Ruptured ear drum			
Contact lenses or glasses			

Dentures			
Facial scars which would restrict the fitting and or wearing of a respirator			
If you have any other problems which you feel might interfere with your ability to wear a respirator, please enter them here and mention them to the examiner.			Employee's Signature and date

PART III - TO BE FILLED OUT BY EXAMINER

A. I HAVE REVIEWED THE FOLLOWING INFORMATION:

	Review of Medical Examination performed on _____ (date); copy attached
	Review of Respirator Medical and other pertinent history questionnaires
	FEOH Laboratory Profile (where clinically indicated)
	Pulmonary Function Test (FVC and FEV 1)
	Other tests performed and reviewed
B.	I CERTIFY THAT, BASED ON THIS REVIEW, THE EMPLOYEE IS CLASSIFIED IN THE FOLLOWING REPIRATOR CATEGORY:
	No restrictions on respirator use
	Some specific-use restrictions
	No respirator use permitted

Restrictions:

Examiner:

Date:

SAFETY INSPECTION CHECK LIST FOR DIVING OPERATIONS
U.S. ARMY ENGINEER DISTRICT, NEW ORLEANS

Contract No:	**Contractor:**
Inspected By:	**Date of Dive:**

NOTE: Corps of Engineers General Safety Requirements (EM 385-1-1) references as shown in parentheses.	Yes	No
1 PERSONNEL CHECK		
Check with District Diving Coordinator to verify that all medical/first-aid/CPR paper work is in the Safety Office.		
Current medical examination for each diver - **must be within the last 12 months** (30.A.06)(a) (30.A.12)		
Diving or tending certification. (30.A.06)(b)		
Current First Aid certification. (renewed every 3 yrs.) (30.A.08)		
Current CPR certification. (renewed annually - 30.A.08)		
2 ADMINISTRATIVE CHECK		
Contractor Safe Practice Manual on site. (30.A.11)		
Has dive plan been developed and approved. (30.A.13)		
Has pre-dive briefing been performed with dive team. (30.A.14)		
If applicable, are decompression tables available.		
Have all valves, switches, controls, and equipment components been property locked out and/or tagged out. (30.A.13 (9)		
Has dive log been filled out for each dive. (30.A.17)		
3 EQUIPMENT CHECK		
A Air compressor (30.E)		
Air compressor tagged and tested every six months for:(30.E.05)		
Carbon Monoxide <20 PPM (30.E.05) (b) (1)		
Carbon Dioxide < +1,000 PPM (30.E.05) (b) (2)		
Oil mist <5 milligrams per cubic meter (30.E.05) (b) (3)		
Air shall not contain a level of hydrocarbons greater than 25 PPM (30.E.05) (b) (4)		
Is air intake located away from exhaust. (30.E.04)		
Does volume tank have check valve on the inlet side, a pressure gauge, a relief valve and a drain valve. (30.E.02)		
Does compressor have adequate capacity to deliver 4.5cfm actual to each diver. (30.E.03)		

Continued	Yes	No
B. Surface supplied air diving		
Is each diver continuously tended. (30.C.06) (a)		
Standby diver dressed out and readily available. (30.C.06) (d)		
Bail-out bottles fully charged and worn. (30.C.06) (e)		
Does the reserve breathing air supply have in-line capable of supporting the dive operation. (30.C.06) (f)		
Have all lights, special tools been tested (30.E.01) (30.E.13)		
Has voice communication systems been checked. (30.E.06) (h)		
Is safety harness with positive buckling device and an attachment point for the umbilical and a lifting point worn. (30.E.10) (b)		
Is approved first-aid kits at each dive site. (30.E.11) (a)		
Is portable oxygen supply available at dive site. (30.E.11) (b)		
Is litter or backboard with attached flotation on site. (30.E.11) (c)		
C. Breathing air supply hoses		
Have breathing hoses been tested to 1.5 times the working pressure. (30.E.06)(f)		
Is the umbilical marked at 10ft. increments to 100ft. from the diver end. (30.E.06)(c)		
Is a safety line of 3/8 in. synthetic material a part of each umbilical. (30.E.06)(e)		
4. Scuba Diving Operations		
CHECK WITH DISTRICT DIVING COORDINATOR BEFORE ANY SCUBA DIVING OPERATIONS		

Notes:

SMALL BOAT INSPECTION CHECKLIST
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Are periodic inspections & tests of all marine plant & equipment made to insure safe operating conditions? (19.A.01) d.			
2	Are marine plant and/or equipment found to be in unsafe condition, taken out of service and its use prohibited until unsafe conditions are corrected? (19.A.01) (f)			
3	Are all items of floating plant or associated equipment stored or placed beyond 20 feet or overhead transmission or distribution lines? (11.E.06)			
4	Was all marine plant & equipment put into use on the job inspected, tested and found to be in safe operating condition before initial use? (19.A.01) (c)			
5	Do inspection records maintained at the site become part of the official project file and made available to designated authorities? (19.A.01) (e)			
6	Is the maximum number of passengers that can be safely transported posted on all launches, motorboats and skiff? (19.C.02)(a)			
7	Does horsepower of engine meet hull specifications? ER385-1-91			
8	Is a signal device provided on the vessel to give signals required by applicable navigation rules? (19.A.05)(c)			
9	Are visual distress signaling devices (day and night) present and up to date?			
10	Is type and size of anchor and attached line suitable for size of boat?			
11	Are paddles and/or oars on board and in good condition?			
12	Is bilge pump and discharge (if so equipped) properly located and in good operating condition?			
13	Is a fully stocked First Aid kit of the proper size on board? (03.B)			
14	Are navigation lights working properly?			
15	Has a Type III/Type V or better USCG personal flotation device (PFD) been provided to all boat passengers and properly worn? (05.I.01)			
16	Are PFDs inspected for defects which would alter their buoyancy before and after each use? (05.I.02)			
17	Are defective PFDs or PFDs with less than 13 pounds buoyancy removed from service? (05.I.02)			
18	Are all PFDs equipped with retro-reflective tape meeting EM385-1-1, (05.I. 03)			
19	Is each boat equipped with at least one USCG approved life ring or ring buoy with at least 90 feet of " solid braid polypropylene line or equal attached? (05.I.04)			
20	Is the motorboat equipped with a kill switch?			
21	Are boat seats securely bolted to the boat deck?			
22	Are all launches and motorboats equipped with fire extinguishers of at least the size and rating(s) specified? (19.C.04)			
23	Are provisions made for preventing accumulation of fuel/oils on floors, decks and in bilges? (19.A.07)			
24	Are all carburetors on gasoline engines equipped with a backfire trap or flame arrestor? (19.A.06)			

Proponent: CEMVN-SS

25	Are fuel tank overflow, fill, and vent pipes so equipped that liquid or vapor cannot escape inside hull or cabin, and will flow overboard?			
26	Are automatic or remote controls provided where built-in fire extinguisher systems are installed? (19.C.04)			
27	Are boats powered by internal combustion engines, located within compartments or confined spaces, equipped with vent fans rated for Class I locations? (19.A.10)f. (1)			
28	Are ventilator intakes extended to a distance not more than one foot from the engine compartment bottom?			
29	**BOAT TRAILERING**			
a	Is the hitch secured to the tongue locking mechanism sound and non-binding?			
b	Are safety chains and hooks adequate for the size of the load?			
c	Are all lights (brake, turning and running) operating properly?			
d	Are tires in good condition (adequate tread, free of dry rot) and properly inflated?			
e	Are wheel bearings properly lubricated and is the proper torque on the wheel nut?			
f	Are caps and/or buddy bearings installed properly and functional?			
g	Are brakes (if equipped) working properly?			
h	Is the trailer tongue weight proper for the boat carried?			
I	Are rollers and/or bunks properly aligned and in good condition?			
j	Are trailer wheel bearing seals marine grade & do they seal properly to prevent seepage of water into bearings and races?			
k	Has the trailer's master cylinder been checked for proper level of fluid and are there any signs of brake fluid leakage?			
l	Has the trailer's wheel cylinders been inspected for signs of brake fluid leakage under dry conditions?			
m	Is the trailer suspension system adequate and capable of supporting the boat and other equipment loadings?			
n	Is the boat secured at bow and stern when trailered?			
o	Has a transom saver been installed for support of outboard motor skeg (foot)?			
p	Are trailer safety chains of a sufficient length to properly cradle the trailer tongue?			
30	**TOWING VEHICLE**			
a	Is the vehicle of adequate weight and power to safely tow the loaded boat and trailer?			
b	Is the hitch properly rated for the weight of the boat and trailer to be towed?			
c	Is the hitch secured to the frame (not bumper) of the vehicle?			
d	Is the ball on the hitch the proper size for the trailer to be towed?			
e	Is the ball securely attached to the tow bar?			
f	Is the remote braking mechanism operating properly			
g	Does the towing vehicle have adequately sized rear-view mirrors on both sides?			

h	Is rear suspension of towing vehicle sufficient & in condition to accept trailer tongue weight?			

ACCIDENT PREVENTION PROGRAM
ADMINISTRATIVE PLAN

1. Contractor	2. Contract Name & No.		3. Date
4. Project Superintendent	5. Shift/day	5a. Hours/shift	5b. Maximum employees/shift

6a. TRAINING - List subjects to be discussed with employees in safety indoctrination.

6b. TRAINING - List mandatory training and certifications which are applicable to this project (e.g., explosive actuated tools, confined space entry, crane operator, diver, vehicle operator, etc.)

7. Responsibility & Authority - Who is responsible for safety?
Project: Corporate: Line of Authority?

8. Who will conduct safety inspection?	8a. How	8b. When
9a. Is safety & health policy attached?	9b. Is safety program attached?	9c. Day & hour weekly safety meeting

10. How will subcontractor & supplies be controlled?	11. What are their safety responsibilities?

12. Who will report accidents, exposure data?

13. MEDICAL SUPPORT. Outline on-site medical support and off-site medical arrangements.

14. Outline procedures for conducting hazard assessments & written certification of PPE	Who?	When?	How?

15. Names of first aid attendants having certificates	Type of certificate & expiration date	Names of USCG licensed boat operators. Type license & expiration date.

On a separate sheet submit your proposed layout of temporary buildings and facilities (including subcontractors) and traffic patterns including access roads, haul roads, R.R.s. utilities, etc.

The _____ will pursue a positive program of training,, inspections
(Company)
and hazard control throughout the term of this contract. Mr./Ms. _____ has

the responsibility and authority for enforcing them.

Contractor's Signature	Date	C.O. or C.O.R. Signature	Date

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	EXCAVATION AND EMBANKMENT OPERATONS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	When operations are near highways; are danger, caution, traffic control signs and/or signal lights provided? (Section 08) See Table 8-1			
2	Are signal persons in reflectorized apparel provided to direct operations? (08.B.08)			
3	Does all moving equipment being operated at night have adequate head and tail lights? (16.A.07)(b) and 16.A.11)			
4	Are adequate brakes provided on mobile equipment? (16.A.07 (d))			
5	Do hauling units have emergency braking systems, operated from operator's position, that works automatically when regular brakes fail? (16.A.07 (d))			
6	Does maintenance or slow moving equipment have a flashing light to warn other traffic? (16.A.13)			
7	Where metal scaffold towers are used, are they properly secured, plumb, rigidly braced, and resting on solid foundations? (21.A.07)			
8	Where traffic or personnel cross pits or excavations do bridges have adequate guard rails? (21.B.01 and 21.F.02)			
9	Are adequate haul roads provided for hauling units? (21.I)			
10	What means are used to control dust? (21.I.10) (f)			
11	Are bracing, shoring, cribbing inspected daily and after rains? (25.A.02 (a)			
12	Are the sides of excavations shored up or cut to angle or repose? (25.A.03 (a) (25.C)			
13	Is ground water and surface water adequately controlled to prevent its entering the excavation? 25.A.06)(a)			
14	Is wire netting, rock bolts, fencing, etc. used to prevent rock falls? (25.A.07 (a)			
15	Have all stumps, boulders, or other materials that might slide or roll into an excavation been removed or barricaded? (25.A.07 (b)			
16	Is excavated material stored and retained at least 2ft. from the excavation's edge? Is it placed at a safe distance so as to prevent overloading on the face of the excavation? (25.A.07 (c)			
17	Where vehicular or haulage traffic is near excavation, are adequate stop logs provided so as to prevent equipment from falling into excavation? (25.A.08) (a)			
18	Is safe access into excavations provided? (25.B.05) **NOTE:** Ramps, stairs or mechanical man hoists shall be used for depths over 20ft. Properly placed and constructed ladders as well as ramps, stairs, or mechanical man hoists may be used up to 20ft.			
19	Are at least two means of exit provided workers in excavations? (25.B.05 (a))			
20	Are adequate guard rails, barricades, lights and warnings provided as well as safe access? (25.B)			
21	Remarks			

SAFETY INSPECTION CHECKLIST FOR MARINE EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	FUEL BARGES NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is the Coast Guard Certificate of Inspection and all current inspections available? (19.A.01 (a))			
2	Are moving parts, hot pipes, etc., adequately guarded or screened from contact? (16.B.03 (a/b)			
3	Are all stumbling hazards such as deck fittings, obstructions, etc., identified by yellow paint? (19.A.07 (i))			
4	Are decks, steps, etc., provided with non-slip surfaces? (19.B.01 (b))			
5	Are guard rails, bulwarks, or taut cable guard lines provided to help prevent falls? (19.A.07 (h))			
6	Are adequate "Warning," "No Smoking," "No Open Lights," signs posted? (09.B.09, 19.A.06, 19.B.14)			
7	Do holds and deck tanks have gooose neck vents with flame screen or acceptable venting systems? (09.B.27)			
8	Are dispensing outlets from deck tanks equipped with an automatic-closing valve without a latch-open device? (09.B.27)			
9	Is the barge equipped with suitable adequate fire extinguishers? (09.B.03)			
10	Are properly equipped ring buoys and water lights in the required number provided? (05.A.04)			
11	Where intgernal combustion engines are used, are they covered with a well ventilated hood? (19.A.01 (a))			
12	Is a remote manual shut-off provided for deck pumps and engines? (19.A.01 (a))			
13	Are the carburetors on gasoline engines equipped with flame arrestors? **NOTE:** Air filters on down draft type are acceptable. (19.A.06 (f))			
14	Are drip pans with flame screens having an overboard drain or suction into the intake manifold provided on all but down draft carburetors? (19.A.06 (f))			
15	Is all deck cargo placed on dunNage? (19.A.07 (j))			
16	Is a licensed tankerman or officer used for fuel dispensing? (19.A.06 (h))			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	GENERATORS - FIXED AND PORTABLE NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is the temporary wiring guarded, isolated by elevation, or buried so as to prevent accidental contact? (11.A.02)			
2	Are extension cords of the type listed by Underwriters Laboratories, Inc., for the purpose in which they are used? (11.A.03) See Table 11-1			
3	Are all switch boxes, receptacle boxes, metal cabinets, and temporary power lines marked to indicate the maximum operating voltage? (11.A.06)			
4	Are all circuits protected against overload? (11.B.01)			
5	Are disconnect boxes securely fastened to a surface and fitted with a cover? (11.B.02 (b)			
6	Does each fuse cabinet have close fitting doors that can be locked? (11.B.01 (e)			
7	Are all circuit breakers, switches, and fuses marked or labeled identifying the circuits or equipment supplied through them? (11.B.04)			
8	Are all switches, circuits breakers, fuse panels, or motor controllers that are located out-of-doors or in wet locations in a weatherproof enclosure or cabinet? (11.B.05)			
9	Are all circuits grounded? In accordance with the NEC (11.C.01)			
10	Has a sketch been submitted and accepted for the proposed temporary power distribution system? (11.D.01)			
11	Is the vertical clearance above walkways 10-15 ft or more for circuits carrying 600 volts or less? (11.D.03) See Table			
12	Are all wires insulated from their supports? (11.D.05)			
13	Are records of operational checks available? (16.A.01 (b))			
14	Is the unit shut down for servicing, fueling, etc? (16.A.14)			
15	Is the unit equipped with a suitable fire extinguisher (5 BC)? (16.A.26)			
16	Are exhaust systems protected from contact? (16.B.03 (b))			
17	Are fuel tanks located in a manner to prevent spills or overflows from running onto engine, exhaust, or electrical equipment? (16.B.04)			
18	Are exhaust discharges from equipment so directed that they do not endanger persons from exhaust fumes? (16.B.05)			

REMARKS

SAFETY INSPECTION FOR MARINE EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	LIFEBOAT AND LIFE SKIFFS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is a life saving skiff available where men are working over or near water? (05.J.01)			
2	Does the lifeboat have the following equipment? (05.J.04)			
	a. Four oars or equivalent means of propulsion. (Two if skiff is motor powered.)			
	b. Oar locks attached to oars or gunwales.			
	c. One ball pointed boat hook.			
	d. One ring buoy with 70 feet of 3/8 inch polypropylene or equivalent line attached.			
	e. Two personal flotation devices.			
3	Is a suitable motorboat provided where use of oars is impractical? (05.J.05)			
4	Is the life skiff kept afloat or is a means for instant safe launching provided? (05.J.03)			
5	Are trained persons kept at ready for launching and operating the life skiff? (05.J.02)			
6	Is the life boat used for other purposes than drills or emergencies? **THIS IS A VIOLATION.** (05.J.01)			
7	When a motor boat is used as a lifeboat, is it equipped with a compatible fire extinguisher? (19.C.03 (a))			
8	Is the maximum capacity of boat posted? (Capacity should be no less than 3.) (19.C.02(a)			
9	Does the boat meet the minimum flotation requirements of the USCG? (05.J.06 & 19.C.02)			
10	Does the horsepower of the motor conform with the capacity plate .			
11	Is the fuel supply hose in satisfactory condition?			
12	Is the hull in a good condition? (No obvious leaks.)			
13	Have floating plants found in unsafe condition taken out of service? 19.A.01(f)			
14	Is their an approved fire extinguisher on board? 19.C.03(a)			

Remarks

SAFETY INSPECTION FOR CONSTRUCTION ACTIVITY
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	NIGHT OPERATIONS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	General			
a	On construction contracts, is there a designated Contractor's representative on duty during night operations? FAR Clause			
b	Are weekly safety meetings being held for night-shift employees, by field supervisors or foremen? (01.B.03)(A)(B)			
c	Are regularly scheduled safety meetings being held (at least once a month) for night supervisors? (01.B.03 (a)			
d	Are there adequate communications and/or transportation available in the event of serious injury to personnel? (03.A.01)			
e	Is there two qualified first-aid and CPR attendant per shift on duty? (03.A.02)(a)			
f	Are fire, man-overboard & abandon-ship drills (as applicable) conducted at least monthly? (10.A.04 (d)) **NOTE:** These drills should first be conducted on the very first night shift?			
2	Lighting - Section 7 at Table 7-1			
a	Are haul roads properly marked for night work? (Section 7, Table 7-1)			
b	Is there adequate lighting in work areas, On decks and walkways? (07.A)			
c	Is there adequate lighting at crew boat loading area on floating plant? (07.A)			
d	Are all vechicles, construction equipment properly lighted? (16.A.11) (16.A.07)(b)			
3	Transportation to and from float plant			
a	Is boat equipped with sufficient number of life preservers? (05.I.01)(a,b,c,d,e)			
b	Are all vehicles and construction equipment properly lighted for night work? (18.A.02)			
c	If boat is less than 26 feet in length, has it been tested for flotation and stability, or does it carry BIA certification? (19.A.01)			
d	If more than 6 passengers are carried, or boat is greater than 26 feet in length, is vessel Coast Guard certified and operator licensed? (19.A.02)			
e	For boats of less than 26 feet in length, is operator experienced, and his name posted as a designated small boat operator? (19.A.02) (19.C.01)(c)			
f	Is weather deck of boat coated with non-skid material? (19.B.01)(b)			
g	Is there safe, easy access from boat to landing? (19.B.02)			
h	Do guard rails meet requirements of EM 385-1-1? (19.B.02)(c)			
i	Is the capacity of boat posted in accordance with EM 385-1-1? (19.C.02)(a)			

Remarks

SAFETY INSPECTION FOR CONSTRUCTION EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	PILE DRIVERS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is the width of the hull of floating drivers at least 45% of the height of the leads above water? (16.L.07 (2))			
2	If compressed air is used to activate hammer, have the air tanks been tested and certified? (20.C.05) Where steam is used, has the boiler been inspected and certified? (20.C.01-20.C.05)			
3	Are all boilers equipped with approved type water columns, gauge glass, and try cocks? (20.C.05)			
4	Is the boiler equipped with an approved blow-off valve? (20.C.06)			
5	Is insulation or guarding furnished for protection against hot surfaces, pipes, exhausts? (16.B.03)			
6	Are safety lashings provided on hose connections to jet pipes, hammers, pile ejectors? (16.L.05)			
7	When driving and handling steel piling is a closed shackle or other positive means used which will prevent pile from falling? (16.L.08)			
8	Is a stop block provided to prevent the hammer from being raised against the head block? (16.L.02 (d))			
9	Do the landings (platforms) have toe boards, guard rails? (16.L.02) **NOTE:** Landings or leads shall not be used for storage of any kind.			
10	Are swinging leads provided with fixed ladders? (16.L.02 a (1))			
11	Do "dogs" automatically disengage when load is relieved or drum rotated? (116.L.03) **THIS IS A VIOLATION.**			
12	Are non-slip surfaces provided for work areas, passageways, stairs, etc.? (19.B.01 (b))			
13	Is adequate protection provided against contact with winch drums, gears, cables, and moving parts? (16.B.03)			
14	Does the air compressor tank have an accessible drain at its lowest point? (20.B.18-20.B.23)			
15	Is the pressure gauge on the air-tank in good working condition? (20.A.12)			
16	Is the air-tank equipped with a sealed safety relief valve? (20.A.13 (c))			
17	Does discharge from blow-off valves (steam or air) create a hazard? (20.A.10)			
18	During fueling or servicing of compressor, is the motor stopped? (16.A.08)			
19	Is a properly equipped life saving skiff provided for floating driver or where work is over or near water? (05.J)			
20	Are sufficient work-vests available and used? (19.C.03)			
21	Are adequate fire extinguishers provided? (16.A.26) **NOTE:** 5 BC. MINIMUM			
22	Does at least one person in crew hold a valid first-aid certificate? (03.A.02)			
23	Are adequate first-aid kits provided? (03.A.03)			
24	Are cables, fittings, etc. in good condition? (15.A.06 and 15.F)			
25	Are unguarded running lines located within 6'6" of the ground or working level? (15.A.03)			
26	Are only designated qualified operators being assigned to operate mechanized equipment? (16.A.04)			

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

PORTABLE ELECTRIC HAND TOOLS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1 Is personal protective equipment provided for eyes, hands, etc., and their use enforced? (05.A)			
2 Are flexible cords approved for that location? (11.A.03)			
3 Are flexible cords in continuous lengths without splices? (11.A.03 (c))			
4 Are portable and semi-portable electrical tools and equipment grounded by multiconductor cord and receptacle? (11.C.01 (b))			
5 Are tools grounded with multi-contact plug and receptacle? (11.C.01 (b))			
6 Are GFCI provided in all circuits using portable electric tools? (11.C.05)(a)(b)			
7 Are power hand tools inspected and tested? (13.A.02 (b))			
8 Are tools designed to accommodate guards supplied with them? (13.A.03)(a)			
9 When overhead work is being done, are means provided to prevent tools from falling? (13.A.04)			
10 Are only nonsparking tools used in locations where sources of ignition may cause a fire or explosion? (13.A.06)			
11 Safety guards shall be provided for all machines using an abrasive wheel. (13.B.01)			
12 Has a ring test been done on abrasive wheels before mounting? (13.B.06)			
13 Are circular saws equipped with guards that automatically enclose the blade? (13.C.01)			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT

U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	PORTABLE AIR COMPRESSORS NOTE: Corps of Engineers Safety and Health Requirements Manual (EM385-1-1) references are shown in parentheses.	Yes	No	N/A
1	Has inspection and performance test been completed. (20.A.01)			
2	Have the air tanks been tested and certified? (20.A.02)			
3	Are records of inspection and test available? (20.A.03)			
4	Does discharge from any valve create a hazard? (20.A.10)			
5	Is air pressure gauge in working order? (20.A.12)			
6	Is the tank equipped with a safety relief valve? (20.A.13)			
7	Is equipment that is subject to whipping or rotation if released provided with an automatic shut-off? (20.A.15)			
8	Are safety lashing provided at connections of tools and hose and all quick make-up connections of hose? (20.A.16)			
9	Will the compressor automatically shut off before discharge pressure exceeds the maximum working pressure? (20.B.08)			
10	Is the compressor located so that flammables, toxic vapors, gases, or dust will not be blown or drawn into intake? (20.B.09)			
11	No valve shall be installed on the air intake pipe of a compressor with an atmospheric intake. (20.B.10)			
12	Is the discharge piping from the compressor to the receiver as large as the discharge opening on the compressor? (20.B.11)			
13	Is there a convenient stop valve between the air tank and each stationary piece of equipment? (20.B.12)			
14	Are installation and location of air receivers as per 20.B.17?			
15	Does the air tank have an accessible drain valve? (20.B.18)			

16 REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	POWER BENCH TOOLS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is eye, foot and other protective equipment, as needed, provided and use enforced? (05.B.01)			
2	Are adequate warning signs displayed? (08.A.01)			
3	Is the equipment always shutdown for adjustments and/or maintenance? (11.A.02)(a)(b)			
4	Is the power switch located so as to prevent accidental starting? (11.B.03)(b)			
5	Can the power be cut off without the operator having to leave his position? (13.C.01)			
6	Are the circular rip saws equipped with guards that automatically and completely enclose the cutting edges, anti-kickback devices, and splitters? (13.C.01 (a)			
7	Are electric powered tools properly grounded? (11.C.01 (b))			
8	Is a copy of manufacturer's instructions and recommendations maintained with the tool? (13.A.02 (a)			
9	Have the tools been inspected and tested prior to use? (13.A.02)(a)(b)			
10	Are the moving parts (shafts, beltdrives, spindles, etc.) safely guarded from accidental contact? (13.A.03)(b)			
11	Is personal protective equipment provided as outlines in section 6? (13.A.13)			
12	Are tool rests on power grinders more than distance from the wheel? (13.B.05)			
13	Are damaged grinding wheels, etc. in use? (13.B.06) **NOTE**-Violation -destroy defective parts.			
14	Are planer and jointer blades fully guarded? (13.C.01)(c)			
15	Are band saws fully enclosed except for blade at point of operation? (13.C.01 (d)			
16	Are radial arm power saws equipped with an automatic brake? (13.C.04)			
17	Is a limit stop provided to prevent leading edge of radial and swing saws from traveling beyond the edge of the table? (13.C.06)			
18	Is a block, pushstick or other safe means provided for operations near cutting edges? (13.C.08 (b))			
19	Are brushes provided for removal of sawdust, chips, etc.? (13.C.08 (d)			
20	Are lathes, metal saws, drills, etc. left unattended while still running? (13.C.08 (e) **NOTE:** This could occur when working with heavy steel plates or large shafts. If so, this is a violation.			
21	Is good housekeeping practiced? (14.C and 14.D.01)			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	RUBBER TIRED FARM TRACTORS, BACKHOES, FRONT END LOADERS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is protection (grills, canopies, screens) provided to shield operator from falling or flying objects? (16.B.10 and 16.B.11)			
2	Is adequate roll-over protection provided? (16.B.12)			
3	Are seat belts provided? (16.B.08)			
4	Are only designated qualified operators being assigned to operate mechanized equipment? (16.A.04)			
5	Does the unit have a suitable fire extinguisher? 5 BC (16.A.26)			
6	Is there an effective , working, reverse alarm? (16.B.01)			
7	Are moving parts, shafts, sprockets, belts, etc., guarded? (16.B.03 (a) and 16.B.07 and 16.B.13)			
8	Is protection against contact with hot surfaces, exhaust, etc., provided? (16.B.03 (6))			
9	Are all screens, guards, shields in place and effective? (16.B.03)			
10	Is a safe means of access to the cab provided (steps, grab bars, non-slip surfaces)? (16.B.03 (d))			
11	Are pressurized cylinders, outriggers, etc., equipped with a pilot check valve? (20.A.17)			
12	Are sufficient lights provided for night operators? (16.A.11)			
13	Are there initial inspections and scheduled inspections of the equipment at regular intervals? (16.A.02 (a) and (b))			
14	Are fuel tanks located in a manner to prevent spills or overflows from running onto engine exhaust or electrical equipment? (16.B.04)			
15	Are exhaust discharges from equipment so directed that they do not endanger persons or obstruct the view of the operator? (16.B.05)			
16	Has the equipment been inspected and tested by a competent person? (16.A.01)			
17	Are inspection records kept available as a part of the official project file? (16.A.01 (b))			

Remarks:

SAFETY INSPECTION FOR SKIFFS AND HULLS PROPELLED BY OUTBOARD MOTORS
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Does the boat (when in use) have a Coast Guard approved dry chemical fire extinguisher with a rating of 5-B:C units? (19.C.04 (a))			
2	Does the boat meet the minimum floatation requirements of the USCG? (19.C.02)			
3	Is the maximum passenger capacity posted in a conspicuous manner? (19.C.03 (a))			
4	Does the horsepower of the motor conform with the capacity plate and if marine plant and equipment are unsafe are they prohibited from use until unsafe condition is corrected?			
5	Is each operator properly licensed? (19.A Table 19-1 (2))			
6	Is the condition of the fuel supply hose satisfactory? (19.A.01 (f))			
7	Is the hull in a satisfactory condition? (Any obvious leaks?) (19.A.01 (e))			
8	Does the buoyancy material show any evidence of deterioration or does it appear that some may have been removed? (Do air tanks appear sound and watertight?) (05.J.06 & 19.C.02)			
9	Is a Type-III or better USCG approved International Orange personal floatation device provided for all persons? (05.I)			
10	Is an efficient whistle or similar signaling device provided for use when the vessel is underway? (19.A.05 (c))			
11	Is adequate protection from the elements provided for all persons being transported by water? (19.A.05 (d))			
12	Is the boat equipped with a white stern light having a 32 point 2 mile visibility? (19.A.01 (f))			
13	Are the lights properly maintained, assuring that they can be shown between sunset and sunrise? (19.A.04 (f))			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	SCRAPERS, MOTOR GRADERS, HEAVY HAULING UNITS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is the unit equipped with a suitable fire extinguisher (5 BC)? (16.A.26)			
2	Is a safe means of access to the cab provided (steps, grab bars, non-slip surfaces)? (16.B.03 (d))			
3	Is the operator protected against weather, falling or flying objects? (16.B.10 and 16.B.11)			
4	Are seat belts and adequate rollover protection provided where applicable? (16.B.08 & 16.B.12)			
5	Are adequate head and tail lights provided? (16.A.07 (b))			
6	Have brakes been tested and found satisfactory? (16.A.07 (d))			
7	Does the unit have an emergency brake system? (16.A.07 (d))			
8	Can the emergency system be activated from cab? (16.A.07 (d))			
9	Does the emergency brake work automatically when regular brakes fail? (16.A.07 (d))			
10	Have air tanks been tested and certified? (20.A.01 (b))			
11	Is an air pressure gage in working condition installed on the unit? (20.A.12)			
12	Does the air tank have an accessible drain valve? (20.B.17)			
13	Are the units equipped with windshield wipers, defrosting and defogging equipment that are in good operating condition? (16.A.07)			
14	Is there an effective reverse signal where applicable? (16.B.01)			
15	Has the unit been inspected and certified mechanically safe by a qualified person before being placed in use? (16.A.01)			
16	Is the record of the test available? (16.A.01 (b))			
17	Is the unit shut down for servicing, fueling, etc.? (16.A.14)			
18	Are only designated qualified operators being assigned to operate mechanized equipment? (16.A.04)			
19	Are fuel tanks located in a manner to prevent spills or overflows from running onto engine, exhaust or electrical equipment? (16.B.04)			
20	Are exhaust discharges from equipment so directed that they do not endanger persons or obstruct the view of the operator? (16.B.05)			
21	Are seats provided for each person required to ride on equipment? (16.A.07 (a))			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	STRUCTURAL STEEL ERECTION NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Are all required safety apparel and equipment furnished and use enforced? (Section 5)			
2	Is safe access provided to all work areas? (21.A.01) **NOTE:** Riding on hooks, buckets, material hoists, loads, etc. is prohibited. (16.C.14 and 16.K.11)			
3	Are stairways provided on all structures or work levels 20ft. or more in height? **NOTE:** Temporary stairways should be provided where permanent stairways are not installed concurrently with construction of each floor. (21.E.01)			
4	Are portable ladders secured top and bottom? (21.D.08 (d))			
5	Do the ladders extend at least 3ft. past the landing? (21.D.01 (b))			
6	Are floor or roof holes properly guarded with a securely anchored railing, intermediate rail and toe board? (24.A.01)			
7	Are safety nets being used where scaffolds, catch platforms, or temporary floors are impractical? (21.C.10)			
8	Are safety nets being inspected and debris removed daily as well as being tested regularly? (21.C.11 & 12 & 14)			
9	Are safety belts and life lines provided? (05.F)			
10	Are protective devices being used on roofing work which will protect workmen from slipping and falling and prevent workmen or the public on lower levels from being struck by falling objects? (27.H.01)			
11	Have all hoist towers been adequately inspected. (16.K.05)			
12	When electric powered hoist is used, has an automatic load-hold device been installed in case of power failure? (22.E.08)			
13	Are signal persons used when the operator cannot see the point of operations? (08.B.03)			
14	Is a standard signal system used? (16.C.10)			
15	Are tag lines or other means used to control loads? (14.A.06)			
16	Are the load rating plate and standard hand signal list attached to the hoisting equipment in view of the operator? (16.C.01)			
17	Have the hoisting equipment been inspected and tested? (16.A.01)			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	TEMPORARY ELECTRICAL WIRING NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is the temporary wiring guarded, isolated by elevation, or buried so as to prevent accidental contact? (11.A.02)			
2	Are extension cords of the type listed by Underwriters Laboratories, Inc., for the purpose in which they are used? (11.A.03) See Table 11-1			
3	Are all switch boxes, receptacle boxes, metal cabinets, and temporary power lines marked to indicate the maximun operating voltage? (11.A.06)			
4	Are all circuits protected against overload? (11.B.01)			
5	Does each fuse cabinet have close fitting doors that can be locked? (11.B.01 (e)			
6	Are disconnect boxes securely fastened to a surface and fitted with a cover? (11.B.02 (b))			
7	Is the incoming service or supply circuit readily accessible? (11.B.03 (a)			
8	Are all circuit breakers, switches, fuses marked or labeled identifying the circuits or equipment supplied through them? (11.B.04)			
9	Are all switches, circuits breakers, fuse panels, or motor controllers that are located out-of-doors or in wet locations in a weatherproof enclosure or cabinet? (11.B.05)			
10	Are all circuits grounded? In accordance with the NEC. (11.C.01)			
11	Are ground fault circuit interrupters installed in circuits used by portable electric tools? (11.C.05)(a)(b)(c)(d)(e)(f)(g)			
12	Has a sketch been submitted and accepted for the proposed temporary power distribution system? (11.D.01)			
13	Is the vertical clearance above walkways 10-15 feet or more for circuits carrying 600 volts or less? (11.D.03)			
14	Do temporary light strings have lamp sockets and connections permanently molded to the hard service cord insulation? (11.D.04 (b)			
15	Are all wires insulated from their supports? (11.D.05)			
16	Are guards provided for bulbs on temporary lighting strings and extension cords? (11.D.06 (a)			
17	Are exposed empty light sockets or broken bulbs present? (11.D.06 (c)			
18	Is portable electric lighting used in confined wet and/or hazardous locations operated at a maximum of 12 volts? 11.D.06 (d)			
19	Is a plainly marked switch provided at the entrance to tanks or confined spaces where wiring is used? (11.D.07)			
20	Is any floating plant or equipment situated within 20 feet of an overhead transmission line? (11.E.06)			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	TREE WORK, MAINTENANCE OR REMOVAL OPERATIONS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Are all chain saws in sound mechanical condition? (31.A.04)			
2	Are saws started more than 10 feet from fuel containers? (13.F.04)			
3	Are saws fueled while running or hot or near open flame? (13.F.04)			
4	Is eye, ear, hand, foot, or leg protection provided? (13.F.03)			
5	Is the chain saw used to cut above shoulder height? (13.F.06)			
6	Has the area been cleared of brush, felled trees, etc. prior to cutting? (13.D.01)			
7	Do all chain saws have an automatic chain brake or kickback device? (13.F.01)			
8	Is tree removal, trimming, or repair under the supervision of a qualified tree worker? (31.A.01)			
9	Are tree workers wearing saddles, safety belts, safety straps and/or lanyards? (31.B.02)			
10	Are tree workers carrying tools in their hands while climbing? (31.B.07)			
11	Are brush chippers operated and maintained in accordance with manufacturer's recommendations? (31.D.03)			
12	Are climber spurs of the tree climbing type? (31.B.01 (a))			
13	Are pole pruners, pole saws, and other similar tools equipped with wood or nonmetallic handles? (31.E.01 (a))			

REMARKS:

SAFETY INSPECTION CHECKLIST FOR TUGS, TENDERS, MOTORBOATS
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Name of Vessel (Identification)	Name of Operator (Captain)
Inspected by (Signature)	Witness (Signature)

	NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Is a valid Coast Guard certificate or Marine Survey available? (19.A.01 (a) (b))			
2	Does the boat operator have a valid Coast Guard certificate or correctly endorsed document? (19.A.02)			
3	Is emergency lighting and power system inspected monthly? (19.A.04 (f))			
4	Is an adequate whistle, horn, or warning device provided? (19.A.05 (c))			
5	Is the maximum passenger capacity posted? (19.C.03 (a))			
6	Is at least the number of life vests provided the same as the posted passenger capacity? (19.C.03 (b))			
7	When crew is quartered, are two ways of exit provided? (19.B.04 (b))			
8	Can doors be secured in either open or closed positions? (19.A.05 (i))			
9	Are railings or grab bars provided along the sides? (19.B.01 (c))			
10	Are stumbling hazards, deck fittings, etc. painted yellow? (19.A.07 (i))			
11	Are non-slip surfaces provided on ship's ladders, decks, and walks? (19.B.01 (b))			
12	On towing vessels, is an axe provided in an easily accessible location for freeing lines? (19.A.05 (b))			
13	Are controls, requiring operation in cases of emergency, to items such as (fire extinguishing system, power switches, safety & fuel valves, alarms, boiler stops) readily available and protected from accidental operation? (19.A.05 (e))			
14	Are try cocks or glass tube gauges on the fuel tanks? (19.A.06 (a)) **THIS IS A VIOLATION.**			
15	Is shut-off valve provided at both the tank and engine end of the fuel line? (19.A.06 (b) & (c))			
16	Can the shut-off valve at the tank be operated from outside the tank compartment? 19.A.06 (b))			
17	Are gasoline engine carburetors fitted with flame arresters? (19.A.06 (e))			
18	Is there a carburetor drip pan with flame screen that either empties overboard or is emptied by the intake manifold suction? **NOTE:** Not required on downdraft. (19.A.06 (f))			
19	Are shafts, gears, and moving parts adequately screened or guarded against contact? (16.B.03)			
20	Are hot pipes and surfaces insulated or screened? (16.B.03 (b))			
21	Have the air tanks been tested and certified? (20.A)			
22	When gasoline or L.P. gas power plant or equipment is used, is the vessel fitted with an automatic CO_2 system or the equivalent and one hand operated dry powder or CO_2 extinguisher? (19.C.04 (b))			
23	Are explosive proof exhaust fans provided to ventilate bilges when gasoline or L.P. gas is used? (19.A.10 (f))			
24	Are hand powered deck winches provided with self holding brakes? Are cranks and wheels with projecting spokes, pins, or knobs prohibited? (13.A.08)			
25	Is an adequate first-aid kit available? (03.A.03)			

26	Are at least two members of the crew on each watch qualified to administer first-aid and CPR? (03.A.02)			
27	Are properly fitted ring buoys and one water light provided? (05.I.03)			
28	Is a safe means to board and disembark provided? (19.B.02 (a))			
29	Is adequate protection from the elements provided for all persons being transported by water? (19.A.05 (d))			
30	Are the fuel fill pipe connections located outside the engine room? (19.A.06 (b))			
31	Are the fuel tanks vented directly to the atmosphere? (19.A.06 (h))			
32	Are the fuel vents and fill pipes provided with a catch basin having a capacity of at least 18 inches deep and having a capacity of at least 5 gallons? (Flush deck fill fitting being serviced with automatic back pressure shutoff nozzles are excluded.) (19.A.06 (h))			
33	Is the fuel transfer system designed to receive fuel by a fixed connection if an automatic back pressure shutoff nozzle is not used? (19.A.06 (h))			

REMARKS:

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	WELDER - WELDING OPERATIONS NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Does the welding unit have a compatible fire extinguisher? (10.C.01)			
2	When welding operations are near combustible materials, has written authorization been given by designated authority. (10.C.03 (c))			
3	Is the welding equipment inspected daily? (10.A.02)			
4	Are combustible materials screened from slag, heat and sparks? (10.C.[illegible]) 05, 06			
5	Are workers and the public shielded from rays, flashes, sparks, molten metal and slag? (10.A.04)			
6	Are passageways, ladders, steps, etc. kept clear of hoses or cables? (10.A.05)			
7	Is the electric welding unit shutdown when leads are unattended? (10.E.11)			
8	Are non-current carrying parts of electric powered welders grounded? (10.E.04)			
9	Are splices, repaired insulation, etc., within 10 feet. of the rod holder? **THIS IS A VIOLATION.** Check for broken insulation--exposed wires. (10.E.03 (b))			
10	Are leads found in contact with metal parts supporting suspended scaffolds? **THIS IS A VIOLATION.** (10.E.09)			
11	Are leads placed near high tension wires? **THIS IS A VIOLATION.** (10.E.08)			
12	Are all torch valves and gas supply shut off when work is suspended? (10.D.05)			
13	When work is suspended; are hoses, torch, etc., removed from confined spaces? (10.D.06)			
14	When stored, in transit, or regulator is not in place; is the valve protected with cap? (20.D.07 (a) & (b))			
15	Are all compressed gas cylinders kept upright at all times, except when being hoisted? (20.D.10)			
16	Are upright cylinders secured against falling (20.D.08 & 20.D.10)			
17	Is the valve wrench or wheel in operating position when cylinder is in use? (20.D.11)			
18	Are cylinders stored in well ventilated locations? (20.D.03)			
19	Are oxygen cylinders in storage and fuel gases separated by a fire resistive wall or by a distance of 20 feet? (20.D.03 (d))			
20	Is oxygen used to blow dust out of clothes, hair, or to cool off with? **THIS IS A VIOLATION.** (20.B.05 (a) and 20.D.18)			
21	Are "No Smoking" signs posted around cylinder storage area? (20.D.03 (e) and 20.D.04)			
22	Is the pressure on the working side of the acetylene regulator greater than 15 psig? **THIS IS A VIOLATION.** (10.D.[illegible]) 09			
23	Are proper measures being taken for fire control? (10.C.03)			
24	Are compressed gas cylinders separated from flammable or combustible material by at least 40 feet? (20.D.03 (c))			
25	Is all oxygen-fuel gas cutting or welding equipped with reverse-flow check valves between torch & hoses? (10.D.07 ( ))(a)			
26	Is personal protective equipment appropriate for the hazards encountered? (10.A.09)			
27	Are all pressure gauges and regulators in proper working order? (20.D.19)			
28	Is a pressure gauge provided on all pressurized equipment and systems? (20.A.12)			

SAFETY INSPECTION FOR MISCELLANEOUS EQUIPMENT
U.S. Army Engineer District, New Orleans

Date of Inspection:

Contractor or Unit	Contract No. or Activity
Inspected by (Signature)	Witness (Signature)

	WINCHES - HAND AND POWERED NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses.	Yes	No	N/A
1	Are hazardous moving parts adequately guarded? i.e. Gears, drums, fly wheels, piston arms, moving cables, spokes, knobs, projections on hand wheels. (16.B.03)			
2	Are exhaust pipes, steam pipes, hot surfaces insulated or guarded? (16.B.03 (b))			
3	Are the drums equipped with positive locking devices? (16.C.05)			
4	Are at least three full turns of cable retained on drums at all times? (16.C.09 (a))			
5	Is a signal person provided when necessary? (08.B.04)			
6	Is an inspection made of the cables at scheduled intervals? (15.A.01)			
7	Are cracked spokes, hubs or flanges in use? **This is a violation.** (15.F.04)			
8	When wedge socket type fastening is used on wire rope, is the short end clipped with a U-bolt? (15.B.04)			
9	On gasoline engine-powered winches, are the carburetors equipped with a back-fire trap or flame arrestor? (19.A.06 (e))			
10	Is the winch shut down - power off - for servicing and/or fueling? (16.A.08)			
11	Is a fuel shut-off valve located at both the tank and engine? (19.A.06 (b) and (c))			
12	Are fuel tanks placed so that overflow or spills will not fall into/on electrical equipment or the engines? (16.B.04)			
13	On floating plant gasoline-powered winches, do carburetors have drip pans fitted with flame screens provided with overboard discharge or emptied by suction from the intake manifold? Not required on down draft carburetors. (19.A.06 (f))			
14	Are cranks used on hand-powered winches or hoists without being provided with positive self-locking dogs? (13.A.08)			

REMARKS:

MOTOR VEHICLE INSPECTION (TRANSPORTING HAZARDOUS MATERIALS)

(Read Instructions before completing this form.)

This form applies to all vehicles which must be marked or placarded in accordance with Title 49 CFR.	1. GOVERNMENT BILL OF LADING/TRANSPORTATION CONTROL NUMBER

SECTION 1 - DOCUMENTATION	ORIGIN a.	DESTINATION b.
2. CARRIER/GOVERNMENT ORGANIZATION		
3. DATE/TIME OF INSPECTION		
4. LOCATION OF INSPECTION		
5. OPERATOR(S) NAME(S)		
6. OPERATOR(S) LICENSE NUMBER(S)		
7. MEDICAL EXAMINER'S CERTIFICATE*		

8. *(X if satisfactory at origin)*

a. MILITARY HAZMAT ENDORSEMENT		d. ERG OR EQUIVALENT COMMERCIAL:		YES		NO
b. VALID LEASE*		e. DRIVER'S VEHICLE INSPECTION REPORT*				
c. ROUTE PLAN		f. COPY OF 49 CFR PART 397				

9. CVSA DECAL DISPLAYED ON COMMERCIAL EQUIPMENT*	YES	NO
a. TRUCK/TRACTOR		
b. TRAILER		

SECTION II - MECHANICAL INSPECTION

All items shall be checked on empty equipment prior to loading. Items with an asterisk shall be checked on all incoming loaded equipment.

10. TYPE OF VEHICLE(S)	11. VEHICLE NUMBER(S)

12. PART INSPECTED *(X as applicable)*	ORIGIN (1) SAT	ORIGIN (1) UNSAT	DESTINATION (2) SAT	DESTINATION (2) UNSAT		ORIGIN (1) SAT	ORIGIN (1) UNSAT	DESTINATION (2) SAT	DESTINATION (2) UNSAT	COMMENTS (3)
a. SPARE ELECTRICAL FUSES					k. EXHAUST SYSTEM					
b. HORN OPERATIVE					l. BRAKE SYSTEM*					
c. STEERING SYSTEM					m. SUSPENSION					
d. WINDSHIELD/WIPERS					n. COUPLING DEVICES					
e. MIRRORS					o. CARGO SPACE					
f. WARNING EQUIPMENT					p. LANDING GEAR*					
g. FIRE EXTINGUISHER*					q. TIRES, WHEELS, RIMS					
h. ELECTRICAL WIRING					r. TAILGATE/DOORS*					
i. LIGHTS AND REFLECTORS					s. TARPAULIN*					
j. FUEL SYSTEM*					t. OTHER *(Specify)*					

13. INSPECTION RESULTS *(X one)* ACCEPTED ☐ REJECTED ☐

(If rejected give reason under "Remarks". Equipment will be approved if deficiencies are corrected prior to loading.)

14. SATELLITE MOTOR SURVEILLANCE SYSTEM: *(X one)* ACCEPTED ☐ REJECTED ☐

15. REMARKS

16. INSPECTOR SIGNATURE *(Origin)*	17. INSPECTOR SIGNATURE *(Destination)*

SECTION III - POST LOADING INSPECTION

This section applies to Commercial and Government/Military vehicles. All items will be checked prior to release of loaded equipment and shall be checked on all incoming loaded equipment.

	ORIGIN (1) SAT	ORIGIN (1) UNSAT	DESTINATION (2) SAT	DESTINATION (2) UNSAT	COMMENTS (3)
18. LOADED IAW APPLICABLE SEGREGATION/COMPATIBILITY TABLE OF 49 CFR					
19. LOAD PROPERLY SECURED TO PREVENT MOVEMENT					
20. SEALS APPLIED TO CLOSED VEHICLE; TARPAULIN APPLIED ON OPEN EQUIPMENT					
21. PROPER PLACARDS APPLIED					
22. SHIPPING PAPERS/DD FORM 836 FOR GOVERNMENT VEHICLE SHIPMENTS					
23. COPY OF DD FORM 626 FOR DRIVER					
24. SHIPPED UNDER DOT EXEMPTION 868					

25. INSPECTOR SIGNATURE *(Origin)*	26. DRIVER(S) SIGNATURE *(Origin)*
27. INSPECTOR SIGNATURE *(Destination)*	28. DRIVER(S) SIGNATURE *(Destination)*

Reset

INSTRUCTIONS

SECTION I - DOCUMENTATION

General Instructions.

All items (2 through 9) will be checked at origin prior to loading. Items with an asterisk (*) apply to commercial operators or equipment only. Only Items 2 through 7 are required to be checked at destination.

Items 1 through 5. Self explanatory.

Item 6. Enter operator's Commercial Driver's License (CDL) number or Military OF-346 License Number. CDL and OF-346 must have the HAZMAT and other appropriate endorsements IAW Part 383.

Item 7. *Enter the expiration date listed on the Medical Examiner's Certificate.

Item 8.a. APPLIES TO MILITARY OPERATORS ONLY. Military Hazardous Materials Certification. In accordance with applicable service regulations, ensure operator has been certified to transport hazardous materials.

b. *Valid Lease. Shipper will ensure a copy of the appropriate contract of lease is carried in all leased vehicles and is available for inspection. (Defense Transportation Regulation (DTR) requirement.)

c. Route Plan. Prior to loading any Hazard Class/Division 1.1, 1.2, or 1.3 (Explosives) for shipment, ensure that the operator possesses a written route plan in accordance with 49 CFR Part 397. Route Plan requirements for Hazard Class 7 (Radioactive) materials are found in 49 CFR 397.101.

d. Emergency Response Guidebook (ERG) or Equivalent. Commercial operators must be in possession of an ERG or equivalent document. Shipper will provide applicable ERG page(s) to military operators.

e. *Driver's Vehicle Inspection Report. Review the operator's Vehicle Inspection Report. Ensure that there are no defects listed on the report that would affect the safe operation of the vehicle.

f. Copy of 49 CFR Part 397. Operators are required by regulation to have in their possession a copy of 49 CFR Part 397 (Hazardous Materials Driving and Parking Rules). If military operators do not possess this document, shipper may provide a copy to operator.

Item 9. *Commercial Vehicle Safety Alliance (CVSA) Decal. Check to see if equipment has a current CVSA decal and mark applicable box. Vehicles without CVSA, check documentation of the last vehicle periodic inspection.

SECTION II - MECHANICAL INSPECTION

General Instructions.

All items (12.a. through 12.t.) will be checked on all incoming empty equipment prior to loading. All UNSATISFACTORY conditions must be corrected prior to loading. Items with an asterisk (*) shall be checked on all incoming loaded equipment. Unsatisfactory conditions that would affect the safe off-loading of the equipment must be corrected prior to unloading.

SECTION II *(Continued)*

Item 12.a. Spare Electrical Fuses. Check to ensure that at least one spare fuse for each type of installed fuse is carried on the vehicle as a spare or vehicle is equipped with an overload protection device (circuit breaker). (49 CFR 393.95)

b. Horn Operative. Ensure that horn is securely mounted and of sufficient volume to serve purpose. (49 CFR 393.81)

c. Steering System. The steering wheel shall be secure and must not have any spokes cracked through or missing. The steering column must be securely fastened. Universal joints shall not be worn, faulty or repaired by welding. The steering gear box shall not have loose or missing mounting bolts or cracks in the gear box mounting brackets. The pitman arm on the steering gear output shaft shall not be loose. Steering wheel shall turn freely through the limit of travel in both directions. All components of a power steering system must be in operating condition. No parts shall be loose or broken. Belts shall not be frayed, cracked or slipping. The power steering system shall not be leaking. (49 CFR 396 Appendix G)

d. Windshield/Wipers. Inspect to ensure that windshield is free from breaks, cracks or defects that would make operation of the vehicle unsafe; that the view of the driver is not obscured and that the windshield wipers are operational and wiper blades are in serviceable condition. Defroster must be operative when conditions require. (49 CFR 393.60, 393.78 and 393.79)

e. Mirrors. Every vehicle must be equipped with two rear vision mirrors located so as to reflect to the driver a view of the highway to the rear along both sides of the vehicle. Mirrors shall not be cracked or dirty. (49 CFR 393.80)

f. Warning Equipment. Equipment must include three bidirectional emergency reflective triangles that conform to the requirements of FMVSS No. 125. FLAME PRODUCING DEVICES ARE PROHIBITED. (49 CFR 393.95)

g. Fire Extinguisher. Military vehicles must be equipped with two serviceable fire extinguishers with an Underwriters Laboratories rating of 10 BC or more. (Commercial motor vehicles must be equipped with one serviceable 10 BC Fire Extinguisher). Fire extinguisher(s) must be located so that it is readily accessible for use and securely mounted on the vehicle. The fire extinguisher must be designed, constructed and maintained to permit visual determination of whether it is fully charged. (49 CFR 393.95)

h. Electrical Wiring: Electrical wiring must be clean and properly secured. Insulation must not be frayed, cracked or otherwise in poor condition. There shall be no uninsulated wires, improper splices or connections. Wires and electrical fixtures inside the cargo area must be protected from the lading. (49 CFR 393.28, 393.32, 393.33)

SECTION II *(Continued)*

i. Lights/Reflectors. (Head, tail, turn signal, brake, clearance, marker and identification lights, Emergency Flashers). Inspect to see that all lighting devices and reflectors required are operable, of proper color and properly mounted. Ensure that lights and reflectors are not obscured by dirt or grease or have broken lenses. High/Low beam switch must be operative. Emergency Flashers must be operative on both the front and rear of vehicle. (49 CFR 393)

j. Fuel System. Inspect fuel tank and lines to ensure that they are in serviceable condition, free from leaks, or evidence of leakage and securely mounted. Ensure that fuel tank filler cap is not missing. Examine cap for defective gasket or plugged vent. Inspect filler necks to see that they are in completely serviceable condition and not leaking at joints. (49 CFR 393.83 and 396 Appendix G)

k. Exhaust System. Exhaust system shall discharge to the atmosphere at a location to the rear of the cab or if the exhaust projects above the cab, at a location near the rear of the cab. Exhaust system shall not be leaking at a point forward of or directly below the driver compartment. No part of the exhaust system shall be located where it will burn, char or damage electrical wiring, fuel system or any other part of the vehicle. No part of the exhaust system shall be temporarily repaired with wrap or patches. (49 CFR 393.83 and 396 Appendix G)

l. Brake System (to include hand brakes, parking brakes and Low Air Warning devices). Check to ensure that brakes are operational and properly adjusted. Check for audible air leaks around air brake components and air lines. Check for fluid leaks, cracked or damaged lines in hydraulic brake systems. Ensure that parking brake is operational and properly adjusted. Low Air Warning devices must be operative. (49 CFR 396 Appendix G)

m. Suspension. Inspect for indications of misaligned, shifted or cracked springs, loosened shackles, missing bolts, spring hangers unsecured at frame and cracked or loose U-bolts. Inspect for any unsecured axle positioning parts, and sign of axle misalignment, broken torsion bar springs (if so equipped). (49 CFR 396 Appendix G)

n. Coupling Devices (Inspect without uncoupling). Fifth Wheels: Inspect for unsecured mounting to frame or any missing or damaged parts. Inspect for any visible space between upper and lower fifth wheel plates. Ensure that the locking jaws are around the shank and not the head of the kingpin. Ensure that the release lever is seated properly and safety latch is engaged. Pintle Hook, Drawbar, Towbar Eye and Tongue and Safety Devices: Inspect for unsecured mounting, cracks, missing or ineffective fasteners (welded repairs to pintle hook is prohibited). Ensure safety devices (chains, hooks, cables) are in serviceable condition and properly attached. (49 CFT 396 Appendix G)

o. Cargo Space. Inspect to ensure that cargo space is clean and free from exposed bolts, nuts, screws, nails or inwardly projecting parts that could damage the lading. Check floor to ensure it is tight and free from holes. Floor shall not be permeated with oil or other substances. (49 CFR 177.815(e)(1) and 398.94)

p. Landing Gear. Inspect to ensure that landing gear and assembly are in serviceable condition, correctly assembled, adequately lubricated and properly mounted.

SECTION II *(Continued)*

q. Tires, Wheels and Rims: Inspect to ensure that tires are properly inflated. Flat or leaking tires are unacceptable. Inspect tires for cuts, bruises, breaks and blisters. Tires with cuts that extend into the cord body are unacceptable. Thread depth shall not be less than: 4/32 inches for tires on a steering axle of a power unit, and 2/32 inches for all other tires. Mixing bias and radial on the steering axle is prohibited. Inspect wheels and rims for cracks, unseated locking rings, broken, loose, damaged or missing lug nuts or elongated stud holes. (49 CFR 396 Appendix G)

r. Tailgate/Doors. Inspect to see that all hinges are tight in body. Check for broken latches and safety chains. Doors must close securely. (49 CFR 177.835(h))

s. Tarpaulin. If shipment is made on open equipment, ensure that lading is properly covered with fire and water resistant tarpaulin. (49 CFR 177.835(h))

t. Other Unsatisfactory Condition. Note any other condition which would prohibit the vehicle from being loaded with hazardous materials.

Item 14. For AA&E and other shipments requiring satellite surveillance, ensure that the Satellite Motor Surveillance System is operable. Shipper will instruct the driver to send a "test" emergency message to DTTS by having the driver activate the "emergency (panic) button". Shipper will contact DTTS at 1-800-826-0794 to verify that test message was received. Message must be received by DTTS for system to be considered operational.

SECTION III - POST LOADING INSPECTION

General Instructions.

All items will be checked prior to the release of loaded equipment. Shipment will not be released until deficiencies are corrected. All items will be checked on incoming loaded equipment. Deficiencies will be reported in accordance with applicable service regulations.

Item 18. Check to ensure shipment is loaded in accordance with 49 CFR Part 177.848 and the applicable Segregation or Compatibility Table of 49 CFR 177.848.

Item 19. Check to ensure the load is secured from movement in accordance with applicable service outload drawings.

Item 20. Check to ensure seal(s) have been applied to closed equipment; fire and water resistant tarpaulin applied on open equipment.

Item 21. Check to ensure each transport vehicle has been properly placarded in accordance with 49 CFR Part 172 Subpart F.

Item 22. Check to ensure operator has been provided shipping papers that comply with 49 CFR Part 172 Subpart C. For shipments transported by Government vehicle, shipping paper will be DD Form 836.

Item 23. Ensure operator(s) sign DD Form 626, are given a copy and understand the hazards associated with the shipment.

Item 24. Applies to Commercial Shipments Only. If shipment is made under DOT Exemption 868, ensure that shipping papers are properly annotated and copy of Exemption 868 is with shipping papers.

SAFETY INSPECTION CHECKLIST FOR CONSTRUCTION EQUIPMENT

CONTRACTOR		CONTRACT NUMBER
TYPE OF EQUIPMENT	EQUIPMENT NUMBER	DATE OF INSPECTION

CORPS OF ENGINEERS SAFETY AND HEALTH REQUIREMENTS MANUAL, EM 385-1-1, REV OCT 84, REFERENCES ARE IN PARENTHESES.

INDICATE ANSWERS BY PLACING "X" IN PROPER COLUMN.	YES	NO	N/A
1. IS ENG FORM 3363 OR EQUIVALENT WARNING SIGN FOR HIGH-VOLTAGE LINES POSTED AT OPERATOR'S POSITION IN CRANE? (15.E.08)			
2. ARE BELTS, GEARS, SHAFTS, PULLEYS, SPROCKETS, SPINDLES, DRUMS, FLYWHEELS, CHAINS, OR OTHER RECIPROCATING OR ROTATING PARTS ADEQUATELY GUARDED? (18.B.03)			
3. ARE ALL HOT PIPES AND SURFACES EXPOSED TO ACCIDENTAL CONTACT SUITABLY GUARDED OR INSULATED? (18.B.04)			
4. ARE FUEL TANKS LOCATED SO THAT SPILLS OR OVERFLOWS WILL NOT COME IN CONTACT WITH ENGINE, EXHAUST, OR ELECTRICAL EQUIPMENT? (18.B.05)			
ARE EXHAUSTS AND DISCHARGES SO DIRECTED AS NOT TO ENDANGER WORKMEN OR OBSTRUCT VIEW OF OPERATOR? (18.B.06)			
6. ARE PLATFORMS, CATWALKS, STEPS, HANDHOLDS, AND GUARDRAILS PROVIDED TO ASSURE SAFE FOOTING AND ACCESSWAYS? (18.B.08)			
7. IS ADEQUATE PROTECTION FOR OPERATOR PROVIDED AGAINST THE ELEMENTS, FALLING OR FLYING OBJECTS, SWINGING LOADS, BACKLASH OR WINCH CABLES, AND SIMILAR HAZARDS? (18.B.18) (18.B.19) (18.B.11)			
8. ARE CRAWLER AND RUBBER TIRED TRACTORS, SELF-PROPELLED PNEUMATIC TIRED EARTH MOVERS, WATER TANK TRUCKS, BACKHOES, COMPACTORS, FRONT END LOADEPS (CRAWLER AND PNEUMATIC TIRE), GRADALLS, MOTOR GRADERS, POWERBELT EXCAVATORS, ROLLERS (TRACKED OR WHELLED), AND SCRAPERS (ALL TYPES), EQUIPPED WITH ROPES OF SUFFICIENT STRUCTURAL STRENGTH TO PROTECT THE OPERATOR IN THE EVENT OF ROLLOVER, AND SEATBELT FOR PROTECTION OF THE OPERATOR? (18.B.20)			
9. IF EQUIPMENT IS TO BE OPERATED ON HIGHWAYS, IS IT EQUIPPED WITH TURN SIGNALS, VISIBLE FROM THE FRONT AND REAR? (18.A.15)			
10. ARE POSITIVE STOPS OR LIMITING DEVICES PROVIDED FOR EQUIPMENT OPERATED ON RAILS, TRACKS, OR TROLLEYS? (18.A.16)			

.DICATE ANSWERS BY PLACING "X" IN PROPER COLUMN.	YES	NO	N/A
11. IS ALL OF THE GLASS WHICH IS INSTALLED IN THE OPERATOR'S COMPARTMENT SAFETY GLASS? (18.B.18) (18.C.15)			
12. IS A WARNING DEVICE OR SIGNALPERSON PROVIDED WHERE THERE IS DANGER TO PERSONS FROM MOVING EQUIPMENT, SWINGING LOADS, BUCKETS, BOOMS, ETC.? (18.B.15)			
13. IS HEAVY DUT HAULAGE EQUIPENT EQUIPPED WITH AN OPERABLE EMERGENCY BRAKING SYSTEM WHICH WILL AUTOMATICALLY STOP THE EQUIPMENT UPON FAILURE IN THE SERVICE BRAKE SYSTEM? CAN THIS SYSTEM ALSO BE OPERATED MANUALLY FROM THE OPERATOR'S POSITION? (18.A.22)			
14. IS THE CRANE EQUIPPED WITH A SHOCK-ABSORBING TYPE BOOM STOP? (CABLE STOPS ARE NOT ACCEPTABLE.) (18.C.19)			
15. IS ENG FORM 3364 OR A SIMILAR SAFE-LOAD-CAPACITY CHART FOR VARIOUS BOOM RADII POSTED IN THE CAB OF THE CRANE? IS THIS CHART APPLICABLE TO PRESENT BOOM LENGTH, COUNTER WEIGHT, ETC.? IS A BOOM ANGLE OR RADIUS INDICATOR WITHIN THE OPERATOR'S VIEW? (18.C.02) (18.E.08) (18.G.04)			
16. DO ALL POINTS REQUIRING LUBRICATION DURING OPERATION HAVE SUCH FITTINGS LOCATED OR GUARDED IN SUCH MANNER THAT PERSONNEL SERVICING THE EQUIPMENT ARE PROTECTED FROM INJURY? (18.A.18)			
17. DO ALL MODIFICATIONS, EXTENSIONS, REPLACEMENT PARTS, AND/OR REPAIRS TO EQUIPMENT MAINTAIN THE SAME FACTOR OF SAFETY AS THE ORIGINALLY DESIGNED EQUIPMENT? (18.A.33) (18.C.04)			
18. IS THE SWING RADIUS OF THE REAR OF ROTATING CRANES, TEMPORARILY OR PREMANENTLY MOUNTED, BARRICADED TO PREVENT EMPLOYEES FROM BEING STRUCK OR CRUSHED? (18.B.21)			
19. IS ADEQUATE CLEARANCE MAINTAINED BETWEEN MOVING AND ROTATING STRUCTURES OF THE CRANE AND FIXED OBJECTS TO PERMIT SAFE PASSAGE? (18.C.18)			
20. ARE ALL DRUMS ON LOAD HOISTING EQUIPMENT EQUIPPED WITH POSITIVE HOLD DEVICES? (18.C.05)			
21. IS THERE SUFFICIENT CABLE TO ALLOW TWO FULL WRAPS OF CABLE ON DRUMS AT ALL TIMES? (18.C.07)			
22. IS HOIST BRAKING EQUIPMENT CAPABLE OF STOPPING, LOWERING AND HOLDING A LOAD OF AT LEAST THE FULL TEST LOAD? (18.C.06)			
23. ARE TRAVELING CRANES EQUIPPED WITH A WARNING DEVICE WHICH WILL SOUND CONTINUOUSLY WHEN CRANE IS TRAVELING? (18.E.02)			

INDICATE ANSWERS BY PLACING "X" IN PROPER COLUMN.	YES	NO	N/A
24. ARE ALL HOSE CONNECTIONS TO PILEDRIVER HAMMERS, PILE EJECTORS, AND JET PIPES EQUIPPED WITH A SAFETY LASHING MEETING REQUIREMENTS OF 18.J.03?			
25. ARE THE HANGING OR SWINGING PILEDRIVING LEADS EQUIPPED WITH A FIXED LADDER? (18.J.04)			
26. ARE FIXED PILEDRIVER LEADS EQUIPPED WITH DECKED LANDINGS HAVING GUARDRAILS, INTERMEDIATE RAILS, AND TOE BOARDS? ARE THE FIXED LEADS PROVIDED WITH A FIXED LADDER OR STAIRS FOR ACCESS TO LANDINGS AND HEAD BLOCKS? (18.J.05)			
27. ARE THE PILEDRIVER LEADS EQUIPPED WITH STOP BLOCKS TO PREVENT THE HAMMER FROM BEING RAISED AGAINST THE HEAD BLOCK? (18.J.07)			
28. ARE FIXED LADDERS MORE THAN 20 FEET IN HEIGHT ON PILEDRIVING LEADS PROVIDED WITH A LADDER CLIMBING DEVICE? (30.B.13) (30.B.14)			
29. ARE ALL WIRE ROPES OR CABLES IN GOOD OPERATING CONDITION? (17.C.01) (17.C.02) (17.C.03)			
30. ARE DRUMS, SHEAVES, AND PULLEYS SMOOTH AND FREE OF DEFECTS? (17.C.07)			
ARE WIRE ROPE SOCKETS, SPLICES, THIMBLES, AND CLIPS ADEQUATE AND PROPERLY APPLIED? (17.A.04) (17.C.03) (17.C.09) (17.C.10)			
32. ARE HOOKS, SHACKLES, RINGS, PAD EYES, AND OTHER FITTINGS IN GOOD CONDITION? (17.A.05)			
33. ARE RUNNING LINES OF HOISTING EQUIPMENT EXPOSED TO HAZARDOUS CONTACT ADEQUATELY GUARDED? (17.A.06)			
34. ARE FUELING CANS USED WITH THIS EQUIPMENT APPROVED TYPE SAFETY CANS? (12.D.39)			
35. PERFORMANCE TEST. PRIOR TO BEING PLACED IN OPERATION THE FOLLOWING CRANES AND DERRICKS WILL BE GIVEN A PERFORMANCE TEST TO DEMONSTRATE THE STRENGTH, STABILITY, CAPABILITY, AND ADEQUACY OF POWER, BRAKES, CLUTCHES, AND CONTROLS TO SAFELY MANEUVER THE SPECIFIED PERCENT OF THE MAXIMUM ANTICIPATED LOAD AT THE MAXIMUM BOOM RADIUS TO BE USED IN ACCOMPLISHING THE CURRENT CONTRACT OPERATIONS. THIS TEST WILL BE THE BASIS UPON WHICH THE EQUIPMENT IS RATED FOR THE CURRENT CONTRACT. PARTICULAR ATTENTION SHALL BE GIVEN THAT UNDER NO CIRCUMSTANCES WILL THE MAXIMUM ANTICIPATED LOAD USED FOR PERFORMANCE TEST LOAD EXCEED THE MANUFACTURER'S RATING. THE CONTRACTOR WILL PROVIDE THE TEST WEIGHTS. a. CRAWLER, TRUCK AND WHEEL MOUNTED CRANES 125% OF THE MAXIMUM ANTICIPATED LOAD. (18.C.01) (18.D.01)			

ICATE ANSWERS BY PLACING "X" IN PROPER COLUMN.

	YES	NO	N/A
b. PORTAL, HAMMERHEAD AND TOWER CRANES 125% OF THE MAXIMUM ANTICIPATED LOAD. (18.C.01) (18.E.01)			
c. PEDESTAL MOUNTED CRANES AND DERRICKS 125% OF THE MAXIMUM ANTICIPATED LOAD. (18.C.01) (18.F.02)			
d. FLOATING CRANES IN ACCORDANCE WITH THE FOLLOWING TABLE:			

SAGE WORKING LOAD	TEST LOAD
UP TO 20 TONS	125% OF WORKING LOAD
UP TO 50 TONS	WORKING LOAD PLUS 5 TONS
OVER 50 TONS	110% OF WORKING LOAD

(18.C.01) (18.G.05)

DATE: _____ WEIGHT OF TEST LOAD _____ TONS

LENGTH OF BOOM. _____ FEET

MAXIMU RADIUS AT WHICH TEST PERFORMED: _____ FEET

	YES	NO	N/A
ARE ADEQUATE FIRE EXTINGUISHERS INSTALLED ON THE EQUIPMENT, CHARGED, TAGGED, AND READY FOR USE, SUITABLY PLACED, AND DISTINCTLY MARKED, AND IS ACCESSIBILITY TO THEM UNOBSTRUCTED? (13.A.01) (13.A.02)			
37. ARE TRUCK AND CRAWLER MOUNTED CRANES MOUNTED ON BARGES SECURELY ATTACHED TO THE BARGE; OR ARE CONTROL BARRIERS PROVIDED TO PREVENT EQUIPMENT FROM RUNNING OFF BARGE WHERE BARGE STABILITY IS SUCH AS TO PERMIT LIMITED TRAVEL. (18.G.06)			
38. ARE ADEQUATE GUARDRAILS PROVIDED AROUND THE SKIPS OF PAVERS, CONCRETE MIXERS AND SIMILAR EQUIPMENT? GUARD IS REQUIRED FOR OPEN END OF SKIP. (18.B.07)			
39. ARE ALL MOTOR VEHICLES EQUIPPED AS FOLLOWS WHEN OPERATED BETWEEN SUNSET AND SUNRISE?			
a. DIRECTIONAL SIGNAL LIGHTS BOTH FRONT AND REAR?			
b. TWO HEADLIGHTS, ONE ON EACH SIDE; ONE RED TAILLIGHT AND ONE RED OR AMBER STOP LIGHTS ON EACH SIDE.			
c. THREE EMERGENCY FLARES, REFLECTIVE MARKERS, OR EQUIVALENT PORTABLE WARNING DEVICE. (19.A.06)			

CATE ANSWERS BY PLACING "X" IN PROPER COLUMN.	YES	NO	N/A
40. IS SERVICE OR MAINTENANCE EQUIPMENT, WHICH WILL BE PARKED OR MOVING SLOWER THAN NORMAL TRAFFIC ON HAUL ROADS AT NIGHT, EQUIPPED WITH A FLASING YELLOW LIGHT MOUNTED TO BE VISIBLE FROM ALL DIRECTIONS? (18.A.20)			
41. ARE BRAKES ON WHEELED EQUIPMENT IN GOOD OPERATING CONDITION? (18.A.21) (19.A.03) (19.A.07) (19.A.08)			
42. ARE WINDSHIELDS ON EQUIPMENT PROVIDED WITH WINDSHIELD WIPERS, AND DEFROSTING AND DEFOGGING DEVICES? (19.A.10) (19.A.11)			
43. IS ALL GLASS INSTALLED IN CABS AND BODIES OF VEHICLES AND EQUIPMENT "SAFETY GLASS"? (19.A.15)			
44. ARE TRUCKS AND SIMILAR EQUIPMENT EQUIPPED WITH SPEEDOMETERS, FUEL GAUGES, AND HORNS IN WORKING CONDITION? (19.A.09)			
45. ARE RUNNING BOARDS AND STEPS OF VEHICLES PROVIDED WITH NONSLIP SURFACES? (19.A.14)			
46. ARE DUMP BODIES PROVIDED WITH HINGED STRUTS OR OTHER SUITABLE DEVICES FOR LOCKING BODY IN RAISED POSITION? (19.A.20)			
. ARE TAILGATE DUMPING DEVICES SO ARRANGED THAT OPERATOR WILL BE IN THE CLEAR WHILE DUMPING LOAD? (19.A.22)			
48. IS ENGINE EQUIPPED WITH POWER-OPERATED STARTING DEVICE IN OPERATIVE CONDITION? (19.A.23)			
49. IS AIR-PRESSURE GAUGE IN OPERATIVE CONDITION IN EQUIPMENT WITH AIR BRAKES? (21.A.10)			
50. IS AIR TANK EQUIPPED WITH DRAIN VALVE IN AN ACCESSIBLE POSITION? (21.B.19) (21.B.24) (21.B.26)			
51. ARE TOWING DEVICES STRUCTURALLY ADEQUATE AND PROPERLY MOUNTED? (19.A.17)			
52. IF EQUIPMENT IS TO OPERATE ON AIRFIELD LANDING AREAS IS IT EQUIPPED WITH PROPER FLAGS? (10.D.07)			
53. ARE CABLES FOR ELECTRICALLY POWERED EQUIPMENT IN GOOD CONDITION AND ARE INSULATED HOT STICKS AVAILABLE FOR HANDLING CABLES? (07.A.04) (15.A.02) 15.A.04) (15.A.09)			

U.S. ARMY ENGINEERS ALASKA DISTRICT SAFETY INSPECTION	Date: Correction:
Contractor or Office:	Contract or Activity:
Inspected By:	Site Inspector's Signature:

	Yes	No	REMARKS
1. Inspector has reviewed EM 385-1-1 & DIVR 385-1-1			
2. Policy statement with endorsements, man overboard, fire, abandon ship drills held monthly and documented.			
3. Copy of Accident Prevention Program, Job Hazard Analysis, Hurricane Protection Plan and Drug abuse program at site.			
4. Daily safety inspection performed and documented, equipment inspection checklist on hand and completed.			
5. Safety meeting held weekly and documented.			
6. Current first aid/CPR cardholder, Log of Accidents, Medical Surveillance, First-Aid kits, fire plan, emergency numbers & Emer. Response Plan posted. Written name of Safety/Fire coordinator.			
7. Accident reporting, timeliness, investigation, accident summary.			
8. Hazard Chemical Inventory/MSDS, haz/storage, annual training			
9. Doc. showing safety training/DDC/new employee indoctrination			
10. Const/safe: heavy equipment rigging, welding/cutting, tools, pressurized equipment & access facilities, ladders, scaffolding.			
11. Housekeep-sanitation, warning signs, matl/tool storage, tripping			
12. Fire protection, flammable/combustible storage, fuel handling			
13. Personal protective equipment issued/used, i.e., respirators, fall protection, rescue equipment, personnal flotation devices, protection for head, foot, eyes, face, hands, body.			
14. Electrical safety-i.e., battery charging, lockout/tagout, bonding, grounaing, permanent & temporary wiring, overhead lines			

DEFICIENCIES NOTED:

DEFICIENCIES NOTED CONTINUED:

JE JACOBS

SAFETY OBSERVATION REPORT

Date: _____ **Time:** _____ **Originator:** _____

Project: _____ **Supervisor:** _____

Location: _____ **Action Person:** _____

Observation:

Check Box That Applies:

- ☐ Safe Behavior Observed (No Further Action Required) Proper Procedures Followed
- ☐ Unsafe Behavior
- ☐ Unsafe Condition

☐ If Non-compliance describe non-compliance below:

Corrective Action:

Further Action or Help Needed?

Action Person Signature:	Date Closed:	Action Person Notified: Yes/No

JE JACOBS

VISITOR CHECK-IN LOG

Project Name:		Project No.:	Date:	
Name	Representing	Destination	Time (24-Hour)	
			In	Out

JE JACOBS

AIR MONITORING RECORD

Employee Name: _____ **Employee No.:** _____ **Company:** _____ **Title:** _____

Project Name: _____ **Project Number:** _____

Date Sampled: _____ **Sampled By:** _____

Sampling Method and Analyte: _____

Collection Media:

____ Charcoal Tube ____ Filter (Total) ____ Passive Dosimeter Collector Mfg: _____

____ Silica Gel ____ Filter (Resp.) ____ Other: _____ Size/Type: _____

____ Chromosorb ____ Impinger _____ Lot #: _____

Sample Type:

____ Personal - TWA ____ Blank Does Sampling Represent Typical Exposure? _____

____ Personal Peak ____ Bulk Temperature _____ Collector Mfg: _____

____ Area ____ Other _____ Humidity: _____ Wind: _____

____ Source _____

Activities During Sample Collection:

_____

_____

Sample Pump: Mfg & Model #: _____ Serial #: _____

Calibrator: Type: _____ Mfg & Model #: _____ Serial #: _____

Calibration Date: _____ Calibrated By: _____

Sample #	Time On	Time Off	Total Time	Pre Cal Flow Rate	Post Cal Flow Rate	Average Flow Rate	Sample Volume	Analytical Result	TWA

Descriptive Data: (Engineering controls or PPE used, work activities, sample interferences etc.)

_____

_____

Date: _____ Signature: _____

Send results to: File; Project Manager; H&S; Employee

JE JACOBS

HEALTH AND SAFETY INSTRUMENT CALIBRATION LOG

Date	Time	Instrument	MFG Model #	Serial #	Calibration Gas	Lot #	Concentration	BKG Counts	Span Setting	Initials

JE JACOBS

EXPOSURE MONITORING LOG

Project Name:	Project No.	Date:
Location Monitored:	Atmospheric Conditions:	
Activity Monitored:		
Site No.		

Time (24-Hour Clock)	Background	Readings								
		Monitor (depth)	FID (ppm)	PID (ppm)	$\%O_2$	%LEL	H_2S	Mini-Ram	Other	Samplers Initials

JE JACOBS

HAZARDOUS MATERIAL EXPOSURE AND FIELD ACTIVITY REPORT

EMPLOYEE'S OFFICE LOCATION: ANCHORAGE

For: _____Month _____ year

NAME OF EMPLOYEE: _____

CHECK HERE FOR: ____"NO SITE VISITS"

PART I - SITE VISITS TO NON-EXCLUSION ZONES

SITE NAME/ LOCATION	ACTIVITY	DURATION OF SITE VISIT (HOURS)

PART II - SITE VISITS TO EXCLUSION ZONES (For additional room, use back of form)

SITE NAME/ LOCATION	ACTIVITY	CHEMICAL OR OTHER MATERIALS PRESENT	EXPOSURE POTENTIAL (I.M.S.)	DURATION OF SITE VISIT HOURS	LEVEL OF PROTECTION USED

***I = Incidental** Potential for exposure is 1/10 or under the exposure limit level.
M = Moderate Potential for exposure is >1/10 up to, but not including, the exposure limit level.
S = Significant Potential for exposure at or above exposure limit level.

_____
EMPLOYEE SIGNATURE DATE

Return to: Jacobs Safety Officer, Jacobs Engineering, 4300 B Street, Suite 600, Anchorage, AK 99503

JE JACOBS

DAILY HEALTH AND SAFETY REPORT

Contract Number / Delivery Order Number: _____

Project Title: _____

Location: _____ **List Contractors/Organizations Present:** _____

Weather Conditions			
Temp Low:		Temp Hi:	Comments:
Wind Speed: _____		Conditions: _____	

Zero Accident Process
Safe Plans of Action in effect today: Yes ☐ No ☐
Total Project SPAs generated to date: _____
Were any Safety Observation Reports (SORs) generated today? (List Individually) **Yes** ☐ **No** ☐
Total SORs for today: _____ Total SORs since mobilization: _____

Health and Safety Inspections	
Check any of the following inspections performed today:	
☐ Heavy Equipment	☐ Cranes
☐ Hand Tools	☐ Storage Areas
☐ Site Office	☐ Sanitation Facilities
☐ Drill Rig	☐ Monitoring Instruments
☐ Misc. Electrical	☐ Misc. Equipment
☐ Excavation	☐ Exclusion Zone
☐ PPE	☐ Operations
☐ Other	List:

Observation/Comments made during the daily inspections :

Air Monitoring			
Was air monitoring performed within the breathing zone today?	☐ **N/A**	☐ **Yes**	☐ **No**
Did the air monitoring results exceed the PEL?	☐ **N/A**	☐ **Yes**	☐ **No**
Have Air Samples Been Collected for Laboratory Analysis?		☐ **Yes**	☐ **No**

Type of Test (personal, area, perimeter)	**Test Method/Matrix**	**Quantity of Samples**

General Health and Safety			
Worker protection levels this date:	☐ **Level A** ☐ **Level B** ☐ **Level C** ☐ **Level D** ☐ **N/A**		
Was any work activity conducted within a confined space?		☐ **Yes**	☐ **No**
Was any work activity conducted within an area determined to be immediately dangerous to life and health?		☐ **Yes**	☐ **No**
Were approved decontamination procedures used on workers and equipment as required?	☐ **N/A**	☐ **Yes**	☐ **No**
Was a Safety Tailgate Meeting held this day? (See attached)		☐ **Yes**	☐ **No**
Was there any “Lost Time” accident this day? (If YES, attach copy of completed accident report)		☐ **Yes**	☐ **No**
Was hazardous waste/materials released into the environment? (If YES, attach copy of spill report)		☐ **Yes**	☐ **No**

(SM) _____ Health and Safety _____

Date _____ Date _____

USACE Equipment Inspection Forms

JE JACOBS

RENTAL EQUIPMENT CONDITION REPORT FOR AUTOMOBILES/TRUCKS

CLIENT _____ PROJECT NO. _____

VEHICLE TYPE _____ AGENCY RECEIVED FROM _____

MAKE/MODEL _____ MILEAGE Out _____ MILEAGE In _____

"Yes or No" Where Appropriate "G" - New or in Good Condition "R" - Requires Repairs "N" - Items Not Applicable

BODY & INTERIOR

☐ Inspection Sticker _____ ☐ Upholstery _____

☐ License/Sticker _____ ☐ Heater/Defroster _____

☐ Door Locks _____ ☐ Air Conditioner _____

☐ Door Handles _____ ☐ Steering _____

☐ Lighting System _____ ☐ Floor Boards/Mats _____

☐ Body _____ ☐ Paint _____

ENGINE & OPERATING SYSTEMS

☐ Oil Level and Condition _____ ☐ Oil Leaks _____

☐ Operating Condition _____ ☐ Cooling System/Hoses _____

☐ Water Level/Anti-Freeze _____ ☐ Transmission _____

☐ Tire Condition/Lugs _____ ☐ Transmission Level/Condition _____

☐ Battery Condition __ _____ ☐ Corrosion/terminal Connections _____

☐ Tire Pressure _____ ☐ Lug Nuts _____ ☐ Fan/ Alternator _____ ☐ Belts _____

☐ Control Panel, Gauges _____ ☐ Spare Tire _____

☐ Jack, Tire Tool _____ ☐ Exhaust System _____

☐ Windshield Wipers _____ ☐ Brakes _____

☐ Windows, Windshield _____ ☐ Parking Brake _____

REMARKS:

Initial Inspection By _____ Date _____

JE JACOBS

STANDARD EQUIPMENT INSPECTION FORM

Make	Type	Year of Manufacture	Date	Model	Serial No.	Hours	Employee ID	Inspector Name

			Engine	Attachment	Attachment
Fill in appropriate boxes	Company Name				
	Supervisor Name				

A. SERVICE CHECKS PRE-FIELD MOBILIZATION:

ITEM	*OK*	*AMT NEEDED*	*ITEM*	*OK*	*AMT ADDED*
Radiator & Freeze Protection			Batteries		
Transmission			Differential/Plan		
Final Drives			Tandems		
Engine			Fuel Level		
Hydraulic System			Drain Fuel Sediment		
Lubrication Points			Pivot Shaft		

B. EQUIPMENT INSPECTION PRE-FIELD MOBILIZATION

	CONDITION Bad/Good/ Excellent	*Attn Needed*	**Explanation**	*Corrected? (Y/N)*
Engine Compartment				
Radiator				
Fan & Shrouds				
Air Induction and Filter				
Belts Pulleys				
Exhaust & Rain Cap				
Battery & Cables				
Hydraulic Cylinders				
Operators Comp.				
Controls & Linkages				
Hoses & Lines				
Oil Leaks				
Fuel Leaks				
Coolant				
Fasteners				
Cracks				
Guards & Covers				
Cutting Edges				
Sprockets				
Rollers & Idlers				
Tracks or Tires				

B. EQUIPMENT INSPECTION PRE-FIELD MOBILIZATION (continued)

	CONDITION Bad/Good/ Excellent	Attn Needed	Explanation	Corrected? (Y/N)
Engine				
Governor Control				
Trans Operation				
Trans Linkage				
Steering System				
Service Brakes				
Parking Brake				
Unusual Noise				
Gauges Operational				
Gauges Normal				
Backup Alarm				
Heater & Fan				
Switches				
Wipers & Washer				
Lights				
Horn				
Seat & Seat Belts				
Windows				
Doors				
General Appearance:				
Machine Damage:				

NOTES:

NOTES (continued)**:**

Deficiencies noted: ☐ Yes ☐ No Explain: _____

Deficiencies fixed: ☐ Yes ☐ No Date: _____

Inspection 100% complete ☐ Yes ☐ No

Subcontractor Signature _____ Date all items passed inspection: _____

BCC-Jacobs Representative _____ Date: _____

JE JACOBS

WELDING/BRAZING/HOT WORK PERMIT

PERMIT #_____

Issued by: _____

Approved by SSHO: _____

Date Permit Issued: _____ Time Permit Issued: _____ Expiration Date: _____

Operation to be Performed: _____

Location of Operation: _____

Special Precautions:

TESTING

Location of Testing	Time	Percentage of LEL	Percentage of O_2	Initials

CHECKLIST

Item	N/A	Yes	Initials of Inspector
Surround equipment and operation safe for hot work			
Tank purged			
Extinguisher present			
No combustibles within 35 feet of operation or items protected by covers or removed from area			
No flammables within 50 feet			
Worker has proper protective equipment to perform function			
Safety blankets available			
Flammable gases greater than 10% present additional precaution needed to perform operation			
Fire watch required			
Welding unit inspected			
Adequate ventilation available			

The location where the work is to be performed has been examined, necessary precautions taken to provide for worker safety and for the area to be a fire safe environment for performing these functions. Permission is granted for the work to be performed.

Signature of SSHO performing inspection and issuing the permit:

I am fully qualified to perform this operation and understand my responsibilities outlined by the inspection just conducted.

Signature of welder/on scene supervisor performing operation:

JE JACOBS

AUTHORIZATION FOR MEDICAL TREATMENT

TO: Dr. _____ Address: _____ Date: _____

This form signed by our representative is your authority to render treatment to:

_____
(Employee)

in accordance with the provisions of and under the conditions prescribed by the Workers' Compensation Act. Unless the case is an emergency, kindly obtain authorization for surgery, radical procedures, or hospitalization from the insurance carrier. Send your bill and report to us at the address listed below.

_____
Authorized Representative

Date of Injury: _____ Location: _____ Job No. _____

How Injury Occurred: _____

Please complete and return by mail to the following address to ensure prompt payment of charges:

Risk Manager
1111 South Arroyo Parkway
Pasadena, CA 99105

FOR DOCTOR'S USE ONLY

Diagnosis of Injury: _____

Disposition of Patient:

____ Occupational ____ Non-Occupational ____ Unable to Determine

____ Able to resume regular duties

____ Able to resume regular duties next workday

____ Able to resume restricted duties with the following limitations: _____
_____

____ Unable to return to work, estimated length of disability: _____

Return for follow-up visit on _____(Date)

_____
Doctor's Signature

USACE Accident Investigation Report (3394)

USACE Report of Accident (256-R)

JE JACOBS

ERS INCIDENT REPORTING FLOWCHART

Incident:
- No adverse impact (e.g. hard hat missing), not property damage, injury, or illness

Yes

- Notify QAR.
- Include in QC/QA daily report.
- Attach SOR if written.

Note: Provide copy of SOR to HSE Office Anchorage

No

Incident:
- Result in First Aid Treatment as defined in OSHA 1904 and CB POD-C 1022

Yes

- Notify QAR.
- Notify Program Manager and/or HSE Manager if employee is to receive medical treatment by a professional health care provider.
- Notify Resident Engineer if medical attention is received.
- Submit POD 265R within 12 hours to HSE Anchorage Office if medical attention is provided to employee.
- Attach SOR if written.
- HSE Office submits POD 265R to USAED District Safety Office within 24 hours.

Notes:
- Log injury on First Aid Log and provide log and SOR (if written) to HSE Administration, Anchorage.
- Medical attention considered E-1 complete Accident/ Incident per HSEP 5.1 or 5.2

No

Incident:
- Result in injury that involved medical treatment defined in OSHA 1904 or CE POD-C 1022 and there was no lost time from work and/or …
- Result in property damage <$2,000 and/or …
- Result in a near miss that could have adverse impact (e.g. crane load could have struck employee) and/or …
- Result in work related illness.

Yes

- Notify QAR.
- Accompany employee to clinic.
- Notify Program Manager and/or HSE Manager immediately.
- Notify Resident Engineer if medical attention/property damage occurs.
- Complete POD 265R within 12 hours and submit to HSE Anchorage Office.
- Complete Incident Investigation Report.
- Include in QC/QA Daily Report.
- HSE Office submits POD 265R to USAED District Safety Office within 24 hours.

Notes:
- Complete Accident/ Incident per HSEP 5.1 or 5.2 and foreword to HSE Administration, Anchorage.
- Attach SOR.

No

Incident:
- Result in injury/illness with lost time from work.
- Property damage >$2,000

Yes

- Notify QAR.
- Accompany employee to clinic.
- Notify Program Manager and/or HSE Manager immediately.
- Notify Resident Engineer if medical attention/property damage occurs.
- Complete POD 265R within 12 hours and submit to HSE Anchorage Office.
- Complete Incident Investigation Report.
- Include in QC/QA Daily Report.
- HSE Office completes Form 3394 and submits within 30 days to the USAED District Safety Office.

Notes:
- Complete Accident/ Incident per HSEP 5.1 or 5.2 and foreword to HSE Administration, Anchorage.
- Attach SOR.

No

Incident:
- Result in Fatality
- One or more persons hospitalized
- >$200,000 in property damage

Yes

- Notify QAR immediately.
- Secure scene.
- Notify Program Manager and/or HSE Manager immediately.
- HSE Office notifies USAED Resident Engineer and District Safety Office immediately.
- HSE Office submits POD 265R within 24 hours and Form 3394 within 30 days to the USAED District Safety Office.
- Cooperation with the Board of Investigation.

Note: State OSHA must be notified immediately of fatality and within 8 hours of an employee hospitalized.

JE JACOBS

SITE TAILGATE MEETING and EXCLUSION ZONE ENTRY LOG

Facility: _____ Conducted by: _____
Date: _____ Time: _____
Client: _____ Project Number: _____
Specific Location: _____
Type of Work: _____
Chemicals Brought to Site: _____

MSDSs available: _____Yes _____No

HEALTH AND SAFETY TOPICS PRESENTED

Protective Clothing/Equipment: _____

Chemical Hazards: _____

Physical Hazard: _____

Emergency Procedures: Apply First Aid and notify Health and Safety immediately _____

Hospital/Clinic: _____
Address: _____
Special Equipment: _____

Evacuation Route: _____

ATTENDEES

Entered Exclusion Zone	Printed Name	Company	SS#	Signature
__Yes __No				
__Yes __No				
__Yes __No				
__Yes __No				
__Yes __No				
__Yes __No				
__Yes __No				

ATTENDEES

Entered Exclusion Zone	Printed Name	Company	SS#	Signature
__Yes __No	_____	_____	_____	_____
__Yes __No	_____	_____	_____	_____
__Yes __No	_____	_____	_____	_____
__Yes __No	_____	_____	_____	_____
__Yes __No	_____	_____	_____	_____
__Yes __No	_____	_____	_____	_____
__Yes __No	_____	_____	_____	_____

(For Safety Staff only)	REPORT NO.	EROC CODE	**UNITED STATES ARMY CORPS OF ENGINEERS ACCIDENT INVESTIGATION REPORT** *(For Use of this Form See Help Menu and USACE Suppl to AR 385-40)*	**REQUIREMENT CONTROL SYMBOL: CEEC-S-8(R2)**

1. ACCIDENT CLASSIFICATION

PERSONNEL CLASSIFICATION	INJURY/ILLNESS/FATAL	PROPERTY DAMAGE	MOTOR VEHICLE INVOLVED	DIVING
GOVERNMENT ☐ CIVILIAN ☐ MILITARY	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ CONTRACTOR	☐	☐ FIRE INVOLVED ☐ OTHER	☐	☐
☐ PUBLIC	☐ FATAL ☐ OTHER		☐	

2. PERSONAL DATA

a. Name *(Last, First, MI)*	b. AGE	c. SEX ☐ MALE ☐ FEMALE	d. SOCIAL SECURITY NUMBER	e. GRADE

f. JOB SERIES/TITLE	g. DUTY STATUS AT TIME OF ACCIDENT	h. EMPLOYMENT STATUS AT TIME OF ACCIDENT
	☐ ON DUTY ☐ TDY ☐ OFF DUTY	☐ ARMY ACTIVE ☐ ARMY RESERVE ☐ VOLUNTEER ☐ PERMANENT ☐ FOREIGN NATIONAL ☐ SEASONAL ☐ TEMPORARY ☐ STUDENT ☐ OTHER *(Specify)*

3. GENERAL INFORMATION

a. DATE OF ACCIDENT *(month/day/year)*	b. TIME OF ACCIDENT *(Military time)* hrs	c. EXACT LOCATION OF ACCIDENT	d. CONTRACTOR'S NAME (1) PRIME: (2) SUBCONTRACTOR:
e. CONTRACT NUMBER ☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(Specify)*		f. TYPE OF CONTRACT ☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(Specify)*	g. HAZARDOUS/TOXIC WASTE ACTIVITY ☐ SUPERFUND ☐ DERP ☐ IRP ☐ OTHER *(Specify)*

4. CONSTRUCTION ACTIVITIES ONLY *(Fill in line and corresponding code number in box from list - see help menu)*

a. CONSTRUCTION ACTIVITY	(CODE) #	b. TYPE OF CONSTRUCTION EQUIPMENT	(CODE) #

5. INJURY/ILLNESS INFORMATION *(Include name on line and corresponding code number in box for items e, f & g - see help menu)*

a. SEVERITY OF ILLNESS/INJURY	(CODE) #	b. ESTIMATED DAYS LOST	c. ESTIMATED DAYS HOSPITALIZED	d. ESTIMATED DAYS RESTRICTED DUTY

e. BODY PART AFFECTED	(CODE)	g. TYPE AND SOURCE OF INJURY/ILLNESS	(CODE)
PRIMARY	#	TYPE	#
SECONDARY	#	SOURCE	#
f. NATURE OF ILLNESS/INJURY	#		

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

a. ACTIVITY AT TIME OF ACCIDENT	(CODE) #	b. PERSONAL FLOATATION DEVICE USED? ☐ YES ☐ NO ☐ N/A

7. MOTOR VEHICLE ACCIDENT

a. TYPE OF VEHICLE	b. TYPE OF COLLISION	c. SEAT BELTS	USED	NOT USED	NOT AVAILABLE
☐ PICKUP/VAN ☐ AUTOMOBILE ☐ TRUCK ☐ OTHER *(Specify)*	☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING ☐ OTHER *(Specify)*	(1) FRONT SEAT			
		(2) REAR SEAT			

8. PROPERTY/MATERIAL INVOLVED

a. NAME OF ITEM	b. OWNERSHIP	c. $ AMOUNT OF DAMAGE
(1)		
(2)		
(3)		

9. VESSEL/FLOATING PLANT ACCIDENT *(Fill in line and correspondence code number in box from list - see help menu)*

a. TYPE OF VESSEL/FLOATING PLANT	(CODE) #	b. TYPE OF COLLISION/MISHAP	(CODE) #

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary)*

11. CAUSAL FACTOR(S) *(Read Instruction Before Completing)*

a. (Explain YES answers in item 13)

	YES	NO
DESIGN: Was design of facility, workplace or equipment a factor?	☐	☐
INSPECTION/MAINTENANCE: Were inspection & maintenance procedures a factor?	☐	☐
PERSON'S PHYSICAL CONDITION: In your opinion, was the physical condition of the person a factor?	☐	☐
OPERATING PROCEDURES: Were operating procedures a factor?	☐	☐
JOB PRACTICES: Were any job safety/health practices not followed when the accident occurred?	☐	☐
HUMAN FACTORS: Did any human factors such as, size or strength of person, etc., contribute to accident?	☐	☐
ENVIRONMENTAL FACTORS: Did heat, cold, dust, sun, glare, etc., contribute to the accident?	☐	☐

a. *(CONTINUED)*

	YES	NO
CHEMICAL AND PHYSICAL AGENT FACTORS: Did exposure to chemical agents, such as dust, fumes, mists, vapors or physical agents, such as, noise, radiation, etc., contribute to accident?	☐	☐
OFFICE FACTORS: Did office setting such as, lifting office furniture, carrying, stooping, etc., contribute to the accident?	☐	☐
SUPPORT FACTORS: Were inappropriate tools/resources provided to properly perform the activity/task?	☐	☐
PERSONAL PROTECTIVE EQUIPMENT: Did the improper selection, use or maintenance of personal protective equipment contribute to the accident?	☐	☐
DRUGS/ALCOHOL: In your opinion, was drugs or alcohol a factor to the accident	☐	☐

b. WAS A WRITTEN JOB/ACTIVITY HAZARD ANALYSIS COMPLETED FOR TASK BEING PERFORMED AT TIME OF ACCIDENT?

☐ YES *(If yes, attach a copy.)* ☐ NO

12. TRAINING

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK?	b. TYPE OF TRAINING.	c. DATE OF MOST RECENT FORMAL TRAINING.
☐ YES ☐ NO	☐ CLASSROOM ☐ ON JOB	(Month) (Day) (Year)

13. FULLY EXPLAIN WHAT ALLOWED OR CAUSED THE ACCIDENT; INCLUDE DIRECT AND INDIRECT CAUSES *(See instruction for definition of direct and indirect causes.) (Use additional paper, if necessary)*

a. DIRECT CAUSE

b. INDIRECT CAUSE(S)

14. ACTION(S) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(S).

DESCRIBE FULLY:

15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14.

a. BEGINNING (Month/Day/Year)	b. ANTICIPATED COMPLETION (Month/Day/Year)		
c. SIGNATURE AND TITLE OF SUPERVISOR COMPLETING REPORT CORPS _____ CONTRACTOR _____	d. DATE *(Mo/Da/Yr)*	e. ORGANIZATION IDENTIFIER *(Div, Br, Sect)*	f. OFFICE SYMBOL

16. MANAGEMENT REVIEW *(1st)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

17. MANAGEMENT REVIEW *(2nd - Chief Operations, Construction, Engineering, etc.)*

a. ☐ CONCUR b. ☐ NON CONCUR c. COMMENTS

SIGNATURE	TITLE	DATE

18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW

a. ☐ CONCUR b. ☐ NON CONCUR c. ADDITIONAL ACTIONS/COMMENTS

SIGNATURE	TITLE	DATE

19. COMMAND APPROVAL

COMMENTS

COMMANDER SIGNATURE	DATE

*U.S. GOVERNMENT PRINTING OFFICE: 1993-0-791-757

10.	ACCIDENT DESCRIPTION *(Continuation)*

13a.	DIRECT CAUSE *(Continuation)*

13b.	INDIRECT CAUSES *(Continuation)*

14.	ACTION(S) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(S) *(Continuation)*