# U.S. Army Corps of Engineers
# South Atlantic Division

## *Final*
## Accident Prevention Plan and
## Site Safety and Health Plan Appendix
## Former Lee Field Naval Air Station
## Green Cove Springs, Florida

*In Support of*
**FUDS HTRW Program**

***Prepared by:***
**CB&I Federal Services LLC**
**312 Directors Drive**
**Knoxville, Tennessee 37923**

***Prepared for:***

**U.S. Army Corps of Engineers, Jacksonville District**
**701 San Marco Boulevard**
**Jacksonville, FL 32207**

**Contract: W912DY-10-D-0014**
**Task Order: 0009**

**June 2014**

The following Accident Prevention Plan (APP) has been designed for the methods presently contemplated by CB&I Federal Services LLC (CB&I), for execution of the proposed work. Therefore, the APP may not be appropriate if the work is not performed by or using the methods presently contemplated by CB&I. In addition, as the work is performed, conditions different from those anticipated may be encountered and the APP may have to be modified. Therefore, CB&I only makes representations or warranties as to the adequacy of the APP for currently anticipated activities and conditions.

# Table of Contents

**Page**


List of Appendices ..... iii
List of Figures ..... iii
List of Exhibits ..... iii
1.0 Accident Prevention Plan ..... 1-1
1.1 Signature Sheet ..... 1-1
1.2 Background Information ..... 1-2
1.3 Statement of Safety and Health Policy ..... 1-5
1.4 Responsibilities and Lines of Authority ..... 1-5
1.5 Subcontractors and Suppliers ..... 1-6
1.5.1 Subcontractor/Supplier Coordination and Control ..... 1-6
1.5.2 Subcontractor/Supplier Safety Responsibilities ..... 1-7
1.6 Training ..... 1-7
1.6.1 Safety Indoctrination Training ..... 1-7
1.6.2 Training and Certifications ..... 1-8
1.6.3 Emergency Response Training ..... 1-9
1.6.4 Supervisory and Employee Safety Meetings ..... 1-9
1.7 Safety and Health Inspections ..... 1-9
1.7.1 Inspections ..... 1-9
1.7.2 External Inspections/Certifications ..... 1-10
1.8 Safety and Health Expectations, Incentive Programs, and Compliance ..... 1-10
1.8.1 Safety Program Goals, Objectives, and Accident Experience Goals ..... 1-10
1.8.2 Safety Incentive Programs ..... 1-11
1.8.3 Employee Safety Responsibility Requirements ..... 1-11
1.8.4 Managers and Supervisors Safety Accountability ..... 1-11
1.9 Accident Reporting ..... 1-12
1.9.1 Exposure Data (Man-Hours Worked) ..... 1-12
1.9.2 Accident Investigations, Reports, and Logs ..... 1-13
1.9.3 Immediate Notification of Major Accidents ..... 1-13
1.9.4 Accident Response ..... 1-13
1.10 Medical Support ..... 1-13
1.11 Personal Protective Equipment ..... 1-14
1.12 Plans (Programs, Procedures) Required by EM 385-1-1 ..... 1-14
1.12.1 Layout Plans ..... 1-14
1.12.2 Emergency Response Plans ..... 1-14
1.12.3 Hazard Communication Program ..... 1-15

## ***Table of Contents*** *(Continued)*


1.12.4 Respiratory Protection Plan ..... 1-15
1.12.5 Health Hazard Control Program ..... 1-15
1.12.6 Lead Abatement Plan ..... 1-16
1.12.7 Asbestos Abatement Plan ..... 1-16
1.12.8 Abrasive Blasting Plan ..... 1-16
1.12.9 Confined Space ..... 1-16
1.12.10 Hazardous Energy Control Plan ..... 1-16
1.12.11 Critical Lift Procedures ..... 1-16
1.12.12 Contingency Plan for Severe Weather ..... 1-16
1.12.13 Access and Haul Road Plan ..... 1-16
1.12.14 Demolition Plan ..... 1-16
1.12.15 Emergency Rescue (Tunneling) ..... 1-17
1.12.16 Underground Construction Fire Prevention and Protection Plan ..... 1-17
1.12.17 Compressed Air Plan ..... 1-17
1.12.18 Formwork and Shoring Erection and Removal Plans ..... 1-17
1.12.19 Jacking Plan (Lift) Slab Plan ..... 1-17
1.12.20 Blasting Plan ..... 1-17
1.12.21 Diving Plan ..... 1-17
1.12.22 Alcohol and Drug Abuse Prevention Plan ..... 1-17
1.12.23 Fall Protection Plan ..... 1-17
1.12.24 Steel Erection Plan ..... 1-17
1.12.25 Night Operations Lighting Plan ..... 1-18
1.12.26 Site Sanitation Plan ..... 1-18
1.12.27 Fire Prevention Plan ..... 1-18
1.13 Contractor Information to Meet the Requirements of the Major Sections of EM 385-1-1 ..... 1-18
1.14 Site-Specific Hazards and Controls ..... 1-19

## List of Appendices


| Appendix | Title | Follows Text |
|---|---|---|
| A | Site Safety and Health Plan | |


## List of Figures


| Figure | Title | Page |
|---|---|---|
| 1 | Site Location Map | 1-3 |
| 2 | Responsibilities and Lines of Authority | 1-7 |


## List of Exhibits


| Exhibit | Title | Follows Text |
|---|---|---|
| 1 | Resumes | |
| 2 | Certifications | |

# List of Acronyms

| | |
|---|---|
| AHA | activity hazard analysis |
| APP | accident prevention plan |
| CFR | Code of Federal Regulations |
| CPR | cardiopulmonary resuscitation |
| EM | Engineer Manual |
| FA | first aid |
| H&S | health and safety |
| HAZWOPER | hazardous waste operations and emergency response |
| HSM | health and safety manager |
| JSA | job safety analysis |
| LFNAS | Lee Field Naval Air Station |
| OSHA | U.S. Occupational Safety and Health Administration |
| PCIH | project certified industrial hygienist |
| PM | project manager |
| PPE | personal protective equipment |
| Shaw | Shaw Environmental and Infrastructure, Inc. |
| SOW | scope of work |
| SS | site supervisor |
| SSHO | site safety and health officer |
| SSHP | site safety and health plan |
| TCRA | time-critical removal action |
| USACE | U.S. Army Corps of Engineers |
| WERS | Worldwide Environmental Remediation Services |

# 1.0 Accident Prevention Plan

## 1.1 Signature Sheet

**Plan Preparer:**

Winston D. Russell
Health and Safety Manager
CB&I Federal Services LLC
(865) 692-3584

6-24-14
Date

**Plan Approval:**

Kenneth A. Cunningham, P.G.
Project Manager
CB&I Federal Services LLC
(865) 692-3585

6-24-14
Date

**Plan Concurrence:**

For
Shane Yenchi
Site Supervisor
CB&I Federal Services LLC

6-24-14
Date

Bob Culbertson, PE, PMP
Army Programs Vice President
CB&I Federal Services LLC
(865) 694-7402

6-24-14
Date

FOR D. MUMMERT
David Mummert, CIH
HSE Director E&D
CB&I Federal Services LLC
(419) 425-6129

6-24-14
Date

## *1.2 Background Information*

The U.S. Army Corps of Engineers (USACE) has authorized CB&I Federal Services LLC (CB&I) to conduct remedial investigations at Former Lee Field Naval Air Station (LFNAS), Clay County, Florida. This effort will be conducted as Task Order 009 under Huntsville Worldwide Environmental Remediation Services (WERS) Contract No. W912DY-10-D-0014. USACE Huntsville and USACE Jacksonville are the clients, with technical support also provided by Savannah District. Government project management and technical oversight will be provided by USACE Jacksonville District.

CB&I has been tasked with the conduct of the investigations at LFNAS authorized under the WERS contract. CB&I, through its Total Environmental Restoration Contract with USACE Savannah District, has conducted previous environmental investigations at LFNAS and has previously prepared and submitted an installation-wide accident prevention plan (APP) for the conduct of the environmental investigations at LFNAS under the Basewide Environmental Services Type contract. Therefore, all policies and procedures described in this APP and the Site Safety and Health Plan (SSHP) (Appendix A) will apply to all CB&I project and all subcontractor personnel. CB&I employees and subcontractor personnel that will conduct on-site efforts will be briefed on these procedures prior to arrival on site. At the start of each workday, the required on-site safety briefing will excerpt and reemphasize the pertinent procedures associated with the day's planned activities. A binder or compact disk with these policies and procedures will be available at the CB&I LFNAS field office, and additional binders will be provided for each field team that is present on site during the conduct of field activities. The APP/SSHP will serve as the means to protect on-site personnel, visitors, and the public from potential hazards that may be encountered during the planned remedial investigations, time-critical removal action (TCRA), and programmatic environmental sites at LFNAS.

This document has been prepared to fulfill the necessary requirements for an APP in accordance with USACE Engineer Manual (EM) 385-1-1 and Engineering Regulation 385-1-92 to perform TCRA at the Pyridine Burn Area. The procedures and guidelines contained herein were based on the best available information at the time of the plan's preparation. Specific requirements may be revised if new information is received or conditions change. Written amendments will document any changes made to the plan and will be included as a revision in Attachment 1 to the SSHP. Additional work planned under this WERS contract will be executed under separate work plans which will contain SSHPs. The outline for future SSHPs will consist of the following:

- Site work plan summary
- Site characterization and analysis
- Site description
- Hazard assessment (chemical, physical, and biological)
- Personal protective equipment (PPE)
- Site monitoring requirements
- Activity hazard analysis
- Emergency procedures.

***Site Location and Description.*** The Reynolds Industrial Park, formerly LFNAS, occupies 1,560 acres along the St. Johns River in the City of Green Cove Springs, Florida. Reynolds Industrial Park

is currently owned by Clay County Port, Inc. LFNAS was acquired for the military in 1940 and was used during World War II for training pilots. After the war, the port facility at LFNAS was used to mothball shallow-draft fleet ships, primarily landing craft and Liberty ships.

In 1963, the ownership of LFNAS was transferred from the U.S. Department of Defense to the City of Green Cove Springs. The City of Green Cove Springs began developing the former LFNAS into an industrial park, a golf course, and port facility. In 1983, Clay County Port, Inc. acquired the property and has continued site development. Businesses currently operating at the Reynolds Industrial Park include a railroad car refurbisher (housed in one of the original hangars), a truck driver training school, an aircraft maintenance facility, a fiberglass pipe manufacturing facility, and an airstrip.

**Pyridine Burn Area TCRA**

The Pyridine Burn Area is located between Landfill Area 1 and the Small Arms Range. Debris / chemicals from Ship Mothballing were burned on site from 1944 through 1955. Other materials disposed by trench burial.

A site location map is included as Figure 1.

**FIGURE 1**
**SITE LOCATION MAP**

The tables below provide the CB&I experience modification rate and U.S. Occupational Safety and Health Administration (OSHA) recordable incident rate for the last three years.

**CB&I Accident Experience**

| YEAR | Experience Modification Rate Interstate | OSHA Recordable Incident Rate |
|---|---|---|
| 2013 | 0.40 | 1.01 |
| 2012 | 0.4 | 0.59 |
| 2011 | 0.44 | 0.71 |

The planned environmental services for LFNAS include various tasks to be implemented by CB&I. This APP has been prepared to support work to be performed as part of Delivery Order 0009 of the WERS contract. Additionally, in the event that supplemental environmental services will be required at LFNAS as authorized by USACE via a modification to Delivery Order 0009 or by a separate task order, the procedures outlined in this APP shall apply to the supplemental services. However, following the award of any supplemental environmental services noted above and prior to initiation of on-site activities, CB&I will review and evaluate this APP to ensure that all supplemental on-site activities are adequately covered by this version of the APP and addenda or a new SSHP will be prepared.

Currently, there are 10 separate sites at which CB&I could perform environmental services:

- Pyridine Burn Area TCRA
- Former Fire Training Area
- Pyridine Burn Area
- Polychlorinated Biphenyls Bunker Area
- Building 19 Underground Storage Tank Area
- Grease Rack Ditch Area
- Landfill Area 2
- Landfill Area 1 & 3
- Service Pit Area
- Fire Training Area TCRA.

Additionally, any site-specific condition or activity that will be conducted during the project which has potential environmental health and safety (H&S) implications and is not covered in this APP/SSHP will be addressed in a study area-specific SSHP. This may include modifications to the current task order or change of conditions from those anticipated.

A preliminary activity hazard analysis (AHA) has been prepared for the anticipated activities for each site described above and included in Chapter 2.0 of the SSHP.

## 1.3 Statement of Safety and Health Policy

CBI

**Health, Safety, and Environmental Policy**

*It is the Policy of CB&I and a key component of our culture, to execute all of our activities in such a manner that will ensure the Health, Safety, and Environmental protection of all our employees, clients, subcontractors, suppliers and the communities in which we live and work.*

*CB&I will manage and apply our HSE Management System in such a manner that every employee shall be involved and ensure the effective implementation of our HSE Principles to assist the Company in achieving our established Goal of Zero Incidents.*

*All Managers and Supervisors of CB&I have the responsibility to continuously improve Health, Safety, and Environmental awareness among all employees, to manage proper usage of the environment, tools and equipment, and to create a culture in which everyone shares responsibility for the Well being of their fellow workers and the community.*

*All Employees of CB&I have the responsibility to execute their personal and work activities in such a manner as to prevent all circumstances which could lead to incidents that may cause personal injury or illnesses, security incidents or environmental damage.*

*CB&I will measure HSE performance and, by setting challenging objectives and targets, strive for continuous improvement.*

*CB&I will implement this Policy in combination with the Health, Safety, and Environmental laws, regulations, standards, and codes of practice of our clients and all applicable governmental agencies.*

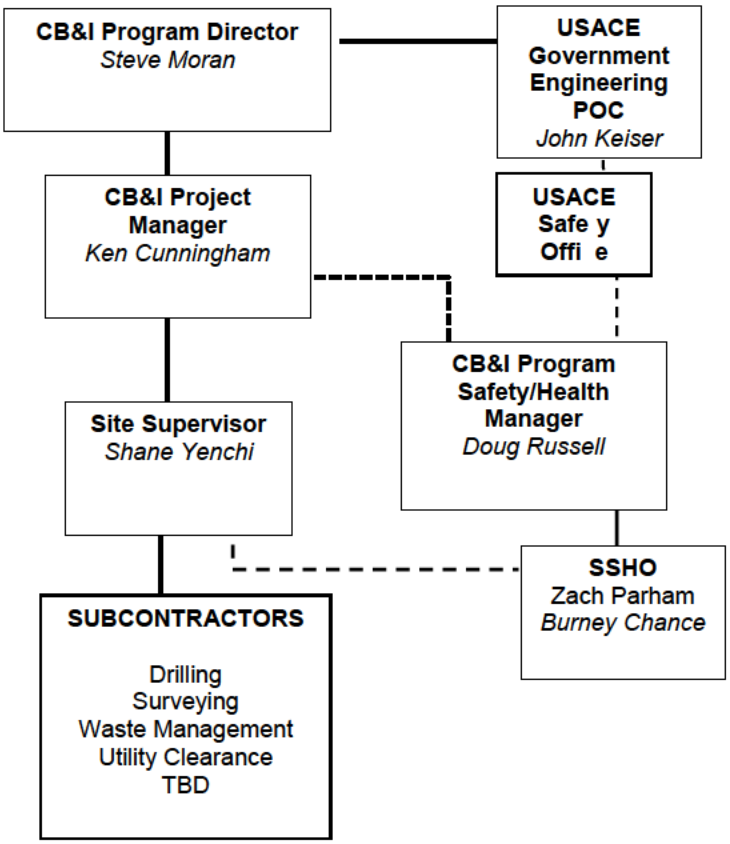
*Philip Asherman*
*President and CEO*

2-13-13
*Date*

## 1.4 Responsibilities and Lines of Authority

Safety responsibilities, accountability, and lines of authority are discussed in Chapter 3.0 of the SSHP. The Project Manager (PM), Site Supervisor (SS), Site Safety and Health Officer (SSHO), Project Certified Industrial Hygienist (PCIH), and Health and Safety Manager (HSM) are responsible for formulating and enforcing H&S requirements and implementing the APP/SSHP. Figure 2 shows the lines of authority organization matrix. Exhibit 1 of this APP contains resumes for the SS/SSHO, HSM, PCIH, and PM.

**FIGURE 2**
**RESPONSIBILITIES AND LINES OF AUTHORITY**




## *1.5 Subcontractors and Suppliers*

Each subcontractor working on the project site will be required to adhere to the APP/SSHP and subsequent study area specific SSHPs as applicable and the requirements presented below.

### *1.5.1 Subcontractor/Supplier Coordination and Control*

All subcontractors will be screened for safety performance and compliance with federal alcohol and drug testing requirements prior to being issued any assignment from CB&I for site work. Subcontractors will comply with the requirements for site safety as outlined in CB&I Procedure HS011, *Contractor Safety and Health Rules*, and CMS-710-02-PR-04400, *Subcontractor Selection Evaluation and Monitoring*. The SS will be responsible for the conduct and control of CB&I subcontractors.

### 1.5.2 Subcontractor/Supplier Safety Responsibilities

All subcontractor employees are subject to the same training and medical surveillance requirements as CB&I personnel, depending on job activity. All activities involving the potential for exposure to hazardous waste materials will require medical and training certification as mandated by 29 Code of Federal Regulations (CFR) 1910.120 and 29 CFR 1926.65. All subcontractor personnel will be required to sign in daily and to attend a pre-work daily meeting discussing operations and safety issues. All subcontractors involved in investigation support/remedial activities will complete a subcontractor pre-job safety checklist prior to the start of work at the site. Subcontractors will submit to the SS a job safety analysis (JSA) for their work activities. The subcontractor reports directly to the SS. All incidents involving subcontractor employees shall be reported to the SS and SSHO, and a copy of the subcontractor's injury/illness report shall be submitted to the HSM within 24 hours.

Subcontractors who perform work on site are required to read or be instructed in and sign this APP/SSHP and to comply with all requirements of this APP/SSHP. Subcontractors not in compliance will be immediately dismissed from the site.

Suppliers delivering various materials to the project site or providing equipment/equipment maintenance will comply with all CB&I rules and regulations. Supplier personnel will not be permitted into contaminated areas or exclusion zones unless their training and medical surveillance is in accordance with 29 CFR 1910.120/1926.65. Contractors will not ride on tractors, forklifts, or similar vehicles unless specific seats and seat belts are provided. They will follow facility and CB&I hot work rules if hot work is required. Trucks will be loaded and unloaded in a safe and effective manner and materials will be stored safely in designated locations only. Associated packaging will be properly disposed of and litter will not be permitted to be scattered or blown from truck beds. Operators of mobile equipment on site must observe all traffic rules such as speed limits and rights-of-way of pedestrians. Any subcontractor operating CB&I vehicles will have to meet the same driving safety training requirements as CB&I employees and document completion of the substantive requirements of CB&I Procedure HS800, *Motor Vehicle Operation: General Requirements*.

## 1.6 Training

This section discusses training requirements.

### 1.6.1 Safety Indoctrination Training

All CB&I or subcontractor employees performing work on site under this task order shall receive initial safety indoctrination training prior to commencement of actual fieldwork. This training will be performed by the SS or SSHO. At a minimum, this initial training shall include, but not be limited to, the following:

- Site location and description including emergency routes, first-aid (FA) kit location, and hospital location.
- Statement of H&S policy

- Project organization, key personnel, and responsibilities
- Chemical, physical, and biological hazards
- AHA
- Hazard control program
- Thermal stress
- Hearing conservation
- Control of hazardous energy
- Sanitation
- Buddy system requirements
- Fire prevention and protection/hot work
- Excavation safety
- PPE
- Site control measures
- Exposure monitoring
- Medical surveillance
- Emergency response and contingency plan
- Record keeping and data management
- Accident reporting and investigation
- Site-specific hazard communication.

### *1.6.2 Training and Certifications*

In accordance with hazardous waste operations and emergency response (HAZWOPER), EM 385-1-1 Section 28, HAZWOPER, CMS-710-04-PR-00300, *Hazardous Waste Operations*, and CMS-710-04-WI-00303, *Hazardous Waste Operations Training*, and certifications applicable to individuals, project-specific work assignments include:

- APP/SSHP training
- Hazardous waste operations 40-hour training
- Twenty-four-hour supervised training
- Hazardous waste supervisor training
- Eight-hour refresher training, if applicable
- CB&I defensive driver training
- Hazard communication training

- Cardiopulmonary resuscitation (CPR), FA, and bloodborne pathogen training
- Thirty-hour OSHA construction safety training for competent persons.

Recertification or refresher training shall follow the following schedule: 8-hour refresher training shall be performed annually for employees who completed the initial 40-hour course. Defensive driver training shall be performed every two years. Hazard communication training shall be performed annually at a minimum and is required on a site-specific project basis. CPR and FA training shall be renewed biannually. CB&I employees who are designated FA and CPR responders shall also have completed bloodborne pathogen training annually and adhere to CMS-710-01-PR-00300, *Bloodborne Pathogens*. SSHO shall have OSHA 30-hour construction safety training and shall maintain this competency through 24 hours of safety and health related coursework every 4 years . Exhibit 2 of this APP contains copies of applicable certifications for CB&I personnel. Subcontractors shall provide documentation on required training appropriate to their on-site work assignments prior to being authorized to work on site.

### *1.6.3 Emergency Response Training*

All CB&I personnel who have completed the 40-hour HAZWOPER training are qualified as basic emergency responders per 29 CFR 1910.120/1926.65 (e) (3). Site-specific emergency response procedures will be reviewed with all site personnel as a part of site indoctrination. The emergency response plan and contingency plans are provided in Chapter 14.0 of the SSHP.

### *1.6.4 Supervisory and Employee Safety Meetings*

The SS, with assistance from the SSHO, will conduct daily safety meetings for all on-site personnel at the start of each work shift and will require any subcontractors to follow similar meeting procedures and participate in the CB&I daily safety meetings. Daily safety meetings will comply with legacy CB&I Procedure HS051, *Tailgate Safety Meetings.* Meetings shall also comply with CMS-710-05-WI-01903, *Craft Supervisor HSE Meeting*, and CMS-710-05-WI-01904, *Weekly HSE Toolbox Meeting*. Supervisors, managers, and SSHOs are also required to attend the bimonthly regional leadership safety council meeting.

## *1.7 Safety and Health Inspections*

This section discusses H&S inspections.

### *1.7.1 Inspections*

The SS and SSHO will conduct safety inspections daily to determine if operations are being performed in accordance with the APP/SSHP and USACE requirements and regulations. Inspections will be performed in accordance with CMS-710-05-PR-01400, *Site HSE Inspection.* Inspection findings will be recorded on the CMS-710-05-FM-01401, *Daily HSE Inspection Form*. The person(s) identified by CB&I for completing the safety inspections are Burney Chance or Shane Yenchi. SSHO qualifications are provided in Exhibit 2. The CB&I PM is also required to conduct monthly inspections of the sites in accordance with CMS-710-05-PR-01400. The SS and SSHO are

responsible for conducting and preparing reports of daily safety inspections of work processes, site conditions, safety deficiencies, and equipment conditions and submitting them to the HSM. The SSHO will discuss any necessary corrective actions with the SS and review new procedures. Copies of these reports shall be maintained at the project location.

The CB&I HSM or PM may periodically conduct site visits and perform site safety assessments. These reports will be kept on file at the CB&I Knoxville, Tennessee, offices and will be tracked in a database for the LFNAS project, including the number of action items noted during the visit and written confirmation of the corrective actions for each item. These responses will be compiled and provided to CB&I program management for review and discussed during bimonthly leadership safety council meetings. Deficiencies shall also be documented on the project H&S assessment summary/deficiency tracking log. This log shall be posted on the H&S bulletin board in areas commonly used by employees. For sites where a fixed support area is not available, the log shall be maintained by the SS or SSHO and be readily available to all on-site personnel.

### *1.7.2 External Inspections/Certifications*

CB&I does not anticipate, but may consider, the use of outside sources to provide safety inspections, as necessary.

As required, safety equipment will comply with appropriate regulations of OSHA, the National Institute for Occupational Safety and Health, the American National Standards Institute, the American Society for Testing and Materials, the U.S. Coast Guard, or other recognized certification organizations.

## *1.8 Safety and Health Expectations, Incentive Programs, and Compliance*

This section discusses H&S expectations, incentive programs, and compliance.

### *1.8.1 Safety Program Goals, Objectives, and Accident Experience Goals*

CB&I considers safety the highest priority during work at a site and has established a goal of **zero incidents** for all projects. All projects will be conducted in a manner that minimizes the probability of near misses, equipment/property damage, or injury. CB&I has established programs to recognize people and projects that demonstrate excellence in safety performance. CB&I will use safety observation programs to identify and correct unsafe acts and conditions. Safety awareness programs will be used to provide continuous training and development of good safety practices. CB&I site supervision will investigate all incidents to determine root causes and institute corrective actions to prevent recurrence. CB&I will provide and enforce safety rules to protect employees, subcontractors, clients, and the public.

The accident experience goals targeted for this task order is **zero accidents**.

### *1.8.2 Safety Incentive Programs*

The planned investigations at LFNAS will be conducted by CB&I staff.

CB&I has a formal Safety Incentive Award Program that is approved by and implemented by the CB&I PM, HSM, and Program Manager. This program applies to all CB&I employees and is described by legacy CB&I Procedure HS023, *Accident Prevention Program: Safety Incentive Award Program*. This program has been designed to recognize group safety performance and to reward the individual only when the project/location team has achieved its established goals. It is intended to encourage all employees to be concerned not only for their own safety but for the safety of coworkers as well. Key elements of this program include the following:

- Eligibility
- Program development
- Award value
- Program funding
- Minimum goals
- Award request
- Goal verification.

### *1.8.3 Employee Safety Responsibility Requirements*

Each employee is responsible for personal safety as well as the safety of others and is expected to participate fully in the safety improvement process, particularly the safety observation program. The employee will use all equipment provided in a safe and responsible manner as directed by the SS and SSHO. All CB&I personnel will follow the policies and procedures set forth in this APP/SSHP. Site personnel concerned with any aspect of H&S shall bring it to the attention of the SS. If not satisfied, they should contact the HSM. All project personnel per CMS-710-05-PR-00400 have the authority to stop work if, in their judgment, serious injury or environmental condition could result from continued activity. The SS and SSHO shall be notified immediately if this becomes necessary. To protect the H&S of all personnel, employees that knowingly disregard safety policies/procedures may be subject to disciplinary actions up to and including termination. CB&I employee safety responsibility is fully detailed in CMS-710-05-FM-01912, *Basic HSE Rules*.

For noncompliance situations with respect to the stated safety responsibilities and requirements incorporated into this APP/SSHP, CB&I personnel will be required to follow the policies and procedures outlined in CMS-710-05-PR-00200, *Disciplinary Action Program.*

### *1.8.4 Managers and Supervisors Safety Accountability*

It is the duty of the first-line supervisor to motivate employees to adhere to the LFNAS project safety policies and procedures in each work situation. A first-line supervisor for these purposes is defined as that person designated to give immediate on-site supervision to personnel involved in a task.

All supervisors shall have complete knowledge of the safe procedure for all jobs and tasks under their supervision, or when in doubt, shall seek assistance prior to initiating a task. This is the only

acceptable manner in which to perform the task. If the task cannot be accomplished safely, it will not be attempted. Supervisors will perform the following tasks:

- Explain the safety procedure involved with a task to each employee and check frequently to see that the employee understands and works as instructed.
- Allocate sufficient time for the training and coaching of all employees to ensure that everyone knows the correct procedure for safely accomplishing required tasks.
- Prevent new employees from performing any tasks until required training is completed.
- Immediately correct unsafe conditions that involve site employees or contractors.
- Ensure that the employees are outfitted with and wear PPE as specified by this APP, the SSHP, and other project-specific procedures or as directed by the PCIH or HSM.
- Set a good safety example.
- Obtain the cooperation of employees and contractors.
- Provide a safe work environment for employees and contractors.
- Confirm contractor safety performance records have been verified prior to contract award and monitor contractor performance during operations.
- Report all accidents, near misses, and property damage in accordance with the incident management and reporting procedure and EM 385-1-1.
- Establish a safety culture that promotes awareness, encourages participation, and recognizes excellence.

## *1.9 Accident Reporting*

This section discusses accident reporting.

### *1.9.1 Exposure Data (Man-Hours Worked)*

CB&I tracks and maintains incident records for federal and internal reporting requirements. Incident rates are reported monthly to the HSM. Incident rates and workers compensation losses are tracked for each business line. Man-hours and lost workday cases will be submitted to the contracting officer representative monthly. The data must be submitted to arrive at the USACE no later than 10 calendar days after the end of each month. The information cutoff date will be the last day of each month. The monthly submission must include the title of the report (i.e., Accident Exposure Data Report), contract number, task order number, project site, month and year for which the report is made, a point of contact listing both email address and telephone number, and number of lost workday accidents to include total days lost. If no hours are worked on the project/task, a report showing "zero (0)" is required.

### *1.9.2 Accident Investigations, Reports, and Logs*

The SS, SSHO, PM, and HSM shall conduct accident/incident investigations. A report is completed by the SS and must be submitted within 24 hours to the HSM and to CB&I Corporate Safety Department. All incident reporting forms will follow the formats provided in legacy Shaw Procedure HS020, *Accident Prevention Program: Reporting, Investigation, and Review.*

Engineer Form 3394 is required to be prepared and submitted in reporting lost workday cases, accidents where three or more persons are admitted to a hospital, a fatality, permanent totally disabling injury, permanent partial disabling injury, or property damage greater than $2,000. Engineer Form 3394 must be submitted to the contracting officer or authorized representative within five working days following the accident in accordance with Army Regulation 385-40 and USACE Supplement 1 to that regulation. Form 3394 is prepared by the contractor, with original signatures shown in Blocks 15c and 16 (copies/faxes are not acceptable). The remaining signature blocks, Blocks 17 through 19, will be completed by USACE.

### *1.9.3 Immediate Notification of Major Accidents*

CB&I will immediately notify USACE of any major accident, including injury, fire, equipment/ property damage, and environmental incident. Immediate notification and investigation of accidents is a mandatory requirement; a full report will be provided within 24 hours. This procedure will be followed in response to any major personal injury as well the incident reporting procedure contained in the APP/SSHP. Accidents involving personal injury/illness or property damage shall immediately be reported to the contracting officer or authorized representative.

### *1.9.4 Accident Response*

The nearest workers will immediately assist a person who shows signs of medical distress or is involved in an accident as long as the accident scene is safe. The work crew supervisor will be summoned. The work crew supervisor will immediately alert the SSHO of a medical emergency situation. The work crew supervisor will advise the following information:

- Location of the victim at the work site
- Nature of the emergency
- Whether the victim is conscious
- Specific conditions contributing to the injury, if known.

## *1.10 Medical Support*

Medical support will be provided on site by FA- and CPR-qualified first responders. The SSHO is designated as the first responder for medical emergencies or minor injuries. At least two on-site employees will be FA and CPR qualified. Off-site emergency medical support will be provided by **Orange Park Medical Center - (904) 276-8500**. For occupational injuries and illnesses that are not serious but require attention beyond on-site FA, the employee shall be evaluated by an occupational physician at **Healing Arts Urgent Care - (904)-829-8649**. Emergency and nonemergency site medical arrangements are outlined in the APP/SSHP. If there is any doubt as to the injured worker's

condition, it is best to let the local paramedic or ambulance service examine and transport the worker.

## 1.11 Personal Protective Equipment

CB&I Procedure HS600, *Personal Protective Equipment*, outlines minimum PPE requirements. This procedure, coupled with management experience; training in proper selection, use, and maintenance of PPE; site-specific conditions; potential environmental contaminants; and physical hazards, will dictate site-specific requirements. The HSM has evaluated the Scope of Work (SOW) and site-specific conditions. Initial protection levels provided in the APP/SSHP have been established by the HSM for the site work activities based on the levels of site contaminants, physical hazards, and the SOW. The APP/SSHP and AHA, in conjunction with CMS-710-02-PR-03000, *Personal Protective Equipment*, shall serve as the written certification for use of PPE. All selected PPE shall be used in accordance with manufacturer recommendations and best management practices. Once on site, visual inspection of the work activities by the SSHO or SS may indicate the need for changes in PPE level(s). Any significant change in the PPE level will be approved by the SSHO in consultation with the HSM.

All personnel using respiratory protection will be cleared by a physician for use of a respirator and fit tested to assure they can achieve an acceptable fit. Physician clearance and results of fit testing will be documented as required.

## 1.12 Plans (Programs, Procedures) Required by EM 385-1-1

This section discusses required plans, programs, and procedures.

### 1.12.1 Layout Plans

Layout plans are not anticipated for this SOW, since temporary facilities construction will not occur on site. Work zones and site control measures are identified in the APP/SSHP.

### 1.12.2 Emergency Response Plans

CB&I employees will travel to the medical facilities listed in Section 1.10 and Chapter 14.0 of the SSHP prior to initiation of hazardous operations in order to become familiar with the hospital route and potential travel delays not anticipated during preparation of this document. Chapter 14.0 in the SSHP also addresses the following:

- Emergency contacts
- Advance notification
- Medical emergencies
- Personal exposure or injury
- Fire control
- Spills or leaks
- Site evacuation
- Emergency decontamination
- Emergency equipment

- Adverse weather conditions/natural disasters
- Critique and follow-up of emergency procedures
- Community alert.

### *1.12.3 Hazard Communication Program*

Material safety data sheets for chemicals that may be required on site or present during site operations are provided in this APP/SSHP and will be updated by the SSHO as new chemicals are brought to or identified on site. CMS-710-01-PR-00400, *Hazard Communication*, shall be implemented on site. Employees shall be trained as to the contents of this APP/SSHP to provide site-specific hazard communication. Hazardous materials are not anticipated to be brought on site. Employee records shall be maintained on site by the SSHO. CB&I employee records are also available through the CB&I Records Training Department.

### *1.12.4 Respiratory Protection Plan*

The primary objective of respiratory protection is to prevent employee exposure to atmospheric contamination. When engineering measures or administrative measures to control contamination and respirable hazards are not feasible or while they are being implemented, personal respiratory protective devices will be used. The CB&I LFNAS respiratory protection requirements are specified in CMS-710-02-PR-03500, *Respiratory Protection.*

The criteria for determining respirator need have been evaluated based on the SOW and potential contamination. Level B respiratory protection will be utilized for the Pyridine TCRA. Respiratory protections is not anticipated for other site based on the review of contamination levels. However, in the event that conditions change, air monitoring will be conducted to confirm that respiratory protection levels, if required, are adequate. All respirator users will be OSHA trained in proper respirator use and maintenance. The SS and SSHO will observe workers during respirator use for signs of stress. The SS, SSHO, PCIH, and HSM will periodically evaluate the implementation of the APP/SSHP to determine its continued effectiveness with regard to respiratory protection. All persons assigned to use respirators will have medical clearance to do so.

### *1.12.5 Health Hazard Control Program*

The AHA presented in Chapter 2.0 of the SSHP addresses the initial hazard evaluation for proposed site activities. The AHA shall serve as the initial certification of hazard assessment and has been prepared by the CB&I HSM. The AHA is an ongoing process from initiation of the APP/SSHP to implementation and completion of field work. The second phase consists of further analysis in the field and completing phase safety plans or JSA as necessary. CB&I Procedure HS045, *Job Safety Analysis,* shall be used to document second-phase hazard control. The SS, with assistance from affected crew personnel and the SSHO, will complete the JSA in accordance with the requirements contained in CB&I Procedure HS045 when site conditions or potential hazards change. The JSA will serve as an amendment to the initial phase AHA and shall be reviewed with all site employees during the daily tailgate safety meeting.

### *1.12.6 Lead Abatement Plan*

The potential exposure to lead at levels above the OSHA action or permissible exposure level is not anticipated during remedial investigations. A lead compliance and monitoring plan will be developed as an attachment to subsequent SSHPs if necessary in the event lead work activities occur. All personnel occupationally exposed to lead shall completely fulfill all requirements outlined in the lead compliance plan.

### *1.12.7 Asbestos Abatement Plan*

An asbestos abatement plan is not required based on the current SOW and historic site knowledge.

### *1.12.8 Abrasive Blasting Plan*

An abrasive blasting plan is not required based on the current SOW.

### *1.12.9 Confined Space*

CMS-710-02-PR-01700, *Confined Space Entry,* is the written confined-space entry program that covers permit and non-permit confined space entry requirements. Confined-space entry is not anticipated based on the current SOW.

### *1.12.10 Hazardous Energy Control Plan*

CMS-710-02-PR-01500, *Control of Hazardous Energy*, provides the necessary guidelines specific to lockout/tagout. A lockout/tagout site-specific plan is not required based on the current SOW; however, the procedures described in CMS-710-02-PR-01500 will be implemented in the event hazardous energy control is necessary. In this event, a site-specific hazardous energy control plan will be prepared as an addendum to the APP.

### *1.12.11 Critical Lift Procedures*

CMS-710-02-PR-01800, *Lift Planning,* define critical lift procedures. Critical lift plans are not required based on the current SOW.

### *1.12.12 Contingency Plan for Severe Weather*

Contingency plans for severe weather are included in the SSHP.

### *1.12.13 Access and Haul Road Plan*

An access and haul road plan is not required based on the current SOW and existing site conditions.

### *1.12.14 Demolition Plan*

A demolition plan, including engineering evaluation and lead-based paint and asbestos surveys, is not required based on the current SOW.

### 1.12.15 Emergency Rescue (Tunneling)

Tunneling is not anticipated based on the current SOW.

### 1.12.16 Underground Construction Fire Prevention and Protection Plan

An underground construction fire prevention and protection plan is not required based on the current SOW.

### 1.12.17 Compressed Air Plan

A compressed air plan is not required based on the current SOW.

### 1.12.18 Formwork and Shoring Erection and Removal Plans

Formwork and shoring erection and removal plans are not required based on the current SOW.

### 1.12.19 Jacking Plan (Lift) Slab Plan

A jacking plan (lift) slab plan is not required based on the current SOW.

### 1.12.20 Blasting Plan

A blasting plan is not required based on the current SOW.

### 1.12.21 Diving Plan

A diving plan is not required based on the current SOW.

### 1.12.22 Alcohol and Drug Abuse Prevention Plan

Substance abuse procedures applicable to all CB&I and subcontractor personnel at LFNAS are outlined in CMS-710-01-PR-03600, *Substance Abuse Program*. CB&I is committed to a drug- and alcohol-free work place. Pre-employment, reasonable cause, random, and client-specific drug and alcohol testing is part of the overall substance abuse program. Post-accident drug and alcohol testing is a requirement of CB&I when not prohibited by state or local law.

### 1.12.23 Fall Protection Plan

CMS-710-02-PR-00900, *Fall Protection*, outlines minimum requirements for employee protection when exposed to a fall of 6 feet or greater or when working over dangerous equipment or operations, this includes 100 percent tie-off when working from portable of fixed ladders when working at 6 feet or greater elevation. A site-specific fall protection plan is not required based on the current SOW.

### 1.12.24 Steel Erection Plan

A steel erection plan is not required based on the current SOW.

### 1.12.25 Night Operations Lighting Plan

CB&I will not perform site work during hours of low lighting. A night operations lighting plan is not required based on the current SOW.

### 1.12.26 Site Sanitation Plan

A site sanitation plan is not required based on the current SOW. CB&I will provide potable drinking water to site employees. On-site toilets, washing facilities, and waste disposal arrangements will be provided by a contracted service.

### 1.12.27 Fire Prevention Plan

Fire prevention is discussed in the SSHP. Spark- or flame-producing operations shall follow the requirements outlined in CMS-710-02-PR-02400, *Fire Protection and Prevention*, and local site-specific requirements.

## 1.13 Contractor Information to Meet the Requirements of the Major Sections of EM 385-1-1

CB&I will provide personnel with the necessary training and experience to safely execute this project and task order. Employees will be competent in the respective areas of site work for which they will be involved. When it is necessary for CB&I personnel to operate equipment, equipment operators shall be qualified for the type of heavy equipment they operate. Competent persons in excavation safety will be present during excavation operations (when required). In addition to this APP, CB&I has prepared an SSHP to meet the major requirements of EM 385-1-1, *United States Army Corps of Engineers (USACE) Safety and Health Requirements Manual*. Chemical, physical, and biological occupational exposure prevention is addressed in the SSHP.

As stated in Section 1.12 of this APP, many of the typical hazard control procedures and plans will not apply to the environmental services required by the current LFNAS SOW.

Medical and FA support will be provided on site by FA- and CPR-qualified first responders. The SSHO is designated as the first responder for medical emergencies or minor injuries. At least two on-site employees will be FA and CPR qualified. The SS, SSHO, and multiple subcontractor personnel are qualified in first responder requirements. On-site medical support will be provided by Green Cove Springs Fire Department or Orange Park Medical Center ambulance/emergency medical technician services.

CB&I will provide suitable PPE as required for the nature of the job being performed, including but not limited to boots, protective clothing, respirators (if required), face shields, safety eyewear, respirator ophthalmic hanger devices, hard hats, and gloves. This PPE will be specified by the H&S department prior to use, subject to an assessment of the hazards to which employees will be potentially exposed. Documentation will be provided to the project files. Employees shall use H&S-approved PPE on any task where there is potential exposure to physical hazards, such as

equipment operation, objects dropping from above, or flying particles; or exposure to toxic or irritating gases, fumes, vapors, liquids, or other materials which may cause respiratory distress or skin irritation. Employees shall be trained in the proper use, maintenance, and limitations of PPE. Employees shall wear hard hats, eye protection, and American National Standard Institute-approved safety foot protection at all job sites.

Fire prevention shall be accomplished by the utilization of inspection and permit systems for all spark- or flame-producing activities. The Green Cove Springs Fire Department shall be notified in advance of site operations and apprised of the type of work and location where fire safety controls are essential. Fire watches shall be required and personnel will understand how to properly operate fire-extinguishing systems and make emergency notifications. All “hot work” activities shall comply with CMS-710-02-PR-02400, *Fire Protection and Prevention*.

Public safety will be achieved by the means of site control zones and access to the work area by authorized personnel only. Site control measures are described in the SSHP.

Chemical, physical, and biological agent occupational exposure prevention requirements are addressed in the SSHP.

## *1.14 Site-Specific Hazards and Controls*

Before initiating a work activity presenting hazards not identified in the initial AHA (Table 2.1 of the SSHP), the SS and SSHO will complete a phase safety or JSA in consultation with the project personnel. CMS-710-05-FM-01705, *Sample Job Safety Analysis,* will be used whenever activities, site conditions, or operations change. The AHA describes steps to safely mitigate classic safety hazards and chemical, physical, and biological hazards. Ionizing radiation is not anticipated to be a hazard of concern for this SOW.

# EXHIBIT 1

# RESUMES

***Last Updated: 03 Jan 2013***

# Burney D. Chance

---

## Professional Qualifications

Mr. Chance has over 13 years of experience in multiple aspects of the environmental remediation industry and over 28 years of experience in environmental and oil field related work. Mr. Chance has expertise in monitoring, sampling, and removing chemical contaminants, including dioxin, polychlorinated biphenyls (PCBs), chromium, carbon disulfide, explosives, asbestos, mercury, and hydrocarbons. He is also experienced in the removal and disposal of underground storage tanks (USTs). In addition, he is experienced in contaminated soil removal and restoration activities. He is knowledgeable in site dewatering, trenching, excavation, and earthmoving. As a Site Safety Officer, he is responsible for on-site oversight of personnel and equipment, procurement of equipment and materials, and project health and safety compliance. He has experience in the remediation of petroleum-contaminated sties and his duties include construction, sampling, and maintenance of remediation systems.

## Education

Associate of Science, Please provide discipline, Pearl River Community College, Poplarville, Mississippi, 1970
High School Diploma, General Studies, Bunker Hill School, Marion County, Mississippi, 1968

## Additional Training/Continuing Education

OSHA 8-Hour Hazardous Waste Training, Shaw E&I, 2005
Asbestos Awareness, 2005
OSHA 30-Hour Construction Training, 2005
CPR, 2005
First Aid, 2004
U.S. Corps of Engineers Construction Quality Management for Contractors Training, 2003
Railcar Transfer Training, 1997
OSHA Supervisor Safety Training, 1996
OSHA Safety Officer's Training, 1994
OSHA 40-Hour Hazardous Waste Training, 1993
OSHA 40-Hour Health and Safety Training, Shaw E&I, 1993
Qualified Persons Training,

## Experience and Background

***01/2008 - present***
***Safety, Shaw Environmental & Infrastructure, Inc., Federal, Lorida, Florida***

Safety over sight for Canal Improvements, Spoil Mound removal, weir demolition and building a boat park.

***07/2006 - Present***
***Field Health and Safety Technician, Shaw Environmental & Infrastructure, Inc., Monroeville, Pennsylvania***

Responsible for on-site oversight of personnel and equipment, procurement of equipment and materials, and project health and safety compliance.

***The following is a summary of key projects:***

Field Health and Safety Technician, Shaw AFB, U.S. Army Corps of Engineers, Sumter, South Carolina, 07/2006 - 08/2006

Project involved safety audit and oversight of groundwater remediation, in particular, KMn04 injections, systems O&M, and subcontractor oversight.

Field Health and Safety Technician, Hurricane Katrina Cleanup, U.S. Army Corps of Engineers, Biloxi, Mississippi, 01/2006 - 07/2006

Project involved building reconstruction and storm damage cleanup from Hurricane Katrina. Duties included safety oversight monitoring, maintaining daily logs, and assuring proper Personal Protection Equipment (PPE) compliance.

Field Health and Safety Technician, Bring New Orleans Back Project, Task 4, U.S. Army Corps of Engineers, New Orleans, Louisiana, 10/2005 - 01/2006

Provided emergency protective measures at a meat packing plant and recovery of city-owned facilities required as a result of Hurricanes Katrina and Rita. Duties included safety oversight monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Evacuee Center Readiness and Operations & Management, U.S. Army Corps of Engineers, Ft. McClellan, Anniston, Alabama, 09/2005 - 10/2005

Project involved making housing available for Hurricane Katrina evacuees. Was responsible for safety oversight, maintenance of daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Fire Debris Release Cleanup, Need Client Name, Need Site Location, 07/2005 - 09/2005

Following an explosion at a cylinder fill plant, project involved fire debris release cleanup. Responsible for safety oversight, monitoring, and assuring PPE compliance.

Field Health and Safety Technician, Hanlin Allied Site, AlliedSignal, Moundsville, West Virginia, 04/2005 - 04/2005

Responsibilities included safety oversight, monitoring, maintaining daily logs, and PPE compliance.

Field Health and Safety Technician, Remedial Action, BP/ARCO, Merryville, Louisiana, 11/2004 - 02/2005

Project involved demolition of buildings, pipe removal, metal removal, excavation for concrete burial site and removal of contaminated soil and liquids, leveling and grading site. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, U.S. Army Corps of Engineers, Former Amarillo AFB, Texas, 08/2004 - 11/2004

Project involved demolition of 5 jet engine test cells, removal of debris, leveling, grading, and seeding of the site. Responsibilities included safety oversight, monitoring, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, U.S. Army Corps of Engineers, Pine Bluff Arsenal, Arkansas, 03/2004 - 08/2004

Project involved remediation, consolidation and capping of three former landfills. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Investigation, U.S. Army Corps of Engineers, Ft. McClellan, Anniston, Alabama, 11/2000 - 03/2004
Project involved the installation of groundwater monitoring wells for remedial investigation for the removal of 3X scrap at previous chemical training area. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE Compliance.

***09/2007 - 12/2007***
***Safety, Shaw Environmental & Infrastructure, Inc., federal, York Haven, Pennsylvania***

Safety over site for the Burnner Island, Fuel Gas Desulphuration system project. For Pennsylvania Power and Light

***07/2007 - 08/2007***
***Safety, Shaw Environmental & Infrastructure, Inc., Federal, Detroit, Algeria***

Safety oversite for clean up after a fire at the detroit Dam, for the USACE.

***07/2007 - 07/2007***
***Safety, Shaw Environmental & Infrastructure, Inc., Federal, Sumter, South Carolina***

Safety over site for sampel wells being driled, at Shaw AfB.

***01/2007 - 07/2007***
***Safety, Shaw Environmental & Infrastructure, Inc., Federal, lorida, Florida***

Safety over sight for Canal Improvements, Spoil mound removal, Weir removal, and building a boat park.

***01/1993 - 07/2005***
***Field Health and Safety Technician, IT Corporation (The Shaw Group Inc., acquired substantially all of the operating assets of The IT Group Inc., in May 2002), Monroeville, Pennsylvania***

Please see above description of duties.

***The following is a summary of key projects:***
Field Health and Safety Technician, Remedial Action, U.S. Army Corps of Engineers, Jacksonville, Florida, 07/2000 - 11/2000
Project involved thermal desorption unit, pentachlorophenal and dioxin removal. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, U.S. Army Corps of Engineers, Washington, DC, 05/2000 - 06/2000
Project involved asbestos abatement at Washington, DC, public schools. Responsibilities included safety oversight, monitoring, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, U.S. Army Corps of Engineers, Keesler AFB, Biloxi, Mississippi, 08/1999 - 06/2000
Project involved the installation of a stormwater drain and restoration of wetlands area. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, U.S. Army Corps of Engineers, MacDill AFB, Tampa, Florida, 03/2000 - 05/2000

Project involved remediation of contaminated soil. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, U.S. Army Corps of Engineers, Ft. McClellan, Anniston, Alabama, 01/2000 - 03/2000
Project involved exploratory trenching of landfills. Responsibilities included safety oversight, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, Ag Street, U.S. Army Corps of Engineers, New Orleans, Louisiana, 05/1999 - 08/1999
Project involved remediation and restoration of lead and arsenic contaminated landfill at a housing project. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, Need client name, Charleston, South Carolina, 01/1999 - 05/1999
Project involved wet and dry decontamination of lead and chromium at a landfill. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPR compliance.

Field Health and Safety Technician, Remedial Action, U.S. Army Corps of Engineers, Keesler AFB, Biloxi, Mississippi, 10/1997 - 01/1999
Project involved construction of a sheetpile wall and installation of a storm drain and backfilling the existing channels for physical containment of a landfill. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Removal Action, , U.S. Army Corps of Engineers, Columbus AFB, Columbus, Mississippi, $280,000.00, 06/1997 - 10/1997
Project involved the removal of underground storage tanks. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, , Sangamo/Wesson, Pickens, South Carolina, $18,200,000.00, 09/1995 - 06/1997
Project involved thermal desorption unit, polychlorinated biphenyls (PCB) cleanup. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

Field Health and Safety Technician, Remedial Action, , Cleve Reber Group, Sorento, Louisiana, $35,000,000.00, 12/1993 - 09/1995
Project involved thermal destruction unit for remediation of soil containing hydrocarbons and toluene. Responsibilities included safety oversight, monitoring, maintaining daily logs, and assuring proper PPE compliance.

***01/1977 - 01/1993***
***Oilfield Technician, Texaco, Inc., Venice, Louisiana***

Held various positions in oilfield related work, including roustabout, paraffin scraper, and relief pumper. Was also safety chairman for ten years, a first aid and CPR instructor for 12 years, and the United Way Campaign coordinator for four years.

***01/1971 - 12/1976***
***Oilfield Technician, AWI, Inc., Harvey, Louisiana***

Work involved oilfield related activities, working on derricks and on a work-over rig.

***Last Updated: 19 Dec 2011***

# Kenneth A. Cunningham

---

## Professional Qualifications

Mr. Cunningham has over 20 years experience in task, project, and program management of investigative and remedial sites for both commercial and government clients. His experience includes Phase I and II environmental audits for property transactions, contamination assessments for soil and groundwater, remedial action plans, corrective action plans, tank closure assessments, remedial system installation, system operation and maintenance, and natural attenuation plans for both hazardous and nonhazardous waste facilities. He has completed more than 200 contamination assessments in Florida, Georgia, South Carolina, Tennessee, West Virginia, and Puerto Rico. Mr. Cunningham is also experienced in shallow and deep boring drilling practices and operations.

He has served as a project and program manager for national and statewide accounts. Recent experience included management of two statewide government contracts in Florida and investigations for hazardous waste facilities. He currently serves as the Investigative Task Manager for a DOD project in West Virginia, managed by the Knoxville office. He also serves as Project Manager for 12 UST sites in Tennessee under active soil and groundwater remediation and for 4 DOD sites in Florida and Puerto Rico. Because of his professional achievements, Mr. Cunningham has been named a Project Management Associate.

## Education

Bachelor of Science, Geology, Tennessee Technological University, Cookeville, Tennessee, 1982
Postgraduate Studies, Geology, Eastern Kentucky University, Richmond, Kentucky

## Additional Training/Continuing Education

8-Hour HAZWOPER Refresher, Shaw E & I, 2011
Adult CPR, Shaw E & I, 2010
Standard First Aid, Shaw E & I, 2010
Project Management Professional (PMP) Certification Preparation, New Horizons - Knoxville, TN, 2009
Defensive Driving for Shaw E & I Employees, Shaw E & I, 2007
OSHA 10-Hour Construction Safety, Shaw E & I, 2006
OSHA Disaster Site Worker, Shaw E & I, 2006
Competent Person Drilling Oversight, Shaw E & I, 2006
Human Resources for the Non-Human Resources Manager, Shaw E & I, 2006
Health and Safety Program Management for Project Managers and Supervisors, Shaw E & I, 2003
Client Program Manager Training, The IT Group, 1999
Project Management Expanded Training, IT Corporation, 1995
Hazardous Waste Site Safety Officer (50 Hour), IT Corporation, 1995
Frontline Leadership Training, IT Corporation, 1994
Sampling Program Management, IT Corporation, 1990
40-Hour Hazardous Waste Operations and Emergency Response Training (29CFR1910.120), IT Corporation, 1989
Groundwater Sampling Safety, IT Corporation, 1989
Groundwater Technology Course, IT Corporation, 1989

## Registrations/Certifications/Licenses

Professional Geologist, 1991, TN2003, Active, Tennessee, 02/2014
Professional Geologist, 1993, PG000945, Active, Georgia, 12/2013
Professional Geologist, 1992, PG1380, Active, Florida, 07/2012
Professional Geologist, 1997, 0788, Inactive, Alabama, 08/2001

## Experience and Background

***11/2006 - Present***
***Project Manager, Shaw Environmental & Infrastructure, Inc., Commercial/Federal, Knoxville, Tennessee***

Mr. Cunningham currently serves as the Project Manager for 12 UST sites (commercial) in West Tennessee for a retail client (Williams Express, Inc.). Site management includes scheduling and cost control, cost proposal preparation, field work, managing field personnel, communication with subcontractors, the client, and regulatory agencies, and report preparation. The sires are in various stages of active remediation or monitoring for petroleum contamination in soil and groundwater.

He also continues to serve as Investigative Task Manager for the West Virginia ordnance Works project and Project Manager for the former Lee Field NAS, former Ramey AFB, former NAS San Juan, and Homestead Air Reserve Base.

***The following is a summary of key projects:***
Project Manager, Homestead ARB, 127031, 131562, 131563, 131780, 135576, 136585, AFCEE, AFRPA, Homestead, FL, $885,000.00, 12/2007 - Present
Conducted annual LTM groundwater sample events for 6 AFRC sites, sediment trap checks and maintenance, investigative activities at 3 sites, and reporting (TO 0083, 0004, and 0032). Conducted biennial LTM groundwater sample events, LUC/IC inspections, and reporting (including preparation of a Five-Year Review Report) for 8 AFRPA sites (TO 0010 and 0026). Conducted well abandonment and landfill cap maintenance activities (TO 0157).

Accomplishments:
Awarded 6 Task Orders (4P - TO 0083, WERC TO 0157, 4PAE08 TO 0004, 0010, 0026, and 0032) since assuming role of PM in December 2007.

Awards/Client Commendations:
Blue Rating for excellent performance for TO 0010 in 2007.

Project Manager, Former NAS San Juan, 121205, U.S. Army Corps of Engineers, San Juan, Puerto Rico, $3,000,000.00, 12/2007 - Present
Activities completed under Task Order 30 include: remediation of a small arms firing range and removal of 3 USTs adjacent to the Puerto Rico Ports Authority Environmental Building. Shaw is also scoped to conduct an investigation and remediation at Site 39, a former petroleum storage area and conduct an investigation along the site-wide fuel pipeline.

Accomplishments:
Completed the small arms remediation, with clean confirmation samples. Completed the UST removal/closure assessment.

Project Manager, Williams Express, Inc./Former MAPCO Express convenience stores, Various, Williams Express, Inc., West Tennessee, $1,200,000.00, 11/2006 - Present

Currently serves as the Project Manager for 12 UST sites in West Tennessee for a retail client (Williams Express, Inc.). Site management includes scheduling and cost control, cost proposal preparation, field work, managing field personnel, communication with subcontractors, the client, and regulatory agencies, and report preparation.

The sites are in various stages of active remediation or monitoring for petroleum contamination in soil and groundwater. Currently conducting operation, maintenance, and monitoring for 6 active remediation sites and 1 closure monitoring site for soil and groundwater contaminated with petroleum hydrocarbons. 3 other sites are inactive waiting direction from TDEC to proceed. Remedial sites have active dual-phase extraction systems. Onsite activities include soil and groundwater sampling, O,M&M of remedial systems, soil boring and monitoring well drilling oversight, free product recovery, and soil-gas surveys.

Accomplishments:
Obtained Case Closure (No Further Action) for sites 2016, 3003, 3164, and 7448.

***05/2002 - 11/2006***
***Investigative Task Manager, Shaw Environmental & Infrastructure, Inc., Federal, Knoxville, Tennessee***

Mr. Cunningham served as the Investigative Task Manager for one formerly used defense sites (FUDS) projects for the U.S. Army corps of Engineers in West Virginia, two sites in Puerto Rico (former Ramey AFB and former NAS San Juan), and one site in Florida (former Lee Field NAS). He manages all aspects of investigative work at the four sites including work plan preparation, cost proposal preparation, scheduling, communication with subcontractors and the client, field work, field crew management, and report preparation.

Contaminant types encountered include: petroleum hydrocarbons, metals, PCBs, explosives, specifically TNT and DNT, and chlorinated hydrocarbons.

***The following is a summary of key projects:***
Project Manager, Homestead Air Reserve Base, 127031, 131562, 131563, 131780, 135576, 136585, 143712, and 144003, AFCEE, Homestead, Florida, $1,039,600.00, 12/2007 - Present
Project Manager for the Homestead Air Reserve site under several contracts, including: 4P, 4PAE08, WERC, and ECOS 09. Responsibilities include overall management of the project, profit and loss, proposal preparation, and client contact.

Work completed to date includes: preparation of all investigative work plans; sampling and analysis plans and safety and health plans; long-term groundwater monitoring and reporting and investigation at sites OU-7, OU-11T and OU-11A, OU-15, SS-2A, SS-15C, OU-20, OU-21, OU-26, OU-30, and OU-31; well abandonment, landfill cap maintenance; LUC/IC inspections and reporting, and preparation of a Five-Year Review for the AFRPA sites.

Accomplishments:
Obtained approval of the AFRPA Five-Year Review from EPA, DERM, and the AFRPA.

Project Manager, Former NAS San Juan, 774873, 121205, U.S. Army Corps of Engineers, San Juan, Puerto Rico, $3,000,000.00, 04/2006 - Present
Project Manager for the former Naval Air Station San Juan site under the SAD TERC contract. Responsibilities include overall management of the project, profit and loss, proposal preparation, and client contact.

Work completed to date includes: preparation of all investigative work plans; sampling and analysis plans and safety and health plans; completion of a background soil study; soil and groundwater assessment at a small arms firing range; assessment of the Crash Boat Station Pipeline System; removal and closure of various USTs; flushing, abandonment, and removal of the Crash Boat Pipeline system; remedial investigation of 2 landfill areas; soil assessment for the Base Laundry Building. Petroleum hydrocarbons, metals, and chlorinated hydrocarbons have been encountered at the site thus far. Investigative tasks have included: a historical records search; collection and analysis of soil, groundwater, surface water, and sediment; clearing and grubbing; monitoring well installation and development; manual pipeline tracing; test pitting; and geophysical survey.

Accomplishments:
Completed closure of USTs at the former Environmental Building. Completed remediation of lead-contaminated soil at the Small Arms Range. Conducting a site investigation at Site 39.

Investigative Task Manager, West Virginia Ordnance Works, Various, U.S. Army Corps of Engineers, Nashville District, Mason County, West Virginia, $10,000,000.00, 05/2002 - Present
Investigative Task Manager for multiple task at the WVOW site under multiple contracts. Responsible for all aspects of investigative task management including: work plan generation, cost proposal preparation and negotiation, manage investigative team for project, supervise field activities, schedule site work, communication with the client, WVOW Tier 1 team members, and subcontractors, report preparation, and active participation in the WVOW Tier 1 Partnering Team.

All investigations were conducted for nitroaromatics contamination associated with previous TNT manufacturing activities. Investigative tasks completed include: soil, sediment, surface water, and groundwater sample collection and analysis, monitoring well and piezometer installation, exploratory trenching, clearing and grubbing, geophysical and manual pipeline tracing, groundwater modeling, and conducting 3 bioremediation treatability studies for nitroaromatics in groundwater.

Accomplishments:
Tier 1 Partnering Team for WVOW including Shaw, USACE-Nashville and Huntington, EPA, and West Virginia DEP graduated to a self-facilitated team in October 2004.

As part of the Tier 1 Team, Shaw has aided in delisting 1,487 acres of the site from the National Priorities List.

Presented Long Term Monitoring Optimization for the West Virginia Ordnance Works at the April 2005 Shaw Symposium in Orlando, FL. Prepared and presented poster for EISB pilot study conducted at WVOW at May 2009 Battelle Conference in Baltimore, MD.

Awards/Client Commendations:
Named in a commendation letter from the USACE, Nashville District for outstanding performance and contribution to the project success in December 2003.

WVOW project received President's Award for 3000 days without a lost workday injury in December 2003.

Tier 1 Partnering Team for WVOW was nominated by the USACE Great Lakes and Ohio River Division for Project Development Team of the Year.

Other Comments:
To date there have been 19 separate Delivery Orders for WVOW tasks under the Nashville AE III

contract. Due to Shaw's excellent service to the USACE, we have been awarded additional work at WVOW through capacity borrowed from the Baltimore AE, Louisville AE, and Mobile AE contracts, and a pass-through award from Bhate, as directed by the USACE.

Project Manager, Former Lee Field Naval Air Station, 783147, 108784, 133067, and 137051, U.S. Army Corps of Engineers, Savannah District, Green Cove Springs, Florida, $3,500,000.00, 11/2000 - Present
Former Investigative Task Manager and current Project Manager (since 12/2007) for the former Lee Field NAS site under the TERC contract. Responsible for all aspects of project management including: work plan generation, cost proposal preparation and negotiation, manage investigative team for project, supervise and execute field activities, schedule site work, communication with the client and subcontractors, Remedial Investigation and assessment report preparation, and participation in periodic team meetings between Shaw, TPMC, USACE, Florida Department of Environmental Protection, and Clay County Port, Inc.

Work completed to date includes: preparation of a site-wide sampling and analysis plans and health and safety plans, completion of a background chemical data study for various media, and conducting investigations at 4 UST sites, 4 HTRW sites, 3 landfill areas, and a small arms firing range. Contaminants encountered include: petroleum hydrocarbons, metals, chlorinated hydrocarbons, PCBs, pesticides, and herbicides. Investigative tasks have included: a historical records search, soil, sediment, surface water, and groundwater sample collection and analysis, monitoring well and piezometer installation, exploratory landfill test pits, methane monitoring, aerial photograph review and interpretation, landfill boundary delineation, clearing and grubbing, manual pipeline tracing, aquifer testing, tidal survey, and conducting human health and ecological risk evaluations.

Accomplishments:
Completed investigations at 4 UST sites and a small arms firing range.

Investigations and reporting have to date resulted in the issuance of Site Rehabilitation Completion Orders for UST Areas 2, 3, and 4. Client satisfaction during first Task Order prompted issuance of a new Task Order upon expiration of the first. Following expiration of the SAD TERC contract in 2007, Shaw was subcontracted by an 8A consultant contracted by the USACE. This arrangement was at the request of the USACE, due to Shaw's past performance and critical site knowledge.

Other Comments:
Shaw is still working at Lee Field as a subcontractor to TerranearPMC.

Project Manager, Former Ramey Air Force Base, 783146, 121205, U.S. Army Corps of Engineers, Savannah District, Aguadilla, Puerto Rico, $3,000,000.00, 10/2000 - Present
Former Investigative Task Manager and current Project Manager (since 12/2007) for the former Ramey Air Force Base site under the SAD TERC contract. Was responsible for all aspects of investigative task management including: work plan generation, cost proposal preparation and negotiation, manage investigative team for project, supervise and execute field activities, schedule site work, communication with the client and subcontractors, and assessment report preparation.

Assumed role of Project Manager in 2007. Responsibilities include overall management of the project, profit and loss, proposal preparation, and client contact.

Work completed to date includes: preparation of all investigative work plans; sampling and analysis plans and safety and health plans; completion of a background soil study; soil and groundwater assessment at a small arms firing range; assessment of the Crash Boat Station Pipeline System; removal and closure of various USTs; flushing, abandonment, and removal of the Crash Boat Pipeline system; remedial

investigation of 2 landfill areas; soil assessment for the Base Laundry Building. Petroleum hydrocarbons, metals, and chlorinated hydrocarbons have been encountered at the site thus far. Investigative tasks have included: a historical records search; collection and analysis of soil, groundwater, surface water, and sediment; clearing and grubbing; monitoring well installation and development; manual pipeline tracing; test pitting; and geophysical survey.

Accomplishments:
Completed the background soil study and Crash Boat Pipeline investigation. Conducted soil and groundwater investigation for the Small Arms Range. Conducted the Remedial Investigation for Landfill Areas 1 and 2. Completed a site investigation for the Base Laundry. Completed Tank closures at the Base Laundry and Building 1029.

Other Comments:
Project ongoing. Currently preparing Landfill RI Report and report of findings for Tank Farm 7.

Investigative Task Manager, Former Air Force Plant 74, 772986, U.S. Army Corps of Engineers, Savannah District, Palm Beach County, Florida, 03/1999 - 04/2003
Investigative Task Manager for the former Air Force Plant 74 site under the TERC contract. Responsible for all aspects of investigative task management including: work plan generation, manage investigative team for project, supervise and execute field activities, schedule site work, communication with the client and subcontractors, RCRA Facility Investigation and report preparation.

Work completed to date includes: finalizing the supplemental RCRA Facility Investigation report, and conducting supplemental investigations at Solid Waste Management Units 3, 7, and 13. Contaminants encountered include: petroleum hydrocarbons, metals, and chlorinated hydrocarbons. Investigative tasks have included: surface water, soil, sediment, and groundwater sample collection and analysis, monitoring well installation, clearing and grubbing, aquifer testing, and conducting human health and ecological risk evaluations.

Accomplishments:
Completed remediation of soil and closure of SWMU 67, 89, and 91.

***11/1999 - 05/2002***
***Investigative Task Manager, IT Corporation (The Shaw Group, Inc. acquired substantially all of the operating assets of the IT Group, Inc. on May 23, 2002), Government Services, Knoxville, Tennessee***

Mr. Cunningham served as the Investigative Task Manager for four formerly used defense sites (FUDS) projects for the U.S. Army corps of Engineers. Two sites are located in Florida and two in Puerto Rico. He manages all aspects of investigative work at the four sites including work plan preparation, cost proposal preparation, scheduling, communication with subcontractors and the client, field work, field crew management, and report preparation.

Types of contamination encountered include: petroleum hydrocarbons, chlorinated hydrocarbons, PCBs, and metals.

***The following is a summary of key projects:***
Investigative Task Manager, West Virginia Ordnance Works, Various, U.S. Army Corps of Engineers, Nashville District, Mason County, West Virginia, $10,000,000.00, 02/2002 - 05/2002
Investigative Task Manager for multiple task at the WVOW site under an existing $10M contract. Responsible for all aspects of investigative task management including: work plan generation, cost proposal preparation and negotiation, manage investigative team for project, supervise field activities,

schedule site work, communication with the client, WVOW Tier 1 team members, and subcontractors, report preparation, and active participation in the WVOW Tier 1 Partnering Team.

All investigations were conducted for nitroaromatics contamination associated with previous TNT manufacturing activities. Investigative tasks completed include: soil, sediment, surface water, and groundwater sample collection and analysis, monitoring well and piezometer installation, exploratory trenching, clearing and grubbing, geophysical and manual pipeline tracing, and groundwater modeling.

Accomplishments:
Described under Shaw experience 05/2002 to present.

Awards/Client Commendations:
Described under Shaw experience 05/2002 to present.

Investigative Task Manager, Lee Field Naval Air Station, 783147 and 108784, U.S. Army Corps of Engineers, Savannah District, Green Cove Springs, Florida, $3,000,000.00, 11/1999 - 05/2002
Investigative Task Manager for the former Lee Field NAS site under the TERC contract. Responsible for all aspects of investigative task management including: work plan generation, cost proposal preparation and negotiation, manage investigative team for project, supervise and execute field activities, schedule site work, communication with the client and subcontractors, Remedial Investigation and assessment report preparation, and participation in periodic team meetings between Shaw, USACE, Florida Department of Environmental Protection, and Clay County Port, Inc.

Work completed to date includes: preparation of a site-wide sampling and analysis plan and health and safety plan, completion of a background chemical data study for various media, and conducting investigations at 4 UST sites, 4 HTRW sites, 3 landfill areas, and a small arms firing range. Contaminants encountered include: petroleum hydrocarbons, metals, chlorinated hydrocarbons, PCBs, pesticides, and herbicides. Investigative tasks have included: a historical records search, soil, sediment, surface water, and groundwater sample collection and analysis, monitoring well and piezometer installation, exploratory landfill test pits, methane monitoring, aerial photograph review and interpretation, landfill boundary delineation, clearing and grubbing, manual pipeline tracing, aquifer testing, tidal survey, and conducting human health and ecological risk evaluations.

Accomplishments:
Described under Shaw experience 05/2002 to present.

Investigative Task Manager, Former Air Force Plant 74, U.S. Army Corps of Engineers, Savannah District, Palm Beach County, Florida, 11/1999 - 05/2002
Investigative Task Manager for the former Air Force Plant 74 site under the TERC contract. Responsible for all aspects of investigative task management including: work plan generation, manage investigative team for project, supervise and execute field activities, schedule site work, communication with the client and subcontractors, RCRA Facility Investigation and report preparation.

Work completed to date includes: finalizing the supplemental RCRA Facility Investigation report, and conducting supplemental investigations at Solid Waste Management Units 3, 7, and 13. Contaminants encountered include: petroleum hydrocarbons, metals, and chlorinated hydrocarbons. Investigative tasks have included: surface water, soil, sediment, and groundwater sample collection and analysis, monitoring well installation, clearing and grubbing, aquifer testing, and conducting human health and ecological risk evaluations.

Accomplishments:

Described under Shaw experience 05/2002 to present.

Investigative Task Manager, Ramey Air Force Base, 783146, U.S. Army Corps of Engineers, Savannah District, Aguadilla, Puerto Rico, 11/1999 - 05/2002
Investigative Task Manager for the former Ramey Air Force Base site under the TERC contract. Responsible for all aspects of investigative task management including: work plan generation, cost proposal preparation and negotiation, manage investigative team for project, supervise and execute field activities, schedule site work, communication with the client and subcontractors, and assessment report preparation.

Work completed to date includes: preparation of all investigative work plans, a sampling and analysis plan, and safety and health plan, completion of a background soil study, and assessment of the Crash Boat Station Pipeline System. Petroleum hydrocarbons have been encountered at the site thus far. Investigative tasks have included: a historical records search, soil sample collection and analysis, clearing and grubbing, and manual pipeline tracing.

Accomplishments:
Described under Shaw experience 05/2002 to present.

***10/1988 - 11/1999***
***Section Manager/Project Manager/Program Manager, IT Corporation, Commercial/Federal, Ocala, Jacksonville, Miami, Florida***

Mr. Cunningham served as Project Manager for a convenience store chain with over 200 locations in Florida and Georgia. He also served as Project Manager for over 50 commercial and state government projects in Florida. Mr. Cunningham also served as Project and Program Manager for a statewide U. S. Postal Service contract, the Dade County DERM-04 contract, and a hazardous waste contract with the Florida Department of Environmental Protection Site Investigation Section for conducting investigations to determine potentially responsible parties.

He managed all aspects of investigative work at the four sites including work plan preparation, cost proposal preparation, scheduling, communication with subcontractors and the client, field work, field crew management, and report preparation.

For the convenience store client, he conducted all types of investigative work, managed the installation of soil and groundwater remediation systems, and conducted monitoring and maintenance of those systems.

His work with the U.S. Postal Service included primarily conducting phase I and Phase II audits for lease or purchase of land parcels. Activities included historical research, title search, soil and groundwater sampling and analysis, and lead and asbestos surveys.

For the DERM-04 contract, managed sites with work involving construction of a natural gas plant, installation of a utility corridor at the Miami International Airport, and installation of an emergency generator and storage tank.

For the FDEP Site Investigation Section Zone 3 contract, conducted comprehensive investigations for 7 contaminated sites. One site involved a rapid response investigation for dioxins, furans, and toxaphene at a chemical spraying site in Palm Beach County. Soil and groundwater sampling was conducted in Level B and C PPE in high temperature conditions.

***The following is a summary of key projects:***

Project/Program Manager, DERM-04 Contract, Various, Dade County Department of Environmental Resource Management, Dade County, Florida, $10,000,000.00, 12/1997 - 04/2000
Project/Program Manager for the 5-year, $10,000,000.00 contract. Projects awarded involved construction of a compressed natural gas facility; replacement of an outdated Power plant UST and replacement with a new system and day tank; and installation of a utility corridor and removal of contaminated soil at the Miami-Dade International Airport.

Accomplishments:
Successfully executed projects listed above on time and within budget.

Project/Program Manager, Florida Department of Environmental Protection - Site Investigation Section, Various, Florida Department of Environmental Protection, Various - South Florida (Zone 3), $3,000,000.00, 07/1996 - 04/2000
Served as Project and Program Manager for Contract No. WM589, a 3-year, $3,000,000.00 contract with the Florida Department of Environmental Protection, Site Investigation Section. Based on performance, the contract was eligible for renewal for two one-year option periods. Scope of work included comprehensive investigations of eight orphan sites with contamination to determine the potentially responsible party. Types of work included soil borings, well installation, soil and groundwater sampling, historical research, obtain off-site access, client and PRP contact, preparation of cost proposals, contract management, and business development.

Accomplishments:
Investigations identified PRPs for FDEP. Based on that knowledge, the FDEP sought legal action against the PRPs and recovery of the investigative costs.

Completed a rapid response soil and groundwater investigation in two weeks including a holiday weekend. Work was conducted during extreme heat in Level C PPE. Work provided necessary information to FDEP that strengthened their court case against a PRP.

Project/Program Manager, U. S. Postal Facilities, Various, U. S. Postal Service, Florida - statewide, $1,500,000.00, 02/1996 - 11/1999
Responsible for program and project management of one year contract with the U.S. Postal Service for a value of approximately $1.5M. Work consisted of conducting Phase I and II environmental audits for property transactions, primarily for new postal facilities. The following work was also conducted: lead and asbestos surveys, wetland surveys and mitigation, and energy reduction surveys. Also responsible for all submittals, preparation of work scopes and cost proposals, interface with the client and regulatory agencies, and business development.

Accomplishments:
Commended for performance by U.S. Postal Service Contract Manager, Ms. Christina Ramsey. Successfully completed over a dozen Phase I and II environmental audits, generally within one week of award, due to the urgency of a pending property transaction.

Project Manager, Huntley Jiff Stores/Lil' Champ Stores, Various, Lil' Champ Food Stores, Inc., Various - Florida and Georgia, $3,000,000.00, 08/1989 - 08/1995
Responsible for overall contract, project, and program management for more than 200 facilities in Florida and Georgia. Work involved: underground storage tank contamination assessments, remedial action plans, emergency response to spills, remediation system installation, system operation and maintenance, monitoring only plans, National Pollutant Discharge Elimination System permitting, corrective action plans, compliance audits, toxicity reduction evaluations, and Phase I and II audits. In addition, Mr. Cunningham reviewed all submittals, prepares work scopes and cost estimates, and interfaces with the

client and regulatory agencies.

Accomplishments:
Completed contamination assessments at approximately 50 sites, resulting in approval of sites for closure, monitoring only, or remedial action. Installed soil and groundwater remediation systems at 10 sites in Florida. Provided operation and maintenance for groundwater treatment systems at approximately 20 sites. Conducted compliance audits for fuel storage systems at approximately 150 sites in Florida.

Project Management, Flowers Bakery, Various, Flowers Baking Company, Ocala, Daytona Bch, Orlando, and Jacksonville, FL, $1,500,000.00, 10/1988 - 11/1993
Served and project manager for time and materials contract for multiple facilities in Florida that formerly stored and dispensed fuel for company vehicles. Types of work conducted include: contamination assessments; remedial action plans; groundwater treatment system installation, operation, and maintenance; and spill response. Also responsible for daily project and contract management, client contact, and requests for reimbursement from the state tanks program, for the client, for investigative and remedial work.

Accomplishments:
Installed and operated pump and treat system to prevent off-site migration of contamination from former underground storage tanks. Successfully recovered over $500,000.00 for the client from the state reimbursement fund.

## Awards/Honors

Blue Rating for Exceptional Performance, TO 0010, AFCEE, 2009
Commendation Letter for WVOW Project, USACE Nashville District, 2003
President's Safety Award (3000 Days With No Lost Day Injuries), Shaw E & I, 2003
Project Management Associate, Shaw E & I, 1992

## Publications/Presentations

Steve Downey, Lingke Zeng, and Ken Cunningham - Shaw E&I and Doug Mullendore - USACE, Nashville District, Enhanced In Situ Bioremediation Field-Scale Study Comparing Different Carbon Sources, Battelle 10th International In Situ and On-Site Bioremediation Symposium, Baltimore, MD, 2009

Ken Cunningham, Shaw E & I, Knoxville, TN Doug Mullendore, USACE-Nashville, TN, Long Term Monitoring Optimization for West Virginia Ordnance Works Site, Shaw Symposium, Remedial Process Optimization, Session 15, Orlando, FL, 2005

***Last Updated: 20 Sep 2013***

# David L. Mummert

---

## Professional Qualifications

Safety and health professional with over 33 years experience on large, complex hazardous materials remediation projects involving chemical, biological, radiological, and shock sensitive/explosive materials for commercial, DOE and DOD clients. As Director of Health and Safety assigned to direction and leadership to the Federal business line, the Environmental, Remediation and Consultation group and CSL West Region. Responsibilities and needs management positions include tracking safety performance metrics, establishing safety performance goals, performing safety needs assessment, serving in a fundamental leadership role in the safety Council process and general administrative requirements of the position.

Additionally, he is assigned other programs/project health and safety management responsibilities. In this role, Mr. Mummert develops and administers industrial hygiene monitoring programs, develops and initiates safety programs, selects respiratory and dermal protection, conducts on-site audits, provides field and client safety consultations, and directs junior industrial hygienists and site safety officers at multiple remedial actions and emergency responses.

He also developed, organized, and conducted focused specific training events and tabletop drills. Examples of these courses include animal health emergency actions, client specific emergency response training, oil spill response training, and the Shaw 50-hour Site Safety Officer course.

## Education

Master of Science, Environmental Health, University of Cincinnati, Cincinnati, Ohio, 1984
Bachelor of Science, Biology, University of Cincinnati, Cincinnati, Ohio, 1976

## Additional Training/Continuing Education

OSHA 40-hour HAZWOPER Refresher, Findlay, OH, 2012
Defensive Driving, Findlay, OH, 2011
OSHA 30 hour Construction, Findlay, 2011
American Red Cross CPR and First Aid, Findlay, OH, 2011
OSHA 10 hour Construction, Findlay, OH, 2005
Loss Prevention System Training, New Jersey, 2004
American Red Cross CPR and First Aid - Trainer, Findlay, OH, 2001
Trenching/Shoring Competent Person, Findlay, OH, 2000
Level A PPE Training, Trenton, NJ, 1997
Job Safety Analysis and Hazard Assessment, Findlay, OH, 1995
OSHA HAZWOPER Supervisor, Findlay, OH, 1989
OSHA 40-hour HAZWOPER , Findlay, OH, 1987
Supervisory Skills, Findlay, OH , 1987

## Registrations/Certifications/Licenses

Certified Industrial Hygienist (CIH), 1984, 3303, Active, Nationwide, 01/2013

## Experience and Background

***05/2002 - Present***
***Director, Health and Safety, Shaw Environmental & Infrastructure, Inc., Findlay, Ohio***

Responsibilities include providing health and safety support to the Federal and ERC business lines, various high hazard projects, and geographically located large projects. Also he supplies program CIH support to various government projects for example the Fuels projects.

***The following is a summary of key projects:***
Program H&S Manager/ Program CIH, NAVFAC RAC 5, U.S. Navy, Norfolk, Virginia, 08/2012 - Present
Assume position of program health and safety manager in addition to the responsibilities of the program CIH for this program conducting multiple remediation projects for the U.S. Navy. Responsible for development of APP/SSHP, determining PPE requirements, establishing air monitoring programs and other safety planning activities. Assign safety officers to the various projects. Monitor project performance and conduct safety needs assessment.

Accomplishments:
The NAVFAC RAC 5 program has went over a year without an OSHA recordable incident.

Program Health and Safety Manager, Midwest PBC, U.S. Air Force, Multiple locations in the Midwest, 07/2012 - Present
Conducting remedial activities at a number of former US Air Force bases. Control of hazards included those involved with trenching, excavation, work around utilities and areas identified as formally serving as possible CWM training areas.

Accomplishments:
At this point the project has completed assigned task with no OSHA recordable's.

Project Health and Safety Manager, Kelly Lackland Air Force Base, U.S. Air Force, San Antonio, Texas, 06/2012 - Present
Conducting remedial activities at multiple sites on this former Air Force Base. Assisting with project execution involving trenching, drilling, water treatment and other construction/remedial based tasks.

Project Health and Safety Manager, Vandenberg AFB MMRP, U.S. Army Corps of Engineers, Lompoc, California, 09/2009 - present
Shaw has been performing unexploded ordnance removal operations at Vandenberg AFB since September, 2009. This operation has involved expending over 232,000 man-hours while traversing nearly 8,000 thousand acres of sometimes heavily vegetated unimproved work areas where poison oak has been identified as a hazard.

Accomplishments:
Completed project with only several minor injuries-most associated with contact the poison oak.

Project Health and Safety Manager, Vandenberg AFB MMRP, U.S. Army Corps of Engineers, Lompoc, California, 09/2009 - Present
Shaw has been performing unexploded ordnance removal operations at Vandenberg AFB since September, 2009. This operation has involved expending over 232,000 man-hours while traversing nearly 8,000 thousand acres of sometimes heavily vegetated unimproved work areas where poison oak has been identified as a hazard.

Accomplishments:

Project has been completed with only minimal minor injuries-most associated with contact the poison oak.

Project Health and Safety Manager, Yorktown Environmental Assessment, Patriots Point Development Agency, Charleston, South Carolina, 08/2012 - 12/2012
Conducting environmental assessment on the former aircraft carrier USS Yorktown. Project involves accessing and sampling tanks, piping and other shipboard containers. Also performed some assessment of radioactive sources, PCBs and firefighting agents.

Accomplishments:
This is a novel project involving the use of 29 CFR 1915 - Maritime regulations to govern potential hot work and also confined space entry. Project completed with 0/0/0 safety performance record.

Program Health and Safety Manager, USDA/USAID Animal Disease Program, USDA/USAID, Various locations, 07/2006 - 10/2008
Involved with program planning, hazard analysis, training, and critical safety practice establishment for Foreign Animal Disease (FAD) and Avian Influenza outbreaks in domestic and international food animal populations. Currently developing course and curriculum for understanding logistical complexities and challenges involved in an Animal Health Emergency (AHE) responses.

Accomplishments:
Accomplished very novel tasks with no injuries

Project Health and Safety Manager, Non Stockpile Weapons Program, U. S. Army, Various - Deer Park, Texas Pine Bluff, Arkansas Andrews, Texas, 11/2004 - 03/2008
Involved with various projects to dispose of neutralent generated from binary chemical weapon destruction programs. Developed Health, Safety and Emergency Response contingency plans for handling neutralent materials which included air monitoring, personal protective equipment program, decontamination procedures and development of emergency response capabilities. Assisted with onsite training programs. Mobilized to the sites and was part of the initial operations team.

Accomplishments:
Accomplished difficult tasks with toxic chemicals

Project Safety Manager, Wayne Disposal, Wayne Disposal Inc., Wayne, Michigan, 09/2005 - 05/2006
Involved with the installation of a 130 feet deep shaft at an active hazardous waste disposal facility in order to repair a damaged leachate recovery system. Developed Health, Safety and Emergency Response contingency plans for shaft entry, coordinated air monitoring activities, implemented a high angle rescue program, and executed a construction safety program.

Awards/Client Commendations:
Accomplish triple zero performance.

Health and Safety Manager and Onsite SSO, City of Austin, 101201 and 108658, City of Austin, Austin, TX, 11/2004 - 05/2005
Involved with a project to identify and remediate soils contaminated with benzoyl peroxide materials. Developed Health, Safety and Emergency Response contingency plans for handling potentially explosive materials which included establishing minimum distances, personal protective equipment program, coordination with local emergency responders, and air monitoring. Assisted with the on-site training program. Mobilized to the site and was part of the initial investigation team.

Accomplishments:
Accomplished project with a triple zero record.

Project CIH and Onsite Safety Officer, Tin Products, U.S, EPA, Lexington, SC, 11/2002 - 03/2002
Involved with a project to access fire damaged aluminum alkyls tanks and transfer contents to portable containers. Developed Health, Safety and Emergency Response contingency plans, air monitoring program, personal protective equipment program for the pyrophoric material. Assisted with the onsite training program. Mobilized to the site and was part of the transfer team during product recovery and tank cleaning operations.

Accomplishments:
Completed transfer operations with a triple zero record.

***07/1998 - 04/2002***
***Director, Health and Safety, IT Corporation (The Shaw Group Inc. acquired substantially all of the operating assets of The IT Group, Inc., in May 2002), Findlay, Ohio***

Responsibilities included provide health and safety support to the Specialty Services and Emergency Response Group.

***The following is a summary of key projects:***
Health and Safety Manager and Site Safety Officer, Anthrax Remediation Projects, USPS, Various Locations, 10/2001 - 02/2002
Developed Health and Safety plans and responded to three separate facilities which were contaminated with anthrax through bio-terrorism activities. Conducted site-specific employee training, administered respirator fit-testing, coordinated antibiotic prescriptions, supervised decontamination operations, and provided health and safety management.

Project CIH and Onsite Safety Officer, Minot Ammonia Derailment, Canadian Pacific Railroad, Minot, ND, 01/2002 - 01/2002
Part of the initial response team to a derailment involving railroad cars of anhydrous ammonia. Conducted site hazard assessment, developed a health and safety plan, and conducted employee briefings for personnel which successfully transferred 7 ammonia cars, some of which were leaking.

Accomplishments:
Completed project with a triple zero record.

Health and Safety Manager and Site Safety Officer, Mercury Remediation Projects, Various Clients, Various Locations, 09/2000 - 04/2001
Responded to three separate mercury related contamination events; the first involved surveying 13 residential homes where mercury containing gas regulators were spilled, the second involved a classroom where a child released approximately one fluid ounce of mercury, and the third was remediation of an act of mercury vandalism in a high school library facility. Provided onsite health and safety management, developed and conducted air monitoring during the remediation and final clean-up air monitoring using both direct reading and fixed media air sampling methods, and interacted with State EPA and local health officials.

Health and Safety Manager and Site Safety Officer, Okmulgee Refinery Hydrogen Fluoride (HF) Project, Phillips Petroleum Company, Okmulgee, OK, 08/1999 - 01/2000
Developed the health and safety plan and emergency response and contingency plan to cold tap, remove, and neutralize product in a HF Alkylation unit. Project required extensive emergency planning and

coordination with local responders, careful selection of respiratory and dermal protection, develop both a personal and perimeter air monitoring program, and development of initial treatment for HF contact. Conducted initial HF briefings for project personnel and Level A use and decontamination procedures. Served as the site safety officer during the project.

Project CIH, Drake Chemical Incineration Project, USACE, Lockhaven, PA, 07/1998 - 10/1999
Project Certified Industrial Hygienist for a multi-year project involving the excavation and incineration of chemically impacted soils and debris. Responsibilities included selection and use of respiratory and dermal protection, industrial hygiene air monitoring program, and modification to the site health and safety plan. Developed work and health and safety plans for opening unknown stainless steel drums. Conducted annual refresher training for local emergency responders.

Health and Safety Manager and Site Safety Officer, North Carolina Disaster Relief Project, FEMA, Various Areas of North Carolina, 07/1999 - 08/1999
Responded to North Carolina following Hurricane Floyd to recover and dispose of large animals and poultry killed by flood waters. Developed health and safety plan, coordinated vaccinations, and supervised health and safety for over 100 employees engaged in this operation.

Health and Safety Manager and Site Safety Officer, Concept Science, State of Pennsylvania, Allentown, PA, 03/1999 - 03/1999
Responded to an explosion at a chemical manufacturing facility that produces hydroxylamine. Developed a health and safety plan which included elements of a demolition plan and project air monitoring requirements. Developed job safety analysis for all the key phases of this disaster remediation and demolition. Following one week as the SSO, returned to the project safety and health management function.

***03/1985 - 06/1998***
***Director, Health and Safety, OHM Remediation Services Inc., Findlay, Ohio***

Progressive experience and responsibilities from Industrial Hygienist to Director, Helot and Safety. Experience and responsibilities included establishing industrial hygiene monitoring programs, training, development of site specific health and safety plans, and management of safety functions.

***The following is a summary of key projects:***
Health and Safety Manager and Site Safety Officer, Shell Belpre, Shell Chemical Company, Belpre, OH, 05/1994 - 12/1994
Responded to initial emergency and remedial activities at a major chemical plant explosion and fire. Performed the initial hazard assessment for multiple chemicals and physical situations and developed the health and safety plan (HASP) for on-site activities. Responsible for the health and safety of approximately 100 employees involving project specific training, development of job safety analyses, and air monitoring. Directed activities of up to six site safety officers.

Project CIH, Weldon Spring Quarry and Building Packages, US DOE, Weldon Springs, MO, 03/1993 - 08/1993
Performed the initial safety and health planning and document preparation for commencement of these two mixed waste remediation projects. These activities included preparation of job safety analyses for each task, coordination of project specific medical surveillance programs, development of project specific personal protective equipment programs, including sourcing and selection of specialty items, project specific emergency response planning, and establishment of project specific industrial hygiene monitoring programs.

Health and Safety Manager and Site Safety Officer, Goose Bay Incineration Project, Canadian Department of National Defense, Happy Valley-Goose Bay, Labrador:, 08/1989 - 04/1990
For this 12-month thermal incineration project, Mr. Mummert was responsible for providing 3-hour training sessions on health, safety, and emergency response activities involving PCBs and PCB combustion products for the CDND, base firefighters, and crew members; coordinating site-specific PCB medical monitoring; developing the site safety plan; conducting surface and air monitoring; assisting with coordination of an emergency drill which simulated an aircraft crash into the facility; conducting routine safety audits of the thermal incinerator and feed preparation area; and serving as administrative industrial hygienist and safety manager.

Health and Safety Manager and Site Safety Officer, Moundsville Chemical Plant Decontamination, Olin Corporation, Moundsville, WV, 06/1988 - 10/1989
He was responsible for safety training and supervision for 90-man crew during the decontamination of facility and asbestos removal; developed site safety plan and prepared and implemented air monitoring program; contaminants included toluene diisocyanate, dichlorobenzene, toluene diamine, phosgene, sulfuric acid, dinitrotoluene, formaldehyde, corrosive organic liquids and solids, mercury, and other chemicals.

Health and Safety Manager, TNT Remediation Project, USATHAMA, Point Pleasant, WV, 04/1987 - 08/1987
Developed site safety plan and provided on-site monitoring of excavation and TNT removal from sewer lines; also developed safety procedures for TNT handling and remote burning of explosive compounds.

Health and Safety Manager, Lagoon Closure Project, Major Chemical Manufacturer, Kansas City, MO, 06/1986 - 10/1986
Mr. Mummert was responsible for health and safety management involving the closure of two lagoons contaminated with lead, arsenic, chrome, cadmium, cyanides, and chlorinated solvents and the demolition of concrete structures (project activities included dewatering and stabilization of remaining sludges and earthmoving of soils); developing site safety plan and air monitoring program for personnel, perimeter, and confined space situations; performing project safety audits; and presenting review of results.

Health and Safety Manager, Explosives Excavation, Major Chemical Manufacturer, Magna, UT, 07/1986 - 09/1986
Mr. Mummert developed site safety plan and provided on-site safety training to, and supervision of, field operations personnel tasked with removal of buried explosives.

Health and Safety Manager, M-Basin Closure, DOE Savannah River Site, Savannah, GA, 05/1986 - 08/1986
Managed health and safety, including radiation safety, on RCRA closure at a DOE facility encompassing an unlined settling basin that received mixed waste effluent from the fuels and target fabrication facility at Savannah River. The M-Basin contained approximately seven million gallons of water and two million gallons of contaminated sludge. SHAW removed, treated, and discharged the free liquids; recovered and stabilized contaminated sludges; consolidated 50,000 cubic yards of metals- and solvents-contaminated sludges from another area to the M-Basin; constructed a cap over the stabilized sludges within the M-Basin; and restored the site.

***10/1981 - 02/1985***
***Industrial Hygienist, Versar New York, Inc., Binghamton, New York***

As senior safety officer for Versar New York, Inc., primary projects involved the decontamination of two buildings contaminated by PCB related fires. Responsibilities included directing industrial hygiene

monitoring programs, enforcing site safety plan requirements, and implementing complete personal protective equipment programs. Regular duties also included direction of safety programs focusing on fall protection, demolition, and hot work; assistance with medical surveillance programs; and conducting new employee health and safety training sessions.

***01/1979 - 03/1981***
***Health and Safety Representative, United Union of Roofers, Waterproofers, and Allied Workers AFL-CIO, Washington, DC***

As the industrial hygienist for the United Union of Roofers, Waterproofers, and Allied Workers the primary responsibilities was to conduct comprehensive industrial hygiene surveys on roofing/waterproofing projects throughout the United States. Additional duties included serving as technical liaison with OSHA, NIOSH, and other professional groups, and the development and presentation of multimedia educational materials for workers.

## Publications/Presentations

David L. Mummert, Poster-health and safety considerations for a hazardous waste landfill leak detection riser pipe repair project., American Industrial Hygiene Association Annual Conference, Minneapolis, Minnesota, 2008

David L. Mummert, Reader, Impact of Revised Airborne Exposure Limits on Non- Stockpile Chemical Material Program Activities, National Academies of Science, Washington, DC, 2005

David L. Mummert, Application of A Risk Matrix Model to Safety Considerations During Disaster Recovery Operations, Ohio Spill Prevention, Planning and Emergency Response Association Conference, Cincinnati, OH, 2005

David L. Mummert and James Joice, Recognition, Evaluation, and Cleanup Techniques for Mercury Releases in Non-occupational Environments, American Industrial Hygiene Conference, Dallas, TX, 2002

David L. Mummert, Application of Hazardous Waste Site Methodology to Large Scale Dead Poultry and Farm Animal Recovery Operations, American Industrial Hygiene Conference, New Orleans, LA, 2001

David L. Mummert, Mercury Release Evaluation and Remediation, 10th Annual Business & Industry Environmental Symposium, Manufacturers? Education Council, Cincinnati, OH, 2001

***Last Updated: 16 Dec 2011***

# Zach C. Parham

---

## Professional Qualifications

Mr. Parham has over 10 years of environmental consulting experience, providing site management, technical and investigative task leadership, and project management. He has planned, performed, and overseen several subsurface investigations, pilot studies, and remedial projects throughout the Eastern United States and Puerto Rico. In addition, Mr. Parham has provided task leadership on projects associated with phase I and II environmental assessments, waste characterization, contaminant migration, contaminated waste disposal, hazardous waste handling, site erosion and sediment control, contaminated sediment characterization and delineation, feasibility studies, pilot test evaluations, treatability studies, above-ground storage tank and below-ground storage tank testing and removal, asbestos assessments, soil characterization and delineation, soil vapor characterization, soil remediation, groundwater monitoring and characterization, groundwater remediation, mass contaminant characterization, natural attenuation evaluation, and wastewater treatment.

Mr. Parham has extensive project technical experience in performing and executing HTRW activities at sites under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) and the Resource Conservation and Recovery Act (RCRA). He also has working knowledge of state and federal regulations, with 6 years of experience conforming to Naval and Air Force requirements.

Mr. Parham has been the lead task manager for projects at present and former governmental and state facilities, petroleum facilities, former dry cleaning facilities, Superfund sites, and various other projects associated with environmental characterization, assessment, and remediation. Throughout Mr. Parham's career, his resourcefulness, diligence, and efficiency have allowed him to solve the environmental challenges associated with his projects, completing them on time and on budget.

## Education

Bachelor of Science, Plant and Soil Sciences/Geology, University of Tennessee, Knoxville, Tennessee, 1999

## Additional Training/Continuing Education

First Aid, Knoxville, TN, 2011
Adult CPR, Knoxville, TN, 2011
8-Hour HAZWOPER Refresher, Knoxville, TN, 2011
Cinfined Space - Entry Supervisor (Ent. & Attn.), Findlay, OH, 2010
Excavation Competent Person Training, Findlay, OH, 2010
8-Hour HAZWOPER Supervisor Training, Findlay, OH, 2010
Hazard Assessment & Resolution Program (HARP), Knoxville, TN, 2010
Site Safety Officer, Findlay, OH, 2010
EI-HS026 Safety Obsrevation Program, Findlay, OH, 2010
OSHA 30 Hour Construction Safety, Findlay, OH, 2010
OSHA Disaster Site Worker, Knoxville, TN, 2008
DOT General Awareness Training, Knoxville, TN, 2007
40-Hour Hazardous Waste Operations and Emergency Response Training (29CFR1910.120), Atlanta,

GA, 2001

## Experience and Background

***05/2002 - Present***
***Scientist 3, Shaw Environmental & Infrastructure, Inc., Knoxville, Tennessee***

Investigative task lead and site management responsibilities include client interaction, proposal development and preparation, investigatory scope of work development and implementation, work plan development and submittal, project site management for investigative/remedial field efforts, preparation and submittal of investigative/remedial reports, and coordination and management of project budgets/personnel. Project assignments have included: Former Lee Field Naval Air Station (LFNAS), Homestead Air Reserve Base (HARB), Former Ramey Air Force Base (RAFB), Former West Virginia Ordnance Works (WVOW), Former Plum Brook Ordnance Works (PBOW), Moody Air Force Base (MAFB), Former Volunteer Army Ammunitions Plant (VAAP), and Redstone Arsenal (RA).

***The following is a summary of key projects:***
Invistigative Task Lead/Site Manager, Former Lee Field Naval Air Station (LFNAS), , USACE, Savannah District, Green Cove Springs, FL, $1,600,000.00, 08/2007 - Present
Investigative task lead and site manager for LFNAS. Responsibilities include: client interaction; proposal development and presentation; investigative scope development; work plan preparation and submittal; planning, staffing, and executing all field investigations, including soil excavation, soil sampling and delineation, site dewatering, sediment monitoring, monitoring well abandonment, monitoring well installation, and groundwater monitoring; investigative report preparation and submittal.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

Investigative Task Lead/Site Manager, Former Ramey Air Force Base (RAFB), , USACE, Savannah District, Aguadilla, Puerto Rico, $1,200,000.00, 08/2007 - Present
Investigative task lead and site manager for RAFB. Responsibilities include: client interaction; proposal development and presentation; investigative scope development; work plan preparation and submittal; planning, staffing, and executing all field investigations, including UST removal, soil excavation, soil sampling and delineation, pipeline abandonment, monitoring well installation, and groundwater monitoring; investigative report preparation and submittal.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

Investigative Task Lead/Site Manager, Homestead Air Reserve Base (HARB), , AFCEE, Homestead, FL, $750,000.00, 10/2005 - Present
Investigative task lead and site manager for HARB. Responsibilities include: client interaction; proposal development and presentation; investigative scope development; work plan preparation and submittal; planning, staffing, and executing all field investigations, including soil sampling and delineation, sediment monitoring, monitoring well abandonment, monitoring well installation, and groundwater monitoring; investigative report preparation and submittal.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

Awards/Client Commendations:

Responsible for Shaw recieving a coveted 'Blue Rating' from AFCEE in 2009.

Project Scientist and Site Manager, West Virginia Ordnance Works (WVOW), USACE, Nashville District, Mason County, West Virginia, 06/2004 - Present
Project scientist and site manager for WVOW. Responsibilities include: investigative scope development; work plan preparation and submittal; planning, staffing, and executing all field investigations, including soil excavation, soil sampling and delineation, surface water and sediment monitoring, monitoring well abandonment, monitoring well installation, groundwater monitoring; investigative report preparation and submittal; and subsurface hydrogeological interpretation.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

Project Scientist, Redstone Arsenal (RA), USACE, Savannah District, Huntsville, Alabama, 04/2002 - 04/2006
Project scientist for RA. Responsibilities include: soil sampling; soil delineation; surface water and sediment sampling; monitoring well development, and groundwater sampling.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

Project Scientist, Plum Brook Ordnance Works (PBOW), USACE, Huntington District, Sandusky, Ohio, 09/2003 - 09/2004
Project scientist for PBOW. Responsibilities include: soil sampling; soil delineation; surface water and sediment sampling; monitoring well development, and groundwater sampling.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

Project Scientist, Moody Air Force Base (MAFB), USACE, Savannah District, Valdosta, Georgia, 11/2002 - 10/2003
Project scientist for MAFB. Responsibilities included: soil sampling; soil delineation; surface water and sediment sampling; monitoring well installation; monitoring well development; and groundwater sampling.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

Project Scientist, Volunteer Army Ammunitions Plant (VAAP), USACE, Nashville District, Chattanooga, Tennessee, 06/2002 - 10/2003
Project scientist for VAAP. Responsibilities include: monitoring well installation; monitoring well development; groundwater sampling; and soil sampling.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

Project Scientist, Fort McClellan (FTMC), USACE, Mobile District, Anniston, Alabama, 06/2001 - 05/2002
Project scientist for FTMC. Responsibilities included: soil sampling; soil delineation; surface water and sediment sampling; monitoring well installation; monitoring well development; and groundwater sampling.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

***06/2001 - 05/2002***
***Environmental Scientist/Engineer, IT Corporation (The Shaw Group, Inc., acquired substantially all of the operating assets of The IT Gourp, Inc., on May 23, 2002)., Government Services, Knoxville, Tennessee***

Project scientist responsibilities included soil delineation/characterization, soil sampling, monitoring well installation and development, groundwater sampling, surface water and sediment sampling at the Fort McClellan project in Anniston, AL.

***The following is a summary of key projects:***
Assistant Environmental Scientist, Fort McClellan, USACE, Anniston, Alabama, 06/2001 - 04/2002
Assistant Environmental Scientist for Fort McClellan. Responsibilities included: groundwater sampling; temporary well installation; soil sampling, and soil lithologic delineation.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

***04/1998 - 10/2000***
***Research Assistant, University of Tennessee, College of Plant and Soil Sciences, Knoxville, Tennessee***

Assisted in the physical characterizations and chemical analysis for various soil delineation and revegetation research projects. Responsibilities included soil morphological characterization and mapping, sample preparation and analysis, Mass Spectronomy laboratory analysis, and data base maintenance.

***The following is a summary of key projects:***
Research Assistant, Soil Characterization Laboratory, College of Plant and Soil Sciences, Knoxville, TN, 01/1999 - 10/2000
Research assistant in the Soil Characterization Laboratory at the University of Tennessee. Assisted in the physical characterizations and chemical analyses for the following projects:
Delineating Anthropogenic Hydric Soils on Mine Tailings in the Copper Basin, Tennessee for Classification and Use.
Relative Efficacies of GPR and EM 31 Compared to Traditional Soil Investigative Techniques on Loess/Alluvium/Tertiary Deposits in Southwest Tennessee.
Soil Morphological, EMI, and GPR Delineations of Anthropogenic Aquic Soils in Ducktown, Tennessee.
Revegetation of Copper Mine Tailings in the Copper Basin, Tennessee.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

Lab Technician, Soil Characterization Laboratory, College of Plant and Soil Sciences, Knoxville, Tennessee, 04/1998 - 12/1998
Lab technician for the soil characterization laboratory at the University of Tennessee. Responsibilities included upkeep of laboratory equipment and assistance in cataloging plant growth data. Performance of relative chemical analysis of various soil types including cataloging and spreadsheet manipulation of data, maintenance, and storage of lab equipment and on-site assessment of various soil morphologies for research studies.

Accomplishments:
Completed all assigned tasks on schedule and on budget.

## Awards/Honors

President's Award, Shaw Environmental and Infrastructure, Inc., 2003

***Last Updated: 04 Jan 2013***

# Winston D. Russell

---

## Professional Qualifications

Mr. Russell has more than 29 years of experience with Shaw Environmental & Infrastructure, Inc. (Shaw E&I) in comprehensive application of professional safety and industrial hygiene as well as the supervision of personnel, safety and health programs, quality control (QC), analytical sampling programs, and environmental remediation/construction and restoration projects. The majority of the projects have involved sampling and treatment of hazardous and industrial waste, stabilization and solidification, construction, incineration, investigation, containment, vapor extraction, HTRW, MEC and environmental monitoring. Mr. Russell is also experienced in the operation of heavy equipment typical of construction sites that helps facilitate an understanding of associated hazards. He has worked as a health and safety (H&S) professional for the last 19 years and managed construction QC programs on large projects throughout the United States. As an H&S Manager, he managed subcontractor, client and Shaw associates in compliance with 29 CFR 1910.120, and 29 CFR 1926.65, Hazardous Waste Operations and Emergency Response. Mr. Russell implemented employee exposure monitoring programs, tracked training and medical records, initiated safety councils, and performed hazard communication training and site compliance audits. As a construction QC systems manager, he developed project specifications, work plans and implemented the quality management processes for Commercial, U.S. Department of Energy (DOE), and U.S. Department of Defense (DoD) projects. Mr. Russell also has experience with public meetings, fire and rescue services, client/regulator negotiations and emergency response services. In the analytical field, he has extensive environmental field sampling experience from sample collection to laboratory analysis procedures. He was the laboratory manager for on-site operations at LAAP. Mr. Russell served as the Construction QC Systems Manager and Site Safety and Health Coordinator for projects in the U.S. Army Corps of Engineers (USACE) Savannah and Mobile District Total Environmental Restoration Contract (TERC) programs. He was a contractor member on an elite USACE SAD committee evaluating loss control and accident prevention for more than 8 years. Currently he is responsible for the H&S program management for multiple Federal programs and projects as well as regional responsibility for the Army east Federal business line. Mr. Russell also manages the H&S aspects of Military Munition Response Programs which involve munitions of explosive concern and nonstockpile chemical warfare agent as well as the commercial diving operations associated with MEC activity and H&S representative for the Shaw dive control board.

## Education

Associate of Engineering, Electronics, State Technical Institute, Knoxville, Tennessee, 1984

## Additional Training/Continuing Education

CB&I Supervisor Incident Prevention Program, Train the Trainer, Columbia, SC, 2013
Instructor CB&I Supervisor Incident Prevention Program, Knoxville, TN, 2013
8-Hour HAZWOPER Refresher, Knoxville, TN, 2013
Defensive Driving On Line, Knoxville, TN, 2012
Respiratory Protection, Knoxville, TN, 2012
Hearing Conservation and Loss Prevention, Knoxville, TN, 2012
8-Hour HAZWOPER Refresher, Knoxville, TN, 2012
Soldier Biological Chemical Command Operations Management, Knoxville, TN, 2012
10-Hour Construction Safety Disaster Site Worker Training, 2008

Electrical Safety, Knoxville, TN, 2005
OSHA 500 Trainer Course For Construction Industry Standards, College of Medicine, Cincinnati, OH, 2004
OSHA Standards for Construction Industry, College of Medicine, Cincinnati, OH, 2003
USACE Construction Quality Management For Contractors, Knoxville, TN, 2003
Embryo-Fetus Protection, Knoxville, TN, 2002
Basic Rigging Concepts, Knoxville, TN, 2001
Air Monitoring Instrumentation, Knoxville, TN, 2001
Respiratory Protection Training, Knoxville, TN, 2001
Principals of Job Safety Analysis, Knoxville, TN, 2001
Chemical, Biological, and Nuclear Warfare Material, Knoxville, TN, 2000
10-Hour OSHA Construction Safety, Knoxville, TN, 1999
Hazard Communication, Knoxville, TN, 1998
DOT General Awareness, Knoxville, TN, 1997
Dupont Training, Cincinnati, OH, 1991
8-Hour HAZWOPER Supervisor Training, New Jersey, 1991
Waste Operation Training, Knoxville, TN, 1989
Confined Space Entry Supervisor, Knoxville, TN, 1989
Health Hazards-Dioxin & PCB, Knoxville, TN, 1988
Vacuum Truck Operation , Kansas , 1987
40-Hour Environmental Emergency Response Training, Knoxville, TN, 1985
Health Hazards Lead, Knoxville, TN, 1985
Asbestos Abatement Worker Training, Knoxville, TN, 1985
40-Hour HAZWOPER, Knoxville, TN, 1984
ARC Advanced Life Saving Water Recreation, Knoxville, TN, 1979

## Registrations/Certifications/Licenses

USACE Construction Quality Control Manager, 2003, NA, Active, Nationwide, 04/2008
OSHA Construction Industry Outreach Trainer, 2004, 500-522, Active, Nationwide, 02/2008

## Experience and Background

***05/2002 - Present***
***Health and Safety Manager, Shaw Environmental & Infrastructure, Inc., Knoxville, Tennessee***

Project experience includes:

***The following is a summary of key projects:***
Health and Safety Manager, Various Programs, Various Clients, Knoxville, Tennessee, 05/2002 - Present
Current program H&S Manager for the following Shaw programs: Savannah Indefinite Delivery Type (IDT), South Atlantic Division (SAD) TERC, USACE Rapid IV, Rapid III, Tinker Architecture & Engineering (A&E) II, Air Force Institute for Operational Health (AFIOH), Omaha TERC II and NCOE AE III. Mr. Russell is also responsible for H&S in the southeast region Federal business line.

Health and Safety Coordinator, Government Support, Federal Government, Knoxville, Tennessee, 05/2002 - 01/2003
Supports government DoD and DOE projects. Prepares H&S plans for site investigations, remedial investigations and remedial actions involving unexploded ordnance (UXO), chemical warfare material (CWM) and hazardous, toxic, and radioactive waste (HTRW) sites. Alternate H&S Manager for the SAD TERC and Omaha TERC programs. Performed site audits and inspections for compliance with H&S

plans and Occupational Safety and Health Administration (OSHA) requirements. Has knowledge in U.S. Army regulations relating to UXO and CWM as well as specific controls and monitoring requirements for protection of the environment and human health from CWM.

Site Safety and Health Officer /Construction QC Systems Manager (SSHO/CQCSM), Redstone Arsenal, U.S. Army, Huntsville, Alabama, 01/2000 - 01/2003
Responsible for safety and QC during the construction of a groundwater treatment system. This system involved the installation of influent and effluent piping in excess of 2.5 miles, foundation construction, equipment placement, connection to six existing extraction wells, electrical and mechanical construction, system shake down, start-up, operation and efficiency testing. Implemented the formal USACE Mobile District QC process including the establishment of definable features of work matrix; four-phase inspection processes, submittal register development/ implementation and management. As the former CQCSM, was the point of contact for the USACE on construction quality and safety issues. Also provided safety and QC support for two one million and two 500,000-gallon aboveground storage tank (AST) remediation, including oil water separator (OWS) remediation. Provided safety oversight on numerous UXO and CWM sites requiring U.S. Army Technical Escort Unit support and UXO technicians for HTRW investigations and remedial action. Developed a written nomination to participate in the USACE Mobile District Construction Division Celebrate Safety program. IT Corporation was voted the Excellence in Safety Management award through the Mobile District for 3rd Quarter-FY 00 in the Continental United States (CONUS) Large category. Represented IT Corporation and conducted presentations to the Celebrate Safety Conference and Banquet for Redstone Arsenal.

***01/2002 - 01/2013***
***H&S Manager, Shaw Environmental & Infrastructure, Inc., Federal, Knoxville, Tennessee***

H&S manager for diverse environmental and construction projects from design, procurement, construction and implementation of accident prevention plans. Numerous projects completed with Zero Incidents and internal and external recognition for safety excellence. Multiple program safety management in excess of 1 billion revenue without serious injury. Major contributor and developer of plans and procedures for dealing with CWM in accordance with DOD regulations.
H&S Manager for the Redstone Arsenal performance based contract (PBC), program management contract (PMC) and RCRA. Developed hundreds of site-specific safety and health plans and activity hazard analysis for HAZWOPER and construction operations. Scope includes HTRW, UXO, CWM and conventional vertical construction.

***06/1984 - 05/2002***
***Health and Safety Manager, IT Corporation (The Shaw Group Inc. acquired substantially all of the operating assets of The IT Group, Inc. on May 23, 2002), Knoxville, Tennessee***

Project experience included:

***The following is a summary of key projects:***
H&S Coordinator/Construction QC Specialist, Milan Army Ammunition Plant (MAAP), USACE, SAD TERC, Milan, Tennessee, 01/1997 - 01/2000
The MAAP project consisted of three delivery orders under the SAD TERC. These included upgrades to an existing groundwater treatment facility for carbon handling and removal, construction of a 1,300 gallon per minute (gpm) Groundwater Treatment Plant and construction of a 78,000 square foot (sf) Bioremediation Facility for composting explosives-contaminated soil. Was responsible for all aspects of on-site safety and health, both for IT and subcontractors. The project was nominated in 1998 and 1999 under the USACE Mobile District Celebrate Safety program and voted a quarterly winner each year. IT participated in the Celebrate Safety yearly banquet as quarterly winners in both 1998 and 1999. Also

closed out two of the delivery orders as the Site Superintendent and Construction QC Systems Manager in addition to being the H&S Officer. The Groundwater Treatment Plant construction consisted of installation of over five miles of high density polyethylene (HDPE) pipe, extraction and monitoring well installation, plant foundation construction, equipment placement, testing and operation. The Bioremediation Facility required foundation construction, storm water drainage system installation, pre-engineered metal building erection, purchasing of specialized composting equipment and equipment operation training.

H&S Coordinator, Funnel and Gate System, Need Client, Denver, Colorado, 01/1996 - 01/1997
Managed the site H&S program for construction of a Funnel and Gate System to treat trichloroethylene (TCE) in groundwater below drinking water maximum concentration limits (MCLs). Project involved installation of over 1,200 linear feet (lf) of Waterloo Barrier sheet piling to average depths of 28 feet. Served as the Confined Space Entry Supervisor for four 40 ft x 10 ft x 30 ft deep flow through groundwater treatment cells vertically backfilled and separated with pea gravel and reactive iron filings that required on-site trench protection system design, construction and placement under Permit Required Confined Space entry standards. Designed, constructed and operated a water treatment system using carbon and suspended solids filtration to store and treat groundwater encountered from excavation and flow through cell construction. Operated hydraulic cranes, track excavators, backhoes and front end loaders to facilitate project schedules and assisted with archeological explorations of 1800s ranch home findings.

H&S Coordinator, H&S Oversight, Need Client, Sumter, South Carolina, 01/1995 - 01/1996
Provided H&S oversight on vapor extraction and monitoring well installation, Vapor Extraction System (VES) operation, maintenance and safety compliance auditing.

H&S Coordinator, Excavation of Contaminated Soils, Need Client, Novato, California, 01/1994 - 01/1995
Oversaw the excavation of contaminated soils and operated a portable Gas Chromatograph to analyze benzene, toluene, ethylbenzene, and xylenes (BTEX) compounds. Participated in management of building demolition, field sampling, treatment of generated waste streams and Site Safety and Health Plan employee and subcontractor enforcement.

H&S Coordinator, Davy Creek Dredging, Need Client, Ashippum, Wisconsin, 01/1994 - 01/1994
This project consisted of dredging ¾ mile of Davy Creek, water treatment, soil stabilization, vegetation removal and wetlands excavation. Excavation operations and hauling required the use of specialized amphibious construction equipment. Filter Presses, pH adjustment, solids removal processes and transportation/disposal (T&D) were several of the disciplines that Mr. Russell was associated as part of the on-site management team.

Air Sampling Specialist, Safety and Health Coverage, Need Client, Mantua, New Jersey, 01/1990 - 01/1994
Initially, provided safety and health coverage for the installation of monitoring wells requiring supplied air respiratory protection for more than seven months. Assumed the position of the Air Sampling Specialist and redeveloped the overall Integrated Air Sampling Program. For the last 16 months of the project, was the Site Safety Officer/Emergency Response Coordinator. Helen Kramer Landfill was a 84-acre project with 78 acres requiring multilayer cap construction, slurry wall construction at depths of 78 feet and length over one mile. The project also consisted of leachate collection system installation, water and gas treatment plant construction/operation. Performed the efficiency testing required for permitting the Water Treatment and Gas Treatment facilities with New Jersey Department Environmental Protection (NJDEP). This required the sampling of both aqueous and vapor phase systems and source areas from stack emissions. Presented the data to the USACE for submission to state regulators. Collected over 10,000 air samples for the analysis of 15 volatile organic compounds (VOCs). Completed and managed

the documentation for personnel, work area, perimeter and off-site air monitoring stations, high volume total suspended particulates (TSP), and 37mm cassette sampling. Provided quality assurance (QA) in the laboratory analysis for VOCs using gas chromatography and metals using atomic adsorption, inductively coupled plasma (ICP) and flame furnace. As the Site Safety Officer. oversaw the Gas Treatment and Water Treatment System construction, performed efficiency sampling and analysis and reported all documentation to the USACE under Transmittal 4288. As the Emergency Response Coordinator, provided the interface with local fire, police and emergency management agencies as well as agency training to the IT/USACE Emergency Contingency Plans specific to Helen Kramer Landfill.

Air Sampling Specialist, T&D Coordination, New York Department of Transportation (NYDOT) Hazmat Division, Edgemere Landfill, New York, 01/1989 - 01/1990
Responsible for oversight on the safety aspects associated with the excavation of solvent-contaminated soil and buried drums, T&D coordination for the New York Department of Sanitation, and perimeter air monitoring program development and implementation. Provided all the site personnel, client, and NYDOT Hazmat Division with site-specific safety and health training.

Air Sampling Specialist, Motco Trust Project, Motco, La Marque, Texas, 01/1987 - 01/1989
The MOTCO Trust project required initial site assessment, investigation and remediation to support construction of two Hybrid Thermal Treatment Systems (HTTS). One unit utilized rotary kiln treatment while the other involved aqueous phase injection. Slurry wall technologies were utilized for both on- and off-site groundwater diversion. Was the on-site sampling coordinator prior to the construction phase and responsible for sample collection and documentation. Reviewed the analytical data and presented remedial action requirements to both MOTCO and Texas Water Commission (TWC). Performed daily operation and calibration of a Photovac Gas Chromatograph for air sample analysis of VOCs. As the H&S Officer, performed daily site supervision for compliance with the site safety and health plan during construction of the HTTS. Trained local personnel in site H&S program management and presented safety and emergency response contingency plans in public meetings.

Sampling Coordinator, HTTS, USACE, Minden, Louisiana, 01/1986 - 01/1987
IT Corporation performed HTTS construction, operations and site remediation for the USACE at Louisiana Army Ammunition Plant (LAAP). Implemented the sampling plan for characterization of explosive contamination in soil and lagoon sediments from former munitions manufacturing disposal.Was responsible for all aspects of sample collection, documentation, shipping coordination, analytical parameters and data presentation to the client. Also worked in conjunction with United States Army Toxic and Hazardous Materials Agency (USATHMA) developing sample identification and tracking systems.

Sampling Coordinator, Diamond Shamrock, NJDEP, Newark, New Jersey, 01/1984 - 01/1986
The Diamond Shamrock project involved total site assessment, demolition and remediation of a former herbicide and pesticide manufacturing facility under U.S. Government contract for production of Agent Orange. Mr. Russell performed initial site investigation sampling of a facility that had been evacuated by NJDEP prior to the mobilization of IT Corporation. He performed sampling on the Passaic River and facility grounds in addition to supporting residential area investigations. He was a construction foreman for segregation of debris, drum removal and sampling, Assisted the project manager and site chemist in evaluation of treatment alternatives to remove dioxin from contaminated water using carbon adsorption.

Field Environmental Technician, Asbestos Removal, Athens Tennessee Public Schools, Knoxville, Tennessee, 01/1984 - 01/1984
Initially, was a temporary hire for removal of asbestos in Athens Tennessee Public Schools and was promoted to a full-time IT employee. Performed extensive sampling support activities for Field Analytical Services (FAS), worked with on-site laboratories for analysis of polychlorinated biphenyls (PCBs), oil and grease, total suspended solids and hazard categorization (HAZCAT). Was familiar with laboratory

operations and analytical procedures associated with SW-846. Supervised many projects in the private sector as the Sampling Coordinator. Performed wipe, chip, grab, core, air and water sampling for a broad range of contaminants. Was one of the lead personnel for remediation projects managed out of the Knoxville, Tennessee office under Field Services and Construction Engineering Group. Supervised demolition projects, AST and UST remediation and T&D. Was also on the IT Corporation emergency response (ER) team providing statewide ER services under contract to the State of Tennessee.

## Awards/Honors

Presidents Award 3,000 Days PBOW & WVOW A&E II Program, Shaw, 2005
Million Hour Award SAD TERC, Shaw, 2005
Presidents Award 3,000 Days Redstone Arsenal, Shaw, 2003
Presidents Award 1,000 Days EPA RTP, Shaw, 2003
Presidents Award 1,500 Days Shaw AFB, Shaw, 2003
Presidents Award 1,500 Days Moody AFB, Shaw, 2003
Presidents Award 2,500 Days Myrtle Beach AFB, Shaw, 2003
Presidents Award 1,500 Days Fort Gillem, Shaw, 2003
Million Hour Award Omaha TERC, Shaw, 2003
Quarterly Safety Award, USACE, 2002
Quarterly Safety Award, USACE, 2001
Annual Safety Award, USACE, 2000
Quarterly Safety Award MAAP, USACE, 1998
District Safety Award, Sacramento USACE, 1996
National Quality Award, IT Corporation, 1996

## Publications/Presentations

Russell, Doug, Celebrate Safety, USACE Safety Conference, Nashville, TN, 2000

Russell, Doug, Perimeter and Off Site Air Monitoring, Public Meeting, Mantua, NJ, 1993

Russell, Doug, Hazardous Waste Air Monitoring and Emergency Response, Public Meeting, La Marque, TX, 1988

# Shane T. Yenchi

## Professional Qualifications

Mr. Yenchi serves primarily as a Project Manager and Site Manager/Site Superintendent for industrial and commercial construction-based projects. His 19 years of experience includes Project Management, Site Management, Quality Control Compliance, Health and Safety, Field Engineering, Treatment Systems, and Environmental Assessment on numerous construction and remediation projects. Mr. Yenchi's Site Manager/Site Superintendent responsibilities have involved all aspects of field implementation including mobilization and demobilization; subcontractor coordination, oversight, and management; quality control and quality assurance conformance and testing; managing and maintaining project field schedules; organizing and managing the project field teams; and interfacing with the project management team, regulatory community, and the client during project execution.

## Education

Bachelor of Science, Environmental Resource Management, Penn State University, University Park, Pennsylvania, 1994
Associate of Science, Wildlife Technology, Penn State University, DuBois, Pennsylvania, 1992

## Additional Training/Continuing Education

Site Safety Officer, 2006

FRA CSX Roadway Worker Protection Contractor Safety, 2013

American Red Cross AED Adult, 2014

American Red Cross CPR Adult, 2014

American Red Cross Standard First Aid, 2014

OSHA 40-hour 8-hour Refresher Training, 2013

Florida DOT Maintenance of Traffic (MOT) Intermediate Course

e-RAILSAFE Systems Contractor, 2013

OSHA 40-hour Health and Safety Training, 1994

Environmental Sample Collection Training

Use of Nuclear Testing Equipment Training, Troxler Electronics

Contractor Construction Quality Control Management Training, USACE

OSHA Confined Space Entry Supervisor Training

OSHA 10-Hour Construction Safety Training

OSHA HAZWOPER Supervisor Training

OSHA 24-Hour Hazardous Material Technician Training

## Experience and Background

***02/2006 - Present***
***Project Manager, Shaw Environmental & Infrastructure, Inc., Construction, Jacksonville, Florida***

Perform Project Management duties on civil construction and environmental remediation projects. Duties include bidding/ estimating new work, project setup, operations management,

personnel management, cost management, schedule management, identifying and negotiating contract changes and project closeout.

***The following is a summary of key projects:***

Project Manager, JEA KGS Groundwater Recovery System, JEA, Jacksonville, FL
Installed an Groundwater Recovery System  JEA's Kennedy Generating Station to create a hydraulic barrier to intercept potentially contaminated groundwater and prevent it from migrating to the St. Johns River The GRS consists of 20 shallow recovery wells and 4 deep recovery wells installed along the riverfront. Recovered groundwater is pumped to the GRS automated treatment system where it undergoes several steps of pretreatment to recover potential oils in the groundwater prior to discharge to the local POTW. The treatment system consists of a 2,000 gallon Oil Water Separator, 2,000 gallon Groundwater Storage Tank, Duplex Bagfilter Skid, Polishing Filter pneumatic feed pumps and an air compressor. The treatment system is totally automated controlled by a PLC. Currently under contract to perform O&M on the system for up to 3 years.

Construction Manager, FDEP Preapproval CSXT Baldwin Rail Yard source Removal, 137739, FDEP, Baldwin, Florida
Shaw performed source removal remediation activities on petroleum contaminated soils at the CSXT rail yard in Baldwin, Florida via the State of Florida Preapproval program. Field activities included excavation and off-site disposal of 21,054 tons excessively contaminated soils, groundwater dewatering via a subsurface sock system, treatment and discharge of 428,900 gallons of petroleum contaminated water, application of enhanced bioremediation solutions and backfilling open excavations.

Construction Engineer, Hurricane Risk Reduction Project Inner Harbor Navigation Canal – MRGO Fill, 133097, USACE, New Orleans, Louisiana
Filling the Mississippi River Gulf Outlet (MRGO) Fill was required to support the floodwall construction through the MRGO. The (MRGO) Fill consists of placing geogrid and geotextile fabric on both sides of the MRGO previously dredged to minus 42 feet elevation. Initially, a 5 foot layer of bedding stone was placed on the geogrid/geotextile combination for protection of the material followed by sand fill in the center and quarry run rock on outer extents on the bedding stone. The combination of quarry run rock and sand fill was placed in 5 foot lifts to minus 21 elevation with the quarry run rock acting as containment dykes for the sand fill placed in the open water. Quantities placed include 34,429 SY of geotextile materials, 93,613 tons on bedding stone, 120,500 tons of sand fill and 84,705 tons of quarry run rock.

Construction Engineer, Hurricane Risk Reduction Project Inner Harbor Navigation Canal - Dredging, 132013, USACE, New Orleans, Louisiana
Dredging an access channel through marsh from Mississippi Gulf Outlet to the Gulf (MRGO) to the Gulf Intercostal Waterway (GIWW) for the floodwall access channel. Hydraulic cutter head dredges were utilized to cut the 7,600 foot channel to a typical bottom elevation of minus 15 feet elevation with a top width of 370 feet. Dredge spoils were discharged into designated open water disposal areas to restore open water marsh. 1,202,275 CY of material was dredged during this effort.

Project Manager, Coronet Industries Pond 6 closure, 124132, Coronet Industries, Plant City, FL
Capping a 70-acre clay settling pond contaminated with metals and low level radiation. The capping consisted of a stabilizing the existing soft clays with a layer of geogrid/ geotextile material, followed by drainage and grading layers caped with a HDPE liner. The liner was covered with 2 feet of soil as a protective cover. A ground water interceptor drain system was

installed around the perimeter of the pond.

Project Manager, USAG Chemical Wetland Mitigation No. 3, 119916, USAG Chemicals, Fort Mead, Florida
Project entailed performing the earth work for the mitigation of a 44 acre wetland site. The entire 44 acre site was cleared and dewatered prior to starting the earthwork. Approximately 900,000 cuyds of soil were handled during the earthwork. Of the 900,000 cuyds approximately 300,000 cuyds consisted of a soft clay material that needed to be removed from the work area. Employed innovated methods for moving the soft clays via agitation with an airboat retrofitted with a push blade and pumping the clay to the disposal area rather than trucking..

***03/2004 - 02/2006***
***Project Superintendent, Shaw Environmental & Infrastructure, Inc., Engineering, Jacksonville, Florida***

FDOT District II Projects
Working on multiple FDOT District II projects in the Jacksonville, Florida area. Project work included but not limited to; set-up/ operation of water treatment plants, management and disposal of contaminated soils and water, storm water drainage swale reinforcement with Gabion Baskets, construction of storm water retention ponds and site sampling/ assessment.

CSX Transportation Projects
Provide construction and environmental oversight on behalf of CSX during construction of a slurry wall and cap to encapsulate contamination. Performing QA field testing on work and materials during installation of the slurry wall.

Jacksonville Electric Authority (JEA)
Assisted Jacksonville Electric Authority (JEA) with compliance issues during the demolition of their Southside Generating Station, which is regulated jointly under RCRA and the Brownfield Redevelopment Act. Worked closely with JEA project management and environmental department on issues of environmental concern and general construction activities. Involved with development, review, and implementation of site engineering investigation and operation plans. Provided oversight for confirmatory, investigation, and delineation soil sampling. Also provided construction oversight of excavation efforts for removal of contaminated soils and assisted JEA with consolidation, management, and disposal of hazardous and non-hazardous materials requiring offsite disposal.

***The following is a summary of key projects:***
Construction Manager, CSXI Gentilly Yard Hurricane Katrina Rebuild Support, 118046, CSXI, New Orleans
Support CSXI with the rebuild effort of the Gentilly yard that was damaged Hurricane Katrina. Project duties include construction management, contract review and cost tracking.

***05/2002 - 03/2004***
***Site Environmental Construction Manager, URS Corporation, Engineering, Jacksonville, Florida***

Represented Jacksonville Electric Authority (JEA) for compliance issues during the demolition of their Southside Generating Station, which is regulated jointly under RCRA and the Brownfield Redevelopment Act. Worked closely with JEA project management and environmental department on issues of environmental concern and general construction activities. Involved with development, review, and implementation of site engineering investigation and operation plans.

Provided oversight for confirmatory, investigation, and delineation soil sampling. Also provided construction oversight of excavation efforts for removal of contaminated soils and assisted JEA with consolidation, management, and disposal of hazardous and non-hazardous materials requiring offsite disposal.

***05/1994 - 05/2002***
***Site Environmental Construction Manager, IT Corporation (The Shaw Group Inc., acquired substantially all of the operating assets of The IT Group, Inc., on May 23, 2002)., Construction, Jacksonville, Florida***

Environmental Oversight Representative, Jacksonville Electric Authority (JEA) Southside Generating Station Site Demolition, Jacksonville, FL. Assisted JEA with compliance issues during the demolition of the Southside Generating Station. Supervised pre-excavation soil sampling to establish excavation limits for areas requiring remediation by excavation and offsite disposal. Provided oversight for confirmatory, investigation, and delineation soil sampling. Implemented a lead-based paint investigation throughout the facility. Involved with development, review, and implementation of site engineering investigation and operation plans. Also provided construction oversight of excavation efforts for removal of contaminated soils.

Field Supervisor/Excavation Superintendent, ThermoRetec MGP, St. Augustine, FL. Supervised excavation of approximately 50,000 cubic yards of coal tar pitch impacted soil from upland and marsh areas adjacent to the San Sebastian River. Numerous engineering controls were implemented in support of the excavation activities including installation of a sheetpile wall excavation support system; operation and maintenance of 116 well points; installation and operation of 9 deep wells; and sidewall benching. Scheduled manpower distribution for operational activities. Documented site activities in field reports.

Field Supervisor, Jacksonville Electric Authority (JEA) Southside Generating Station Site Pond Closure, Jacksonville, FL. Provided field management oversight during closure of a percolation pond. Field activities included removal of approximately 4,406 cubic yards of sludge and soil from a decommissioned percolation pond and shipment of the material to an approved disposal facility. Implemented Sample Analysis Plan. Provided documentation and reporting of all field activities.

Quality Control Coordinator/Field Supervisor, Coleman Evans Superfund Site, Jacksonville, FL. Project involved remediation of pentachlorophenol- and dioxin-contaminated soils by means of thermal desorption. Responsibilities included oversight of thermal desorption unit and provide support activities during site excavation, civil construction, WWTP operations, waste management, perimeter air monitoring, and analytical data review. Implemented the site Chemical Quality Control Plan and Sample Analysis Plan. Performed grade control. Provided daily field activities reports.

Quality Control Coordinator/Field Supervisor, Drake Chemical Superfund Site, Lock Haven, PA. Project involved remediation of approximately 200,000 cubic yards of soils by means of thermal incineration. Support activities included operation of thermal destruction facility; excavation, perimeter, and community air monitoring; relocation of city water and sewage lines; and site reclamation. Monitored site erosion control practices. Performed topographic surveys to confirm site excavation limits. Performed nuclear density and sand cone compaction testing on backfilled soils. Performed inspections on construction and remediation activities and provided daily, weekly, and monthly reporting of project status.

Field Supervisor, Vineland Chemical Company Superfund Site, Vineland, NJ. Implemented a

treatability-sampling plan for arsenic-contaminated soil and surveyed sample locations for the treatability samples. Collected soil and sediment samples. Maintained equipment utilized during operations at the site.

Technician/Heavy Equipment Operator, Waste Management Landfill, Greenridge, PA. Participated in construction of a 10-acre landfill cell and capping an existing 8-acre landfill. Project entailed extensive earth moving activities and placing subgrade to a design elevation. Performed grade control during construction of the landfill cell and landfill cap. Implemented stormwater management practices. Installed a leachate collection system. Closely monitored compaction testing and grade control to ensure contract requirements were being achieved.

Technician/Heavy Equipment Operator, Naval Training Facility, Bainbridge, MD. Project entailed remediation of contaminated areas of a decommissioned Naval training facility. Work consisted of excavating petroleum- and asbestos-contaminated soils and construction of a hazardous waste landfill, excavation grade control, reclamation of a wetland disturbed during excavation, and construction and operation of a carbon filter WWTP.

# EXHIBIT 2

# CERTIFICATIONS

**OSHA** 600062629

U.S. Department of Labor
Occupational Safety and Health Administration

Burney Chance

has successfully completed a 30-hour Occupational Safety and Health Training Course in

Construction Safety & Health

Robert G. Knock — 3/10/05

(Trainer) (Date)

This certificate is awarded to

**Burney Chance**

for the successful completion of the course

**Hazard Communication (HAZCOM) – Globally Harmonized System (GHS)**

Hours: 1 Hours 0 Min  Credits: 0

**Completion Date: 6/12/2013**

This certificate is awarded to

**Burney Chance**

for the successful completion of the course

**Site Safety Officer**

**Completion Date: 10/7/1994**

Virgil Barton, Sr. Vice President
Quality, EHS, Regulatory Compliance,
Process Improvement

This certificate is awarded to

**Burney Chance**

for the successful completion of the course

## 40-Hour HAZWOPER Training

Hours: 0 Hours 0 Min  Credits: 0

**Completion Date: 2/22/1993**

Virgil Barton, Sr. Vice President
Quality, EHS, Regulatory Compliance,
Process Improvement

This certificate is awarded to

**Burney Chance**

for the successful completion of the course

**8-Hour HAZWOPER Refresher**

Hours: 8 Hours 0 Min  Credits: 0

**Completion Date: 6/12/2013**

Virgil Barton, Sr. Vice President
Quality, EHS, Regulatory Compliance,
Process Improvement

This certificate is awarded to

**Burney Chance**

for the successful completion of the course

## 8-Hour HAZWOPER Supervisor Training

Hours: 8 Hours 0 Min  Credits: 0

**Completion Date: 9/26/1996**

Virgil Barton, Sr. Vice President
Quality, EHS, Regulatory Compliance,
Process Improvement

**Physician's Written Opinion**

**HAZWOPER & RESPIRATOR CLEARANCE**

**Periodic Field Exposure Exam**

| Name: Burney Chance | Date: 12.17.13 | Social Security Number: XXX-XX-2035 |
|---|---|---|

On this date, CORE Health Networks has reviewed the above employee's recent medical examination and associated medical tests in accordance to OSHA 1910.120 pertaining to workers exposed to hazardous wastes and make the following statements:

1. Are there any detected medical conditions that would place the employee at increased risk of material impairment of the employee's health while working in the above job position?
   [ ]Yes [ X ]No

2. Are there any recommended limitations upon the employee's assigned work?
   [ ]Yes [ X ]No

3. Has the employee been informed of the examination results?
   [ X ]Yes [ ]No

**MEDICAL RECOMMENDATIONS FOR RESPIRATOR USE**

On this date, CORE Health Networks has examined the above employee according to OSHA 1910.134 Federal Regulation pertaining to respiratory protection and make the following statements:

[ X ] No limitations have been placed on use of a respirator
[ ] Medically not able to wear a respirator
[ ] May wear a respirator for escape only
[ ] These limitations have been placed on the use of a respirator
[X ] A copy of this document has been provided to the employee
[ ] A follow-up evaluation is to be scheduled on _____

William J. Nassetta, MD, MPH

12.19.2013
Date

Employee Signature

Supervisor Signature

# CERTIFICATE *of* COMPLETION

Presented To

**Kenneth A. Cunningham**

In Recognition of Having Successfully Completed the Prescribed Course of Study for

**Site Remediation**

OSHA 29 CFR 1910.120(e)(2)(i) through (e)(2)(vii)

I certify that the above trainee has completed this training course as given by The IT Group or one of its subsidiaries.

**04/29/1989**

EFFECTIVE DATE

Don L. Unruh

DON L. UNRUH, CIH, CSP
Manager, Internal Training Group

The Shaw Group Inc.

# CERTIFICATE *of* COMPLETION

Presented To

## Kenneth A. Cunningham

In Recognition of Having Successfully Completed the Prescribed Course of Study For

## Site Remediation

OSHA 29 CFR 1910.120(e)(2)(i) through (e)(2)(vii)

Effective Date: **04/29/1989**

I certify that the above trainee has completed this training course as given by The Shaw Group Inc. or one of its subsidiaries.

Don L. Unruh

Edward Wick
Director, Shaw Training & Development

Don L. Unruh, CIH, CSP
Director, Environmental Health & Safety Training

The Shaw Group Inc.

# CERTIFICATE *of* COMPLETION

Presented To

## Kenneth A. Cunningham

In Recognition of Having Successfully Completed the Prescribed Course of Study For

## Site Remediation

OSHA 29 CFR 1910.120(e)(2)(i) through (e)(2)(vii)

Effective Date: **04/29/1989**

I certify that the above trainee has completed this training course as given by The Shaw Group Inc. or one of its subsidiaries.

Don L. Unruh

Edward Wick
Director, Shaw Training & Development

Don L. Unruh, CIH, CSP
Director, Environmental Health & Safety Training

The Shaw Group Inc.

# CERTIFICATE *of* COMPLETION

Presented To

## Kenneth A. Cunningham

In Recognition of Having Successfully Completed the Prescribed Course of Study For

## Site Remediation

OSHA 29 CFR 1910.120(e)(2)(i) through (e)(2)(vii)

Effective Date: **04/29/1989**

I certify that the above trainee has completed this training course as given by The Shaw Group Inc. or one of its subsidiaries.

Don L. Unruh

Edward Wick
Director, Shaw Training & Development

Don L. Unruh, CIH, CSP
Director, Environmental Health & Safety Training

**Compliance Solutions**

*"Today's Training....Tomorrow's Solution"*

10515 E 40th Ave, Suite 116, Denver Colorado 80239 Phone: 800-711-2706

*Student Affiliation:*
*IT Corporation*
*4433*

# *Certificate of Completion*

This is to certify that

*Zach Parham*

has successfully completed the classroom requirements for

*40 Hour HAZWOPER*

*29 CFR 1910.120(e)*

Presented

*Friday, June 15, 2001*

## *Compliance Solutions Occupational Trainers, Inc.*

*Certificate Number: 34549*

Neval Gupta
*Vice President*

Larry Erwin
*National Training Manager*

The Shaw Group Inc.

# CERTIFICATE *of* COMPLETION

Presented To

## Kenneth A. Cunningham

In Recognition of Having Successfully Completed the Prescribed Course of Study For

## Site Remediation

OSHA 29 CFR 1910.120(e)(2)(i) through (e)(2)(vii)

Effective Date: **04/29/1989**

I certify that the above trainee has completed this training course as given by The Shaw Group Inc. or one of its subsidiaries.

Don L. Unruh

Edward Wick
Director, Shaw Training & Development

Don L. Unruh, CIH, CSP
Director, Environmental Health & Safety Training

The Shaw Group Inc.

# CERTIFICATE *of* COMPLETION

Presented To

## Kenneth A. Cunningham

In Recognition of Having Successfully Completed the Prescribed Course of Study For

## Site Remediation

OSHA 29 CFR 1910.120(e)(2)(i) through (e)(2)(vii)

Effective Date: **04/29/1989**

I certify that the above trainee has completed this training course as given by The Shaw Group Inc. or one of its subsidiaries.

Don L. Unruh

Edward Wick
Director, Shaw Training & Development

Don L. Unruh, CIH, CSP
Director, Environmental Health & Safety Training

The Shaw Group Inc.

# CERTIFICATE *of* COMPLETION

Presented To

## Kenneth A. Cunningham

In Recognition of Having Successfully Completed the Prescribed Course of Study For

## Site Remediation

OSHA 29 CFR 1910.120(e)(2)(i) through (e)(2)(vii)

Effective Date: **04/29/1989**

I certify that the above trainee has completed this training course as given by The Shaw Group Inc. or one of its subsidiaries.

Don L. Unruh

Edward Wick
Director, Shaw Training & Development

Don L. Unruh, CIH, CSP
Director, Environmental Health & Safety Training

This certificate is awarded to

**Shane Yenchi**

for the successful completion of the course

## 40-Hour HAZWOPER Training

Hours: 0 Hours 0 Min  Credits: 0

**Completion Date: 7/14/1994**

Virgil Barton, Sr. Vice President
Quality, EHS, Regulatory Compliance,
Process Improvement

*Student Affiliation:*
*CB&I Shaw*
*4433*

**Compliance Solutions**

*"Today's Training... Tomorrow's Solution"*

3980 Quebec St., 2nd Floor, Denver CO 80207-1633 800-711-2706

# *Certificate of Completion*

**This is to certify that**

*Shane Yenchi*

has been tested and successfully meets the training requirements for

***8-Hour HAZWOPER Refresher***
***as per 29 CFR 1910.120(e)***

**Presented**

***Tuesday, May 14, 2013***

## *Compliance Solutions Occupational Trainers, Inc.*

*Certificate Number:* *754858280*

Neval Gupta
***Vice President***

Jeffrey Kline
***President***

This certificate is awarded to

**Shane Yenchi**

for the successful completion of the course

## Excavation Competent Person Training

Hours: 8 Hours 0 Min  Credits: 0

**Completion Date: 9/12/2005**

Virgil Barton, Sr. Vice President
Quality, EHS, Regulatory Compliance,
Process Improvement

This certificate is awarded to

**Shane Yenchi**

for the successful completion of the course

**Site Safety Officer**

Hours: 0 Hours 0 Min  Credits: 0

**Completion Date: 1/30/2006**

Virgil Barton, Sr. Vice President
Quality, EHS, Regulatory Compliance,
Process Improvement

This certificate is awarded to

**Shane Yenchi**

for the successful completion of the course

## 8-Hour HAZWOPER Supervisor Training

Hours: 8 Hours 0 Min  Credits: 0

**Completion Date: 1/20/2006**

Virgil Barton, Sr. Vice President
Quality, EHS, Regulatory Compliance,
Process Improvement

# APPENDIX A

# SITE SAFETY AND HEALTH PLAN

## *Reviews and Approvals*

The approved version of this Installation-wide Site Safety and Health Plan appendix to the Installation-wide Accident Prevention Plan for remedial investigations of environmental sites at the former Lee Field Naval Air Station has been provided to the Site Supervisor. I acknowledge my responsibility as the Project Manager to provide the Site Supervisor with the equipment, materials, and qualified personnel to implement fully all safety requirements in this installation-wide Site Safety and Health Plan. I will formally review this plan with the health and safety staff at least annually or until applicable projects completion.

Kenneth A. Cunningham
Project Manager
CB&I Federal Services LLC

6-24-14
Date

Winston D. Russell
Health and Safety Manager
CB&I Federal Services LLC

6-24-14
Date

For
Shane Yenchi
Site Supervisor
CB&I Federal Services LLC

6-24-14
Date

# Table of Contents


**Page**

Reviews and Approvals ..... i
List of Attachments ..... vi
List of Tables ..... vi
List of Figures ..... vi
List of Acronyms ..... vii
1.0 Site Description and Contamination Characterization ..... 1-1
2.0 Job Hazard/Risk Analysis ..... 2-1
2.1 Scope of Work ..... 2-1
2.2 Activity Hazard Analysis by Task ..... 2-4
2.2.1 Physical Hazards ..... 2-5
2.2.2 Noise ..... 2-5
2.2.3 Drilling Hazards ..... 2-5
2.2.4 Drum Handling Hazards ..... 2-7
2.2.5 Forklift Operations ..... 2-7
2.2.6 Handling Flammable/Combustible Materials ..... 2-7
2.2.7 Heavy Equipment and Vehicle Traffic Hazards ..... 2-7
2.2.8 High-Pressure Water Jetting Operation Hazards ..... 2-10
2.2.9 Sampling Hazards ..... 2-11
2.2.10 Temperature Extremes ..... 2-11
2.2.11 Wildlife Hazards ..... 2-11
2.2.12 Chemical Hazards ..... 2-12
2.2.13 Operation of Boats and Water Safety ..... 2-12
2.3 Anticipated Biological Hazards ..... 2-13
2.3.1 Snakes ..... 2-13
2.3.2 Insects ..... 2-14
2.3.3 Buried Sharp Objects ..... 2-15
2.3.4 Poisonous Plants ..... 2-15
2.3.5 Alligators ..... 2-15
3.0 Staff Organization, Qualifications, and Responsibilities ..... 3-1
3.1 All Personnel ..... 3-1
3.1.1 Stop Work Authority ..... 3-1
3.1.2 Incident Reporting ..... 3-1
3.1.3 Plan Compliance ..... 3-2
3.1.4 Site Organization ..... 3-2
3.2 Project Certified Industrial Hygienist ..... 3-2
3.3 Site Supervisor ..... 3-3
3.4 Site Safety and Health Officer ..... 3-3
3.5 Project Manager ..... 3-3
3.6 Health and Safety Manager ..... 3-3

## ***Table of Contents*** *(Continued)*


4.0 Training ..... 4-1
4.1 General ..... 4-1
4.2 Site-Specific Orientation ..... 4-1
4.3 Tailgate Safety Meetings ..... 4-1
4.4 Site Workers Basic Course ..... 4-1
4.5 Supervisors Course ..... 4-2
4.6 First Aid and Cardiopulmonary Resuscitation ..... 4-2
5.0 Personal Protective Equipment ..... 5-1
5.1 Respiratory Program ..... 5-1
5.1.1 Medical Certification ..... 5-3
5.1.2 Air-Purifying Respirators ..... 5-3
5.1.3 Cartridge Selection And Change-Out Schedule ..... 5-3
5.1.4 Inspection And Cleaning ..... 5-3
5.1.5 Fit Testing ..... 5-4
5.1.6 Facial Hair ..... 5-4
5.1.7 Corrective Lenses ..... 5-4
5.1.8 Air-Purifying Respirator Limitations ..... 5-4
5.2 Levels of Protection ..... 5-4
5.2.1 Level A Protection ..... 5-4
5.2.2 Level B Protection ..... 5-5
5.2.3 Level C Protection ..... 5-5
5.2.4 Level D-Modified Protection ..... 5-6
5.2.5 Level D Protection ..... 5-6
5.3 Activity-Specific Levels of Protection ..... 5-7
5.4 Donning/Doffing Personal Protective Equipment ..... 5-7
5.4.1 Donning Procedures for Modified Level D or Higher Personal Protective Equipment ..... 5-7
5.4.2 Doffing Procedures for Modified Level D or Higher Personal Protective Equipment ..... 5-8
6.0 Medical Surveillance Program ..... 6-1
6.1 Physical Examinations ..... 6-1
6.1.1 Pre-Placement Examination ..... 6-2
6.1.2 Annual Examination ..... 6-2
6.1.3 Exit Examination ..... 6-2
6.2 Subcontractor Requirements ..... 6-2
6.3 Medical Restriction ..... 6-2
6.4 Medical Records ..... 6-2
7.0 Exposure Monitoring/Air Sampling Program ..... 7-1
7.1 Air Monitoring ..... 7-1
7.1.1 Air Monitoring Frequency ..... 7-1
7.1.2 Air Monitoring Equipment ..... 7-2
7.1.3 Monitoring Equipment Maintenance and Calibration ..... 7-2
7.2 Other Hazardous Conditions ..... 7-2

## ***Table of Contents*** *(Continued)*


7.3 Noise Monitoring ..... 7-2
7.4 Monitoring Records ..... 7-3
7.5 Notification of Personal Monitoring Results ..... 7-3
7.6 Exposure Standards ..... 7-3
8.0 Cold and Heat Stress ..... 8-1
8.1 Heat Stress ..... 8-1
8.1.1 Heat Stress Prevention ..... 8-2
8.1.2 Heat Stress Monitoring ..... 8-3
8.2 Cold Stress ..... 8-4
9.0 Standard Operating Safety Procedures, Engineering Controls, and Work Practices ..... 9-1
9.1 General Practices ..... 9-1
9.2 Operating Procedures ..... 9-2
9.2.1 Drilling Equipment Operations ..... 9-2
9.2.2 Drum Handling Safety ..... 9-5
9.2.3 Heavy Equipment Operating Safety ..... 9-5
9.2.4 High-Pressure Water Jetting Operation Safety ..... 9-7
9.2.5 Lifting Safety ..... 9-8
9.2.6 Confined-Space Entry ..... 9-9
9.3 Hearing Conservation ..... 9-9
9.4 Hot Work ..... 9-9
9.5 Alcohol and Drug Testing ..... 9-9
10.0 Site Control Measures ..... 10-1
10.1 Work Zones ..... 10-1
10.2 Security Operations ..... 10-1
11.0 Personal Hygiene and Decontamination ..... 11-1
11.1 Personnel Decontamination Procedures-Level B ..... 11-1
11.2 Personnel Decontamination Procedures-Level C ..... 11-2
11.3 Potable Water ..... 11-3
11.4 Nonpotable Water ..... 11-3
11.5 Toilet Facilities ..... 11-3
11.6 Trash Collection ..... 11-3
12.0 Equipment Decontamination Procedures ..... 12-1
13.0 Emergency Equipment and First Aid ..... 13-1
13.1 Bloodborne Pathogen Exposure Control Plan ..... 13-1
13.1.1 Definition ..... 13-1
13.1.2 Hepatitis B Virus ..... 13-2
13.1.3 Human Immunodeficiency Virus ..... 13-2
13.2 Exposure Determination ..... 13-2
13.3 Measures for Prevention ..... 13-3
13.3.1 Universal Precautions ..... 13-3
13.3.2 Engineering Controls ..... 13-3
13.3.3 Work Practice Controls ..... 13-3
13.3.4 Personal Protective Equipment ..... 13-4

## ***Table of Contents*** *(Continued)*


13.3.5 Waste Handling ..... 13-5
13.3.6 Waste Disposal ..... 13-5
13.4 Medical Requirements ..... 13-5
13.4.1 Hepatitis B Vaccination ..... 13-5
13.4.2 Post-Exposure Procedures and Evaluation ..... 13-5
13.4.3 Post-Exposure Medical Evaluation ..... 13-6
13.5 Hazard Communication ..... 13-6
13.5.1 Warning Labels ..... 13-6
13.5.2 Warning Signs ..... 13-6
13.5.3 Employee Training Program ..... 13-6
13.6 Record Keeping ..... 13-6
13.6.1 Training Records ..... 13-6
13.6.2 Medical Records ..... 13-7
13.6.3 Incident Recording ..... 13-7
14.0 Emergency Response and Contingency Procedures ..... 14-1
14.1 General ..... 14-1
14.2 First Aid ..... 14-1
14.3 Emergency Response ..... 14-1
14.3.1 Pre-Emergency Planning ..... 14-1
14.3.2 Project Manager's Responsibilities ..... 14-1
14.3.3 Evacuation Signal ..... 14-1
14.3.4 Emergency Equipment/Facilities ..... 14-1
14.3.5 Medical Emergencies ..... 14-2
14.3.6 Emergency Contact/Notification Listing ..... 14-2
14.3.7 Key Project Personnel ..... 14-2
14.3.8 Directions to the Nearest Hospital and Occupational Physician ..... 14-3
14.4 General Emergency Procedures ..... 14-3
14.4.1 Personal Injury ..... 14-3
14.4.2 Fire or Explosion ..... 14-3
14.5 Evacuation Routes and Procedures ..... 14-4
14.6 Spills or Leaks ..... 14-4
14.7 Adverse Weather Conditions/Natural Disasters ..... 14-6
15.0 References ..... 15-1

## List of Attachments


Attachment 1 - Safety and Health Plan Revisions
Attachment 2 - Subcontractor Certification
Attachment 3 - Material Safety Data Sheets
Attachment 4 - Safety Inspection Audit Forms
Attachment 5 - USACE Accident Investigation Report ENG Form 3394
Attachment 6 - Hospital and Occupational Clinic Location Map
Attachment 7 - Boat Inspection Forms and Float Plan
Attachment 8 - Hurricane Protection Plan


## List of Tables


| *Table* | *Title* | *Follows Text* |
|---|---|---|
| 2-1 | Activity Hazard Analysis | |
| 2-2 | Toxicological and Physical Properties of Chemicals | |
| 7-1 | Action Levels | |
| 7-2 | Air Monitoring Frequency and Location | |
| 8-1 | Examples of Permissible Heat Exposure Threshold Limit Values for Personnel Wearing Permeable Clothing | |
| 8-2 | Examples of Permissible Heat Exposure Threshold Limit Values for Personnel Wearing Impermeable Clothing | |
| 8-3 | Temperature Monitoring/Physiological Monitoring Frequency/Work-Rest Table | |


## List of Figures


| *Figure* | *Title* | *Follows Text* |
|---|---|---|
| 10-1 | Exclusion Zone, Contamination Reduction Zone and Support Zone Layout | |

# *List of Acronyms*

| | |
|---|---|
| $^{o}F$ | degrees Fahrenheit |
| ACGIH | American Conference of Governmental Industrial Hygienists |
| AHA | activity hazard analysis |
| AIDS | Acquired Immune Deficiency Syndrome |
| APP | accident prevention plan |
| APR | air-purifying respirator |
| CFR | Code of Federal Regulations |
| COC | contaminant of concern |
| CPR | cardiopulmonary resuscitation |
| CRZ | contamination reduction zone |
| dBA | A-weighted decibel |
| EM | engineer manual |
| EPA | U.S. Environmental Protection Agency |
| EZ | exclusion zone |
| FA | first aid |
| FID | flame ionization detector |
| GCTL | groundwater cleanup target level |
| $H_2S$ | hydrogen sulfide |
| H&S | health and safety |
| HBV | hepatitis B virus |
| HIV | human immunodeficiency virus |
| HSM | health and safety manager |
| kV | kilovolt |
| LFNAS | former Lee Field Naval Air Station |
| MSDS | Material Safety Data Sheet |
| NIOSH | National Institute for Occupational Safety and Health |
| OSHA | U.S. Occupational Safety and Health Administration |
| PCB | polychlorinated biphenyl |
| PCIH | project certified industrial hygienist |
| PEL | permissible exposure limit |
| PID | photoionization detector |
| PM | project manager |
| PPE | personal protective equipment |
| Shaw | Shaw Environmental and Infrastructure, Inc. |
| SS | site supervisor |
| SSHO | site safety and health officer |
| SSHP | site-specific safety and health plan |
| SZ | support zone |

## *List of Acronyms* *(Continued)*

| | |
|---|---|
| TCRA | time-critical removal action |
| TWA | time-weighted average |
| USACE | U.S. Army Corps of Engineers |
| USCG | U.S. Coast Guard |
| UST | underground storage tank |
| VOC | volatile organic compound |

# 1.0 Site Description and Contamination Characterization

Reynolds Industrial Park, formerly Lee Field Naval Air Station (LFNAS), occupies 1,560 acres along the St. Johns River in the City of Green Cove Springs, Florida. Reynolds Industrial Park is currently owned by Clay County Port, Inc. LFNAS was acquired for the military in 1940 and used during World War II for training pilots. After the war, the port facility at LFNAS was used to mothball shallow-draft fleet ships, primarily landing craft and Liberty ships.

In 1963, the ownership of LFNAS was transferred from the U.S. Department of Defense to the City of Green Cove Springs. The City of Green Cove Springs began developing the former LFNAS into an industrial park, a golf course, and a port facility. In 1983, Clay County Port, Inc. acquired the property and has continued site development. Businesses currently operating at the Reynolds Industrial Park include a railroad car refurbisher (housed in one of the original hangars), a truck driver training school, an aircraft maintenance facility, a fiberglass pipe manufacturing facility, and an airstrip.

CB&I Federal Services LLC (CB&I) will perform environmental investigations and removal actions on 10 sites located within LFNAS. The following text provides site descriptions and anticipated contamination based on previous site characterization data and environmental investigations.

***Pyridine Burn Area – Time-Critical Removal Action.*** The Pyridine Burn Area, the time-critical removal action (TCRA), occupies approximately 7.5 acres on the north side of Wildwood Road, across from Landfill Area 1. Several soil and debris mounds containing miscellaneous metal and concrete debris and buried drum carcasses are present around the site. The U.S. Navy used the Pyridine Burn Area as a disposal area for excess materials removed from ships beginning sometime in 1946. Materials reported to have been disposed of in the Pyridine Burn Area included carbon tetrachloride, transformer oils, polychlorinated biphenyls (PCB), and asbestos. Dumping in the area ceased in 1954 or 1955. In 1992, Dames & Moore, Inc. discovered a drum burial area measuring 80 feet wide by 440 feet long. Remedial actions at this site will be executed in Level B personal protective equipment (PPE) due to the potential hazards associated with pyridine and associated waste.

***Fire Training Area.*** The Fire Training Area occupies approximately 1.9 acres in the northwestern corner of LFNAS on the western bank of the St. Johns River. The area is sandy with three concrete rings that were formerly used for fire training exercises. Investigation activities conducted by several organizations (Environmental Science and Engineering, Inc., Water & Air, the U.S. Environmental Protection Agency [EPA], and CB&I) at the Fire Training Area indicate that PCBs (Aroclor 1260) and metals are the only contaminants of concern (COC) in soil; benzene, vinyl chloride, and liquid-phase hydrocarbons have been identified as COCs in the groundwater. Three PCB hot spots have been identified by soil borings FTASB01, FTASB02, and FTASB03. Benzene

was detected at 2.2 micrograms per liter in monitoring well FTAMW03, and vinyl chloride has been detected in monitoring wells FTAMW01, FTADM-MW07, and FTADM-MW08 and direct-push location FTADP01. Liquid-phase hydrocarbons have been observed in wells FTAMW02 and FTAMW05.

***Building 19 Underground Storage Tank (UST) Area.*** A 500-gallon lube oil tank and petroleum-contaminated soil were removed from an area just south of Building 19. A film of petroleum was detected in a temporary monitoring well installed in the former excavation. Groundwater samples collected from the temporary well on two occasions indicated no exceedances of the state of Florida groundwater cleanup target levels (GCTL).

***PCB Bunker Area.*** The PCB Bunker Area is an area of former ammunition bunkers that were used to store PCB-containing transformers. The site occupies an area of approximately 1.8 acres in the south-central portion of the base. A pond measuring 410 feet long by 80 feet wide borders the site on the north, with a stream extending from the pond south along the northwest boundary of the site. The stream drains the pond into Three Mile Swamp, which lies just southwest of the site.

CB&I and Prasad Constructors demolished a former ammunition storage bunker in 1998 that was used to store old PCB-containing transformers, based on the results of soil and groundwater investigations conducted by Rust Environmental and Infrastructure. PCBs are the only COCs that have been detected in this area. Approximately 970 tons of PCB-impacted soil were removed. Confirmation sampling indicated that hot spots remained south of the former bunker. Results of additional investigation activities by CB&I indicated that PCB contamination remains in subsurface soil west and east of Wildwood Road. In addition, PCBs were identified in sediment from the adjacent intermittent stream to the northwest, which flows toward a wetland area (Three Mile Swamp). An investigation of surface water and groundwater here indicated it has not been impacted by PCBs.

***Grease Rack Ditch Area.*** The Grease Rack Ditch Area occupies approximately 1 acre in the central portion of LFNAS. The former grease rack was located on the western side of Building 8, with a ditch extending to the east. The site is currently mostly paved and gravel except for the area within and south of the ditch, which is grass. Previous investigations have identified polynuclear aromatic hydrocarbons, PCBs, dioxin/furan, and metals impacting the soil and groundwater. Although many of the constituents could be associated with former maintenance activities at the grease rack, the history of the site is not clear.

***Landfill Area 2.*** Landfill Area 2 covers approximately 7.5 acres of land at the western edge of the LFNAS. The landfill area is relatively flat; however, nine earthen mounds are located in the southern portion of the site. Historical records indicate that the area known as Landfill Area 2 was used as a public works storage area. The period of most activity at the site, based on aerial photograph review,

occurred from 1947 to 1958. Post-DOD activities were documented at the landfill area from approximately 1982 through 1990.

***Landfill Area 1 & 3.*** Landfill Area 1 covers approximately 6.2 acres of land near the southeastern corner of LFNAS property. Historical LFNAS records indicate that the area known as Landfill Area 1 was referred to as a “Sanitary Yard Dump” or “Main Dump” on several maps dating from the 1940s and 1950s. Post-U.S. Department of Defense activity at the landfill was documented by aerial photographs from 1971 through 1990. The surface of the eastern one-half of the landfill was recently graded by Clay County Port, Inc. in order to utilize the surface area as a lay-down yard for fill and/or equipment.

Landfill Area 3 covers approximately 4 acres of land at the southwestern edge of the LFNAS property. Historical LFNAS records indicate that Landfill Area 3 was reportedly used to dispose of domestic waste, refuse, and medical waste. A review of historical aerial photographs indicated landfill-related activity at Landfill Area 3 beginning in 1951. Activity at the landfill continued through at least 1958.

***Service Pit Area.*** CB&I conducted a site investigation and addendum for this approximately 28-acre area, formerly used as the warm-up apron for World War II aircraft, with 52 individual fueling pits. Based on CB&I’s investigation, no soil or groundwater contamination exceeding GCTLs was detected. Subsequent to this investigation, a consultant hired by Clay County Port, Inc. conducted soil and groundwater sampling between CB&I’s sample points and discovered two locations where benzene exceeded GCTLs.

# 2.0 Job Hazard/Risk Analysis

## 2.1 Scope of Work

CB&I will perform remedial investigations and removal actions as previously described at multiple sites located within the LFNAS boundaries. Currently, planned activities include preparing work plans, reports, and regulatory documents; obtaining permits and clearances; and completing and implementing investigative and remedial activities safely and efficiently. Below is a summary of scoped activities for each of the sites.

### Pyridine Burn Area TCRA

- Collect and analyze soil samples prior to excavation within and along the margins of the trench-like feature for waste characterization.
- The excavation area will be cleared of trees and brush to allow execution of the work. A small area adjacent to the site will also be cleared to facilitate a laydown yard and soil staging area.
- Mobilize construction equipment and personnel to the site.
- Stage fill material on site to be utilized during the excavation phase to minimize the accumulation of surface runoff, rain, or groundwater in the excavation.
- Install warning signs at the site.
- Survey the excavation boundaries.
- Excavate the trench area in Level B PPE to groundwater (approximately 1 to 5 feet below ground surface) The area is estimated to be approximately 440 feet long and 80 feet wide, resulting in excavation of approximately 6,500 bank cubic yards.
- Excavation will be performed under the direct supervision of the Site Safety and Health Officer (SSHO), monitoring site conditions to ensure that appropriate precautions are being taken.
- Perform site control and dust suppression measures as needed.
- Any intact drums will be overpacked in Level B, transported to the staging area, and sampled for off-site waste disposal.
- Backfilling will be performed as the excavation proceeds. Backfilling will be conducted daily as air monitoring dictates acceptable concentrations for this activity to be performed in Level D PPE.
- Buried debris/containers and adjacent soil will be segregated and staged on site for waste characterization and off-site disposal.
- Conduct excavation boundary soil sampling.

- Restore the site to pre-excavation conditions to the extent practicable. Disturbed areas will be leveled, graded to promote positive drainage, and seeded with materials similar to what is currently on site or native to the area.

- Any areas damaged by site activities will be restored to match existing conditions.

### *Dioxins Background Study*

- Collect samples at 20 soil boring locations and 12 sediment locations to develop a background data set for dioxins.

### *Fire Training Area*

- Collect collocated sediment samples at 3 locations within the St. John's River adjacent to the shore of the FTA to update existing data set for sediments.

- Collect surface and subsurface soil samples at 8 locations to characterize contaminant influence along the eastern and southern limits of the FTA.

- Install four shallow permanent monitoring wells to further delineate impacts along the eastern and southern limits of the FTA.

- Collect groundwater samples from the 4 new monitoring wells and the 12 existing monitoring wells.

### *Pyridine Burn Area*

- Drill 6 vertical profile borings to define the presence and extent of a groundwater confining clay layer identified during deep monitoring well installation.

- Collect screening level DPT groundwater samples for VOC analysis only from the 6 vertical profile borings to further characterize the extent of previous VC exceedances.Install four deep permanent monitoring adjacent to select existing shallow wells.

- Install 4 shallow and 4 deep permanent monitoring wells to delineate the horizontal and vertical extent of elevate VC other potential site-related contaminants.

- Collect groundwater samples from the 8 new monitoring wells and the 15 existing monitoring wells.

### *PCB Bunker Area*

- Collect additional sediment samples in four locations.

### *Building 19 UST Area*

- Collect surface and subsurface soil samples at 12 locations to fully characterize any potential impacts to site soils resulting from the former UST.Collect DPT groundwater samples from 8 soil boring locations to further define contaminant migration into the Building 19 UST site.

- Install two shallow and one deep permanent monitoring well to define the presence or absence of fuel impacts within the extent of the potential “clean” area between the Former Building 19 UST and the Service Pit Area.

Collect groundwater samples from the 3 new and 4 existing monitoring wells adjacent to the potential “clean” area between the Building 19 UST Area and the SPA.

### *Grease Rack Ditch Area*

- Collect surface and subsurface soil samples at eight locations (six outside the ditch and two inside the ditch) to further define the horizontal and vertical extent of soil cleanup target level exceedances.
- Collect groundwater samples from the 10 existing monitoring wells to further define previous GCTL exceedances.

### *Landfill Area 2*

- Collect surface and subsurface soil samples at six locations in the northwestern portion of the landfill area to define the horizontal and vertical extent of previous soil cleanup target level exceedances.
- Collect groundwater samples from all 10 existing monitoring wells to further support determination of site status.

### *Landfill Area 1*

- Collect collocated surface and sediment samples at six locations to investigate the extent of contaminant migration from Landfill Area 1.
- Drill three vertical profile borings to define the presence and extent of a groundwater confining clay layer identified during deep monitoring well installation.
- Collect surface and subsurface soil samples at 10 locations to redefine the contact exposure risks associated with the potential presence of near surface contaminants within the eastern portion of the site.
- Install four deep permanent monitoring adjacent to select existing shallow wells.
- Collect groundwater samples from the 4 new monitoring wells and the 13 existing monitoring wells.

### *Landfill Area 3*

- Collect one collocated surface water and sediment sample to investigate the surficial extent of dichloroethene and vinyl chloride impacts outside the southeastern limits of Landfill Area 3.
- Drill eight vertical profile borings to define the presence and extent of a groundwater confining clay layer.

- Collect screening level DPT groundwater samples from the 8 vertical profile borings to further delineate the extent of DCE and VC impacts directly southeast of Landfill Area 3.
- Collect surface and subsurface soil samples at nine locations to define horizontal and vertical extent of previous exceedances within the footprint of the landfill area.
- Install 4 shallow and 4 deep monitoring wells to define the horizontal and vertical extent of previous DCE and VC GCTL exceedances and to enhance the perimeter monitoring network in support of the ZOD approach.Upon completion of new monitoring well installations, collect groundwater samples from the 8 new and 12 existing monitoring wells.

### *Service Pit Area*

- Collect surface and subsurface soil samples at eight locations adjacent to eight individual former service pits to define the horizontal and vertical extent of previous exceedances.
- Install eight shallow permanent monitoring wells to further define the extent of previous exceedances at individual service pit locations.
- Upon completion of new monitoring well installations, collect groundwater samples from the 8 new monitoring wells and the 22 existing monitoring wells in the Service Pit Area.

Upon assignment of the additional sites, the Accident Prevention Plan (APP) and Site-Specific Safety and Health Plan (SSHP) will be reviewed and addenda developed to meet the site specific needs of each site.

## *2.2 Activity Hazard Analysis by Task*

The activity hazard analysis (AHA) identifies potential safety, health, and environmental hazards and provides guideline requirements for the protection of personnel, the community, and the environment. Because of the complexity and constant change of environmental projects, supervisors and employees must continually inspect the work site to identify hazards that may harm site personnel, the community, or the environment. The Project Manager (PM), Site Supervisor (SS), and SSHO must be aware of these changing conditions and discuss them with the Health and Safety Manager (HSM). The HSM will write addenda to modify AHAs as necessary. Initial phase AHAs by task are provided in Table 2-1. The AHAs for specific project activities will be discussed during the site orientation. AHAs developed for new activities or task orders will be provided in area-specific SSHPs and discussed at the tailgate safety meeting or at a meeting (preparatory inspection) held specifically for the new activity. CMS-710-05-FM-01705, *Sample Job Safety Analysis 2*, shall also be implemented daily and utilized to supplement AHAs and daily tailgate safety meetings.

### 2.2.1 Physical Hazards

The primary physical hazards for this project are associated with the use of material handling equipment and support vehicles, operation of heavy equipment, working around excavations, use of drill rigs, flammable or combustible liquid transfer, heat stress, and the collection of water and soil samples. The potential physical hazards of the work activities are as follows:

- Noise
- Heavy equipment hazards
- Drum handling hazards
- Forklift operations
- Handling flammable/combustible materials
- High-pressure water jetting operations
- Sampling hazards
- Temperature extremes
- Wildlife hazards
- Hot cutting
- Hoisting and rigging
- Remedial/investigative-derived waste handling and disposal.

Controls for these hazards are addressed in Table 2-1.

### 2.2.2 Noise

Noise exposure at or above the U.S. Occupational Safety and Health Administration (OSHA) action level (85 A-weighted decibels [dBA]) is likely during some remedial investigation activities. Exposure to noise levels in excess of 90 dBA, the OSHA permissible exposure limit (PEL) for noise, is likely during heavy equipment operation, use of pneumatic tools, or work near drill rigs. Sound level monitoring will be required to characterize the noise levels. A hearing conservation program is required for all workers on site who may be exposed to noise levels at or above 85 dBA.

Exposure to noise over the OSHA action level can cause temporary impairment of hearing; prolonged and repeated exposure can cause permanent damage to hearing. The risk and severity of hearing loss increases with the intensity and duration of exposure to noise. In addition to damaging hearing, noise can impair voice communication, increasing the risk of accidents on site.

### 2.2.3 Drilling Hazards

Physical hazards specific to a majority of drilling operations are listed in this section.

Underground utilities, including sewer, telephone, water, fuel, or electrical lines, will be located before intrusive operations are initiated. The SS will ensure that facility utility clearances are secured. CB&I will be responsible to contact the local utility one-call center for utility clearances on property not covered under the National One-Call Center. All provisions of the legacy CB&I Procedure HS308, *Underground/Overhead Utility Contact Prevention*, shall be followed or a formal variance submitted for approval.

***Slips.*** Slips are toothed wedges positioned between the drill pipe and the master bushing/rotary table to suspend the drill string in the well bore when it is not supported by the hoist. Most accidents associated with slip operations are related to manual materials handling; strained backs and shoulders are common.

***Tongs.*** Tongs are large, counter-weighted wrenches used to break out the torqued couplings on drill pipe. Both sets of tongs have safety lines; when breakout force is put on the tongs, the tongs or the safety lines could break and injure an employee standing close to them. Another likely accident can occur when the driller actuates the wrong tong lever and an unsecured tong swings across the rig floor at uncontrolled velocity. A common accident attributable to tongs can occur when an employee has his hand or finger in the wrong place as he attempts to swing and latch the tong onto the drill pipe, resulting in crushing injuries or amputation of the fingers.

***Elevators.*** Elevators are sets of clamps affixed to the bails on the swivel below the traveling block. They are used to clamp each side of a drill pipe and hold the pipe as it is pulled from the well bore. Accidents and injuries can occur during the latching and unlatching tasks; fingers and hands can get caught and crushed in the elevator latch mechanism. If the pipe is overhead when the latching mechanism fails, the pipe may fall on employees working on the drill floor.

***Cat Lines.*** Cat lines are used on drilling rigs to hoist material. Accidents that occur during cat line operations may injure the employee doing the rigging as well as injure the operator. Minimal hoisting control causes sudden and erratic load movements, which may result in hand and foot injuries.

***Working Surfaces.*** The rig floor is the working surface for most tasks performed in well drilling operations. The surface is frequently wet from circulating fluid and/or water used to wash it down. Slippery work surfaces can increase the likelihood of back injuries, overexertion injuries, and slips and falls.

***Tower Operations.*** The tower man on a well drilling operation performs his tasks from various elevated work platforms in the mast. He is exposed to falls when not using fall protection equipment while climbing the tower ladder, working with the pipe stands, and moving from the ladder to his platform station.

***Utility Hazards.*** There may be overhead or underground utilities at the site. Special precaution will be taken to ensure the safety of personnel and visitors to the sites.

***Materials Handling.*** The most common type of accident that occurs in material handling operations is the "caught between" situation, in which a load is being handled and a finger or toe

gets caught between two objects. Rolling stock can shift and/or fall from a pipe rack or truck bed. Rig accidents can occur as a result of improperly placing the rig on uneven or unstable terrain or failing to adequately secure the rig prior to the start of operations.

### *2.2.4 Drum Handling Hazards*

The use of drums for waste disposal and temporary containment of investigative- and remediation-derived waste awaiting analytical results may pose a safety hazard causing injuries to employees and/or property if safe drum handling procedures are not implemented. Drum handling shall be performed with equipment designed for this purpose. Employees shall be cognizant of pinch points when moving, staging, and transporting drums. Drums will not be moved manually; appropriate mechanical drum handling equipment will be used at all times.

### *2.2.5 Forklift Operations*

The use of forklifts (industrial lift trucks) to move materials may result in injury to personnel, equipment damage, and property damage. Forklift operator certification training is mandated by OSHA 29 Code of Federal Regulations (CFR) 1910.178; U.S. Army Corps of Engineers (USACE) Engineer Manual (EM) 385 1-1, Section 16.A.24 (USACE, 2008); and CMS-710-02-PR-00800, *Lift Trucks (Forklifts) and Powered Industrial Trucks*. Training specific to the type of forklift to be operated shall be performed no less than every three years. Only qualified and authorized operators will be permitted to execute forklift activities.

### *2.2.6 Handling Flammable/Combustible Materials*

Handling flammable/combustible liquids during refueling of equipment and transfer operations poses a potential for fire if controls are not implemented. All transfer pumps shall be rated and designed for flammable liquid transfer. Bonding and grounding requirements shall be utilized to mitigate potential static electricity, which can result from friction and movement of flammable liquids within transfer lines. All ignition sources shall be eliminated within 50 feet of flammable/combustible liquid transfer activities. Care will be exercised to avoid topping off fuel tanks to minimize potential for spillage from expansion/overflow. A minimum 5-pound ABC dry chemical fire extinguisher shall be readily available when transferring flammable or combustible materials.

### *2.2.7 Heavy Equipment and Vehicle Traffic Hazards*

The hazards associated with the operation of heavy equipment are injuries to personnel, equipment damage, and property damage. The potential for injury or damage to occur is associated with, but not limited to the size of the equipment, limited visibility of the driver, and potential underground and overhead hazards. Only qualified operators are authorized to operate heavy equipment. Whenever a struck-by scenario exists, personnel who are exposed to heavy equipment operations or vehicle traffic shall wear Class III high-visibility American National Standards Institute/International Safety Equipment Association warning vests or equivalent clothing.

***Use of Heavy and Mechanized Equipment.*** Excavators, backhoes, loaders, drill rigs, self-propelled direct-push, and other types of heavy construction or mechanized equipment may be used to accomplish the work at the project. The use of heavy equipment can be dangerous. Extra care shall be exercised in its use and while working in the vicinity.

***Heavy Construction Equipment.*** Various types of heavy construction equipment will be used for project activities. All operators of this equipment shall be familiar with the requirements for inspection and operation of the equipment that they will be using. Before equipment is placed into use and on a daily basis, the operator is to inspect and verify that it is in safe operating condition, as described in Section 9.2.3. The following guidelines shall be adhered to while operating heavy construction equipment:

- Equipment shall not be operated in a manner that will endanger persons or property nor will the safe operating speeds or loads be exceeded.
- Getting on or off of equipment while it is in motion is prohibited.
- Equipment shall be operated in accordance with the manufacturer's instructions and recommendations.
- Determinations of road conditions and structures shall be made in advance to verify that clearances and load capacities are safe for the passage of equipment.
- All machinery or equipment shall be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. Equipment designed to be serviced while running is exempt from this requirement.
- Buckets, blades, dump bodies, and similar equipment will be either fully lowered or blocked when being repaired or when not in use. All controls shall be in a neutral position, with the engines stopped and brakes set, unless work being performed on the machine requires otherwise, per manufacturer recommendations.
- No guard, safety appliance, or device shall be removed from machinery or equipment or made ineffective except for making immediate repairs, lubrications, or adjustments, and then only after the power has been shut off. All guards and devices will be replaced immediately after completion of repairs and adjustments and before power is turned on.
- Mechanized equipment shall be shut down prior to and during fueling operations. Closed systems with automatic shut-off, which prevent spillage if connections are broken, may be used to fuel diesel-powered equipment left running.
- Each piece of heavy equipment and other similar equipment shall be equipped with at least one dry chemical or carbon dioxide fire extinguisher with a minimum rating of 10-B:C.
- Personnel shall not work, pass under, or ride in the buckets or booms of loaders in operation.
- All self-propelled construction equipment, whether moving alone or in combination, shall be equipped with a reverse signal alarm.

- Seat belt use is required while operating equipment.
- Spotters for the operator shall be the only personnel allowed in the vicinity of the heavy equipment. Spotters shall stay out of the boom radius area. Personnel needing to approach heavy equipment while operating shall observe the following protocols:
  - Wear Class 2 high visibility vests meeting American National Standards Institute specifications.
  - Make eye contact with the operator (and spotter).
  - Signal the operator to cease heavy equipment activity.
  - Approach the equipment only after the operator has given signal to do so.

### *1. Mechanized Equipment – Use of Quick Connect/Disconnect Systems*

The manufacturer's specifications and operating manuals for hydraulic equipment and attachments utilizing quick connect/disconnect systems shall be followed. After completing a switch in attachments, the equipment operator shall take the actions necessary to verify the quick connect/disconnect system is positively engaged.

### *2. Excavators, Loaders, and Backhoes Used to Transport or Hoist Loads with Rigging*

When hydraulic excavating equipment is to be used to transport or hoist loads utilizing hooks, eyes, slings, chains, or other rigging, the following requirements shall apply:

- Operations involving the use of hydraulic excavating equipment and rigging to transport or hoist loads require different operator skills and considerations than the standard excavating operations routinely performed with hydraulic excavating equipment.
- An AHA specific to the transporting or hoisting operation shall be prepared. The AHA shall include, but not be limited to the following:
  - Written proof of qualifications of equipment operators, riggers, and others involved in the transporting and hoisting operations
  - Performance of the operational test described in Section 16.S.03(b) of EM 385-1-1 (USACE, 2008)
  - Proper operating procedures in accordance with the equipment manufacturer's operating manual
  - Proper use and on-site availability of manufacturer's load rating capacities or charts
  - Proper use of rigging, including positive latching devices to secure the load and rigging
  - Inspection of rigging
  - Use of tag lines to control the load
  - Communications
  - Establishment of a sufficient swing radius (equipment, rigging, and load)

- Stability of surfaces beneath the hydraulic excavating equipment.

An operational test with the selected hydraulic excavating equipment will be performed in the presence of the Government Designated Authority, if available. The operational test shall consist of a demonstration that the test load and selected rigging can be safely lifted, maneuvered, controlled, stopped, and landed. The operational test shall be representative of the complete cycle of the proposed transporting or hoisting operation, including configuration, orientation, and positioning of the excavating equipment and the use of identical rigging. The test load shall be equivalent to the maximum anticipated load, but shall not exceed 100 percent of the manufacturer's load rating capacity for the excavating equipment as configured. Written documentation of the performance of the operational test outlining test procedures and results shall be maintained at the on-site project office.

All rigging and rigging operations shall comply with the requirements of Section 15 of EM 385-1-1 (USACE, 2011). Hooks, eyes, slings, chains, or other rigging shall not be attached to or hung from the teeth of a bucket during the transporting or hoisting of a load by hydraulic excavating equipment.

After the completion and acceptance of an operational test described in EM 385-1-1 16.S.03(a)(2) (USACE, 2011), if repair, major maintenance, or reconfiguration of the hydraulic excavating equipment or attachments is required, another operational test shall be performed to demonstrate that the completed repairs are satisfactory and that the test load and selected rigging can be safely lifted, maneuvered, controlled, stopped, and landed.

Loads shall be lifted to the minimum height necessary to clear the ground or other obstacles and carried as low as possible when the equipment is traveling.

Loads shall not be lifted over personnel.

Adequate clearances shall be maintained from electrical sources.

Hydraulic excavating equipment shall not be used to hoist personnel. The riding of personnel on loads, hooks, hammers, buckets, or any other hydraulic excavating equipment attachment is prohibited.

### *2.2.8 High-Pressure Water Jetting Operation Hazards*

The use of high-pressure water jetting equipment (1,000 pounds per square inch gage) for decontamination and general cleaning may result in lacerations from accidental water spray slips, trips, and falls. Accidents can occur as a result of improper operation of the high-pressure water jetting equipment, failing to adequately isolate the work area from other activities, use of faulty or damaged equipment, and improper use of adequate PPE. Operators of high-pressure washers shall, at a minimum, wear metatarsal guards to protect the feet, face shields over American National Standards Institute-approved safety glasses, hard hats, work gloves, and outer Tyvek® to minimize water spray onto personal clothing. Impermeable Tyvek or equivalent is required when washing contaminated materials. Operations of this equipment shall comply with CMS-710-02-PR-07100, *Pressurized Water Cleaning and Cutting Operations*. Equipment shall be inspected prior to use in

accordance with CMS-710-02-FM-07101, *Pre-Operation Checklist for Pressure Water Jet Cleaning and Cutting Equipment.*

### *2.2.9 Sampling Hazards*

Field sampling operations can consist of the collection of groundwater, subsurface soil, surface water, and sediment samples for subsequent analysis. The physical hazards of these operations are primarily associated with the sample collection methods and procedures used.

The primary hazards associated with these specific sampling procedures are not potentially serious; however, other operations in the area, or the conditions under which samples must be collected, may present certain chemical and physical hazards. The hazards of these types of sampling procedures are generally limited to strains/sprains and potential eye hazards resulting from sampling activities. Sampling from atop portable holding tanks (metal and/or polyethylene tanks) may necessitate fall protection if the sampling location is 6 feet or more off the ground and standard guardrail systems are not in place. CMS-710-02-PR-00900, *Fall Protection*, shall be followed when subject to a fall of 6 feet or more or when working over dangerous machinery, regardless of the working height.

### *2.2.10 Temperature Extremes*

Field activities will involve prolonged work in unsheltered locations. In these conditions, wearing PPE puts field personnel at considerable risk of heat stress. Heat stress effects range from transient heat fatigue to serious illness and death. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and the individual characteristics of the worker. Because heat stress is one of the most common and potentially serious and fatal illnesses during operations in hot environments, preventive measures and alertness to the symptoms are vital. CMS-710-01-PR-00600, *Heat Stress Prevention and Control*, shall be followed. Physiological monitoring shall be initiated when workers are wearing semi-permeable or impermeable encapsulating ensembles, workers shall be monitored when the temperature in the work area is above 70 degrees Fahrenheit (°F) (21 degrees Celsius). Cold and/or wet environmental conditions can place workers at risk of a cold-related illness. Hypothermia can occur whenever temperatures are below 45°F and is most common during wet, windy conditions, with temperatures lower than 40°F. The principal cause of hypothermia in these conditions is loss of insulating properties of clothing due to moisture coupled with heat loss caused by wind and evaporation of moisture on the skin. For temperatures at or below 60.8°F, monitoring will be initiated; for temperatures less than 30.2°F, ambient temperature monitoring will be required every 2 hours, as well as wind speed measurements. CMS-710-01-PR-00700, *Cold Stress Prevention and Control,* shall be followed to mitigate employee cold stress hazards.

### *2.2.11 Wildlife Hazards*

Workers should avoid contact with and feeding of any wildlife while engaged in site work at LFNAS.

### *2.2.12 Chemical Hazards*

Table 2-2 presents the toxicological and physical properties and exposure limits of chemicals anticipated at the LFNAS that may be encountered in site media and chemicals intended for field activity use. Additionally, Material Safety Data Sheets (MSDS) and chemicals intended for use at LFNAS are provided in Attachment 3.

Small quantities of sample preservatives (i.e., hydrochloric acid, sulfuric acid, nitric acid, and sodium hydroxide) will be in sample containers provided by the analytical laboratory. Preservatives will already be inside containers and samplers will be required to wear chemical-resistant gloves and safety glasses/goggles; therefore, exposure to these chemicals is unlikely, but user care must be exercised in accordance with MSDS recommendations.

### *2.2.13 Operation of Boats and Water Safety*

CB&I is strongly committed to ensuring all employees operating boats or conducting work alongside bodies of water are familiar with the hazards of water operations and the proper protective measures that must be taken to prevent injury. In addition to the requirements below, CMS-710-02-PR-05700, *Mechanized and Marine Equipment,* shall be followed.

***Training.*** All personnel who may operate motorized vessels on navigable water ways shall be required to participate in a boating safety course (or provide documentation of an equivalent or higher level of boating safety training) prior to conducting vessel operations on site. As a minimum, this course shall provide training on the following topics: proper boat and safety equipment inspections; content and frequency of equipment safety inspection; proper use of onboard safety equipment, including fire extinguisher, radio, flares, horn, etc.; proper procedures on the completion and filing of a float plan; appropriate boating “rule-of-the-road:” emergency procedures in the event of capsizing or being thrown overboard; and different types of personal flotation devices) and their proper inspection and use.

***Boat Inspection.*** Prior to each day or shift of operations, a boat inspection shall be conducted by the boat operator/captain. This inspection shall be conducted in accordance with accepted U.S. Coast Guard (USCG) and any applicable state boating safety inspection procedures and the USACE Safety Inspection for Launches, Motorboats and Skiffs. The USCG “Checklist For Boating Safety” and the “USACE Safety Inspection for Launches, Motorboats and Skiffs” (**Attachment 7**), or equivalents, shall be used to ensure necessary safety equipment is aboard, this equipment is functioning properly, and all members of the crew are aware of proper procedures that are to be followed upon the water. In addition, this information shall be reviewed during the daily tailgate safety meeting to ensure the procedure has been conducted and all crew members are satisfied as to its completion.

***Float Plan.*** Prior to boat departure, each boat operator/captain shall be responsible for ensuring a float plan form (**Attachment 7**) is filed with the SS and the off-site PM. All float plans shall be reviewed with boat crews during the daily tailgate safety meeting.

This plan shall include: the size, type, and description of the boat; engine type, size, and fuel capacity; number of persons aboard; their names, ages, and home addresses; survival equipment aboard; expected duration of operation; specific locations to be and expected time of return; the plan shall also include USCG, Marine Police and other emergency numbers.

Any alterations in the float plan shall be reported directly to the individual with whom the plan was filed. It will be the responsibility of the on-site team leader to ensure daily boat/equipment inspections are completed and documented, daily tailgate safety meetings are conducted, and float plans are properly filed.

***General Operating Procedures.*** The following safety procedures shall be observed at all times:

- At no time shall an individual stand in any boat.
- Boat(s) shall not be overloaded with equipment or personnel.
- Loads shall be distributed evenly throughout the boat.
- Personal flotation devices Types I, II, or III shall be worn at all times when working on or adjacent to the water. Type III or Type V personal flotation devices will be worn when on small boats.
- All personal flotation devices shall be properly inspected to ensure appropriate USCG approvals and ratings information is available.
- One Type IV throwable device shall be available for each person on board.
- An audible signal/alarm shall be maintained in each boat.
- Each boat shall be equipped with some type of visual display signal/device (i.e., flares or appropriate distress flag).
- All powerboats shall have a valid state registration. This registration shall be maintained on the boat and, as necessary, made available for USCG or marine police inspection.
- As a minimum, each powerboat shall be equipped with a fire extinguisher.
- Boats shall not be operated at night without proper lighting and visual distress signals.
- As possible, boat(s) shall avoid entering into major shipping lanes.

## *2.3 Anticipated Biological Hazards*

Potential biological hazards at LFNAS include snakes, insects, buried sharp objects, and poisonous plants.

### *2.3.1 Snakes*

If work sites are such that the possibility of encountering snakes exists, all personnel shall be cautioned to be alert to the presence of snakes. If a snake bite occurs, attempts should be made to kill the snake if it is safe to do so for positive identification. The victim should be transported to the

nearest hospital within 30 minutes. First aid (FA) consists of applying a pressure bandage and washing the area around the wound to remove any unabsorbed venom. Omit cutting and sucking, unless medical care cannot be obtained within 30 minutes. Snake venoms are complex and include proteins, some of which have enzymatic activity. The effects produced by venoms include neurotoxic effects with sensory, motor, cardiac, and respiratory difficulties; cytotoxic effects on red blood cells, blood vessels, heart muscle, kidneys, and lungs; defects in coagulation; and effects from local release of substances by enzymatic actions. Other noticeable effects of snake bites include swelling, edema, and pain around the bite and the development of ecchymosis (the escape of blood into tissues from ruptured blood vessels).

### *2.3.2 Insects*

All personnel should be aware of the potential presence of wasps, bees, spiders, and ticks. Precautions include familiarity with the signs/symptoms and potential health hazards of Lyme disease and the proper implementation of appropriate work practices.

Particular caution must be exercised to prevent being bitten by ticks and potentially contracting tick-borne diseases. Specific precautions include the following:

- Wear hooded coveralls to cover your body as much as possible. Light-colored clothing makes spotting of ticks easier.
- Try to eliminate possible paths by which the deer tick may reach unprotected skin. For example, tuck bottoms of pants into socks or boots and sleeves into gloves. (Duct tape may be utilized to help seal cuffs and ankles.) If heavy concentrations of ticks or insects are anticipated or encountered, Tyvek coveralls may be utilized.
- Conduct periodic and frequent (e.g., hourly) surveys of your clothing for the presence of ticks. Remove any ticks/insects that become attached to clothing.
- Use insect/tick repellents containing non-N-N-diethyl-m-toluamide compounds. Apply repellents in accordance with manufacturers' recommendations. These repellents are readily available and include such brands as Deep Woods OFF® and Maximum Strength OFF. Check the ingredients of the repellent. CB&I field personnel should check with the PM to ensure that use of insect repellents will not interfere with sample collection procedures.

The Centers for Disease Control and Prevention report that human illness from West Nile virus is rare, even in areas where the virus has been reported. The chance that any one person is going to become ill from a mosquito bite is low. West Nile virus is spread by the bite of an infected mosquito and can infect people, horses, many types of birds, and some other animals. Most people who become infected with West Nile virus will have either no symptoms or only mild ones. On rare occasions, West Nile virus infection can result in a severe and sometimes fatal illness known as West Nile encephalitis (an inflammation of the brain). The risk of severe disease is higher for persons 50 years of age and older. There is no evidence to suggest that West Nile virus can be spread from person to person or from animal to person.

A common venomous spider is the black widow. The adult female is glossy black with short, almost microscopic hairs and a crimson hourglass marking on the underside of the abdomen. They are found in dark corners of barns, stables, and garages and in piles of boxes and crates. They have also been known to reside in vacant rodent burrows; under stones, logs, and long grass; and in hollow stumps and brush piles. Generally, black widows are not aggressive and usually can be induced to bite only if pressed against the skin. If disturbed, they typically will retreat to a corner of their web. However, these spiders are more aggressive if they are protecting an egg sac. After a bite, a dull numbing pain in the affected extremity occurs. Also, pain and some muscular rigidity in the abdomen or the shoulder, back, and chest may occur. The bite may also produce headache, dizziness, skin rash, nausea, vomiting, anxiety, and weakness, and increased skin temperature over the affected area may be observed. Ice may be placed over the bite to reduce the pain. Bites are rarely fatal to adults, but because the black widow spider injects neurotoxins, it is important to seek immediate medical attention.

### *2.3.3 Buried Sharp Objects*

Although the potential biological hazards associated with this project are not anticipated to be significant, on-site personnel should be aware of potential bacterial/viral infections (e.g., tetanus) through ingestion following skin contact or from puncture wounds sustained from stepping on or handling buried sharp objects.

### *2.3.4 Poisonous Plants*

Three or five leaves radiating from a stem identify poison ivy, poison oak, and poison sumac. Poison ivy is in the form of a vine, while oak and sumac are bush-like. All produce a delayed allergic hypersensitivity. The plant tissues have an oleoresin, which is active in live, dead, and dried parts. The oleoresin may be carried through smoke, dust, contaminated articles, and the hair of animals. Symptoms usually occur 24 to 48 hours after exposure, resulting in burning or stinging, and weeping and/or crusted blisters. Should exposure to any of these plants occur, wash the affected area with a mild soap and water, but do not scrub the area. The best antidote for poisonous plants is recognition and avoidance. There are products available over the counter designed for application before exposure and after potential exposure to toxic plants. Some prevent the plant oleoresin from contacting the skin, some are used after potential exposure to wash the skin, and others are used to treat symptoms of exposure. In extreme cases, prescription steroids may be used to reduce the allergic reaction. If work sites are located in areas where poisonous plants may be encountered, personnel should wear long pants, long sleeves, and gloves to minimize the possibility of exposure. In some areas, the use of a Tyvek or other protective suit may be advisable.

### *2.3.5 Alligators*

Alligators and humans have shared marshes, swamps, rivers and lakes of the southeastern United States for many centuries, but in recent years Florida has experienced tremendous human population growth. That trend continues today, with hundreds of people moving to Florida daily.

Many of these new residents seek homes on waterfront lots, resulting in increased interactions. Although many Floridians have learned to coexist with alligators, the potential for conflict always exists. Because of their predatory nature and large size (up to 14 feet in length and greater than 1,000 pounds), alligators can, and occasionally do, attack pets and livestock. Regrettably, humans, too, occasionally are attack victims and in rare instances are killed by large alligators. More than 200 unprovoked alligator attacks on humans have been documented since 1948, with 13 resulting in fatalities. The Florida Fish and Wildlife Conservation Commission receives more than 15,000 alligator-related complaints annually. Most of these complaints deal with alligators occurring in places such as backyard ponds, canals, ditches, and streams, but they also turn up in garages, pools, and golf course water hazards. In many cases, if left alone, alligators eventually will retreat to a more isolated place away from people. Most attacks involve animals over six feet long. Alligators become more active in the beginning of March, peaking in May, which is their mating season. Females will nest in June and July, and the eggs will hatch in August and September. Even a small amount of impounded water may contain a large alligator. Twilight and night are prime times for alligator attacks. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators. Don’t dump food or scraps into or near the water. This can attract alligators. Always be aware of your surroundings and use caution and common sense. If at any time personnel observe alligators at the site they will immediately inform the site superintendent, who will then notify the rest of the crew and Florida Wildlife Commission. The Florida Fish and Wildlife Conservation Commission’s nuisance alligator hot line is 1-866-FWC-GATOR.

# 3.0 Staff Organization, Qualifications, and Responsibilities

This chapter discusses staff organization, qualifications, and responsibilities.

## 3.1 All Personnel

All site personnel possess stop work authority and are responsible for incident reporting and installation-wide SSHP compliance.

### 3.1.1 Stop Work Authority

In accordance with CMS-710-05-PR-00400, *Stop Work Authority*, **all** employees have the right and duty to stop work when conditions are unsafe or when established safety procedures are being disregarded. Whenever an employee determines that workplace conditions present an immediate uncontrolled risk of injury or illness, immediate resolution with the appropriate supervisor shall be sought. If the supervisor is unable or unwilling to correct the unsafe conditions, the employee is authorized and required to issue a Stop Work Order. The specific activity or operation in question shall be discontinued until the issue is resolved.

Upon issuance of a Stop Work Order, the supervisor shall contact the project/location manager and the project/location health and safety (H&S) representative and request their assistance in assessing the situation or conditions that lead to the Stop Work Order. If the PM and the H&S representative are unable to agree on the necessary corrective actions or the appropriateness of the Stop Work Order, the issue shall be referred to the business line/program manager and the business line HSM.

Resumption of safe operations is the primary objective; however, operations shall not resume until an H&S representative has given approval that workplace conditions now meet acceptable safety standards. Any supervisor or manager responsible for resuming operations without H&S approval, thereby endangering project personnel, shall be subject to termination.

### 3.1.2 Incident Reporting

All injuries, no matter how small, will be reported to the SS and SSHO or the individual or individuals acting in those capacities. An accident/injury/illness report in accordance with legacy Shaw Procedure HS020, *Accident Prevention Program,* will be completed by the SS and submitted to the HSM; USACE and the HSM shall be notified. If there is any dispute with regard to H&S, on-site staff will attempt to resolve the issue on the project level. If the issue cannot be resolved, they will consult off-site management for assistance. The specific activity or operation in question shall be discontinued until the issue is resolved.

Initial notification of ALL ACCIDENTS regardless of the seriousness will be reported by the SS to the USACE District Safety and Occupational Health Office, either by email, by telephone (912) 652-5843 or (912) 652-5486 (fax), or in person within 24 hours of the accident's occurrence. Information to be

conveyed will include (1) name of injured employee(s), (2) date and time of accident, (3) location of accident, (4) brief description of accident, (5) description of damage or extent of injury, and (6) caller's name and phone number. Notification of the USACE District Safety and Occupational Health Office via these means does not preclude submittal of ENG Form 3394 (Accident/Incident Reporting Form).

All NON-RECORDABLE accidents or injuries will be reported on ENG Form 3394 dated March 1999 and submitted to the USACE District Safety Office with the required supervisory signatures. A non-recordable accident is defined as no lost time, no medical expenses incurred, first-aid case only, and/or Government property damage of $1,999.99 or less to include fire and motor vehicle accident.

An ENG Form 3394 will be completed on all RECORDABLE accidents or injuries. Recordable injuries incur lost time and/or medical cost. Also, the following types of FA cases are recordable: (1) cases in which no leave or continuation of pay is charged to the employee, no medical expenses incurred but which requires one or more no cost examination or treatment during duty hours excluding the day of the injury or (2) two or more no cost visits for examination or treatment after duty hours excluding the day of the injury. Accidents are recordable if Government property damage of $2,000 or more results, which includes government motor vehicle and/or fire. The original ENG Form 3394 will be forwarded through line management channels for completion of signatures in accordance with instructions on the form and forwarded within 10 workdays to the USACE District Safety Office.

### *3.1.3 Plan Compliance*

All personnel working in the field during site activities are responsible for complying with this SSHP, EM 385-1-1, and all other required CMS guidelines.

### *3.1.4 Site Organization*

Site organization is shown on Figure 2 of the APP.

## *3.2 Project Certified Industrial Hygienist*

The Project Certified Industrial Hygienist (PCIH) is responsible for the development, implementation, and oversight of the H&S program and the SSHP. Doug Russell is the designated PCIH. The PCIH may designate a fully trained and experienced individual, such as the SSHO, to implement and continually enforce safety policies and activities on site. The PCIH has formal education and training in occupational H&S, certification in industrial hygiene by the American Board of Industrial Hygiene, and more than 20 years of experience managing safety and occupational health at hazardous waste site cleanup operations.

### *3.3 Site Supervisor*

The SS directly controls the operations of all field teams performing site activities and will spend most of the day in the field monitoring their performance and assisting them in achieving maximum operational safety and efficiency. Shane Yenchi is the designated SS and the Competent and Qualified person. The SS reports directly to the PM and receives guidance from the PM concerning technical and operational issues. The SS will implement the approved plans in the field and must review and approve any changes to the approved plans. The SS will supervise all teams on a project. Additionally, the SS has the authority to temporarily stop work to correct an unsafe condition or procedure.

### *3.4 Site Safety and Health Officer*

The SSHO is responsible for implementation of this SSHP during site activities as well as for making recommendations and revisions for the HSM and SS approval. Burney Chance is the designated SSHO. The SSHO will conduct daily inspections to determine if operations are being conducted in accordance with this SSHP, Army requirements, and OSHA regulations. The SSHO shall have completed OSHA 30-hour Construction Safety Training within the last three years. The SSHO reports directly to the HSM and PM. An open dialogue will be kept between the SSHO, HSM, PM, and supervisory personnel of the project to ensure that safety issues are quickly addressed and corrective action taken. The SSHO has the authority to take immediate steps to correct unsafe or unhealthful conditions, including the stoppage of field work when deemed necessary.

### *3.5 Project Manager*

The PM is responsible for ensuring that the necessary personnel are available for this project and that the reporting, scheduling, and budgetary obligations for this project are met. Ken Cunningham is the designated PM. The PM will have a minimum of three years of experience in management of hazardous waste operations and/or emergency response and an education in the environmental profession or a related field.

### *3.6 Health and Safety Manager*

The HSM is responsible for all facets of the H&S program from the initial project planning phase through development and implementation of the installation-wide APP/SSHP. Doug Russell is the designated HSM. The HSM shall be the focal point for all project H&S-related issues and will assure the necessary resources and qualified personnel are available to support the overall project. The HSM will periodically evaluate the effectiveness of the site H&S program and may perform site audits.

# 4.0 Training

## 4.1 General

All on-site project personnel shall have completed at least 40 hours of hazardous waste operations training, as required by 29 CFR 1910.120 and 29 CFR 1926.65. In addition, all field employees shall have received a minimum of three days of actual field experience under the direct supervision of a trained, experienced supervisor. Those personnel who completed the 40-hour training more than 12 months prior to the start of the project shall have completed an 8-hour refresher course within the past 12 months. Supervisors shall have completed an additional eight hours of relevant H&S training. All CB&I employees receive annual hazard communication training as a component of the annual eight-hour refresher course. Subcontractor personnel must meet these training requirements. Documentation of CB&I and subcontractor training shall be maintained with the project files.

Substance-specific training may be required depending on the scope of work. A review of the current regulatory standards will be completed by the HSM to determine if the following training would be required:

- Lead awareness
- Asbestos sampling/worker/supervisor
- PCB awareness.

## 4.2 Site-Specific Orientation

All personnel, before performing any work at the site, are required to go through a site-specific H&S orientation. This orientation will provide training on the potential H&S hazards and procedures specific to the site and discuss the provisions of the installation-wide APP and SSHP. This training will also include hazard communication specific to what is anticipated to be encountered on site. All personnel will acknowledge their attendance by signing the SSHP acknowledgement form. Additionally, subcontractors must acknowledge the Subcontractor Certification Form in Attachment 2.

## 4.3 Tailgate Safety Meetings

The SS, with SSHO assistance, shall conduct a tailgate safety meeting at the beginning of each shift or whenever new employees arrive at the job site once the job commences. The topics discussed at the tailgate safety meeting will include H&S considerations for the day's activities, necessary protective equipment, potential for encounters with biological hazards, problems encountered, and new operations. Attendance records and meeting notes will be maintained with the project files.

## 4.4 Site Workers Basic Course

The following is a list of the topics covered in the OSHA 40-hour training course required for all CB&I employees and subcontractors:

- General site safety
- Physical hazards (fall protection, noise, heat stress, and cold stress)
- Names and titles of key personnel responsible for site H&S
- Safety, health, and other hazards typically present at hazardous waste sites
- Use of PPE
- Work practices by which employees can minimize risks from hazards
- Safe use of engineering controls and equipment on site
- Medical surveillance requirements, including recognition of symptoms and signs that might indicate overexposure to hazards
- Workers' right to know (Hazard Communication OSHA 1910.1200)
- Routes of exposure to contaminants
- Engineering controls and safe work practices
- Components of the site H&S program
- Decontamination practices for personnel and equipment
- Confined-space entry procedures
- Emergency response plan.

## *4.5 Supervisors Course*

Management and supervisors must receive an additional eight hours of training that includes the following:

- General site H&S programs
- PPE programs
- Air monitoring techniques.

## *4.6 First Aid and Cardiopulmonary Resuscitation*

At least two employees current in FA/ cardiopulmonary resuscitation (CPR) will be assigned to the work crew and on the site whenever operations are ongoing. Annual refresher training in CPR and tri-annual refresher training in FA is required to maintain the currency of the certificate.

# 5.0 Personal Protective Equipment

The PPE outlined in this chapter has been selected according to the site characterization and analysis, job tasks, site hazards, intended use, potential chemical hazards, and duration of potential employee exposures. Maintenance and storage of PPE, decontamination, donning and doffing procedures, inspection and monitoring of effectiveness, and PPE limitations are outlined in this chapter.

## 5.1 Respiratory Program

A comprehensive respiratory protection program has been established by CB&I and is required in all locations where use of such equipment is intended to lessen the potential for adverse health effects to any employee. The written respiratory protection program for the LFNAS project is contained in CMS-710-02-PR-03500, *Respiratory Protection Program*.

As part of the respiratory training program, each employee is instructed in the following elements:

- Nature of the respiratory hazard on the work site and the appraisal of potential consequences if the respiratory protection is not used
- Use and proper fitting of the respirator
- Cleaning, disinfection, inspection, maintenance, and storage of the respirator
- Proper selection, capabilities, and limitations.

Routinely used respiratory equipment will be inspected, cleaned, and disinfected daily to help assure proper hygienic practices. An inspection of these breathing devices will include the following:

- Examine the head straps for breaks, loss of elasticity, and broken or malfunctioning buckles and other attachments.
- Examine the facepiece for excessive dirt, cracks, tears, distortion, holes, or inflexibility.
- Examine the exhalation and inhalation valves for any foreign material, cracks, tears, or distortion in the valve. Additional checks will be made to inspect for proper insertion, defective valve covers, or improper installation.
- Examine the air-purifying elements for incorrect cartridge, expired shelf life of the cartridge, and cracks or dents in the cartridge or cartridge holder.
- Examine for proper insertion of the cartridges into the facepiece and check the gaskets inside the cartridge holder.
- Examine air cylinders for adequate air volume. Only Grade D air will be used for breathing air.

When Level C protection is required, respirator cartridges will be changed in accordance with the service life calculations performed by the HSM, per CMS-710-02-PR-03500. Respirator cartridges will be changed, at a minimum, daily per procedure. Respirator cartridges will also be changed out if increased breathing resistance or breakthrough is detected. All respirators will be inspected prior to each day's use. If broken or malfunctioning parts are found during the cleaning process, these parts will be replaced or new respiratory equipment will be issued to the user.

The respiratory protective equipment will be stored in an area protected from any mechanical damage. These devices will also be stored in a location that provides protection against dust, heat, excessive moisture, or damage by chemical contact. The storage area for the respirators should be in a readily accessible location.

- Only employees who have been trained to wear and maintain respirators properly will be allowed to use respiratory protection.
- Selection of respirators, as well as any decisions regarding upgrading or downgrading of respiratory protection, will be made by the HSM.
- Positive and negative pressure checks will be performed each time the respirator is donned.
- Only employees who have been fit tested within the last 12 months will be allowed to work in atmospheres where respirators are required.
- Respirator users will be instructed in the proper use and limitations of respirators.
- If an employee has difficulty breathing during the fit test or during use, he will be medically evaluated to determine if he can wear a respirator safely while performing assigned tasks.
- No employee will be assigned to tasks requiring the use of respirators if, based upon the most recent examination, a physician determines that the health or safety of the employee will be impaired by respirator use.
- Contact lenses will not be worn while using any type of positive pressure respiratory protection.
- Air-supplied respirators will be assembled according to manufacturer's specifications. Hose length, couplings, valves, regulators, manifolds, and all accessories will meet American National Standards Institute and the manufacturer's requirements.
- Respirators will be cleaned and sanitized daily after use.
- Respirators will be stored in a convenient, clean, and sanitary location on site.
- Respirators will be inspected during cleaning. Worn or deteriorated parts will be replaced.
- Facial hair that might interfere with a good facepiece seal or proper operation of the respirator is prohibited.

- The SSHO will review the respiratory protection program daily to ensure employees are properly wearing and maintaining their respirators and that the respiratory protection is adequately protecting the employees.
- The HSM and the PM will evaluate the respiratory protection program monthly to ensure the continuing effectiveness.
- Respirators used for emergency response will be inspected weekly by the SSHO.

### *5.1.1 Medical Certification*

Only workers who have been certified by a physician as being physically capable of respirator usage will be issued a respirator. Personnel unable to pass a respiratory fit test or without medical clearance for respirator use will not be permitted to enter or work in areas on site that require respiratory protection. Employees must also receive a written physician's opinion that they are fit for general hazardous waste operations as per 29 CFR 1910.120(f)(7). The specific requirements for examination of potentially exposed employees appear in detail in legacy Shaw Procedure HS100, *Medical Policies and Procedures*, but include at least the following: history and physiology, dipstick urinalysis, vision, vital signs, spirometry, audiometry, periodic electrocardiogram, chest x-ray based on age, biochemistry, and 10-panel drug screen. Additional criteria could be required based on toxic substances anticipated or present.

### *5.1.2 Air-Purifying Respirators*

A National Institute for Occupational Safety and Health (NIOSH)-approved full-face air-purifying respirator (APR) with elements chosen based on potential hazard will be used for most exclusion zone (EZ) activities where certain inhalation hazards are possible. In some cases, a specific combination cartridge type may not be available for the APR (i.e., hydrogen sulfide [$H_2S$]). In that case, a full-face supplied air respirator shall be used. Survivair®-brand respirators have been selected as the primary respiratory protection manufacturer for CB&I. If an employee is unable to achieve satisfactory fit with a Survivair respirator, Mine Safety Appliance-brand respirators are accepted.

### *5.1.3 Cartridge Selection And Change-Out Schedule*

Cartridges shall be chosen based on the actual or potential hazard. Protection against potential inhalation of volatile organic compounds (VOC) will be provided by organic vapor/P-100/acid gas/high-efficiency particulate air combination cartridges (Survivair No. 1053).

### *5.1.4 Inspection And Cleaning*

Respirators shall be inspected before each use by the wearer. Any defective or damaged respirator shall be immediately removed from service. If parts are field replaceable they shall be replaced and the respirator returned to service. If the respirator cannot be repaired it shall be rendered unusable and discarded. All respirators and associated equipment will be decontaminated and hygienically cleaned after each use. Records of inspections of PPE by the SSHO or designee will be kept as part

of the field activity daily log or on such documentation as the SSHO deems appropriate in the site H&S files.

### 5.1.5 Fit Testing

Annual respirator fit tests are required of all personnel using respiratory protection. Copies of each worker's medical clearance for respirator wear and fit-testing records will be maintained in the site H&S files.

### 5.1.6 Facial Hair

No personnel with facial hair that interferes with the respirator's sealing surface will be permitted to wear a respirator or work in areas requiring respirator use. Employees with psoriasis, eczema, or dermatitis that affects significant skin surface area should be excluded from activities requiring respirator use (i.e., EZ or contamination reduction zone [CRZ]).

### 5.1.7 Corrective Lenses

Normal eyeglasses cannot be worn under full-face respirators because the temple bars interfere with the respirator's sealing surfaces. For workers requiring corrective lenses, special spectacles designed for use with respirators will be provided. Contact lenses may be worn when wearing full-face negative pressure respirators.

### 5.1.8 Air-Purifying Respirator Limitations

APRs and powered APR types are limited to use in atmospheres containing at least 19.5 percent oxygen at sea level. They are not appropriate for use in atmospheres immediately dangerous to life and health. They are not protective against certain contaminants such as hydrogen sulfide or materials that do not exhibit warning properties. Based on anticipated hazards, powered and unpowered APRs are appropriate for this project when necessary.

## 5.2 Levels of Protection

The level of protection used in the EZ is based on site-specific information. Specific levels of protection will be changed whenever site conditions change. Levels of protection can either be increased to the next higher level or decreased to the next lower level. To request a change in levels of protection, the SS must contact the HSM and PM. If the need arises to protect H&S, the SS can upgrade protection levels, then review that decision with the HSM, SSHO, and PM. Levels of protection will not be downgraded without prior approval from the HSM or PCIH.

### 5.2.1 Level A Protection

Level A protection is not anticipated. Level A protection consists of the following:

- NIOSH-approved self-contained breathing apparatus
- Totally encapsulating butyl rubber protective suit (with built-in gloves and boots)
- Latex or lightweight nitrile gloves (inner)

- Hard hat
- Hearing protection (when working near/adjacent to operating equipment).

### *5.2.2 Level B Protection*

Level B is anticipated. Level B protection consists of the following:

- Level B PPE (e.g., supplied air respiratory protection) shall be required for personnel performing waste handling operations in the Pyridine Burn Area and handling of chemical containers with unknown contents, in atmospheres that exceed the American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value. In general, when Level B respiratory protection is needed, personnel will wear airline respirators with 5-minute egress bottles.

Level B protection will include the following PPE:

- Pressure-demand supplied-air respirator with 5-minute egress bottle (or a self-contained breathing apparatus if high mobility is required).
- Tychem® F chemical protective coveralls (or equivalent) with elastic wrists, ankles, and hood. Openings at wrists, ankles and hood shall be taped.
- Safety-toed chemical resistant boots meeting ASTM F2413-05 specifications (i.e., Onguard Hazmax® or equivalent).
- Leather outer work gloves with a cut-resistant liner.
- Chemical-protective North Silver Shield® (or equivalent) as inner gloves.
- Ear plugs (as needed).
- High-visibility vests (when working near mobile equipment).
- Cooling vest or vortex tube cooling assembly (as needed).

### *5.2.3 Level C Protection*

Level C protection will be used when engineering controls are not effective in keeping the contaminant in the breathing zone below action levels. Level C protection will also be required if the air monitoring data indicate the need for upgrade based on volatile organics or total dust. The following equipment will be used for Level C protection:

- NIOSH-approved, full-face APRs equipped with organic vapor/acid gas cartridge in combination with high-efficiency particulate air filter
- Hooded Tyvek, taped at gloves, boots, and respirator
- Nitrile gloves (outer)
- Latex or lightweight nitrile gloves (inner)
- Neoprene steel-toed boots or polyvinyl chloride overbooties/steel-toed safety boots

- Hard hat
- Hearing protection (when working near/adjacent to operating equipment).

Note: In addition to Level C PPE, the operator of high-pressure water jetting equipment shall wear metatarsal guards for protecting legs and feet.

### *5.2.4 Level D-Modified Protection*

The following equipment will be used for Level D-Modified protection:

- Permeable Tyvek, Kleenguard, or its equivalent
- Polyvinyl chloride boot covers
- Nitrile, heavy work, or latex gloves
- Steel-toed safety boots
- Safety glasses
- Hard hat
- Hearing protection (when working near/adjacent to operating equipment).

Note: In addition to modified Level D PPE, the operator of high-pressure water jetting equipment shall wear metatarsal guards for protecting the legs and feet and a face shield over safety glasses.

### *5.2.5 Level D Protection*

The minimal level of protection that will be required of personnel at the site will be Level D. The following equipment will be used for Level D protection:

- Coveralls or work clothing
- Leather work gloves (when necessary)
- Steel-toed safety boots
- Safety glasses
- Hard hat (when working with any operating machinery)
- Hearing protection (when working near/adjacent to operating equipment).

***Selection of PPE.*** The selection of PPE will be determined after a thorough evaluation of the site-specific chemical, physical, and biological hazards involved during each project task. The initial levels of PPE are provided in this SSHP. The initial level of protection will be raised to a higher level if air monitoring results in workers' breathing zone are greater than the action levels or if unanticipated site contamination conditions occur.

***Using PPE.*** All persons entering the EZ will don the required PPE according to established procedures in this plan to minimize exposure potential. When leaving the EZ, PPE will be removed according to the established procedures to minimize the spread of contamination.

## 5.3 Activity-Specific Levels of Protection

The required level of protection is specific to the activity being conducted. The levels of PPE only apply to activities conducted inside of an established site work zone. All work conducted outside established work zones will require only Level D PPE. The initial levels of protection that will be used while conducting site activities are as follows:

| Activity | Level of Initial Protection | Special Requirements |
|---|---|---|
| Mobilization/Site Preparation | D | Tyvek may be necessary for protection from poisonous plants. Use heavy work gloves for material handling. |
| Clearing (if required) | Modified D | Tyvek may be necessary for protection from poisonous plants. |
| Surveying | Modified D | Tyvek may be necessary for protection from poisonous plants. |
| Excavation Pyridine Burn Area | B | Cease operations should breathing zone measurements exceed established action levels. |
| Backfill Pyridine Burn Area | D | If air monitoring results are acceptable and separation/wind direction from excavation is adequate |
| Shallow subsurface soil sampling | D | Nitrile gloves. Tyvek may be necessary for protection from poisonous plants. |
| Subsurface soil sampling and monitoring well installation | D | Modified D when handling potentially contaminated drill auger/rods as well as decontamination of these items. |
| Decontamination (personnel) | C | Level C for personnel working in the CRZ |
| Decontamination (pressure washing) | Modified D | Impermeable Tyvek for pressure washing contaminated materials and metatarsal guards when the water pressure is greater than 1,000 pounds per square inch. |
| Surface water and sediment sampling | D | Personal flotation devices, harnesses and lifelines, and waders may be necessary based on site sampling location and conditions. |
| Well development and abandonment | D | Nitrile gloves. Tyvek may be necessary for protection from poisonous plants. |
| Well completion (bollard and pad) | D | Heavy work gloves for material handling. |
| Site restoration | D | Tyvek may be necessary for protection from poisonous plants. |

## 5.4 Donning/Doffing Personal Protective Equipment

This section discusses doffing and donning of PPE.

### 5.4.1 Donning Procedures for Modified Level D or Higher Personal Protective Equipment

- Put on boots and boot covers and tape the coveralls over the boots or boot covers.
- Put on gloves.
- Tape the coveralls over the gloves at the wrist.

- Don respirator (if Level C PPE and perform a positive and negative pressure test).
- Put hood or head covering over the respirator.
- Put on remaining protective equipment, (e.g. hard hat, safety glasses, etc.).

One person will remain outside the work area to check that each person entering has the proper protective equipment. No persons will be allowed to enter an EZ improperly attired.

### *5.4.2 Doffing Procedures for Modified Level D or Higher Personal Protective Equipment*

Whenever a person leaves the work site, the following proper decontamination sequence will be followed:

- Upon entering the CRZ, rinse contaminated mud and debris from boots or remove disposable boot covers.
- Clean reusable protective equipment and outer gloves.
- Remove protective garments and equipment. All disposable contaminated clothing should be placed in plastic bags and labeled as contaminated waste.
- Remove respirator and wipe outer surfaces.
- Remove inner gloves.
- Proceed to the clean area and dress.
- Clean respirator and prepare for next use.

All disposable contaminated equipment, garments, and PPE will be placed in plastic bags and properly labeled for disposal.

# 6.0 Medical Surveillance Program

## 6.1 Physical Examinations

All field personnel performing activities in a designated EZ or CRZ shall, within the past 12 months, have completed a comprehensive medical evaluation that meets the requirements of OSHA Regulations 29 CFR 1910.120 and 29 CFR 1926.65. The annual medical evaluation includes the following elements:

- Medical and occupational history questionnaire
- Physical examination
- Complete blood count, with differential
- Liver enzyme profile
- Chest x-ray, once every three years based on physicians discretion or employee age, for non-asbestos workers
- Pulmonary function test
- Audiogram
- Electrocardiogram for persons older than 35 years of age or physicians discretion or if indicated necessary during the physical examination
- Visual acuity
- Follow-up examinations at the discretion of the examining physician or the corporate medical director.

The examining physician provides the employee with a letter summarizing his findings and recommendations. Each employee also has the right to inspect and copy medical records.

The examining physician provides the employer with a certificate confirming the worker's fitness for work and ability to wear a respirator. A copy of this certification for all project workers will be kept on site during all project site work.

Subcontractors will verify on the certification form that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations shall meet the requirements of 29 CFR 1910.120, 29 CFR 1910.134, HS100, and this SSHP. Subcontractors must submit a completed Subcontractor Certification Form (Attachment 2) and supply copies of the medical examination clearance certificate for each on-site employee.

### 6.1.1 Pre-Placement Examination

All employees performing activities within the CRZ or EZ will receive a pre-placement baseline medical examination prior to assignment to hazardous waste operations and emergency response field operations.

### 6.1.2 Annual Examination

Each year subsequent to the baseline examination, all employees and subcontractors must undergo an annual examination similar in scope to the placement examination. Chest x-rays are taken every fifth year unless required more frequently by a specific OSHA standard or the occupational physician. The medical and occupational history is updated with each examination. Employees receive a complete medical summary and explanation for any identified medical restrictions.

### 6.1.3 Exit Examination

CB&I employees receive an exit examination upon leaving the company if they have not been examined within the previous six months. The exit examination consists of the annual examination. The employee's immediate supervisor is to notify the home office H&S assistant within a reasonable time before the termination to allow for the necessary arrangements.

## 6.2 Subcontractor Requirements

Subcontractors who may be required to work in an EZ will certify that all their employees have successfully completed a physical examination by a qualified physician. The physical examinations will meet the requirements of 29 CFR 1926.65. Subcontractors will also supply copies of the medical examination clearance certificate for each employee they have on site.

## 6.3 Medical Restriction

When a medical care provider identifies a need to restrict work activity, the employee's home office H&S assistant will communicate the restriction to the employee, his supervisor, and the HSM. The terms of the restriction will be discussed with the employee and his supervisor. Every attempt will be made to keep the employee working while not violating the terms of the medical restriction.

## 6.4 Medical Records

Medical and personal exposure monitoring records will be maintained according to the requirements of 29 CFR 1910.1020 and kept for 30 years after employment. Employee confidentiality shall be maintained. Employees and their authorized representatives have access to these records through the H&S assistant.

# 7.0 Exposure Monitoring/Air Sampling Program

This chapter discusses the exposure monitoring/air sampling program at the LFNAS site.

## 7.1 Air Monitoring

***Hazardous and Toxic Wastes.*** Monitoring will be performed by the SSHO or other qualified individual during the performance of invasive operations in which exposure to hazardous substances is possible. A calibrated flame ionization detector (FID) (i.e., organic vapor analyzer 128 or equivalent) or photoionization detector (PID) (i.e., HNu, Microtip, or equivalent with an 10.6-electron volt lamp) organic vapor monitor will be utilized to monitor workers' breathing zones to determine if any organic material may be present that would necessitate upgrading of protection level. If flammable or potentially toxic vapors are suspected at the site (i.e., methane or $H_2S$), a combustible gas indicator/oxygen analyzer will be used to detect percent lower explosive limit, percent oxygen and parts per million $H_2S$. LEL/02 monitoring will be required for Pyridine Burn Area excavation due to flammability of pyridine.

Invasive operations include drilling, installation of monitoring wells, direct-push sampling, soil boring, and excavation for sample collection/characterization. Noninvasive operations that do not disturb existing materials include site setup, surveying, decontamination, backfilling, and miscellaneous support zone (SZ) activities.

Air monitoring results will be used to determine the effectiveness and/or need for engineering control methods and trigger action levels, as specified in Table 7-1.

All air monitoring activities shall be documented on a real-time air monitoring log or Field Activity Daily Log form.

In addition to the real-time air monitoring previously described, integrated air sampling may be necessary to quantify COCs in relation to respective PELs. Integrated personal air sampling for COCs could be necessary initially in order to make a negative exposure determination and assess the effectiveness of engineering controls in reducing employee exposure. Integrated air sample collection shall be performed in accordance with the most current NIOSH or OSHA sampling methods for the COC. Analytical laboratories performing the analysis of personal samples shall be approved by ACGIH and participate in the proficiency analytical testing program.

### 7.1.1 Air Monitoring Frequency

Air monitoring frequency and locations are presented in Table 7-2.

### *7.1.2 Air Monitoring Equipment*

A FID or PID and combustible gas/ oxygen indicator will be available for on-site use as necessary. All equipment shall be maintained in such quantity and condition as to adequately monitor and assess all site operations.

### *7.1.3 Monitoring Equipment Maintenance and Calibration*

All air monitoring equipment will be calibrated in accordance with the manufacturer's specification. Preventive maintenance and repairs will be conducted in accordance with the respective manufacturer's procedures.

All direct-reading instrumentation calibrations should be conducted under the approximate environmental conditions the instrument will be used. All air monitoring equipment calibrations and maintenance activities shall be documented on a real-time instrument calibration log or field activity daily log. All completed H&S documentation/forms shall be maintained by the SSHO for review by the HSM.

If an instrument is found to be inoperative or suspected of giving erroneous readings, the SSHO shall be responsible for immediately removing the instrument from service and obtaining a replacement unit. The specific CB&I or subcontractor operation for which this equipment is essential shall cease until an appropriate replacement unit is obtained. The SSHO shall be responsible for ensuring a replacement unit is obtained and/or repairs are initiated on the defective equipment.

When applicable, only manufacturer-trained and/or authorized CB&I personnel will be allowed to perform instrument repairs or preventive maintenance.

## *7.2 Other Hazardous Conditions*

If unknown chemicals or contamination are encountered, operations will cease until the situation is evaluated. The SS or SSHO will contact the HSM to evaluate any potentially hazardous situations or any situation with elevated contamination levels. Operations will only be resumed if they can be accomplished in a safe manner.

## *7.3 Noise Monitoring*

Noise monitoring will not be conducted, because previous noise monitoring during similar heavy equipment operations has characterized noise levels greater than 85 dBA within a 5-foot radius around the rear end (motor side) of heavy equipment. Hearing protection is mandatory for all employees in or when working near/adjacent to operating heavy equipment. Noise monitoring will occur when new heavy equipment is brought on site and when new tasks are started that have not previously had their noise levels characterized.

## 7.4 Monitoring Records

The SSHO shall ensure that site monitoring records are complete and incorporated into the project file. Any personnel or area air monitoring results will be incorporated into the CB&I H&S files. The HSM will be responsible for establishing, maintaining, and forwarding to other CB&I offices (as necessary) all the following required monitoring information for placement in individual employee files:

- Employee name and payroll number
- The date, time, pertinent task information, and exposure information
- Weather conditions (wind direction, precipitation, temperature, etc.)
- Description of the analytical methods, equipment used, equipment identification number, and calibration data
- Type of PPE worn
- Engineering controls used to reduce exposure.

## 7.5 Notification of Personal Monitoring Results

Within five working days after receipt of monitoring results, the project H&S staff and the host office H&S staff will ensure that each employee is informed in writing of the results that represent that employee's exposure. Monitoring results representative of an employee's exposure shall be reported to the affected employee on an Employee Notification of Industrial Hygiene Monitoring Results Form.

Whenever the results indicate that the representative employee exposure exceeds the PEL, with or without regard to respiratory protection, the Employee Notification of Industrial Hygiene Monitoring Results Form shall state that the PEL was exceeded and provide a description of the corrective action taken to reduce exposure to a level below the PEL.

CB&I will provide industrial hygiene monitoring results to subcontractor companies if the exposure of subcontractor employees to airborne contaminants is elevated. Notification of subcontractor personnel of industrial hygiene monitoring results is the responsibility of the subcontractor.

## 7.6 Exposure Standards

Currently, exposure guidelines for many chemical substances are regulated by OSHA. OSHA PELs are based upon the time-weighted average (TWA) concentration for a normal 8-hour workday and a 40-hour work week.

Threshold limit values and recommended exposure limits refer to airborne concentrations of substances that represent conditions to which nearly all employees may be repeatedly exposed without adverse effect. These threshold limit values and recommended exposure limits are prescribed by ACGIH and NIOSH and based on the best available information obtained through industrial experience and animal or human studies. Because of the wide variation in individual

susceptibility, a small percentage of workers may experience discomfort from some substances at concentrations below the recommended values. It has been policy to use these guidelines for good hygienic practices; however, whenever applicable, stricter guidelines may be utilized.

Several chemical substances have short-term exposure limits or ceiling values that allow a maximum concentration to which workers can be exposed continuously for a short period of time without suffering from the following:

- Irritation
- Chronic or irreversible tissue damage
- Narcosis of a sufficient degree to result in accidental injury, impaired self-rescue abilities, or substantially reduced work efficiency.

The short-term exposure limit is defined by ACGIH and OSHA as a 15-minute TWA exposure, which should not be exceeded within a 2-hour time period during a workday, even if the 8-hour TWA is within applicable limits. OSHA requires that a 15-minute "ceiling" concentration never be exceeded for that chemical constituent. This notation appears as the letter "C" after the chemical name.

Under certain chemical substance listings, a "skin" notation may appear. This refers to the potential contribution to the overall exposure by the cutaneous route, including mucous membranes and eye, either airborne or by direct contact. Limited quantitative data are available describing absorption as a function of the concentration to which the skin is exposed. Biological monitoring may be considered to determine the relative contribution of dermal exposure to the total dose.

ACGIH, NIOSH, and OSHA have recognized through epidemiological studies, toxicology studies and, to a lesser extent, case histories that certain chemical substances may have the potential to be carcinogenic in humans. Because of the long latency period for many carcinogens, it is often impossible to base timely risk management decisions on the results of such information. Two categories of carcinogens (confirmed human carcinogens and suspected human carcinogens) are designated, based on the most current literature and information. These categories are based on either of the following:

- Limited epidemiologic evidence
- Demonstration of carcinogens in one or more animal species by appropriate methods.

The worker potentially exposed to a known human carcinogen must be properly equipped to ensure virtually no contact with the chemical constituents. In the case of a suspected human carcinogen, worker exposure by all routes must be carefully controlled by the use of personal and respiratory protection and through administrative or engineering controls.

# 8.0 Cold and Heat Stress

## 8.1 Heat Stress

The combination of warm ambient temperature, humidity, and protective clothing increases the potential for heat stress. Heat stress is caused by a number of interacting factors, including environmental conditions, clothing, workload, and individual characteristics. Extremely hot weather can cause physical discomfort, loss of efficacy, or personal injury. Individuals vary in their susceptibility to heat stress. Factors that may predispose individuals to heat stress include the following:

- Lack of physical fitness
- Insufficient acclimation
- Age
- Dehydration
- Obesity
- Alcohol and/or drug use
- Medical conditions
- Infections
- Sunburn
- Diarrhea
- Chronic disease.

Reduced work tolerance and the increased risk of heat stress are directly influenced by the amount and type of PPE worn. PPE adds weight and bulk and severely reduces the body's access to normal heat exchange mechanisms (evaporation, convection, and radiation), and increases energy expenditure. Respirators increase the work of breathing. CMS-710-01-PR-00600, *Heat Stress Prevention and Control*, will be adhered to at all times. Heat stress disorders include rash, cramps, exhaustion, and stroke. Heat stress awareness training will be a part of the initial training session and will be reinforced, as necessary, during daily tailgate safety meetings. This information will be reviewed during safety meetings. Workers are encouraged to increase consumption of water and electrolyte-containing beverages such as Gatorade® or fruit juices. These beverages will be provided on site. If the body's physiological processes fail to maintain a normal body temperature because of excessive heat, a number of physical reactions can occur, ranging from mild to fatal. Heat-related problems include the following:

- ***Heat Rash*** – Heat rash is caused by continuous exposure to heat and humidity and aggravated by chafing clothes. Heat rash decreases the body's ability to tolerate heat in addition to being a nuisance.

- ***Heat Cramps*** – Heat cramps are caused by profuse perspiration with inadequate electrolytic fluid replacement. Heat cramps cause painful muscle spasms and pain in the extremities and abdomen.

- ***Heat Exhaustion*** – Heat exhaustion is caused by increased stress on various organs to meet increased demand to cool the body. Heat exhaustion causes shallow breathing;

pale, cool, moist skin; profuse sweating; and dizziness. Promptly moving the affected individual to a cool place to lie down and providing cool fluids to drink can alleviate heat exhaustion.

- ***Heat Stroke*** – Heat stroke is the most severe form of heat stress. This is a life-threatening situation. Call the emergency medical service. Heat stroke symptoms include hot, dry skin; no perspiration; nausea; dizziness; confusion; strong, rapid pulse; and coma. The body must be cooled immediately to prevent severe injury or death. Remove the victim from heat. Immerse victim in cool bath or wet clothing to allow better evaporative cooling.

### *8.1.1 Heat Stress Prevention*

One or more of the following control measures shall be used to help control heat stress:

- Site workers will be encouraged to drink plenty of water throughout the day. They will be advised to slightly increase their salt intake by lightly salting their food.
- On-site drinking water will be kept cool (50 to 60°F) to encourage personnel to drink frequently.
- A work regimen that will provide adequate rest periods for cooling down will be established using physiological monitoring. When physiological monitoring is not providing adequate heat stress control, additional controls, including job rotation, work/rest cycles, etc., will be implemented to supplement physiological monitoring. Table 8-1 shows a work/rest schedule which may be implemented as it relates to the work load and regimen of personnel working in permeable clothing. Table 8-2 shows a work/rest schedule which may be implemented as it relates to the work load and regimen of personnel working in impermeable clothing.
- Heat stress monitoring using NIOSH/OSHA/USCG/EPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities* shall be conducted when impermeable clothing is worn or temperatures are at or above 70°F dry bulb temperature. Ambient dry bulb temperature will be taken in accordance with Table 8-3.
- All personnel will be advised of the dangers and symptoms of heat stroke, heat exhaustion, and heat cramps.
- Cooling devices, such as vortex tubes or cooling vests, may be used when personnel wear impermeable clothing in conditions of extreme heat.
- Employees will be instructed to monitor themselves and coworkers for signs of heat stress and to take additional breaks as necessary.
- A shaded rest area will be provided whenever possible.
- Employees shall not be assigned to other tasks during breaks.
- Employees shall remove impermeable garments during rest periods. This includes white Tyvek-type garments.
- All employees shall be informed of the importance of adequate rest, acclimation, and proper diet in the prevention of heat stress disorders.

Individuals succumbing to the symptoms of heat stress will notify the SSHO, SS, or designee immediately. In the event of heat stress, halt activities and initiate treatment. Early detection and treatment of heat stress can prevent the onset of more serious heat exhaustion or stroke conditions. Individuals that have succumbed to any heat-related illness become more sensitive and predisposed to additional heat stress situations.

**Notify the SSHO** if you have a condition such as cardiac (heart) disease that may affect your ability to tolerate heat or if you are taking medications such as beta-andrenergic receptor blockers and calcium-channel blockers, diuretics, antihistamines, phenothiazines, or cyclic antidepressants. If you are not sure if your prescription medication is one of those, please contact your doctor or pharmacist.

### *8.1.2 Heat Stress Monitoring*

Heat stress monitoring will be based on the "Evaluation Scheme for Heat Stress" published by ACGIH and described in CMS-710-01-PR-00600, *Heat Stress Prevention and Control*.

The SSHO or his/her designee shall maintain and review logs recording each worker's physiological monitoring information and shall determine, based on those records, if adjustments to work/rest regimen must be made.

***Individual Monitoring.*** Physiological monitoring can be used in lieu of or addition to the Wet Bulb Globe Temperature Index and is preferred to adjust individual work/rest cycles. Personnel will take breaks, as needed, to cool down. Once ambient temperatures reach 70°F, physiological monitoring will be conducted in accordance with Table 8-3. Physiological monitoring will be recorded on the Heat Stress Monitoring Record. It is anticipated that this monitoring can be self performed once the H&S representative demonstrates appropriate techniques to affected employees. Because individuals vary in their susceptibility to heat, this type of monitoring has its advantages over the Wet Bulb Globe Temperature Index. The following two parameters are to be monitored at the beginning of each rest period:

- ***Heart Rate.*** Each individual will count his/her radial (wrist) pulse as early as possible during each rest period. If the heart rate of any individual exceeds 65 percent of his/her calculated maximum heart rate (maximum heart rate = 180 - age) at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same. An individual is not permitted to return to work until his/her sustained hear rate is below 65 percent of his/her calculated maximum heart rate.

- ***Temperature.*** Each individual will measure his/her temperature with a thermometer for one minute as early as possible in the first rest period. If the temperature exceeds 99.6°F at the beginning of the rest period, then the work cycle will be decreased by one-third. The rest period will remain the same.

  An individual is not permitted to return to work if his/her temperature exceeds 100.4°F.

## *8.2 Cold Stress*

Cold stress is not anticipated to be a concern but is discussed for informational purposes. Most cold-related worker fatalities have resulted from failure to escape low environmental air temperatures or from immersion in low temperature water. The single most important aspect of life-threatening hypothermia is a fall in the deep core temperature of the body.

Site workers should be protected from exposure to cold so that the deep core temperature does not fall below 36 degrees Celsius/96.8°F. Lower body temperatures will very likely result in reduced mental alertness, reduction in rational decision making, or loss of consciousness, with the threat of fatal consequences. To prevent such occurrence, the following measures will be implemented:

- Cold stress monitoring shall be conducted using the most current ACGIH cold stress standard.
- Site workers must wear warm clothing such as mittens and heavy socks, when the air temperature is below 45°F. Protective clothing, such as Tyvek or other disposable coveralls, may be used to shield employees from the wind.
- When the air temperature is below 35°F, employees must wear clothing for warmth, in addition to chemical-protective clothing. This will include:

– Insulated suits, such as whole body thermal underwear
– Wool socks or polypropylene socks to keep moisture off the feet
– Insulated gloves
– Insulated boots
– Insulated head cover such as hard hat, winter liner, or knit cap
– Insulated jacket, with wind and water resistant outer layer.

- At air temperatures below 35°F, the following work practices must be implemented:

– If the clothing of a site worker might become wet on the job site, the outer layer of clothing must be water impermeable.

– If a site worker's underclothing becomes wet in any way, the worker must change into dry clothing immediately. If the clothing becomes wet from sweating (and the employee is not uncomfortable), the employee may finish the task at hand prior to changing into dry clothing.

– Site workers must have a warm break area (65°F or above).

– Hot liquids such as soups or warm, sweet drinks must be provided in the break area. The intake of coffee and tea should be limited, due to their circulatory and diuretic effects.

– The buddy system must be practiced at all times on site. Any site worker observed with severe shivering must leave the work area immediately.

– Site workers should dress in layers, with thinner, lighter clothing worn next to the body.

– Site workers should avoid overdressing when going into warm areas or performing strenuous activities.

# 9.0 Standard Operating Safety Procedures, Engineering Controls, and Work Practices

The following work practices will be observed during all site activities.

## 9.1 General Practices

- At least one copy of this plan shall be available at the project site in a location readily available to all personnel, including visitors.
- Each work team will have a copy of this plan with them at all times while at the work site.
- Never work alone and maintain buddy system and open lines of communication (cellular phone or radio).
- Maintain line of sight with workers during activities that could involve potentially hazardous substances.
- Practice contamination avoidance. Never sit or kneel on potential contaminated ground, never lay equipment on the ground, avoid obvious sources of contamination such as puddles, and avoid unnecessary contact with on-site objects.
- If PPE is ripped or torn, work shall stop and PPE shall be removed, repaired, and/or replaced.
- Be alert to any unusual changes in your own condition; never ignore warning signs. Notify on-site SSHO about suspected exposures, illness, and accidents.
- A vehicle will be readily available for emergency use. All personnel at the site shall be familiar with the most direct route to the nearest hospital.
- Note wind direction. Personnel shall remain upwind whenever possible during on-site activities involving hazardous fumes, vapor, and flammable material.
- Never climb over or under refuse or obstacles.
- Hands and face should be thoroughly washed before eating, drinking, etc.
- Ensure that no one individual is required to lift more than 60 pounds.
- All cranes will be operated by qualified operators. Proof of the operator's qualification will be in writing.
- Legible and understandable precautionary labels that comply with the hazard communication standard shall be affixed prominently to all containers of contaminated scrap, waste, debris, and clothing. Labeling shall be bilingual.
- No food or beverages shall be present or consumed in the restricted work areas (EZ and CRZ).
- No tobacco products shall be present or used in the restricted work areas (EZ and CRZ).

- Cosmetics shall not be applied within the restricted work areas (EZ and CRZ).

- Per CMS-710-02-FM-04406, *Minimum Project HSE Requirements*, glass bottles or containers are not permitted on site. The only allowable exception is where an EPA method requires glass containers for sample collection.

- All crew personnel on site shall use the buddy system (working in pairs or teams). If protective equipment or noise levels impair communications, then prearranged hand signals shall be used for communication. Visual contact shall be maintained between crew members at all times, and crew members must observe each other for signs of toxic exposure. Indication of adverse effects include, but are not limited to, the following:

  - Changes in complexion and skin coloration
  - Changes in coordination
  - Changes in demeanor
  - Excessive salivation and papillary response
  - Changes in speech pattern.

- Employees shall inform their partners or fellow team members of nonvisible effects of overexposure to toxic materials. The symptoms of such overexposure may include the following:

  - Headaches
  - Dizziness
  - Nausea
  - Blurred vision
  - Cramps
  - Irritation of eyes, skin, or respiratory tract.

## *9.2 Operating Procedures*

This section discusses site operating procedures at LFNAS.

### *9.2.1 Drilling Equipment Operations*

Specific elements of this section may not be applicable, depending on the type of drilling equipment used and/or for the anticipated scope of this project. Prior to the start of site work, the drilling subcontractor will inspect all drilling equipment in the presence of the SS. Drilling shall comply with the most protective provisions of Shaw legacy Procedure HS316, *Drill Rig Operations;* CMS-710-02-PR-07200, *Drill Rig Operations;* and manufacturer recommendations.

- The departing driller shall inform the oncoming driller of any special hazards or ongoing work that may affect the safety of the crew.

- Firefighting equipment shall not be tampered with and shall not be removed for other than the intended firefighting purposes or for servicing.

- If lubrication fittings are not accessible with guards in place, machinery shall be stopped for oil and greasing.

- Rigging material equipment for material handling shall be checked prior to use on each shift and as often as necessary to ensure it is safe. Defective rigging shall be removed from service.

- The area around the tower ladder shall be kept clear to provide unimpeded access to the ladder.
- Work areas and walkways shall not be obstructed.
- The rotary table of the rig floor shall be kept free of obstructions and free of undue accumulation of oil, water, ice, or circulating fluids.
- All emergency stop devices shall be clearly labeled and every crew member familiar with their location and operation.
- All controls shall be properly labeled as to their specific function
- Auger guards or presence sensing devices shall be used to protect personnel from accidental contact with the rotating auger.

### *Overhead Electric Clearances*

| Nominal System Voltage | Minimum Required Clearance |
|---|---|
| 0-50 kilovolts (kV) | 10 feet |
| 51-200 kV | 15 feet |
| 201-300 kV | 20 feet |
| 301-500 kV | 25 feet |
| 751-1000 kV | 45 feet |

When equipment is in transit, with the boom lowered and no lead, the equipment clearance must be at least 4 feet for voltages less than 50 kV, 10 feet for voltages of 50 to 345 kV, and 16 feet for voltages greater than 345 kV.

### *Hoisting Operations*

- The tower must not be raised until the rig has been blocked, leveled, and chocked.
- Drillers shall never engage the rotary clutch without watching the rotary table and ensuring that it is clear of personnel and equipment.
- Unless the draw works are equipped with an automatic feed control, the brake shall not be left unattended without first being tied down.
- Drill pipe or casing shall not be picked up suddenly.
- Drill pipe shall not be hoisted until the driller is sure that the pipe is latched in the elevator, or the tower man has signaled that he may safely hoist the pipe.
- During instances of unusual loading of the tower or mast, such as when making an unusually hard pull, only the driller should be on the rig floor, and no one shall be on the rig or tower.

- The brakes on the draw works of every drilling rig shall be tested by each driller when he comes on shift to determine whether they are in good order. The brakes shall be thoroughly inspected by a competent individual each week.
- A hoisting line with a load imposed shall not be permitted to be in direct contact with any tower member or stationary equipment unless it has been specifically designed for line contact.
- Workers shall never stand near the well bore when any wire line device is being run.
- Hoisting control stations shall be kept clean and controls labeled as to their functions.

***Riding Hoisting Equipment.*** Under no circumstances will personnel be permitted to ride the traveling block or elevators, nor will the cat line be used as a personnel carrier.

### *Cat Line Operations*

- Only experienced workers will be allowed to operate the cat head controls. The kill switch must be clearly labeled and operational prior to operation of the cat line.
- The cat head area must be kept free of obstructions and entanglements.
- The operator shall not use more wraps than necessary to pick up the load. More than one layer of wrapping is not permitted.
- Personnel shall not stand near, step over, or go under a cable or cat line that is under tension.
- Employees rigging loads on cat lines shall take the following precautions:

– Keep out from under the load.

– Keep fingers and feet where they will not be crushed.

– Be sure to signal clearly when the load is being picked up.

– Use standard visual signals only and do not depend on shouting to coworkers.

– Make sure the load is properly rigged, because a sudden jerk in the cat line will shift or drop the load.

### *Pipe Handling*

- Pipe shall be loaded and unloaded layer by layer, with the bottom layer pinned or blocked securely on all four corners. Each successive layer should be effectively blocked or chocked.
- Workers shall not be permitted on top of the load during loading, unloading, or transferring of pipe or rolling stock.
- Employees shall be instructed never to try to stop rolling pipe or casing; they should be instructed to stand clear of rolling pipe.

- Slip handles shall be used to lift and move slips. Employees should not be permitted to kick slips into position.
- When pipe is being hoisted, personnel shall not stand where the bottom end of the pipe could whip and strike them.
- Pipe stored in racks, catwalks, or on flatbed trucks shall be chocked to prevent rolling.

### *Tower Operations*

- The tower climber shall be used whenever climbing the tower. Personnel on the tower should be tied off or otherwise protected from falling when working in an unguarded elevated position.
- All stands of pipe and drill collars racked in a tower shall be secured with rope or otherwise adequately secured.
- Tools, tower parts, or materials of any kind shall not be thrown from the tower.
- The elevators must be properly clamped onto all pipe joints prior to the driller engaging the load.

### *Making and Breaking Joints*

- Tongs shall be used for the initial making up and breaking of the joint. The rotary table should not be used for the initial breaking of a joint.
- Employees making or breaking joints shall not be permitted to stand within the arc of the tong handles when the tong pull line is under tension. Employees should handle the tongs only by the appropriate handles.
- Employees shall be trained in the safe use of spinning chains. Spinning chains should not be handled near the rotary table while it is in motion.

## *9.2.2 Drum Handling Safety*

Operations shall be organized to minimize the amount of drum or container movement. Employees shall be warned of the potential hazards associated with the contents of the drums or containers during tailgate safety meetings prior to the beginning of drum handling operations. Drum handling will not be conducted manually; appropriate mechanical drum handling equipment will be used at all time. All drums and containers used to store remedial or investigative waste shall be labeled as to their content. Ignition sources during transfer operations shall be minimized by using proper equipment and procedures. Standing upon or working from drums or containers is prohibited.

## *9.2.3 Heavy Equipment Operating Safety*

The physical hazards and control methods shown in Table 2-1 shall be reviewed for each task and communicated to all affected personnel. As new hazards are discovered, the hazards will be promptly communicated to site personnel. Prior to the start of site work, the heavy equipment

operators will inspect all equipment and complete a safety inspection checklist for each piece of equipment.

All heavy equipment will be used in the intended manner. Drivers will operate all equipment in accordance with the manufacturer's instructions and within the safe operating parameters defined by the manufacturer.

Ground personnel should always make eye contact and wait for a signal to proceed before passing close to or in front of operating equipment or moving vehicles. When ground personnel are working in the vicinity of heavy equipment, they should inform the operator of their presence. Ground personnel shall wear Class III high-visibility apparel when working around heavy equipment.

All drivers and operators will be expected to adhere to the speed limits, signs, and road markings.

All heavy equipment will carry a multipurpose dry chemical fire extinguisher (at least 5 pounds).

Backhoes and other non-crane heavy equipment will be used to "pull" (lift) equipment only when this is within the normal design parameter of the equipment. If a piece of equipment such as a trackhoe is used to make a lift, it will have a lifting eye mounted on or near the bucket. This lifting eye must be standard equipment for the make and the model of equipment. This type of lifting shall also comply with the new requirements of Section 16.N and Appendix T of EM 385 1-1.

During trenching, CMS-710-02-PR-01600, *Excavation and Trenching,* must be followed. This procedure complies with OSHA Regulations 1926.650 through 1926.652. Per the procedure, any excavation greater than 4 feet deep which persons must enter must be shored, sloped, or otherwise made safe for entry. The shoring or sloping system must be designed by a registered professional engineer licensed in the state of Florida. The design must be present at the site, and the system must be installed as designed.

All excavation shall be performed from a stable ground position. Daily inspections of the excavation shall be made by a competent person who has received training in excavation safety. The competent person shall determine the likelihood of a cave-in, and necessary requirements, such as sloping or shoring, shall be taken if the walls appear to be unstable.

All spoil shall be located at least 3 feet from the edge of the excavation to prevent it from falling back into the excavation. The excavation shall be guarded on all sides by barricades or caution tape at least 2 feet from the spoils outside edge. Class II perimeter protection per EM-385-1-1 is anticipated for the majority of excavations at the former LFNAS.

All project personnel shall participate in the daily tailgate safety meetings and be instructed on the following requirements:

- Before excavating, the existence and location of underground pipe, electrical equipment, and gas lines will be determined. This will be done, if possible, by contacting the appropriate utility company and/or client representative to mark the location of the lines. If the client's knowledge of the area is incomplete, an appropriate device, such as a cable avoiding tool, will be used to locate the service line. No mechanical excavation is allowed within 3 feet of underground utilities. Only hand digging is permitted.
- Operations must be suspended and the area vented if the airborne VOC concentration in the breathing zone measured by the FID or PID reaches 5 parts per million continuously. If flammable atmospheres are suspected, a combustible gas/oxygen analyzer will be utilized.
- A VOC and/or flammable vapor oxygen reading of the general work area will be made regularly. Continuous monitoring is required when working with fuel/UST sites.
- If excavating equipment is located in the vicinity of overhead power lines, distances specified in Section 9.2.1 at a minimum must be maintained between the lines and any point on the equipment. If the lines have appreciable sag or windy conditions exist, this distance shall be increased by 5 feet.

All cranes (if required on site) will be operated by qualified operators. Proof of the operator's qualification will be in writing.

### *9.2.4 High-Pressure Water Jetting Operation Safety*

***Job Setup.*** All machinery and mechanized equipment shall be operated only by personnel who have been trained in accordance with the original manufacturer's instructional training program and have been qualified through demonstrating the knowledge, experience, and ability to perform the assigned task.

The jetting operator shall be responsible for the safe operation of the high-pressure water jetting equipment. To ensure the safety of the operator and nearby workers and to ensure that proper equipment selection is followed, the manufacturer's checklist shall be completed prior to starting work.

The work area should be isolated with use of suitable barriers (i.e., rope, safety tape, barrels, etc.) to warn personnel they are entering a hazardous area. The perimeter should be outside the effective range of the jet whenever possible. The work area must be as clean as feasible to prevent slip, trip, and fall hazards.

### *High-Pressure Water Jetting Operations*

- The equipment must be operated within the limitations specified by the manufacturer.
- The system shall incorporate at least one fluid shutoff or dump service. The orifice operator must always be able to shut down the water jet by releasing pressure on the trigger, switch, or foot valve pedal.
- Hoses shall be arranged so that a tripping hazard does not occur.
- The hoses shall be checked for evidence of damage, wear, or imperfections.
- Any electrical equipment in the immediate area of the operation that presents a hazard to the operator shall be de-energized, shielded, or otherwise made safe. Ground fault circuit interrupters shall be used for any necessary power hookups.
- Only approved safety cans shall be used to store fuel. Do not refuel equipment while it is operating.
- Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.
- The minimum PPE shall be worn during jetting operations, including hard hats, impact-resistant safety glasses, and safety shoes. In addition, the jetting gun operator will wear metatarsal guards for the legs and feet, hearing protection (if appropriate), and liquid-resistant clothing.
- The jet operator shall not be distracted until the jet has stopped.
- When pressurizing the system, increase pressure slowly on the system while it is being inspected for leaks, faulty components, or both. Repair or replace components only when equipment is properly locked out and tagged.
- During jetting operations, a minimum of two persons, one at the orifice or gun and one accessible to the pump, shall be employed at all times.
- The operator and other team members shall be capable of performing the required operations safely. All shall be capable of speaking and reading the instructions and warnings in the language of their place of work.

### *9.2.5 Lifting Safety*

Back strain or injury may be prevented by using proper lifting techniques. The fundamentals of proper lifting include the following:

- Consider the size, shape, and weight of the object to be lifted. Two persons must lift an object if it cannot be lifted safely alone (e.g., greater than 60 pounds).
- The hands and the object should be free of dirt or grease that could prevent a firm grip.
- Gloves must be used and the object inspected for metal slivers, jagged edges, burrs, and rough or slippery surfaces.

- Fingers must be kept away from points that could crush or pinch them, especially when putting an object down.
- Feet must be placed far enough apart for balance. The footing should be solid and the intended pathway should be clear.
- The load should be kept as low as possible, close to the body with the knees bent.
- To lift the load, grip firmly and lift with the legs, keeping the back as straight as possible.

### *9.2.6 Confined-Space Entry*

Confined-space entry is not anticipated during planned activities at LFNAS. If confined-space entry must be performed, an SSHP addendum shall be prepared and approved prior to work start.

## *9.3 Hearing Conservation*

All on-site CB&I and subcontractor personnel shall wear hearing protection with a noise reduction rating of at least 20 when noise levels exceed 85 dBA. All CB&I employees who are active in hazardous waste operations and emergency response operations and participate in the medical surveillance program are enrolled in a hearing conservation program and receive annual hearing conservation training. Site personnel who may be exposed to noise shall also receive baseline and annual audiograms and training as to the causes and prevention of hearing loss. CB&I maintains a comprehensive written hearing conservation program in their H&S policies and as described in CMS-710-01-PR-00900, *Noise Control and Hearing Conservation*.

Whenever possible, equipment that does not generate excessive noise levels will be selected for this project. If the use of noisy equipment is unavoidable, barriers or increased distance will be used to minimize worker exposure to noise, wherever possible.

## *9.4 Hot Work*

Any spark of flame-producing activity will require prior notification to the SSHO in order to plan and prepare for fire prevention contingencies as well as execution of overall fire prevention measures. CMS-710-02-PR-02400, *Fire Protection and Prevention*, shall be required for all flame- and spark-producing site work.

## *9.5 Alcohol and Drug Testing*

CB&I is firmly committed to providing associates a safe and healthful workplace and to providing clients and the public safe and efficient services. Associate involvement with the use, possession, or sale of alcohol, illegal drugs, “look-alikes,” or any substance represented as a controlled substance creates an impediment toward meeting these commitments and is prohibited.

All associates of CB&I shall be subject to drug and alcohol testing as described in accordance with CMS-710-01-PR-03600, *Substance Abuse Program*. Contractors and subcontractors are required to

document that they maintain a substance abuse prevention program with effectiveness comparable to the CB&I programs.

# 10.0 Site Control Measures

## 10.1 Work Zones

Construction areas will be demarcated as construction areas. The remedial investigation areas will be divided into three work zones: the EZ, a CRZ, and an SZ. The SSHO will be responsible for designation of the work zones. The EZ is the area where contamination does or could occur. The EZ for a site will be an approximate 20-foot radius around the work area or heavy equipment operation or a 10-foot radius around sampling locations and will be marked with barrier tape or other means to warn personnel of potential chemical or physical hazards. Measurements from real-time air monitoring instrumentation will also dictate initiation of specific site control measures or expansion of EZ demarcation.

Only CB&I personnel and authorized visitors who have met the requirements discussed in Section 6.1 and are wearing the required PPE will be allowed within a site CRZ or EZ.

A decontamination area/CRZ for equipment and personnel will be established immediately adjacent to the EZ. This area will also be delineated with traffic cones and/or barrier tape.

The remainder of the project area will be designated as the SZ. No special markings or warning labels are required for this area.

A typical EZ, CRZ, and SZ layout is provided on Figure 10-1.

## 10.2 Security Operations

This section describes the procedures for controlling access by personnel and vehicles into potentially dangerous or hazardous working areas within the site. Site management may use a combination of security fencing, lighting, and warning signs to control access to each area. Entrance to each area will be restricted to specific points that will be controlled and monitored by project personnel. Only project personnel, subcontractor personnel, and authorized visitors with proper identification will be allowed access to the active site. A CB&I escort will always accompany visitor personnel. The primary mission of security operations is the control of personnel and vehicles entering and leaving the sites.

Security operations will include the following:

- Maintain a visitor log at the project.
- Escort visitors to the site(s) by project personnel. Visitors will receive an abbreviated site orientation briefing in accordance with this SSHP.
- Contract with a security service to patrol the sites during off-work hours and weekends, if required.

- Notify local law enforcement in the event of vandalism, trespassing, or breaking and entering. It is not intended that project personnel assume a confrontational role.
- Lock site facilities containing items of value or items subject to vandalism when unoccupied.

Attention will be paid to the potential impacts of activities on nearby residences, businesses, and schools.

# 11.0 Personal Hygiene and Decontamination

In general, everything that enters an EZ at hazardous, toxic, and radiological waste sites must either be decontaminated or properly discarded upon exit from the EZ. Personnel contact with hazardous substances is not actually anticipated based on the scope of work; however, should contamination be identified, the following measures shall be initiated.

## 11.1 Personnel Decontamination Procedures-Level B

The following industrial chemical decontamination procedure is applicable to personnel in Level B PPE at the CRZ supporting the Pyridine Burn Area.

- **Station A – Equipment Drop**. This station is located at the exit of the CRZ and consists of a 6-mil plastic drop cloth.
- **Station B – Boot Wash**. This station consists of a plastic or metal shuffle pan with smooth or protected edges and a long-handled brush. Water will be added to the shuffle pan to a depth of 3 or 4 inches.
- The individual exiting the EZ will step into the shuffle pan and shuffle water over each boot or boot cover. Boots will be scrubbed thoroughly with the brush.
- **Station C – Outer Garment Decon**. This station consists of a shuffle pan, a plastic drum or trash can, a spray applicator of water, a long-handled brush, and a sponge.
- The individual exiting the EZ will step into the shuffle pan for gross decon. A CRZ attendant will spray or pour water over the protective clothing, removing gross contamination.
- **Station D – Outer Garment Wash**. This station consists of a shuffle pan, a wash container (i.e., a trash can or plastic drum filled with soapy water), a long-handled brush and a sponge.
- The individual exiting the EZ will step into the shuffle pan for outer garment wash. A CRZ attendant will thoroughly scrub the individual from head to toe with soapy water.
- **Station E – Outer Garment Rinse**. This station consists of a shuffle pan, a spray applicator of clean water, or a hose with a spray nozzle connected to the water source.
- The individual exiting the EZ will step into the shuffle pan for outer garment rinse. A CRZ attendant will thoroughly rinse the individual from head to toe with clean water.
- **Station F – Outer Garment Removal**. This station consists of a trash can or plastic drum lined with a 6-mil plastic bag, a chair, scissors, and a 6-mil plastic drop cloth.
- With the assistance of the CRZ attendant, personnel exiting the EZ will doff their PPE in the following order:
  - Tape sealing the outer gloves and outer boots/boot covers to the outer chemical protective garment.

- Outer boots or boot covers.
- Outer gloves.
- The supplied-air respirator facepiece mounted regulator will be removed (the facepiece remains on).
- Outer chemical protective garment (i.e., the Tychem F coveralls) will be doffed.
- Used sealing tape and single-use (i.e., “disposable”) PPE will be placed in the trash can, while multi-use PPE will be placed on the drop cloth.

- **Station G – Facepiece Removal and Inner Glove Removal**. This station consists of one trash can or plastic drum (minimum) lined with a 6-mil plastic bag, a 6-mil plastic drop cloth, and face and hand-washing facilities. Personnel exiting the EZ will remove the Level B facepiece, placing it on the drop cloth. Personnel will then remove their inner gloves. Single-use “disposable” gloves will be placed in the trash can. Personnel will then wash their face and hands.

- **Station H – Medical Monitoring Tent.** This station consists of a tent or other shaded area, chairs, heat stress monitoring equipment, and bottled potable water for hydration. Personnel exiting the EZ will have their pulse and temperature recorded, while resting, cooling, and rehydrating.

## *11.2 Personnel Decontamination Procedures-Level C*

These decontamination procedures apply to personnel wearing Level C or D-Modified PPE if those persons are potentially exposed to COCs. The procedures are listed here in the event that an upgraded PPE ensemble is required. These are the minimum acceptable requirements:

- **Station 1: Equipment Drop** - Deposit equipment used on site (tools, sampling devices, monitoring instruments, radios, etc.) on plastic drop cloths. These items must be decontaminated or discarded prior to removal from the work zone.

- ***Station 2: Outer Boot and Glove Removal*** - Remove outer boots and then gloves. If outer boots and gloves are disposable, deposit them in a container with plastic liner; otherwise, store in a clean, dry place after cleaning.

- **Station 3: Outer Garment Removal** - Remove hard hat and disposable coveralls. Deposit disposable coveralls in a container lined with plastic. Decontaminate or dispose of splash suits as necessary. Wipe clean and store hard hat.

- **Station 4: Respiratory Protection Removal** - Remove respirator facepiece. APR cartridges will be discarded at the end of each day or more frequently if personnel begin to experience increased inhalation resistance. Wash and rinse respirator after each use. Store in clean, dry location.

- **Station 5: Inner Glove Removal**- Remove inner gloves and deposit in container for disposal.

- **Station 6: Wash Face and Hands.**

## 11.3 Potable Water

The following rules apply for all project field operations:

- An adequate supply of potable water will be provided at each work site.
- Portable containers used to dispense drinking water shall be capable of being tightly closed and equipped with a tap dispenser. Water shall not be consumed directly from the container.
- Containers used for drinking water shall be clearly marked and not used for any other purpose.
- Disposable cups will be supplied; both a sanitary container for unused cups and a receptacle for disposing of used cups shall be provided.

## 11.4 Nonpotable Water

Outlets for nonpotable water shall be identified to clearly indicate that the water is unsafe and is not to be used for drinking, washing, or cooking purposes. There shall be no cross connection (open or potential) between potable and nonpotable water systems. Nonpotable and potable water systems shall be separated to minimize confusion and possible cross contamination.

## 11.5 Toilet Facilities

Toilet facilities shall be available for employees. If permanent toilet facilities are not available (i.e., the work site is more than 500 feet from a building with an accessible toilet) and mobile crews do not have access to a vehicle, then portable chemical toilet(s) will be provided per the requirements of EM 385-1-1, Section O2.C.

## 11.6 Trash Collection

Trash collected from the site will be segregated into potential hazardous waste or construction debris. Labeled trash receptacles will be set up in the CRZ and the SZ. Trash will be collected at the end of each shift or as often as necessary to maintain housekeeping and a safe work area. Trash shall be segregated between hazardous and nonhazardous debris. Hazardous material shall be disposed of in accordance with local regulation and environmental protection.

# 12.0 Equipment Decontamination Procedures

Decontamination of heavy equipment will be necessary in the event potential contamination is identified. Equipment utilized in hazardous, toxic, and radiological waste operations must be assumed to be contaminated and carefully inspected and/or decontaminated prior to being used for other activities. A visual inspection of the frame and tires of all vehicles and equipment leaving a work zone will be completed. In order for a vehicle/equipment to pass inspection, it must be in a clean condition and free of loose dirt material on tailgates, axles, wheels, etc.

Cleaning pumps, hoses, and transportable tanks used for the temporary storage of decontamination residual and rinse water is anticipated. Frac tanks or equivalent storage units will be cleaned by pressure washing. It is anticipated that access to the tank interior for cleaning purposes can be achieved through manways without the need to enter a confined space.

An equipment decontamination area will be established on site and utilized to remove waste materials from all equipment leaving a work zone. Decontamination procedures will consist of cleaning equipment to remove dirt.

Equipment wash water residues (if decontamination via water spray is deemed necessary by the SSHO) will be collected for disposal. Any material that is generated by decontamination procedures will be stored until disposal arrangements are made.

***PPE Decontamination.*** Where and whenever possible, single-use, external protective clothing shall be used for work within the EZ or CRZ. This protective clothing shall be disposed of in marked containers. Depending upon subsequent analysis, this protective clothing may require disposal as hazardous waste.

Reusable protective clothing will be rinsed at the site with detergent and water. An MSDS must be present on site for any hazardous chemicals used during decontamination procedures (see Attachment 3).

Respiratory protective equipment will be wiped with a damp cloth and bagged while in the CRZ. After the respirator has been removed from the CRZ, it will be thoroughly cleaned with soap and water. The respirator facepiece will be cleaned and sanitized at the end of each work shift.

# 13.0 Emergency Equipment and First Aid

At least two CB&I employees or subcontractor personnel on site will hold a current certificate in American Red Cross standard FA. This training provides 6.5 hours of adult CPR and basic FA. If a medical emergency exists, consult the emergency phone number list and request an ambulance immediately. Perform FA/CPR as necessary, stabilize the injured, decontaminate if necessary, and extricate only if the environment in which the injured person is located is dangerous or unsafe and only if the rescuers are appropriately protected for potential hazards they may encounter during the rescue. When emergency services personnel arrive, communicate all FA activities that have occurred. Transfer responsibility for care of the injured/ill to the emergency services personnel. The following items and emergency response equipment will be located within easy access at all times:

- FA kit and bloodborne pathogen infection control kit per CMS-710-01-PR-00300, *Bloodborne Pathogens,* and CMS-710-01-PR-01600*, First Aid and Medical Services*.
- Eyewash – A 15-minute eyewash (required if corrosives are present) or an appropriate amount of portable sterile eyewash bottles will be available on site for flushing foreign particles or contaminants out of eyes. The SSHO will demonstrate the proper operation of the unit(s) prior to the start of work.
- Emergency phone numbers list.
- Hospital and occupational clinic route map.
- Cellular phones and/or portable radios for emergency communications in remote areas.
- Type ABC fire extinguishers to contain and extinguish small fires. The local or facility fire department shall be summoned in the event of any fire on site.
- Drugs, inhalants, or medications shall not be included in the FA kit.

## 13.1 Bloodborne Pathogen Exposure Control Plan

This exposure control plan presents H&S guidelines for voluntary FA and CPR care providers. To meet the requirements of OSHA 29 CFR 1910.151 and EM 385-1-1, during day shift operations, at least two persons on site will be adequately trained in FA and CPR and in the requirements of the bloodborne pathogens standard as listed in 29 CFR 1910.1030; CMS-710-01-PR-00300, *Bloodborne Pathogens;* and this SSHP.

### 13.1.1 Definition

Bloodborne pathogens are those agents (i.e., bacteria, virus, and fungi) found in blood components; certain body fluids; and other materials, objects, or surfaces that have had contact with blood that are capable of causing disease or death to unprotected people who come into contact with blood or blood-affected items. Diseases caused by bloodborne pathogens include, but are not limited to, hepatitis B virus (HBV), human immunodeficiency virus (HIV), hepatitis C, and malaria. The most significant and of greatest concern are HBV and HIV.

### *13.1.2 Hepatitis B Virus*

HBV is the major bloodborne pathogen hazard that FA/CPR care providers are most likely to encounter. The HBV can remain infectious for up to 10 days, even in dried blood. The virus adversely affects 8,000 to 10,000 workers annually, resulting in approximately 200 deaths each year.

***Hepatitis Exposure Symptoms.*** Hepatitis (inflammation of the liver) causes severe liver damage or cirrhosis. Exposure symptoms include fever, fatigue, nausea, vomiting, muscle aches, loss of appetite, and jaundice (yellowing of the eyes or skin). Hepatitis diagnosis is difficult because some symptoms are similar to the flu and may remain mild for an extended period of time.

Presently, no cure exists for hepatitis, but it can be prevented with a vaccination.

### *13.1.3 Human Immunodeficiency Virus*

HIV attacks and deteriorates the body's immune system and eventually weakens it to the point that infection sets in, causing the disease Acquired Immune Deficiency Syndrome (AIDS). HIV is primarily transmitted through sexual contact but may also be transmitted through contact with blood and body fluids. HIV is not transmitted by touching or working with people who are HIV positive.

***Human Immunodeficiency Virus Exposure Symptoms.*** HIV leads to AIDS-related illnesses that eventually cause neurological problems, cancer, pneumonia, and death. People can carry the virus for many years without experiencing any symptoms. Upon development, symptoms may include weight loss, skin lesions, dry cough, fever, fatigue, diarrhea, or swelling of the lymph glands.

Presently, no cure exists for HIV or AIDS, and no vaccination is currently available.

## *13.2 Exposure Determination*

The guidelines in this plan are designed to limit occupational exposure of site workers to infectious blood materials that could result in disease or possibly death. The contents of this plan are intended to protect the CB&I employees trained in FA and CPR who are responsible for administering medical assistance to site workers.

***Means of Transmission.*** The major activity that may expose any of these CB&I employees to bloodborne pathogens is their response and care to on-site personal injuries or decontamination of equipment/surfaces contaminated by blood or other potentially infectious materials during an incident. These CB&I employees could be subject to bloodborne pathogens during rendering of FA or CPR by accidental exposure because of the following:

- Punctures through the skin with a contaminated sharp object (i.e., scissors)
- Contact or absorption of blood or blood-contaminated objects through open or broken skin (i.e., cuts, scratches, rashes)
- Blood splashes to their eyes, nose, mouth, or other mucous membranes.

Workers can reduce their risk of contracting HBV or HIV by implementing the recommended work practices (outlined in this plan) before, during, and after responding to emergency medical incidents involving personal injuries.

## *13.3 Measures for Prevention*

The establishment of work practice controls is an integral part of an effective exposure control plan in preventing accidental infection of employees. These work practices are designed to protect employees from reasonably foreseeable occupational exposures to bloodborne pathogens from blood and other potentially infectious material. The work practice controls outlined in this section are applicable to the administration of FA in emergency situations and subsequent cleanup only. Additional controls and requirements are available in CMS-710-01-PR-00300, *Bloodborne Pathogens*.

### *13.3.1 Universal Precautions*

Universal precautions is an approach to infection control that operates on the assumption that all human blood and bodily fluids are to be treated as if they are known to be contaminated with HIV, HBV, or other infectious diseases. Universal precautions shall be implemented whenever there exists a foreseeable potential for contact with blood or bodily fluids.

### *13.3.2 Engineering Controls*

Because of the generally remote location of the work site, the nature of work in outdoor locations with potential exposure to airborne chemical contaminants, and the potential for exposure being limited to emergency situations, the implementation of engineering controls may not be feasible. Exposure control shall be accomplished through implementation of work practice controls and use of PPE.

### *13.3.3 Work Practice Controls*

Work practice controls shall be instituted whenever foreseeable potential contact with, or exposure to, blood and bodily fluid exists. Examples of situations in which these controls are to be implemented include, but are not limited to, accidents or injuries in which administration of FA is required; application of bandages to minor cuts and abrasions of another person; and contact with sores, wounds, or broken skin.

Following are specific work practice controls that shall be implemented:

- Open wounds or cuts will be promptly bandaged.
- Hands and face will be washed as soon as possible after administering FA or CPR. If wash facilities are not readily available, stock disposable one-time-use towelettes.
- No eating, drinking, or smoking is allowed in any work area where a potential exists for occupational exposure to bloodborne pathogens.
- Nondisposable equipment or materials that have or may have blood or infectious fluid contact must be washed immediately after their use (a 1-to-10 solution of bleach and water is recommended for proper decontamination.).
- Any clothing that comes into contact with blood or infectious fluids shall be removed as soon as possible after administering FA or CPR.
- No personal clothing that comes into contact with blood or infectious fluids shall be laundered off site.
- FA kits on site will be equipped with a pair of surgical gloves and CPR mouthpieces in addition to a biohazard (bloodborne pathogen) kit.

***Minimization of Contact.*** Direct contact with blood and bodily fluids should be kept to an absolute minimum, as required in a particular situation. In situations where direct contact is likely, PPE shall be worn to help prevent infection.

Based upon professional judgment, an employee may choose to temporarily forego the use of PPE if he determines that the use of the PPE will further jeopardize his/her well-being or that of the injured worker. This limited application must be carefully evaluated by the employee.

If this situation does occur, CB&I is obligated to investigate and document the circumstances in an effort to provide alternative means to avoid further occurrence.

### *13.3.4 Personal Protective Equipment*

The following are specific PPE items that shall be implemented:

- Always use CPR mouthpieces or ventilation devices.
- Inspect PPE prior to use to ensure it is in good working order and without flaws.
- Do not reuse gloves once removed.
- After use, remove gloves from top to bottom inside out, not allowing unprotected skin to contact the exterior of the gloves.

### 13.3.5 Waste Handling

Disposable items that have or may have blood contact must be bagged separately from other trash. These wastes must be placed in leak-proof containers or bags and labeled.

A collection container for contaminated articles will be available on site. Wastes used in medical emergency treatment (i.e., gloves, towels, gauze) shall be disposed of in the infectious waste container(s). Each container will be replaced as needed and will not be overfilled.

### 13.3.6 Waste Disposal

The waste will remain on site in biohazard-labeled, approved container(s) until an approved disposal facility capable of receiving medical wastes is identified. Disposal of the infectious waste container(s) shall be in accordance with applicable local, state, and federal regulations.

## 13.4 Medical Requirements

The medical requirements of the exposure control plan include provision of an HBV vaccination to all exposed employees and post-exposure procedures and evaluation.

### 13.4.1 Hepatitis B Vaccination

All designated FA providers or potentially exposed employees will have an HBV vaccination made available to them at no cost. Prior to administration, the employee will also receive training as to the vaccine's efficacy, safety, benefits, and consequences. The vaccination series shall be initiated within 24 hours of providing FA/CPR in an incident and shall be administered under the supervision of a licensed physician. Employees may, at their own discretion, decline the vaccination, in which case documentation of declination will be completed and employees may be assigned immediately. If an employee covered by this exposure plan decides to accept the vaccination at a later date, the vaccination will be offered at that time at no cost to the employee.

### 13.4.2 Post-Exposure Procedures and Evaluation

Subsequent to all reported exposure incidents, a confidential medical evaluation and follow-up shall be made available to each employee exposed in the incidents.

***Documentation Procedures.*** Documentation of the exposure incident shall be recorded as soon as possible and include the route(s) of exposure, the circumstances surrounding the incident, and the identification of the source individual. Additionally, each incident shall be placed on the “FA incident list” attached to the location OSHA log of occupational injuries and illnesses.

### Blood Testing

***Source Individuals.*** As soon as feasible, the source individual in an exposure incident will be asked to consent to a blood test to determine HBV and HIV infectivity. Where applicable laws require

employee consent, documented consent shall be obtained prior to testing. If an employee refuses the blood test, documentation of the refusal will be made. Documentation of the test results shall be made available to the exposed employee(s). All results should be kept confidential; criminal and civil penalties may be charged against persons negligently or willfully releasing such information, depending on local laws.

***Exposed Employees.*** Exposed employees will be asked to consent to a blood test for HBV and HIV serological status. If consent to HIV testing is denied, the blood sample will be preserved for 90 days; within this time, the employee may elect to consent to the HIV test.

### *13.4.3 Post-Exposure Medical Evaluation*

Exposed employees shall receive a health care professional's written opinion for post-exposure evaluations. The written opinion shall include the results of the evaluation and any medical conditions resulting from the exposure incident that require further medical treatment.

## *13.5 Hazard Communication*

This section discusses the use of warning labels and signs and the employee training program.

### *13.5.1 Warning Labels*

Containers used for disposal of blood contaminated supplies and waste will be labeled in accordance with the word "biohazard."

### *13.5.2 Warning Signs*

There are no designated areas for medical treatment on site, because FA will be provided on an emergency basis only; therefore, warning signs are not applicable. In cases of potential exposure, observers and nonessential personnel should be verbally warned to keep a safe distance from injured personnel.

### *13.5.3 Employee Training Program*

All associates who are FA/CPR trained and may provide assistance shall be trained in the requirements for voluntary providers, this SSHP and its addenda, and the general provisions of CMS-710-01-PR-00300, *Bloodborne Pathogens*.

## *13.6 Record Keeping*

This section discusses maintenance of training and medical records and recording of incidents.

### *13.6.1 Training Records*

All employees selected to attend the training program that covers the contents of this plan shall sign the acknowledgment form and the training attendance form.

The training record will contain the date, training outline, name and qualifications of the trainer, and names and job titles of attendees.

At the completion of the training program, all participants must take and pass the training quiz.

The training records will be maintained by the CB&I training departments for at least three years from the training date.

### *13.6.2 Medical Records*

Medical records necessary for CB&I employees must include documentation of HBV vaccination status, medical follow-up, post-exposure testing, and a medical professional's written evaluation.

***Confidentiality.*** The employee medical records will be forwarded to Human Resources/CORE Health Services for inclusion in the employee's medical file.

***Maintenance and Transfer of Records.*** CB&I shall maintain the employee medical records for the duration of the employee's employment plus 30 years thereafter.

If, for whatever reason, CB&I no longer does business and no successor exists, CB&I will notify the director of NIOSH in writing three months prior to the disposal of records. If so directed, the records shall be transferred to the director of NIOSH.

### *13.6.3 Incident Recording*

All persons on site must report any near-miss incident, accident, injury, or illness to their immediate supervisor. Supervisors or managers will follow the legacy CB&I incident reporting procedures HS020, *Accident Prevention Program: Reporting, Investigation, and Review*. FA will be provided by the designated site first aider. Injuries and illnesses requiring medical treatment will be accompanied by an Authorization for Treatment form. The employee's supervisor will complete the Supervisor's Employee Injury Report, and the Notification of Accident (First Report) will be completed and submitted within 24 hours to the Government Designated Authority in accordance with EM 385-1-1, Appendix B. An Accident Investigation Report Form (Engineering Form 3394) will be submitted at a later time if required. The results of the investigation should be reported on the accident/injury investigation report. The Supervisor’s Employee Injury Report must be completed and submitted to the HSM within 24 hours of the incident. The accident/injury investigation report must be submitted within 72 hours of the incident.

An incident that occurs as a result of rendering emergency medical care will be recorded on the OSHA 300 Log as OSHA defines work-related injuries and illnesses. All injuries involving the release of blood or bodily fluids must be immediately reported to the H&S department to ensure proper reporting and follow-up. Within 10 working days of any reportable incident, an accident report (ENG

Form 3394) will be completed in accordance with AR 385-40 and Supplement 1 to the same regulation and forwarded to the USACE office at the following address:

U.S. Army Corps of Engineers
Anthony Vigliotti
701 San Marco Boulevard
Jacksonville, FL 32207

An incident follow-up report will be completed within one week of the incident.

# 14.0 Emergency Response and Contingency Procedures

## 14.1 General

This SSHP has been developed to allow site activities to be conducted without adversely impacting the safety of the workers, the community, and the environment. Procedures included in this chapter address the action required in the event extraordinary conditions occur at the site.

## 14.2 First Aid

If FA and/or CPR is administered by site personnel, the SSHO must ensure full compliance with the requirements of Chapter 13.0 and the bloodborne pathogen exposure control plan. CB&I Type I and II FA kits shall be maintained at the site. If the victim cannot be safely moved from the contaminated area, FA necessary to stabilize the victim for safe transport shall be administered at the accident location. Appropriate decontamination of all clothing and equipment shall be followed upon leaving the contaminated area. The SSHO is responsible for administering FA.

## 14.3 Emergency Response

This section discusses emergency response procedures at LFNAS.

### 14.3.1 Pre-Emergency Planning

During the site-specific orientation and at the daily tailgate safety meetings, all employees will be trained in and reminded of the provisions of this emergency response plan, the communication systems, and evacuation routes. This plan will be reviewed and revised, if necessary, on a regular basis. This will ensure that the plan is adequate and consistent with prevailing site conditions.

### 14.3.2 Project Manager's Responsibilities

The PM has primary responsibility for responding to and correcting emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible actions may involve evacuation of personnel from the site area. The PM is additionally responsible for ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. In the absence of the PM, the SS shall assume the responsibilities of the PM. All project personnel are responsible for assisting the PM in responding to emergency situations within the capabilities of their skills, equipment, and training.

### 14.3.3 Evacuation Signal

Vehicle or portable air horns will be used for evacuation signals with one long, continuous blast, which signals emergency evacuation of the site.

### 14.3.4 Emergency Equipment/Facilities

All individuals shall be familiar with the site and be able to identify the locations of the following emergency equipment:

- CB&I-approved FA kits
- Fire extinguishers (minimum of 10-pound ABC)
- Emergency eyewash
- Emergency communication device
- PPE.

### *14.3.5 Medical Emergencies*

FA should be administered by the SSHO while awaiting an ambulance or paramedics. In the event of serious injury on site, all activities will be immediately suspended and resources will be diverted until it can be ensured that response procedures are adequate and that proper assistance has been provided to ambulance or paramedics responsible for treating the injury. Serious injuries or illnesses will be treated at the hospital. Non-serious injuries beyond on-site FA shall be evaluated by an occupational physician. Attachment 5 contains hospital and occupational clinic maps and directions.

All injuries and illnesses must be immediately reported to the PM or the SSHO, who will then notify appropriate off-site personnel and organizations as necessary in accordance with legacy Shaw Procedure HS020, *Accident Prevention Program: Reporting, Investigation, and Review*.

Attending emergency physicians should be given the telephone number of the assigned CB&I medical director to obtain immediate access to an employee's medical records and for consultation purposes.

### *14.3.6 Emergency Contact/Notification Listing*

In case of any emergency, the SSHO or PM will coordinate site access and response.
Local, state, and national emergency numbers are as follows:

Emergency (Ambulance, Fire Department, Sheriff's Office)..... 911
Orange Park Medical Center (Emergency Services).....(904) 276-8500
Healing Arts Urgent Care Occupational Clinic.....(904) 823-3401
Fax (904) 829-8649
CORE Health Services.....(877) 347-7429
Green Cove Springs Fire Department.....(904) 529-2233
Ambulance ..... 911
Clay County Sheriff .....(904) 284-7575
National Response Center .....(800) 424-8802
Poison Control Center.....(800) 222-1222
EPA Region IV .....(404) 347-3931
Game and Fresh Water Fish Commission of Florida (reporting alligator nuisance) .....(904) 758-0525

### *14.3.7 Key Project Personnel*

Ken Cunningham, CB&I PM..... Office (865) 692-3585
Cell (865) 607-0406
Shane Yenchi, CB&I Site Supervisor .....Cell (904) 424-1490
Burney Chance, CB&I SSHO..... Office (865) 690-3211

Doug Russell, CB&I HSM..... Office (865) 692-3584
Cell (865) 414-9545
Anthony Vigliotti, USACE PM..... Office (904) 232-3432
Cell (904) 568-6004
CB&I Health, and Safety HOTLINE (Incident Notification) .....(866) 299-3445
Dr. William Nassetta, CORE Occupational Physician .....(877) 347-7429

### *14.3.8 Directions to the Nearest Hospital and Occupational Physician*

Any situation requiring urgent medical attention will be handled at the hospital. Serious injuries or illnesses will be treated at **Orange Park Medical Center**. Injuries that are not serious in nature but require medical evaluation beyond FA shall be evaluated by a CORE Health Services network occupational physician at **Healing Arts Urgent Care Occupational Clinic**. Maps and directions to the hospital and occupational clinic are provided in Attachment 6.

## *14.4 General Emergency Procedures*

- If a member of the field crew experiences any adverse effects or symptoms of exposure while on the scene, the entire field crew shall immediately halt work and act according to the instructions provided by the SSHO.
- The discovery of any condition that would suggest the existence of a situation more hazardous than anticipated shall result in the evacuation of the field team and reevaluation of the hazard and the level of protection required.
- If an accident occurs, the SS must immediately complete a CB&I injury report in accordance with legacy Shaw Procedure HS020, *Accident Prevention Program: Reporting,* and USACE Accident Investigation Report (ENG Form 3394 (Attachment 5). If necessary, follow-up action shall be taken to correct the situation that caused the accident.

### *14.4.1 Personal Injury*

The SSHO is trained in American Red Cross FA procedures and shall administer appropriate FA treatment, including CPR, in emergency situations. The following general emergency procedures shall be carried out in the event of injury:

- Notify the SSHO of the incident.
- Administer FA.
- Transport victim to nearest hospital or occupational physician, as appropriate.
- Notify the PM, the HSM, CB&I management, and USACE representative of the incident and describe the emergency response actions taken.

### *14.4.2 Fire or Explosion*

In the event of a fire of explosion:

1. Immediately evacuate injured personnel and leave the area.
2. Administer FA, as appropriate.

3. Notify security emergency services.
4. Notify the PM, CB&I HSM, and the USACE representative.

Smoking or open flames are prohibited except in designated smoking areas. Vehicles and equipment will not be left idling. Equipment and vehicles should stay on the paved areas as much as possible.

All flammable liquids will be stored in Underwriters Laboratory- or Factory Mutual-approved storage cabinets. Small quantities of most flammable liquids (5 gallons or less) may be stored in work areas or carried in vehicles, providing those materials will be used that day and contained in a safety can or other approved container. Storage of combustible materials in work areas will be kept to a minimum.

A fire extinguisher shall be provided within 50 feet of any area where more than 5 gallons of flammable or combustible liquids or 5 pounds of flammable gas are being used on the job site (excluding the integral fuel tanks of motor vehicles). Portable fire extinguishers shall be inspected monthly and serviced at least annually by a person licensed or registered by the state fire marshal.

Within occupied offices or trailers, only Underwriters Laboratory-approved electrical extension cords may be used. When outdoors, only double-insulated or grounded electrical power tools may be used.

A hot work permit must be completed and posted prior to any hot work (such as welding or cutting) on site. Hot work shall be in compliance with CMS-710-02-PR-02400, *Fire Protection and Prevention*. CB&I will coordinate with on-site fire prevention authorities to obtain a facility hot work permit when necessary.

## *14.5 Evacuation Routes and Procedures*

Evacuation routes and procedures will be developed by CB&I upon arrival at the site in coordination with local subcontractor personnel.

## *14.6 Spills or Leaks*

In the event of a spill or material release to the air, soil, or water, the SS or SSHO will immediately notify the PM and the HSM. An assessment will be made of the magnitude and potential impact of the release. If it is safe to do so, site personnel will attempt to locate the source of release, prevent further release, and contain the spilled and/or affected materials as follows:

- The spill or release will be approached cautiously. Real-time air monitoring will be continuously performed in the spill vicinity.
- Hazards will be identified based on available information from witnesses or material identification documents (placards, MSDSs, and logs). The potential hazards will be

evaluated to determine the proper personal protection levels, methods, and equipment necessary for response.

- If necessary, the release area will be evacuated, isolated, and secured.
- If possible, spill containment will initially be made without entering the immediate hazard area.
- Entry to the release area will be made with the PPE, personnel, methods, and equipment necessary to perform the work. Hazardous spill containment and collection will be performed in four steps, as follows:
  - Contain the spill with absorbent socks, booms, granules, or construction of temporary dikes.
  - Control the spill at the source by plugging leaks, uprighting containers, overpacking containers, or transferring contents of a leaking container.
  - Collect the spilled material with shovels or heavy equipment as necessary.
  - Store the spilled material for further treatment or disposal. Treatment and/or disposal options of the material will depend on the amount and type of material.

If site personnel cannot safely and sufficiently respond to an environmental release, evacuation of the area may be warranted. The decision to evacuate will depend upon the risk of exposure to SZ personnel and the severity of the release. Personnel will be trained in basic emergency response procedures, as needed. The Fire Department will be notified in the event of a significant spill. Upon their arrival at the site, the SS will brief them on the current situation at hand and any potential hazards the team may be faced with.

CB&I will maintain the following equipment and materials for use during spill response activities:

- Absorbent pads
- Granular absorbent material (noncombustible)
- Polyethylene sheeting
- Shovels and assorted hand tools.

In the event site evacuation is necessary, it shall be in a direction that is upwind of potential releases, if possible. Because the immediate work areas are not fenced, evacuation on foot may be follow any convenient route that allows the workers to achieve a safe distance from the danger area. Evacuation by vehicle should be by way of access roads, if possible.

The authority to order personnel to evacuate the area rests with the SS and SSHO, each of whom will advise the other, when applicable, as soon as possible. Evacuations may or may not be limited to a specific EZ or site area.

- Personnel working in the EZ will immediately make their way to the designated assembly or rally point for a head count. Depending on the severity of the event and allowable time, personnel exiting the EZ may be instructed to forego or modify decontamination procedures.

- Personnel in the SZ will immediately report to the designated assembly or rally point for a head count and further instructions. The SS and SSHO will remain in contact to ensure that evacuation procedures are properly executed. If the designated assembly or rally point is inaccessible, personnel shall evacuate to an upwind location as determined at the time and perform a head count.

- Situations requiring evacuation may include unusually severe weather conditions, fires, or significant chemical spills or releases. In the event of project evacuation due to fires, or significant chemical spills or releases, the CB&I Program Director, CB&I PM, CB&I HSM, USACE representative, fire department, and police department will be notified immediately. A site emergency map that delineates evacuation routes, emergency, FA kit locations, rally point, and site-control zone perimeters will be developed once an on-site evaluation of conditions and topography is complete.

- The safe evacuation distance will depend on the type of emergency involved. If an emergency situation involves very volatile material, the default safe distance will be a minimum of 300 feet upwind from the suspected materials.

- In an emergency, it is imperative that site control and security be maintained. To control site personnel, the site entry/exit log will be used to ensure that all personnel are present or accounted for at the assembly point(s).

The potential for significant personnel contamination is low because there are no known or suspected contaminants of concern in high concentration. If emergency decontamination of personnel is necessary, removal of outer PPE shall take place on site if such removal would not put the victim at increased risk. Emergency medical services personnel will be informed of potential contaminants prior to transport to a medical facility.

The team support vehicle is designated as an emergency vehicle. FA kits shall be made available in accordance with CMS-710-01-PR-01600, *First Aid and Medical Services.* All emergency equipment will be maintained in proper working order and inspected to ensure completeness and proper working order. In the event that any of the disposable items are used, the SSHO will ensure they are replaced immediately.

## *14.7 Adverse Weather Conditions/Natural Disasters*

Adverse weather can take many forms. Thunder and lightning storms, hail, dust storms, and tornados are a few examples. Sudden changes in the weather, extreme weather conditions, and natural disasters can create a number of subsequent hazards. Inclement weather may cause poor working conditions, including slip, trip, and fall hazards. Natural disasters can create many secondary hazards, such as release of hazardous materials to the environment, structure failure, and fires.

Routinely monitoring weather conditions and reports may help reduce the impact of severe weather and natural disasters. It may be necessary to halt certain hazardous operations or stop work altogether to allow the situation to pass. If thunder is detected prior to or during a storm (thunder indicates lightning is present), all activity should stop and employees should shelter in place for 30

minutes from the last thunder sound. The SS, with consultation from the SSHO, must decide what operations, if any, are safe to perform based on existing conditions and anticipated conditions.

Attachment 8 contains a Hurricane Protection Plan for LFNAS.

# 15.0 References

U.S. Army Corps of Engineers (USACE), 2008, *Safety and Health Requirements Manual*, EM 385-1-1, November.

U.S. Army Corps of Engineers (USACE), 2007, *Safety and Occupational Health Requirements for Hazardous, Toxic, and Radioactive Waste (HTRW) Activities,* ER 385-1-92, May.

# TABLES

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
# General Material Storage

Date: February 2014 Project: FUDS HTRW Program

Activity: General Material Storage

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): L

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Material Storage | Flammable and combustible liquids | • Store in NO SMOKING AREA.<br>• Fire extinguisher readily available.<br>• Transfer only when properly grounded and bonded.<br>• Store more than one days use flammable liquids in an approved flammable liquid storage cabinet.<br>• Metal safety cans required for storage. Label containers to content. | L |
| | | Round stock | • Secure from rolling; do not climb or stand on the stack. | L |
| | | Slip, trip, and fall hazards | • Practice good housekeeping. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Material Storage**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Material Storage | Sprains and strains | • Use safe lifting procedures. | L |
| | | Pinch points/cuts | • Keep hands, fingers, and feet clear of moving/suspended materials and equipment.<br>• Beware of contact points.<br>• Stay alert at all times!<br>• Utilize appropriate hand protection when handling materials that present potential hand injury. | L |
| | | Hazard communication | • Label all containers as to contents and hazards; provide MSDS or SDS for nay hazardous materials used onsite.. | L |
| | | Sprains/strains | • Use the proper tool for the job being performed.<br>• Get assistance if needed.<br>• Avoid twisting/turning while inserting and removing water probe. | L |
| | | Spills/residual materials | • Absorbent material will be kept available where leaks or spills may occur. | L |
| | | Lighting | • Adequate lighting will be provided to ensure a safe working environment. | L |
| | | Slip, trip, and falls | • Avoid walking on wet surfaces.<br>• Practice good housekeeping. | L |
| | | Splash hazards | • Splash-resistant PPE will be used to protect employees from splash hazards. | L |
| | | General hazards | • Material storage and HSE controls shall comply with CMS-710-02-PR-00300, Material Storage and Handling | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Material Storage**

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | N/A | Pre-job training for general site activities and controls, and general project PPE requirements. | At project start. FSSSSHO will verify all site personnel and/or visitors receive training prior to the initiation of activities. |
| | N/A | Pre-job training for proper ergonomic/lifting techniques. | At project start. SS/SSHO will verify all site personnel have been briefed on ergonomic/lifting techniques. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## Clearing and Grubbing

Date: February 2014 Project: FUDS HTRW Program

Activity: Clearing and Grubbing

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): M

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Clearing and Grubbing Work Area | Dropping trees onto personnel | • Only qualified personnel will drop trees.<br>• The work area shall be cleared to permit safe working conditions and an escape route planned before any cutting is started.<br>• Just before the tree or limb is ready to fall, an audible warning shall be given to those in the area. All personnel in the vicinity shall be safely out of range.<br>• Employees shall work from the uphill side whenever possible.<br>• Prior to falling operations, the surrounding area, the shape of the tree, the lean of the tree, wind force and direction, and the location of other employees will be reviewed. | M |
| | | Chainsaw operations | • The chainsaw will not be fueled while running, when hot, or near open flame. The saw will not be started within 10 feet of a fuel container.<br>• The operator will hold the saw with both hands during all cutting operations. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Clearing and Grubbing**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Operators must wear eye, ear, hand, foot, and leg protection (i.e., chainsaw chaps).<br>• The chainsaw must never be used to cut above the operator's shoulder height.<br>• The idle speed will be adjusted so that the chain does not move when the engine is idling.<br>• The operator will shut off the saw when carrying it over slippery surfaces, through heavy brush, and when adjacent to personnel.<br>• All chainsaws on site shall have an automatic chain brake or kickback device.<br>• Follow all manufacturers recommended operating safety procedures. | |
| | | Contact with moving equipment/vehicles | • Persons exposed to vehicle or equipment traffic shall wear Class III high-visibility apparel.<br>• Site workers shall establish hand signals when verbal communication becomes difficult.<br>• Equipment operated on the highway shall be equipped with headlights, taillights, brake lights, back-up lights, and turn signals visible from the front and rear.<br>• Never walk or work directly in back of or to the side of heavy equipment without the operator's knowledge.<br>• Assign trained flag person(s) if necessary to direct traffic. | M |
| | | Faulty or damaged equipment being utilized to perform work | • All machinery or mechanized equipment will be inspected by a competent mechanic and be certified to be in safe operating condition.<br>• Equipment will be inspected before being put to use and at the beginning of each shift.<br>• Faulty/unsafe equipment will be tagged and, if possible, locked out.<br>• Heavy equipment shall be equipped with reverse signal alarm, backup warning lights, or the vehicle is backed up only when an observer signals it is safe to do so. | M |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Clearing and Grubbing**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Inexperienced operator | • Machinery and mechanized equipment shall be operated only by designated personnel.<br>• Heavy equipment operators shall inform their supervisor(s) of any prescribed medication that they are taking that would impair their judgment. | L |
| | | Lacerations | • Wear cotton or leather work gloves for material handling.<br>• Wear leather gloves, long sleeve shirt, face shield, and chainsaw chaps when operating a chainsaw. | M |
| | | Noise | • Wear hearing protection when working on or adjacent to heavy equipment. | M |
| | | Overhead hazards | • Make sure that no obstacles are within the radius of heavy equipment<br>• Always stay a safe distance from power poles and energized overhead electric in accordance with EM 385-1-1 Table 11-1. | L |
| | | Pinch Points | • Maintain proper clearance from heavy equipment.<br>• Beware of contact points.<br>• Stay alert at all times. | M |
| | | Slips, trips, and falls | • Practice good housekeeping; keep work area picked up and clean as feasible.<br>• Continually inspect the work area for skip, trip, and fall hazards.<br>• Look before you step; ensure safe and secure footing. | L |
| | | Stored energy | • Piles of vegetation or tree limbs can be under sprung tension, be alert to stored energy.<br>• Manipulate piled debris with heavy equipment at a safe distance prior to placing employees in the environment. | M |

**EQUIPMENT**

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Clearing and Grubbing**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Vegetation and Tree Removal Equipment | Pre-job training for general site activities and controls, and general project PPE requirements. Per subcontractor and/or equipment manufacturer requirements. | Daily inspection of equipment prior to start of work by qualified and/or designated competent personnel with concurrence from the SSHO. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## Dewatering System

Date: February 2014 Project: FUDS HTRW Program

Activity: Installation and Operation of Dewatering System

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): M

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Install Dewatering System | New personnel | • All personnel shall attend the site orientation training. | L |
| | | Failure to properly plan daily activities | • Complete JSA for each task, as specified in CMS-710-05-FM-01705, Sample Job Safety Analysis.<br>• Use "Safety Step Back" program frequently – for each task to be completed. | L |
| | | Underground and overhead utilities | • Follow procedure for Intrusive Activities Permit in Environmental Health and Safety Plan (SSHP).<br>• Locate and mark underground utilities prior to commencing activity (follow Shaw legacy HS 308).<br>• Identify overhead utilities in work areas and travel routes.<br>• Remain aware of overhead power lines and maintain safe clearances – use spotters when necessary.<br>• Post overhead hazard warning signs as necessary. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Dewatering System**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Slips, trips, and falls | • Use caution when walking in vegetated areas.<br>• Use caution when walking on wet, muddy, rocky, slippery, or uneven terrain.<br>• Keep working/walking areas clear and maintain housekeeping.<br>• Do not jump from equipment or elevated surfaces.<br>• Use fall restraint and fall protection when working near sump holes. | L |
| | | Hand injuries | • Inspect items for sharp edges prior to handling.<br>• Wear leather gloves and be aware of and avoid pinch point hazards. | L |
| | | Noise | • Wear hearing protection to reduce noise exposures to below the OSHA limits.<br>• Perform noise monitoring on equipment operators and ground personnel operating or working in the vicinity of noisy equipment. | L |
| | | Use of mechanical/heavy equipment | • Only qualified personnel shall be permitted to operate equipment.<br>• Inspect equipment daily after the initial USACE inspection.<br>• Verify all mechanical guards are in place and functioning properly.<br>• Note deficiencies in equipment on the inspection form.<br>• Do not use unsafe equipment.<br>• Operate all equipment at safe speeds and in a safe manner.<br>• Wear safety belts and hearing protection.<br>• Ground personnel, working near heavy equipment, shall wear high visibility conspicuity vests.<br>• Personnel are only permitted to approach equipment after a signal from the operator.<br>• All equipment shall have backing alarms.<br>• Ground personnel shall not position themselves between equipment and stationary objects.<br>• Shut down all equipment with energies dissipated prior to performing maintenance activities – lock out/tag out procedures may apply. | L |
| | | Use of rigging | • Inspect rigging before each use. Note deficiencies on the inspection form.<br>• Rigging found to be unsafe or showing the red-thread shall not be used, tagged, and taken out of service. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Dewatering System**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Verify rated capacity of rigging.<br>• Determine the weight of the item lifted prior to the lift. The rigger (competent person) shall calculate sling loads.<br>• If the actual weight is not known, the item weight must be determined by a Manufacturer Data Sheet, Truck Weigh Ticket (only for single piece loads), Corporate/Regional Resource Management, or by the calculated weight (contact Project Engineer).<br>• The rigger will not hold onto load (or the rigging) and will step back as load is lifted, so that he does not become entangled into or struck by the load.<br>• Never stand under a suspended load.<br>• Stay clear of heavy equipment.<br>• Use tag lines when appropriate. | |
| | | Use of operational chemicals | • Read and follow MSDS for each chemical used.<br>• Provide ventilation as necessary.<br>• Wear proper PPE.<br>• Properly label all containers. | L |
| | | Fire | • Shut off all engines and allow cooling before refueling.<br>• A 20-B:C fire extinguisher shall be available during refueling and a 40-B:C fire extinguisher shall be available at established refueling areas.<br>• Do not smoke near fueling areas.<br>• Do not start gas-powered equipment in fueling area (at least 10 feet away).<br>• Store gasoline in safety cans with flash arrestors and spring-loaded vents.<br>• Smoking is permitted in designated areas only.<br>• Do not park vehicles in tall dry grass with engines running. | L |
| | | Heavy lifting, strains, and sprains | • No individual shall lift any object that weighs over 60 pounds.<br>• Use proper lifting techniques.<br>• Multiple employees or the use of mechanical lifting devices are required for lifting objects over the 60-pound limit. | L |
| | | Contact with or exposure to contaminated soils and water | • Avoid contact with contaminated soils and water.<br>• Wear PPE, as specified in the SSHP.<br>• Follow decontamination procedures, as specified in the SSHP. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Dewatering System**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Perform air monitoring, as specified in the SSHP.<br>• Use engineering controls as necessary to control vapors. | |
| | | Excavation | • Excavations shall be inspected by a competent person a minimum of once per day.<br>• Personnel shall not enter excavations unless protective systems such as sloping/benching, shoring, or trench boxes are in place. Personnel shall stand no closer to the edge of an excavation than the angle of repose allows.<br>• Trenches deeper than four feet are considered to be confined spaces. Personnel shall not enter these confined spaces unless approved and permitted by the SS/SSHO.<br>• Soils, equipment, and materials shall be kept at least two feet from the face of excavations. The excavation shall be backfilled or barricaded when work is not in progress.<br>• Perimeter protection shall be provided. | M |
| | | Struck-by | • Personnel shall not be permitted in the swing radius of the equipment.<br>• Personnel shall maintain a safe distance from operations.<br>• Ground personnel shall wear ANSI Class 3 reflective vests when working near heavy equipment. | L |
| | | Use of hand tools | • Hand tools shall be inspected daily and before each use. Damaged tools shall be removed from service. | L |
| | | Dump truck operations | • Inspect trucks daily, paying particular attention to tire condition, tire pressure, and leaking hydraulic fluid.<br>• Re-evaluate overhead hazards prior to allowing dump trucks onto the project site. Barricade areas with overhead hazards with caution tape to prevent dump bed from contacting.<br>• In areas where it is not feasible to use barricades, then spotters and overhead hazard warning signs shall be provided: however, the minimum distances from electrical lines must be observed (SSHP Section 9.2.1).<br>• Wear seat belts while trucks are in motion at the project site.<br>• Assist trucks when backing is necessary. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Dewatering System**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Obey traffic control signage and flag persons, as necessary.<br>• Do not allow trucks to raise beds on uneven surfaces or in soft areas where the tires will sink.<br>• Prohibit ground personnel near trucks when beds are raised.<br>• Stay away from pinch hazards.<br>• Lower dump beds before moving trucks.<br>• Dump trucks shall not be allowed to contact contaminated materials unless proper decontamination will be performed. | |
| | | Electrocution | • Only qualified electricians shall make electrical connections.<br>• All electrical work shall comply with National Electric Code standards.<br>• NFPA 70E PPE requirements are in effect. | L |
| | | Severe weather | • The SSHO will monitor weather conditions each day in order to plan and prepare for hazardous conditions.<br>• The SSHO will identify a suitable tornado shelter at each work location.<br>• Work activities will be suspended prior to weather conditions becoming hazardous so that workers have ample time to seek shelter.<br>• Upon seeing lightning or hearing thunder, outdoor activities shall be suspended and personnel shall be evacuated to safe areas (inside vehicles, buildings, or tornado shelters as appropriate). When clouds with dark bases and wind speeds pick up, anticipate thunderstorms and the potential for tornadoes. Those who have been struck by lightning did not seek cover in a timely fashion.<br>• Follow the procedures in Section 14.7 of the SSHP. | L |
| | | Heat stress and cold stress | • Follow procedures outlined in the SSHP. | L |
| | Operate Dewatering Systems | New personnel | • All personnel shall attend the site orientation training. | L |
| | | Failure to properly plan daily activities | • Complete JSA for each task, as specified in CMS-710-05-FM-01705, Sample Job Safety Analysis.<br>• Use Hazard Assessment Resolution Program (HARP) or Safety Step Back | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Dewatering System**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | frequently – for each task to be completed. | |
| | | Slips, trips, and falls | • Use caution when walking in vegetated areas.<br>• Use caution when walking on wet, muddy, slippery, or uneven terrain.<br>• Keep working/walking areas clear and maintain housekeeping.<br>• Do not jump from equipment or elevated surfaces.<br>• Use fall restraint and fall protection when working at 6ft or greater elevation. | L |
| | | Hand injuries | • Inspect items for sharp edges prior to handling.<br>• Wear leather gloves and be aware of and avoid pinch point hazards. | L |
| | | Noise | • Wear hearing protection to reduce noise exposures to below the OSHA limits.<br>• Perform noise monitoring on equipment operators and ground personnel operating or working in the vicinity of noisy equipment. | L |
| | | Contact with or exposure to contaminants | • Avoid contact with potentially contaminated water.<br>• Wear PPE, as specified in the SSHP.<br>• Follow decontamination procedures, as specified in the SSHP.<br>• Perform air monitoring, as specified in the SSHP. | L |
| | | Use of operational chemicals | • Read and follow MSDS for each chemical used.<br>• Provide ventilation as necessary.<br>• Wear proper PPE.<br>• Properly label all containers. | L |
| | | Fire | • Shut off all engines and allow cooling before refueling.<br>• A 20-B:C fire extinguisher shall be available during refueling and a 40-B:C fire extinguisher shall be available at established refueling areas.<br>• Do not smoke near fueling areas.<br>• Do not start gas-powered equipment in fueling area (at least 10 feet away).<br>• Store gasoline in safety cans with flash arrestors and spring-loaded vents.<br>• Smoking is permitted in designated areas only. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Dewatering System**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Heavy lifting, strains, and sprains | • No individual shall lift any object that weighs over 60 pounds.<br>• Use proper lifting techniques.<br>• Multiple employees or the use of mechanical lifting devices are required for lifting objects over the 60-pound limit. | L |
| | | Confined spaces | • If entry into storage tanks is necessary for cleaning prior to demobilization, contact the health and safety manager. Shaw HS300, Confined Space procedure will be required and only trained and qualified personnel will engage confined space entry work. | L |
| | | Injury from pumps and hoses | • Review operator's manual for recommended operating procedures.<br>• Always wear face shield when disconnecting hoses.<br>• "Dead-heading" pumps will create dangerous steam and super-heated water.<br>• Secure hoses to prevent whipping.<br>• Be prepared for spills. | L |
| | | Severe weather | • The SSHO will monitor weather conditions each day in order to plan and prepare for hazardous conditions.<br>• The SSHO will identify a suitable tornado shelter at each work location.<br>• Work activities will be suspended prior to weather conditions becoming hazardous so that workers have ample time to seek shelter.<br>• Upon seeing lightning or hearing thunder, outdoor activities shall be suspended and personnel shall be evacuated to safe areas (inside vehicles, buildings, or tornado shelters as appropriate. | L |
| | | Heat stress and cold stress | • Follow procedures outlined in the SSHP. | L |
| | | New personnel | • All personnel shall attend the site orientation training. | L |
| | | Failure to properly plan daily activities. | • Complete JSA for each task, as specified in CMS-710-05-FM-01705, Sample Job Safety Analysis.<br>• Use Hazard Assessment Resolution Program (HARP) frequently – for | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Dewatering System**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | each task to be completed. | |
| | | Fork lift operations | • Only qualified and trained fork lift operators shall be permitted to operate forklifts.<br>• Forklifts shall be operated on level and firm ground<br>• Drums shall be secured during transport to minimize upset of load<br>• Keep personnel clear of forklift operations and any suspended loads<br>• Forklifts shall be inspected before use and load capacities never exceeded. If the truck has to enter a trailer the flooring shall be thoroughly inspected and capable of supporting forklift loads. | L |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | N/A | Pre-job training for general site activities and controls, and general project PPE requirements. | At project start. SS/SSHO will verify all site personnel and/or visitors receive training prior to the initiation of activities. |
| | Excavation and Rigging Equipment | Per subcontractor and/or equipment manufacturer requirements. | Daily inspection of equipment prior to start of work by qualified and/or designated competent personnel with concurrence from the SSHO. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## Drilling, Soil Boring, and Monitoring Well Installation

Date: February 2014 Project: FUDS HTRW Program

Activity: Drilling, Soil Boring, and Monitoring Well Installation

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): M

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Drilling, Soil Boring, and Monitoring Well Installation | Uneven terrain, poor ground support, inadequate clearances, contact with utilities | • Inspections or determinations of road conditions and structures shall be made in advance to ensure that clearances and load capacities are safe for the passage or placing of any machinery or equipment.<br>• All mobile equipment and areas in which they are operated shall be adequately illuminated.<br>• Aboveground and belowground utilities will be located prior to staging equipment (reference legacy procedure HS308, "Underground/Overhead Utility Contact Prevention").<br>• Whenever the equipment is parked, the parking brake shall be set.<br>• Equipment parked on inclines will have the wheels chocked. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Drilling, Soil Boring, and Monitoring Well Installation**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Inspect brakes and tire pressure on drill rig before staging for work. | |
| | Drilling, Soil Boring, and Monitoring Well Installation | Faulty or damaged equipment being utilized to perform work | • All machinery or mechanized equipment will be inspected by a competent mechanic and be certified to be in safe operating condition.<br>• Equipment will be inspected before being put to use and at the beginning of each shift.<br>• Faulty/unsafe equipment will be tagged and if possible locked out.<br>• Drill rigs shall be equipped with reverse signal alarm, backup warning lights, or the vehicle is backed up only when an observer signals it is safe to do so. | M |
| | | Inexperienced operator | • Machinery and mechanized equipment shall be operated only by designated personnel.<br>• Operators shall inform their supervisor(s) of any prescribed medication that they are taking that would impair their judgment. | M |
| | | Jacks/outriggers | • Ensure proper footing and cribbing. | L |
| | | Falling objects | • Remove unsecured tools and materials before raising or lowering the derrick.<br>• Stay alert and clear of materials suspended overhead. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Drilling, Soil Boring, and Monitoring Well Installation**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Drilling, Soil Boring, and Monitoring Well Installation | Pinch points | • Keep feet and hands clear of moving/suspended materials and equipment.<br>• Stay alert at all times! | M |
| | | Fire | • Monitor for combustible gas during well installation, methane is a potential hazard.<br>• Mechanized equipment shall be shut down prior to and during fueling operations.<br>• Have fire extinguishers inspected and readily available. | L |
| | | UXO | • If UXO are suspected, UXO specialist will perform UXO avoidance operations prior to site entry.<br>• Do not handle or disturb suspect items.<br>• Practice avoidance of anomalies at all times.<br>• Remember the potential for chemical agents exists with UXO until confirmed by designated authorities. | L |
| | | Contact with rotating or reciprocating machine parts | • Utilize auger guards, barricades or warning barrier to prevent accidental employee contact with rotating auger.<br>• Use machine guards; use long-handled shovels to remove auger cuttings.<br>• Safe lockout procedures for maintenance work. | M |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Drilling, Soil Boring, and Monitoring Well Installation**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Drilling, Soil Boring, and Monitoring Well Installation | Heavy lifting | • Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift. | M |
| | | Slip, trip, and fall hazards | • Practice good housekeeping, keep work area picked up and clean as feasible.<br>• Continually inspect the work area for slip, trip, and fall hazards. | L |
| | | Contact with potentially contaminated materials | • Real- time air monitoring will take place. If necessary, proper personal protective clothing and equipment will be utilized.<br>• Stop immediately at any sign of obstruction.<br>• Do not breathe air surrounding boring unless necessary.<br>• Upgrade to respirator if necessary.<br>• Avoid skin contact with soil cuttings. Wear appropriate Modified Level D PPE..<br>• Stay clear of moving parts of drill rig. | L |
| | | Drum handling | • Be careful not to breathe air from around open drum any more than necessary. Monitor with photoionization detector/flame ionization detector (PID/FID) equipment and upgrade to respirator if necessary.<br>• When filling a drum (with either soil or water), be careful not to make contact with the contained waste. Wear appropriate gloves. Make sure lid or bung of drum is secure.<br>• If moving a drum unassisted, be sure to leverage properly, use proper | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Drilling, Soil Boring, and Monitoring Well Installation**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | lifting techniques, and wear safety glasses and steel-toed boots.<br><br>• When using a drum dolly, make sure straps and lid catch are securely attached. Leverage properly when tilting drum. Be sure toes stay away from drum. | |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Drill Rig | Per Subcontractor and/or equipment manufacturer requirements | Daily inspection of drill rig prior to start of work by designated subcontractor competent personnel with concurrence from SSHO. |
| | Support Equipment | Per Subcontractor and/or equipment manufacturer requirements | Daily inspection of supporting equipment prior to start of work by designated subcontractor competent personnel with concurrence from SSHO. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## Excavation, Trenching, and Backfilling

Date: February 2014 Project: FUDS HTRW Program

Activity: Excavation, Trenching, and Backfilling

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): M

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Excavation, Trenching, and Backfilling | Contact with moving equipment/vehicles | • Site workers shall establish hand signals when verbal communication becomes difficult.<br>• Seats should be provided for each occupant of the equipment.<br>• Equipment operated on the highway shall be equipped with headlights, taillights, brake lights, backup lights, and turn signals visible from the front and rear.<br>• Heavy equipment shall be equipped with backup alarms.<br>• Never walk or work directly in back of or to the side of heavy equipment without the operator's knowledge.<br>• Assign trained flag personnel if necessary to direct traffic. | M |
| | | Dump truck operations | • Dump truck bodies shall be fully lowered or blocked when maintenance is being performed or when not in use.<br>• Dump trucks will have backup alarms.<br>• A signal person will be used when the point of operation is not in full view of the vehicle, machine, or equipment operator; vehicles are backed more | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Excavation, Trenching, and Backfilling**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | than 100 feet; terrain is hazardous; or two or more vehicles are backing in the same area.<br>• Subcontractor T&D contractors shall remain outside the EZ when direct loading contaminated soil. | |
| | Excavation, Trenching, and Backfilling | Faulty or damaged equipment being utilized to perform work | • All machinery or mechanized equipment will be inspected by a competent mechanic and certified to be in safe operating conditions.<br>• Equipment will be inspected before being put to use and at the beginning of each shift.<br>• Faulty/unsafe equipment will be tagged and, if possible, locked out. | M |
| | | Fire/explosion | • Install fire extinguishers on heavy equipment.<br>• Shut down mechanized equipment prior to fueling.<br>• Obtain a hot work permit per CMS-710-02-PR-02400, Fire Protection and Prevention for any operation which could act as an ignition source.<br>• Place fire extinguishers in the work area as needed.<br>• Air monitoring for O2/LEL will be performed where potential to encounter flammable/combustible material exist. | L |
| | | Hazard communication | • Obtain MSDS or SDS for hazardous chemicals used at the site.<br>• Label all containers as to contents and appropriate hazard warning. | L |
| | | Heat stress | • Drink plenty of fluids.<br>• Take frequent breaks.<br>• Allow workers time to acclimate.<br>• Conduct physiological monitoring as needed.<br>• Watch for signs and symptoms of heat stress.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control. | L |
| | | Heat rash | • Keep the skin clean and dry.<br>• Change perspiration-soaked clothing, as necessary.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Bathe at end of work shift or day.<br>• Apply powder to affected area. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Excavation, Trenching, and Backfilling**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Excavation, Trenching, and Backfilling | Heat cramps | • Drink plenty of cool fluids even when not thirsty.<br>• Provide cool fluid for work crews.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Move victim to shaded, cool area. | L |
| | | Heat exhaustion | • Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).<br>• Set up work/rest periods.<br>• Use the "buddy system."<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Allow workers time to acclimate.<br>• Have ice packs available for use.<br>• Take frequent breaks. | L |
| | | Heat stroke | • Evaluate possibility of night work.<br>• Perform physiological monitoring on workers during breaks.<br>• Wear body cooling devices.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control. | L |
| | | Inexperienced operator | • Machinery and mechanized equipment shall be operated only by designated personnel. Apply CMS-710-02-PR-05700, Mechanized and Marine Equipment requirements.<br>• Operators shall inform their supervisor(s) of any prescribed medication that they are taking that would impair their judgment. | L |
| | | Lacerations | • Wear cotton,leather or cut resistant work gloves for material handling prone to cause lacerations or abrasions. | L |
| | Excavation, Trenching, and Backfilling | Overhead hazards | • Make sure that no obstacles are within the radius of the excavator bucket.<br>• Always stay a safe distance from power lines.<br>• Maintain proper clearance from heavy equipment.<br>• Beware of contact points.<br>• Stay alert at all times. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Excavation, Trenching, and Backfilling**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Noise | • Wear hearing protection when working on or adjacent to heavy equipment. | L |
| | | Pinch points | • Beware of contact points.<br>• Stay alert at all times. | L |
| | | Contact with potentially contaminated materials | • Real-time air monitoring will take place. Level B personal protective clothing and equipment will be utilized excavating Pyridine Burn Area.<br>• Stop immediately at any sign of obstruction.<br>• Personnel will be trained in the contaminants of concern identified onsite.Upgrade to respirator if necessary when action levels are reached.<br>• Avoid skin contact with soil cuttings. Wear gloves.<br>• Stay clear of moving parts of drill rig and geoprobe that contact potentially hazardous material and use chemical resistant PPE when contact is required. | L |
| | | Slips, trips, and falls | • Good housekeeping shall be implemented.<br>• The work area shall be kept clean as feasible.<br>• Inspect the work area for slip, trip, and fall hazards. | L |
| | | Thunderstorms, lightning, and tornadoes | • Whenever possible, halt activities and take cover.<br>• If outdoors, stay low to the ground.<br>• Seek shelter in a building if possible.<br>• Stay away from windows.<br>• Cease field activities during thunderstorms. | L |
| | | Cave-ins | • Use caution when walking adjacent to trenches and around spoil material.<br>• Complete an excavation and trenching permit, per CMS-710-02-PR-01600, Excavation and Trenching.<br>• Entry into excavation/trench shall be allowed only after consultation with the site supervisor.<br>• Excavations/trenches greater than 4 feet deep shall not be entered unless sloped, steeped, or shored.<br>• Design of any support system shall be reviewed and approved by a professional engineer. | M |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Excavation, Trenching, and Backfilling**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • A competent person trained in soils identification will be present in the field.<br>• Nonessential equipment will be staged at least 6 feet outside the immediate work area.<br>• Material used for piling, bracing, shoring, and underpinning shall be in good serviceable condition.<br>• Foundations adjacent to where the excavation is to be made below foundation depth shall be supported by shoring, bracing. | |
| | Excavation, Trenching, and Backfilling | Confined space | • Personnel shall not enter an excavation that has any of the following conditions: contains or could contain a hazardous atmosphere; could engulf an entrant; could asphyxiate an entrant due to inwardly conversing walls or a floor that slopes down to a small cross section; or contains any other recognized serious safety or health hazard.<br>• Entries into confined spaces shall be performed in accordance with CMS-710-02-PR-01700, Confined Space Entry<br>• Personnel shall not enter a confined space without completing a confined space permit.<br>• Confined space qualified person must be onsite during confined space work. | L |
| | | Slip, trip, fall | • All work shall be performed from a stable ground position.<br>• Workers who enter excavations 4 feet or greater in depth shall be protected by sloping, shoring, or benching.<br>• For entry into excavations/trenches 4 feet or greater, a means of entry/egress shall be provided every lateral 25 feet.<br>• Spoil material shall be placed at least 3 feet from the edge of the excavation/trench to avoid load strain on the sidewalls.<br>• The excavation/trench shall be guarded on all sides.<br>• Excavations/trenches shall be backfilled as soon as practical after work is completed and all associated equipment removed.<br>• Ladders placed into excavation/trench shall extend 3 feet above the top of the excavation. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Excavation, Trenching, and Backfilling**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Underground utilities | • Follow all provisions associated with legacy Shaw Procedure HS308, *Overhead/Underground Utility Contact Prevention*.<br>• Contact the State OneCall 811 before beginning intrusive activities.<br>• Meet utility clearance personnel when that arrive onsite in order to address any potential concerns.<br>• Look at underground drawings and as-builts as appropriate.<br>• Receive approval for excavation/trenching or relocate activities.<br>• Complete excavation permit as required.<br>• Review expiration date of excavation permit. | M |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Excavation Equipment | Pre-job training for general site activities and controls, and general project PPE requirements. Per subcontractor and/or equipment manufacturer requirements. | Daily inspection of equipment prior to start of work by qualified and/or designated competent personnel with concurrence from the SSHO. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## General Site Setup

Date: February 2014 Project: FUDS HTRW Program

Overall Risk Assessment Code (RAC) (Use highest code): M

Activity: General Site Setup

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Staging Equipment and General Site Setup | Access/egress hazards | • Use qualified and trained bushhog or heavy equipment operators.<br>• Keep employees out of the bushhog work area.<br>• Utilize good housekeeping practices.<br>• Keep aisleways, pathways, and work areas free of obstruction.<br>• Perform a visual survey for utilities or structures prior to clearing and grubbing.<br>• Use appropriate footwear and personal protective equipment (PPE) for the task assigned. | L |
| | | Slip, trip, and fall hazards | • Determine best access route before transporting equipment.<br>• Practice good housekeeping; keep work area picked up and clean as feasible.<br>• Continually inspect the work area for slip, trip, and fall hazards.<br>• Look before you step; ensure safe and secure footing. | M |
| | | Heavy lifting | • Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Site Setup**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Falling objects | • Stay alert and clear of materials suspended overhead; wear hard hat and steel-toed boots. | L |
| | | Flying debris, dirt, dust, etc. | • Wear safety glasses/goggles; ensure that eye wash is in proper working condition. | L |
| | | Pinch points | • Keep hands, fingers, and feet clear of moving/suspended materials and equipment.<br>• Beware of contact points.<br>• Stay alert at all times! | L |
| | | Bees, spiders, snakes | • Inspect work area carefully and avoid placing hands and feet in concealed areas.<br>• Wear snake chaps in high vegetation areas which may be prone to harboring venomous snakes.<br>• Alert your supervisor or site safety and health officer if you have allergic reactions to insect and bee sting. Carry epinephrine when applicable. | M |
| | | Cuts/bruises | • Use cotton or leather work gloves for material handling. | L |
| | | Fire | • Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.<br>• Obtain a Hot Work Permit, per CMS-710-02-PR-02400, Fire Protection and Prevention | L |
| | | Contact with moving equipment/vehicles | • Work area will be barricaded/demarcated.<br>• Equipment will be laid out in an area free of traffic flow.<br>• Employees exposed to vehicular traffic or construction equipment shall wear American National Standards Institute (ANSI)-approved Class III high visibility apparel. | L |
| | | Hazard communication | • Label all containers as to contents and appropriate hazard warning.<br>• Ensure Material Safety Data Sheets (MSDS) or Safety Data Sheets (SDS) | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Site Setup**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | are available for hazardous chemicals used on site.<br>• Personnel using hazardous chemicals shall be trained in the Globally Harmonized System (GHS) HAZCOM revision. | |
| | | Noise | • Sound levels above 85 decibels (dBA) mandate hearing protection. | L |
| | | Lighting | • Adequate lighting will be provided to ensure a safe working environment. | L |
| | | Heat rash | • Keep the skin clean and dry.<br>• Change perspiration-soaked clothing, as necessary.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Bathe at end of work shift or day.<br>• Apply powder to affected area. | L |
| | | Heat cramps | • Drink plenty of cool fluids even when not thirsty.<br>• Provide cool fluid for work crews.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Move victim to shaded, cool area.<br>• Perform physiological monitoring<br>• Take frequent breaks when signs of heat stress occur. | L |
| | | Heat exhaustion | • Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).<br>• Set up work/rest periods.<br>• Use the "buddy system."<br>• Allow workers time to acclimate.<br>• Have ice packs available for use.<br>• Take frequent breaks. | L |
| | | Heat stroke | • Evaluate possibility of night work.<br>• Perform physiological monitoring on workers during breaks.<br>• Wear body cooling devices.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Site Setup**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Contact with moving equipment/vehicles | • Work area will be barricaded/demarcated.<br>• Equipment will be laid out in an area free of traffic flow.<br>• Barricades shall be used on or around work areas when it is necessary to prevent the inadvertent intrusion of pedestrian traffic.<br>• Barriers shall be used to protect workers from vehicular traffic.<br>• Barriers shall be used to guard excavations adjacent to streets or roadways.<br>• Flagging shall be used for the short term (less than 24 hours) to identify hazards until proper barricades or barriers are provided.<br>• Heavy equipment shall have backup alarms.<br>• ANSI-approved Class III high visibility apparel shall be worn when subject to vehicle or heavy equipment operations. | L |
| | | Forklift operations | • Use qualified and trained forklift operators.<br>• Forklift operators shall have completed initial forklift operator safety training and shall complete a refresher every 3 years.<br>• The operator shall not exceed the load capacity rating for the forklift.<br>• The load capacity shall be clearly visible on the forklift.<br>• Forklift operators shall inform their supervisor of any prescribed medication that they are taking that would impair their judgment.<br>• Conduct daily/shift inspections of equipment prior to use in accordance with CMS-710-02-PR-00800, Lift Trucks (Forklifts) and Powered Industrial Trucks. | L |
| | | Portable electric tools | • Portable electric tools that are unsafe due to faulty plugs, damaged cords, or other reasons, shall be tagged (do not use) and removed from service.<br>• Portable electric tools and all cord and plug connected equipment shall be protected by a ground fault circuit interrupter (GFCI) device.<br>• Electrical tools shall be inspected daily prior to use.<br>• Electric tools shall not be used in atmospheres measuring 10 percent or greater lower explosive limit (LEL). | L |
| | | Hand Tools | • Defective tools shall not be used.<br>• Defective tools shall be tagged and immediately removed from service or repaired. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Site Setup**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • The proper tool for the task shall be used and tool used in accordance with manufacturer's recommendations. | |
| | | Grinding/sawing | • Use safety glasses with side shields and hearing protection.<br>• Do not use defective tools.<br>• Inspect grinding wheels and tools for signs of damage prior to each use. | L |
| | | Extension cords | • Extension cords that have faulty plugs, damaged insulation, or are unsafe in any way shall be removed from service.<br>• Cords shall be protected from damage from sharp edges, projections, pinch points (doorways), and vehicular traffic.<br>• Cords shall be suspended with a nonconductive support (rope, plastic ties, etc.).<br>• Flexible cords shall be designed for hard or extra hard usage.<br>• Cords shall be inspected daily buy the user.<br>• Extension cords are considered temporary electric and shall be protected with a GFCI. | L |
| | | Falls from elevated work surfaces | • All employees working 6 feet or more from the ground level or next level shall be provided with positioning devices and fall protection 100 percent of the time. Fall protection shall consist of one of the following: standard railing, warning line system, catch platform, or a full-body harness equipped with a single point of attachment.<br>• All fall protection equipment shall be inspected for damage or wear prior to being brought on the jobsite and daily before each use.<br>• Fall protection equipment shall not be modified. Synthetic materials shall not be painted.<br>• Fall protection equipment shall be stored and maintained as per manufacturer's recommendations.<br>• All standard railings shall be constructed to withstand a load of 200 lbs in any direction with minimal deflection.<br>• Tie-off points shall be capable of supporting 5,400 pounds of dead weight per each user.<br>• Employees shall be trained in the use, inspection, and maintenance of fall restraint systems. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Site Setup**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Comply with all provisions of CMS-710-02-PR-00900, Fall Protection. | |
| | | Injuries from improper use of ladders | • Stairs or ladders shall be provided for any change in elevation 19 inches high or greater where no ramp or other access is provided.<br>• Stairways 44 inches wide or less shall have standard stair railings on each open side. Railings shall be a minimum of 36 inches high.<br>• Stairways greater than 44 inches wide, but less than 88 inches, shall have a standard handrail on each enclosed side and a standard railing on each open side. Stairways greater than 88 inches shall also have an intermediate railing halfway between.<br>• Rise height and tread width shall be uniform throughout the entire flight of stairs.<br>• Temporary stairs shall have a landing of not less than 30 inches in the direction of travel for every 12 feet or less of vertical rise.<br>• Stairs that are slick shall be provided with anti-slip materials if the slick condition cannot be corrected any other way.<br>• Stairs shall be free of hazardous projections such as nails.<br>• Permanent metal stairways, into which concrete is later poured, shall be temporarily filled with wood or other solid material.<br>• Ladders shall be inspected at a minimum quarterly and after any potentially damaging incident. Ladders which are damaged or have faulty construction shall be tagged out and removed from the job site.<br>• Extension ladders shall be tied or blocked to prevent collapse.<br>• Ladders shall extend 3 feet above the landing and shall be secured against movement at the top and placed at a 4:1 slope ratio, height over distance. Non-slip feet shall be provided.<br>• Ladders shall not be placed in aisles or doorways where they may be displaced, unless protected by a barricade.<br>• Metal ladders shall not be used for electrical work.<br>• The rated load capacity of ladders shall not be exceeded.<br>• Only Type 1 or 1A ladders are acceptable for use by company policy. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Site Setup**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Electrical installation | • Electrical installation, repairs, and maintenance shall be performed by qualified and authorized electricians.<br>• Before maintenance on existing electrical lines, lockout/tagout procedures in accordance with Occupational Safety and Health Administration 1910.147 and CMS-710-02-PR-01500, Control of Hazardous Energy, will be followed.<br>• Lockout is the placement of a device that uses a positive means such as a lock to hold an energy- or material-isolating device or system, ensuring that the equipment cannot be operated until the lockout device is removed. If a device cannot be locked out, a tagout system will be used. Tagout is the placement of a warning tag on an energy- or material-isolating device indicating that the equipment controlled may not be operated until the tag is removed.<br>• All electric wiring and equipment must be a type listed by Underwriters Laboratory (UL), Factory Mutual, or other recognized testing or listing agency.<br>• All installations must comply with the National Electrical Safety Code or National Electrical Code.<br>• All circuits must be protected from overload.<br>• Temporary power lines, switch boxes, receptacle boxes, metal cabinets, and enclosures around equipment must be marked to indicate the maximum operating voltage.<br>• All provisions of National Fire Protection Association 70E and arc flash protection shall be exercised. | L |
| | | Lightning strikes | • Whenever possible, halt activities and take cover.<br>• If outdoors, stay low to the ground.<br>• Limit the body surface area that is in contact with the ground (i.e., kneeling on one knee is better than lying on the ground).<br>• Seek shelter in a building if possible.<br>• Stay away from windows.<br>• If available, crouch under a group of trees instead of one single tree.<br>• Keep all body parts in contact with the ground as close as possible.<br>• Remain 6 feet away from tree trunk if seeking shelter beneath tree(s).<br>• If in a group, keep 6 feet of distance between people. | |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Site Setup**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Thunderstorms, tornadoes | • Listen to radio or TV announcements for pending weather information.<br>• Cease field activities during thunderstorm or tornado warnings.<br>• Seek shelter. Do not try to outrun a tornado. | |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | N/A | Pre-job training for general site activities and controls, and general project PPE requirements. | At project start. SSHO will verify all site personnel and/or visitors receive training prior to the initiation of activities. |
| | N/A | Pre-job training for proper ergonomic/lifting techniques. | At project start. SSHO will verify all site personnel have been briefed on ergonomic/lifting techniques. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
# Groundwater Elevation Survey

Date: February 2014 Project: FUDS HTRW Program

Activity: Groundwater Elevation Survey

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): L

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

## IDENTIFIED HAZARDS

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Measuring Water Levels | Cross-contamination and contact with potentially contaminated materials | • Employees will wear proper protective clothing and equipment to safeguard against potential contamination.<br>• Only essential personnel will be in the work area.<br>• Initial real-time air monitoring will take place before and during activities.<br>• All personnel will follow good hygiene practices.<br>• Proper decontamination procedures will be followed.<br>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations. | L |
| | | Hazard communication | • Label all containers as to contents and appropriate hazard warning. Ensure MSDS or SDS are available. | L |
| | | Sprains/strains | • Use the proper tool for the job being performed.<br>• Get assistance if needed. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Groundwater Elevation Survey**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Avoid twisting/turning while inserting and removing water probe. | |
| | | Spills/residual materials | • Absorbent material will be kept available where leaks or spills may occur. | L |
| | | Atmospheric Hazards | • Use real time air monitoring equipment to test for the potential presence of methane or hydrogen sulfide gas in well.<br>• If 10% LEL or 2.5 ppm H2S is measured in a well the water level meter shall be explosion proof and intrinsically safe. | L |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Water Level Meter | Equipment manual, one-on-one instruction from experienced personnel. | Sampling personnel will ensure that equipment is operational. SSHO will verify PPE provide adequate protection for sampling tasks. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## Groundwater Sampling

Date: February 2014 Project: FUDS HTRW Program

Activity: Groundwater Sampling

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): M

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Groundwater Sampling | Cross contamination and contact with potentially contaminated materials | • Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.<br>• Avoid skin contact with water.<br>• Handle samples with care.<br>• Only essential personnel will be in the work area.<br>• Real-time air monitoring will take place before and during sampling activities.<br>• All personnel will follow good hygiene practices.<br>• Proper decontamination procedures will be followed.<br>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations. | L |
| | | Cut hazards | • Use care when handling glassware.<br>• Wear adequate hand protection. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Groundwater Sampling**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Biological hazards | • Survey the sampling area for signs of snakes or insects that could injure personnel.<br>• Wear an appropriate insect repellant.<br>• Snake chaps shall be used when work is required in dense vegetation.<br>• Inspect one another frequently for ticks and insects.<br>• Wear light-colored clothing in order to make it easier to see ticks and insects.<br>• Be aware of potential biological hazards that harbor inside well protective casings. | M |
| | | Hazard communication | • SDSs shall be obtained for hazardous chemicals brought on site.<br>• Label all containers as to contents and appropriate hazard warning. | L |
| | | Heat rash | • Keep the skin clean and dry.<br>• Change perspiration-soaked clothing, as necessary.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Bathe at end of work shift or day.<br>• Apply powder to affected area. | L |
| | | Heat cramps | • Drink plenty of cool fluids even when not thirsty.<br>• Provide cool fluid for work crews.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Move victim to shaded, cool area. | L |
| | | Heat exhaustion | • Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).<br>• Set up work/rest periods.<br>• Use the "buddy system."<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Allow workers time to acclimate.<br>• Have ice packs available for use.<br>• Take frequent breaks. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Groundwater Sampling**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Heat stroke | • Evaluate possibility of night work.<br>• Perform physiological monitoring on workers during breaks.<br>• Wear body cooling devices.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control. | L |
| | | Strains/sprains | • Use the proper tool for the job being performed.<br>• Get assistance if needed.<br>• Avoid twisting/turning while pulling on tools, moving equipment, etc. | L |
| | | Spills/residual materials | • Absorbent material and containers will be kept available where leaks or spills may occur. | L |
| | | Lighting | • Adequate lighting will be provided to ensure a safe working environment. | L |
| | | Unattended worker | • "Buddy system" - visual contact will be maintained with the sampling technician during sampling activities. | L |
| | | Electrical hazards/generators | • Electrical receptacles on portable generators shall be equipped with GFCI protection.<br>• Portable generators shall be grounded in accordance with EM 385 1-1 Section 11 D.<br>• Electrical cords shall be inspected prior to use and be equipped with a ground conductor.<br>• Defective cord sets shall be immediately removed from service and disposed. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Groundwater Sampling**

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Water Level Meter | Equipment manual, one-on-one instruction from experienced personnel. | Sampling personnel will ensure that equipment is operational. SSHO will verify PPE provide adequate protection for sampling tasks. |
| | Water Pumps and miscellaneous sampling equipment | Equipment manual, one-on-one instruction from experienced personnel, review safe lifting techniques for heavier equipment. | Sampling personnel will ensure that equipment is operational. Sampling personnel will inspect sample containers for leaking preservatives. SSHO will verify PPE provide adequate protection for sampling tasks. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## General Field Work

Date: February 2014 Project: FUDS HTRW Program

Activity: Hot Work

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): L

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Torch Cutting, Arc Welding, Grinding | • Welding flash<br>• Welding burns<br>• Fire | • Cutting, welding, or other operations that produce excessive heat, open sparks, or flames shall not be permitted within 50 feet of a potential liquid fuel source.<br>• One 10:ABC multipurpose dry chemical fire extinguisher shall be readily available in the hot work area.<br>• Complete a hot work permit per CMS-710-02-PR-02400, Fire Protection and Prevention prior to initiation of hot work.<br>• The area shall be monitored with a combustible gas meter to ensure less than 10 percent LEL.<br>• Work will not be permitted in atmospheres greater than 10 percent LEL.<br>• The worker shall be protected from sparks or flame by wearing leather guards (Tyvek is not protective against heat sources).<br>• Welders shall wear welding goggles or hood.<br>• Complete a hot work permit for each shift and when conditions change.<br>• Compressed gas cylinders shall be secure in an upright position. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Field Work**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Gas regulators shall be in proper working order.<br>• Cylinders shall be marked or stenciled to identify the type of gas in the cylinder.<br>• Oil and oily rags shall be kept away from oxygen equipment.<br>• Cylinder valves shall be closed when work is finished and when cylinders are empty or moved.<br>• Objects to be welded, cut, or heated shall be moved to a safe location when possible.<br>• Remove all potential fire hazards in the vicinity.<br>• Provide appropriate respirators protection, if needed, to operator.<br>• Acetylene regulators shall not be adjusted to permit a discharge greater than 15 pounds per square inch gauge (psig).<br>• Fuel/oxygen combination used for cutting, welding, or heating shall have reverse-flow check valves between torch and regulator. | |
| | | Contact with potentially contaminated materials | • All site personnel will wear the appropriate PPE. | L |
| | | Inhalation | • Personnel shall place themselves upwind of hot work activities.<br>• Painted surfaces shall be stripped at least 4" on either side of location to be welded or flame cut.<br>• Prior to cutting, welding or grinding, verify the paint is not lead based paint. | L |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | N/A | Pre-job training for general site activities and controls, and general project PPE requirements. | At project start. FM/SSHO will verify all site personnel and/or visitors receive training prior to the initiation of activities. |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**General Field Work**

| | | | |
|---|---|---|---|
| | N/A | Pre-job training for proper ergonomic/lifting techniques. | At project start. FM/SSHO will verify all site personnel have been briefed on ergonomic/lifting techniques. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
# Waste Handling and Disposal

Date: February 2014 Project: FUDS HTRW Program

Activity: Waste Handling and Disposal

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): L

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

## IDENTIFIED HAZARDS

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Waste Handling and Disposal | Heavy lifting | • Use proper lifting techniques.<br>• Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift. | L |
| | | Slip, trip, and fall hazards | • Good housekeeping shall be implemented.<br>• The work area shall be kept clean as feasible.<br>• Inspect the work area for slip, trip, and fall hazards. | L |
| | | Fueling | • Only approved safety cans shall be used to store fuel.<br>• Do not refuel equipment while it is operating.<br>• Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Waste Handling and Disposal**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Faulty or damaged equipment | • Equipment shall be inspected before being placed into service and at the beginning of each shift.<br>• Preventive maintenance procedures recommended by the manufacturer shall be followed.<br>• A lockout/tagout procedure shall be used for equipment found to be faulty or undergoing maintenance. | L |
| | | High-pressure water | • Jetting gun operator must wear appropriate PPE including hard hat, impact-resistant safety glasses with side shields, face shield, water-resistant clothing, metatarsal guards for feet and legs, and hearing protection (if appropriate).<br>• One standby person shall be available within the vicinity of the pump during jetting operation.<br>• The work area shall be isolated and adequate barriers will be used to warn other site personnel. | L |
| | | Heat rash | • Keep the skin clean and dry.<br>• Change perspiration-soaked clothing, as necessary.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Bathe at end of work shift or day.<br>• Apply powder to affected area. | L |
| | | Heat cramps | • Drink plenty of cool fluids even when not thirsty.<br>• Provide cool fluid for work crews.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Move victim to shaded, cool area. | L |
| | | Heat exhaustion | • Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).<br>• Set up work/rest periods.<br>• Use the "buddy system."<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Allow workers time to acclimate.<br>• Have ice packs available for use.<br>• Take frequent breaks. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Waste Handling and Disposal**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Heat stroke | • Evaluate possibility of night work.<br>• Perform physiological monitoring on workers during breaks.<br>• Wear body cooling devices.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control. | L |
| | | Unqualified operators | • Only qualified and trained personnel are permitted to operate machinery and mechanized equipment<br>• Forklift operators shall have completed initial operator safety training and refresher training every 3 years applicable to the type forklift being operated. Follow requirements per CMS-710-02-PR-00800, Lift Trucks (Forklifts) and Powered Industrial Trucks | L |
| | | Out of control equipment | • No machinery or equipment is permitted to run unattended.<br>• Machinery or equipment will not be operated in a manner that will endanger persons or property, nor will the safe operating speeds or loads be exceeded. | L |
| | | Noise | • Sound levels above 85 dBA mandate hearing protection by nearby site personnel. | L |
| | | Activation during repairs | • All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. | L |
| | | Pinch points | • Keep feet and hands clear of moving/suspended materials and equipment.<br>• Stay alert and clear of materials suspended | L |
| | | Falling objects | • Hard hats are required by site personnel.<br>• Stay alert and clear of material suspended overhead. | L |
| | | Flying debris | • Impact-resistant safety glasses with side shields are required. | L |
| | | Material handling | • Appropriate drum and material handling equipment shall be utilized onsite.<br>• Follow manufacturers use recommendations for material handling equipment. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Waste Handling and Disposal**

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Drums | One-on-one instruction from experienced personnel, experienced subcontractors. | Each drum with or without waste will be documented by the FM/SSHO or designated personnel. |
| | Spanner wrenches and other tools for opening and closing drums | One-on-one instruction from experienced personnel, experienced subcontractors. | Personnel will inspect tools prior to each use. |
| | Drum dolly or forklift | One-on-one instruction from experienced personnel, experienced subcontractors, moving construction equipment awareness. | Personnel will inspect tools prior to each use. Daily inspection of forklift prior to start of work by designated subcontractor competent personnel with concurrence from SSHO. |
| | Haul Trucks | Training on proper loading and unloading techniques, moving construction equipment awareness. | Daily inspection of equipment prior to start of work by designated subcontractor competent personnel with concurrence from SSHO. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## Site Mobilization and Demobilization

Date: February 2014 Project: FUDS HTRW Program

Activity: Site Mobilization and Demobilization

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): L

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Site Mobilization and Demobilization | Operation of motor vehicles and trucks - general. | • All company owned, leased, or rented vehicle operations shall comply with the requirements of Shaw Environmental, Inc. (Shaw) legacy Procedure HS800, "Motor Vehicle Operation: General Requirements."<br>• All company owned, leased, or rented commercial vehicle operations shall comply with the requirements of Shaw legacy Procedure HS810, "Commercial Motor Vehicle Operation And Maintenance."<br>• Subcontractors operating motor vehicles shall comply with all federal, state, and local traffic regulations.<br>• Subcontractors shall only use vehicles, which are in good condition and safe to operate.<br>• Subcontractors shall inspect vehicles routinely used on a weekly basis and submit the inspection documentation to the Site Safety and Health Officer.<br>• All personnel shall drive defensively, take adequate rest breaks, and wear seat belts while vehicles are in motion. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Site Mobilization and Demobilization**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Use a spotter to help guide vehicles through tight areas. | |
| | | Operation of motor vehicles and trucks – backing. | • Back into parking spaces upon arrival, whenever possible.<br>• Walk around the vehicle before backing to identify any new conditions or obstructions.<br>• Set out orange cone system to require truck operator to walk around truck and collect cone(s) prompting area inspection prior to moving truck.<br>• Use a spotter when backing whenever possible.<br>• Understand hand signals.<br>• Sound horn prior to backing.<br>• Check the rear-view and side mirrors prior to backing. (Note: All vehicles, other than automobiles, should have small convex mirrors attached to the side mirrors.)<br>• Back slowly in areas of obstructed vision.<br>• Anticipate others who may be backing out into your pathway and adjust accordingly. | L |
| | | Operation of motor vehicles and trucks – skids. | • If the vehicle has begun to skid out of control, turn the steering wheel in the direction of the skid and re-adjust the wheel, as necessary.<br>• Slow travel speeds during hazardous travel conditions.<br>• Use 4-wheel drive, if available, when driving vehicles off road, on steep inclines, muddy conditions, etc.<br>• Do not take vehicles "off road" if they cannot be operated safely. | L |
| | | Operation of motor vehicles and trucks – speeding. | • Obey all posted speed limits.<br>• Radar detectors are prohibited in all Shaw company owned, leased, or rented vehicles.<br>• Reduce travel speed during hazardous conditions (e.g., rain, fog, and snow). Maintain 2 seconds between vehicles under normal conditions; maintain 3 seconds behind motorcycle; 7 seconds pulling a trailer behind a semi-truck; and 6 seconds behind a semi-truck, no trailer; add additional seconds for rain, fog, etc.<br>• Determine whether your vehicle has anti-lock brakes. If it does, read the operators manual to determine how to use them properly. Test the | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Site Mobilization and Demobilization**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | brakes on a wet roadway so that you will know how they perform under emergency conditions.<br>• Always leave yourself an "out" during travel.<br>• When stopping, make sure that you leave enough distance between you and the car in front of you. You should be able to see the rear tires of the vehicle in front, when stopped.<br>• When at a red light, and it turns green, use the "delayed start" technique, by counting to three before you take your foot off the brake.<br>• DO NOT TAILGATE. | |
| | | Operation of motor vehicles and trucks – blind spots. | • Become familiar with any blind spots associated with your vehicle.<br>• Adjust mirrors properly.<br>• Make sure you use your directional signals.<br>• Always look over your shoulder to ensure that the lane is clear when changing lanes.<br>• Become extra cautious when approaching other drivers' blind spots. | L |
| | | Operation of motor vehicles and trucks – cellular phones. | • Do not use handheld cellular phones while driving.<br>• Pull over to the side of the road or parking lot when making a call.<br>• Avoid any distracting activity while behind the wheel of a motor vehicle. | L |
| | | Operation of motor vehicles and trucks – equipment failure. | • Perform required inspections of your vehicle.<br>• Any vehicle with mechanical defects that may endanger the safety of the driver, passengers or the public shall not be used.<br>• Verify that safety equipment is in the vehicle. Safety equipment should include a spare tire, jack, first aid kit, fire extinguisher, and flashlight. Flares and/or reflective triangles should be available in larger trucks.<br>• Ensure that the proper documentation is in the vehicle. Documentation should include an operations manual for the vehicle, insurance card, vehicle registration, and accident report forms. | L |
| | | Operation of motor vehicles and trucks – influenced by drug and alcohol. | • Never drive under the influence of drugs or alcohol.<br>• Conviction of DUI/DWI will result in loss of driving authorization on company business and possibly your employment with Shaw. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Site Mobilization and Demobilization**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Operation of motor vehicles and trucks – driver attitude. | • Do not operate any vehicle when abnormally tired, temporarily disabled, or under the influence of drugs or alcohol.<br>• Keep an even temper when driving. Do not let the actions of others affect your attitude.<br>• Remember that you represent Shaw as a company when driving in Shaw trucks and equipment.<br>• No employee is authorized to operate a company vehicle (including rentals) after having been on duty for a period of 12 hours.<br>• No employee may drive for more than 12 hours in a single on-duty period. | L |
| | | Operation of motor vehicles and trucks – vehicle loading. | • Do not overload the vehicle.<br>• Secure all equipment within the body of the vehicle.<br>• Do not block side view mirrors with load.<br>• Do not transport U.S. Department of Transportation manifested hazardous materials without a commercial driver's license with appropriate endorsements. All hazardous material shipments must have prior approval from the Project Manager and Health and Safety Manager.<br>• Vehicles carrying loads that project beyond the sides of rear of the vehicle shall carry a red flag not less than 144 square inches at or near the end of the projection.<br>• Dispatch all equipment and personnel with proper forms and identification. | L |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Vehicle | Valid driver's license, vehicle registration, and current insurance. Initial drivers safety training and driver record clearance. Refresher driving safety training every 2 years. | Prior to field work. Requirement to access site. |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Site Mobilization and Demobilization**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Vehicle, equipment, and trailers | Operator will be experienced with the operation of the equipment they are using. Verify use of trailers connected to company vehicles does not require DOT qualified operators in accordance with HS800 and HS810 | Prior to use. SSHO and/or subcontractor competent personnel will ensure operators are qualified in vehicle/equipment operation. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
# Shipping

Date: February 2014 Project: FUDS HTRW Program

Activity: Shipping

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): M

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

## IDENTIFIED HAZARDS

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Moving and Shipping Collected Samples | Pinch points | • Keep hands, fingers, and feet clear of moving/suspended materials and equipment.<br>• Beware of contact points.<br>• Stay alert at all times! | L |
| | | Cut hazards | • Wear adequate hand protection. Use care when handling glassware. Inspect glassware prior to handling when possible. | L |
| | | Hazard communication | • Label all containers as to contents and associated hazards. | L |
| | | Heavy lifting | • Use proper lifting techniques. Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift. | M |

## Table 2-1
## ACTIVITY HAZARD ANALYSIS
## Shipping

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | DOT/FAA Hazard Class | • Shippers shall be current in IATA or DOT hazardous material shipping training. | L |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | N/A | Pre-job training for general site activities and controls, and general project PPE requirements. | At project start. SSHO will verify all site personnel and/or visitors receive training prior to the initiation of activities. |
| | N/A | Pre-job training for proper ergonomic/lifting techniques. | At project start. SSHO will verify all site personnel have been briefed on ergonomic/lifting techniques. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## Soil Sampling

Date: February 2014 Project: FUDS HTRW Program

Activity: Soil Sampling

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): M

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Soil Sampling | Cross contamination and contact with potentially contaminated materials | • Sampling technicians will wear proper protective clothing and equipment to safeguard against potential contamination.<br>• Avoid skin contact with water.<br>• Handle samples with care.<br>• Only essential personnel will be in the work area.<br>• Real-time air monitoring will take place before and during sampling activities.<br>• All personnel will follow good hygiene practices.<br>• Proper decontamination procedures will be followed.<br>• All liquids and materials used for decontamination will be contained and disposed of in accordance with federal, state, and local regulations. | L |
| | | Biological hazards | • Survey the sampling area for signs of snakes or insects that could injure personnel.<br>• Wear an appropriate insect repellant. | M |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Soil Sampling**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Snake chaps shall be used when work is required in dense vegetation.<br>• Inspect one another frequently for ticks and insects.<br>• Wear light-colored clothing in order to make it easier to see ticks and insects. | |
| | Soil Sampling | Repetitive motion | • When hand augering multiple sample locations frequently rotate personnel.<br>• Notify your supervisor if you experience repetitive motion symptoms. | M |
| | | Defective sampling tool | • Inspect sampling devices during periodic decontamination activities and prior to use. | L |
| | | Chemical burns | • When using dilute nitric acid for decontamination wear chemical resistant gloves, goggles or face shield. | L |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Trowel, Stainless Spoon, Hand Auger | One-on-one instruction from experienced personnel, applicable safety training. | Sampling personnel will inspect equipment before each use. SSHO will verify PPE provide adequate protection for sampling tasks. |
| | | Pre-job training for proper ergonomic/lifting techniques | Project start. SSHO will verify all site personnel have been briefed on ergonomic/lifting techniques. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## Land Surveying

Date: February 2014 Project: FUDS HTRW Program

Activity: Land Surveying

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): L

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Land Surveying | Thunderstorms, lightning, and tornadoes | • Whenever possible, halt activities and take cover.<br>• If outdoors, stay low to the ground.<br>• Seek shelter in a building if possible.<br>• Stay away from windows.<br>• Cease field activities during thunderstorms or tornado warnings.<br>• Use caution when walking adjacent to trenching and around spoil material. | L |
| | | Heat cramps | • Drink plenty of cool fluids even when not thirsty.<br>• Provide cool fluid for work crews.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Move victim to shaded, cool area. | L |
| | | Heat exhaustion | • Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).<br>• Set up work/rest periods. | L |

## Table 2-1
## ACTIVITY HAZARD ANALYSIS
## Land Surveying

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | | • Use the "buddy system."<br>• Allow workers time to acclimate.<br>• Have ice packs available for use.<br>• Take frequent breaks. | |
| | | Heat stroke | • Evaluate possibility of night work.<br>• Perform physiological monitoring on workers during breaks.<br>• Wear body cooling devices.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control. | L |
| | | Traffic accidents | • If working adjacent to roadways, have workers wear fluorescent orange vests.<br>• Use warning signs or lights to alert oncoming traffic.<br>• Assign trained flag person(s) if necessary to direct local traffic.<br>• Set up temporary parking locations outside the immediate work area.<br>• Motor vehicle operators shall obey all posted traffic signs, signals, and speed limits.<br>• Pedestrians have the right of way.<br>• Wear seat belts when vehicles are in motion. | L |
| | | Sink holes | • Constantly survey the area for depressions that my indicate sink holes.<br>• Walk well around potential sink holes and demarcate the area to warn other personnel.<br>• Notify FM/SSHO immediately if possible sinkholes are observed. | L |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | N/A | Pre-job training for general site activities and controls, and general project PPE requirements. | At project start. SS/SSHO will verify all site personnel and/or visitors receive training prior to the initiation of activities. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
## Surface Water and Sediment Sampling

Date: February 2014 Project: FUDS HTRW Program

Activity: Surface Water and/or Sediment Sampling

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): M

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

**IDENTIFIED HAZARDS**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Surface Water and/or Sediment Sampling | Working near water | • Personal flotation devices (PFD) will be provided and worn by workers over or near water where the danger of drowning exists.<br>• PFDs shall be inspected prior to and after each use.<br>• Detective PFDs will be tagged and removed from service.<br>• Ring buoys with at least 90 feet of line shall be provided and readily available at locations where employees are working over or adjacent to water.<br>• Use the "buddy system."<br>• Personnel trained in launching and operating the skiff shall be readily available during work hours.<br>• If waders are required ensure the soles are puncture resistant or use puncture resistant boot inserts. | M |
| | | Biological | • Continuously inspect the work area for biological hazards that harbor near water. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**Surface Water and Sediment Sampling**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | Surface Water and/or Sediment Sampling | Walking surface | • When walking in water with poor visibility use a pole or probe to examine path ahead of you for possible underwater hazards e.g., deep hole, dense vegetation. | M |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Sampling Equipment | Equipment manual, one-on-one instruction from experienced personnel, review safe lifting techniques for heavier equipment. | Sampling personnel will ensure that equipment is operational. Sampling personnel will inspect sample containers for leaking preservatives. SSHO will verify PPE provide adequate protection for sampling tasks. |

# Table 2-1
# ACTIVITY HAZARD ANALYSIS
# High-Pressure Water Jetting Operations

Date: February 2014 Project: FUDS HTRW Program

Activity: High-Pressure Water Jetting Operations (Decontamination)

Activity Location: Former Lee Field Naval Air Station, Green Cove Springs, Florida

Prepared By: Doug Russell

Competent Person: Shane Yenchi

Overall Risk Assessment Code (RAC) (Use highest code): L

**Risk Assessment Code Matrix**

E= Extremely High Risk
H= High Risk
M= Moderate Risk
L= Low Risk

| Severity | Probability: Frequent | Likely | Occasional | Seldom | Unlikely |
|---|---|---|---|---|---|
| Catastrophic | E | E | H | H | M |
| Critical | E | H | H | M | L |
| Marginal | H | M | M | L | L |
| Negligible | M | L | L | L | L |

## IDENTIFIED HAZARDS

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | High-Pressure Water Jetting Operations, including Decontamination | Heavy lifting | • Use proper lifting techniques.<br>• Lifts greater than 60 pounds require assistance or mechanical equipment; size up the lift. | L |
| | | Slip, trip, and fall hazards | • Good housekeeping shall be implemented.<br>• The work area shall be kept clean as feasible.<br>• Inspect the work area for slip, trip, and fall hazards. | L |
| | | Fueling | • Only approved metal safety cans shall be used to store fuel.<br>• Do not refuel equipment while it is operating.<br>• Fire extinguishers shall be suitably placed, distinctly marked, readily accessible, and maintained in a fully charged and operable condition.<br>• Fuel quantities in excess of one days use shall be stored in approved flammable cabinets. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**High-Pressure Water Jetting Operations**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Faulty or damaged equipment | • Equipment shall be inspected before being placed into service and at the beginning of each shift.<br>• Preventive maintenance procedures recommended by the manufacturer shall be followed.<br>• A lockout/tagout procedure shall be used for equipment found to be faulty or undergoing maintenance. | L |
| | | High-pressure water | • Jetting gun operator must wear appropriate PPE including hard hat, impact-resistant safety glasses with side shields, face shield, water-resistant clothing, metatarsal guards for feet and legs, and hearing protection (if appropriate).<br>• One standby person shall be available within the vicinity of the pump during jetting operation.<br>• The work area shall be isolated and adequate barriers will be used to warn other site personnel. | L |
| | | Heat rash | • Keep the skin clean and dry.<br>• Change perspiration-soaked clothing, as necessary.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Bathe at end of work shift or day.<br>• Apply powder to affected area. | L |
| | | Heat cramps | • Drink plenty of cool fluids even when not thirsty.<br>• Provide cool fluid for work crews.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Move victim to shaded, cool area. | L |
| | | Heat exhaustion | • Conduct physiological worker monitoring as needed (i.e., heart rate, oral temperature).<br>• Set up work/rest periods.<br>• Use the "buddy system."<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control.<br>• Allow workers time to acclimate.<br>• Have ice packs available for use.<br>• Take frequent breaks. | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**High-Pressure Water Jetting Operations**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Heat stroke | • Evaluate possibility of night work.<br>• Perform physiological monitoring on workers during breaks.<br>• Wear body cooling devices.<br>• Comply with CMS-710-01-PR-00600, Heat Stress Prevention and Control. | L |
| | | Unqualified operators | • Only qualified and trained personnel are permitted to operate machinery and mechanized equipment associated with water jet cutting and cleaning. | L |
| | | Out of control equipment | • No machinery or equipment is permitted to run unattended.<br>• Machinery or equipment will not be operated in a manner that will endanger persons or property, nor will the safe operating speeds or loads be exceeded. | L |
| | | Noise | • Sound levels above 85 dBA mandate hearing protection by nearby site personnel. | L |
| | | Contact with potentially contaminated materials | • Real- time air monitoring will take place. If necessary, proper personal protective clothing and equipment will be utilized.<br>• Upgrade to respirator if necessary.<br>• Avoid skin contact with soil cuttings. Wear gloves. | L |
| | | Activation during repairs | • All machinery or equipment will be shut down and positive means taken to prevent its operation while repairs or manual lubrications are being done. | L |
| | | Pinch points | • Keep feet and hands clear of moving/suspended materials and equipment.<br>• Stay alert and clear of materials suspended | L |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**High-Pressure Water Jetting Operations**

| | JOB STEPS | HAZARDS | ACTIONS TO ELIMINATE OR MINIMIZE HAZARDS | RAC |
|---|---|---|---|---|
| | | Falling objects | • Hard hats are required by site personnel.<br>• Stay alert and clear of material suspended overhead.<br>• Tooling or augers placed on racks off the ground surface shall be secured.<br>• Racks shall be capable of withstanding the anticipated weight loading.<br>• Rack bases shall be designed to prevent them from being easily tipped over. | L |
| | | Flying debris | • Impact-resistant safety glasses with side shields are required. | L |
| | | Cross contamination | • Containment structures shall be erected to collect rinsate and liquids generated during equipment cleaning. | |

**EQUIPMENT**

| | EQUIPMENT | TRAINING/REQUIREMENTS | INSPECTION |
|---|---|---|---|
| | Pressure Washer/Steam Cleaner and Miscellaneous Decontamination Equipment | One-on-one instruction from experienced operator, CMS-710-02-PR-07100, Pressurized Water Cleaning and Cutting Operations and/or equipment manufacturer requirements. | Daily inspection of equipment prior to start of work by designated competent personnel with concurrence from SSHO. CMS-710-02-FM-07101, Pre-Operation Checklist for Pressure Water Jet Cleaning and Cutting Equipment.<br>Ensure that contaminants and cleansers are removed following decontamination process. SSHO will verify gloves and other PPE provide adequate protection to skin and eyes during decontamination. |
| | N/A | Pre-job training for proper ergonomic/lifting techniques. | At project start. SS/SSHO will verify all site personnel have been briefed on ergonomic/lifting techniques. |

**Table 2-1**
**ACTIVITY HAZARD ANALYSIS**
**High-Pressure Water Jetting Operations**

# Table 2-2

## Toxicological and Physical Properties of Chemicals
## Installationwide Safety and Health Plan
## Former Lee Field Naval Air Station, Green Cove Springs, Florida



| Substance [CAS] | IP[a] (eV) | Odor Threshold (ppm) | Route[b] | Symptoms of Exposure | Treatment | TWA[c] | STEL[d] | Source[e] | IDLH (NIOSH)[f] |
|---|---|---|---|---|---|---|---|---|---|
| Benzene<br><br>[71-43-2] | 9.24 | 34B119 | Inh<br>Abs<br>Ing<br>Con | Irritates eyes, nose, respiratory system; giddiness; headache, nausea, staggered gait; fatigue, anorexia, lassitude; dermatitis; bone-marrow depression. Carcinogenic. | Eye: Irrigate immediately<br>Skin: Soap wash promptly<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 1 ppm<br>0.5 ppm (skin)<br><br>0.1 ppm | 5 ppm<br>2.5 ppm<br><br>1 ppm | PEL<br>TLV<br><br>REL | Ca<br>[500 ppm]*<br><br>*OSHA |
| Ethyl benzene<br><br>[100-41-4] | 8.76 | 0.09B0.6 | Inh<br>Ing<br>Con | Irritates eyes, mucous membranes; headache; dermatitis; narcosis, coma. | Eye: Irrigate immediately<br>Skin: Water flush promptly<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 100 ppm<br>100 ppm<br>100 ppm | 125 ppm<br>125 ppm | PEL<br>TLV<br>REL | 800 ppm |
| Fuel oil<br>(diesel oil, medium) | ? | ? | Ing<br>Inh<br>Con | Ingestion causes nausea, vomiting, and cramps; depressed central nervous system, headache, coma, death; pulmonary irritation; kidney and liver damage; aspiration causes severe lung irritation, coughing, gagging, dyspnea, substernal stress, pulmonary edema; bronchopneumonia; excited, then depressed, central nervous system. | Eye: Irrigate promptly<br>Skin: Soap wash<br>Breath: Respiratory support<br>Swallow: Immediate medical attention<br>Aspiration: Immediate medical attention | | | PEL<br>TLV<br>REL | |
| Gasoline<br><br>[8006-61-9] | ? | 0.3 | Inh<br>Ing<br>Con | Intoxication, headaches, blurred vision, dizziness, nausea; eye, nose throat irritation; potential kidney and other cancers. Carcinogenic. | Eye: Irrigate immediately (15 min)<br>Skin: Soap wash promptly<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 300 ppm<br>Ca, lowest feasible conc.<br>(LOQ 15 ppm) | 500 ppm | PEL<br>TLV<br>REL | Ca<br>(ND) |

# Table 2-2

## Toxicological and Physical Properties of Chemicals
## Installationwide Safety and Health Plan
## Former Lee Field Naval Air Station, Green Cove Springs, Florida



| Substance [CAS] | IP[a] (eV) | Odor Threshold (ppm) | Route[b] | Symptoms of Exposure | Treatment | TWA[c] | STEL[d] | Source[e] | IDLH (NIOSH)[f] |
|---|---|---|---|---|---|---|---|---|---|
| Hydrogen chloride (hydrochloric acid)<br><br>[74-90-8] | 12.74 | 0.255-0.6 | Inh<br>Ing<br>Con | Inflamed nose, throat, larynx; cough, burns throat, choking; burns eyes, skin; dermatitis; in animals; laryngeal spasm; pulmonary edema. | Eye: Irrigate immediately<br>Skin: Water flush immediately<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | | C5 ppm<br>C5 ppm<br>C5 ppm | PEL<br>TLV<br>REL | 50 ppm |
| Methanol<br><br>[67-56-1] | 10.85 | 4.2-5960 | Inh<br>Abs<br>Ing<br>Con | Irritated eyes, headache, drowsiness, lightheadedness, nausea, vomiting, disturbance in vision, blindness. | Eye: Irrigate immediately<br>Skin: Water flush promptly<br>Breath: Fresh air<br>Swallow: Immediate medical attention | 200 ppm<br>200 ppm (skin)<br>200 ppm | <br>250 ppm<br>250 ppm | PEL<br>TLV<br>REL | 6,000 ppm |
| Methylene chloride (dichloromethane)<br><br>[75-09-2] | 11.32 | ? | Inh<br>Ing<br>Con | Fatigue, weakness, sleepiness, lightheadedness; numbness and tingling in limbs; nausea; irritated eyes and skin. | Eye: Irrigate immediately<br>Skin: Soap wash promptly<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 25 ppm<br>50 ppm | 125 ppm | PEL<br>TLV<br>REL | Ca<br>(2,300 ppm) |
| Motor oil<br><br>[NA] | ? | ? | Inh<br>Ing | See oil mist; usually only a problem if misted or ingested. | Eye: Irrigate immediately (15 min)<br>Skin: Soap wash immediately<br>Swallow: Immediate medical attention | | | PEL<br>TLV<br>REL | |
| Nitric acid<br><br>[7697-37-2] | 11.95 | 0.3-1 | Inh<br>Ing<br>Con | Irritated eyes, mucous membranes, and skin; delayed pulmonary edema, pneumonitis, bronchitis; dental erosion. | Eye: Irrigate immediately<br>Skin: Water flush promptly<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 2 ppm<br>2 ppm<br>2 ppm | <br>4 ppm<br>4 ppm | PEL<br>TLV<br>REL | 25 ppm |
| PCBs<br><br>11097-69-1 | ? | ? | Inh<br>Ing<br>Con<br>Abs | Irritated eyes; chloracne; liver damage; reproductive effects. Carcinogen | Eye: Irrigate immediately<br>Skin: Soap wash immediately<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 0.5 $mg/m^3$ (skin)<br>0.5 $mg/m^3$ (skin)<br>0.001 $mg/m^3$ | -<br>-<br>- | PEL<br>TLV<br>REL | Ca<br><br>[5 $mg/m^3$] |

# Table 2-2

## Toxicological and Physical Properties of Chemicals
## Installationwide Safety and Health Plan
## Former Lee Field Naval Air Station, Green Cove Springs, Florida



| Substance [CAS] | IP[a] (eV) | Odor Threshold (ppm) | Route[b] | Symptoms of Exposure | Treatment | TWA[c] | STEL[d] | Source[e] | IDLH (NIOSH)[f] |
|---|---|---|---|---|---|---|---|---|---|
| Portland cement | | | Inh | Fine gray powder that can be irritating if inhaled or in eyes. | Eye: Irrigate immediately<br>Skin: Soap wash immediately<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | | 15 $mg/m^3$<br>10 $mg/m^3$<br>10 $mg/m^3$ | PEL<br>TLV<br>REL | 5000 $mg/m^3$ |
| Pyridine | 9.27 | NA | Inh<br>Abs<br>Ing<br>Con | Irritated eyes; headache, anxiety, dizziness, insomnia; nausea, anorexia; dermatitis; liver, kidney damage | Eye: Irrigate immediately<br>Skin: Water flush immediately<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 1 ppm | NA | PEL<br>REL<br>TLV | 1000 ppm |
| Sodium hydroxide<br><br>[1310-73-2] | NA | NA | Inh<br>Ing<br>Con | Irritated nose; pneumonitis; burns eyes, and skin; temporary loss of hair. | Eye: Irrigate immediately<br>Skin: Water flush immediately<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 2 $mg/m^3$ | C2 $mg/m^3$<br>C2 $mg/m^3$ | PEL<br>TLV<br>REL | 10 $mg/m^3$ |
| Toluene<br><br>[108-88-3] | 8.82 | 0.16-37 | Inh<br>Abs<br>Ing<br>Con | Fatigue, weakness; confusion, euphoria, dizziness, headache; dilated pupils, lacrimation; nervousness, muscular fatigue, insomnia; paralysis; dermatitis. | Eye: Irrigate immediately<br>Skin: Soap wash promptly<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 200 ppm<br>50 ppm (skin)<br>100 ppm | C 300ppm<br>-<br>150 ppm | PEL<br>TLV<br>REL | 500 ppm |
| Xylene<br>(o-, m-, and p-isomers)<br><br>[1330-20-7;95-47-6; 108-38-3;106-42-3] | 8.56/<br>8.56/<br>8.44 | 1.1-1.2 | Inh<br>Abs<br>Ing<br>Con | Dizziness, excitement, drowsiness, incoordination, staggering gait; irritated eyes, nose, throat; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis. | Eye: Irrigate immediately<br>Skin: Soap wash promptly<br>Breath: Respiratory support<br>Swallow: Immediate medical attention | 100 ppm<br>100 ppm<br>100 ppm | 150 ppm<br>150 ppm | PEL<br>TLV<br>REL | 900 ppm |

[a]IP = Ionization potential (electron volts).
[b]Route = Inh, Inhalation; Abs, Skin absorption; Ing, Ingestion; Con, Skin and/or eye contact.
[c]TWA = Time-weighted average. The TWA concentration for a normal work day (usually 8 or 10 hours) and a 40-hour work week, to which nearly all workers may be repeatedly exposed, day after day without adverse effect.

# Table 2-2

## Toxicological and Physical Properties of Chemicals
## Installationwide Safety and Health Plan
## Former Lee Field Naval Air Station, Green Cove Springs, Florida



[d]STEL = Short-term exposure limit. A 15-minute TWA exposure that should not be exceeded at any time during a workday, even if the TWA is not exceeded.
[e]PEL = Occupational Safety and Health Administration (OSHA) permiss ble exposure limit (29 CFR 1910.1000, Table Z).
AEL = Airborne Exposure Limit.
TLV = American Conference of Governmental Industrial Hygiene (ACGIH) threshold limit valueCTWA.
REL = National Institute for Occupational Safety and Health (NIOSH) recommended exposure limit.
[f]IDLH (NIOSH) = Immediately dangerous to life or health (NIOSH). Represents the maximum concentration from which, in the event of respirator failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.
NE = No evidence could be found for the existence of an IDLH (NIOSH) Pocket Guide to Chemical Hazards, Pub. No. 97-140, 2007
C = Ceiling limit value which should not be exceeded at any time.
Ca = Carcinogen.
NA = Not applicable.
? = Unknown.
LEL = Lower explosive limits.
$LC_{50}$ = Lethal concentration for 50 percent of population tested.
$LD_{50}$ = Lethal dose for 50 percent of population tested.
NIC = Notice of intended change (ACGIH).

References:

American Conference of Governmental Industrial Hygienists Guide to Occupational Exposure Values, 2007 compiled the American Conference of Governmental Industrial Hygienists.
Amoore, J. E. Hautula, "Odor as an Aid to Chemical Safety," Journal of Applied Toxicology, 1983.
Clayton, George D., Clayton, F. E., Patty's Industrial Hygiene and Toxicology, 3rd ed., John Wiley & Sons, New York.
Documentation of TLVs and BEIs, American Conference of Governmental Industrial Hygienists, 6th ed., 2007
Fazzuluri, F. A., Compilation of Odor and Taste Threshold Values Data, American Society for Testing and Materials, 1978.
Gemet, L. J. Van, Compilation of Odor Threshold Values in Air and Water, CIVO, Netherlands, 1977.
Gemet, L. J. Van, Compilation of Odor Threshold Values in Air and Water, Supplement IV, CIVO, Netherlands, 1977.
Lewis, Richard J., Sr., 1992, Sax's Dangerous Properties of Industrial Materials, 8th ed., Van Nostrand Reinhold, New York..
National Institute for Occupational Safety and Health Pocket Guide to Chemicals, Pub. No. 97-140, 2007 NIOSH
Odor Threshold for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association, 1989.
Respirator Selection Guide, 3M Occupational Health and Safety Division, 2007
Verschuseren, K., Handbook of Environmental Data on Organic Chemicals, Van Nostrand and Reinhold, 1977.
Warning Properties of Industrial ChemicalsCOccupational Health Resource Center, Oregon Lung Association.
Workplace Environmental Exposure Levels, American Industrial Hygiene Association, 2005

## Table 7-1

## Action Levels
## Installation-wide Safety and Health Plan
## Former Lee Field Naval Air Station, Green Cove Springs, Florida



When in Level B Personal Protective Equipment (PPE)

| Analyte | Action Level[a] | Required Action[b] |
|---|---|---|
| Volatile organic compound (VOC) Pyridine | >500 parts per million (ppm) above background in breathing zone (BZ) | Stop work, test for Benzene with detector tube |
| Benzene | >10 ppm in BZ | Stop work, evacuate work area |
| Oxygen | ≥ 20%, <23%<br>< 20%, >23% | Normal operations<br>Stop work, evacuate work area |
| Flammable vapors | ≥ 10% lower explosive limit (LEL)<br>< 10% LEL | Stop work, evacuate work area<br>Continue operations, monitor for VOCs |

When in Level C PPE

| Analyte | Action Level[a] | Required Action[b] |
|---|---|---|
| VOCs | ≥50 ppm above background in BZ | Stop work, test for Benzene with detector tube |
| Benzene | >5 ppm in BZ | Stop work, evacuate work area, contact HSM |
| Oxygen | ≥ 20%, <23%<br>< 20%, >23% | Normal operations<br>Stop work, evacuate work area |
| Flammable vapors | ≥ 10% LEL<br>< 10% LEL | Stop work, evacuate work area<br>Continue operations, monitor for VOCs |

## Table 7-1

## Action Levels
## Installation-wide Safety and Health Plan
## Former Lee Field Naval Air Station, Green Cove Springs, Florida



When in Level D Modified/D PPE

| Analyte | Action Level[a] | Required Action[b] |
|---|---|---|
| VOCs | ≥5 ppm above background in BZ | Stop activities, suspend work activities for 15 to 30 minutes, if readings are sustained then test for Benzene. |
| Benzene | >1 ppm in BZ | Upgrade to Level C PPE. |
| Oxygen | ≥ 20%, <23%<br>< 20%, >23% | Normal operations<br>Stop work, evacuate work area |
| Flammable vapors | ≥ 10% LEL<br>< 10% LEL | Stop work, evacuate work area<br>Continue operations, monitor for VOCs |

When in Support Zone

| Analyte | Action Level[a] | Required Action |
|---|---|---|
| VOCs | >1 ppm above background in BZ | Evacuate support zone and re-establish perimeter of exclusion zone. |

[a] Four instantaneous peaks in any 15-minute period or a sustained reading for 5 minutes in excess of the action level will trigger a response.
[b] Contact with the H&S manager must be made prior to continuance of work. The H&S manager may then initiate perimeter/integrated air sampling along with additional engineering controls.

**No one is permitted to downgrade levels of PPE without authorization from the H&S manager.**

H&S – Health and safety.
PPE – Personal protective equipment.

## Table 7-2

## Air Monitoring Frequency and Location
## Installationwide Safety and Health Plan
## Former Lee Field Naval Air Station, Green Cove Springs, Florida

| Work Activity | Instrument | Frequency | Location |
|---|---|---|---|
| Staging equipment | OV Monitor | Initially for area | Breathing zone (BZ) of employees |
| Drilling and installation of monitoring wells | OV Monitor<br>CGI Monitor<br>BDT | Initially, then periodically (with each 5- to 10-foot depth)<br>As needed per action level | BZ of employees |
| Subsurface soil sampling | OV Monitor<br>CGI Monitor | Initially for location then periodically (with each 5- to 10-foot depth) | BZ of employees |
| Excavation of soils | OV Monitor<br>CGI Monitor<br>BDT | Initially then periodically every 10-15 minutes<br>As needed per action level | BZ of employees |
| Surface soil and sediment sampling | NR | | |
| Well abandonment | NR | | |

BDT - Benzene detector tube.
CGI - Combustible gas monitor.
OV - Organic vapor.
NR - Not required.

## Table 8-1

## Examples of Permissible Heat Exposure Threshold Limit Values for Personnel Wearing Permeable Clothing Installationwide Safety and Health Plan Former Lee Field Naval Air Station, Green Cove Springs, Florida

| Work/Rest Regimen | *Work Load Light | Moderate | Heavy |
|---|---|---|---|
| Continuous work | 30.0 (86) | 26.7 (80) | 25.0 (77) |
| 75% Work – 25% Rest, each hour | 30.6 (87) | 28.0 (82) | 25.9 (78) |
| 50% Work – 50% Rest, each hour | 31.4 (89) | 29.4 (85) | 27.9 (82) |
| 25% Work – 75% Rest, each hour | 32.2 (90) | 31.1 (88) | 30.0 (86) |

Here are some examples of job titles/tasks and their corresponding work loads:

| Job Title/Task | Work Load |
|---|---|
| Geologist, equipment operator | Light |
| Driller's helper, equipment spotter | Moderate |
| Posthole digging, heavy brush clearing | Heavy |

*Values are given in degrees Celsius ($^{o}$C) and degrees Fahrenheit ($^{o}$F) wet bulb globe temperature and are intended for workers wearing single-layer summer-type clothing. As work load increases, the heat stress impact on an unacclimatized worker is exacerbated. For unacclimatized workers performing a moderate level of work, the permissible heat exposure threshold limit value should be reduced by approximately 2.5$^{o}$C.

Source: American Conference of Governmental Industrial Hygienists, *2007 Threshold Limit Values and Biological Exposure Indices*.

## Table 8-2

## Examples of Permissible Heat Exposure Threshold Limit Values for Personnel Wearing Impermeable Clothing Installationwide Safety and Health Plan Former Lee Field Naval Air Station, Green Cove Springs, Florida

| Work/Rest Regimen | Light | *Work Load Moderate | Heavy |
|---|---|---|---|
| Continuous work | 30.0 (80) | 26.7 (74) | 25.0 (71) |
| 75% Work – 25% Rest, each hour | 30.6 (81) | 28.0 (76) | 25.9 (72) |
| 50% Work – 50% Rest, each hour | 31.4 (83) | 29.4 (79) | 27.9 (76) |
| 25% Work – 75% Rest, each hour | 32.2 (84) | 31.1 (82) | 30.0 (80) |

*Values are given in degrees Celsius (°C) and degrees Fahrenheit (°F) wet bulb globe temperature. As work load increases, the heat stress impact on an unacclimatized worker is exacerbated. For unacclimatized workers performing a moderate level of work, the permissible heat exposure threshold limit value should be reduced by approximately 2.5°C.

Source: American Conference of Governmental Industrial Hygienists, *2007 Threshold Limit Values and Biological Exposure Indices*.

# Table 8-3

## Temperature Monitoring/Physiological Monitoring Frequency/Work-Rest Table
## Installationwide Safety and Health Plan
## Former Lee Field Naval Air Station, Green Cove Springs, Florida

(Page 1 of 2)

| Temperature | Normal Work Clothing | Impervious Garment/PPE |
|---|---|---|
| 70°F to 75°F | 150 minutes | 120 minutes |
| 76°F to 80°F | 120 minutes | 90 minutes |
| 81°F to 85°F | 90 minutes | 60 minutes |
| 86°F to 90°F | 60 minutes | 45 minutes |
| 91°F to 95°F | 45 minutes | 30 minutes |
| 96°F to 100°F | 30 minutes | 15 minutes |
| 100°F or higher | 15 minutes | 5 minutes |

$^{o}$F – Degrees Fahrenheit.
PPE – Personal protective equipment.

| ACGIH 2007 | TLVs – "Acclimitized" | | | |
|---|---|---|---|---|
| Work Demands | Light | Moderate | Heavy | Very Heavy |
| 75%-100 % | 31.0 $^{o}$C<br>87.8 $^{o}$F | 28.0 $^{o}$C<br>82.4 $^{o}$F | | |
| 50%-75% | 31.0 $^{o}$C<br>87.8 $^{o}$F | 29.0 $^{o}$C<br>84.2 $^{o}$F | 27.5 $^{o}$C<br>81.5 $^{o}$F | |
| 25%-50% | 32.0 $^{o}$C<br>89.6 $^{o}$F | 30.0 $^{o}$C<br>86 $^{o}$F | 29.0 $^{o}$C<br>84.2 $^{o}$F | 28.0 $^{o}$C<br>82.4 $^{o}$F |
| 0%-25% | 32.5 $^{o}$C<br>90.5 $^{o}$F | 31.5 $^{o}$C<br>88.7 $^{o}$F | 30.5 $^{o}$C<br>86.9 $^{o}$F | 30.0 $^{o}$C<br>86 $^{o}$F |

| ACGIH 2007 | Action Levels – "Unacclimitized" | | | |
|---|---|---|---|---|
| Work Demands | Light | Moderate | Heavy | Very Heavy |
| 75%-100 % | 28.0 $^{o}$C<br>82.4 $^{o}$F | 25.0 $^{o}$C<br>77 $^{o}$F | | |
| 50%-75% | 28.5 $^{o}$C<br>83.3 $^{o}$F | 26.0 $^{o}$C<br>78.8 $^{o}$F | 24.0 $^{o}$C<br>75.2 $^{o}$F | |
| 25%-50% | 29.5 $^{o}$C<br>85.1 $^{o}$F | 27.0 $^{o}$C<br>80.6 $^{o}$F | 25.5 $^{o}$C<br>77.9 $^{o}$F | 24.5 $^{o}$C<br>76.1 $^{o}$F |
| 0%-25% | 30.0 $^{o}$C<br>86.0 $^{o}$F | 29 $^{o}$C<br>84.2 $^{o}$F | 28 $^{o}$C<br>82.4 $^{o}$F | 27.0 $^{o}$C<br>80.6 $^{o}$F |

Physiological Monitoring
Pulse – Max Pulse Rate 180 minus age; 1 minute rest rate must be <110
Temp – Max Temp for Acclimatized <101.3 $^{o}$F; Unacclimatized < 100.4 $^{o}$F

# Table 8-3

## Temperature Monitoring/Physiological Monitoring Frequency/Work-Rest Table
## Installationwide Safety and Health Plan
## Former Lee Field Naval Air Station, Green Cove Springs, Florida

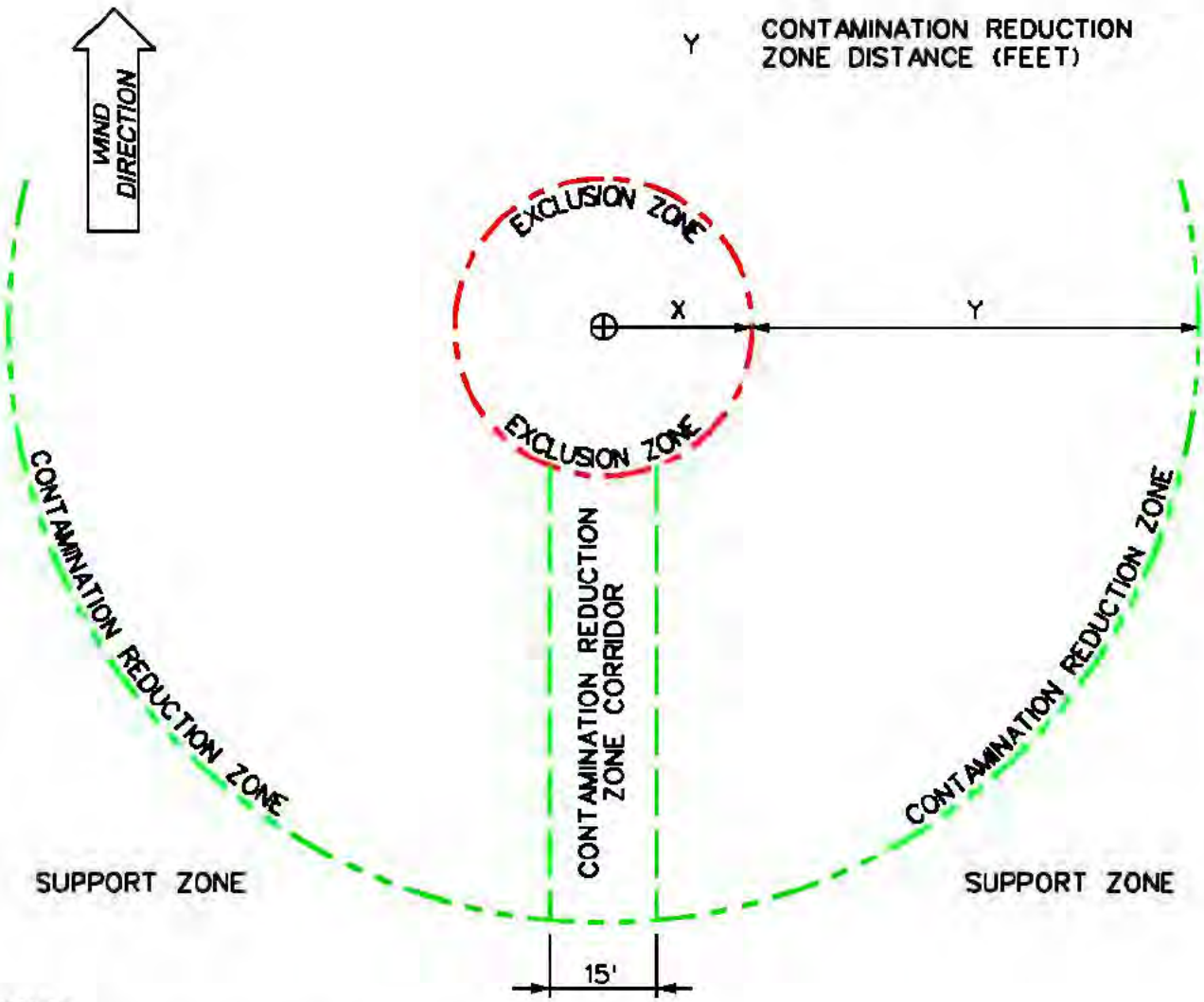


Record Work Demands based on Light, Medium, Heavy type of work

If you must exceed work demand schedule, perform Physiological Monitoring
Record Pulse – Max Pulse Rate 180 minus age; recovery heart rate after 1 min <120 bpm
Record Temp – Max Temp for Acclimatized <101.3 $^{o}$F; Unacclimatized < 100.4 $^{o}$F

| Work Demand | Example of Activity |
|---|---|
| Resting | • Sitting |
| Light | • Sitting with light manual work with hands or hands and arms, and driving<br>• Standing with some light arm work and occasional walking. |
| Moderate | • Sustained moderate hand and arm work, moderate arm and leg work, moderate arm and trunk work, or light pushing and pulling.<br>• Normal walking. |
| Heavy | • Intense arm and trunk work, carrying, shoveling, manual sawing; pushing and pulling heavy loads; and walking at a fast pace. |
| Very Heavy | • Very intense activity at fast to maximum pace. |

# FIGURES




## NOTES:

1. SUPPORT ZONE EQUIPMENT AND PERSONNEL WILL BE SETUP UP WIND OF WORK LOCATION.
2. BARRIERS OR VISUAL MARKINGS WILL BE USED TO MARK ZONES
3. EXCLUSION ZONE SETBACK DISTANCE (X):
   - GROUNDWATER SAMPLE/HAND AUGER SOIL BORING — 15'
   - AUGER DRILLING (ASSUME 10' MAST) — 25'
   - DIRECT-PUSH DRILLING/SPLIT SPOON SAMPLING, EXCAVATION — 40'
4. CONTAMINATION REDUCTION ZONE SETBACK DISTANCE (Y):
   - GROUNDWATER SAMPLE/HAND AUGER SOIL BORING — 10'
   - DRILLING OPERATIONS — 20'

**FIGURE 10-1**

**EXCLUSION ZONE, CONTAMINATION REDUCTION ZONE, AND SUPPORT ZONE LAYOUT**

*FORMER LEE FIELD NAVAL AIR STATION GREEN COVE SPRINGS, FLORIDA*

Shaw® Shaw Environmental, Inc.

STARTING DATE: 15DEC04 | INITIATOR: K.CUNNINGHAM | TECH. REVIEW: K.CUNNINGHAM | DWG. NO.: lee_nas_gen-safety.dgn
DRAWN BY: C.E.TUMLIN | CADD REVIEW: C.BENTLEY | PROJ. MGR.: G.QUARLES | PROJ. NO.: 108784

TIMEDATE2.TBL 8/27/2008 10:03:11 AM

0.0833 ' / IN. cbentley lee_nas_gen-safety.dgn

# ATTACHMENT 1

# SAFETY AND HEALTH PLAN REVISIONS

**SHAW HEALTH AND SAFETY PLAN**
**REVISION DOCUMENTATION**

**Project Name:** _____ **Project No.:** _____

**Revision No.:** _____ **Date:** _____

**Revision Revises:** *Page:* _____ **Section:** _____

**Task(s) Revision Affects:*** _____

_____

**(Attach new/revised Job Safety Analyses)*

**Reason For Revision:**

_____

_____

_____

_____

_____

_____

**Revision:** *(Attach separate sheet(s) as necessary)*

_____

_____

_____

_____

_____

_____

_____

_____

_____

_____

**Completed by:** _____ **Approved by:** _____

# ATTACHMENT 2

# SUBCONTRACTOR CERTIFICATION

# SUBCONTRACTOR CERTIFICATION

I, _____as an agent of _____, do hereby certify that the following employees have successfully completed a 40-hour training course which complies with the provisions of 29 CFR 1910.120/29, CFR 1926.65, and respiratory protection training which complies with 29 CFR 1910.134. Each employee has successfully completed a medical examination which complies with the above regulations.

Individual copies of certification of successful completion of the required training and medical examinations are attached for each employee.

_____ _____

Signature Date

# ATTACHMENT 3

# MATERIAL SAFETY DATA SHEETS

# MATERIAL SAFETY DATA SHEET

## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

**MATHESON TRI-GAS, INC.**
**150 Allen Road Suite 302**
**Basking Ridge, New Jersey 07920**
**Information: 1-800-416-2505**

**Emergency Contact:**
**CHEMTREC 1-800-424-9300**
**Calls Originating Outside the US:**
**703-527-3887 (Collect Calls Accepted)**

### SUBSTANCE: PYRIDINE

**TRADE NAMES/SYNONYMS:**
MTG MSDS 193; AZINE; AZABENZENE; RCRA U196; UN 1282; C5H5N; MAT19990; RTECS UR8400000

**CHEMICAL FAMILY:** pyridinyl

**CREATION DATE:** Jan 24 1989
**REVISION DATE:** Dec 11 2008

## 2. COMPOSITION, INFORMATION ON INGREDIENTS

**COMPONENT:** PYRIDINE
**CAS NUMBER:** 110-86-1
**PERCENTAGE:** 100

## 3. HAZARDS IDENTIFICATION

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

**EMERGENCY OVERVIEW:**
**PHYSICAL DESCRIPTION:** liquid
**MAJOR HEALTH HAZARDS:** skin irritation, eye irritation, central nervous system depression
**PHYSICAL HAZARDS:** Flammable liquid and vapor. Vapor may cause flash fire.

**POTENTIAL HEALTH EFFECTS:**
**INHALATION:**
**SHORT TERM EXPOSURE:** irritation, headache, drowsiness, dizziness, loss of coordination
**LONG TERM EXPOSURE:** nausea, vomiting, diarrhea, stomach pain, loss of appetite, dizziness, sleep disturbances, emotional disturbances, loss of coordination, nerve damage

**SKIN CONTACT:**
**SHORT TERM EXPOSURE:** irritation (possibly severe), allergic reactions, sensitivity to light
**LONG TERM EXPOSURE:** irritation, allergic reactions
**EYE CONTACT:**
**SHORT TERM EXPOSURE:** irritation, eye damage
**LONG TERM EXPOSURE:** irritation
**INGESTION:**
**SHORT TERM EXPOSURE:** nausea, vomiting, diarrhea, disorientation, emotional disturbances, lung congestion
**LONG TERM EXPOSURE:** same as effects reported in long term inhalation, heart damage, kidney damage, liver damage

## 4. FIRST AID MEASURES

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

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

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

**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 and activated charcoal slurry.

## 5. FIRE FIGHTING MEASURES

**FIRE AND EXPLOSION HAZARDS:** Severe fire hazard. Vapor/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back.

**EXTINGUISHING MEDIA:** alcohol-resistant foam, carbon dioxide, regular dry chemical, water

Large fires: Use alcohol-resistant foam or flood with fine water spray.

**FIRE FIGHTING:** Move container from fire area if it can be done without risk. Dike for later disposal. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. 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). Do not attempt to extinguish fire unless flow of material can be stopped first. Flood with fine water spray. Do not scatter spilled material with high-pressure water streams. Cool containers with water spray until well after the fire is out. Apply water from a protected location or from a safe distance. Avoid inhalation of material or combustion by-products. Stay upwind and keep out of low areas. Water may be ineffective.

**FLASH POINT:** 68 F (20 C) (CC)
**LOWER FLAMMABLE LIMIT:** 1.8%
**UPPER FLAMMABLE LIMIT:** 12.4%
**AUTOIGNITION:** 900 F (482 C)
**FLAMMABILITY CLASS (OSHA):** IB

## 6. ACCIDENTAL RELEASE MEASURES

**WATER RELEASE:**
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. Remove 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. Keep unnecessary people away, isolate hazard area and deny entry. Stay upwind and keep out of low areas. 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).

## 7. HANDLING AND STORAGE

**STORAGE:** Store and handle in accordance with all current regulations and standards. Protect from physical damage. Subject to storage regulations: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Keep separated from incompatible substances.

## 8. EXPOSURE CONTROLS, PERSONAL PROTECTION

**EXPOSURE LIMITS:**
**PYRIDINE:**
5 ppm (15 mg/m3) OSHA TWA
1 ppm ACGIH TWA
5 ppm (15 mg/m3) NIOSH recommended TWA 10 hour(s)

**VENTILATION:** Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Provide local exhaust ventilation system. Ensure compliance with applicable exposure limits.

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

**CLOTHING:** Wear appropriate chemical resistant clothing.

**GLOVES:** Wear appropriate chemical resistant gloves.

**RESPIRATOR:** The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
**125 ppm**
Any supplied-air respirator operated in a continuous-flow mode.
Any powered, air-purifying respirator with organic vapor cartridge(s).
**250 ppm**
Any air-purifying respirator with a full facepiece and an organic vapor canister.
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s).
Any self-contained breathing apparatus with a full facepiece.
Any supplied-air respirator with a full facepiece.
**1000 ppm**
Any supplied-air respirator with a full facepiece that is operated in a pressure-demand or other positive-pressure mode.
Emergency or planned entry into unknown concentrations or IDLH conditions -
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 a full facepiece that is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive-pressure mode.
**Escape -**
Any air-purifying full-facepiece respirator (gas mask) with a chin-style, front-mounted or back-mounted organic vapor canister.
Any appropriate escape-type, self-contained breathing apparatus.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

**PHYSICAL STATE:** liquid
**ODOR:** Not available
**MOLECULAR WEIGHT:** 79.10
**MOLECULAR FORMULA:** C5-H5-N
**BOILING POINT:** 239 F (115 C)
**FREEZING POINT:** -44 F (-42 C)
**VAPOR PRESSURE:** 18 mmHg @ 20 C

**VAPOR DENSITY (air=1):** 2.7
**SPECIFIC GRAVITY (water=1):** 0.9819
**WATER SOLUBILITY:** soluble
**PH:** 8.2 (0.2 M solution)
**VOLATILITY:** Not available
**ODOR THRESHOLD:** <1 ppm
**EVAPORATION RATE:** Not available
**COEFFICIENT OF WATER/OIL DISTRIBUTION:** Not available
**SOLVENT SOLUBILITY:**
**Soluble:** alcohol, ether, acetone, benzene, oils, ligroin, organic solvents

## 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.

**INCOMPATIBILITIES:** acids, combustible materials, oxidizing materials, halogens, halo carbons

**HAZARDOUS DECOMPOSITION:**
Thermal decomposition products: oxides of carbon, nitrogen

**POLYMERIZATION:** Will not polymerize.

## 11. TOXICOLOGICAL INFORMATION

**PYRIDINE:**
**IRRITATION DATA:** 500 mg/24 hour(s) skin-rabbit mild
**TOXICITY DATA:** 10 gm/m3 inhalation-mammal LC50; 1 gm/kg skin-guinea pig LD50; 1500 mg/kg oral-mouse LD50
**CARCINOGEN STATUS:** IARC: Human Inadequate Evidence, Animal Limited Evidence, Group 3; ACGIH: A3 -Confirmed Animal Carcinogen
**LOCAL EFFECTS:**
Irritant: skin, eye
**ACUTE TOXICITY LEVEL:**
Toxic: inhalation, dermal absorption
Moderately Toxic: ingestion
**TARGET ORGANS:** central nervous system
**MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:** central nervous system disorders, kidney disorders, liver disorders
**TUMORIGENIC DATA:** Available.
**MUTAGENIC DATA:** Available.

## 12. ECOLOGICAL INFORMATION

**ECOTOXICITY DATA:**
**FISH TOXICITY:** 26000 ug/L 96 hour(s) LC50 (Mortality) Common, mirror, colored, carp (Cyprinus carpio)

**INVERTEBRATE TOXICITY:** 1430 mg/L 24 hour(s) EC100 (Abundance) Water flea (Daphnia magna)

**ALGAL TOXICITY:** 280000 ug/L 48 hour(s) (Population Growth) Green algae (Scenedesmus pannonicus)

**OTHER TOXICITY:** 10000 ug/L 96 hour(s) (Abnormality) Clawed toad (Xenopus laevis)

## 13. DISPOSAL CONSIDERATIONS

Dispose in accordance with all applicable regulations. Hazardous Waste Number(s): D038. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level- 5.0 mg/L. Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U196.

## 14. TRANSPORT INFORMATION

**U.S. DOT 49 CFR 172.101:**
**PROPER SHIPPING NAME:** Pyridine
**ID NUMBER:** UN1282
**HAZARD CLASS OR DIVISION:** 3
**PACKING GROUP:** II
**LABELING REQUIREMENTS:** 3

**CANADIAN TRANSPORTATION OF DANGEROUS GOODS:**
**SHIPPING NAME:** Pyridine
**UN NUMBER:** UN1282
**CLASS:** 3
**PACKING GROUP/CATEGORY:** II

## 15. REGULATORY INFORMATION

**U.S. REGULATIONS:**
**CERCLA SECTIONS 102a/103 HAZARDOUS SUBSTANCES (40 CFR 302.4):**
**PYRIDINE:** 1000 LBS RQ

**SARA TITLE III SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart B):** Not regulated.

**SARA TITLE III SECTION 304 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355 Subpart C):** Not regulated.

**SARA TITLE III SARA SECTIONS 311/312 HAZARDOUS CATEGORIES (40 CFR 370 Subparts B and C):**
ACUTE: Yes
CHRONIC: No
FIRE: Yes
REACTIVE: No
SUDDEN RELEASE: No

**SARA TITLE III SECTION 313 (40 CFR 372.65):**
**PYRIDINE**

**OSHA PROCESS SAFETY (29 CFR 1910.119):** Not regulated.

**STATE REGULATIONS:**
**California Proposition 65:**
Known to the state of California to cause the following:
**PYRIDINE**
Cancer (May 17, 2002)

**CANADIAN REGULATIONS:**
**WHMIS CLASSIFICATION:** Not determined.

**NATIONAL INVENTORY STATUS:**
**U.S. INVENTORY (TSCA):** Listed on inventory.

**TSCA 12(b) EXPORT NOTIFICATION:** Not listed.

**CANADA INVENTORY (DSL/NDSL):** Not determined.

## 16. OTHER INFORMATION

"RTECS®" is a United States trademark owned and licensed under authority of the U.S. Government, by and through Symyx Software, Inc. Portions ©Copyright 2001, U.S. Government. All rights reserved.

©Copyright 1984-2009 ChemADVISOR, Inc. All rights reserved.

**MATHESON TRI-GAS, INC. MAKES NO EXPRESS OR IMPLIED WARRANTIES, GUARANTEES OR REPRESENTATIONS REGARDING THE PRODUCT OR THE INFORMATION HEREIN, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR USE. MATHESON TRI-GAS, INC. SHALL NOT BE LIABLE FOR ANY PERSONAL INJURY, PROPERTY OR OTHER DAMAGES OF ANY NATURE, WHETHER COMPENSATORY, CONSEQUENTIAL, EXEMPLARY, OR OTHERWISE,**

**RESULTING FROM ANY PUBLICATION, USE OR RELIANCE UPON THE INFORMATION HEREIN.**

Centers for Disease Control and Prevention
CDC 24/7: Saving Lives. Protecting People.™

Search the Pocket Guide

SEARCH

Enter search terms separated by spaces.

# Pyridine

**Synonyms & Trade Names** Azabenzene, Azine

| | | |
|---|---|---|
| **CAS No.** 110-86-1 | **RTECS No.** UR8400000 (/niosh-rtecs/UR802C80.html) | **DOT ID & Guide** 1282 129 (http://wwwapps.tc.gc.ca/saf-sec-sur/3/erg-gmu/erg/guidepage.aspx?guide=129) (http://www.cdc.gov/Other/disclaimer.html) |
| **Formula** $C_5H_5N$ | **Conversion** 1 ppm = 3.24 mg/m3 | **IDLH** 1000 ppm<br>See: 110861 (/niosh/idlh/110861.html) |
| Exposure Limits<br>**NIOSH REL** : TWA 5 ppm (15 mg/m3)<br>**OSHA PEL** : TWA 5 ppm (15 mg/m3) | | **Measurement Methods**<br>**NIOSH** 1613 (/niosh/docs/2003-154/pdfs/1613.pdf) ;<br>**OSHA** 7 (http://www.osha.gov/dts/sltc/methods/organic/org001/org001.html) (http://www.cdc.gov/Other/disclaimer.html)<br>See: NMAM (/niosh/docs/2003-154/) or OSHA Methods (http://www.osha.gov/dts/sltc/methods/index.html) (http://www.cdc.gov/Other/disclaimer.html) |

**Physical Description** Colorless to yellow liquid with a nauseating, fish-like odor.

| | | | | | |
|---|---|---|---|---|---|
| **MW:** 79.1 | **BP:** 240° F | **FRZ:** -44°F | **Sol:** Miscible | **VP:** 16 mmHg | **IP:** 9.27 eV |
| **Sp.Gr:** 0.98 | **Fl.P:** 68°F | **UEL:** 12.4% | **LEL:** 1.8% | | |

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

**Incompatibilities & Reactivities** Strong oxidizers, strong acids

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

**Symptoms** irritation eyes; headache, anxiety, dizziness, insomnia; nausea, anorexia; dermatitis; liver, kidney damage

**Target Organs** Eyes, skin, central nervous system, liver, kidneys, gastrointestinal tract,

| | |
|---|---|
| **Personal Protection/Sanitation** (See protection codes (protect.html) )<br>**Skin:** Prevent skin contact<br>**Eyes:** Prevent eye contact<br>**Wash skin:** When contaminated<br>**Remove:** When wet (flammable) | **First Aid** (See procedures (firstaid.html) )<br>**Eye:** Irrigate immediately<br>**Skin:** Water flush immediately<br>**Breathing:** Respiratory support<br>**Swallow:** Medical attention immediately |

**Change:** No recommendation
**Provide:** Eyewash, Quick drench

Respirator Recommendations

**NIOSH/OSHA**

**Up to 125 ppm:**
(APF = 25) Any supplied-air respirator operated in a continuous-flow mode£
(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£

**Up to 50 ppm:**
(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s)£
(APF = 50) Any self-contained breathing apparatus with a full facepiece
(APF = 50) Any supplied-air respirator with a full facepiece

**Up to 1000 ppm:**
(APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

**Emergency or planned entry into unknown concentrations or IDLH conditions:**
(APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

**Escape:**
(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister
Any appropriate escape-type, self-contained breathing apparatus

Important additional information about respirator selection (pgintrod.html#mustread)

See also: INTRODUCTION (/niosh/npg/pgintrod.html) See ICSC CARD: 0323 (/niosh/ipcsneng/neng0323.html) See MEDICAL TESTS: 0200 (/niosh/docs/2005-110/nmed0200.html)

Page last reviewed: April 4, 2011
Page last updated: November 18, 2010
Content source: National Institute for Occupational Safety and Health (NIOSH) Education and Information Division

Centers for Disease Control and Prevention 1600 Clifton Rd. Atlanta, GA 30333, USA
800-CDC-INFO (800-232-4636) TTY: (888) 232-6348 - Contact CDC–INFO

**CHEVRON**
**DIESEL FUEL NO. 2 GRADE Revised: 03/28/1993**

**MSDS Contents**


1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
2. COMPOSITION/INFORMATION ON INGREDIENTS
3. HAZARDS IDENTIFICATION
4. FIRST AID MEASURES
5. FIRE FIGHTING MEASURES
6. ACCIDENTAL RELEASE MEASURES
7. HANDLING AND STORAGE
8. EXPOSURE CONTROLS/PERSONAL PROTECTION
9. PHYSICAL AND CHEMICAL PROPERTIES
10. STABILITY AND REACTIVITY
11. TOXICOLOGICAL INFORMATION
12. ECOLOGICAL INFORMATION
13. DISPOSAL CONSIDERATIONS
14. TRANSPORT INFORMATION
15. REGULATORY INFORMATION
16. OTHER INFORMATION


CHEVRON

MATERIAL SAFETY DATA SHEET

## 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

DIESEL FUEL NO. 2 GRADE

| COMPANY IDENTIFICATION | EMERGENCY TELEPHONE NUMBERS |
|---|---|
| CHEVRON USA PRODUCTS COMPANY | HEALTH (24 HR): (800)231-0623 OR |
| ENVIRONMENTAL, SAFETY, AND HEALTH | (510)231-0623 (INTERNATIONAL) |
| 575 MARKET ST., ROOM 2900 | TRANSPORTATION (24 HR): CHEMTREC |
| SAN FRANCISCO, CA 94105-2856 | (800)424-9300 OR (202)483-7616 |

PRODUCT INFORMATION: (800)822-5823 MSDS REQUESTS
(510)242-5357 TECHNICAL

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

COMPOSITION COMMENT:
ALL THE COMPONENTS OF THIS MATERIAL ARE ON THE TOXIC SUBSTANCES CONTROL ACT
CHEMICAL SUBSTANCES INVENTORY.

THE PROPORTION COMPOSITIONS ARE GIVEN TO ALLOW FOR THE VARIOUS RANGES OF
THE COMPONENTS PRESENT IN THE WHOLE PRODUCT AND MAY NOT EQUAL 100%.

100.0 % DIESEL FUEL NO. 2 GRADE

CONTAINING

| COMPONENTS | AMOUNT | LIMIT/QTY | AGENCY/TYPE |
|---|---|---|---|
| DIESEL FUEL NO. 2<br>CHEMICAL NAME: FUELS, DIESEL, NO. 2<br>CAS68476346 | 100.0% | | |
| HDS DISTILLATE, MIDDLE<br>CHEMICAL NAME: DISTILLATES, HYDRODESULFURIZED MIDDLE CAS64742809 | | | |
| GAS OIL, LIGHT<br>CHEMICAL NAME: DISTILLATES, STRAIGHT RUN MIDDLE CAS64741442 | | | |
| KEROSENE<br>CHEMICAL NAME: KEROSINE CAS8008206 | | | |
| HYDROSULFURIZED KEROSINE<br>CHEMICAL NAME: KEROSINE, HYDRODESULFURIZED CAS64742810 | | | |
| CAT CRACKED DISTILLATE, LIGHT<br>CHEMICAL NAME: DISTILLATES, LIGHT CATALYTIC CRACKED CAS64741599 | | | |

TLV - THRESHOLD LIMIT VALUE TWA - TIME WEIGHTED AVERAGE
STEL - SHORT-TERM EXPOSURE LIMIT TPQ - THRESHOLD PLANNING QUANTITY
RQ - REPORTABLE QUANTITY CPS - CUSA PRODUCT CODE
CC - CHEVRON CHEMICAL COMPANY CAS - CHEMICAL ABSTRACT SERVICE NUMBER

## 3. HAZARDS IDENTIFICATION

**** EMERGENCY OVERVIEW ****

PALE YELLOW LIQUID.

- COMBUSTIBLE
- HARMFUL OR FATAL IF SWALLOWED - CAN ENTER LUNGS AND CAUSE DAMAGE
- CAUSES SKIN IRRITATION
- CANCER HAZARD
- PROLONGED OR REPEATED SKIN CONTACT MAY INCREASE THE RISK OF SKIN CANCER
- KEEP OUT OF REACH OF CHILDREN

POTENTIAL HEALTH EFFECTS

EYE:
THIS SUBSTANCE IS NOT EXPECTED TO CAUSE PROLONGED OR SIGNIFICANT EYE

IRRITATION.

SKIN:
THIS SUBSTANCE IS A MODERATE SKIN IRRITANT SO CONTACT WITH THE SKIN COULD
CAUSE PROLONGED (DAYS) INJURY TO THE AFFECTED AREA. THE DEGREE OF INJURY
WILL DEPEND ON THE AMOUNT OF MATERIAL THAT GETS ON THE SKIN AND THE SPEED
AND THOROUGHNESS OF THE FIRST AID TREATMENT. IF ABSORBED THROUGH THE SKIN,
THIS SUBSTANCE IS CONSIDERED PRACTICALLY NON-TOXIC TO INTERNAL ORGANS.

INGESTION:
IF SWALLOWED, THIS SUBSTANCE IS CONSIDERED PRACTICALLY NON-TOXIC TO
INTERNAL ORGANS. BECAUSE OF THE LOW VISCOSITY OF THIS SUBSTANCE, IT CAN
DIRECTLY ENTER THE LUNGS IF IT IS SWALLOWED (THIS IS CALLED ASPIRATION).
THIS CAN OCCUR DURING THE ACT OF SWALLOWING OR WHEN VOMITING THE SUBSTANCE.

ONCE IN THE LUNGS, THE SUBSTANCE IS VERY DIFFICULT TO REMOVE AND CAN CAUSE
SEVERE INJURY TO THE LUNGS AND DEATH.

INHALATION:
PROLONGED BREATHING OF VAPORS CAN CAUSE CENTRAL NERVOUS SYSTEM EFFECTS.
THIS HAZARD EVALUATION IS BASED ON DATA FROM SIMILAR MATERIALS.

SIGNS AND SYMPTOMS OF EXPOSURE:
SKIN: MAY INCLUDE PAIN OR A FEELING OF HEAT, DISCOLORATION, SWELLING, AND
BLISTERING. INHALATION: CENTRAL NERVOUS SYSTEM EFFECTS MAY INCLUDE ONE OR
MORE OF FOLLOWING: HEADACHE, DIZZINESS, LOSS OF APPETITE, WEAKNESS AND
LOSS OF COORDINATION.

CARCINOGENICITY:
THIS PRODUCT CONTAINS A MIXTURE OF PETROLEUM HYDROCARBONS CALLED MIDDLE
DISTILLATES (WHICH MEANS THEY BOIL BETWEEN APPROXIMATELY 350F AND 700F).
BECAUSE OF THIS BROAD DESCRIPTION, MANY PRODUCTS ARE CONSIDERED MIDDLE
DISTILLATES YET THEY ARE PRODUCED BY A VARIETY OF DIFFERENT PETROLEUM
REFINING PROCESSES. TOXICOLOGY DATA DEVELOPED ON SOME MIDDLE DISTILLATES
FOUND THAT THEY CAUSED POSITIVE RESPONSES IN SOME MUTAGENICITY TESTS AND
CAUSED SKIN CANCER WHEN REPEATEDLY APPLIED TO MICE OVER THEIR LIFETIME.
THIS PRODUCT MAY CONTAIN SOME MIDDLE DISTILLATES FOUND TO CAUSE THOSE
ADVERSE EFFECTS.

## 4. FIRST AID MEASURES

EYE:
NO FIRST AID PROCEDURES ARE REQUIRED. HOWEVER, AS A PRECAUTION FLUSH EYES
WITH FRESH WATER FOR 15 MINUTES. REMOVE CONTACT LENSES IF WORN.

SKIN:
REMOVE CONTAMINATED CLOTHING. WASH SKIN THOROUGHLY WITH SOAP AND WATER.
SEE A DOCTOR IF ANY SIGNS OR SYMPTOMS DESCRIBED IN THIS DOCUMENT OCCUR.
DISCARD CONTAMINATED NON-WATERPROOF SHOES AND BOOTS. WASH CONTAMINATED CLOTHING.

INGESTION:
IF SWALLOWED, GIVE WATER OR MILK TO DRINK AND TELEPHONE FOR MEDICAL ADVICE.
DO NOT MAKE PERSON VOMIT UNLESS DIRECTED TO DO SO BY MEDICAL PERSONNEL. IF
MEDICAL ADVICE CANNOT BE OBTAINED, THEN TAKE THE PERSON AND PRODUCT CONTAINER TO THE NEAREST MEDICAL EMERGENCY TREATMENT CENTER OR HOSPITAL.

INHALATION:
IF ANY SIGNS OR SYMPTOMS AS DESCRIBED IN THIS DOCUMENT OCCUR, MOVE THE PERSON TO FRESH AIR. IF ANY OF THESE EFFECTS CONTINUE, SEE A DOCTOR.

NOTE TO PHYSICIANS:
INGESTION OF THIS PRODUCT OR SUBSEQUENT VOMITING CAN RESULT IN ASPIRATION
OF LIGHT HYDROCARBON LIQUID WHICH CAN CAUSE PNEUMONITIS.

## 5. FIRE FIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINT: (P-M) 125F (52C) MIN.

AUTOIGNITION: NDA

FLAMMABILITY LIMITS (% BY VOLUME IN AIR): LOWER: 0.6 UPPER: 4.7

EXTINGUISHING MEDIA:
$CO_2$, DRY CHEMICAL, FOAM AND WATER FOG.

NFPA RATINGS:

| | |
|---|---|
| HEALTH | 0 |
| FLAMMABILITY | 2 |
| REACTIVITY | 0 |

FIRE FIGHTING INSTRUCTIONS:
LIQUID EVAPORATES AND FORMS VAPOR (FUMES) WHICH CAN CATCH FIRE AND BURN WITH EXPLOSIVE VIOLENCE. INVISIBLE VAPOR SPREADS EASILY AND CAN BE SET ON
FIRE BY MANY SOURCES SUCH AS PILOT LIGHTS, WELDING EQUIPMENT, AND

ELECTRICAL MOTORS AND SWITCHES. FIRE HAZARD IS GREATER AS LIQUID TEMPERATURE RISES ABOVE 85 F.

FOR FIRES INVOLVING THIS MATERIAL, DO NOT ENTER ANY ENCLOSED OR CONFINED FIRE SPACE WITHOUT PROPER PROTECTIVE EQUIPMENT. THIS MAY INCLUDE SELF-CONTAINED BREATHING APPARATUS TO PROTECT AGAINST THE HAZARDOUS EFFECTS OF NORMAL PRODUCTS OF COMBUSTION OR OXYGEN DEFICIENCY. READ THE ENTIRE DOCUMENT.

COMBUSTION PRODUCTS:
NORMAL COMBUSTION FORMS CARBON DIOXIDE AND WATER VAPOR; INCOMPLETE COMBUSTION CAN PRODUCE CARBON MONOXIDE.

## 6. ACCIDENTAL RELEASE MEASURES

CHEMTREC EMERGENCY NUMBER (24 HR): (800)424-9300 OR (202)483-7616

ACCIDENTAL RELEASE MEASURES:
ELIMINATE ALL SOURCES OF IGNITION IN VICINITY OF SPILL OR RELEASED VAPOR.

CLEAN UP SMALL SPILLS USING APPROPRIATE TECHNIQUES SUCH AS SORBENT MATERIALS OR PUMPING. WHERE FEASIBLE AND APPROPRIATE, REMOVE CONTAMINATED SOIL. FOLLOW PRESCRIBED PROCEDURES FOR REPORTING AND RESPONDING TO LARGER RELEASES. THIS MATERIAL IS CONSIDERED TO BE A WATER POLLUTANT AND RELEASES OF THIS PRODUCT SHOULD BE PREVENTED FROM CONTAMINATING SOIL AND WATER AND FROM ENTERING DRAINAGE AND SEWER SYSTEMS.

U.S.A. REGULATIONS REQUIRE REPORTING SPILLS OF THIS MATERIAL THAT COULD REACH ANY SURFACE WATERS. THE TOLL FREE NUMBER FOR THE U.S. COAST GUARD NATIONAL RESPONSE CENTER IS (800) 424-8802.

## 7. HANDLING AND STORAGE

HANDLING AND STORAGE:
DO NOT USE OR STORE NEAR FLAME, SPARKS OR HOT SURFACES. USE ONLY IN WELL VENTILATED AREA. KEEP CONTAINER CLOSED.

DO NOT WELD, HEAT OR DRILL CONTAINER. REPLACE CAP OR BUNG. EMPTIED CONTAINER STILL CONTAINS HAZARDOUS OR EXPLOSIVE VAPOR OR LIQUID.

CAUTION! DO NOT USE PRESSURE TO EMPTY DRUM OR DRUM MAY RUPTURE WITH EXPLOSIVE FORCE.

WARNING! NOT FOR USE AS PORTABLE HEATER OR APPLIANCE FUEL. TOXIC FUMES
MAY ACCUMULATE AND CAUSE DEATH.

## 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

PERSONAL PROTECTIVE EQUIPMENT

EYE/FACE PROTECTION:
NO SPECIAL EYE PROTECTION IS USUALLY NECESSARY.

SKIN PROTECTION:
AVOID CONTACT WITH SKIN OR CLOTHING. SKIN CONTACT SHOULD BE MINIMIZED BY
WEARING PROTECTIVE CLOTHING INCLUDING GLOVES.

RESPIRATORY PROTECTION:
NO SPECIAL RESPIRATORY PROTECTION IS NORMALLY REQUIRED. HOWEVER, IF OPERATING CONDITIONS CREATE HIGH AIRBORNE CONCENTRATIONS, THE USE OF AN APPROVED RESPIRATOR IS RECOMMENDED.

ENGINEERING CONTROLS:
USE THIS MATERIAL ONLY IN WELL VENTILATED AREAS.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION:
PALE YELLOW LIQUID.

PH: NDA

VAPOR PRESSURE: 0.04 PSIA @ 40C

VAPOR DENSITY (AIR=1): NDA

BOILING POINT: 176 - 370C (348-698F)

FREEZING POINT: NDA

MELTING POINT: NA

SOLUBILITY: SOLUBLE IN HYDROCARBON SOLVENTS; INSOLUBLE IN WATER.

SPECIFIC GRAVITY: 0.84 @ 15.6/15.6C (TYPICAL)

DENSITY: NDA

VISCOSITY: 1.9 CST @ 40C (MIN.)

## 10. STABILITY AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS: NDA.

CHEMICAL STABILITY: STABLE.

CONDITIONS TO AVOID: NO DATA AVAILABLE.

INCOMPATIBILITY WITH OTHER MATERIALS:
MAY REACT WITH STRONG OXIDIZING AGENTS, SUCH AS CHLORATES, NITRATES, PEROXIDES, ETC.

HAZARDOUS POLYMERIZATION: POLYMERIZATION WILL NOT OCCUR.

## 11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: MINIMAL EFFECTS CLEARING IN LESS THAN 24 HOURS.

SKIN EFFECTS: MODERATE IRRITATION AT 72 HOURS. (MODERATE ERYTHEMA).

ACUTE ORAL EFFECTS: THE ORAL LD50 IN RATS IS > 5 ML/KG.

ACUTE INHALATION EFFECTS:
THE 4-HOUR INHALATION LC50 IN RATS IS GREATER THAN 5 MG/L.

ADDITIONAL TOXICOLOGY INFORMATION:
THE DATA ABOVE IS OBTAINED FROM STUDIES SPONSORED BY THE AMERICAN PETROLEUM
INSTITUTE (API).

WHOLE DIESEL ENGINE EXHAUST WAS REVIEWED BY THE INTERNATIONAL AGENCY FOR
RESEARCH ON CANCER (IARC) IN THEIR MONOGRAPH 46 (1989). EVIDENCE FOR CAUSING CANCER WAS CONSIDERED SUFFICIENT IN ANIMALS AND LIMITED IN HUMANS.
IARC PLACED DIESEL EXHAUST IN CATEGORY 2A, CONSIDERING IT PROBABLY CARCINOGENIC TO HUMANS.

THE NATIONAL INSTITUTE OF OCCUPATIONAL SAFETY AND HEALTH (NIOSH) HAS RECOMMENDED THAT WHOLE DIESEL EXHAUST BE REGARDED AS POTENTIALLY CAUSING
CANCER. THIS RECOMMENDATION WAS BASED ON TEST RESULTS SHOWING INCREASED
LUNG CANCER IN LABORATORY ANIMALS EXPOSED TO WHOLE DIESEL EXHAUST. THE EXCESS RISK OF CANCER FOR PEOPLE EXPOSED TO DIESEL EXHAUST HAS NOT BEEN DETERMINED AS STUDIES ON EXPOSED WORKERS HAVE BEEN INCONCLUSIVE. IT IS RECOMMENDED THAT EXPOSURE TO DIESEL EXHAUST BE MINIMIZED TO REDUCE THE POTENTIAL CANCER RISK.

## 12. ECOLOGICAL INFORMATION

ECOTOXICITY: NO DATA AVAILABLE.

ENVIRONMENTAL FATE: NO DATA AVAILABLE.

## 13. DISPOSAL CONSIDERATIONS

DISPOSAL CONSIDERATIONS:
PLACE CONTAMINATED MATERIALS IN DISPOSABLE CONTAINERS AND DISPOSE OF IN A
MANNER CONSISTENT WITH APPLICABLE REGULATIONS. CONTACT LOCAL ENVIRONMENTAL
OR HEALTH AUTHORITIES FOR APPROVED DISPOSAL OF THIS MATERIAL.

## 14. TRANSPORT INFORMATION

THE DESCRIPTION SHOWN MAY NOT APPLY TO ALL SHIPPING SITUATIONS. CONSULT
49CFR, OR APPROPRIATE DANGEROUS GOODS REGULATIONS, FOR ADDITIONAL
DESCRIPTION REQUIREMENTS (E.G., TECHNICAL NAME) AND MODE-SPECIFIC OR
QUANTITY-SPECIFIC SHIPPING REQUIREMENTS.

DOT SHIPPING NAME: NDA

DOT HAZARD CLASS: NDA

DOT IDENTIFICATION NUMBER: NDA

DOT PACKING GROUP: NDA

## 15. REGULATORY INFORMATION

SARA 311 CATEGORIES:

1. IMMEDIATE (ACUTE) HEALTH EFFECTS: YES
2. DELAYED (CHRONIC) HEALTH EFFECTS: YES
3. FIRE HAZARD: YES
4. SUDDEN RELEASE OF PRESSURE HAZARD: NO
5. REACTIVITY HAZARD: NO

REGULATORY LISTS SEARCHED:

| | | |
|---|---|---|
| 01=SARA 313 | 11=NJ RTK | 21=TSCA SECT 4(E) |
| 02=MASS RTK | 12=CERCLA 302.4 | 22=TSCA SECT 5(A)(E)(F) |
| 03=NTP CARCINOGEN | 13=MN RTK | 23=TSCA SECT 6 |
| 04=CA PROP 65-CARCIN | 14=ACGIH TWA | 24=TSCA SECT 12(B) |
| 05=CA PROP 65-REPRO TOX | 15=ACGIH STEL | 25=TSCA SECT 8(A) |
| 06=IARC GROUP 1 | 16=ACGIH CALC TLV | 26=TSCA SECT 8(D) |

07=IARC GROUP 2A 17=OSHA TWA 28=CANADIAN WHMIS
08=IARC GROUP 2B 18=OSHA STEL 29=OSHA CEILING
09=SARA 302/304 19=CHEVRON TWA 30=CHEVRON STEL
10=PA RTK 20=EPA CARCINOGEN

THE FOLLOWING COMPONENTS OF THIS MATERIAL ARE FOUND ON THE REGULATORY LISTS
INDICATED.

KEROSINE
IS FOUND ON LISTS: 02,10,11,

## 16. OTHER INFORMATION

NFPA RATINGS:
HEALTH 0;
FLAMMABILITY 2;
REACTIVITY 0;
(LEAST-0, SLIGHT-1, MODERATE-2, HIGH-3, EXTREME-4). THESE VALUES ARE OBTAINED USING THE GUIDELINES OR PUBLISHED EVALUATIONS PREPARED BY THE NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) OR THE NATIONAL PAINT AND COATING ASSOCIATION (FOR HMIS RATINGS).

REVISION STATEMENT:
MSDS DISCONTINUED. THIS MATERIAL SAFETY DATA SHEET WILL NO LONGER BE UPDATED. SEE MSDS #525. REVISED FOR INDEXING PURPOSES ONLY.

THE ABOVE INFORMATION IS BASED ON THE DATA OF WHICH WE ARE AWARE AND IS BELIEVED TO BE CORRECT AS OF THE DATE HEREOF. SINCE THIS INFORMATION MAY
BE APPLIED UNDER CONDITIONS BEYOND OUR CONTROL AND WITH WHICH WE MAY BE UNFAMILIAR AND SINCE DATA MADE AVAILABLE SUBSEQUENT TO THE DATE HEREOF MAY
SUGGEST MODIFICATION OF THE INFORMATION, WE DO NOT ASSUME ANY RESPONSIBILITY FOR THE RESULTS OF ITS USE. THIS INFORMATION IS FURNISHED
UPON CONDITION THAT THE PERSON RECEIVING IT SHALL MAKE HIS OWN DETERMINATION OF THE SUITABILITY OF THE MATERIAL FOR HIS PARTICULAR PURPOSE.

REVISION NUMBER: 8 REVISION DATE: 03/28/93 MSDS NUMBER: 002657
NDA - NO DATA AVAILABLE NA - NOT APPLICABLE

PREPARED ACCORDING TO THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) AND THE ANSI MSDS STANDARD (Z400.1) BY THE TOXICOLOGY AND HEALTH
RISK ASSESSMENT UNIT, CRTC, P.O. BOX 4054, RICHMOND, CA 94804

**CHEVRON**
**MID-GRADE UNLEADED GASOLINE Revised: 03/31/2003**

**MSDS Contents**


SECTION 1 PRODUCT AND COMPANY IDENTIFICATION
SECTION 2 COMPOSITION/INFORMATION ON INGREDIENTS
SECTION 3 HAZARDS IDENTIFICATION
SECTION 4 FIRST AID MEASURES
SECTION 5 FIRE FIGHTING MEASURES
SECTION 6 ACCIDENTAL RELEASE MEASURES
SECTION 7 HANDLING AND STORAGE
SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION
SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES
SECTION 10 STABILITY AND REACTIVITY
SECTION 11 TOXICOLOGICAL INFORMATION
SECTION 12 ECOLOGICAL INFORMATION
SECTION 13 DISPOSAL CONSIDERATIONS
SECTION 14 TRANSPORT INFORMATION
SECTION 15 REGULATORY INFORMATION
SECTION 16 OTHER INFORMATION


CHEVRON

MATERIAL SAFETY DATA SHEET

CHEVRON PLUS UNLEADED GASOLINE

MSDS: 3205

REVISION #: 26

REVISION DATE: 3/31/2003

MATERIAL SAFETY DATA SHEET

## SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

CHEVRON MID-GRADE UNLEADED GASOLINE

PRODUCT NUMBER(S): CPS201001 (SEE SECTION 16 FOR ADDITIONAL PRODUCT NUMBERS)

SYNONYMS: CALCO MID-GRADE UNLEADED GASOLINE, CHEVRON PLUS UNLEADED GASOLINE

COMPANY IDENTIFICATION:
CHEVRON PRODUCTS COMPANY
MARKETING, MSDS COORDINATOR
6001 BOLLINGER CANYON ROAD
SAN RAMON, CA 94583
UNITED STATES OF AMERICA

TRANSPORTATION EMERGENCY RESPONSE:

CHEMTREC: (800) 424-9300 OR (703) 527-3887

HEALTH EMERGENCY:
CHEVRONTEXACO EMERGENCY INFORMATION CENTER:
LOCATED IN THE USA. INTERNATIONAL COLLECT CALLS ACCEPTED. (800) 231-0623 OR
(510) 231-0623

PRODUCT INFORMATION:
TECHNICAL INFORMATION: (510) 242-5357

SPECIAL NOTES:
THIS MSDS APPLIES TO:
FEDERAL REFORMULATED GASOLINE, CALIFORNIA REFORMULATED GASOLINE, WINTERTIME
OXYGENATED GASOLINE, LOW RVP GASOLINE AND CONVENTIONAL GASOLINE.

## SECTION 2 COMPOSITION/INFORMATION ON INGREDIENTS

| COMPONENTS | CAS NUMBER | AMOUNT |
|---|---|---|
| GASOLINE | 86290-81-5 | 100 % VOLUME |
| BENZENE | 71-43-2 | 0.1-4.9 % VOLUME |
| ETHYL BENZENE | 100-41-4 | 0.1-3 % VOLUME |
| NAPHTHALENE | 91-20-3 | 0.1-2 % VOLUME |
| ETHANOL | 64-17-5 | 0-10 % VOLUME |
| METHYL TERT-BUTYL ETHER (MTBE) | 1634-04-4 | 0-15 % VOLUME |
| TERTIARY AMYL METHYL ETHER (TAME) | 994-05-8 | 0-17 % VOLUME |
| ETHYL TERT-BUTYL ETHER (ETBE) | 637-92-3 | 0-18 % VOLUME |

MOTOR GASOLINE IS CONSIDERED A MIXTURE BY EPA UNDER THE TOXIC SUBSTANCES
CONTROL ACT (TSCA). THE REFINERY STREAMS USED TO BLEND MOTOR GASOLINE ARE ALL
ON THE TSCA CHEMICAL SUBSTANCES INVENTORY. THE APPROPRIATE CAS NUMBER FOR
REFINERY BLENDED MOTOR GASOLINE IS 86290-81-5. THE PRODUCT SPECIFICATIONS OF
MOTOR GASOLINE SOLD IN YOUR AREA WILL DEPEND ON APPLICABLE FEDERAL AND STATE
REGULATIONS.

## SECTION 3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE
HARMFUL OR FATAL IF SWALLOWED - MAY CAUSE LUNG DAMAGE IF SWALLOWED
VAPOR HARMFUL
CAUSES SKIN IRRITATION
CAUSES EYE IRRITATION
LONG-TERM EXPOSURE TO VAPOR HAS CAUSED CANCER IN LABORATORY ANIMALS
KEEP OUT OF REACH OF CHILDREN
TOXIC TO AQUATIC ORGANISMS

IMMEDIATE HEALTH EFFECTS:

EYE:
CONTACT WITH THE EYES CAUSES IRRITATION. SYMPTOMS MAY INCLUDE PAIN, TEARING,
REDDENING, SWELLING AND IMPAIRED VISION.

SKIN:
CONTACT WITH THE SKIN CAUSES IRRITATION. SKIN CONTACT MAY CAUSE DRYING OR
DEFATTING OF THE SKIN. SYMPTOMS MAY INCLUDE PAIN, ITCHING, DISCOLORATION,
SWELLING, AND BLISTERING. CONTACT WITH THE SKIN IS NOT EXPECTED TO CAUSE AN
ALLERGIC SKIN RESPONSE. NOT EXPECTED TO BE HARMFUL TO INTERNAL ORGANS IF
ABSORBED THROUGH THE SKIN.

INGESTION:
BECAUSE OF ITS LOW VISCOSITY, THIS MATERIAL CAN DIRECTLY ENTER THE LUNGS, IF
SWALLOWED, OR IF SUBSEQUENTLY VOMITED. ONCE IN THE LUNGS IT IS VERY DIFFICULT
TO REMOVE AND CAN CAUSE SEVERE INJURY OR DEATH.

INHALATION:
THE VAPOR OR FUMES FROM THIS MATERIAL MAY CAUSE RESPIRATORY IRRITATION.
SYMPTOMS OF RESPIRATORY IRRITATION MAY INCLUDE COUGHING AND DIFFICULTY
BREATHING. BREATHING THIS MATERIAL AT CONCENTRATIONS ABOVE THE RECOMMENDED
EXPOSURE LIMITS MAY CAUSE CENTRAL NERVOUS SYSTEM EFFECTS. CENTRAL NERVOUS
SYSTEM EFFECTS MAY INCLUDE HEADACHE, DIZZINESS, NAUSEA, VOMITING, WEAKNESS,
LOSS OF COORDINATION, BLURRED VISION, DROWSINESS, CONFUSION, OR
DISORIENTATION. AT EXTREME EXPOSURES, CENTRAL NERVOUS SYSTEM EFFECTS MAY
INCLUDE RESPIRATORY DEPRESSION, TREMORS OR CONVULSIONS, LOSS OF
CONSCIOUSNESS, COMA OR DEATH.

DELAYED OR OTHER HEALTH EFFECTS:

REPRODUCTION AND BIRTH DEFECTS:
THIS MATERIAL IS NOT EXPECTED TO CAUSE BIRTH DEFECTS OR OTHER HARM TO THE
DEVELOPING FETUS BASED ON ANIMAL DATA.

CANCER:

PROLONGED OR REPEATED EXPOSURE TO THIS MATERIAL MAY CAUSE CANCER. GASOLINE
HAS BEEN CLASSIFIED AS A GROUP 2B CARCINOGEN (POSSIBLY CARCINOGENIC TO HUMANS) BY THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC).

CONTAINS BENZENE, WHICH HAS BEEN CLASSIFIED AS A CARCINOGEN BY THE NATIONAL
TOXICOLOGY PROGRAM (NTP) AND A GROUP 1 CARCINOGEN (CARCINOGENIC TO HUMANS) BY
THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER (IARC).
CONTAINS ETHYLBENZENE WHICH HAS BEEN CLASSIFIED AS A GROUP 2B CARCINOGEN
(POSSIBLY CARCINOGENIC TO HUMANS) BY THE INTERNATIONAL AGENCY FOR RESEARCH ON
CANCER (IARC).
CONTAINS NAPHTHALENE, WHICH HAS BEEN CLASSIFIED AS A GROUP 2B CARCINOGEN
(POSSIBLY CARCINOGENIC TO HUMANS) BY THE INTERNATIONAL AGENCY FOR RESEARCH ON
CANCER (IARC).

WHOLE GASOLINE EXHAUST HAS BEEN CLASSIFIED AS A GROUP 2B CARCINOGEN (POSSIBLY
CARCINOGENIC TO HUMANS) BY THE INTERNATIONAL AGENCY FOR RESEARCH ON CANCER
(IARC).
RISK DEPENDS ON DURATION AND LEVEL OF EXPOSURE. SEE SECTION 11 FOR ADDITIONAL
INFORMATION.

## SECTION 4 FIRST AID MEASURES

EYE:
FLUSH EYES WITH WATER IMMEDIATELY WHILE HOLDING THE EYELIDS OPEN. REMOVE
CONTACT LENSES, IF WORN, AFTER INITIAL FLUSHING, AND CONTINUE FLUSHING FOR AT
LEAST 15 MINUTES. GET MEDICAL ATTENTION IF IRRITATION PERSISTS.

SKIN:
WASH SKIN WITH WATER IMMEDIATELY AND REMOVE CONTAMINATED CLOTHING AND SHOES.
GET MEDICAL ATTENTION IF ANY SYMPTOMS DEVELOP. TO REMOVE THE MATERIAL FROM
SKIN, USE SOAP AND WATER. DISCARD CONTAMINATED CLOTHING AND SHOES OR
THOROUGHLY CLEAN BEFORE REUSE.

INGESTION:
IF SWALLOWED, GET IMMEDIATE MEDICAL ATTENTION. DO NOT INDUCE VOMITING. NEVER
GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

INHALATION:
MOVE THE EXPOSED PERSON TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL

RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. GET MEDICAL ATTENTION IF
BREATHING DIFFICULTIES CONTINUE.

NOTE TO PHYSICIANS:
INGESTION OF THIS PRODUCT OR SUBSEQUENT VOMITING MAY RESULT IN ASPIRATION OF
LIGHT HYDROCARBON LIQUID, WHICH MAY CAUSE PNEUMONITIS.

## SECTION 5 FIRE FIGHTING MEASURES

SEE SECTION 7 FOR PROPER HANDLING AND STORAGE.

FIRE CLASSIFICATION:
OSHA CLASSIFICATION (29 CFR 1910.1200): FLAMMABLE LIQUID.

NFPA RATINGS:
HEALTH: 1
FLAMMABILITY: 3
REACTIVITY: 0

FLAMMABLE PROPERTIES:

FLASHPOINT: (TAGLIABUE CLOSED CUP) < -45 DEG. C (< -49 DEG. F)

AUTOIGNITION: > 280 DEG. C (> 536 DEG. F)

FLAMMABILITY (EXPLOSIVE) LIMITS (% BY VOLUME IN AIR):
LOWER: 1.4
UPPER: 7.6

EXTINGUISHING MEDIA:
DRY CHEMICAL, CO2, AFFF FOAM OR ALCOHOL RESISTANT FOAM IF >15% VOLUME POLAR
SOLVENTS (OXYGENATES).

PROTECTION OF FIRE FIGHTERS:

FIRE FIGHTING INSTRUCTIONS:
USE WATER SPRAY TO COOL FIRE-EXPOSED CONTAINERS AND TO PROTECT PERSONNEL. FOR
FIRES INVOLVING THIS MATERIAL, DO NOT ENTER ANY ENCLOSED OR CONFINED FIRE
SPACE WITHOUT PROPER PROTECTIVE EQUIPMENT, INCLUDING SELF-CONTAINED BREATHING
APPARATUS.

COMBUSTION PRODUCTS:
HIGHLY DEPENDENT ON COMBUSTION CONDITIONS. A COMPLEX MIXTURE OF AIRBORNE
SOLIDS, LIQUIDS, AND GASES INCLUDING CARBON MONOXIDE, CARBON DIOXIDE, AND
UNIDENTIFIED ORGANIC COMPOUNDS WILL BE EVOLVED WHEN THIS MATERIAL UNDERGOES

COMBUSTION.

## SECTION 6 ACCIDENTAL RELEASE MEASURES

PROTECTIVE MEASURES:
ELIMINATE ALL SOURCES OF IGNITION IN THE VICINITY OF THE SPILL OR RELEASED
VAPOR. IF THIS MATERIAL IS RELEASED INTO THE WORK AREA, EVACUATE THE AREA
IMMEDIATELY. MONITOR AREA WITH COMBUSTIBLE GAS INDICATOR.

SPILL MANAGEMENT:
STOP THE SOURCE OF THE RELEASE IF YOU CAN DO IT WITHOUT RISK. CONTAIN RELEASE
TO PREVENT FURTHER CONTAMINATION OF SOIL, SURFACE WATER OR GROUNDWATER. CLEAN
UP SPILL AS SOON AS POSSIBLE, OBSERVING PRECAUTIONS IN EXPOSURE
CONTROLS/PERSONAL PROTECTION. USE APPROPRIATE TECHNIQUES SUCH AS APPLYING
NON-COMBUSTIBLE ABSORBENT MATERIALS OR PUMPING. ALL EQUIPMENT USED WHEN
HANDLING THE PRODUCT MUST BE GROUNDED. A VAPOR SUPPRESSING FOAM MAY BE USED
TO REDUCE VAPORS. USE CLEAN NON-SPARKING TOOLS TO COLLECT ABSORBED MATERIAL.
WHERE FEASIBLE AND APPROPRIATE, REMOVE CONTAMINATED SOIL. PLACE CONTAMINATED
MATERIALS IN DISPOSABLE CONTAINERS AND DISPOSE OF IN A MANNER CONSISTENT WITH
APPLICABLE REGULATIONS.

REPORTING:
REPORT SPILLS TO LOCAL AUTHORITIES AND/OR THE U.S. COAST GUARD'S NATIONAL
RESPONSE CENTER AT (800) 424-8802 AS APPROPRIATE OR REQUIRED. THIS MATERIAL
IS COVERED BY EPA'S COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION AND
LIABILITY ACT (CERCLA) PETROLEUM EXCLUSION. THEREFORE, RELEASES TO THE
ENVIRONMENT MAY NOT BE REPORTABLE UNDER CERCLA.

## SECTION 7 HANDLING AND STORAGE

PRECAUTIONARY MEASURES:
READ AND OBSERVE ALL PRECAUTIONS ON PRODUCT LABEL. THIS PRODUCT PRESENTS AN
EXTREME FIRE HAZARD. LIQUID VERY QUICKLY EVAPORATES, EVEN AT LOW
TEMPERATURES, AND FORMS VAPOR (FUMES) WHICH CAN CATCH FIRE AND BURN WITH
EXPLOSIVE VIOLENCE. INVISIBLE VAPOR SPREADS EASILY AND CAN BE SET ON FIRE BY
MANY SOURCES SUCH AS PILOT LIGHTS, WELDING EQUIPMENT, AND ELECTRICAL MOTORS

AND SWITCHES. NEVER SIPHON GASOLINE BY MOUTH.
USE ONLY AS A MOTOR FUEL. DO NOT USE FOR CLEANING, PRESSURE APPLIANCE FUEL,
OR ANY OTHER SUCH USE. DO NOT STORE IN OPEN OR UNLABELED CONTAINERS. DO NOT
GET IN EYES, ON SKIN, OR ON CLOTHING. DO NOT TASTE OR SWALLOW. DO NOT BREATHE
VAPOR OR FUMES. WASH THOROUGHLY AFTER HANDLING. KEEP OUT OF THE REACH OF
CHILDREN.

UNUSUAL HANDLING HAZARDS:
WARNING!
DO NOT USE AS PORTABLE HEATER OR APPLIANCE FUEL. TOXIC FUMES MAY ACCUMULATE
AND CAUSE DEATH.

GENERAL HANDLING INFORMATION:
AVOID CONTAMINATING SOIL OR RELEASING THIS MATERIAL INTO SEWAGE AND DRAINAGE
SYSTEMS AND BODIES OF WATER.

STATIC HAZARD:
ELECTROSTATIC CHARGE MAY ACCUMULATE AND CREATE A HAZARDOUS CONDITION WHEN
HANDLING THIS MATERIAL. TO MINIMIZE THIS HAZARD, BONDING AND GROUNDING MAY BE
NECESSARY BUT MAY NOT, BY THEMSELVES, BE SUFFICIENT. REVIEW ALL OPERATIONS
WHICH HAVE THE POTENTIAL OF GENERATING AN ACCUMULATION OF ELECTROSTATIC
CHARGE AND/OR A FLAMMABLE ATMOSPHERE (INCLUDING TANK AND CONTAINER FILLING,
SPLASH FILLING, TANK CLEANING, SAMPLING, GAUGING, SWITCH LOADING, FILTERING,
MIXING, AGITATION, AND VACUUM TRUCK OPERATIONS) AND USE APPROPRIATE
MITIGATING PROCEDURES. FOR MORE INFORMATION, REFER TO OSHA STANDARD 29 CFR
1910.106, 'FLAMMABLE AND COMBUSTIBLE LIQUIDS', NATIONAL FIRE PROTECTION
ASSOCIATION (NFPA 77, 'RECOMMENDED PRACTICE ON STATIC ELECTRICITY', AND/OR
THE AMERICAN PETROLEUM INSTITUTE (API) RECOMMENDED PRACTICE 2003, 'PROTECTION
AGAINST IGNITIONS ARISING OUT OF STATIC, LIGHTNING, AND STRAY CURRENTS'.
IMPROPER FILLING OF PORTABLE GASOLINE CONTAINERS CREATES DANGER OF FIRE. ONLY
DISPENSE GASOLINE INTO APPROVED AND PROPERLY LABELED GASOLINE CONTAINERS.
ALWAYS PLACE PORTABLE CONTAINERS ON THE GROUND. BE SURE PUMP NOZZLE IS IN
CONTACT WITH THE CONTAINER WHILE FILLING. DO NOT USE A NOZZLE'S LOCK-OPEN
DEVICE. DO NOT FILL PORTABLE CONTAINERS THAT ARE INSIDE A VEHICLE OR
TRUCK/TRAILER BED.

GENERAL STORAGE INFORMATION:

DO NOT USE OR STORE NEAR HEAT, SPARKS OR OPEN FLAMES. USE AND STORE ONLY IN
WELL VENTILATED AREA. KEEP CONTAINER CLOSED WHEN NOT IN USE.

CONTAINER WARNINGS:
CONTAINER IS NOT DESIGNED TO CONTAIN PRESSURE. DO NOT USE PRESSURE TO EMPTY
CONTAINER OR IT MAY RUPTURE WITH EXPLOSIVE FORCE. EMPTY CONTAINERS RETAIN
PRODUCT RESIDUE (SOLID, LIQUID, AND/OR VAPOR) AND CAN BE DANGEROUS. DO NOT
PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND, OR EXPOSE SUCH CONTAINERS
TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION.
THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. EMPTY CONTAINERS SHOULD BE
COMPLETELY DRAINED, PROPERLY CLOSED, AND PROMPTLY RETURNED TO A DRUM
RECONDITIONER OR DISPOSED OF PROPERLY.

## SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
CONSIDER THE POTENTIAL HAZARDS OF THIS MATERIAL (SEE SECTION 3), APPLICABLE
EXPOSURE LIMITS, JOB ACTIVITIES, AND OTHER SUBSTANCES IN THE WORK PLACE WHEN
DESIGNING ENGINEERING CONTROLS AND SELECTING PERSONAL PROTECTIVE EQUIPMENT.
IF ENGINEERING CONTROLS OR WORK PRACTICES ARE NOT ADEQUATE TO PREVENT
EXPOSURE TO HARMFUL LEVELS OF THIS MATERIAL, THE PERSONAL PROTECTIVE
EQUIPMENT LISTED BELOW IS RECOMMENDED. THE USER SHOULD READ AND UNDERSTAND
ALL INSTRUCTIONS AND LIMITATIONS SUPPLIED WITH THE EQUIPMENT SINCE PROTECTION
IS USUALLY PROVIDED FOR A LIMITED TIME OR UNDER CERTAIN CIRCUMSTANCES.

ENGINEERING CONTROLS:
USE PROCESS ENCLOSURES, LOCAL EXHAUST VENTILATION, OR OTHER ENGINEERING
CONTROLS TO CONTROL AIRBORNE LEVELS BELOW THE RECOMMENDED EXPOSURE
LIMITS.

PERSONAL PROTECTIVE EQUIPMENT:

EYE/FACE PROTECTION:
NO SPECIAL EYE PROTECTION IS NORMALLY REQUIRED. WHERE SPLASHING IS POSSIBLE,
WEAR SAFETY GLASSES WITH SIDE SHIELDS AS A GOOD SAFETY PRACTICE.

SKIN PROTECTION:
NO SPECIAL PROTECTIVE CLOTHING IS NORMALLY REQUIRED. WHERE SPLASHING IS
POSSIBLE, SELECT PROTECTIVE CLOTHING DEPENDING ON OPERATIONS CONDUCTED,
PHYSICAL REQUIREMENTS AND OTHER SUBSTANCES IN THE WORKPLACE. SUGGESTED
MATERIALS FOR PROTECTIVE GLOVES INCLUDE:

CHLORINATED POLYETHYLENE (OR CHLOROSULFONATED POLYETHYLENE), NITRILE RUBBER,
POLYURETHANE, VITON.

RESPIRATORY PROTECTION:
DETERMINE IF AIRBORNE CONCENTRATIONS ARE BELOW THE RECOMMENDED EXPOSURE LIMITS. IF NOT, WEAR AN APPROVED RESPIRATOR THAT PROVIDES ADEQUATE PROTECTION
FROM MEASURED CONCENTRATIONS OF THIS MATERIAL, SUCH AS:
AIR-PURIFYING RESPIRATOR FOR ORGANIC VAPORS. WHEN USED AS A FUEL, THIS MATERIAL CAN PRODUCE CARBON MONOXIDE IN THE EXHAUST. DETERMINE IF AIRBORNE
CONCENTRATIONS ARE BELOW THE OCCUPATIONAL EXPOSURE LIMIT FOR CARBON MONOXIDE.
IF NOT, WEAR AN APPROVED POSITIVE-PRESSURE AIR-SUPPLYING RESPIRATOR.
USE A POSITIVE PRESSURE AIR-SUPPLYING RESPIRATOR IN CIRCUMSTANCES WHERE AIR-PURIFYING RESPIRATORS MAY NOT PROVIDE ADEQUATE PROTECTION.

OCCUPATIONAL EXPOSURE LIMITS:

| COMPONENT | LIMIT | TWA | STEL | CEILING | NOTATION |
|---|---|---|---|---|---|
| BENZENE | ACGIH_TLV | .5 PPM | 2.5 PPM | | SKIN A1 |
| BENZENE | OSHA_PEL | 1 PPM | 5 PPM | | |
| BENZENE | OSHA_Z2 | 10 PPM | | 25 PPM | |
| ETHANOL | ACGIH_TLV | 1000 PPM | | | A4 |
| ETHANOL | OSHA_PEL | 1000 PPM | | | |
| ETHYL BENZENE | ACGIH_TLV | 100 PPM | 125 PPM | | A3 |
| ETHYL BENZENE | OSHA_PEL | 100 PPM | 125 PPM | | |
| ETHYL TERT-BUTYL ETHER (ETBE) | ACGIH_TLV | 5 PPM | | | |
| GASOLINE | ACGIH_TLV | 300 PPM | 500 PPM | | A3 |
| GASOLINE | OSHA_PEL | 300 PPM | 500 PPM | | |
| METHYL TERT-BUTYL ETHER (MTBE) | ACGIH_TLV | 50 PPM | | | A3 |
| NAPHTHALENE | ACGIH_TLV | 10 PPM | 15 PPM | | SKIN A4 |
| NAPHTHALENE | OSHA_PEL | 10 PPM | 15 PPM | | |
| TERTIARY AMYL METHYL ETHER (TAME) | CHEVRON | | 50 PPM | | |

REFER TO THE OSHA BENZENE STANDARD (29 CFR 1910.1028) AND TABLE Z-2 FOR

DETAILED TRAINING, EXPOSURE MONITORING, RESPIRATORY PROTECTION AND MEDICAL
SURVEILLANCE REQUIREMENTS BEFORE USING THIS PRODUCT.

## SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

ATTENTION:
THE DATA BELOW ARE TYPICAL VALUES AND DO NOT CONSTITUTE A SPECIFICATION.

COLOR: COLORLESS TO YELLOW

PHYSICAL STATE: LIQUID

ODOR: PETROLEUM ODOR

pH: NA

VAPOR PRESSURE: 5 PSI - 15 PSI (TYPICAL) @ 37.8 DEG. C (100 DEG. F)

VAPOR DENSITY (AIR=1): 3-4 (TYPICAL)

BOILING POINT: 37.8 DEG. C (100 DEG. F) - 204.4 DEG. C (400 DEG. F) (TYPICAL)

SOLUBILITY: INSOLUBLE IN WATER; MISCIBLE WITH MOST ORGANIC SOLVENTS.

FREEZING POINT: NA

MELTING POINT: NA

SPECIFIC GRAVITY: 0.7 G/ML - 0.8 G/ML @ 15.6 DEG. C (60.1 DEG. F)

VISCOSITY: <1 SUS @ 37.8 DEG. C (100 DEG. F)

## SECTION 10 STABILITY AND REACTIVITY

CHEMICAL STABILITY:
THIS MATERIAL IS CONSIDERED STABLE UNDER NORMAL AMBIENT AND ANTICIPATED STORAGE AND HANDLING CONDITIONS OF TEMPERATURE AND PRESSURE.

INCOMPATIBILITY WITH OTHER MATERIALS:
MAY REACT WITH STRONG OXIDIZING AGENTS, SUCH AS CHLORATES, NITRATES, PEROXIDES, ETC.

HAZARDOUS DECOMPOSITION PRODUCTS: NONE KNOWN (NONE EXPECTED)

HAZARDOUS POLYMERIZATION: HAZARDOUS POLYMERIZATION WILL NOT OCCUR.

## SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS:

EYE IRRITATION:
THE DRAIZE EYE IRRITATION MEAN SCORE IN RABBITS FOR A 24-HOUR EXPOSURE WAS:
0/110.

SKIN IRRITATION:
FOR A 4-HOUR EXPOSURE, THE PRIMARY IRRITATION INDEX (PII) IN RABBITS IS:
4.8/8.0.

SKIN SENSITIZATION:
THIS MATERIAL DID NOT CAUSE SENSITIZATION REACTIONS IN A MODIFIED BUEHLER
GUINEA PIG TEST.

ACUTE DERMAL TOXICITY:
24 HOUR(S) LD50: >3.75G/KG (RABBIT).

ACUTE ORAL TOXICITY:
LD50: >5 ML/KG (RAT)

ACUTE INHALATION TOXICITY:
4 HOUR(S) LD50: >2000PPM (RAT).

ADDITIONAL TOXICOLOGY INFORMATION:
GASOLINES ARE HIGHLY VOLATILE AND CAN PRODUCE SIGNIFICANT CONCENTRATIONS OF
VAPOR AT AMBIENT TEMPERATURES. GASOLINE VAPOR IS HEAVIER THAN AIR AND AT HIGH
CONCENTRATIONS MAY ACCUMULATE IN CONFINED SPACES TO PRESENT BOTH SAFETY AND
HEALTH HAZARDS. WHEN VAPOR EXPOSURES ARE LOW, OR SHORT DURATION AND
INFREQUENT, SUCH AS DURING REFUELLING AND TANKER LOADING/UNLOADING, NEITHER
TOTAL HYDROCARBON NOR COMPONENTS SUCH AS BENZENE ARE LIKELY TO RESULT IN ANY
ADVERSE HEALTH EFFECTS. IN SITUATIONS SUCH AS ACCIDENTS OR SPILLS WHERE
EXPOSURE TO GASOLINE VAPOR IS POTENTIALLY HIGH, ATTENTION SHOULD BE PAID TO
POTENTIAL TOXIC EFFECTS OF SPECIFIC COMPONENTS. INFORMATION ABOUT SPECIFIC
COMPONENTS IN GASOLINE CAN BE FOUND IN SECTIONS 2, 8 AND 15 OF THIS MSDS.
MORE DETAILED INFORMATION ON THE HEALTH HAZARD OF SPECIFIC GASOLINE
COMPONENTS CAN BE OBTAINED CALLING THE CHEVRON EMERGENCY INFORMATION CENTER
(SEE SECTION 1 FOR PHONE NUMBERS).

NEUROTOXICITY:
PATHOLOGICAL MISUSE OF SOLVENTS AND GASOLINE, INVOLVING REPEATED AND
PROLONGED EXPOSURE TO HIGH CONCENTRATIONS OF VAPOR IS A SIGNIFICANT EXPOSURE

ON WHICH THERE ARE MANY REPORTS IN THE MEDICAL LITERATURE. AS WITH OTHER
SOLVENTS, PERSISTENT ABUSE INVOLVING REPEATED AND PROLONGED EXPOSURES TO HIGH
CONCENTRATIONS OF VAPOR HAS BEEN REPORTED TO RESULT IN CENTRAL NERVOUS SYSTEM
DAMAGE AND EVENTUALLY, DEATH. IN A STUDY IN WHICH TEN HUMAN VOLUNTEERS WERE
EXPOSED FOR 30 MINUTES TO APPROXIMATELY 200, 500 OR 1000 PPM CONCENTRATIONS
OF GASOLINE VAPOR, IRRITATION OF THE EYES WAS THE ONLY SIGNIFICANT EFFECT
OBSERVED, BASED ON BOTH SUBJECTIVE AND OBJECTIVE ASSESSMENTS. IN AN
INHALATION STUDY, GROUPS OF 6 FISCHER RATS (3 MALE. 3 FEMALE) WERE EXPOSED TO
2056 PPM OF WHOLY VAPORIZED UNLEADED GASOLINE FOR 6 HOURS PERDAY, 5 DAY PER
WEEK FOR UP TO 18 MONTHS. HISTOPATHOLOGY OF THE PERIPHERAL NERVOUS SYSTEM AND
SPINAL CORD REVEALED NO DISTAL AXONAL NEUROPTHY OF THE TYPE ASSOCIATED WITH
EXPOSURE TO N-HEXANE EVEN THOUGH GASOLINE CONTAINED 1.9% N-HEXANE. THE
AUTHORS CONCLUDED THAT GASOLINE TREATMENT MAY HAVE AMPLIFIED THE INCIDENCE
AND PROMINENCE OF SOME NATURALLY OCCURRING AGE-RELATED (SUBCLINICAL) IN THE
NERVOUS SYSTEM. BIRTH DEFECTS AND REPRODUCTIVE TOXICITY:
AN INHALATION STUDY WITH RATS EXPOSED TO 0, 400 AND 1600 PPM OF WHOLLY
VAPORIZED UNLEADED GASOLINE, 6 HOURS PER DAY ON DAY 6 THROUGH 16 OF
GESTATION, SHOWED NO TERATOGENIC EFFECTS NOR INDICATION OF TOXICITY TO EITHER
THE MOTHER OR THE FETUS. ANOTHER INHALATION STUDY IN RATS EXPOSED TO 3000,
6000, OR 9000 PPM OF GASOLINE VAPOR, 6 HOURS PER DAY ON DAY 6 THROUGH 20 OF
GESTATION, ALSO SHOWED NO TERATOGENIC EFFECTS NOR INDICATIONS OF TOXICITY TO
EITHER THE MOTHER OR THE FETUS.

CHRONIC TOXICITY/CANCER:
WHOLLY VAPORIZED UNLEADED GASOLINE WAS USED IN A 3 MONTH INHALATION STUDY.
GROUPS OF 40 RATS (20 MALES, 20 FEMALE) AND 8 SQUIRREL MONKEYS (4 MALE, 4
FEMALE) WERE EXPOSED 6 HOURS PER DAY AND 5 DAYS PER WEEK FOR 13 WEEKS TO 384
OR 1552 PPM GASOLINE. ONE GROUP OF EACH SPECIES SERVED AS UNEXPOSED CONTROLS.
THE INITIAL CONCLUSION OF THIS STUDY WAS THAT INHALATION OF GASOLINE AT
AIRBORNE CONCENTRATIONS OF UP TO 1522 PPM CAUSED NO TOXICITY IN RATS OR
MONKEYS. HOWEVER, FURTHER HISTOPATHOLOGICAL EXAMINATION OF MALE RAT KIDNEYS
ON THE HIGHEST DOSE GROUP REVEALED AN INCREASED INCIDENCE AND SEVERITY OF
REGENERATIVE EPITHELIUM AND DILATED TUBULES CONTAINING PROTEINACEOUS
DEPOSITS. LIFETIME INHALATION OF WHOLLY VAPORIZED UNLEADED GASOLINE AT 2056

PPM HAS CAUSED INCREASED LIVER TUMORS IN FEMALE MICE. THE MECHANISM OF THIS
RESPONSE IS STILL BEING INVESTIGATED BUT IT IS THOUGHT TO BE AN EPIGENETIC
PROCESS UNIQUE TO THE FEMALE MOUSE.

THIS EXPOSURE ALSO CAUSED KIDNEY DAMAGE AND EVENTUALLY KIDNEY CANCER IN MALE
RATS. NO OTHER ANIMAL MODEL STUDIED HAS SHOWN THESE ADVERSE KIDNEY EFFECTS
AND THERE IS NO PHYSIOLOGICAL REASON TO BELIEVE THAT THEY WOULD OCCUR IN MAN.
EPA HAS CONCLUDED THAT MECHANISM BY WHICH WHOLLY VAPORZIED UNLEADED GASOLINE
CAUSES KIDNEY DAMAGE IS UNQUE TO THE MALE RAT. THE EFFECTS IN THAT SPECIES
(KIDNEY DAMAGE AND CANCER) SHOULD NOT BE USED IN HUMAN RISK ASSESMENT. IN
THEIR 1988 REVIEW OF CARCINOGENIC RISK FROM GASOLINE, THE INTERNATIONAL
AGENCY FOR RESEARCH ON CANCER (IARC) NOTED THAT, BECAUSE PUBLISHED
EPIDEMIOLOGY STUDIES DID NOT INCLUDE ANY EXPOSURE DATA, ONLY OCCUPATIONS
WHERE GASOLINE EXPOSURE MAY HAVE OCURRED WERE REVIEWED. THESE INCLUDED
GASOLINE SERVICE STATION ATTENDANTS AND AUTOMOBILE MECHANICS. IARC ALSO NOTED
THAT THERE WAS NO OPPORTUNITY TO SEPARATE EFFECTS OF COMBUSTION PRODUCTS FROM
THOSE OF GASOLINE ITSELF. ALTHOUGH IARC ALLOCATED GASOLINE A FINAL OVERALL
CLASS IFICATION OF GROUP 2B, I.E. POSSIBLY CARCINOGENIC TO HUMANS, THIS WAS
BASED ON LIMITED EVIDENCE IN EXPERIMENTAL ANIMALS PLUS SUPPORTING EVIDENCE
INCLUDING THE PRESENCE IN GASOLINE OF BENZENE AND 1, 3-BUTADIENE. THE ACTUAL
EVIDENCE FOR CARCINOGENICITY IN HUMANS WAS CONSIDERED INADEQUATE.

MUTAGENICITY:
GASOLINE WAS NOT MUTAGENIC, WITH OR WITHOUT ACTIVATION, IN THE AMES ASSAY
(SALMONELLA TYPHIMURIUM), SACCHARAMYCES CEREVISESAE, OR MOUSE LYMPHOMA
ASSAYS. IN ADDITION, POINT MUTATIONS WERE NOT INDUCED IN HUMAN LYMPHOCYTES.
GASOLINE WAS NOT MUTAGENIC WHEN TESTED IN THE MOUSE DOMINANT LETHAL ASSAY.
ADMINISTRATION OF GASOLINE TO RATS DID NOT CAUSE CHOMOSOMAL ABERRATIONS IN
THEIR BONE MARROW CELLS.
EPIDEMIOLOGY:
TO EXPLORE THE HEALTH EFFECTS OF WORKERS POTENTIALLY EXPOSED TO GASOLINE
VAPORS IN THE MARKETING AND DISTRIBUTION SECTORS OF THE PETROLEUM INDUSTRY,
THE AMERICAN PETROLEUM INSTITUTE SPONSORED A COHORT MORTALITY STUDY
(PUBLICATION 4555), A NESTED CASE-CONTROL STUDY (PUBLICATION 4551), AND AN
EXPOSURE ASSESSMENT STUDY (PUBLICATION 4552). HISTORIES OF EXPOSURE TO

GASOLINE WERE RECONSTRUCTED FOR COHORT OF MORE THAN 18,000 EMPLOYEES FROM
FOUR COMPANIES FOR THE TIME PERIOD BETWEEN 1946 AND 1985. THE RESULTS OF THE
COHORT MORTALITY STUDY INDIC ATED THAT THERE WAS NO INCREASED MORTALITY FROM
EITHER KIDNEY CANCER OR LEUKEMIA AMONG MARKETING AND MARINE DISTRIBUTION
EMPLOYEES WHO WERE EXPOSED TO GASOLINE IN THE PETROLEUM INDUSTRY, WHEN
COMPARED TO THE GENERAL POPULATION. MORE IMPORTANTLY, BASED ON INTERNAL
COMPARISONS, THERE WAS NO ASSOCIATION BETWEEN MORTALITY FROM KIDNEY CANCER OR
LEUKEMIA AND VARIOUS INDICES OF GASOLINE EXPOSURE. IN PARTICULAR, NEITHER
DURATION OF EMPLOYMENT, DURATION OF EXPOSURE, AGE AT FIRST EXPOSURE, YEAR OF
FIRST EXPOSURE, JOB CATEGORY, CUMULATIVE EXPOSURE, FREQUENCY OF PEAK
EXPOSURE, NOR AVERAGE INTENSITY OF EXPOSURE HAD ANY EFFECT ON KIDNEY CANCER
OR LEUKEMIA MORTALITY. THE RESULTS OF THE NESTED CASE-CONTROL STUDY CONFIRMED
THE FINDINGS OF THE ORIGINAL COHORT STUDY. THAT IS, EXPOSURE TO GASOLINE AT
THE LEVELS EXPERIENCED BY THIS COHORT OF DISTRIBUTION WORKERS IS NOT A
SIGNIFICANT RISK FACTOR FOR LEUKEMIA (ALL CELL TYPES), ACUTE MYELOID
LEUKEMIA, KIDNEY CANCER OR MULTIPLE MYELOMA.

## SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY:
THE 96 HOUR(S) LC50 FOR RAINBOW TROUT (ONCORHYNCHUS MYKISS) IS 2.7 MG/L.
THE 48 HOUR(S) LC50 FOR WATER FLEA (DAPHNIA MAGNA) IS 3.0 MG/L.
THE 96 HOUR(S) LC50 FOR SHEEPSHEAD MINNOW (CYPRINODON VARIEGATUS) IS 8.3
MG/L.
THE 96 HOUR(S) LC50 FOR MYSID SHRIMP (MYSIDOPSIS BAHIA) IS 1.8 MG/L.

THIS MATERIAL IS EXPECTED TO BE TOXIC TO AQUATIC ORGANISMS. GASOLINE STUDIES
HAVE BEEN CONDUCTED IN THE LABORATORY UNDER A VARIETY OF TEST CONDITIONS WITH
A RANGE OF FISH AND INVERTEBRATE SPECIES. AN EVEN MORE EXTENSIVE DATABASE IS
AVAILABLE ON THE AQUATIC TOXICITY OF INDIVIDUAL AROMATIC CONSTITUENTS. THE
MAJORITY OF PUBLISHED STUDIES DO NOT IDENTIFY THE TYPE OF GASOLINE EVALUATED,
OR EVEN PROVIDE DISTINGUISHING CHARACTERISTICS SUCH AS AROMATIC CONTENT OR
PRESENCE OF LEAD ALKYLS. AS A RESULT, COMPARISON OF RESULTS AMONG STUDIES
USING OPEN AND CLOSED VESSELS, DIFFERENT AGES AND SPECIES OF TEST ANIMALS AND

DIFFERENT GASOLINE TYPES, IS DIFFICULT.

THE BULK OF THE AVAILABLE LITERATURE ON GASOLINE RELATES TO THE ENVIRONMENTAL IMPACT OF MONOAROMATIC (BTEX) AND DIAROMATIC (NAPHTHALENE, METHYLNAPHTHALENES) CONSTITUENTS. IN GENERAL, NON-OXYGENATED GASOLINE EXHIBITS SOME SHORT-TERM TOXICITY TO FRESHWATER AND MARINE ORGANISMS, ESPECIALLY UNDER CLOSED VESSEL OR FLOW-THROUGH EXPOSURE CONDITIONS IN THE LABORATORY. THE COMPONENTS WHICH ARE THE MOST PROMINENT IN THE WATER SOLUBLE FRACTION AND CAUSE AQUATIC TOXICITY, ARE ALSO HIGHLY VOLATILE AND CAN BE READILY BIODEGRADED BY MICROORGANISMS.

ENVIRONMENTAL FATE:
THIS MATERIAL IS EXPECTED TO BE READILY BIODEGRADABLE. FOLLOWING SPILLAGE, THE MORE VOLATILE COMPONENTS OF GASOLINE WILL BE RAPIDLY LOST, WITH CONCURRENT DISSOLUTION OF THESE AND OTHER CONSTITUENTS INTO THE WATER. FACTORS SUCH AS LOCAL ENVIRONMENTAL CONDITIONS (TEMPERATURE, WIND, MIXING OR WAVE ACTION, SOIL TYPE, ETC), PHOTO-OXIDATION, BIODEGRADATION AND ADSORPTION ONTO SUSPENDED SEDIMENTS, CAN CONTRIBUTE TO THE WEATHERING OF SPILLED GASOLINE.

THE AQUEOUS SOLUBILITY OF NON-OXYGENATED UNLEADED GASOLINE, BASED ON ANALYSIS OF BENZENE, TOLUENE, ETHYLBENZENE+XYLENES AND NAPHTHALENE, IS REPORTED TO BE 112 MG/L. SOLUBILITY DATA ON INDIVIDUAL GASOLINE CONSTITUENTS ALSO AVAILABLE.

## SECTION 13 DISPOSAL CONSIDERATIONS

USE MATERIAL FOR ITS INTENDED PURPOSE OR RECYCLE IF POSSIBLE. THIS MATERIAL, IF IT MUST BE DISCARDED, MAY MEET THE CRITERIA OF A HAZARDOUS WASTE AS DEFINED BY US EPA UNDER RCRA (40 CFR 261) OR OTHER STATE AND LOCAL REGULATIONS. MEASUREMENT OF CERTAIN PHYSICAL PROPERTIES AND ANALYSIS FOR REGULATED COMPONENTS MAY BE NECESSARY TO MAKE A CORRECT DETERMINATION. IF THIS MATERIAL IS CLASSIFIED AS A HAZARDOUS WASTE, FEDERAL LAW REQUIRES DISPOSAL AT A LICENSED HAZARDOUS WASTE DISPOSAL FACILITY.

## SECTION 14 TRANSPORT INFORMATION

THE DESCRIPTION SHOWN MAY NOT APPLY TO ALL SHIPPING SITUATIONS. CONSULT 49CFR, OR APPROPRIATE DANGEROUS GOODS REGULATIONS, FOR ADDITIONAL DESCRIPTION

REQUIREMENTS (E.G., TECHNICAL NAME) AND MODE-SPECIFIC OR QUANTITY-SPECIFIC
SHIPPING REQUIREMENTS.

DOT SHIPPING NAME: GASOLINE

DOT HAZARD CLASS: 3 (FLAMMABLE LIQUID)

DOT IDENTIFICATION NUMBER: UN1203

DOT PACKING GROUP: II

## SECTION 15 REGULATORY INFORMATION

SARA 311/312 CATEGORIES:
1. IMMEDIATE (ACUTE) HEALTH EFFECTS: YES
2. DELAYED (CHRONIC) HEALTH EFFECTS: YES
3. FIRE HAZARD: YES
4. SUDDEN RELEASE OF PRESSURE HAZARD: NO
5. REACTIVITY HAZARD: NO

REGULATORY LISTS SEARCHED:

4_I1=IARC GROUP 1
15=SARA SECTION 313

4_I2A=IARC GROUP 2A
16=CA PROPOSITION 65

4_I2B=IARC GROUP 2B
17=MA RTK

05=NTP CARCINOGEN
18=NJ RTK

06=OSHA CARCINOGEN
19=DOT MARINE POLLUTANT

09=TSCA 12(B)
20=PA RTK

THE FOLLOWING COMPONENTS OF THIS MATERIAL ARE FOUND ON THE REGULATORY LISTS
INDICATED.

| | |
|---|---|
| BENZENE | 15, 16, 17, 18, 20, 4_I1, 5, 6 |
| ETHANOL | 17, 18, 20 |
| ETHYL BENZENE | 15, 17, 18, 20, 4_I2B |
| GASOLINE | 17, 18, 20 |
| METHYL TERT-BUTYL ETHER (MTBE) | 15, 17, 18, 20, 9 |

NAPHTHALENE 15, 16, 17, 18, 20, 4_I2B

TERTIARY AMYL METHYL ETHER (TAME) 9

CERCLA REPORTABLE QUANTITIES(RQ)/SARA 302 THRESHOLD PLANNING QUANTITIES(TPQ):

| COMPONENT | COMPONENT RQ | COMPONENT TPQ | PRODUCT RQ |
|---|---|---|---|
| BENZENE | 10 LBS | NONE | 186 LBS |
| ETHANOL | 100 LBS | NONE | 1961 LBS |
| ETHYL BENZENE | 1000 LBS | NONE | 34964 LBS |
| METHYL TERT-BUTYL ETHER (MTBE) | 1000 LBS | NONE | 7513 LBS |
| NAPHTHALENE | 100 LBS | NONE | 4000 LBS |

CHEMICAL INVENTORIES:

CANADA:
ALL THE COMPONENTS OF THIS MATERIAL ARE ON THE CANADIAN DSL OR HAVE BEEN
NOTIFIED UNDER THE NEW SUBSTANCE NOTIFICATION REGULATIONS, BUT HAVE NOT YET
BEEN PUBLISHED IN THE CANADA GAZETTE.

UNITED STATES:
ALL OF THE COMPONENTS OF THIS MATERIAL ARE ON THE TOXIC SUBSTANCES CONTROL
ACT (TSCA) CHEMICAL INVENTORY.

WHMIS CLASSIFICATION:
CLASS B, DIVISION 2: FLAMMABLE LIQUIDS
CLASS D, DIVISION 2, SUBDIVISION A: VERY TOXIC MATERIAL - CARCINOGENICITY
CLASS D, DIVISION 2, SUBDIVISION B: TOXIC MATERIAL - SKIN OR EYE IRRITATION

## SECTION 16 OTHER INFORMATION

NFPA RATINGS:
HEALTH: 1
FLAMMABILITY: 3
REACTIVITY: 0

(0-LEAST, 1-SLIGHT, 2-MODERATE, 3-HIGH, 4-EXTREME, PPE:- PERSONAL PROTECTION
EQUIPMENT INDEX RECOMMENDATION, *- CHRONIC EFFECT INDICATOR). THESE VALUES
ARE OBTAINED USING THE GUIDELINES OR PUBLISHED EVALUATIONS PREPARED BY THE
NATIONAL FIRE PROTECTION ASSOCIATION (NFPA) OR THE NATIONAL PAINT AND COATING
ASSOCIATION (FOR HMIS RATINGS).

ADDITIONAL PRODUCT NUMBER(S):
CPS201003, CPS201004, CPS201006, CPS201007, CPS201008, CPS201010, CPS201011,
CPS201018, CPS201021, CPS201025, CPS201031, CPS201032, CPS201033, CPS201034,
CPS201036, CPS201037, CPS201038, CPS201041, CPS201043, CPS201046, CPS201048,
CPS201064, CPS201208, CPS201210, CPS201211, CPS201212, CPS201230, CPS201231,
CPS201232, CPS201260, CPS201261, CPS201262, CPS201271, CPS201272, CPS201273,
CPS201280, CPS201281, CPS201282, CPS201288, CPS201290, CPS201291, CPS201292,
CPS201851, CPS201852, CPS201858, CPS201859, CPS201860, CPS204004, CPS204005,
CPS204012, CPS204013, CPS204024, CPS204025, CPS204048, CPS204049, CPS204072,
CPS204073, CPS204090, CPS204091, CPS204106, CPS204107, CPS204118, CPS204119,
CPS204142, CPS204143, CPS204166, CPS204167, CPS204190, CPS204191, CPS204202,
CPS204203, CPS204214, CPS204215, CPS204226, CPS204227, CPS204250, CPS204251,
CPS204274, CPS204275, CPS204292, CPS204293, CPS204325, CPS204326, CPS204360,
CPS204361, CPS204366, CPS204367, CPS204372, CPS204373, CPS204378, CPS204379,
CPS204384, CPS204385, CPS204390, CPS204391, CPS204396, CPS204397, CPS204402,
CPS204403, CPS204408, CPS204409, CPS204414, CPS204415, CPS204420, CPS204421,
CPS204426, CPS204427, CPS204432, CPS204433, CPS204438, CPS204439, CPS204468,
CPS204469, CPS204486, CPS204487, CPS204504, CPS204505, CPS204522, CPS204523,
CPS204540, CPS204541, CPS204558, CPS204559, CPS204576, CPS204577, CPS204594,
CPS204595, CPS204612, CPS204613, CPS204630, CPS204631, CPS204648, CPS204649,
CPS204666, CPS204667, CPS204692, CPS204693, CPS204698, CPS204699, CPS204704,
CPS204705, CPS204710, CPS204711, CPS204723, CPS204724, CPS204729, CPS204730

REVISION STATEMENT:
THIS REVISION UPDATES THE FOLLOWING SECTIONS OF THIS MATERIAL SAFETY DATA

SHEET:
SECTION 1 (PRODUCT CODES). THIS MATERIAL SAFETY DATA SHEET HAS BEEN PREPARED
USING THE PROSTEWARD MSDS SYSTEM.

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:
TLV - THRESHOLD LIMIT VALUE
TWA - TIME WEIGHTED AVERAGE
STEL - SHORT-TERM EXPOSURE LIMIT
PEL - PERMISSIBLE EXPOSURE LIMIT
CAS - CHEMICAL ABSTRACT SERVICE NUMBER
NDA - NO DATA AVAILABLE
NA - NOT APPLICABLE
/= - GREATER THAN OR EQUAL TO

PREPARED ACCORDING TO THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) AND THE ANSI MSDS STANDARD (Z400.1) BY THE CHEVRONTEXACO ENERGY
RESEARCH & TECHNOLOGY COMPANY, 100 CHEVRON WAY, RICHMOND, CALIFORNIA 94802.

THE ABOVE INFORMATION IS BASED ON THE DATA OF WHICH WE ARE AWARE AND IS BELIEVED TO BE CORRECT AS OF THE DATE HEREOF. SINCE THIS INFORMATION MAY BE
APPLIED UNDER CONDITIONS BEYOND OUR CONTROL AND WITH WHICH WE MAY BE UNFAMILIAR AND SINCE DATA MADE AVAILABLE SUBSEQUENT TO THE DATE HEREOF MAY
SUGGEST MODIFICATIONS OF THE INFORMATION, WE DO NOT ASSUME ANY RESPONSIBILITY
FOR THE RESULTS OF ITS USE. THIS INFORMATION IS FURNISHED UPON CONDITION THAT
THE PERSON RECEIVING IT SHALL MAKE HIS OWN DETERMINATION OF THE SUITABILITY
OF THE MATERIAL FOR HIS PARTICULAR PURPOSE.

**BAYER**
**NITRIC ACID Revised: 02/11/1997**

**MSDS Contents**


1. CHEMICAL PRODUCT IDENTIFICATION
2. COMPOSITION/INFORMATION ON INGREDIENTS
3. HAZARDS IDENTIFICATION
4. FIRST AID MEASURES
5. FIRE FIGHTING MEASURES
6. ACCIDENTAL RELEASE MEASURES
7. HANDLING AND STORAGE
8. PERSONAL PROTECTION
9. PHYSICAL AND CHEMICAL PROPERTIES
10. STABILITY AND REACTIVITY
11. TOXICOLOGICAL INFORMATION
12. ECOLOGICAL INFORMATION
13. DISPOSAL CONSIDERATIONS
14. TRANSPORTATION INFORMATION
15. REGULATORY INFORMATION
16. OTHER INFORMATION


BAYER

MATERIAL SAFETY DATA SHEET


BAYER CORPORATION
PRODUCT SAFETY & REGULATORY AFFAIRS
100 BAYER ROAD
PITTSBURGH, PA 15205-9741


TRANSPORTATION EMERGENCY:
CALL CHEMTREC: 800-424-9300
DISTRICT OF COLUMBIA: 202-483-7616

NON-TRANSPORTATION:
BAYER EMERGENCY PHONE: (412) 923-1800
BAYER INFORMATION PHONE: (800) 662-2927

## 1. CHEMICAL PRODUCT IDENTIFICATION

PRODUCT NAME: NITRIC ACID

PRODUCT CODE: M992

CHEMICAL FAMILY: INORGANIC ACID

CHEMICAL NAME: NITRIC ACID

SYNONYMS: CONCENTRATED NITRIC ACID; 98+% NITRIC ACID

CAS NUMBER: 7697-37-2

FORMULA: HNO3

## 2. COMPOSITION/INFORMATION ON INGREDIENTS

| INGREDIENT NAME/CAS NUMBER | EXPOSURE LIMITS | | CONCENTRATION (%) |
|---|---|---|---|
| HAZARDOUS INGREDIENTS: | | | |
| NITRIC ACID | OSHA: | 2.00 PPM TWA | 98 TO 100% |
| 7697-37-2 | | 5.00 MG/M3 TWA | |
| | | 4.00 PPM STEL | |
| | | 10.00 MG/M3 STEL | |
| | ACGIH: | 2.00 PPM TWA | |
| | | 5.20 MG/M3 TWA | |
| | | 4.00 PPM STEL | |
| | | 10.00 MG/M3 STEL | |

NITRIC OXIDE AND NITROGEN DIOXIDE GAS AND FUME MAY BE RELEASED BY HYDROLYSES
OR THERMAL DECOMPOSITION OF NITRIC ACID AND MAY BE ENCOUNTERED WHEN NITRIC
ACID COMES IN CONTACT WITH MOISTURE IN THE AIR.

| | | | |
|---|---|---|---|
| NITRIC OXIDE | OSHA: | 25.00 PPM TWA | % NOT NOTED |
| 10102-43-9 | | 30.00 MG/M3 TWA | |
| | ACGIH: | 25.00 PPM TWA | |
| | | 31.00 MG/M3 TWA | |
| NITROGEN DIOXIDE | OSHA: | 1.00 PPM STEL | % NOT NOTED |
| 10102-44-0 | | 1.80 MG/M3 STEL | |
| | ACGIH: | 3.00 PPM TWA | |
| | | 5.60 MG/M3 TWA | |
| | | 5.00 PPM STEL | |
| | | 9.40 MG/M3 STEL | |

## 3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
DANGER!
CORROSIVE
OXIDIZER

COLOR: COLORLESS TO SLIGHTLY BROWN

FORM: FUMING LIQUID

ODOR:
SHARP ACIDIC ODOR (ACRID)
HARMFUL IF INHALED OR INGESTED
CAUSES RESPIRATORY TRACT BURNS
CAUSES SKIN BURNS

CAUSES EYE BURNS
MAY CAUSE BLINDNESS
CAUSES DIGESTIVE TRACT BURNS
CONTACT WITH METALS LIBERATES FLAMMABLE GAS
CONTACT WITH ORGANIC MATERIAL MAY CAUSE FIRE
MIXTURES WITH ORGANIC MATERIAL CAN BE EXPLOSIVE
WATER RUNOFF FROM FIRE FIGHTING MAY BE CORROSIVE
CORROSIVE GASES/FUMES ARE GIVEN OFF DURING BURNING OR THERMAL DECOMPOSITION.

POTENTIAL HEALTH EFFECTS:

ROUTE(S) OF ENTRY:
SKIN CONTACT
EYE CONTACT
INHALATION

HUMAN EFFECTS AND SYMPTOMS OF OVEREXPOSURE:

ACUTE INHALATION:
NITRIC ACID IS CORROSIVE AND ITS VAPORS ARE IRRITATING TO THE MUCOUS MEMBRANES OF THE RESPIRATORY TRACT. INHALATION OF NITRIC ACID VAPORS RESULTS IN COUGHING, CHOKING AND INFLAMMATION OF THE RESPIRATORY TRACT. THE IRRITATING NATURE OF THESE VAPORS IS TYPICALLY SUFFICIENT TO CAUSE A PERSON TO LEAVE AREAS OF EXCESSIVE CONCENTRATION. HOWEVER, VAPOR INHALATION CAN BE FATAL TO PERSONS SPRAYED WITH ACID OR THOSE TRAPPED IN AREAS OF HIGH NITRIC ACID CONCENTRATIONS.

CHRONIC INHALATION:
PROLONGED EXPOSURE TO LOW VAPOR CONCENTRATIONS MAY CAUSE DENTAL DISCOLORATION AND EROSION OF EXPOSED TEETH, BLEEDING OF NOSE AND GUMS AND ULCERATION OF THE NASAL MUCOSA.

ACUTE SKIN CONTACT:
DIRECT CONTACT WITH THE SKIN CAUSES SEVERE BURNS UNLESS THE NITRIC ACID IS IMMEDIATELY WASHED OFF. CHEMICAL BURNS OR DERMATITIS MAY OCCUR FROM EXPOSURE TO HIGH CONCENTRATIONS OF NITRIC ACID VAPOR.

CHRONIC SKIN CONTACT:
REPEATED CONTACT WITH LOW CONCENTRATIONS MAY CAUSE SKIN DESICCATION (DRYING) AND ULCERATIONS.

ACUTE EYE CONTACT:
NITRIC ACID IS CORROSIVE AND ITS VAPORS ARE IRRITATING TO THE MUCOUS MEMBRANES OF THE EYES. SEVERE EYE IRRITATION WILL RESULT FROM EXPOSURE TO NITRIC ACID VAPOR OR SOLUTION. INITIAL SYMPTOMS MAY BE DISCOMFORT, TEARING AND/OR BLURRING OF VISION. PERMANENT EYE DAMAGE INCLUDING BLINDNESS MAY

RESULT IF THERE IS A DELAY IN FLUSHING IT FROM THE PERSON'S EYES.

CHRONIC EYE CONTACT:
REPEATED OR PROLONGED EXPOSURE MAY RESULT IN LACRIMATION (EXCESSIVE SECRETION OF TEARS) AND CHRONIC CONJUNCTIVITIS.

ACUTE INGESTION:
IF INGESTED, NITRIC ACID IS CORROSIVE TO THE TISSUES WITH WHICH IT COMES IN
CONTACT. INGESTION MAY CAUSE A BURNING PAIN IN THE MOUTH, THROAT, ESOPHAGUS
AND ABDOMEN.

CARCINOGENICITY:
THIS PRODUCT IS NOT LISTED BY NTP, IARC OR REGULATED AS A CARCINOGEN BY OSHA.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
ASTHMA, OTHER RESPIRATORY DISORDERS (BRONCHITIS, EMPHYSEMA, BRONCHIAL HYPERACTIVITY), SKIN ALLERGIES, ECZEMA.

## 4. FIRST AID MEASURES

FIRST AID FOR EYES:
IMMEDIATELY FLUSH EYES WITH RUNNING WATER FOR AT LEAST 15 MINUTES. TO ASSURE
THOROUGH FLUSHING OF ALL EYE TISSUE, THE EYELIDS SHOULD BE HELD APART DURING
IRRIGATION. PERMANENT EYE INJURY CAN OCCUR, PARTICULARLY IF RINSING IS DELAYED. IMMEDIATELY REFER TO A PHYSICIAN, PREFERABLY AN EYE SPECIALIST FOR
MEDICAL TREATMENT.

FIRST AID FOR SKIN:
RINSE WITH LARGE AMOUNTS OF RUNNING WATER WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. AVOID USING HOT WATER AND HARD RUBBING. IF CONTACT IS
EXTENSIVE OR IRRITATION DEVELOPS, A PHYSICIAN SHOULD BE CONTACTED IMMEDIATELY. WASH CLOTHING BEFORE REUSE.

FIRST AID FOR INHALATION:
REMOVE TO FRESH AIR. ADMINISTER OXYGEN IF BREATHING IS DIFFICULT. IF NOT
BREATHING, GIVE ARTIFICIAL RESPIRATION. IMMEDIATELY CONTACT A PHYSICIAN.

FIRST AID FOR INGESTION:
DO NOT INDUCE VOMITING. IF THE PERSON IS CONSCIOUS, GIVE LARGE AMOUNTS OF
WATER. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON. CONTACT A PHYSICIAN IMMEDIATELY.

## 5. FIRE FIGHTING MEASURES

FLASH POINT: NOT APPLICABLE.

AUTO-IGNITION TEMPERATURE: NOT APPLICABLE.

EXTINGUISHING MEDIA:
WATER
DRY CHEMICAL
CARBON DIOXIDE
WATER SPRAY FOR LARGE FIRES.

SPECIAL FIRE FIGHTING PROCEDURES:
NO FIRE HAZARD EXISTS DIRECTLY FROM NITRIC ACID. NITRIC ACID CAN CAUSE SPONTANEOUS IGNITION OF ORGANIC MATERIALS OR OTHER COMBUSTIBLE MATERIALS.
NITRIC ACID IS A STRONG OXIDIZER AND CONTACT WITH COMBUSTIBLE SUBSTANCES OR
REDUCING AGENTS SHOULD BE AVOIDED. FIREFIGHTERS EXPOSED TO NITRIC ACID VAPORS SHOULD WEAR A SELF-CONTAINED BREATHING APPARATUS AND FULL PROTECTIVE
ACID RESISTANT CLOTHING. WATER SPRAY SHOULD BE USED TO COOL FIRE EXPOSED
CONTAINERS AND TO CONTROL VAPORS. KEEP UPWIND.

## 6. ACCIDENTAL RELEASE MEASURES

SPILL OR LEAK PROCEDURES:
EVACUATE AREA AND STAY UPWIND. IF IT IS SAFE TO DO SO, TRAINED PERSONNEL
SHOULD ATTEMPT TO REDUCE OR STOP LEAK. LARGE SPILL SHOULD BE CONTAINED AND
PUMPED INTO TANKS WHICH HAVE BEEN CONSTRUCTED FOR NITRIC ACID SERVICE. FULL
ACID RESISTANT SUITS AND SELF-CONTAINED BREATHING APPARATUS SHOULD BE WORN
DURING EMERGENCY OPERATIONS. A WATER FOG OR SPRAY SHOULD BE USED TO CONTROL
VAPORS. FLUSH SPILL AREA WITH PLENTY OF WATER AND NEUTRALIZE WASHINGS WITH
LIME OR SODA ASH. DO NOT GET WATER INSIDE CONTAINER. SMALL SPILLS CAN BE
HANDLED BY ABSORPTION (CEMENT POWDER OR FLY ASH) AND REACTED WITH LARGE AMOUNTS OF DRY ALKALI (SODA ASH OR LIME). ABSORBED AND REACTED MATERIAL CAN
THEN BE SHOVELED INTO CONTAINERS AND DISPOSED. ADHERE TO FEDERAL, STATE AND
LOCAL REGULATIONS ON REPORTING RELEASES.

## 7. HANDLING AND STORAGE

STORAGE TEMPERATURE (MIN/MAX): AMBIENT/122 F (50 C).

SHELF LIFE: NOT ESTABLISHED.

SPECIAL SENSITIVITY:
LIGHT CAN CAUSE A SLOW DECOMPOSITION OF NITRIC ACID, CAUSING IT TO BECOME
DARKER IN COLOR.

HANDLING/STORAGE PRECAUTIONS:
NITRIC ACID SHOULD BE HANDLED AND STORED IN EQUIPMENT SUITABLY DESIGNED FOR
ACID SERVICE. KEEP CONTAINER TIGHTLY CLOSED. KEEP IN A COOL, DRY PLACE AWAY
FROM EXCESSIVE HEAT, IN ORIGINAL OR SIMILAR NITRIC ACID COMPATIBLE
CONTAINERS. KEEP SEPARATE FROM BASES, ORGANICS AND OTHER READILY OXIDIZABLE
MATERIALS. USE WITH ADEQUATE VENTILATION. AVOID INHALATION OF VAPORS MISTS
AND FUMES. AVOID CONTACT WITH EYES AND SKIN. RESEAL CONTAINERS IMMEDIATELY
AFTER USE. STORE AWAY FROM FOOD AND BEVERAGES.

## 8. PERSONAL PROTECTION

EYE PROTECTION REQUIREMENTS:
SPLASH PROOF GOGGLES AND FULL FACE SHIELD SHOULD BE USED TO PREVENT LIQUID
FROM SPLASHING INTO THE EYES.

SKIN PROTECTION REQUIREMENTS:
PVC OR NEOPRENE GLOVES, BOOTS, ACID SUITS AND OTHER SPLASH PROTECTION AS
APPROPRIATE FOR WORKING CONDITIONS. EMPLOYEES SHOULD WASH THEIR HANDS AND
FACE BEFORE EATING, DRINKING OR USING TOBACCO PRODUCTS.

VENTILATION REQUIREMENTS:
LOCAL EXHAUST OR OTHER MEANS SHOULD BE USED TO MAINTAIN ALL EXPOSURES BELOW
THE TLV.

RESPIRATOR REQUIREMENTS:
FULLFACE NIOSH/MSHA APPROVED FOR ACID GASES. DO NOT EXCEED THE USE LIMITS OF
THE RESPIRATOR.

ADDITIONAL PROTECTIVE MEASURES:
EMERGENCY SHOWERS AND EYE WASH STATIONS SHOULD BE AVAILABLE. FULL ACID SUITS
AND NIOSH APPROVED SELF-CONTAINED BREATHING APPARATUS SHOULD BE AVAILABLE TO
HANDLE MAJOR SPILLS. TRAIN EMPLOYEES IN THE SAFE USE AND HANDLING OF
HAZARDOUS CHEMICALS.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL FORM: FUMING LIQUID

COLOR: COLORLESS TO SLIGHTLY BROWN

ODOR: SHARP ACIDIC ODOR (ACRID)

MOLECULAR WEIGHT: 62.98

pH: 1

BOILING POINT: APPROX. 181.4 F (83 C); DECOMPOSES

MELTING/FREEZING POINT: APPROX. -43.6 F (-42 C)

VISCOSITY: APPROX. 0.942 MPAS

SOLUBILITY IN WATER: MISCIBLE

SPECIFIC GRAVITY: APPROX. 1.522 @ 68 F (20 C)

BULK DENSITY: 12.5 LBS/GAL.

VAPOR PRESSURE: 60 MBAR @ 68 F (20 C)

VAPOR DENSITY: >1 (AIR = 1)

## 10. STABILITY AND REACTIVITY

STABILITY: THIS IS A STABLE MATERIAL.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

INCOMPATIBILITIES:
COMBUSTIBLE OR OXIDIZING SUBSTANCES, METAL POWDERS, ALKALI, ORGANIC SOLVENTS, CYANIDES, CARBIDES AND SULFIDES.

INSTABILITY CONDITIONS: EXCESSIVE TEMPERATURES.

DECOMPOSITION TEMPERATURE: APPROX. 181.4 F (83 C).

DECOMPOSITION PRODUCTS:
IN THE PRESENCE OF INCOMPATIBLE MATERIALS OR WHEN HEATED, TOXIC OXIDES OF
NITROGEN AND OTHER POTENTIALLY HAZARDOUS MATERIALS ARE PRODUCED.

## 11. TOXICOLOGICAL INFORMATION

TOXICITY DATA FOR: NITRIC ACID

ACUTE TOXICITY:
ORAL LD50: DATA NOT ESTABLISHED FOR PRODUCT.
DERMAL LD50: DATA NOT ESTABLISHED FOR PRODUCT.
INHALATION LC50: 2500 PPM (1 HOUR - RAT). (1)
EYE EFFECTS: CORROSIVE.
SKIN EFFECTS: CORROSIVE.
SENSITIZATION: DATA NOT ESTABLISHED FOR PRODUCT.

SUBCHRONIC TOXICITY: DATA NOT ESTABLISHED FOR PRODUCT.

CHRONIC TOXICITY: DATA NOT ESTABLISHED FOR PRODUCT.

OTHER TOXICITY DATA (MUTAGENIC, TERATOGENIC, REPRODUCTIVE TESTS):
DATA NOT ESTABLISHED FOR PRODUCT.

1 DUPONT'S HASKELL LABORATORY FOR TOXICOLOGY AND INDUSTRIAL MEDICINE.

## 12. ECOLOGICAL INFORMATION

ECOLOGY DATA FOR: NITRIC ACID

AQUATIC TOXICITY: LETHAL TO FISH AT A CONCENTRATION OF 25 TO 36 MG/L.

## 13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHOD:
LANDFILL OR NEUTRALIZE IN ACCORDANCE WITH FEDERAL, STATE AND LOCAL ENVIRONMENTAL REGULATIONS.

## 14. TRANSPORTATION INFORMATION

TECHNICAL SHIPPING NAME: NITRIC ACID (WHITE FUMING)
FREIGHT CLASS BULK: NITRIC ACID
PRODUCT LABEL: NITRIC ACID (BULK TAG)

DOT (DOMESTIC SURFACE):
PROPER SHIPPING NAME: NITRIC ACID
HAZARD CLASS OR DIVISION: 8; 5.1
UN/NA NUMBER: UN2031
PACKAGING GROUP: PG I
DOT PRODUCT RQ LBS (KGS): 1000 LBS (453.6 KGS)
HAZARD LABEL(S): CORROSIVE; OXIDIZER
HAZARD PLACARD(S): CORROSIVE; OXIDIZER

* THE U.S. DEPARTMENT OF TRANSPORTATION (DOT) 49 CFR REGULATIONS PERMIT THE
UTILIZATION OF SUBSIDIARY (SECONDARY) HAZARD SHIPPING PAPER ENTRIES,

LABELING AND PLACARDING. REFER TO 49 CFR 172.202 (A) (2), 172.402 (A) (2)
AND 172.505 (D) FOR ADDITIONAL INFORMATION.

IMO/IMDG CODE (OCEAN):
PROPER SHIPPING NAME: NITRIC ACID
HAZARD CLASS DIVISION NUMBER: 8; 5.1
UN NUMBER: UN2031
PACKAGING GROUP: I
HAZARD LABEL(S): CORROSIVE; OXIDIZER
HAZARD PLACARD(S): CORROSIVE; OXIDIZER

* THE INTERNATIONAL MARITIME ORGANIZATION (IMO) PERMITS THE UTILIZATION OF
SUBSIDIARY (SECONDARY) HAZARD LABELING, PLACARDING AND SHIPPING PAPER
ENTRIES. REFER TO THE INTERNATIONAL MARITIME DANGEROUS GOODS CODES 7.3.4,
7.4.6 AND 9.3.10.

ICAO/IATA (AIR):
PROPER SHIPPING NAME: NITRIC ACID
HAZARD CLASS DIVISION NUMBER: 8
UN NUMBER: UN2031
SUBSIDIARY RISK: 5.1
PACKING GROUP: I
HAZARD LABEL(S): CORROSIVE; OXIDIZER
RADIOACTIVE?: NON-RADIOACTIVE
PASSENGER AIR - MAX. QTY.: FORBIDDEN
CARGO AIR - MAX. QTY.: 2.5 L
CARGO AIR PACKING INSTRUCTION: 809

* THE INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA) DANGEROUS GOODS
REGULATIONS PERMIT THE UTILIZATION OF SUBSIDIARY (SECONDARY) HAZARD LABELING
AND SHIPPING PAPER ENTRIES. REFER TO THE IATA DANGEROUS GOODS CODES
REGULATIONS 3.10.4, 7.2.3 AND 8.1.6.9.

## 15. REGULATORY INFORMATION

OSHA STATUS:
THIS PRODUCT IS HAZARDOUS UNDER THE CRITERIA OF THE FEDERAL OSHA HAZARD
COMMUNICATION STANDARD 29 CFR 1910.1200.

TSCA STATUS: ON TSCA INVENTORY

CERCLA REPORTABLE QUANTITY:
98+% NITRIC ACID, CAS# 7697-37-2, 1000 LBS. (454 KG).

SARA TITLE III:

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES:
NITRIC ACID, CAS# 7697-37-2, 98 TO 100%.

SECTION 311/312 HAZARD CATEGORIES:

IMMEDIATE HEALTH HAZARD
DELAYED HEALTH HAZARD
REACTIVE HAZARD

SECTION 313 TOXIC CHEMICALS: NITRIC ACID, CAS# 7697-37-2, 98 TO 100%.

RCRA STATUS:
WHEN DISCARDED IN ITS PURCHASED FORM, THIS PRODUCT MEETS THE CRITERIA OF
CORROSIVITY AND SHOULD BE MANAGED AS A HAZARDOUS WASTE (EPA HAZARDOUS WASTE
NUMBER D002). (40 CFR 261.20-24)

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.

| COMPONENT NAME/CAS NUMBER | CONCENTRATION | STATE CODE |
|---|---|---|
| NITRIC ACID<br>7697-37-2 | 98 TO 100% | PA1, MA, NJ3 |
| WATER<br>7732-18-5 | 0% TO 2% | NJ4 |
| LEAD<br>7439-92-1 | 10 PPM (MAX.) | CA3 |

CA3 = WARNING! THIS CHEMICAL IS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE
CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.
MA = MASSACHUSETTS HAZARDOUS SUBSTANCE LIST
NJ3 = NEW JERSEY SPECIAL HEALTH HAZARDOUS SUBSTANCE LIST
NJ4 = NEW JERSEY OTHER - INCLUDED IN 5 PREDOMINANT INGREDIENTS >1%
PA1 = PENNSYLVANIA HAZARDOUS SUBSTANCE LIST

## 16. OTHER INFORMATION

REASON FOR ISSUE:
UPDATE TO 16 SECTION FORMAT
ADD SUBSIDIARY INFO. FOR TRANSPORTATION.

PREPARED BY: D. P. KELLY

APPROVED BY: J. H. CHAPMAN

APPROVAL DATE: 02/11/97

SUPERSEDES DATE: 04/07/95

MSDS NUMBER: 07852

THIS INFORMATION IS FURNISHED WITHOUT WARRANTY, EXPRESSED OR IMPLIED, EXCEPT
THAT IT IS ACCURATE TO THE BEST KNOWLEDGE OF BAYER CORPORATION. THE DATA ON
THIS SHEET RELATES ONLY TO THE SPECIFIC MATERIAL DESIGNATED HEREIN. BAYER
CORPORATION ASSUMES NO LEGAL RESPONSIBILITY FOR USE OR RELIANCE UPON THESE
DATA.

**ARCH CHEMICALS**
**SULFURIC ACID Revised: 12/19/2000**

**MSDS Contents**


I. PRODUCT AND COMPANY IDENTIFICATION
II. COMPOSITION/INFORMATION ON INGREDIENTS
III. HAZARDS IDENTIFICATION
IV. FIRST AID
V. FIRE FIGHTING MEASURES
VI. ACCIDENTAL RELEASE MEASURES
VII. HANDLING AND STORAGE
VIII. EXPOSURE CONTROLS / PERSONAL PROTECTION
IX. PHYSICAL DATA
X. STABILITY AND REACTIVITY
XI. TOXICOLOGICAL INFORMATION
XII. ECOLOGICAL INFORMATION
XIII. DISPOSAL CONSIDERATIONS
XIV. TRANSPORTATION INFORMATION
XV. REGULATORY INFORMATION
XVI. ADDITIONAL INFORMATION


ARCH(TM)

ARCH CHEMICALS, INC.

MATERIAL SAFETY DATA

FOR ANY EMERGENCY, CALL 24HOURS/7 DAYS: 1-800-654-6911

FOR ALL TRANSPORTATION ACCIDENTS, CALL CHEMTREC(R*): 1-800-424-9300

FOR ALL MSDS QUESTIONS & REQUESTS, CALL: 1-800-511-MSDS

PRODUCT NAME: SULFURIC ACID

## I. PRODUCT AND COMPANY IDENTIFICATION

REVISION DATE: 12-19-2000

SUPERCEDES: 09-11-2000

MSDS NO: 00049-0180- 105040

SYNONYMS: OIL OF VITRIOL, DIPPING ACID

CHEMICAL FAMILY: INORGANIC ACID

DESCRIPTION / USE: ACID

FORMULA:

ARCH CHEMICALS, INC.
501 MERRITT 7
PO BOX 5204
NORWALK, CT 06856-5204

## II. COMPOSITION/INFORMATION ON INGREDIENTS

| CAS OR CHEMICAL NAME | CAS # % | RANGE |
|---|---|---|
| SULFURIC ACID | 7664-93-9 | 51 - 100 |

## III. HAZARDS IDENTIFICATION

OSHA HAZARD CLASSIFICATION:
CORROSIVE TO EYES, CORROSIVE TO SKIN, CORROSIVE TO MUCOUS MEMBRANES, HIGHLY
TOXIC BY INHALATION, LUNG TOXIN, SKIN HAZARD, EYE HAZARD, WATER REACTIVE

ROUTES OF ENTRY: INHALATION, SKIN, EYES, INGESTION

CHEMICAL INTERACTIONS: NO KNOWN INTERACTIONS

MEDICAL CONDITIONS AGGRAVATED:
RESPIRATORY DISEASES INCLUDING ASTHMA AND BRONCHITIS, CARDIOVASCULAR DISEASE

HUMAN THRESHOLD RESPONSE DATA:

ODOR THRESHOLD: NOT ESTABLISHED

IRRITATION THRESHOLD: NOT ESTABLISHED

HAZARDOUS MATERIALS IDENTIFICATION SYSTEM/NATIONAL FIRE PROTECTION ASSOCIATION CLASSIFICATIONS:

HAZARD RATINGS:

| | HMIS | NFPA |
|---|---|---|
| HEALTH | 3 | 3 |
| FLAMMABILITY | 0 | 0 |
| REACTIVITY | 2 | 2 |
| | | WATER REACTIVE |

IMMEDIATE (ACUTE) HEALTH-EFFECTS:

INHALATION TOXICITY:
HIGHLY TOXIC. INHALATION OF HIGH CONCENTRATIONS MAY BE FATAL.

INHALATION IRRITATION:
INHALATION OF THIS MATERIAL MAY PRODUCE SEVERE IRRITATING AND/OR CORROSIVE

EFFECTS TO THE NOSE, MOUTH, THROAT, AND RESPIRATORY TRACT. IT MAY CAUSE BURNS
WHICH CAN RESULT IN SYMPTOMS WHICH MAY INCLUDE COUGHING, WHEEZING, CHOKING,
SHORTNESS OF BREATH, CHEST PAIN, AND IMPAIRMENT OF LUNG FUNCTION. INHALATION OF
HIGH CONCENTRATIONS CAN ALSO RESULT IN PERMANENT LUNG DAMAGE. MAY CAUSE
PULMONARY EDEMA (FLUID BUILD-UP IN LUNGS).

SKIN CONTACT:
DERMAL EXPOSURE CAN CAUSE SEVERE IRRITATION AND/OR BUMS CHARACTERIZED BY
REDNESS, SWELLING, AND SCAB FORMATION. PROLONGED SKIN EXPOSURE MAY CAUSE
PERMANENT DAMAGE.

EYE CONTACT:
CORROSIVE. BURNS CAN OCCUR FOLLOWING EXPOSURE. DIRECT CONTACT MAY CAUSE
IMPAIRMENT OF VISION, CORNEAL DAMAGE AND/OR BLINDNESS. RINSING OF THE EYE
SHOULD TAKE PLACE IMMEDIATELY.

INGESTION IRRITATION:
IRRITATION AND/OR BURNS CAN OCCUR TO THE ENTIRE GASTROINTESTINAL TRACT,
INCLUDING THE STOMACH AND INTESTINES, CHARACTERIZED BY NAUSEA, VOMITING,
DIARRHEA, ABDOMINAL PAIN, BLEEDING, AND/OR TISSUE ULCERATION OR PERFORATION.
ASPIRATION MAY LEAD TO LUNG DAMAGE.

INGESTION TOXICITY: MAY BE TOXIC IF SWALLOWED.

ACUTE TARGET ORGAN TOXICITY:
THIS PRODUCT IS CORROSIVE TO ALL TISSUES CONTACTED AND UPON INHALATION, MAY
CAUSE IRRITATION TO MUCOUS MEMBRANES AND RESPIRATORY TRACT.

PROLONGED (CHRONIC) HEALTH EFFECTS:

CARCINOGENICITY:
THIS PRODUCT IS NOT KNOWN OR REPORTED TO BE CARCINOGENIC BY ANY
REFERENCE SOURCE INCLUDING IARC, OSHA, NTP OR EPA.

REPRODUCTIVE AND DEVELOPMENTAL TOXICITY:
NO REPRODUCTIVE OR DEVELOPMENTAL RISK TO HUMANS IS EXPECTED FROM EXPOSURE TO
THIS PRODUCT.

INHALATION:
PROLONGED OR REPEATED EXPOSURE MAY CAUSE CONTINUOUS BRONCHITIS. PROLONGED OR
REPEATED INHALATION MAY CAUSE LUNG DAMAGE. MAY CAUSE: DENTAL EROSION

SKIN CONTACT:
PROLONGED OR REPEATED EXPOSURE MAY CAUSE EXTENSIVE PERMANENT SKIN DAMAGE.

INGESTION:
THERE ARE NO KNOWN OR REPORTED EFFECTS FROM CHRONIC INGESTION EXCEPT FOR
EFFECTS SIMILAR TO THOSE EXPERIENCED FROM SINGLE EXPOSURE.
THE ACUTE CORROSIVITY OF THIS PRODUCT, MAKES CHRONIC INGESTION OF SIGNIFICANT
AMOUNTS UNLIKELY.

CHRONIC TARGET ORGAN TOXICITY: RESPIRATORY TRACT, TEETH, SKIN, EYES

SUPPLEMENTAL HEALTH HAZARD INFORMATION:
NO ADDITIONAL HEALTH INFORMATION AVAILABLE.

## IV. FIRST AID

INHALATION:
IF INHALED: REMOVE INDIVIDUAL TO FRESH AIR. IF NOT BREATHING, GIVE ARTIFICIAL
RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. CALL A PHYSICIAN.

SKIN CONTACT:
IF ON SKIN: IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR 15 MINUTES. IF
CLOTHING COMES IN CONTACT WITH THE PRODUCT, THE CLOTHING SHOULD BE REMOVED
IMMEDIATELY AND SHOULD BE LAUNDERED BEFORE RE-USE. CALL A PHYSICIAN.

EYES:
IF IN EYES: IMMEDIATELY FLUSH EYES WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES
WHILE HOLDING EYELIDS APART. CALL A PHYSICIAN IMMEDIATELY.

INGESTION:
IF SWALLOWED: CALL A PHYSICIAN IMMEDIATELY. DO NOT INDUCE VOMITING UNLESS
DIRECTED TO DO SO BY A PHYSICIAN. NEVER GIVE ANYTHING BY MOUTH TO AN
UNCONSCIOUS PERSON.

## V. FIRE FIGHTING MEASURES

FLAMMABILITY SUMMARY (OSHA):
PRODUCT IS NOT KNOWN TO BE FLAMMABLE, COMBUSTIBLE, PYROPHORIC OR EXPLOSIVE.
REACTS WITH MOST METALS TO FORM FLAMMABLE HYDROGEN GAS. WATER REACTIVE

FLAMMABLE PROPERTIES:

FLASH POINT: NONE

AUTOIGNITION TEMPERATURE: NOT APPLICABLE

UPPER FLAMMABLE/EXPLOSIVE LIMIT, % IN AIR: NOT APPLICABLE

LOWER FLAMMABLE/EXPLOSIVE LIMIT, % IN AIR: NOT APPLICABLE

FIRE/EXPLOSION HAZARDS:
MATERIAL WILL NOT IGNITE OR BURN. REACTS WITH MOST METALS TO FORM FLAMMABLE HYDROGEN GAS.

EXTINGUISHING MEDIA: NOT APPLICABLE.
CHOOSE EXTINGUISHING MEDIA SUITABLE FOR SURROUNDING MATERIALS.

FIRE FIGHTING INSTRUCTIONS:
RESPONSE TO THIS MATERIAL REQUIRES THE USE OF A FULL ENCAPSULATED SUIT AND
FULL-FACE (NIOSH APPROVED) SELF-CONTAINED BREATHING APPARATUS (SCBA).
USE WATER TO COOL CONTAINERS.

HAZARDOUS COMBUSTION PRODUCTS: SULFUR CONTAINING GASES

## VI. ACCIDENTAL RELEASE MEASURES

PERSONAL PROTECTION FOR EMERGENCY SITUATIONS:
ADDITIONAL PROTECTIVE CLOTHING MUST BE WORN TO PREVENT PERSONAL CONTACT WITH
THIS MATERIAL. THOSE ITEMS INCLUDE BUT ARE NOT LIMITED TO BOOTS, IMPERVIOUS
GLOVES, HARD HAT, SPLASH-PROOF GOGGLES, IMPERVIOUS CLOTHING, I.E., CHEMICALLY
IMPERMEABLE SUIT, SELF-CONTAINED BREATHING APPARATUS.

SPILL MITIGATION PROCEDURES:

AIR RELEASE:
HAZARDOUS CONCENTRATIONS IN AIR MAY BE FOUND IN LOCAL SPILL AREA AND IMMEDIATELY DOWNWIND. VAPORS MAY BE SUPPRESSED BY THE USE OF WATER FOG.
CONTAIN ALL LIQUID FOR TREATMENT AND/OR DISPOSAL AS A (POTENTIAL) HAZARDOUS
WASTE.

WATER RELEASE:
THIS MATERIAL IS HEAVIER THAN WATER. THIS MATERIAL IS SOLUBLE IN WATER. CONTAIN
ALL LIQUID FOR TREATMENT AND/OR DISPOSAL AS A (POTENTIAL) HAZARDOUS WASTE.
NOTIFY ALL DOWNSTREAM USERS OF POSSIBLE CONTAMINATION.

LAND RELEASE:
CREATE A DIKE OR TRENCH TO CONTAIN MATERIALS. COVER WITH DRY LIME, SAND OR SODA
ASH. ABSORB SPILL WITH INERT MATERIAL (E.G., DRY SAND, CLAY, EARTH OR COMMERCIAL ABSORBENT), THEN PLACE IN A CHEMICAL WASTE CONTAINER.

ADDITIONAL SPILL INFORMATION:
STOP SOURCE OF SPILL AS SOON AS POSSIBLE AND NOTIFY APPROPRIATE PERSONNEL.

UTILIZE EMERGENCY RESPONSE PERSONAL PROTECTION EQUIPMENT PRIOR TO THE START OF
ANY RESPONSE. EVACUATE ALL NON-ESSENTIAL PERSONNEL. DISPOSE OF SPILL RESIDUES
PER GUIDELINES UNDER SECTION XIII, DISPOSAL CONSIDERATION. THIS MATERIAL MAY BE
NEUTRALIZED FOR DISPOSAL; YOU ARE REQUESTED TO CONTACT ARCH CHEMICALS AT 1
-800-654-6911 BEFORE BEGINNING ANY SUCH PROCEDURE.

## VII. HANDLING AND STORAGE

HANDLING:
DO NOT TAKE INTERNALLY. AVOID CONTACT WITH SKIN, EYES AND CLOTHING. UPON
CONTACT WITH SKIN OR EYES, WASH OFF WITH WATER. AVOID BREATHING (DUST, VAPOR,
MIST, GAS). KEEP CONTAINER CLOSED WHEN NOT IN USE. USE ONLY WITH ADEQUATE
VENTILATION.

STORAGE:
STORE IN A COOL, DRY AND WELL VENTILATED PLACE. ISOLATE FROM INCOMPATIBLE
MATERIALS. STORE IN A TIGHTLY CLOSED CONTAINER.

INCOMPATIBLE MATERIALS FOR STORAGE:
REFER TO SECTION X, "INCOMPATIBLE MATERIALS."

## VIII. EXPOSURE CONTROLS / PERSONAL PROTECTION

VENTILATION:
LOCAL EXHAUST VENTILATION OR OTHER ENGINEERING CONTROLS ARE NECESSARY WHEN
HANDLING OR USING THIS PRODUCT. USE LOCAL EXHAUST VENTILATION TO MAINTAIN
LEVELS BELOW EXPOSURE LIMITS.

PROTECTIVE EQUIPMENT FOR ROUTINE USE OF PRODUCT

RESPIRATORY PROTECTION:
WEAR A NIOSH APPROVED RESPIRATOR IF LEVELS ABOVE THE EXPOSURE LIMITS ARE
POSSIBLE.

RESPIRATOR TYPE(S):
A NIOSH APPROVED FULL-FACE AIR PURIFYING RESPIRATOR WITH ACID GAS CARTRIDGE AND
DUST/MIST FILTER. AIR PURIFYING RESPIRATORS SHOULD NOT BE USED IN OXYGEN
DEFICIENT OR IDLH ATMOSPHERES OR IF EXPOSURE CONCENTRATIONS EXCEED TEN (10)

TIMES THE PUBLISHED LIMIT.

SKIN:
WEAR IMPERVIOUS GLOVES, BOOTS AND APRON TO AVOID SKIN CONTACT. A FULL IMPERVIOUS SUIT IS RECOMMENDED IF EXPOSURE IS POSSIBLE TO A LARGE PORTION OF
THE BODY.

EYES: USE CHEMICAL GOGGLES AND A FACESHIELD.

PROTECTIVE CLOTHING TYPE: BUTYL RUBBER, POLYETHYLENE, TEFLON

OTHER PPE:
AN EYE WASH AND SAFETY SHOWER SHOULD BE PROVIDED IN THE IMMEDIATE WORK AREA.

EXPOSURE LIMIT DATA:

| CHEMICAL NAME | CAS # | OSHA PEL / STEL | ACGIH LIMITS |
|---|---|---|---|
| SULFURIC ACID | 7664-93-9 | 1 MG/M3 TWA | 3 MG/M3 STEL<br>1 MG/M3 TWA |

CHEMICAL NAME: SULFURIC ACID

NIOSH IMMEDIATELY DANGEROUS TO LIFE OR HEALTH: 15 MG/M3

## IX. PHYSICAL DATA

PHYSICAL STATE: CLEAR LIQUID

COLOR: COLORLESS

ODOR: NONE

MOLECULAR WEIGHT: (ACTIVE INGREDIENT) 98.08

pH (@ 25 DEG. C): <1 (1% SOLUTION IN NEUTRAL, DISTILLED WATER)

OCTANOL/WATER COEFF: NO DATA

SOLUBILITY IN WATER: COMPLETELY MISCIBLE

BULK DENSITY: NOT APPLICABLE

SPECIFIC GRAVITY: APPROXIMATELY 1.4 - 1.84

VAPOR DENSITY: NO DATA

VAPOR PRESSURE (@ 25 DEG. C): NIL

EVAPORATION RATE: NO DATA

VOLATILES, % BY VOL.: NO DATA

BOILING POINT:
APPROXIMATELY 275 - 330 DEG. C.
APPROXIMATELY 527 - 626 DEG. F.

FREEZING POINT: <11 DEG. C. <52 DEG. F.

## X. STABILITY AND REACTIVITY

STABILITY AND REACTIVITY SUMMARY:
STABLE UNDER NORMAL CONDITIONS. NOT SENSITIVE TO MECHANICAL SHOCK. NOT SENSITIVE TO STATIC DISCHARGE. REACTS WITH MOST METALS TO FORM FLAMMABLE
HYDROGEN GAS.

REACTIVE PROPERTIES: WATER REACTIVE, CORROSIVE

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR

CONDITIONS TO AVOID:
CONTACT WITH WATER. AVOID FREEZING. AVOID CONTACT WITH ORGANIC MATERIALS. HIGH TEMPERATURES

CHEMICAL INCOMPATIBILITY:
STRONG ALKALIS, STRONG OXIDIZING AGENTS, METALS, CYANIDES, ORGANIC MATERIALS,
SULFIDES

HAZARDOUS DECOMPOSITION PRODUCTS: HYDROGEN, OXIDES OF SULFUR

DECOMPOSITION TEMPERATURE: 340 DEG. C. 644 DEG. F.

PRODUCT MAY BE UNSTABLE AT TEMPERATURES ABOVE: 250 DEG. C. 482 DEG. F.

## XI. TOXICOLOGICAL INFORMATION

COMPONENT ANIMAL TOXICOLOGY:

ORAL LD50 VALUE:

SULFURIC ACID:
ORAL LD50: RAT 2.14 G/KG

DERMAL LD50 VALUE:

SULFURIC ACID:
DERMAL LD50: RABBIT >3 G/KG

INHALATION LC50 VALUE:

SULFURIC ACID:
INHALATION LC50: (1H) RAT 1020 MG/CU M

PRODUCT ANNUAL TOXICITY:

ORAL LD50 VALUE: ORAL LD50 RAT BELIEVED TO BE 2.14 G/KG

DERMAL LD 50 VALUE: DERMAL LD50 RABBIT BELIEVED TO BE >3 G/KG

INHALATION LC50 VALUE: INHALATION LC50 (1H) RAT 1020 MG/CU M

SKIN IRRITATION: THIS MATERIAL IS EXPECTED TO BE CORROSIVE.

EYE IRRITATION:
THIS MATERIAL IS EXPECTED TO CAUSE IRREVERSIBLE EFFECTS TO THE CORNEA WITH
IMPAIRMENT OF VISION OR CORROSION TO THE EYES.

REPRODUCTIVE AND DEVELOPMENTAL TOXICITY:
NO REPRODUCTIVE OR DEVELOPMENTAL RISK TO HUMANS IS EXPECTED FROM EXPOSURE TO
THIS PRODUCT.

COMPONENT DATA:

SULFURIC ACID:
SULFURIC ACID AEROSOL (95.7% PURITY) WAS TESTED IN PREGNANT MICE AND RABBITS
EXPOSED TO CONCENTRATIONS OF 0, 5, AND 20 MG/CUBIC-METER BY INHALATION ON
GESTATIONAL DAYS 6-15 AND 6-18, RESPECTIVELY. NO REPRODUCTIVE OR DEVELOPMENTAL
EFFECTS WERE SEEN IN EITHER SPECIES AT ANY OF THE EXPOSURE CONCENTRATIONS
UTILIZED.

MUTAGENICITY: NOT KNOWN OR REPORTED TO BE MUTAGENIC.

CARCINOGENICITY:
THIS CHEMICAL IS NOT KNOWN OR REPORTED TO BE CARCINOGENIC BY ANY REFERENCE
SOURCE INCLUDING IARC, OSHA, NTP, OR EPA.

COMPONENT DATA:

SULFURIC ACID:
IARC EVALUATED SEVERAL EPIDEMIOLOGY STUDIES WHERE WORKERS FROM A VARIETY OF
INDUSTRIES HAD BEEN EXPOSED TO A MIXTURE OF STRONG INORGANIC ACID MISTS. IARC
HAS CONCLUDED THAT THERE IS SUFFICIENT EVIDENCE THAT OCCUPATIONAL EXPOSURE TO A
MIXTURE OF STRONG INORGANIC-ACID MISTS CONTAINING SULFURIC ACID IS CARCINOGENIC
TO HUMANS (GROUP I CARCINOGEN). CANCER HAS NOT BEEN OBSERVED IN ANIMALS WHEN
THEY ARE EXPOSED ONLY TO SULFURIC ACID MISTS. EXPOSURE TO SULFURIC ACID BY
ITSELF WAS NOT DETERMINED TO BE CARCINOGENIC TO HUMANS.

## XII. ECOLOGICAL INFORMATION

OVERVIEW:
BECAUSE OF THE LOW pH OF THIS PRODUCT, IT WOULD BE EXPECTED TO PRODUCE SIGNIFICANT ECOTOXICITY UPON EXPOSURE TO AQUATIC ORGANISMS AND AQUATIC SYSTEMS.

ECOLOGICAL TOXICITY VALUES:

SULFURIC ACID:
WATER FLEA (DAPHNIA MAGNA), 7 DAYS = 6.5 MG/L - NO EFFECT.
MOSQUITO FISH 24 HR. LC50: = 14 MG/L.
MOSQUITO FISH 48 HR. LC50: = 14 MG/L.
MOSQUITO FISH 96 HOURS = 10 MG/L - NO EFFECT.

## XIII. DISPOSAL CONSIDERATIONS

CARE MUST BE TAKEN TO PREVENT ENVIRONMENTAL CONTAMINATION FROM THE USE OP THIS
MATERIAL. THE USER OF THIS MATERIAL HAS THE RESPONSIBILITY TO DISPOSE OF UNUSED
MATERIAL, RESIDUES AND CONTAINERS IN COMPLIANCE WITH ALL RELEVANT LOCAL, STATE
AND FEDERAL LAWS AND REGULATIONS REGARDING TREATMENT, STORAGE AND DISPOSAL FOR
HAZARDOUS AND NONHAZARDOUS WASTES.

WASTE DISPOSAL SUMMARY:
SPENT OR DISCARDED MATERIAL MAY BE A HAZARDOUS WASTE.

POTENTIAL US EPA WASTE CODES: D002

DISPOSAL METHODS:
AS A HAZARDOUS LIQUID WASTE, IT MUST BE DISPOSED OF IN ACCORDANCE WITH LOCAL,
STATE AND FEDERAL REGULATIONS IN A PERMITTED HAZARDOUS WASTE TREATMENT, STORAGE
AND DISPOSAL FACILITY BY TREATMENT OR INCINERATION.

COMPONENTS SUBJECT TO LAND BAN RESTRICTIONS: SULFURIC ACID (D002)

## XIV. TRANSPORTATION INFORMATION

THIS MATERIAL IS REGULATED AS A DOT HAZARDOUS MATERIAL.

DOT DESCRIPTION (49 CFR 172.101):

LAND (U.S. DOT): SULFURIC ACID, 8, UN1830, PG II

AIR (IATA/ICAO): SULPHURIC ACID, SOLUTION, 8, UN 1830, PG II.

WATER (IMO): SULPHURIC ACID, SOLUTION, 8, UN 1830, PG II.

HAZARD LABEL/PLACARD: (PRIMARY) CORROSIVE

SULFURIC ACID:
FINAL RQ = 1000 POUNDS (454 KG)

EMERGENCY RESPONSE GUIDE NUMBER: 137

## XV. REGULATORY INFORMATION

UNITED STATES:

TOXIC SUBSTANCES CONTROL ACT (TSCA):
THE COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY OF EXISTING
CHEMICAL SUBSTANCES.

NSF LISTING(S):
NSF MAXIMUM DRINKING WATER USE CONCENTRATION = 50 MG/L AS SULFURIC ACID.

PESTICIDE ACCEPTANCE INDICATION:
US EPA REGISTRATION NUMBER: NOT APPLICABLE

SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) TITLE III:

HAZARD CATEGORIES SECTIONS 311/312 (40 CFR 370.2):
HEALTH:
ACUTE
CHRONIC

PHYSICAL: REACTIVITY

EMERGENCY PLANNING & COMMUNITY RIGHT TO KNOW (40 CFR 355. APP. A):

EXTREMELY HAZARDOUS SUBSTANCE SECTION 302 - THRESHOLD PLANNING QUANTITY:

SULFURIC ACID:
TPQ = 1000 POUNDS
RQ = 1000 POUNDS

REPORTABLE QUANTITY (40 CFR 302.4):

SULFURIC ACID:
FINAL RQ = 1000 POUNDS (454 KG)

SUPPLIER NOTIFICATION REQUIREMENTS (40 CFR 372.45), 313 REPORTABLE COMPONENTS:

SULFURIC ACID:
ACID AEROSOLS INCLUDING MISTS, VAPORS, GAS, FOG, AND OTHER AIRBORNE FORMS OF
ANY PARTICLE SIZE: FORM R REPORTING REQUIRED FOR 1.0% DE MINIMIS CONCENTRATION

STATE RIGHT-TO-KNOW REGULATIONS STATUS OF INGREDIENTS:
PENNSYLVANIA: SULFURIC ACID
NEW JERSEY: SULFURIC ACID
MASSACHUSETTS: SULFURIC ACID

## XVI. ADDITIONAL INFORMATION

MSDS REVISION STATUS:

SECTION(S) REVISED: 3

MAJOR REFERENCES:

MURRAY F. J. ET AL. EMBRYOTOXICITY OF INHALED SULFURIC ACID AEROSOL IN MICE
AND RABBITS. J. ENVIRON. SCI. HEALTH, C13(3), 251-266 (1979).

SOSKOLNE, C. L. ET AL. LARYNGEAL CANCER AND OCCUPATIONAL EXPOSURE TO SULFURIC
ACID, AMERICAN JOURNAL OF EPIDEMIOLOGY, VOL. 120, NO. 3, (1984).

ALARIE, Y. ET AL. LONG-TERM CONTINUOUS EXPOSURE TO SULFURIC ACID MIST IN
CYNOMOLGUS MONKEYS AND GUINEA PIGS, ARCH. ENVIRON. HEALTH, VOL. 27, JULY 1973.

MARSHALL S. SULFURIC ACID. HANDBOOK OF TOXIC AND HAZARDOUS CHEMICALS AND
CARCINOGENS. NOYES PRESS, 2ND EDITION (1985).

OTHER REFERENCES AVAILABLE UPON REQUEST.

THIS MATERIAL SAFETY DATA SHEET (MSDS) HAS BEEN PREPARED IN COMPLIANCE WITH THE
FEDERAL OSHA HAZARD COMMUNICATION STANDARD, 29 CFR 1910.1200. THE INFORMATION
IN THIS MSDS SHOULD BE PROVIDED TO, ALL WHO WILL USE, HANDLE, STORE, TRANSPORT, OR OTHERWISE BE EXPOSED TO THIS PRODUCT. THIS INFORMATION HAS BEEN
PREPARED FOR THE GUIDANCE OF PLANT ENGINEERING, OPERATIONS AND MANAGEMENT AND
FOR PERSONS WORKING WITH OR HANDLING THIS PRODUCT. ARCH CHEMICALS BELIEVES THIS
INFORMATION TO BE RELIABLE AND UP TO DATE AS OF THE DATE OF PUBLICATION BUT,
MAKES NO WARRANTY THAT IT IS. ADDITIONALLY, IF THIS MSDS IS MORE THAN THREE

YEARS OLD, YOU SHOULD CONTACT ARCH CHEMICALS MSDS CONTROL AT THE PHONE NUMBER
AT THE BEGINNING OF THIS MSDS TO MAKE CERTAIN THAT THIS DOCUMENT IS CURRENT.

**ALCONOX**
**ALCONOX Revised: 10/15/2003**

**MSDS Contents**


SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION
SECTION 2 - HAZARDOUS INGREDIENTS
SECTION 3 - HAZARDS IDENTIFICATION
SECTION 4 - FIRST AID MEASURES
SECTION 5 - FIRE FIGHTING MEASURES
SECTION 6 - ENVIRONMENTAL RELEASE MEASURES
SECTION 7 - HANDLING AND STORAGE
SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION
SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES
SECTION 10 - STABILITY AND REACTIVITY
SECTION 11 - TOXICOLOGICAL INFORMATION
SECTION 12 - ECOLOGICAL INFORMATION
SECTION 13 - DISPOSAL CONSIDERATIONS
SECTION 14 - TRANSPORT INFORMATION
SECTION 15 - REGULATORY INFORMATION
SECTION 16 - OTHER INFORMATION


ALCONOX

MATERIAL SAFETY DATA SHEET

## SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: ALCONOX

GENERAL USE: DETERGENT CLEANER

PRODUCT DESCRIPTION: WHITE GRANULAR POWDER MIXTURE, PRACTICALLY ODORLESS

MANUFACTURERS NAME: ALCONOX, INC

STREET ADDRESS: 30 GLENN ST. SUITE 309

CITY, STATE, ZIP, COUNTRY: WHITE PLAINS, NY 10603 USA

TELEPHONE NUMBER FOR INFORMATION: ++914-948-4040

EMERGENCY TELEPHONE NUMBER:
CHEM-TEL: (800) 255-3924
OUTSIDE USA: ++813-248-0573

DISTRIBUTOR NAME: SAME UNLESS FILLED IN

STREET ADDRESS:

CITY, STATE, ZIP, COUNTRY:

TELEPHONE NUMBER FOR INFORMATION:

EMERGENCY TELEPHONE NUMBER:

DATE PREPARED: OCTOBER 8, 2003

## SECTION 2 - HAZARDOUS INGREDIENTS

| HAZARDOUS COMPONENTS | CAS # | % BY WT | OSHA PEL PPM | OSHA PEL MG/M3 |
|---|---|---|---|---|
| SODIUM PHOSPHATE, TRIBASIC (A) | 7758-29-4 | 10-30 | N/E | |
| SODIUM CARBONATE (NUISANCE DUST) | 497-19-8 | 7-13 | | 15 |
| SODIUM DODECYLBENZENE SULFONATE (A) | 25155-30-0 | 10-30 | N/E | |
| TETRASODIUM PHOSPHATE | 7722-88-5 | 10-30 | | 5 |

| HAZARDOUS COMPONENTS | ACGIH TWA PPM | ACGIH TWA MG/M3 | SARA TITLE III | RQ LBS. |
|---|---|---|---|---|
| SODIUM PHOSPHATE, TRIBASIC (A) | | | | 5000 |
| SODIUM CARBONATE (NUISANCE DUST) | | | | |
| SODIUM DODECYLBENZENE SULFONATE (A) | | | | 1000 |
| TETRASODIUM PHOSPHATE | | | | |

(A) SEE SECTION 15

N/E: NOT ESTABLISHED

## SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:
GRANULAR POWDER, AIRBORNE DUST PARTICLES ARE HARMFUL AND IRRITATING TO RESPIRATORY TRACT. CONTACT WITH EYES AND SKIN MAY CAUSE IRRITATION.
HAZARD
SYMBOLS FOR THIS PRODUCT XI, XN.

POTENTIAL HEALTH EFFECTS:

INHALATION:
BREATHING AIRBORNE PARTICLES OR DUST FROM MIXING, SPRAYING, SANDING, GRINDING, ETC., MAY CAUSE IRRITATION TO THE RESPIRATORY TRACT

SKIN: NONE EXPECTED, HOWEVER, PROLONGED CONTACT MAY CAUSE IRRITATION

EYES: CONTACT WITH EYES MAY CAUSE IRRITATION

INGESTION: MAY CAUSE GASTRIC DISTRESS, STOMACH PAINS, VOMITING AND DIARRHEA

CARCINOGENICITY:

NTP?
NO

IARC (MONOGRAPHS)?
NO

OSHA REGULATED?
NO

## SECTION 4 - FIRST AID MEASURES

INHALATION:
REMOVE AFFECTED PERSON TO FRESH AIR; IF SYMPTOMS PERSIST SEEK MEDICAL ATTENTION

SKIN:
REMOVE CONTAMINATED CLOTHING; WASH AFFECTED AREA WITH SOAP AND WATER; LAUNDER
CONTAMINATED CLOTHING BEFORE REUSE; IF IRRITATION PERSISTS SEEK MEDICAL ATTENTION

EYES:
REMOVE CONTACT LENSES. FLUSH EYES WITH CLEAR RUNNING WATER FOR 15 MINUTES
WHILE HOLDING EYELIDS OPEN; IF IRRITATION PERSISTS, SEEK MEDICAL ATTENTION

INGESTION: GIVE TWO GLASSES OF WATER FOR DILUTION; DO NOT INDUCE VOMITING

## SECTION 5 - FIRE FIGHTING MEASURES

FLASH POINT (METHOD USED): NON-FLAMMABLE

FLAMMABLE LIMITS:
LEL: NOT APPLICABLE
UEL: NOT APPLICABLE

AUTOIGNITION TEMPERATURE: NOT DETERMINED

NFPA CLASS: NONE

GENERAL HAZARDS:
PRODUCT IS NOT CONSIDERED FLAMMABLE OR COMBUSTIBLE. PRODUCTS OF COMBUSTION
INCLUDE COMPOUNDS OF CARBON, HYDROGEN AND OXYGEN, INCLUDING CARBON MONOXIDE.

EXTINGUISHING MEDIA:
CARBON DIOXIDE, WATER, WATER FOG, DRY CHEMICAL, CHEMICAL FOAM

FIRE FIGHTING PROCEDURES: NONE

UNUSUAL FIRE AND EXPLOSION HAZARDS: NONE

HAZARDOUS COMBUSTION PRODUCTS: SMOKE, FUMES, OXIDES OF CARBON

## SECTION 6 - ENVIRONMENTAL RELEASE MEASURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
CONFINE AND SEGREGATE PRODUCT FOR REUSE; PLACE MATERIAL INTO APPROVED CONTAINERS FOR DISPOSAL; FOR SPILLS IN EXCESS OF ALLOWABLE LIMITS (RQ) NOTIFY
THE NATIONAL RESPONSE CENTER @ (800) 424-8802; REFER TO CERCLA 40 CFT 302
FOR DETAILED INSTRUCTIONS

## SECTION 7 - HANDLING AND STORAGE

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
KEEP CONTAINER CLOSED WHEN NOT IN USE; PROTECT CONTAINERS FROM ABUSE; STORE
CONTAINERS IN COOL, DRY AREA. KEEP THIS AND OTHER CHEMICALS OUT OF REACH OF
CHILDREN.

## SECTION 8 - EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS:
THE USE OF LOCAL EXHAUST VENTILATION AND AIRBORNE PARTICLE COLLECTION IS
RECOMMENDED. NO OTHER SPECIAL CONTROLS ARE INDICATED.

PERSONAL PROTECTION:

RESPIRATORY PROTECTION (SPECIFY TYPE):
NIOSH APPROVED RESPIRATOR DESIGNED TO REMOVE AIRBORNE PARTICULATE PRESENT IN
EXCESS OF MAXIMUM ALLOWABLE CONCENTRATIONS DUE TO OPERATIONS SUCH AS MIXING,
SPRAYING, SANDING, BUFFING, ETC. REFER TO 29 CFR 1910.134 OR EUROPEAN STANDARD EN 149 FOR REGULATIONS.

PROTECTIVE GLOVES: NEOPRENE OR RUBBER GLOVES

EYE PROTECTION: SAFETY GOGGLES WITH SIDE SHIELDS

OTHER PROTECTIVE CLOTHING OR EQUIPMENT: SAFETY EYEBATH NEARBY

WORK/HYGIENIC PRACTICES:
PRACTICE SAFE WORKPLACE HABITS. MINIMIZE BODY CONTACT WITH THIS, AS WELL AS
ALL CHEMICALS IN GENERAL

## SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

VAPOR PRESSURE (MM HG): NOT APPLICABLE

VAPOR DENSITY (AIR=1): NOT APPLICABLE

SPECIFIC GRAVITY (WATER=1): 0.85-1.10

EVAPORATION RATE (WATER=1): NOT APPLICABLE

SOLUBILITY IN WATER: COMPLETE TO >10% W/W

FREEZING POINT: NOT APPLICABLE

pH: 9.5 (1% AQUEOUS SOLUTION)

PHYSICAL STATE: GRANULAR POWDER

BOILING POINT: NOT APPLICABLE

APPEARANCE AND ODOR: WHITE GRANULAR POWDER, PRACTICALLY ODORLESS

VISCOSITY: NOT APPLICABLE

VOLATILE ORGANIC COMPOUNDS (VOC): NONE

## SECTION 10 - STABILITY AND REACTIVITY

STABILITY:
UNSTABLE (  )
STABLE  (XXX)
CONDITIONS TO AVOID: STORE IN A COOL DRY AREA

INCOMPATABILITY (MATERIALS TO AVOID): STRONG OXIDIZERS, STRONG ACIDS

HAZARDOUS DECOMPOSITION OR BYPRODUCTS:
DECOMPOSITION WILL NO OCCUR IF HANDLED AND STORED PROPERLY. IN CASE OF FIRE,
OXIDES OF CARBON, HYDROCARBONS, FUMES, AND SMOKE MAY BE PRODUCED.

HAZARDOUS POLYMERIZATION:
MAY OCCUR  (  )
WILL NOT OCCUR (XXX)
CONDITIONS TO AVOID: NONE

## SECTION 11 - TOXICOLOGICAL INFORMATION

| HAZARDOUS INGREDIENTS | % | CAS # | LD50 OF INGREDIENT (SPECIES AND ROUTE) |
|---|---|---|---|
| SODIUM PHOSPHATE, TRIBASIC (A) | 10-30 | 7758-29-4 | 3100 MG/KG ORAL-RAT |
| SODIUM CARBONATE (NUISANCE DUST) | 7-13 | 497-19-8 | 4020 MG/KG |
| SODIUM DODECYLBENZENE SULFONATE (A) | 10-30 | 25155-30-0 | NOT ESTABLISHED |
| TETRASODIUM PHOSPHATE | 10-30 | 7722-88-5 | NOT ESTABLISHED |
| MIXTURE AS A WHOLE | 100% | VARIOUS | >5.0 G/KG ORAL-RAT |

| HAZARDOUS INGREDIENTS | LC50 OF INGREDIENT (SPECIES AND ROUTE) |
|---|---|
| SODIUM PHOSPHATE, TRIBASIC (A) | NOT ESTABLISHED |
| SODIUM CARBONATE (NUISANCE DUST) | 1200 MG/M3/2H |
| SODIUM DODECYLBENZENE SULFONATE (A) | NOT ESTABLISHED |
| TETRASODIUM PHOSPHATE | NOT ESTABLISHED |
| MIXTURE AS A WHOLE | |

## SECTION 12 - ECOLOGICAL INFORMATION

NO DATA ARE AVAILABLE ON THE ADVERSE EFFECTS OF THIS MATERIAL ON THE ENVIRONMENT. NEITHER COD NOR BOD DATA ARE AVAILABLE. BASED ON THE CHEMICAL
COMPOSITION OF THEIR PRODUCT IT IS ASSUMED THAT THE MIXTURE CAN BE TREATED IN
AN ACCLIMATIZED BIOLOGICAL WASTE TREATMENT PLANT SYSTEM IN LIMITED QUANTITIES. HOWEVER TREATMENT SHOULD BE EVALUATED AND APPROVED FOR EACH SPECIFIC BIOLOGICAL SYSTEM. NONE OF THE INGREDIENTS IN THIS MIXTURE ARE CLASSIFIED AS A MARINE POLLUTANT.

## SECTION 13 - DISPOSAL CONSIDERATIONS

WASTE DISPOSAL METHODS:

DISPOSE OF IN ACCORDANCE WITH LOCAL, STATE, AND FEDERAL REGULATIONS. DO NOT
FLUSH TO WATERWAY. REFER TO "40 CFR PROTECTION OF ENVIRONMENT PARTS 260-299"
FOR DISPOSAL REGULATIONS IN THE US. CONSULT YOUR LOCAL, STATE, AND FEDERAL
ENVIRONMENTAL PROTECTION AGENCY BEFORE DISPOSING OF ANY CHEMICALS.

## SECTION 14 - TRANSPORT INFORMATION

PROPER SHIPPING NAME: NOT REGULATED

HAZARD CLASS/PACK GROUP: NONE/NONE

REFERENCE: NOT APPLICABLE

IDENTIFICATION NUMBER: NONE

LABEL: NONE REQUIRED

IATA HAZARD CLASS/PACK GROUP: NONE

IMDG HAZARD CLASS: NONE

RID/ADR DANGEROUS GOODS CODE: NONE

CANADIAN TDG CLASS/DIVISION: NONE

HAZARD SYMBOLS: NONE

NOTE:
TRANSPORTATION INFORMATION PROVIDED IS FOR REFERENCE ONLY. CLIENT IS URGED TO
CONSULT CFR 49 PARTS 100-177, IMDG, IATA, EC, CANADIAN TDG, AND UNITED NATIONS TDG INFORMATION MANUALS FOR DETAILED REGULATIONS AND EXCEPTIONS COVERING SPECIFIC CONTAINER SIZES, PACKAGING AND MATERIALS AND METHODS OF
SHIPPING.

## SECTION 15 - REGULATORY INFORMATION

TSCA (TOXIC SUBSTANCES CONTROL ACT):
COMPONENTS OF THIS PRODUCT ARE LISTED ON THE TSCA INVENTORY

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT):
311/312 HAZARD CATEGORIES: ACUTE HEALTH
313 REPORTABLE INGREDIENTS: NONE

CERCLA (COMPREHENSIVE RESPONSE COMPENSATION AND LIABILITY ACT):
(A) THE COMPREHENSIVE ENVIRONMENTAL RESPONSE, COMPENSATION, AND LIABILITY ACT
(CERCLA) HAS NOTIFICATION REQUIREMENTS FOR RELEASES OR SPILLS TO THE

ENVIRONMENT OF THE REPORTABLE QUANTITY (RQ FOR THIS MIXTURE = 6,000 LBS) OR
GREATER AMOUNTS, ACCORDING TO 40 CFR 302

CPR (CANADIAN CONTROLLED PRODUCTS REGULATIONS):
THIS PRODUCT HAS BEEN CLASSIFIED IN ACCORDANCE WITH THE HAZARD CRITERIA OF
THE CONTROLLED PRODUCTS REGULATIONS AND THE MSDS CONTAINS ALL THE INFORMATION
REQUIRED BY THE CONTROLLED PRODUCTS REGULATIONS

EINECS (EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES):
COMPONENTS OF THIS PRODUCT ARE ON THE EUROPEAN INVENTORY OF EXISTING COMMERCIAL CHEMICAL SUBSTANCES

AICS (AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES):
COMPONENTS OF THIS PRODUCT ARE ON THE AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES

EC RISK PHRASES:
R20: HARMFUL BY INHALATION
R36: IRRITATING TO EYES
R37: IRRITATING TO RESPIRATORY SYSTEM
R38: IRRITATING TO SKIN

EC SAFETY PHRASES:
S8: KEEP CONTAINER DRY
S22: DO NOT BREATH DUST
S24: AVOID CONTACT WITH SKIN
S25: AVOID CONTACT WITH EYES

## SECTION 16 - OTHER INFORMATION

NO SPECIFIC NOTES

HMIS HAZARD RATINGS:

| | |
|---|---|
| HEALTH | 1 |
| FLAMMABILITY | 0 |
| REACTIVITY | 0 |
| PERSONAL PROTECTIVE EQUIPMENT | B SAFETY GLASSES, GLOVES |

0 = INSIGNIFICANT
1 = SLIGHT
2 = MODERATE
3 = HIGH
4 = EXTREME

REVISION SUMMARY:
THIS MSDS HAS BEEN REVISED IN THE FOLLOWING SECTIONS: NO REVISIONS AVAILABLE

MSDS PREPARED BY MANUFACTURER

THE INFORMATION CONTAINED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT

WARRANTED TO BE SO. USERS ARE ADVISED TO CONFIRM IN ADVANCE OF NEED THAT
INFORMATION IS CURRENT, APPLICABLE AND SUITED TO THE CIRCUMSTANCES OF USE.
VENDOR ASSUMES NO RESPONSIBILITY FOR INJURY TO VENDEE OR THIRD PERSONS PROXIMATELY CAUSED BY THE MATERIAL IF REASONABLE SAFETY PROCEDURES ARE NOT
ADHERED TO AS STIPULATED IN THE DATA SHEET. FURTHERMORE, VENDOR ASSUMES NO
RESPONSIBILITY FOR INJURY CAUSED BY ABNORMAL USE OF THIS MATERIAL EVEN IF
REASONABLE SAFETY PROCEDURES ARE FOLLOWED.

DOCUMENT NAME: MSDSAX.DOC

ISSUED BY: MALCOLM MCLAUGHLIN

AUTHOR: MALCOLM MCLAUGHLIN

EFFECTIVE DATE: 10/15/2003

ISSUE DATE: 10/08/03

SUPERCEDES: A XEUMSDS 112502

**ACROS ORGANICS**
**SODIUM HYDROXIDE** **Revised: 09/22/2004**

**MSDS Contents**


SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION
SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS
SECTION 3 - HAZARDS IDENTIFICATION
SECTION 4 - FIRST AID MEASURES
SECTION 5 - FIRE FIGHTING MEASURES
SECTION 6 - ACCIDENTAL RELEASE MEASURES
SECTION 7 - HANDLING and STORAGE
SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION
SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES
SECTION 10 - STABILITY AND REACTIVITY
SECTION 11 - TOXICOLOGICAL INFORMATION
SECTION 12 - ECOLOGICAL INFORMATION
SECTION 13 - DISPOSAL CONSIDERATIONS
SECTION 14 - TRANSPORT INFORMATION
SECTION 15 - REGULATORY INFORMATION
SECTION 16 - ADDITIONAL INFORMATION


**** MATERIAL SAFETY DATA SHEET ****

Sodium hydroxide
95583

## SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

MSDS Name: Sodium hydroxide
Catalog Numbers:
AC134070000, AC134070010, AC134070025, AC206060000, AC206060010, AC206060025
AC206060025, AC383040000, AC424330000, AC424330025, AC424330100, AC424330250
AC424330250, AC424335000
Synonyms:
Caustic soda


Company Identification (Europe): Acros Organics BVBA
Janssen Pharmaceuticalaan 3a
2440 Geel, Belgium
Company Identification (USA): Acros Organics
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies in Europe, call: 0032(0) 14575299

## SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS

| CAS# | Chemical Name | % | EINECS# | Haz Symbols | Risk Phrases |
|---|---|---|---|---|---|
| 1310-73-2 | Sodium hydroxide | >97% | 215-185-5 | | |

Hazard Symbols: C
Risk Phrases: 35

## SECTION 3 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

Target Organs: Respiratory system, gastrointestinal system, eyes, skin.

Potential Health Effects

Eye:
Causes severe eye burns. Causes redness and pain.

Skin:
May be fatal if absorbed through the skin. Causes skin burns. May cause deep, penetrating ulcers of the skin.

Ingestion:
Causes gastrointestinal tract burns. Causes severe pain, nausea, vomiting, diarrhea, and shock. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract. May be harmful if swallowed.

Inhalation:
Irritation may lead to chemical pneumonitis and pulmonary edema. Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma.

Chronic:
Prolonged or repeated skin contact may cause dermatitis.

## SECTION 4 - FIRST AID MEASURES

Eyes:
Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid immediately.

Skin:
Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Discard contaminated clothing in a manner which limits further exposure.

Ingestion:
Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately.

Inhalation:
Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.

Notes to Physician:
Treat symptomatically and

## SECTION 5 - FIRE FIGHTING MEASURES

General Information:
Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Use water with caution and in flooding amounts. Contact with moisture or water may generate sufficient heat to ignite nearby combustible materials.

Extinguishing Media:
For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.

Autoignition Temperature:Not available.
Flash Point: Not available.
Explosion Limits, lower:Not available.
Explosion Limits, upper:Not available.
NFPA Rating:

## SECTION 6 - ACCIDENTAL RELEASE MEASURES

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:

Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions.

## SECTION 7 - HANDLING and STORAGE

Handling:

Wash thoroughly after handling. Use with adequate ventilation. Do not allow water to get into the container because of violent reaction. Do not get in eyes, on skin, or on clothing. Do not ingest or inhale. Use only in a chemical fume hood.

Storage:

Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Store under nitrogen.

## SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Controls:

Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

| Chemical Name | ACGIH | NIOSH | OSHA - Final PELs |
|---|---|---|---|
| Sodium hydroxide | 2 mg/m3 Ceiling | 10 mg/m3 IDLH | 2 mg/m3 TWA |

OSHA Vacated PELs:

Sodium hydroxide:
No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:
Wear chemical goggles.
Skin:
Wear appropriate protective gloves to prevent skin exposure.
Clothing:
Wear appropriate protective clothing to prevent skin exposure.
Respirators:
Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Always use a NIOSH or European Standard EN 149 approved respirator when necessary.

## SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

| | |
|---|---|
| Physical State: | Pellets |
| Color: | white |
| Odor: | odorless |
| pH: | Not available. |
| Vapor Pressure: | 1mbar @700 deg C |
| Vapor Density: | Not available. |
| Evaporation Rate: | Not available. |
| Viscosity: | Not available. |
| Boiling Point: | 1390 deg C @760mmHg |
| Freezing/Melting Point: | 318 deg C |
| Decomposition Temperature: | |
| Solubility in water: | Freely Soluble. |
| Specific Gravity/Density: | 2.130 |
| Molecular Formula: | HNaO |
| Molecular Weight: | 40 |

## SECTION 10 - STABILITY AND REACTIVITY

Chemical Stability:
Stable at room temperature in closed containers under normal storage and handling conditions. Absorbs carbon dioxide from the air. Air

sensitive. Hygroscopic: absorbs moisture or water from the air.

Conditions to Avoid:

Incompatible materials, exposure to air, acids, exposure to moist air or water.

Incompatibilities with Other Materials:

Water, acids, aluminum, carbon dioxide, steel, zinc, tin, hydrogen sulfide.

Hazardous Decomposition Products:

Toxic fumes of sodium oxide, hydrogen gas, sodium peroxide fumes.

Hazardous Polymerization: Will not occur.

## SECTION 11 - TOXICOLOGICAL INFORMATION

RTECS#:

CAS# 1310-73-2: WB4900000

LD50/LC50:

CAS# 1310-73-2: Draize test, rabbit, eye: 400 ug Mild; Draize test, rabbit, eye: 1% Severe; Draize test, rabbit, eye: 50 ug/24H Severe; Draize test, rabbit, eye: 1 mg/24H Severe; Draize test, rabbit, skin: 500 mg/24H Severe.

Oral, rabbit: LDL0 = 500 mg/kg

rabbit: 1mg/30s severe

Carcinogenicity:

Sodium hydroxide -

Not listed by ACGIH, IARC, or NTP.

Epidemiology:

No data available.

Teratogenicity:

No data available.

Reproductive Effects:

No data available.

Neurotoxicity:

No data available.

Mutagenicity:

No data available.

Other Studies:

See actual entry in RTECS for complete information. The toxicological properties have not been fully investigated.

## SECTION 12 - ECOLOGICAL INFORMATION

## SECTION 13 - DISPOSAL CONSIDERATIONS

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste.
US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

## SECTION 14 - TRANSPORT INFORMATION

US DOT
Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN Number: UN1823
Packing Group: II
Canadian TDG
No information available.
USA RQ:CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ

## SECTION 15 - REGULATORY INFORMATION

US FEDERAL
TSCA
CAS# 1310-73-2 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA
CERCLA Hazardous Substances and corresponding RQs
CAS# 1310-73-2: 1000 lb final RQ; 454 kg final RQ

SARA Section 302 Extremely Hazardous Substances
None of the chemicals in this product have a TPQ.
SARA Codes
CAS # 1310-73-2: acute, reactive.
Section 313
No chemicals are reportable under Section 313.

Clean Air Act:
This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:
CAS# 1310-73-2 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

Sodium hydroxide can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level:
None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives
Hazard Symbols: C
Risk Phrases:
R 35 Causes severe burns.
Safety Phrases:
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 37/39 Wear suitable gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

WGK (Water Danger/Protection)
CAS# 1310-73-2: 1

United Kingdom Occupational Exposure Limits
CAS# 1310-73-2: OES-United Kingdom, STEL 2 mg/m3 STEL

United Kingdom Maximum Exposure Limits

Canada
CAS# 1310-73-2 is listed on Canada's DSL List.
WHMIS: Not available.
CAS# 1310-73-2 is listed on Canada's Ingredient Disclosure List.

Exposure Limits
CAS# 1310-73-2: OEL-AUSTRALIA:TWA 2 mg/m3
OEL-BELGIUM:STEL 2 mg/m3

OEL-DENMARK:TWA 2 mg/m3
OEL-FINLAND:TWA 2 mg/m3
OEL-FRANCE:TWA 2 mg/m3
OEL-GERMANY:TWA 2 mg/m3
OEL-JAPAN:STEL 2 mg/m3
OEL-THE NETHERLANDS:TWA 2 mg/m3
OEL-THE PHILIPPINES:TWA 2 mg/m3
OEL-SWEDEN:TWA 2 mg/m3
OEL-SWITZERLAND:TWA 2 mg/m3;STEL 4 mg/m3
OEL-THAILAND:TWA 2 mg/m3
OEL-TURKEY:TWA 2 mg/m3
OEL-UNITED KINGDOM:TWA 2 mg/m3;STEL 2 mg/m3
OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV
OEL IN NEW ZEALAND, SINGAPORE, VIETNAM check ACGI TLV

## SECTION 16 - ADDITIONAL INFORMATION

MSDS Creation Date: 7/16/1996 Revision #3 Date: 9/22/2004

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 way shall the company 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 the company has been advised of the possibility of such damages.

---

**AIR LIQUIDE**
**METHANE Revised: 07/31/2002**

**MSDS Contents**


1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION
2 COMPOSITION/INFORMATION ON INGREDIENTS
3 HAZARDS IDENTIFICATION
4 FIRST AID MEASURES
5 FIRE FIGHTING MEASURES
6 ACCIDENTAL RELEASE MEASURES
7 HANDLING AND STORAGE
8 EXPOSURE CONTROLS/PERSONAL PROTECTION
9 PHYSICAL AND CHEMICAL PROPERTIES
10 STABILITY AND REACTIVITY
11 TOXICOLOGICAL INFORMATION
12 ECOLOGICAL INFORMATION
13 DISPOSAL CONSIDERATIONS
14 TRANSPORT INFORMATION
15 REGULATORY INFORMATION
16 OTHER INFORMATION


AL
AIR LIQUIDE(TM)

SAFETY DATA SHEET

PRODUCT: METHANE

MSDS NR: 078A_AL

VERSION: 1.01

DATE: 31/07/2002

## 1 IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY

MSDS NR: 078A_AL

PRODUCT NAME: METHANE

CHEMICAL FORMULA: CH4

COMPANY IDENTIFICATION:
AIR LIQUIDE S.A.
75 QUAL D'ORSAY, PARIS
FRANCE

SEE PARAGRAPH 16 "OTHER INFORMATION"

EMERGENCY PHONE NUMBERS:
SEE HEADING AND/OR FOOTER ON ORIGINAL MSDS
SEE PARAGRAPH 16 "OTHER INFORMATION"

## 2 COMPOSITION/INFORMATION ON INGREDIENTS

SUBSTANCE/PREPARATION: SUBSTANCE.

COMPONENTS/IMPURITIES:
CONTAINS NO OTHER COMPONENTS OR IMPURITIES WHICH WILL INFLUENCE THE CLASSIFICATION OF THE PRODUCT.

CAS NR: 00074-82-8

EEC NR (FROM EINECS): 200-812-7

## 3 HAZARDS IDENTIFICATION

HAZARDS IDENTIFICATION:
COMPRESSED GAS
EXTREMELY FLAMMABLE

## 4 FIRST AID MEASURES

INHALATION:
IN HIGH CONCENTRATIONS MAY CAUSE ASPHYXIATION. SYMPTOMS MAY INCLUDE LOSS OF
MOBILITY/CONSCIOUSNESS. VICTIM MAY NOT BE AWARE OF ASPHYXIATION.
IN LOW CONCENTRATIONS MAY CAUSE NARCOTIC EFFECTS. SYMPTOMS MAY INCLUDE DIZZINESS, HEADACHE, NAUSEA AND LOSS OF CO-ORDINATION.
REMOVE VICTIM TO UNCONTAMINATED AREA WEARING SELF CONTAINED BREATHING APPARATUS. KEEP VICTIM WARM AND RESTED. CALL A DOCTOR. APPLY ARTIFICIAL RESPIRATION IF BREATHING STOPPED.

## 5 FIRE FIGHTING MEASURES

SPECIFIC HAZARDS: EXPOSURE TO FIRE MAY CAUSE CONTAINERS TO RUPTURE/EXPLODE.

HAZARDOUS COMBUSTION PRODUCTS:
INCOMPLETE COMBUSTION MAY FORM CARBON MONOXIDE.

SUITABLE EXTINGUISHING MEDIA: ALL KNOWN EXTINGUISHANTS CAN BE USED.

SPECIFIC METHODS:
IF POSSIBLE, STOP FLOW OF PRODUCT.

MOVE AWAY FROM THE CONTAINER AND COOL WITH WATER FROM A PROTECTED POSITION.
DO NOT EXTINGUISH A LEAKING GAS FLAME UNLESS ABSOLUTELY NECESSARY.
SPONTANEOUS/EXPLOSIVE RE-IGNITION MAY OCCUR. EXTINGUISH ANY OTHER FIRE.

SPECIAL PROTECTIVE EQUIPMENT FOR FIRE FIGHTERS:
IN CONFINED SPACE USE SELF-CONTAINED BREATHING APPARATUS.

## 6 ACCIDENTAL RELEASE MEASURES

PERSONAL PRECAUTIONS:
WEAR SELF-CONTAINED BREATHING APPARATUS WHEN ENTERING AREA UNLESS ATMOSPHERE
IS PROVED TO BE SAFE.
EVACUATE AREA.
ENSURE ADEQUATE AIR VENTILATION.
ELIMINATE IGNITION SOURCES.

ENVIRONMENTAL PRECAUTIONS: TRY TO STOP RELEASE.

CLEAN UP METHODS: VENTILATE AREA.

## 7 HANDLING AND STORAGE

HANDLING AND STORAGE:
ENSURE EQUIPMENT IS ADEQUATELY EARTHED.
SUCK BACK OF WATER INTO THE CONTAINER MUST BE PREVENTED.
PURGE AIR FROM SYSTEM BEFORE INTRODUCING GAS.
DO NOT ALLOW BACKFEED INTO THE CONTAINER.
USE ONLY PROPERLY SPECIFIED EQUIPMENT WHICH IS SUITABLE FOR THIS PRODUCT, ITS
SUPPLY PRESSURE AND TEMPERATURE. CONTACT YOUR GAS SUPPLIER IF IN DOUBT.
KEEP AWAY FROM IGNITION SOURCES (INCLUDING STATIC DISCHARGES).
SEGREGATE FROM OXIDANT GASES AND OTHER OXIDANTS IN STORE.
REFER TO SUPPLIER'S CONTAINER HANDLING INSTRUCTIONS.
KEEP CONTAINER BELOW 50 DEG. C IN A WELL VENTILATED PLACE.

## 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

PERSONAL PROTECTION:
ENSURE ADEQUATE VENTILATION.
DO NOT SMOKE WHILE HANDLING PRODUCT.

## 9 PHYSICAL AND CHEMICAL PROPERTIES

MOLECULAR WEIGHT: 16

MELTING POINT: -182 DEG. C

BOILING POINT: -161 DEG. C

CRITICAL TEMPERATURE: -82 DEG. C

RELATIVE DENSITY, GAS: 0.6 (AIR=1)

RELATIVE DENSITY, LIQUID: 0.42 (WATER=1)

VAPOUR PRESSURE 20 DEG. C: NOT APPLICABLE.

SOLUBILITY MG/L WATER: 26 MG/L

APPEARANCE/COLOUR: COLOURLESS GAS

ODOUR: NONE

AUTOIGNITION TEMPERATURE: 595 DEG. C

FLAMMABILITY RANGE: 5-15 VOL% IN AIR.

## 10 STABILITY AND REACTIVITY

STABILITY AND REACTIVITY:
CAN FORM EXPLOSIVE MIXTURE WITH AIR.
MAY REACT VIOLENTLY WITH OXIDANTS.

## 11 TOXICOLOGICAL INFORMATION

GENERAL: NO KNOWN TOXICOLOGICAL EFFECTS FROM THIS PRODUCT.

## 12 ECOLOGICAL INFORMATION

GENERAL: NO KNOWN ECOLOGICAL DAMAGE CAUSED BY THIS PRODUCT.

GLOBAL WARMING FACTOR: 21

## 13 DISPOSAL CONSIDERATIONS

GENERAL:
DO NOT DISCHARGE INTO AREAS WHERE THERE IS A RISK OF FORMING AN EXPLOSIVE
MIXTURE WITH AIR.
WASTE GAS SHOULD BE FLARED THROUGH A SUITABLE BURNER WITH FLASH BACK ARRESTOR.

DO NOT DISCHARGE INTO ANY PLACE WHERE ITS ACCUMULATION COULD BE DANGEROUS.
CONTACT SUPPLIER IF GUIDANCE IS REQUIRED.

## 14 TRANSPORT INFORMATION

PROPER SHIPPING NAME: METHANE, COMPRESSED

UN NR: 1971

CLASS/DIV: 2.1

ADR/RID CLASSIFICATION CODE: 2, 1 DEG. F

ADR/RID HAZARD NR: 23

LABELLING ADR:
LABEL 3: FLAMMABLE GAS

OTHER TRANSPORT INFORMATION:
AVOID TRANSPORT ON VEHICLES WHERE THE LOAD SPACE IS NOT SEPARATED FROM THE
DRIVER'S COMPARTMENT.
ENSURE VEHICLE DRIVER IS AWARE OF THE POTENTIAL HAZARDS OF THE LOAD AND KNOWS
WHAT TO DO IN THE EVENT OF AN ACCIDENT OR AN EMERGENCY.
BEFORE TRANSPORTING PRODUCT CONTAINERS ENSURE THAT THEY ARE FIRMLY SECURED
AND:
CYLINDER VALVE IS CLOSED AND NOT LEAKING
VALVE OUTLET CAP NUT OR PLUG (WHERE PROVIDED) IS CORRECTLY FITTED
VALVE PROTECTION DEVICE (WHERE PROVIDED) IS CORRECTLY FITTED
THERE IS ADEQUATE VENTILATION.
COMPLIANCE WITH APPLICABLE REGULATIONS.

## 15 REGULATORY INFORMATION

NUMBER IN ANNEX I OF DIR 67/548: 601-001-00-4.

EC CLASSIFICATION: F+; R12

SYMBOLS:
F+: EXTREMELY FLAMMABLE

RISK PHRASES:
R12: EXTREMELY FLAMMABLE.

SAFETY PHRASES:
S9: KEEP CONTAINER IN WELL VENTILATED PLACE.
S16: KEEP AWAY FROM IGNITION SOURCES - NO SMOKING.
S33: TAKE PRECAUTIONARY MEASURES AGAINST STATIC DISCHARGES.

## 16 OTHER INFORMATION

ENSURE ALL NATIONAL/LOCAL REGULATIONS ARE OBSERVED.
ENSURE OPERATORS UNDERSTAND THE FLAMMABILITY HAZARD.
THE HAZARD OF ASPHYXIATION IS OFTEN OVERLOOKED AND MUST BE STRESSED DURING
OPERATOR TRAINING.
BEFORE USING THIS PRODUCT IN ANY NEW PROCESS OR EXPERIMENT, A THOROUGH MATERIAL COMPATIBILITY AND SAFETY STUDY SHOULD BE CARRIED OUT.
DETAILS GIVEN IN THIS DOCUMENT ARE BELIEVED TO BE CORRECT AT THE TIME OF
GOING TO PRESS. WHILST PROPER CARE HAS BEEN TAKEN IN THE PREPARATION OF THIS
DOCUMENT, NO LIABILITY FOR INJURY OR DAMAGE RESULTING FROM ITS USE CAN BE
ACCEPTED.
THIS SAFETY DATA SHEET HAS BEEN ESTABLISHED IN ACCORDANCE WITH THE APPLICABLE
EUROPEAN DIRECTIVES AND APPLIES TO ALL COUNTRIES THAT HAVE TRANSLATED THE
DIRECTIVES IN THEIR NATIONAL LAWS.
THIS MSDS IS FOR INFORMATION PURPOSES ONLY AND IS SUBJECT TO CHANGE WITHOUT
NOTICE. (PRIOR TO PURCHASE OF PRODUCTS, PLEASE CONTACT YOUR LOCAL AIR LIQUIDE
OFFICE FOR A COMPLETE MSDS (WITH MANUFACTURER'S NAME AND EMERGENCY PHONE
NUMBER).)

AIR LIQUIDE S.A.
75 QUAL D'ORSAY, PARIS
FRANCE

**MINE SAFETY APPLIANCES**
**MSA P/N 494450 CALIBRATION CHECK GAS, 100 PPM ISOBUTYLENE IN AIR**
**Revised: 03/01/1993**

**MSDS Contents**


PRODUCT IDENTITY
APPLICABLE CHEMICAL CONTENTS
PHYSICAL AND CHEMICAL PROPERTIES
PHYSICAL HAZARD INFORMATION
HEALTH HAZARDS
SAFE HANDLING AND USE
CONTROL MEASURES


MATERIAL SAFETY DATA SHEET
29 CFR 1910.1200 OSHA HAZARD
COMMUNICATION RULE FORMAT


MINE SAFETY APPLIANCES COMPANY
PO BOX 426
PITTSBURGH, PA 15230
PHONE (412) 967-3000


THIS PRODUCT CONTAINS ISOBUTENE, OXYGEN AND NITROGEN, SUBSTANCES SUBJECT TO
THE PENNSYLVANIA WORKER AND COMMUNITY RIGHT-TO-KNOW ACT.

## PRODUCT IDENTITY

LABEL IDENTITY - MSA P/N 494450 CALIBRATION CHECK GAS, 100 PPM ISOBUTYLENE
IN AIR

CHEMICAL NAME - ISOBUTENE, OXYGEN, NITROGEN MIXTURE

ADDITIONAL IDENTITIES - MSA P/N 494450 CALIBRATION GAS

FORMULA - C4H8 IN AIR

## APPLICABLE CHEMICAL CONTENTS

| | PPM | TWA |
|---|---|---|
| ISOBUTENE (CAS 115-11-7) | 100 | NONE |
| AIR | BALANCE | NONE |

NOTE: GAS UNDER PRESSURE, 1000 PSIG AT 70 DEG. F
APPROX. 100 LITERS GAS AT ATMOSPHERIC PRESSURE

## PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE AND ODOR - COLORLESS GAS, FAINT ODOR
BOILING POINT - N/A SPECIFIC GRAVITY (H2O = 1) - N/A
VAPOR PRESSURE - N/A PERCENT VOLATILE BY VOLUME - N/A
VAPOR DENSITY (AIR = 1) - > 1
SOLUBILITY IN WATER - ISOBUTYLENE -- INSOLUBLE
OXYGEN -- 3.2 CM3/100 ML (25 DEG. C)
NITROGEN -- 2.3 CM3/100 ML (0 DEG. C)

## PHYSICAL HAZARD INFORMATION

PHYSICAL HAZARD - COMPRESSED GAS 1000 PSIG AT 70 DEG. F

CONDITIONS OR MATERIALS TO AVOID - NONE

FLASH POINT - N/A LEL N/A UEL N/A

EXTINGUISHING MEDIA - THIS CALIBRATION GAS MIXTURE IS NOT FLAMMABLE

SPECIAL FIRE FIGHTING PROCEDURES - SEE NEXT ITEM

UNUSUAL FIRE AND EXPLOSION HAZARDS - GAS UNDER PRESSURE, 1000 PSIG AT 70
DEG. F. DO NOT EXCEED 120 DEG. F.

## HEALTH HAZARDS

HEALTH HAZARDS - NONE KNOWN FOR 100 PPM ISOBUTYLENE IN AIR.
ISOBUTYLENE INHALATION RAT LC50: 620 GM/M3/4H
ISOBUTYLENE INHALATION MOUSE LC50: 415 GM/M3/2H

SIGNS AND SYMPTOMS OF EXPOSURE - N/A TO THIS GAS MIXTURE.

PRIMARY ROUTES OF ENTRY - INHALATION

TARGET ORGANS - NO INFORMATION. ISOBUTYLENE IS AN ASPHYXIANT AND A WEAK
ANESTHETIC.

MEDICAL CONDITIONS GENERALLY RECOGNIZED AS BEING AGGRAVATED BY
EXPOSURE - NO INFORMATION

EXPOSURE LIMITS - NONE (ACGIH 1992-93)

CARCINOGENICITY DATA - COMPONENT GASES ARE NOT LISTED BY NIOSH RTECS, OSHA, NTP OR IARC.

EMERGENCY AND FIRST AID PROCEDURES - NONE

## SAFE HANDLING AND USE

HYGIENIC PRACTICES - AVOID BREATHING GAS

PROTECTIVE MEASURES DURING REPAIR AND MAINTENANCE OF CONTAMINATED EQUIPMENT - N/A

PROCEDURES FOR SPILL OR LEAK CLEANUP - VENTILATE AREA

WASTE DISPOSAL - DO NOT PUNCTURE OR INCINERATE CYLINDER. BEFORE DISCARDING CYLINDER, SLOWLY RELEASE CONTENTS TO A SAFE EXHAUST.

STORAGE - STORE IN A COOL, DRY, WELL-VENTILATED AREA. DO NOT EXCEED 120
DEG. F.

## CONTROL MEASURES

PERSONAL PROTECTIVE EQUIPMENT - DUE TO THE LIMITED AMOUNT OF GAS IN THE CYLINDER, AND THE LOW RELEASE RATE EMPLOYED IN INSTRUMENT CALIBRATION, RESPIRATORY PROTECTION IS NOT INDICATED UNDER CONDITIONS OF INTENDED USE.

ENGINEERING CONTROLS - NONE

WORK PRACTICES - USE IN WELL-VENTILATED AREAS. FOLLOW THE CALIBRATION PROCEDURE DETAILED IN THE MSA INSTRUCTION MANUAL PROVIDED WITH THE INSTRUMENT UNDER CALIBRATION.

DATE OF PREPARATION - REV. 1, MARCH 1993

THE INFORMATION PROVIDED HEREIN HAS BEEN COMPILED FROM SOURCES BELIEVED TO
BE RELIABLE. HOWEVER, MINE SAFETY APPLIANCES COMPANY MAKES NO WARRANTY AS
TO THE ACCURACY, COMPLETENESS, OR SUFFICIENCY OF THE INFORMATION AND IN NO
EVENT WILL MINE SAFETY APPLIANCES COMPANY BE RESPONSIBLE FOR LOSS OR DAMAGE OF ANY NATURE WHATSOEVER RESULTING FROM USE OF THE INFORMATION.

N/A - NOT APPLICABLE

**AIR LIQUIDE AMERICA**
**HYDROGEN Revised: 08/31/2005**

**MSDS Contents**


1. PRODUCT AND COMPANY INFORMATION
2. HAZARD IDENTIFICATION
3. COMPOSITION AND INFORMATION ON INGREDIENTS
4. FIRST-AID MEASURES
5. FIRE-FIGHTING MEASURES
6. ACCIDENTAL RELEASE MEASURES
7. HANDLING AND STORAGE
8. EXPOSURE CONTROLS - PERSONAL PROTECTION
9. PHYSICAL AND CHEMICAL PROPERTIES
10. STABILITY AND REACTIVITY
11. TOXICOLOGICAL INFORMATION
12. ECOLOGICAL INFORMATION
13. DISPOSAL CONSIDERATIONS
14. TRANSPORTATION INFORMATION
15. REGULATORY INFORMATION
16. OTHER INFORMATION


AL
AIR LIQUIDE(TM)

MATERIAL SAFETY DATA SHEET

PREPARED TO U.S. OSHA, CMA, ANSI AND CANADIAN WHMIS STANDARDS

## 1. PRODUCT AND COMPANY INFORMATION

CHEMICAL NAME; CLASS: HYDROGEN

SYNONYMS: HYDROGEN, COMPRESSED; MOLECULAR HYDROGEN

CHEMICAL FAMILY: FLAMMABLE GAS

FORMULA: H2

DOCUMENT NUMBER: 10050

PRODUCT USE: FOR GENERAL ANALYTICAL/SYNTHETIC CHEMICAL USES.

MANUFACTURED/SUPPLIED FOR:
AL
AIR LIQUIDE(TM)

ADDRESS:
2700 POST OAK DRIVE
HOUSTON, TX 77056-8229

EMERGENCY PHONE:
CHEMTREC: 1 -800-424-9300

BUSINESS PHONE:
GENERAL MSDS INFORMATION: 1-713/896-2896

FAX ON DEMAND: 1-800/231-1366

## 2. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW:
HYDROGEN IS A COLORLESS, ODORLESS, FLAMMABLE GAS. HYDROGEN POSES A SERIOUS FIRE HAZARD WHEN IT IS ACCIDENTALLY RELEASED. THE MAIN HEALTH HAZARD ASSOCIATED WITH RELEASES OF THIS GAS IS ASPHYXIATION, BY DISPLACEMENT OF OXYGEN. FLAME OR HIGH TEMPERATURE IMPINGING ON A LOCALIZED AREA OF THE CYLINDER OF HYDROGEN CAN CAUSE THE CYLINDER TO RUPTURE OR BURST WITHOUT ACTIVATING THE CYLINDER'S RELIEF DEVICES. PROVIDE ADEQUATE FIRE PROTECTION DURING EMERGENCY RESPONSE SITUATIONS.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE:
THE MOST SIGNIFICANT ROUTE OF OVER-EXPOSURE FOR HYDROGEN IS BY INHALATION.

INHALATION:
HIGH CONCENTRATIONS OF THIS GAS CAN CAUSE AN OXYGEN-DEFICIENT ENVIRONMENT. IT SHOULD BE NOTED THAT BEFORE SUFFOCATION COULD OCCUR, THE LOWER FLAMMABILITY LIMIT OF HYDROGEN IN AIR WOULD BE EXCEEDED; POSSIBLY CAUSING AN OXYGEN-DEFICIENT AND EXPLOSIVE ATMOSPHERE. INDIVIDUALS BREATHING AN OXYGEN DEFICIENT ATMOSPHERE MAY EXPERIENCE SYMPTOMS WHICH INCLUDE HEADACHES, RINGING IN EARS, DIZZINESS, DROWSINESS, UNCONSCIOUSNESS, NAUSEA, VOMITING, AND DEPRESSION OF ALL THE SENSES. UNDER SOME CIRCUMSTANCES OF OVER-EXPOSURE, DEATH MAY OCCUR. THE FOLLOWING EFFECTS ASSOCIATED WITH VARIOUS LEVELS OF OXYGEN ARE AS FOLLOWS:

| CONCENTRATION | SYMPTOM OF EXPOSURE |
|---|---|
| 12-16% OXYGEN | BREATHING AND PULSE RATE INCREASED, MUSCULAR COORDINATION SLIGHTLY DISTURBED. |
| 10-14% OXYGEN | EMOTIONAL UPSET, ABNORMAL FATIGUE, DISTURBED RESPIRATION. |
| 6-10% OXYGEN | NAUSEA AND VOMITING, COLLAPSE OR LOSS OF CONSCIOUSNESS. |

BELOW 6% CONVULSIVE MOVEMENTS, POSSIBLE RESPIRATORY COLLAPSE, AND DEATH.

HEALTH EFFECTS OR RISKS FROM EXPOSURE:
AN EXPLANATION IN LAY TERMS. OVER-EXPOSURE TO THIS GAS MIXTURE MAY CAUSE THE FOLLOWING HEALTH EFFECTS:

ACUTE:
THE MOST SIGNIFICANT HAZARD ASSOCIATED WITH HYDROGEN IS INHALATION OF OXYGEN-DEFICIENT ATMOSPHERES. SYMPTOMS OF OXYGEN DEFICIENCY INCLUDE RESPIRATORY DIFFICULTY, RINGING IN EARS, HEADACHES, SHORTNESS OF BREATH, WHEEZING, HEADACHE, DIZZINESS, INDIGESTION, NAUSEA, AND, AT HIGH CONCENTRATIONS, UNCONSCIOUSNESS OR DEATH MAY OCCUR. THE SKIN OF A VICTIM OF OVER-EXPOSURE MAY HAVE A BLUE COLOR.

CHRONIC:
THERE ARE CURRENTLY NO KNOWN ADVERSE HEALTH EFFECTS ASSOCIATED WITH CHRONIC EXPOSURE TO THE COMPONENTS OF THIS COMPRESSED GAS.

TARGET ORGANS: RESPIRATORY SYSTEM.

## 3. COMPOSITION AND INFORMATION ON INGREDIENTS

| CHEMICAL NAME | CAS# | MOLE % |
|---|---|---|
| HYDROGEN | 1333-74-0 | 99.9% |
| MAXIMUM IMPURITIES | | <0.1% |

| CHEMICAL NAME | EXPOSURE LIMITS IN AIR | | | | |
|---|---|---|---|---|---|
| | ACGIH | | OSHA | | OTHER |
| | TLV PPM | STEL PPM | PEL PPM | STEL PPM | IDLH PPM |
| HYDROGEN | THERE ARE NO SPECIFIC EXPOSURE LIMITS FOR HYDROGEN. HYDROGEN IS A SIMPLE ASPHYXIANT (SA). OXYGEN LEVELS SHOULD BE MAINTAINED ABOVE 19.5%. | | | | |
| MAXIMUM IMPURITIES | NONE OF THE TRACE IMPURITIES IN HYDROGEN CONTRIBUTE SIGNIFICANTLY TO THE HAZARDS ASSOCIATED WITH THE PRODUCT. ALL HAZARD INFORMATION PERTINENT TO HYDROGEN HAS BEEN PROVIDED IN THIS MATERIAL SAFETY DATA SHEET, | | | | |

PER THE REQUIREMENTS OF THE OSHA HAZARD COMMUNICATION STANDARD (29 CFR 1910.1200) AND STATE EQUIVALENTS STANDARDS.

THIS MATERIAL IS CLASSIFIED AS HAZARDOUS UNDER OSHA REGULATIONS IN THE UNITED STATES AND THE WHMIS IN CANADA.

NE = NOT ESTABLISHED
C = CEILING LIMIT

NOTE:
ALL WHMIS REQUIRED INFORMATION IS INCLUDED. IT IS LOCATED IN APPROPRIATE SECTIONS BASED ON THE ANSI Z400.1-2004 FORMAT.

## 4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO HYDROGEN WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. AT A MINIMUM, SELF-CONTAINED BREATHING APPARATUS AND FIRE-RETARDANT PERSONAL PROTECTIVE EQUIPMENT SHOULD BE WORN. ADEQUATE FIRE PROTECTION MUST BE PROVIDED DURING RESCUE SITUATIONS.

REMOVE VICTIM(S) TO FRESH AIR, AS QUICKLY AS POSSIBLE. TRAINED PERSONNEL SHOULD ADMINISTER SUPPLEMENTAL OXYGEN AND/OR CARDIO-PULMONARY RESUSCITATION, IF NECESSARY. ONLY TRAINED PERSONNEL SHOULD ADMINISTER SUPPLEMENTAL OXYGEN.

VICTIM(S) MUST BE TAKEN FOR MEDICAL ATTENTION. RESCUERS SHOULD BE TAKEN FOR MEDICAL ATTENTION, IF NECESSARY. TAKE COPY OF LABEL AND MSDS TO PHYSICIAN OR OTHER HEALTH PROFESSIONAL WITH VICTIM(S).

## 5. FIRE-FIGHTING MEASURES

FLASH POINT: NOT APPLICABLE; FLAMMABLE GAS.

AUTOIGNITION TEMPERATURE: 565.5 DEG. C (1050 DEG. F)

FLAMMABLE LIMITS (IN AIR BY VOLUME, %):
LOWER (LEL): 4.0%
UPPER (UEL): 75%.

FIRE EXTINGUISHING MATERIALS:

EXTINGUISH HYDROGEN FIRES BY SHUTTING-OFF THE SOURCE OF THE GAS. USE WATER
SPRAY TO COOL FIRE-EXPOSED CONTAINERS, STRUCTURES, AND EQUIPMENT.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
AN EXTREME EXPLOSION HAZARD EXISTS IN AREAS IN WHICH THE GAS HAS BEEN RELEASED, BUT THE MATERIAL HAS NOT YET IGNITED. HYDROGEN BURNS WITH AN ALMOST INVISIBLE BLUE FLAME.

DANGER!
FIRES IMPINGING (DIRECT FLAME) ON THE OUTSIDE SURFACE OF UNPROTECTED CYLINDERS OF HYDROGEN CAN BE VERY DANGEROUS. EXPOSURE TO FIRE COULD CAUSE A
CATASTROPHIC FAILURE OF THE CYLINDER RELEASING THE CONTENTS INTO A FIREBALL
AND EXPLOSION OF RELEASED GAS. THE RESULTING FIRE AND EXPLOSION CAN RESULT
IN SEVERE EQUIPMENT DAMAGE AND PERSONNEL INJURY OR DEATH OVER A LARGE AREA
AROUND THE CYLINDER. FOR MASSIVE FIRES IN LARGE AREAS, USE UNMANNED HOSE
HOLDER OR MONITOR NOZZLES; IF THIS IS NOT POSSIBLE, WITHDRAW FROM AREA AND
ALLOW FIRE TO BURN.

EXPLOSION SENSITIVITY TO MECHANICAL IMPACT: NOT SENSITIVE.

EXPLOSION SENSITIVITY TO STATIC DISCHARGE:
STATIC DISCHARGE MAY CAUSE THIS GAS TO IGNITE EXPLOSIVELY. DUE TO LOW ELECTRICAL CONDUCTIVITY, THIS SUBSTANCE CAN GENERATE ELECTROSTATIC CHARGES
DURING HANDLING OPERATIONS.

SPECIAL FIRE-FIGHTING PROCEDURES:
STRUCTURAL FIRE-FIGHTERS MUST WEAR SELF-CONTAINED BREATHING APPARATUS AND
FULL PROTECTIVE EQUIPMENT. THE BEST FIRE-FIGHTING TECHNIQUE MAY BE SIMPLY
TO LET THE BURNING GAS ESCAPE FROM THE CYLINDER OR PIPELINE. STOP THE LEAK
BEFORE EXTINGUISHING FIRE. IF THE FIRE IS EXTINGUISHED BEFORE THE LEAK IS
SEALED, THE STILL-LEAKING GAS COULD EXPLOSIVELY RE-IGNITE WITHOUT WARNING
AND CAUSE EXTENSIVE DAMAGE, INJURY, OR FATALITY. IN THIS CASE, INCREASE VENTILATION TO PREVENT FLAMMABLE OR EXPLOSIVE MIXTURE FORMATION. EVACUATION
MAY BE NECESSARY. THE NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK (GUIDE
#115) RECOMMENDS 0.5 MILES.

## 6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE:

EVACUATE IMMEDIATE AREA. UNCONTROLLED RELEASES SHOULD BE RESPONDED TO BY TRAINED PERSONNEL USING PRE-PLANNED PROCEDURES. PROPER PROTECTIVE EQUIPMENT SHOULD BE USED. IN CASE OF A GAS RELEASE, CLEAR THE AFFECTED AREA, PROTECT PEOPLE, AND RESPOND WITH TRAINED PERSONNEL.

ELIMINATE ANY POSSIBLE SOURCES OF IGNITION, AND PROVIDE MAXIMUM EXPLOSION-PROOF VENTILATION. IF THE GAS IS LEAKING FROM CYLINDER OR VALVE, CONTACT THE SUPPLIER. ADEQUATE FIRE PROTECTION MUST BE PROVIDED. USE ONLY NON-SPARKING TOOLS AND EQUIPMENT DURING THE RESPONSE.

MINIMUM PERSONAL PROTECTIVE EQUIPMENT SHOULD BE LEVEL B: FIRE-RETARDANT PROTECTIVE CLOTHING, GLOVES AND SELF-CONTAINED BREATHING APPARATUS. USE ONLY NON-SPARKING TOOLS AND EQUIPMENT. LOCATE AND SEAL THE SOURCE OF THE LEAKING GAS. PROTECT PERSONNEL ATTEMPTING THE SHUT-OFF WITH WATER-SPRAY. ALLOW THE GAS, WHICH IS LIGHTER THAN AIR, TO DISSIPATE. COMBUSTIBLE GAS CONCENTRATION MUST BE BELOW 10% OF THE LEL (4.0%) PRIOR TO ENTRY. MONITOR THE SURROUNDING AREA FOR COMBUSTIBLE GAS LEVELS AND OXYGEN LEVEL. THE ATMOSPHERE MUST HAVE AT LEAST 19.5 PERCENT OXYGEN BEFORE PERSONNEL CAN BE ALLOWED IN THE AREA WITHOUT SELF-CONTAINED BREATHING APPARATUS. ATTEMPT TO CLOSE THE MAIN SOURCE VALVE PRIOR TO ENTERING THE AREA. IF THIS DOES NOT STOP THE RELEASE (OR IF IT IS NOT POSSIBLE TO REACH THE VALVE), ALLOW THE GAS TO RELEASE IN-PLACE OR REMOVE IT TO A SAFE AREA, AWAY FROM SOURCES OF IGNITION, AND ALLOW THE GAS TO BE RELEASED THERE.

THIS IS AN EXTREMELY FLAMMABLE GAS. PROTECTION OF ALL PERSONNEL AND THE AREA MUST BE MAINTAINED.

## 7. HANDLING AND STORAGE

WORK PRACTICES AND HYGIENE PRACTICES:
BE AWARE OF ANY SIGNS OF DIZZINESS OR FATIGUE; EXPOSURES TO FATAL CONCENTRATIONS OF HYDROGEN COULD OCCUR WITHOUT ANY SIGNIFICANT WARNING SYMPTOMS. NON-SPARKING TOOLS SHOULD BE USED.

STORAGE AND HANDLING PRACTICES:
CYLINDERS SHOULD BE STORED UPRIGHT (WITH VALVE-PROTECTION CAP IN PLACE) AND FIRMLY SECURED TO PREVENT FALLING OR BEING KNOCKED OVER. CYLINDERS CAN BE STORED IN THE OPEN, BUT IN SUCH CASES, SHOULD BE PROTECTED AGAINST EXTREMES OF WEATHER AND FROM THE DAMPNESS OF THE GROUND TO PREVENT RUSTING.

CYLINDERS SHOULD BE STORED IN DRY, WELL-VENTILATED AREAS AWAY FROM SOURCES
OF HEAT, IGNITION AND DIRECT SUNLIGHT. KEEP STORAGE AREA CLEAR OF MATERIALS
WHICH CAN BURN. DO NOT ALLOW AREA WHERE CYLINDERS ARE STORED TO EXCEED
52 DEG. C (125 DEG. F). STORE CONTAINERS AWAY FROM HEAVILY TRAFFICKED AREAS
AND EMERGENCY EXITS. STORE AWAY FROM PROCESS AND PRODUCTION AREAS, AWAY FROM
ELEVATORS, BUILDING AND ROOM EXITS OR MAIN AISLES LEADING TO EXITS. PROTECT
CYLINDERS AGAINST PHYSICAL DAMAGE.

CYLINDERS SHOULD BE SEPARATED FROM OXYGEN CYLINDERS, OR OTHER OXIDIZERS, BY
A MINIMUM DISTANCE OF 20 FT., OR BY A BARRIER OF NON-COMBUSTIBLE MATERIAL AT
LEAST 5 FT. HIGH, HAVING A FIRE-RESISTANCE RATING OF AT LEAST 0.5 HOURS.
ISOLATE FROM OTHER INCOMPATIBLE CHEMICALS (REFER TO SECTION 10, STABILITY
AND REACTIVITY).

STORAGE AREAS MUST MEET NATIONAL ELECTRICAL CODES FOR CLASS 1 HAZARDOUS AREAS.
POST "NO SMOKING OR OPEN FLAMES" SIGNS IN STORAGE OR USE AREAS.
CONSIDER INSTALLATION OF LEAK DETECTION AND ALARM FOR STORAGE AND USE AREAS.
HAVE APPROPRIATE EXTINGUISHING EQUIPMENT IN THE STORAGE AREA (I.E. SPRINKLER
SYSTEM, PORTABLE FIRE EXTINGUISHERS).

KEEP THE SMALLEST AMOUNT NECESSARY ON-SITE AT ANY ONE-TIME. FULL AND EMPTY
CYLINDERS SHOULD BE SEGREGATED. USE A FIRST-IN, FIRST-OUT INVENTORY SYSTEM
TO PREVENT FULL CONTAINERS FROM BEING STORED FOR LONG PERIODS OF TIME.

USE NON-SPARKING VENTILATION SYSTEMS, APPROVED EXPLOSION-PROOF EQUIPMENT,
AND APPROPRIATE ELECTRICAL SYSTEMS. ELECTRICAL EQUIPMENT USED IN GAS-HANDLING
OPERATIONS, OR LOCATED IN STORAGE AREAS, SHOULD BE NON-SPARKING OR EXPLOSION
PROOF. USE A CHECK VALVE IN THE DISCHARGE LINE TO PREVENT HAZARDOUS BACKFLOW.
NEVER TAMPER WITH PRESSURE RELIEF DEVICES IN VALVES AND CYLINDERS.

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS:
COMPRESSED GASES CAN PRESENT SIGNIFICANT SAFETY HAZARDS. THE FOLLOWING RULES
ARE APPLICABLE TO WORK SITUATIONS IN WHICH CYLINDERS ARE BEING USED:

BEFORE USE:
MOVE CYLINDERS WITH A SUITABLE HAND-TRUCK. DO NOT DRAG, SLIDE OR ROLL
CYLINDERS. DO NOT DROP CYLINDERS OR PERMIT THEM TO STRIKE EACH OTHER.

SECURE CYLINDERS FIRMLY. LEAVE THE VALVE PROTECTION CAP (WHERE PROVIDED)
IN-PLACE UNTIL CYLINDER IS READY FOR USE.

DURING USE:
USE DESIGNATED CGA FITTINGS AND OTHER SUPPORT EQUIPMENT. DO NOT USE ADAPTERS.
USE PIPING AND EQUIPMENT ADEQUATELY DESIGNED TO WITHSTAND PRESSURES TO BE
ENCOUNTERED. DO NOT HEAT CYLINDER BY ANY MEANS TO INCREASE THE DISCHARGE RATE
OF THE PRODUCT FROM THE CYLINDER. DO NOT USE OILS OR GREASE ON GAS-HANDLING
FITTINGS OR EQUIPMENT. DO NOT "CRACK" VALVE OPEN BEFORE CONNECTING IT, SINCE
SELF-IGNITION MAY OCCUR. LEAK CHECK SYSTEM WITH LEAK DETECTION SOLUTION, NEVER
WITH FLAME. IMMEDIATELY CONTACT THE SUPPLIER IF THERE ARE ANY DIFFICULTIES
ASSOCIATED WITH OPERATING CYLINDER VALVE. NEVER INSERT AN OBJECT (E.G. WRENCH,
SCREWDRIVER, PRY BAR, ETC.) INTO VALVE CAP OPENINGS. DOING SO MAY DAMAGE
VALVE, CASING A LEAK TO OCCUR. USE AN ADJUSTABLE STRAP WRENCH TO REMOVE
OVER-TIGHT OR RUSTED CAPS. NEVER STRIKE AN ARC ON A COMPRESSED GAS CYLINDER
OR MAKE A CYLINDER PART OF AN ELECTRIC CIRCUIT.

AFTER USE:
CLOSE MAIN CYLINDER VALVE. VALVES SHOULD BE CLOSED TIGHTLY. REPLACE VALVE
PROTECTION CAP. MARK EMPTY CYLINDERS "EMPTY".

NOTE:
USE ONLY DOT OR ASME CODE CONTAINERS DESIGNED FOR FLAMMABLE GAS STORAGE.
EARTH-GROUND AND BOND ALL LINES AND EQUIPMENT ASSOCIATED WITH HYDROGEN.
CLOSE VALVE AFTER EACH USE AND WHEN EMPTY. CYLINDERS MUST NOT BE RECHARGED
EXCEPT BY OR WITH THE CONSENT OF OWNER. FOR ADDITIONAL INFORMATION, REFER TO
NFPA 50A AND OSHA 1910.103.

STANDARD VALVE CONNECTIONS FOR U.S. AND CANADA:

USE THE PROPER CGA CONNECTIONS, DO NOT USE ADAPTERS:

THREADED:
0-3000 PSIG CGA 350
3001-5500 PSIG CGA 695
5501-7500 PSIG CGA 703

PIN-INDEXED YOKE: NOT APPLICABLE.

ULTRA HIGH INTEGRITY: 724.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT:

FOLLOW PRACTICES INDICATED IN SECTION 6 (ACCIDENTAL RELEASE MEASURES). MAKE
CERTAIN APPLICATION EQUIPMENT IS LOCKED AND TAGGED-OUT SAFELY. PURGE GAS
HANDLING EQUIPMENT WITH INERT GAS (I.E. NITROGEN) BEFORE ATTEMPTING REPAIRS.
ALWAYS USE PRODUCT IN AREAS WHERE ADEQUATE VENTILATION IS PROVIDED.

## 8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS:
USE WITH ADEQUATE VENTILATION. PROVIDE NATURAL OR EXPLOSION-PROOF VENTILATION
ADEQUATE TO ENSURE HYDROGEN DOES NOT REACH ITS LOWER FLAMMABILITY LIMIT
OF 4.0%. LOCAL EXHAUST VENTILATION IS PREFERRED, BECAUSE IT PREVENTS
CHEMICAL DISPERSION INTO THE WORK PLACE BY ELIMINATING IT AT ITS SOURCE.
IF APPROPRIATE, INSTALL AUTOMATIC MONITORING EQUIPMENT TO DETECT THE LEVEL
OF FLAMMABLE GAS.

RESPIRATORY PROTECTION:
MAINTAIN OXYGEN LEVELS ABOVE 19.5% IN THE WORKPLACE. USE SUPPLIED AIR
RESPIRATORY PROTECTION IF OXYGEN LEVELS ARE BELOW 19.5% (AIR-PURIFYING
RESPIRATORS WILL NOT FUNCTION) OR DURING EMERGENCY RESPONSE TO A RELEASE OF
HYDROGEN. DURING AN EMERGENCY SITUATION, BEFORE ENTERING THE AREA, CHECK FOR
FLAMMABLE GAS LEVEL AS WELL AS OXYGEN-DEFICIENT ATMOSPHERES. IF RESPIRATORY
PROTECTION IS REQUIRED, FOLLOW THE REQUIREMENTS OF THE FEDERAL OSHA
RESPIRATORY PROTECTION STANDARD (29 CFR 1910.134), OR EQUIVALENT STATE
STANDARDS.

EYE PROTECTION: SAFETY GLASSES.

HAND PROTECTION:
WEAR LEATHER GLOVES WHEN HANDLING CYLINDERS OF HYDROGEN. OTHERWISE, WEAR GLOVE
PROTECTION APPROPRIATE TO THE SPECIFIC OPERATION FOR WHICH HYDROGEN IS USED.

BODY PROTECTION:
USE BODY PROTECTION APPROPRIATE FOR TASK. COTTON CLOTHING IS RECOMMENDED FOR
USE TO PREVENT STATIC ELECTRIC BUILD-UP. SAFETY SHOES ARE RECOMMENDED WHEN
HANDLING CYLINDERS. TRANSFER OF LARGE QUANTITIES UNDER PRESSURE MAY REQUIRE
USE OF FIRE RETARDANT CLOTHING.

## 9. PHYSICAL AND CHEMICAL PROPERTIES

GAS DENSITY @ 21.1 DEG. C (70 DEG. F) AND 1 ATM:
0.00521 LB/FT3 (0.08342 KG/M3)

BOILING POINT @ 1 ATM:
-423.0 DEG. F
-253.0 DEG. C

FREEZING/MELTING POINT @ 1 ATM: -259 DEG. C (-434.6 DEG. F)

SPECIFIC GRAVITY (AIR = 1) @ 21.1 DEG. C (70 DEG. F): 0.069

pH: NOT APPLICABLE.

SOLUBILITY IN WATER VOL/VOL @ 15.6 DEG. C (60 DEG. F): 0.019

MOLECULAR WEIGHT: 2.016

EVAPORATION RATE (nBuAc = 1): NOT APPLICABLE.

EXPANSION RATIO: NOT APPLICABLE.

ODOR THRESHOLD: NOT APPLICABLE

SPECIFIC VOLUME (FT3/LB): 192

VAPOR PRESSURE @ 21.1 DEG. C (70 DEG. F) PSIG: NOT APPLICABLE.

COEFFICIENT WATER/OIL DISTRIBUTION: NOT APPLICABLE.

APPEARANCE AND COLOR:
COLORLESS, ODORLESS GAS AT STANDARD ATMOSPHERE AND TEMPERATURE.

HOW TO DETECT THIS SUBSTANCE (WARNING PROPERTIES):
THERE ARE NO DISTINCT WARNING PROPERTIES. IN TERMS OF LEAK DETECTION, FITTINGS AND JOINTS CAN BE PAINTED WITH A SOAP SOLUTION TO DETECT LEAKS,
WHICH WILL BE INDICATED BY A BUBBLE FORMATION.

NOTE:
THIS GAS IS LIGHTER THAN AIR AND MUST NOT BE ALLOWED TO ACCUMULATED IN ELEVATED LOCATIONS.

## 10. STABILITY AND REACTIVITY

STABILITY: STABLE.

DECOMPOSITION PRODUCTS:
HYDROGEN, WHEN IGNITED IN THE PRESENCE OF OXYGEN, WATER WILL BE PRODUCED.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE:
STRONG OXIDIZERS (I.E. CHLORINE, BROMINE, PENTAFLUORIDE, OXYGEN, OXYGEN

DIFLUORIDE, AND NITROGEN TRIFLUORIDE). OXYGEN/HYDROGEN MIXTURES CAN EXPLODE
ON CONTACT WITH A CATALYST SUCH AS PLATINUM.

HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

CONDITIONS TO AVOID:
CONTACT WITH INCOMPATIBLE MATERIALS AND EXPOSURE TO HEAT, SPARKS AND OTHER
SOURCES OF IGNITION. CYLINDERS EXPOSED TO HIGH TEMPERATURES OR DIRECT FLAME
CAN RUPTURE OR BURST.

## 11. TOXICOLOGICAL INFORMATION

TOXICITY DATA:
THERE ARE NO SPECIFIC TOXICOLOGY DATA FOR HYDROGEN. HYDROGEN IS A SIMPLE
ASPHYXIANT (SA), WHICH ACTS TO DISPLACE OXYGEN IN THE ENVIRONMENT.

SUSPECTED CANCER AGENT:

HYDROGEN IS NOT FOUND ON THE FOLLOWING LISTS:
FEDERAL OSHA Z LIST, NTP, IARC, CAL/OSHA; THEREFORE IS NOT CONSIDERED TO BE,
NOR SUSPECTED TO BE A CANCER-CAUSING AGENT BY THESE AGENCIES.

IRRITANCY OF PRODUCT:
HYDROGEN IS NOT IRRITATING; HOWEVER, CONTACT WITH RAPIDLY EXPANDING GASES
CAN CAUSE FROSTBITE TO EXPOSED TISSUE.

SENSITIZATION TO THE PRODUCT:
HYDROGEN IS NOT KNOWN TO CAUSE SENSITIZATION IN HUMANS.

REPRODUCTIVE TOXICITY INFORMATION:
LISTED BELOW IS INFORMATION CONCERNING THE EFFECTS OF HYDROGEN ON THE HUMAN
REPRODUCTIVE SYSTEM.

MUTAGENICITY: NO MUTAGENICITY EFFECTS HAVE BEEN DESCRIBED FOR HYDROGEN.

EMBRYOTOXCITY: NO EMBRYOTOXIC EFFECTS HAVE BEEN DESCRIBED FOR HYDROGEN.

TERATOGENICITY: NO TERATOGENICITY EFFECTS HAVE BEEN DESCRIBED FOR HYDROGEN.

REPRODUCTIVE TOXICITY:
NO REPRODUCTIVE TOXICITY EFFECTS HAVE BEEN DESCRIBED FOR HYDROGEN.

A MUTAGEN IS A CHEMICAL WHICH CAUSES PERMANENT CHANGES TO GENETIC MATERIAL
(DNA) SUCH THAT THE CHANGES WILL PROPAGATE THROUGH GENERATION LINES. AN

EMBRYOTOXIN IS A CHEMICAL WHICH CAUSES DAMAGE TO A DEVELOPING EMBRYO (I.E.
WITHIN THE FIRST EIGHT WEEKS OF PREGNANCY IN HUMANS), BUT THE DAMAGE DOES
NOT PROPAGATE ACROSS GENERATIONAL LINES. A TERATOGEN IS A CHEMICAL WHICH
CAUSES DAMAGE TO A DEVELOPING FETUS, BUT THE DAMAGE DOES NOT PROPAGATE
ACROSS GENERATIONAL LINES. A REPRODUCTIVE TOXIN IS ANY SUBSTANCE WHICH
INTERFERES IN ANY WAY WITH THE REPRODUCTIVE PROCESS.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE:
ACUTE OR CHRONIC RESPIRATORY CONDITIONS MAY BE AGGRAVATED BY OVER-EXPOSURE
TO HYDROGEN.

BIOLOGICAL EXPOSURE INDICES (BEIS):
CURRENTLY, BIOLOGICAL EXPOSURE INDICES (BEIS) ARE NOT APPLICABLE FOR
HYDROGEN.

RECOMMENDATIONS TO PHYSICIANS:
ADMINISTER OXYGEN, IF NECESSARY; TREAT SYMPTOMS; REDUCE OR ELIMINATE
EXPOSURE.

## 12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY:
HYDROGEN OCCURS NATURALLY IN THE ATMOSPHERE. THIS GAS WILL BE DISSIPATED
RAPIDLY IN WELL-VENTILATED AREAS.

EFFECT OF MATERIAL ON PLANTS OR ANIMALS:
ANY ADVERSE EFFECT ON ANIMALS WOULD BE RELATED TO OXYGEN DEFICIENT
ENVIRONMENTS. NO ADVERSE EFFECT IS ANTICIPATED TO OCCUR TO PLANT-LIFE.

EFFECT OF CHEMICAL ON AQUATIC LIFE:
NO EVIDENCE IS CURRENTLY AVAILABLE ON HYDROGEN'S EFFECTS ON AQUATIC
LIFE.

## 13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL:
WASTE DISPOSAL MUST BE IN ACCORDANCE WITH APPROPRIATE FEDERAL, STATE, AND
LOCAL REGULATIONS. RETURN CYLINDERS WITH ANY RESIDUAL PRODUCT TO AIR LIQUIDE.
DO NOT DISPOSE OF LOCALLY.

FOR EMERGENCY DISPOSAL, SECURE THE CYLINDER AND SLOWLY DISCHARGE THE GAS TO
THE ATMOSPHERE IN A WELL-VENTILATED AREA OR OUTDOORS, AWAY FROM ALL SOURCES
OF IGNITION.

## 14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: HYDROGEN, COMPRESSED

HAZARD CLASS NUMBER AND DESCRIPTION: 2.1 (FLAMMABLE GAS)

UN IDENTIFICATION NUMBER: UN 1049

PACKING GROUP: NOT APPLICABLE.

DOT LABEL(S) REQUIRED: FLAMMABLE GAS

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 115

MARINE POLLUTANT:
HYDROGEN IS NOT CLASSIFIED BY THE DOT AS MARINE POLLUTANTS (AS DEFINED BY
49 CFR 172.101, APPENDIX B).

SPECIAL SHIPPING INFORMATION:
CYLINDERS SHOULD BE TRANSPORTED IN A SECURE POSITION, IN A WELL-VENTILATION
VEHICLE. THE TRANSPORTATION OF COMPRESSED GAS CYLINDERS IN AUTOMOBILES OR IN
CLOSED-BODY VEHICLES PRESENT SERIOUS SAFETY HAZARDS AND SHOULD BE DISCOURAGED.

NOTE:
SHIPMENT OF COMPRESSED GAS CYLINDERS WHICH HAVE NOT BEEN FILLED WITH THE
OWNERS CONSENT IS A VIOLATION OF FEDERAL LAW (49 CFR, PART 173.301 (B).

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:
THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. USE THE ABOVE INFORMATION
FOR THE PREPARATION OF CANADIAN SHIPMENTS.

## 15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS:
HYDROGEN IS NOT SUBJECT TO THE REPORTING REQUIREMENTS OF SECTIONS 302, 304
AND 313 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT.
THIS PRODUCT IS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTIONS 311 AND
312 OF TITLE III OF THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (40 CFR

370.21).

SARA THRESHOLD PLANNING QUANTITY: NOT APPLICABLE.

TSCA INVENTORY STATUS: HYDROGEN IS LISTED ON THE TSCA INVENTORY.

CERCLA REPORTABLE QUANTITY (RQ): NOT APPLICABLE.

OTHER U.S. FEDERAL REGULATIONS:

HYDROGEN IS SUBJECT TO THE REPORTING REQUIREMENTS OF SECTION 112(R) OF THE
CLEAN AIR ACT. THE THRESHOLD QUANTITY FOR OF THIS GAS IS 10,000 POUNDS.

DEPENDING ON SPECIFIC OPERATIONS INVOLVING THE USE OF HYDROGEN, THE
REGULATIONS OF THE PROCESS SAFETY MANAGEMENT OF HIGHLY HAZARDOUS CHEMICALS
MAY BE APPLICABLE (29 CFR 1910.119). UNDER THIS REGULATION HYDROGEN IS NOT
LISTED IN APPENDIX A, HOWEVER, ANY PROCESS THAT INVOLVES A FLAMMABLE GAS
ON-SITE, IN ONE LOCATION, IN QUANTITIES OF 10,000 LBS (4,553 KG) OR GREATER
IS COVERED UNDER THIS REGULATION UNLESS IT IS USED AS A FUEL.

HYDROGEN DOES NOT CONTAIN ANY CLASS I OR CLASS II OZONE DEPLETING CHEMICALS
(40 CFR PART 82).

HYDROGEN IS LISTED AS REGULATED SUBSTANCES IN QUANTITIES OF 10,000 LBS
(4,553 KG) OR GREATER, PER 40 CFR, PART 68, OF THE RISK MANAGEMENT FOR
CHEMICAL ACCIDENTAL RELEASE.

OTHER CANADIAN REGULATIONS:
HYDROGEN IS CATEGORIZED AS A CONTROLLED PRODUCT, HAZARD CLASS A, B1 AS PER
THE CONTROLLED PRODUCT REGULATIONS.

STATE REGULATORY INFORMATION:

HYDROGEN IS COVERED UNDER SPECIFIC STATE REGULATIONS, AS DENOTED BELOW:

ALASKA - DESIGNATED TOXIC AND HAZARDOUS SUBSTANCES: HYDROGEN.

CALIFORNIA - PERMISSIBLE EXPOSURE LIMITS FOR CHEMICAL CONTAMINANTS:
HYDROGEN.

FLORIDA - SUBSTANCE LIST: HYDROGEN.

ILLINOIS - TOXIC SUBSTANCE LIST: HYDROGEN.

KANSAS-SECTION 302/313 LIST: NO.

MASSACHUSETTS - SUBSTANCE LIST: HYDROGEN.

MINNESOTA - LIST OF HAZARDOUS SUBSTANCES: HYDROGEN.

MISSOURI - EMPLOYER INFORMATION/TOXIC SUBSTANCE LIST: HYDROGEN.

NEW JERSEY - RIGHT TO KNOW HAZARDOUS SUBSTANCE LIST: HYDROGEN.

NORTH DAKOTA - LIST OF HAZARDOUS CHEMICALS, REPORTABLE QUANTITIES: NO.

PENNSYLVANIA - HAZARDOUS SUBSTANCE LIST: HYDROGEN.

RHODE ISLAND - HAZARDOUS SUBSTANCE LIST: HYDROGEN.

TEXAS - HAZARDOUS SUBSTANCE LIST: NO.

WEST VIRGINIA - HAZARDOUS SUBSTANCE LIST: NO.

WISCONSIN - TOXIC AND HAZARDOUS SUBSTANCES: NO.

CALIFORNIA PROPOSITION 65:
HYDROGEN IS NOT ON THE CALIFORNIA PROPOSITION 65 LISTS.

## 16. OTHER INFORMATION

NFPA RATING:
HEALTH 1
FLAMMABILITY 4
REACTIVITY 0
OTHER

HAZARDOUS MATERIAL INFORMATION SYSTEM:
HEALTH (BLUE) 0
FLAMMABILITY (RED) 4
REACTIVITY (YELLOW) 0
PROTECTIVE EQUIPMENT B

EYES
RESPIRATORY
HANDS
BODY

SEE SECTION 8

FOR ROUTINE INDUSTRIAL APPLICATIONS

MIXTURES:
WHEN TWO OR MORE GASES OR LIQUEFIED GASES ARE MIXED, THEIR HAZARDOUS PROPERTIES MAY COMBINE TO CREATE ADDITIONAL, UNEXPECTED HAZARDS. OBTAIN AND EVALUATE THE SAFETY INFORMATION FOR EACH COMPONENT BEFORE YOU PRODUCE THE MIXTURE. CONSULT AN INDUSTRIAL HYGIENIST OR OTHER TRAINED PERSON WHEN YOU MAKE YOUR SAFETY EVALUATION OF THE END PRODUCT. REMEMBER, GASES AND LIQUIDS HAVE PROPERTIES WHICH CAN CAUSE SERIOUS INJURY OR DEATH.

FURTHER INFORMATION ABOUT HYDROGEN, CAN BE FOUND IN THE FOLLOWING PAMPHLETS
PUBLISHED BY:
COMPRESSED GAS ASSOCIATION INC. (CGA)
4221 WALNEY ROAD
5TH FLOOR
CHANTILLY, VA 20151-2923.

TELEPHONE: (703) 788-2700.

G-5: "HYDROGEN"

G-5.3: "COMMODITY SPECIFICATION FOR HYDROGEN"

P-1: "SAFE HANDLING OF COMPRESSED GASES IN CONTAINERS"

P-14: "ACCIDENT PREVENTION IN OXYGEN-RICH AND OXYGEN DEFICIENT ATMOSPHERES"

SB-2:
"OXYGEN DEFICIENT ATMOSPHERES"
"HANDBOOK OF COMPRESSED GASES"

PREPARED BY:
CHEMICAL SAFETY ASSOCIATES, INC.
9163 CHESAPEAKE DRIVE
SAN DIEGO, CA 92123-1002
619/565-0302

FAX ON DEMAND: 1-800/231-1366

AL
AIR LIQUIDE(TM)

THIS MATERIAL SAFETY DATA SHEET IS OFFERED PURSUANT TO OSHA'S HAZARD COMMUNICATION STANDARD, 29 CFR, 1910.1200. OTHER GOVERNMENT REGULATIONS MUST BE REVIEWED FOR APPLICABILITY TO HYDROGEN. TO THE BEST OF AIR LIQUIDE'S KNOWLEDGE, THE INFORMATION CONTAINED HEREIN IS RELIABLE AND ACCURATE AS OF THIS DATE; HOWEVER, ACCURACY, SUITABILITY OR COMPLETENESS ARE NOT GUARANTEED AND NO WARRANTIES OF ANY TYPE, EITHER EXPRESS OR IMPLIED, ARE PROVIDED. THE INFORMATION CONTAINED HEREIN RELATES ONLY TO THIS SPECIFIC PRODUCT. IF HYDROGEN IS COMBINED WITH OTHER MATERIALS, ALL COMPONENT PROPERTIES MUST BE CONSIDERED. DATA MAY BE CHANGED FROM TIME TO TIME. BE SURE TO CONSULT THE LATEST EDITION.

EFFECTIVE DATE: AUGUST 31, 2005

# ATTACHMENT 4

# SAFETY INSPECTION AUDIT FORMS

# Project HSE Inspection Form

Project Location _____ Type of Project _____ Contract No. _____

Date _____ Your Name _____ Supt._____

| | Safe | At Risk | N/A | I/H |
|---|---|---|---|---|
| **1.0 GENERAL** | | | | |
| 1.1 All employees receive video HSE orientation and trained in PIP? | | | | |
| 1.2 Safety Rule Book distributed with a sign off sheet retained as evidence of training? | | | | |
| 1.3 HSE meetings held with supervisor and subcontractors every two weeks? | | | | |
| 1.4 HSE meetings held each week with work crews? | | | | |
| 1.5 Minutes of jobsite safety meetings recorded and kept at jobsite? | | | | |
| 1.6 Competent contractor personnel assigned responsibility to inspect jobsite for safety? | | | | |
| 1.7 Government (OSHA) sign posted? Form 300 up-to-date? | | | | |
| 1.8 Safety bulletins, accident prevention material, safety rules posted? | | | | |
| 1.9 Weekly safety inspection reports by subcontractor personnel prepared and kept at jobsite? | | | | |
| 1.10 Minimum two cer ified First Aid/CPR personnel per shift? | | | | |
| 1.11 Managing an Incident Poster complete and posted? | | | | |
| 1.12 Approved and stocked First Aid Kit on jobsite? | | | | |
| 1.13 Good housekeeping maintained? (all) | | | | |
| 1.14 Employees informed on access to med. & exposure records? | | | | |
| 1.15 Provisions made for vessel to vent during off work hours? | | | | |
| 1.16 Precautions taken to protect customer's property, employees, and visitors from paint spray & abrasive blasting materials? | | | | |
| 1.18 Employees informed of any special site or customer HSE requirements? | | | | |
| 1.19 Subcontractors aware of Employer responsibilities? Complying with CBI requirements? | | | | |
| 1.20 Protection over manways/doorsheets? | | | | |
| 1.21 JSA being used to plan new or hazardous jobs? Employees involved in process? | | | | |
| 1.22 Atmospheric monitoring performed where required? Documented? | | | | |
| 1.23 Vessels and/or pipelines isolated/blinded/blanked? | | | | |
| 1.24 Appropriate manuals and proper instructions on jobsite? | | | | |
| 1.25 Dangerous openings fenced or covered? | | | | |
| 1.26 Test water to come through clean lines? | | | | |
| 1.27 Employees informed of evacuation route? | | | | |
| 1.28 All noise areas posted? | | | | |
| **2.0 PERSONAL PROTECTION** | | | | |
| 2.1 Hearing protec ion provided and worn by all where noise levels are excessive? | | | | |
| 2.2 Hard hats and safety glasses (with ANSI Z87 or equiv. side shields) provided for and worn by all? | | | | |
| 2.3 Appropriate work gloves worn by employees for their assigned work? | | | | |
| 2.4 Additional eye and face protection provided for and worn by all where exposed to potential eye or face injury? | | | | |
| 2.5 Adequate footwear worn by employees for their assigned work? | | | | |
| 2.6 Have respirator users received a medical evalua ion? Fit-tested? | | | | |
| 2.7 Written Respiratory Protec ion Program on site? | | | | |
| 2.8 Are respirators, blast and paint hoods available and used? | | | | |
| 2.9 Fresh air respirators used for internal spray painting? | | | | |
| 2.10 Personnel trained in wearing and inspection of PPE? Is PPE being inspected? | | | | |
| 2.11 Are burning goggles/face shields available & | | | | |

| | Safe | At Risk | N/A | /H |
|---|---|---|---|---|
| used? | | | | |
| 2.12 Are approved safety harnesses used where required? | | | | |
| 2.13 Approved lanyard connected at waist level or above to approved anchorage? | | | | |
| 2.14 Wire rope, independent lifelines used for each employee on suspended scaffold, painter's boom, air buggy and boatswains chairs? | | | | |
| 2.15 Supplied air helmet or hood used by all operators when abrasive blasting? | | | | |
| 2.16 Preventive injections provided for workers around raw sewage? | | | | |
| 2.17 Airline filtering devices functioning properly? Carbon monoxide monitor installed after filter? Set at 10 PPM? Alarm checked and meter bump checked daily wi h test gas? | | | | |
| 2.18 Protective skin cream provided and used by painters? | | | | |
| **3.0 HAZARD COMMUNICATION PROGRAM (OR RIGHT TO KNOW PROGRAM)** | | | | |
| 3.1 Written program on site? | | | | |
| 3 2 Personnel trained and logged in? | | | | |
| 3 3 All material safety data sheets on site? (Current within 3 yrs.) | | | | |
| 3.4 Containers labeled (other than container that contents will be used up in one shift)? | | | | |
| **4.0 SANITATION / HEALTH / ENVIRONMENT** | | | | |
| 4.1 Marked & labeled portable containers used to dispense drinking water? | | | | |
| 4 2 Single service cups used for drinking water, containers provided for new & used cups? | | | | |
| 4 3 Adequate number of toilet facilities provided & maintained? | | | | |
| 4.4 Special washing facilities provided for workers handling materials which may be harmful to their health? | | | | |
| 4 5 Illumination in work areas (including offices, shops) adequate? | | | | |
| 4.6 Is ventilation adequate? | | | | |
| 4.7 Means provided for waste/scrap removal? | | | | |
| 4 8 Waterless hand cleaner, etc. provided? | | | | |
| **5.0 FLAMMABLE MATERIALS** | | | | |
| 5.1 In areas where flammables are stored or where operations present a fire hazard "NO Smoking or Open Flame" sign posted? | | | | |
| 5 2 Fuel containers posted? | | | | |
| 5 3 Indoor and outdoor storage of flammables in approved containers or cabinets with warning signs posted? | | | | |
| 5.4 Form, scrap lumber & all other debris including combustible scrap/debris removed from work areas at regular intervals? | | | | |
| 5 5 Containers provided for collection, separation of waste & trash? | | | | |
| 5.6 Solvent waste, oily rags & flammable liquids kept in fire resistant covered containers until removed from worksite? | | | | |
| 5.7 Required portable fire-fighting equipment available, properly located & maintained? Inspection tags up to date? | | | | |
| 5 8 Fuel operated equipment shut off for refueling & bonded to fuel tank? | | | | |
| 5 9 Are Safety Cans used for flammables? | | | | |
| 5.10 Fire extinguisher operational & available with 75' (23m) of each work area? Have monthly & annual inspec ion tag? | | | | |
| 5.11 Fire extinguishers available within 50' (15m) of each work area where flammable liquids are used/stored? | | | | |
| 5.12 Safety-shutdown on stoves & excess flow valves on pre-heater lines? | | | | |
| 5.13 Gas manifolds marked & capped? | | | | |

# Project HSE Inspection Form

| | Safe | At Risk | N/A | I/H |
|---|---|---|---|---|
| 5.14 Sta ionary flammable containers grounded-bonded? Have spill containment? | | | | |
| 5.15 Combustibles kept 50' (15m) from welding areas? | | | | |
| 5.16 Fire extinguishers in cab of crane, hoist, etc.? | | | | |
| 5.17 Non-sparking fans used & bonded to tank for ventilation? | | | | |
| 5.18 Ventilation fans correctly sized for tank volume? | | | | |
| 5.19 Ven ilation used to prevent flammable vapors exceeding 10% of LFL (Lower Flammable Limits)? | | | | |
| 5.20 Inside work stopped when flammable vapors exceed 10% LFL? | | | | |
| 5.21 Oxygen ($O_2$) level not less than 19.5% or greater than 22%? | | | | |
| 5.22 Flammable liquid containers clearly labeled/bonded during use? | | | | |
| 5.23 Paint spillage contained & cleaned up daily? | | | | |
| 5.24 Atmospheric monitoring for oxygen & LFL performed before entry into enclosed spaces? Proper forms completed before starting work & when painting? Tests taken at two-hour intervals, after lunch & monitored? | | | | |
| **6.0 AIR TOOLS OR EQUIPMENT** | | | | |
| 6.1 Hand held powered tools (saws, air impact) equipped with guard & ONLY with constant pressure switch? | | | | |
| 6.2 Hand held powered tools (drills, tappers, fastener drivers, disc & belt sanders, power saws and angle grinders) provided with momentary contact "on-off" switch? | | | | |
| 6.3 Devices provided on air power tools to prevent tools from becoming accidentally disconnected from hose? | | | | |
| 6.4 Air hose connections secured? Wired or chained toge her? | | | | |
| 6.5 Air driven nailers operating at more than 100 psi provided with safety device on the muzzle to prevent nail ejec ion unless muzzle is in contact with work surface? | | | | |
| 6.6 Airless spray guns (operating at 1000 psi) equipped with safety preventing pulling of trigger until safety device is manually released? | | | | |
| 6.7 Excess flow valves in air lines greater than ½" (12.7mm) diameter? | | | | |
| 6.8 Blast pots tested & cer ified? | | | | |
| 6.9 Abrasive blasting equipment, hose, nozzles & dead men switch in safe condition? Static dissipating hose used or abrasive pot properly grounded? | | | | |
| 6.10 Air hoses inspected weekly? | | | | |
| 6.11 Airless spray equipment inspected weekly for safe condition? Static dissipating hose used or pump properly grounded? | | | | |
| 6.12 Is air for cleaning being used properly (30 psi max)? | | | | |
| 6.13 Is air receiver test & certified & equipped with pop-off safety valve & pressure gauge? | | | | |
| 6.14 Man ways free from cables & hoses? | | | | |
| **7.0 POWER TOOLS** | | | | |
| 7.1 Power actuated tools provided with safety shield/guard & operator has evidence of special training in their use? | | | | |
| 7.2 Do electric portable power tools have grounding conductor or double-insulated? | | | | |
| 7.3 All fixed power woodworking tools provided with a disconnect switch that can be locked or tagged in he off position? | | | | |
| 7.4 Defective tools & equipment tagged as unsafe, or controls locked in off position, or physically removed from site? | | | | |
| 7.5 Correct tools provided & used? | | | | |
| 7.6 Abrasive wheels properly handled & stored? | | | | |
| **8.0 ELECTRICAL** | | | | |
| 8.1 On power circuits, exposed or concealed where accidental contact by tools/equipment may be hazardous, warning sign shall be posted and all workers advised of hazard? | | | | |
| 8.2 Regular inspections made to assure effective grounding of noncurrent carrying metal parts of portable and/or plug connected equipment or GFCI's installed on all 110-120 V temporary | | | | |

| | Safe | At Risk | N/A | /H |
|---|---|---|---|---|
| circuits? MPS Log up to date? | | | | |
| 8 3 Temporary lights equipped with guards to prevent accidental contact with bulb? | | | | |
| 8.4 Receptacles, attachment plugs not interchangeable on circuits of different voltages, current ratings or type of current (AC or DC)? | | | | |
| 8 5 Electrical equipment properly grounded? | | | | |
| 8.6 Approved electrical equipment used where flammable vapors may develop? | | | | |
| 8.7 Electrical service lines greater than 220V elevated or buried? | | | | |
| 8 8 Transformers fenced off or elevated? | | | | |
| 8 9 All electrical power cords handled safely, grounded & in good repair? | | | | |
| 8.10 EPD's or ELCB's installed & working on 220V power sources? | | | | |
| **9.0 LADDERS** | | | | |
| 9.1 Ladders regularly inspected properly constructed, in safe condition & destroyed when found defective? | | | | |
| 9 2 Side rails extended 3' (1m) above landing or provision of grab rails? | | | | |
| 9 3 Top of ladders tied to prevent displacement? | | | | |
| 9.4 Double cleat ladders provided for working area having 25 or more workers & two-way traffic is expected? | | | | |
| 9 5 Double cleat ladders not exceeding 24' (7.3m) in length? | | | | |
| 9.6 Single cleat ladders not exceeding 30' (9.1m) in length? | | | | |
| 9.7 Cleats inset into edges of side rails or filler blocks used? | | | | |
| 9 8 No metal ladders used within 15' (4.6m) of electrical lines? | | | | |
| 9 9 Stepladders used only in full open position? | | | | |
| 9.10 Stepladders of sufficient height so that top two steps do not have to be used to perform work? | | | | |
| 9.11 All manufactured single & extension ladders equipped with ladder shoes? | | | | |
| 9.12 Cable ladders properly secured to structure? | | | | |
| 9.13 Permanent ladders used for access have rest platforms every 24' (7.3m)? Cages or climb device installed & used? | | | | |
| **10.0 SCAFFOLDING** | | | | |
| 10.1 All open sides & ends of platforms more than 10' (3.05m) above ground or floor level, provided with top rails (42" high (1.06m), midrail & toe boards (4" high (101mm)? Area below scaffold barricaded? | | | | |
| 10.2 Where workers pass or work under scaffolds; screens or other overhead protection provided? | | | | |
| 10.3 Platform planks laid together tight preventing tools, etc. from falling though? | | | | |
| 10.4 Scaffold guyed or tied to structure every 26' (7.9m) vertically & 30' (9.1m) circumferentially? | | | | |
| 10.5 Scaffolding set plumb wi h adequate foundation bearing plates? | | | | |
| 10.6 Platform planks extend over end supports not less than 6" (152mm), nor more than 18" (457mm)? | | | | |
| 10.7 Planks secured to prevent dislodgment? | | | | |
| 10.8 Ladders used to gain access to scaffold work platforms? | | | | |
| 10.9 Stairways have handrails? | | | | |
| 10.10 Scaffold trap doors provided & used for access from underneath? | | | | |
| 10.11 Rest platform (or scaffold trap door) provided @ 35' (10.7m) intervals on tank erection ladder? | | | | |
| 10.12 Scaffolds erected properly and tagged? | | | | |
| 10.13 Scaffold boards' ends secure from splitting, tested & properly lapped? | | | | |
| 10.14 Brackets plumb, inspected & good condition? Bracket posts pinned? | | | | |
| 10.15 Tool pails used & secured from falling? | | | | |
| 10.16 Bracket straps welded by qualified welders, inspected & circled by qualified inspector? | | | | |
| 10.17 Handlines erected tight & clamped off? | | | | |
| 10.18 Handlines erected on top angle or wind girders? | | | | |
| 10.19 Third handlines installed where needed? | | | | |
| 10.20 Approved scaffolds used at shaft & column | | | | |

# Project HSE Inspection Form

| | Safe | At Risk | N/A | I/H |
|---|---|---|---|---|
| splices? | | | | |
| 10.21 Safety line system installed & used while erecting roof framing & roof plates? | | | | |
| 10.22 Tubular scaffold approved type (2" or 50.8 mm od.)? | | | | |
| 10.23 Tubular scaffold properly erected, braced & guyed with access ladders & toe boards? | | | | |
| 10.24 Suspended scaffolds, suspended work platforms & aerial lifts approved? Used correctly? | | | | |
| 10.25 Insulation link provided when welding from suspended platform or suspended scaffold? | | | | |
| 10.26 Are independent lifelines with correct cable grab device used on suspended work platforms & scaffolds (except when suspended from crane or derrick)? | | | | |
| 10.27 Correct cable grab used on cable ladders? | | | | |
| 10.28 Boatswain chair on job? Approved type? | | | | |
| 10.29 Powered single or double point suspended scaffold have "U.L." approved label & capacity chart? | | | | |
| **11.0 ROLLING SCAFFOLDS (Manually propelled)** | | | | |
| 11.1 Wheel brakes set while in use? | | | | |
| 11.2 No riders on work platform while moving? | | | | |
| 11.3 Work level 6' (2m) or more above ground floor level have guard rails and toe boards? | | | | |
| 11.4 All cross & diagonal bracing in place & properly connected? | | | | |
| 11.5 Height does not exceed 4 times least base dimension unless outriggers are used? | | | | |
| 11.6 Ladder access to work platform? | | | | |
| 11.7 Are rolling scaffolds properly assembled, inspected & tagged? | | | | |
| **12.0 SWINGING SCAFFOLDS - 2 points Suspension** | | | | |
| 12.1 Roof hooks or irons securely installed & anchored? | | | | |
| 12.2 Sheaves fit size of rope used? | | | | |
| 12.3 Equipped with standard guardrails & toe boards? | | | | |
| 12.4 Load limit marked on each scaffold? | | | | |
| 12.5 Suspension lines inspected before first use & frequently during use? (Record of inspection kept)? | | | | |
| 12.6 Each employee equipped wi h safety harness & shock absorbing lanyard & attached to life line? | | | | |
| 12.7 Lifeline attached at top to independent support & extending to ground level? | | | | |
| 12.8 Suspension lines capable of supporting six times rated load? | | | | |
| 12.9 Power cables for electric hoist machines secured to platform to prevent snagging between power supply joint & platform? | | | | |
| **13.0 FLOOR & WALL OPENINGS** | | | | |
| 13.1 Wall openings 30" (762mm) H, 18" (467mm) W or greater from which there is a drop of 4' (1.2m)or more & bottom of opening less than 3' (1m) above working surface provided with guardrails? | | | | |
| 13.2 Bottom of wall openings less than 4" (102mm) above work surface provided with standard toe board 4" (102mm) high | | | | |
| 13.3 Open sided floors 6' (2m) or more above floor or ground level provided with standard railing & toe board or other equivalent perimeter protection? | | | | |
| 13.4 Stairways when used during construction have handrails on all open sides, guardrails at landings & filler blocks in all recessed treads? | | | | |
| **14.0 MATERIAL HANDLING EQUIPMENT** | | | | |
| 14.1 Approved canopy guards on fork lift trucks & roll-over protection on all earth moving equipment? | | | | |
| 14.2 Rated capacity posted on all lifting, hoisting equipment clearly visible to the operator? | | | | |
| 14.3 Wire rope inspection within last 30 days? | | | | |
| 14.4 Where mobile cranes are regularly used, daily inspections made of critical items & records kept? | | | | |
| 14.5 Written tractor, crane, derrick, inspection within last 30 days? | | | | |
| 14.6 Hand signal chart posted? | | | | |
| 14.7 Qualified personnel operating equipment? | | | | |
| **15.0 CRANES - GENERAL** | | | | |
| 15.1 Annual inspection made of crane hoisting machinery & record kept of dates & results? | | | | |
| 15.2 On tower cranes, daily inspection made of rigging? | | | | |
| 15.3 On tower cranes, weekly inspections made of supporting parts, safety appliances & record kept of repairs required? | | | | |
| 15.4 Where a crane is used – lift log being maintained? | | | | |
| 15.5 Adequate & safe working conditions? | | | | |
| 15.6 Derrick or crane in safe working condition? Operator certified? | | | | |
| 15.7 Capacity charts at operator's station? | | | | |
| 15.8 Written crane, derrick/wire rope inspection within last 30 days on site? Annual inspection for hoist & crane available? | | | | |
| 15.9 Tail-swing of crane barricaded when within 7' (2.1m) of grade? | | | | |
| 15.10 Signal person designated? | | | | |
| 15.11 No part of crane or load closer than 15' (4.6m) to energized electrical lines? | | | | |
| **16.0 EXCAVATIONS, TRENCHING & SHORING** | | | | |
| 16.1 Excavated material effec ively stored & retained at least 2' (.6m) or more from edge of excavations & trenches? | | | | |
| 16.2 Utility company contacted & advised of proposed excava ion work to determine underground utility exposure or when overhead power lines are involved? | | | | |
| 16.3 Substantial stop logs or barricades installed when mobile equipment working adjacent to excavation? | | | | |
| 16.4 Trenches more than 5' (1.5m) in depth shored to standard, laid back to stable slopes or provided with other equivalent protection where hazard of moving ground exists? | | | | |
| 16.5 Trenches less than 5' (1.5m) protected where hazardous ground movement exists? | | | | |
| 16.6 Trenches in hard or compact soil shored to standard when depth is more than 5' (1.5m) & 8' (2.4) or more in length? | | | | |
| 16.7 In lieu of shoring in hard or compact soil, trench above the 5' (1.5m) level sloped (slope not steeper than a 1' (.3m) rise to each 1.5' (.45m) horizontal)? | | | | |
| 16.8 Trenches 4' (1.2m) deep or more provided with ladder located no more han 25' (7.6m) of lateral travel? | | | | |
| **17.0 WELDING, CUTTING, BURNING** | | | | |
| 17.1 Proper PPE provided, in good condition & being used? | | | | |
| 17.2 All oxygen & fuel gas gauges in working condition? | | | | |
| 17.3 All oxygen & fuel gas hoses in good condition & free of grease & oil? | | | | |
| 17.4 Burning torch equipped with back flow prevention devices for both oxygen & fuel gas at the torch? | | | | |
| 17.5 Back flash arrestors on regulators used for flame cutting? | | | | |
| 17.6 Mechanical lighters used for lighting torches? | | | | |
| 17.7 Oxygen & fuel gas cylinders stored in upright posi ion in designated areas with caps in place? Cylinders tied off? Oxygen stored 20' (6.1m) from fuel gas cylinders? | | | | |
| 17.8 Electric arc welding cables in good condi ion & properly attached by lugs to weld machine? | | | | |
| 17.9 Welder's shields & helper's goggles in good condition & equipped with proper lenses? | | | | |
| 17.10 Fire extinguishers provided within 25' (7.6m) of welding, cutting or burning operations? | | | | |
| 17.11 All welding cable positioned to eliminate tripping hazards? | | | | |
| **18.0 ROOFING** | | | | |
| 18.1 Safety harness and life lines or catch platform? | | | | |
| 18.2 Roofing bracket scaffolds secured? | | | | |

# Project HSE Inspection Form

| | Safe | At Risk | N/A | I/H |
|---|---|---|---|---|
| 18.3 Crawl or chicken ladders secured & evenly spaced cleats? | | | | |
| **Flat & Low Pitch Roofs Less than 4/1 Pitch?** | | | | |
| 18.4 Warning line 6' (2m) from roof edge in work area? | | | | |
| 18.5 Safety harness & lines in use at perimeter or standard handrails or equivalent? | | | | |
| 18.6 Protective equipment used when handling hot pitch? | | | | |
| 18.7 Ladder access same as for pitch roofs? | | | | |
| 18.8 Materials stored 6' (2m) from edge? | | | | |
| 18.9 All openings covered or protected by guardrails? | | | | |
| **19.0 CONCRETE FORMING & POURING** | | | | |
| 19.1 Vertical re-steel & anchor bolts protected by covering when employees working above? | | | | |
| 19.2 Employee wearing safety harness or equivalent when 6' (2m) or more adjacent work surface? | | | | |
| 19.3 Walk & standing boards provided when pouring horizontal surfaces on re-steel? | | | | |
| 19.4 Employees provided with & using PPE, while pouring concrete? | | | | |
| 19.5 No riding concrete buckets? | | | | |
| 19.6 All pump crete lines secured at all joints? | | | | |
| 19.7 Concrete trucks blocked when discharging on a slope? | | | | |
| 19.8 Shoring & re-shoring adequate for support? | | | | |
| 19.9 Properly guarded work platform for walls, columns, beams, etc.? | | | | |
| 19.10 Power troweling machines equipped with positive on/off switch? | | | | |
| **20.0 STEEL ERECTION** | | | | |
| 20.1 Decking or safety nets 2 stories or no more than 30' (9.1m) where erection is being performed? | | | | |
| 20.2 Safety railing no less than 1/2" (13mm) wire rope 42" (1.07m) high around the perimeter of all temporary planked or metal docked floors? Minimum of 3 cable clips per interconnecting | | | | |

| | Safe | At Risk | N/A | /H |
|---|---|---|---|---|
| eye? | | | | |
| **21.0 DEMOLITION** | | | | |
| 21.1 Dust controlled by wetting? | | | | |
| 21.2 Employees provided with dust respirators & goggles? | | | | |
| 21.3 Chutes properly erected & drop area barricaded off? | | | | |
| 21.4 Floor openings protected? | | | | |
| 21.5 Employee access to building provided with overhead protection? | | | | |
| 21.6 Stairways in building used for access properly lighted & maintained? | | | | |
| **22.0 RADIATION** | | | | |
| 22.1 Radiation operators certified? | | | | |
| 22.2 Are film badges, dosimeters & alarm rate meters worn by all x-ray personnel? | | | | |
| 22.3 Survey meters used? Calibrated? | | | | |
| 22.4 Warning signs & lights installed? | | | | |
| 22.5 Radioactive source properly stored? | | | | |
| 22.6 Alarm rate meters worn where required? | | | | |
| **23.0 RIGGING** | | | | |
| 23.1 Adequate equipment available to perform the job safely? | | | | |
| 23.2 Crosby cable clips used, properly installed, correct number, size & torque where required? | | | | |
| 23.3 All ropes, cables & hooks inspected daily before use & are in safe condition? | | | | |
| 23.4 2L43-D is used to hang internal painters rigging from center vent or manhole? | | | | |
| 23.5 Slings proper size, safe condition? Capacity marked? | | | | |
| 23.6 All hooks moused? | | | | |
| 23.7 Guy lines marked where needed? | | | | |
| 23.8 Plate clamps in safe working condition? Capacity marked? Correct inspection color? | | | | |
| 23.9 Plate spreaders marked with capacity & weight? | | | | |

REMARKS: (Were At Risk and Imminent Hazard conditions corrected?) _____

_____

_____

_____

Original: Construction Office — Project HSE Signature: _____ Date _____

Copy: Project HSE File

Copy: Construction Manager File — Construction Manager Signature _____ Date _____

# Shop and Warehouse HSE Inspection Form

Location: _____ Date: _____

Superintendent/Foreman: _____ Inspector Name: _____

| | | Safe | At Risk | N/A | I/H |
|---|---|---|---|---|---|
| | **GENERAL** | | | | |
| 1. | Are weekly safety meetings held & documented? | | | | |
| 2. | Do employees know emergency evacuation route and assembly area? | | | | |
| 3. | Have employees received Employee Safety Orientation? | | | | |
| 4. | Are CB&I basic safety rules posted? | | | | |
| 5. | Are two certified first-aid providers available for all shifts? | | | | |
| 6. | Are regulatory signs posted? | | | | |
| 7. | Is injury/illness log up-to-date? | | | | |
| 8. | Do subcontractors comply with CB&I rules? | | | | |
| | **HEALTH AND ENVIRONMENT** | | | | |
| 9. | Are exists clearly marked and illuminated? | | | | |
| 10. | Is good housekeeping maintained? | | | | |
| 11. | Are dangerous openings fenced off or covered? | | | | |
| 12. | Is approved & stocked first-aid kit available? Stretcher and blanket available? | | | | |
| 13. | Are toilets adequate and maintained? | | | | |
| 14. | Is ventilation adequate for abrasive blasting, welding, grinders, and spray painting? | | | | |
| 15. | Are safety signs and tags properly used? | | | | |
| 16. | Is means provided for waste & scrap removal? | | | | |
| 17. | Is illumination adequate? | | | | |
| 18. | Is food <u>not</u> stored or eaten in restroom? | | | | |
| 19. | Are lunchrooms clean? | | | | |
| 20. | Are confined spaces labeled? Are proper procedures used? | | | | |
| | **HAZARD COMMUNICATION PROGRAM (OR RIGHT-TO-KNOW PROGRAM)** | | | | |
| 21. | Written program available? | | | | |
| 22. | Personnel trained and logged in? | | | | |
| 23. | All material safety data sheets on job and chemical list current (within last 3 years)? | | | | |
| 24. | Containers labeled (other than container that contents will be used up on one shift) and stored properly? | | | | |
| | **PERSONAL PROTECTIVE EQUIPMENT** | | | | |
| 25. | Are employees trained in donning and inspecting PPE? | | | | |
| 26. | Are hard hats worn by all employees? | | | | |
| 27. | Are safety glasses with side shields worn by all employees? Clear glasses worn by all indoors? | | | | |
| 28. | Is double-eye protection used where required? | | | | |
| 29. | Do all employees wear safety-toe boots? | | | | |
| 30. | Are burning goggles/shields with proper shading used? | | | | |
| 31. | Are proper gloves worn by all? | | | | |
| 32. | Is hearing protection available/used? Signs posted? | | | | |
| 33. | Has annual noise exposure survey been conducted? | | | | |
| 34. | Is noise exposure re-evaluated within 90 days of installing new equipment/processes? | | | | |
| 35. | Are safety harnesses available/used? | | | | |
| 36. | Are proper respirators available? Used and maintained? | | | | |
| 37. | Have respirator users been fit tested? | | | | |
| | **MATERIAL HANDLING & RIGGING** | | | | |
| 38. | Are slings (both chain and wire rope) adequate and in safe condition? | | | | |
| 39. | Do chain slings have ID/capacity tags and written annual inspection? | | | | |
| 40. | Are all hoisting hooks moused? | | | | |
| 41. | Are cable clamps approved type & size? | | | | |
| 42. | Are proper number of cable clamps used? | | | | |
| 43. | Are plate clamps in safe working condition? | | | | |
| 44. | Are plate clamps inspected annually and proper color code used? | | | | |
| 45. | Are racks provided for sling storage? Used? | | | | |
| 46. | Is hydraulic crane in safe working order? | | | | |
| 47. | Written crane (i.e. overhead, jib, gantry, mobile, etc.) inspection within last 30 days? Accurate? Annual inspection for hoist and crane available? Limit switches tested at the start of each shift? | | | | |
| 48. | Is crane hand signal chart posted? | | | | |
| 49. | Are rail car and truck wheels chocked for loading and unloading? | | | | |
| 50. | Is material storage stable and safe? | | | | |
| 51. | Are all crane operators certified? | | | | |
| 52. | Are load weights known by operators? | | | | |

# Shop and Warehouse HSE Inspection Form

| | | Safe | At Risk | N/A | I/H |
|---|---|---|---|---|---|
| 53. | Are lift truck operators qualified? Wearing seat belts where required? | | | | |
| 54. | Does lift truck have overhead protection? | | | | |
| 55. | Written lift truck inspection(s) within last 30 days? Accurate? Annual inspection for forks available? | | | | |
| | **WALKING AND WORKING SURFACES** | | | | |
| 56. | Are mobile work platforms adequate? | | | | |
| 57. | Is proper scaffold used? Properly erected and in good condition? | | | | |
| 58. | Are stair treads slip-resistant? | | | | |
| 59. | Are aisles and walkways marked on floor? | | | | |
| 60. | Are floor openings protected? | | | | |
| 61. | Are aisles to exits clear? | | | | |
| 62. | Are aerial work platforms properly used? Inspection up-to-date? Operators trained? | | | | |
| 63. | Are ladders in safe condition? Have safety feet? | | | | |
| 64. | Are purchased ladders either ANSI Type 1 or Type 1A ladder grade? | | | | |
| 65. | Are portable straight ladders and extension ladders at 1 to 4 angles and secured? Properly stored? | | | | |
| 66. | Do stairways have handrails? | | | | |
| 67. | Are power tools (e.g. grinders, mechanical presses, forging machines, band saws, table saws, etc) properly guarded? | | | | |
| 68. | Are moving parts (e.g. transmission belts, etc.) properly guarded? | | | | |
| 69. | Are plate roll machines equipped with an emergency "trip wire?" | | | | |
| 70. | Are machine operators properly attired (no loose clothing, jewelry)? | | | | |
| 71. | Do air-powered chipping guns have tool retainers? | | | | |
| 72. | Do air tools have constant pressure switches (CPS)? | | | | |
| 73. | Do portable woodworking tools have CPS? | | | | |
| 74. | Is grinding wheel tool rest within 1/8" of wheel? Is tongue guard within ¼"? | | | | |
| 75. | Are portable electric tools provided with an equipment grounding conductor or is tool "double-insulated?" | | | | |
| 76. | Are electric tools operating in correct polarity? | | | | |
| 77. | Are electrical circuit breakers properly marked? Are all energized parts enclosed? | | | | |
| 78. | Is purchased electrical equipment certified by a recognized testing laboratory (e.g. UL)? Equipment approved for specific use? | | | | |
| 79. | Is machine coolant treated (i.e. sanitized)? Change periodically? | | | | |
| 80. | Are lockout/tag out procedures followed when performing maintenance/repairs of tools and equipment? | | | | |
| 81. | Written LOTO program available? Personnel trained and logged in? | | | | |
| 82. | Is electrical equipment properly grounded? | | | | |
| 83. | Are 220/440 V service lines elevated or buried? | | | | |
| 84. | Are GFCI's installed and working on 110V & 220 V single phase power sources where required? | | | | |
| 85. | Are all electric power cords handled safely, grounded, and in good condition? | | | | |
| 86. | Do air lines over ½"∅ have excess flow valves? | | | | |
| 87. | Is air for cleaning less than 30 psi? | | | | |
| 88. | Are all air hose connections wired together? | | | | |
| 89. | Are air receivers certified and equipped with pop off safety valve and pressure gauge? | | | | |
| 90. | Are the correct tools provided and used? | | | | |
| | **FIRE PROTECTION AND PREVENTION** | | | | |
| 91. | Are metal safety cans used for flammables? | | | | |
| 92. | Are flammable containers grounded and bonded? | | | | |
| 93. | Are fire extinguishers available at each work area? Is inspection within the last 30 days? Are fire extinguisher locations properly marked and unobstructed? | | | | |
| 94. | Are welding areas clear of combustibles? | | | | |
| 95. | Are back flow prevention devices on burning torches? | | | | |
| 96. | Are black flash arrestors on all regulators? | | | | |
| 97. | Are all compressed gas cylinders transported, stored and secured in upright position? | | | | |
| 98. | Are gas and oxygen bottles separated by 20 ft (6m) or firewall? Are all bottles capped | | | | |
| 99. | Is fixed piping (e.g., fuel gas, $O_2$, air, etc.) and manifolds property marked? | | | | |
| 100. | Are fuels and flammables properly stored? "No Smoking" signs posted? | | | | |
| 101. | Do all cranes have a fire extinguisher? | | | | |
| | **ABRASIVE BLASTING AND PAINTING** | | | | |
| 102. | Sandblast equipment, hoses, nozzles & dead man switch in safe condition & grounded? | | | | |
| 103. | Airless spray equipment inspected weekly for safe condition? Properly grounded? | | | | |
| 104. | Are paint guns equipped with trigger guards? | | | | |
| 105. | Is waterless hand cleaner and protective creams provided? | | | | |

# Shop and Warehouse HSE Inspection Form

| | | Safe | At Risk | N/A | I/H |
|---|---|---|---|---|---|
| 106. | Are face shields and particulate respirators worn when filling sand pots? | | | | |
| 107. | Are airline filtering devices functioning properly? Is CO monitor installed? Is alarm set to 10 ppm? Is alarm checked? | | | | |
| 108. | Is airline helmet, hood used while blasting? | | | | |
| | **RADIATION** | | | | |
| 109. | Are radiation operators certified? | | | | |

| | | Safe | At Risk | N/A | I/H |
|---|---|---|---|---|---|
| 110. | Are film badges, dosimeters, and alarm rate meters, worn by all x-ray personnel? | | | | |
| 111. | Are survey meters used where required? | | | | |
| 112. | Are warning signs/lights and safety devices installed and functional? | | | | |
| 113. | Is radio-active source properly stored? | | | | |

Remarks (Were At Risk and Imminent Hazard conditions corrected?): _____

_____

_____

_____

Superintendent's Signature: _____ Date: _____

Inspector's Signature: _____ Date: _____

Original – Shop Superintendent
Copy - HSE Supervisor
Copy -

# PROCEDURE

| | | | |
|---|---|---|---|
| **Procedure Title:** | **Site HSE Inspections** | **CMS Number:** | **CMS-710-05-PR-01400** |
| **Procedure Owner:** | **HSE** | **Issuing Authority:** | **VP Global HSE** |

# SITE HSE INSPECTIONS

| | | | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| 4 | Issued for Use – Performed 2 year review. No change to content. Issuing Authority Approval not required. | SRB | 20 May 2013 |
| 3 | Issued for Use – Changed project to site. Added definition for site. No change to content | JPO | 20 Feb 2013 |
| 2 | Issued for Use – Completed 2 Year Review. Placed in new template. Updated 1.0 to match standard. No change to content. (No Rev Bars) | JPO | 06 Sep 2011 |
| 1 | Issued for Use – 4.5.5 Referenced new form for use in UK Offices (See Rev Bars). | JPO | 21 Aug 2009 |
| 0 | Issued for Use | JPO | 24 Apr 2009 |
| **Rev** | **Changes** | **Approved** | **Date** |



"©Chicago Bridge & Iron Company, 2009. All Rights Reserved. For Internal Use Only.
NOTICE: THIS DOCUMENT, AND ALL TEXT, DRAWINGS, DETAILS AND DATA SHOWN HERETO, IS THE SOLE PROPERTY OF CHICAGO BRIDGE & IRON COMPANY, AND SHALL NOT BE REPRODUCED IN ANY MANNER, USED FOR ANY PURPOSE WHATSOEVER, OR RELEASED TO ANYONE EXCEPT BY EXPRESS WRITTEN PERMISSION OF CHICAGO BRIDGE & IRON COMPANY."

## 1.0 PURPOSE

The purpose of this Procedure is to establish the minimum requirements for HSEInspections on CB&I sites.

## 2.0 SCOPE

This procedure applies to all CB&I employees, contractors and subcontractors associated with a CB&I site.

## 3.0 RESPONSIBILITIES

The following personnel have responsibilities defined in this procedure:

- CB&I Managers
- CB&I Supervisors
- CB&I Employees
- CB&I Contractors

## 4.0 PROCEDURE

Each site will make every attempt to prevent the possibility of incidents and accidents to employees when performing work activities by ensuring that work area hazards are being controlled through compliance with safety regulations, training of employees to properly perform their job activities through employee involvement in safe work activities and through site inspections.

4.1 Inspections shall be performed by nominated Craft employees, Supervisors and Site Management and shall be scheduled so that results can be reviewed regularly by the Site HSE Manager and management team. Significant performance improvement can be achieved by conducting Site HSE inspections and acting on the results obtained. Feedback of the results of inspections to the Project Manager is an essential part of this process. Subcontractor's equipment and work areas are included in all safety inspections.

4.2 Following is a listing of items to assist with identifying subjects that shall be inspected:

- Any work task or activity.
- Atmospheric conditions: dust, gases, fumes, sprays.
- Building and structures: windows, doors, floors, stairs, roofs, etc.
- Containers: scrap bins, rubbish bins, barrels, gas cylinders, solvent and paint cans, etc.
- Rigging equipment: slings, ropes, chains, shackles, hooks, etc.
- Process equipment: acid piping, caustic tanks, dripping valves, accessible shut-offs, showers, etc.
- High pressure steam piping.
- Electrical equipment.
- Firefighting equipment: mobile fire extinguishers
- Hand tools: pry bars, bull pins, hammers,
- Hazardous materials.
- Material handling equipment: forklifts, dollies, etc.
- Pressurized equipment: pneumatic chisels and grinders, etc.
- Production/Construction equipment: welders, oxy cutting equipment, drills, grinders, lathes, etc.
- Ladders, scaffolding, platforms, etc.
- Engines, compressors, electrical motors, etc.
- Openings - shafts, pits, sumps, etc.
- Storage areas: racks, bins, tanks, shelves, etc.
- Transportation equipment: golf carts, trucks, etc.
- Lifting equipment: cranes, hoists winches,manlifts, etc.
- Walkways and roadways: aisles, ramps, docks, etc.

- Warning devices: lights, sirens, etc.

4.3 Inspectors shall consider the following when planning inspections:

4.3.1 It is important to identify the items most likely to cause a hazard and the conditions to look for. It may be necessary to consult manufacturer's specifications or technical experts to determine specific signs of hazards.

4.3.2 Typical parts of an item to be inspected are:

- Parts susceptible to wear, damage, corrosion or stress.
- Protective guards.
- Safety valves, cut-offs, warning system.
- Controls
- Gears, cables, chains, belts, drives
- Electrical cables, switches, grounding systems
- Handles, eyebolts, lugs
- Weight bearing components

4.4 HSE Leader of The Week Program

The intent of the HSE Leader of the Week Program is to train employees in the HSE process. A major portion of the program is teaching employees how to interact with other employees on HSE issues. Additionally, it gives us another HSE dedicated employee to look at the work situation and identify problem situations that others may have overlooked.

4.4.1 SiteManagers and Construction Managers/Site Superintendents are to use the HSE Leader of the Week Program to improve the HSE performance in their area of responsibilities and to train their supervisors in this program.

4.4.2 Superintendents, General Foremen and Foremen are to select the HSE Leaders of the Week and establish the length of time they are to serve. Even though they are called HSE Leader of the Week, it is recommended they serve for more than one (1) week but not more than one (1) month. Additionally, supervision is responsible to properly train the HSE Leaders in their duties.

4.4.3 All employees at a site shall have the opportunity to be the HSE Leader.

4.4.4 Supervision is to dedicate time each week to work with the HSE Leader.

4.4.5 The HSE Leader is to have adequate time to do their duties (normally 3-4 hours).

4.4.6 HSE Leader of the Week duties:

- Watch for and help correct safety hazards/problems.
- Serve as an observer for the I Care process by doing at least one observation each day.
- Help with HSE orientation of new employees.
- Work as an HSE partner with new employees for their first few weeks of employment.
- Assist with HSE inspections and completion of the site HSE Inspection Form. Supervision shall be present to answer questions and help rectify problems encountered.
- Review the site HSE Inspection Form with the area Foreman/Superintendent.
- Work with Foreman/Superintendent and other employees to correct problems found. Help find causal factors for HSE problems discovered. Assist with correcting procedures, training and behavior-causing problems.
- Work with Foreman/Superintendent on HSE meeting outline/agenda and take part in the meeting where appropriate.
- Stop unsafe work where appropriate.

4.4.7 Training

4.4.7.1 Supervision is to review the list of duties with each HSE Leader prior to them starting to function in those duties.

4.4.7.2 The site HSE Inspection Form shall be reviewed with the HSE Leader to help them understand the form and reason for questions asked.

4.4.7.3 They shall receive training as observers in the I Care process.

4.4.8 Post Assignment Evaluation

Supervision shall review the successes and failures of the process with each HSE Leader as they complete their assignment. From the evaluation, they shall work with the employees to improve the process.

4.5 Inspection Frequency

4.5.1 Daily HSE Site Inspections

4.5.1.1 All Site Supervisors shall conduct daily HSE inspections and record their findings on the Daily HSESite Inspection Form(CMS 710-05-FM-01401). They shall also ensure that unsafe acts/conditions are corrected immediately.

4.5.1.2 Subcontract administrators shall conduct daily HSE inspections and ensure that unsafe acts/conditions are corrected immediately. This information shall be recorded on the Daily HSESite Inspection Form.

4.5.1.3 The Daily HSE Site Inspection Form shall be signed by Site HSE and also the Construction Manager/Shop Superintendent.

4.5.1.4 Leading Indicator Inspections shall be directly input into CB&I's Global HSE Data Management System-Cintellate.

4.5.1.5 I Care observations shall be directly input into CB&I's Global HSE Data Management System-Cintellate.

4.5.2 Weekly Supervisor's Inspection

4.5.2.1 Each site superintendent shall lead a formal written HSE inspection of his or her work area each week. The inspection team shall consist of the site superintendent, general foremen, the siteHSE Manager, Subcontract Administrator(s) and the HSE Leader of the Week.

4.5.2.2 The ProjectHSE Inspection Form(CMS 710-05-FM-01402) or Shop and Warehouse HSE Inspection Form (CMS 710-05-FM-01403)shall be used to documentthis inspection.

4.5.2.3 The Project HSE Inspection Form or the Shop and Warehouse HSE Inspection Form shall be signed by Site HSE Manager and also the Construction Manager/Shop Superintendent.

4.5.3 Semi-Monthly SiteHSE Committee Inspection

4.5.3.1 The Site HSE Committee shall conduct an inspection at least every two weeks. The inspection team shall consist of one member of Management (superintendent or subcontract administrator), one supervisor (foreman), and at least three craft members from the HSE Committee. The HSE Committee Chairperson shall assign the members of the HSE Committee inspection team on a rotating basis.

4.5.3.2 The members of the inspection team shall use the Project HSE Inspection Form (CMS-710-05-FM-01402) or the Shop and Warehouse HSE Inspection Form (CMS 710-05-FM-01403) to document this inspection.

4.5.4 Monthly ConstructionSite Manager's Inspection

On a monthly basis, the Site Manager, Construction Manager/Site Superintendent, the SiteHSE Manager, the area foreman, and one member of the HSE Committee shall conduct an additional compliance inspection using the Project HSE Inspection Form (CMS-710-05-FM-01402) or the Shop and Warehouse HSE Inspection Form (CMS 710-05-FM-01403) to document this inspection.The results shall be discussed at the HSE Committee meeting as well as the Supervisor's HSE Meeting, and a copy shall be forwarded to the Area HSE Manager.

4.5.5 Inspections and Guidance to Floor Wardens in the UK

When conducting inspections in CB&I's London office CMS-710-05-GL-01404 will be used and documented on CMS-710-05-FM-01404.

4.6 Inspection Findings

4.6.1 Inspection findings shall be categorized into the following categories:

4.6.1.1 Safe - Inspection items meet the minimum requirements.

4.6.1.2 At Risk - Inspection items do not meet the minimum requirements.At riskinspection elements are further addressed in the following areas:

- Repeat Violations - at risk inspection items noted in previous inspections that have not been corrected.
- All Other At Risk Findings - any other inspection elements scored below the site'sminimum acceptable score. The site'sminimum acceptable score in some cases will be established by the customer or others.

4.6.1.3 Imminent Hazard (IH) - Inspection items that are determined to be immediately hazardous to life and health. All Imminent Hazard findings require immediate work stoppage and correction.

4.6.1.4 Non Applicable (N/A) – Inspection items that are not part of the site's scope.

4.7 Record Retention

4.7.1 The Daily HSESiteInspection Forms (CMS 710-05-FM-01401)shall be filed in the siteHSE files for the duration of the project.

4.7.2 Daily HSESite Inspection Forms(CMS 710-05-FM-01401)shall be routed as follows:

4.7.2.1 Construction Manager/Site Superintendent

4.7.2.2 SiteHSE files

4.8 The Project HSE Inspection Form (CMS-710-05-FM-01402) or the Shop and Warehouse HSE Inspection Form (CMS 710-05-FM-01403) shall be distributed as follows:

4.8.1 Construction Manager/Site Superintendent

4.8.2 SiteHSE Manager

4.8.3 Site Supervisor

4.8.4 Site Safety Committee

4.8.5 Home Office Construction Manager or Manager of Projects or Site Manager

4.8.6 SiteHSE files

4.9 It is the SiteManager's responsibility to ensure all deficiency found during the inspection are corrected in a timely manner.

## 5.0 REFERENCES

| | |
|---|---|
| CMS-710-05-FM-01401 | Daily HSE Site Inspection Form |
| CMS-710-05-FM-01402 | Project HSE Inspection Form |
| CMS-710-05-FM-01403 | Shop & Warehouse HSE Inspection Form |
| CMS-710-05-FM-01404 | UK Offices Floor Warden's Checklist |
| CMS-720-01-FM-00020 | Business Glossary |
| CMS-720-01-FM-00021 | Technical Glossary |

## 6.0 TERMINOLOGY

| ***Term*** | ***Definition*** |
|---|---|
| HSE | Health, Safety and Environmental |
| Inspection | Planned and focused examination on an individual work area based on overall compliance with a specific CMS HSE procedure on a site-specific level. |
| Site | Any location, facility or project where CB&I is performing work. Sites may include, but are not limited to, laboratories, offices, shops, owned facilities, leased facilities and/or project sites. |

## 7.0 EXHIBITS

None

# ATTACHMENT 5

# USACE ACCIDENT INVESTIGATION REPORT ENG FORM 3394

| (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 Supplement to AR 385-40 The proponent agency is CESO | 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 *(YYYYMMDD)* | b. TIME OF ACCIDENT *(Military Time)* hrs. | c. EXACT LOCATION OF ACCIDENT | d. CONTRACTOR'S NAME (1) PRIME (2) SUBCONTRACTOR |
|---|---|---|---|

| e. CONTRACT NUMBER | f. TYPE OF CONTRACT | g. HAZARDOUS/TOXIC WASTE ACTIVITY |
|---|---|---|
| ☐ CIVIL WORKS ☐ MILITARY ☐ OTHER *(Specify)* | ☐ CONSTRUCTION ☐ SERVICE ☐ A/E ☐ DREDGE ☐ OTHER *(Specify)* | ☐ 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 | (CODE) # | SOURCE | (CODE) # |
| f. NATURE OF ILLNESS / INJURY | (CODE) # | | |

6. PUBLIC FATALITY *(Fill in line and correspondence code number in box - see help menu)*

| a. ACTIVITY AT TIME OF ACCIDENT | (CODE) # | b. PERSONAL FLOTATION 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 APPLICABLE |
| ☐ PICKUP/VAN ☐ AUTOMOBILE | ☐ SIDE SWIPE ☐ HEAD ON ☐ REAR END | | | | |
| ☐ TRUCK ☐ OTHER *(Specify)* | ☐ BROADSIDE ☐ ROLL OVER ☐ BACKING | (1) FRONT SEAT | ☐ | ☐ | ☐ |
| _____ | ☐ OTHER (Specify) _____ | (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. ACTIVITY AT TIME OF ACCIDENT (CODE) | a. ACTIVITY AT TIME OF ACCIDENT (CODE) |
| _____ # ☐ | _____ # ☐ |

10. ACCIDENT DESCRIPTION *(Use additional paper, if necessary, see attached page 4.)*

11. CAUSAL FACTOR*(s)* *(Read instructions 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? | ☐ | ☐ |
| 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? *(If yes, attach a copy.)* | ☐ | ☐ |

| 12. TRAINING | | |
|---|---|---|
| a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? | b. TYPE OF TRAINING | DATE OF MOST RECENT FORMAL TRAINING *(YYYYMMDD)* |
| ☐ YES ☐ NO | ☐ CLASSROOM ☐ ON JOB | |

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*(s)* *(Attach additional sheets as needed, See page 4)*

b. INDIRECT CAUSE*(s)* *(Attach additional sheets as needed, See page 5)*

| 14. ACTION(s) TAKEN, ANTICIPATED OR RECOMMENDED TO ELIMINATE CAUSE(s) | | |
|---|---|---|
| DESCRIBE FULLY *(Attach additional sheets as necessary, See page 5)* | | |
| 15. DATES FOR ACTIONS IDENTIFIED IN BLOCK 14. | | |
| a. BEGINNING *(YYYYMMDD)* | | b. ANTICIPATED COMPLETION *(YYYYMMDD)* |
| c. DATE SIGNED *(YYYYMMDD)* | d. TITLE OF SUPERVISOR COMPLETING REPORT | e. CORPS SIGNATURE, SUPERVISOR COMPLETING REPORT |
| c. DATE SIGNED *(YYYYMMDD)* | d. TITLE OF SUPERVISOR COMPLETING REPORT | e. CONTRACTOR SIGNATURE, SUPERVISOR COMPLETING REPORT |
| f. ORGANIZATION IDENTIFIER *(Division, Branch, Section, etc.,)* | | g. OFFICE SYMBOL |
| 16. MANAGEMENT REVIEW *(1st)* | | |
| a. ☐ CONCUR b. ☐ NONCONCUR c. COMMENTS | | |
| DATE*(YYYYMMDD)* | TITLE | SIGNATURE |
| 17. MANAGEMENT REVIEW *(2nd - Chief Operations, Construction, Engineering, etc.,)* | | |
| a. ☐ CONCUR b. ☐ NONCONCUR c. COMMENTS | | |
| DATE*(YYYYMMDD)* | TITLE | SIGNATURE |
| 18. SAFETY AND OCCUPATIONAL HEALTH OFFICE REVIEW | | |
| a. ☐ CONCUR b. ☐ NONCONCUR c. ADDITIONAL ACTIONS/COMMENTS | | |
| DATE*(YYYYMMDD)* | TITLE | SIGNATURE |
| 19. COMMAND APPROVAL | | |
| COMMENTS | | |
| DATE*(YYYYMMDD)* | COMMANDER SIGNATURE | |

10. ACCIDENT DESCRIPTION *(Continuation)*

13a. DIRECT CAUSE*(s)* *(Continuation)*

13b. INDIRECT CAUSE(s) *(Continuation)*

14. ACTION(s) TAKEN, ANTICIPATED, OR RECOMMENDED TO ELIMINATE CAUSE(s) *(Continuation)*

**GENERAL.** Complete a separate report for each person who was injured, caused, or contributed to the accident (excluding uninjured personnel and witnesses). Use of this form for reporting USACE employee first-aid type injuries not submitted to the Office of Workers' Compensation Programs (OWCP) shall be at the discretion of the FOA commander. Please type or print legibly. Appropriate items shall be marked with an "X" in box(es). If additional space is needed, provide the information on a separate sheet and attach to the completed form. Ensure that these instructions are forwarded with the completed report to the designated management reviewers indicated in sections 16 and 17.

**INSTRUCTIONS FOR SECTION 1 - ACCIDENT CLASSIFICATION**

*(Mark All Boxes That Are Applicable)*

a. GOVERNMENT. Mark "CIVILIAN" box if accident involved government civilian employee; mark "MILITARY" box if accident involved U.S. military personnel.

(1) INJURY/ILLNESS/FATALITY - Mark if accident resulted in any government civilian employee injury, illness, or fatality that requires the submission of OWCP Forms CA-1 (injury), CA-2 (illness) or CA-6 (fatality) to OWCP; mark if accident resulted in military personnel lost-time or fatal injury or illness.

(2) PROPERTY DAMAGE - Mark the appropriate box if accident resulted in any damage of $1000 or more to government property (including motor vehicles).

(3) VEHICLE INVOLVED - Mark if accident involved a motor vehicle, regardless of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY - Mark if the accident involved an in-house USACE diving activity.

b. CONTRACTOR.

(1) INJURY/ILLNESS/FATALITY - Mark if accident resulted in any contractor lost-time injury/illness or fatality.

(2) PROPERTY DAMAGE - Mark the appropriate box if accident resulted in any damage of $1000 or more to contractor property (including motor vehicles).

(3) VEHICLE INVOLVED - Mark if accident involved a motor vehicle, regardless of whether "INJURY/ILLNESS/FATALITY" or "PROPERTY DAMAGE" are marked.

(4) DIVING ACTIVITY - Mark if the accident involved a USACE Contractor diving activity.

c. PUBLIC.

(1) INJURY/ILLNESS/FATALITY - Mark if accident resulted in public fatality or permanent total disability. (The "OTHER" box will be marked when requested by the FOA to report an unusual non-fatal public accident that could result in claims against the government or as otherwise directed by the FOA Commander).

(2) VOID SPACE - Make no entry.

(3) VEHICLE INVOLVED - Mark if accident resulted in a fatality to a member of the public and involved a motor vehicle, regardless of whether "INJURY/ILLNESS/FATALITY" is marked.

(4) VOID SPACE - Make no entry.

**INSTRUCTIONS FOR SECTION 2 - PERSONAL DATA**

a. NAME - (MANDATORY FOR GOVERNMENT ACCIDENTS. OPTIONAL AT THE DISCRETION OF THE FOA COMMANDER FOR CONTRACTOR AND PUBLIC ACCIDENTS). Enter last name, first name, middle initial of person involved.

b. AGE - Enter age.

c. SEX - Mark appropriate box.

d. SOCIAL SECURITY NUMBER - (FOR GOVERNMENT PERSONNEL ONLY) Enter the social security number (or other personal identification number if no social security number issued).

e. GRADE - (FOR GOVERNMENT PERSONNEL ONLY) Enter pay grade. Example: 0-6; E-7; WG-8; WS-12; GS-11; etc.

f. JOB SERIES/TITLE - For government civilian employees enter the pay plan, full series number, and job title, e.g., GS-0810/Civil Engineer. For military personnel enter the primary military occupational specialty (PMOS), e.g., 15A30 or 11G50. For contractor employees enter the job title assigned to the injured person, e.g., carpenter, laborer, surveyor, etc.

g. DUTY STATUS - Mark the appropriate box.

(1) ON DUTY - Person was at duty station during duty hours or person was away from duty station during duty hours but on official business at time of the accident.

(2) TDY - Person was on official business, away from the duty station and with travel orders at time of accident. Line-of-duty investigation required.

(3) OFF DUTY - Person was not on official business at time of accident.

h. EMPLOYMENT STATUS - (FOR GOVERNMENT PERSONNEL ONLY) Mark the most appropriate box. If "OTHER" is marked, specify the employment status of the person.

**INSTRUCTION FOR SECTION 3 - GENERAL INFORMATION**

a. DATE OF ACCIDENT - Enter the month, day, and year of accident.

b. TIME OF ACCIDENT - Enter the local time of accident in military time. Example: 1430 hrs (not 2:30 p.m.).

c. EXACT LOCATION OF ACCIDENT - Enter facts needed to locate the accident scene, (installation/project name, building number, street, direction and distance from closest landmark, etc.).

d. CONTRACTOR NAME

(1) PRIME - Enter the exact name (title of firm) of the prime contractor.

(2) SUBCONTRACTOR - Enter the name of any subcontractor involved in the accident.

e. CONTRACT NUMBER - Mark the appropriate box to identify if contract is civil works, military, or other: if "OTHER" is marked, specify contract appropriation on line provided. Enter complete contract number of prime contract, e.g., DACW 09-85-C-0100.

f. TYPE OF CONTRACT - Mark appropriate box. A/E means architect/engineer. If "OTHER" is marked, specify type of contract on line provided.

g. HAZARDOUS/TOXIC WASTE ACTIVITY (HTW) - Mark the box to identify the HTW activity being performed at the time of the accident. For Superfund, DERP, and Installation Restoration Program (IRP) HTW activities include accidents that occurred during inventory, predesign, design, and construction. For the purpose of accident reporting, DERP Formerly Used DoD Site (FUDS) activities and IRP activities will be treated separately. For Civil Works O&M HTW activities mark the "OTHER" box.

**INSTRUCTIONS FOR SECTION 4 - CONSTRUCTION ACTIVITIES**

a. CONSTRUCTION ACTIVITY - Select the most appropriate construction activity being performed at time of accident from the list below. Enter the activity name and place the corresponding code number identified in the box.

**CONSTRUCTION ACTIVITY LIST**

1. MOBILIZATION
2. SITE PREPARATION
3. EXCAVATION/TRENCHING
4. GRADING (EARTHWORK)
5. PIPING/UTILITIES
6. FOUNDATION
7. FORMING
8. CONCRETE PLACEMENT
9. STEEL ERECTION
10. ROOFING
11. FRAMING
12. MASONRY
13. CARPENTRY
14. ELECTRICAL
15. SCAFFOLDING/ACCESS
16. MECHANICAL
17. PAINTING
18. EQUIPMENT/MAINTENANCE
19. TUNNELING
20. WAREHOUSING/STORAGE
21. PAVING
22. FENCING
23. SIGNING
24. LANDSCAPING/IRRIGATION
25. INSULATION
26. DEMOLITION

b. TYPE OF CONSTRUCTION EQUIPMENT - Select the equipment involved in the accident from the list below. Enter the name and place the corresponding code number identified in the box. If equipment is not included below, use code 24, "OTHER", and write in specific type of equipment.

**CONSTRUCTION EQUIPMENT**

1. GRADER
2. DRAGLINE
3. CRANE (ON VESSEL/BARGE)
4. CRANE (TRACKED)
5. CRANE (RUBBER TIRE)
6. CRANE (VEHICLE MOUNTED)
7. CRANE (TOWER)
8. SHOVEL
9. SCRAPER
10. PUMP TRUCK (CONCRETE)
11. TRUCK (CONCRETE/TRANSIT MIXER)
12. DUMP TRUCK (HIGHWAY)
13. DUMP TRUCK (OFF HIGHWAY)
14. TRUCK (OTHER)
15. FORKLIFT
16. BACKHOE
17. FRONT-END LOADER
18. PILE DRIVER
19. TRACTOR (UTILITY)
20. MANLIFT
21. DOZER
22. DRILL RIG
23. COMPACTOR/VIBRATORY ROLLER
24. OTHER

**INSTRUCTIONS FOR SECTION 5 - INJURY/ILLNESS INFORMATION**

a. SEVERITY OF INJURY/ILLNESS - Reference paragraph 2-10 of USACE Supplement 1 to AR 385-40 and enter code and description from list below.

| | |
|---|---|
| NOI | NO INJURY |
| FAT | FATALITY |
| PTL | PERMANENT TOTAL DISABILITY |
| PPR | PERMANENT PARTIAL DISABILITY |
| LWD | LOST WORKDAY CASE INVOLVING DAYS AWAY FROM WORK |
| NLW | RECORDABLE CASE WITHOUT LOST WORKDAYS |
| RFA | RECORDABLE FIRST AID CASE |
| NRI | NON-RECORDABLE INJURY |

b. ESTIMATED DAYS LOST - Enter the estimated number of workdays the person will lose from work.

c. ESTIMATED DAYS HOSPITALIZED - Enter the estimated number of workdays the person will be hospitalized.

d. ESTIMATED DAYS RESTRICTED DUTY - Enter the estimated number of workdays the person, as a result of the accident, will not be able to perform all of their regular duties.

e. BODY PART AFFECTED - Select the most appropriate primary and when applicable, secondary body part affected from the list below. Enter body part name on line and place the corresponding code letters identifying that body part in the box.

| GENERAL BODY AREA | CODE | BODY PART NAME |
|---|---|---|
| ARM/WRIST | AB | ARM AND WRIST |
| | AS | ARM OR WRIST |
| TRUNK, EXTERNAL MUSCULATURE | B1 | SINGLE BREAST |
| | B2 | BOTH BREASTS |
| | B3 | SINGLE TESTICLE |
| | B4 | BOTH TESTICLES |
| | BA | ABDOMEN |
| | BC | CHEST |
| | BL | LOWER BACK |
| | BP | PENIS |
| | BS | SIDE |
| | BU | UPPER BACK |
| | BW | WAIST |
| | BZ | TRUNK OTHER |
| HEAD, INTERNAL | C1 | SINGLE EAR INTERNAL |
| | C2 | BOTH EARS INTERNAL |
| | C3 | SINGLE EYE INTERNAL |
| | C4 | BOTH EYES INTERNAL |
| | CB | BRAIN |
| | CC | CRANIAL BONES |
| | CD | TEETH |
| | CJ | JAW |
| | CL | THROAT, LARYNX |
| | CM | MOUTH |
| | CN | NOSE |
| | CR | THROAT, OTHER |
| | CT | TONGUE |
| | CZ | HEAD OTHER INTERNAL |
| ELBOW | EB | BOTH ELBOWS |
| | ES | SINGLE ELBOW |
| FINGER | F1 | FIRST FINGER |
| | F2 | BOTH FIRST FINGERS |
| | F3 | SECOND FINGER |
| | F4 | BOTH SECOND FINGERS |
| | F5 | THIRD FINGER |
| | F6 | BOTH THIRD FINGERS |
| | F7 | FOURTH FINGER |
| | F8 | BOTH FOURTH FINGERS |
| TOE | G1 | GREAT TOE |
| | G2 | BOTH GREAT TOES |
| | G3 | TOE OTHER |
| | G4 | TOES OTHER |
| HEAD, EXTERNAL | H1 | EYE EXTERNAL |
| | H2 | BOTH EYES EXTERNAL |
| | H3 | EAR EXTERNAL |
| | H4 | BOTH EARS EXTERNAL |
| | HC | CHIN |
| | HF | FACE |
| | HK | NECK/THROAT |
| | HM | MOUTH/LIPS |
| | HN | NOSE |
| | HS | SCALP |
| KNEE | KB | BOTH KNEES |
| | KS | KNEE |
| LEG, HIP, ANKLE, BUTTOCKS | LB | BOTH LEGS/HIPS/ ANKLES/ |
| BUTTOCK | LS | SINGLE LEG/HIP/ ANKLE/BUTTOCK |
| HAND | MB | BOTH HANDS |
| | MS | SINGLE HAND |
| FOOT | PB | BOTH FEET |
| | PS | SINGLE FOOT |
| TRUNK, BONES | R1 | SINGLE COLLAR BONE |
| | R2 | BOTH COLLAR BONES |
| | R3 | SHOULDER BLADE |
| | R4 | BOTH SHOULDER BLADES |
| | RB | RIB |
| | RS | STERNUM (BREAST BONE) |
| | RV | VERTEBRAE (SPINE; DISC) |
| | RZ | TRUNK BONES OTHER |
| SHOULDER | SB | BOTH SHOULDERS |
| | SS | SINGLE SHOULDER |
| THUMB | TB | BOTH THUMBS |
| | TS | SINGLE THUMB |
| TRUNK, INTERNAL ORGANS | V1 | LUNG, SINGLE |
| | V2 | LUNGS, BOTH |
| | V3 | KIDNEY, SINGLE |
| | V4 | KIDNEYS, BOTH |
| | VH | HEART |
| | VL | LIVER |
| | VR | REPRODUCTIVE ORGANS |
| | VS | STOMACH |
| | VV | INTESTINES |
| | VZ | TRUNK, INTERNAL; OTHER |

f. NATURE OF INJURY/ILLNESS - Select the most appropriate nature of injury/illness from the list below. This nature of injury/illness shall correspond to the primary body part selected in 5e, above. Enter the nature of injury/illness name on the line and place the corresponding CODE letters in the box provided.
* The injury or condition selected below must be caused by a specific incident or event which occurred during a single work day or shift.

| GENERAL NATURE CATEGORY | CODE | NATURE OF INJURY NAME |
|---|---|---|
| *TRAUMATIC INJURY OR DISABILITY | TA | AMPUTATION |
| | TB | BACK STRAIN |
| | TC | CONTUSION; BRUISE; ABRASION |
| | TD | DISLOCATION |
| | TF | FRACTURE |
| | TH | HERNIA |
| | TK | CONCUSSION |
| | TL | LACERATION, CUT |
| | TP | PUNCTURE |
| | TS | STRAIN, MULTIPLE |
| | TU | BURN, SCALD, SUNBURN |
| | TI | TRAUMATIC SKIN DISEASES/ CONDITIONS INCLUDING DERMATITIS |
| | TR | TRAUMATIC RESPIRATORY DISEASE |
| | TQ | TRAUMATIC FOOD POISONING |
| | TW | TRAUMATIC TUBERCULOSIS |
| | TX | TRAUMATIC VIROLOGICAL/INFECTIVE/ PARASITIC DISEASE |
| | T1 | TRAUMATIC CEREBRAL VASCULAR CONDITION/STROKE |
| | T2 | TRAUMATIC HEARING LOSS |
| | T3 | TRAUMATIC HEART CONDITION |
| | T4 | TRAUMATIC MENTAL DISORDER, STRESS; NERVOUS CONDITION |
| | T8 | TRAUMATIC INJURY - OTHER (EXCEPT DISEASE, ILLNESS) |

** A nontraumatic physiological harm or loss of capacity produced by systemic infection; continued or repeated stress or strain; exposure to toxins, poisons, fumes, etc.; or other continued and repeated exposures to conditions of the work environment over a long period of time. For practical purposes, an occupational illness/disease or disability is any reported condition which does not meet the definition of traumatic injury or disability as described above.

| GENERAL NATURE CATEGORY | CODE | NATURE OF INJURY NAME | | | |
|---|---|---|---|---|---|
| **NON-TRAUMATIC ILLNESS/DISEASE OR DISABILITY | | | | | |
| RESPIRATORY DISEASE | RA | ASBESTOSIS | | DD | ENDEMIC DISEASE (OTHER THAN CODE TYPES R&S) |
| | RB | BRONCHITIS | | | |
| | RE | EMPHYSEMA | | DE | EFFECT OF ENVIRONMENTAL |
| | RP | PNEUMOCONIOSIS | CONDITION | | |
| | RS | SILICOSIS | | DH | HEARING LOSS |
| | R9 | RESPIRATORY DISEASE, OTHER | | DK | HEART CONDITION |
| VIROLOGICAL, INFECTIVE & PARASITIC DISEASES | | | | DM | MENTAL DISORDER, EMOTIONAL STRESS, NERVOUS CONDITION |
| | VB | BRUCELLOSIS | | DR | RADIATION |
| | VC | COCCIDIOMYCOSIS | | DS | STRAIN, MULTIPLE |
| | VF | FOOD POISONING | | DU | ULCER |
| | VH | HEPATITIS | | DV | OTHER VASCULAR CONDITIONS |
| | VM | MALARIA | | D9 | DISABILITY, OTHER |
| | VS | STAPHYLOCOCCUS | | | |
| | VT | TUBERCULOSIS | SKIN DISEASE OR CONDITION | | |
| | V9 | VIROLOGICAL/INFECTIVE/ PARASITIC - OTHER | | SB | BIOLOGICAL |
| DISABILITY, OCCUPATIONAL | DA | ARTHRITIS, BURSITIS | | SC | CHEMICAL |
| | DB | BACK STRAIN, BACK SPRAIN | | S9 | DERMATITIS, UNCLASSIFIED |
| | DC | CEREBRAL VASCULAR CONDITION; STROKE | | | |

g. TYPE AND SOURCE OF INJURY/ILLNESS (CAUSE) - Type and Source Codes are used to describe what caused the incident. The Type Code stands for an ACTION and the Source Code for an OBJECT or SUBSTANCE. Together, they form a brief description of how the incident occurred. Where there are two different sources, code the initiating source of the incident (see example 1, below). Examples:

(1) An employee tripped on carpet and struck his head on a desk. TYPE: 210 (fell on same level) SOURCE: 0110 (walking/working surface).

NOTE: This example would NOT be coded 120 (struck against) and 0140 (furniture).

(2) A Park Ranger contracted dermatitis from contact with poison ivy/oak.

TYPE: 510 (contact) SOURCE: 0920 (plant)

(3) A lock and dam mechanic punctured his finger with a metal sliver while grinding a turbine blade.

TYPE: 410 (punctured by) SOURCE: 0830 (metal)

(4) An employee was driving a government vehicle when it was struck by another vehicle.

TYPE: 800 (traveling in) SOURCE: 0421 (government-owned vehicle, as driver)

NOTE: The Type Code 800, "Traveling In" is different from the other type codes in that its function is not to identify factors contributing to the injury or fatality, but rather to collect data on the type of vehicle the employee was operating or traveling in at the time of the incident.

Select the most appropriate TYPE and SOURCE identifier from the list below and enter the name on the line and the corresponding code in the appropriate box.

| CODE | TYPE OF INJURY NAME | | |
|---|---|---|---|
| | | | EXERTED |
| | | 0610 | LIFTED, STRAINED BY (SINGLE ACTION) |
| | STRUCK | 0620 | STRESSED BY (REPEATED ACTION) |
| 0110 | STRUCK BY | | EXPOSED |
| 0111 | STRUCK BY FALLING OBJECT | 0710 | INHALED |
| 0120 | STRUCK AGAINST | 0720 | INGESTED |
| | FELL, SLIPPED, TRIPPED | 0730 | ABSORBED |
| 0210 | FELL ON SAME LEVEL | 0740 | EXPOSED TO |
| 0220 | FELL ON DIFFERENT LEVEL | 0800 | TRAVELING IN |
| 0230 | SLIPPED, TRIPPED (NO FALL) | | |
| | CAUGHT | **CODE** | **SOURCE OF INJURY NAME** |
| 0310 | CAUGHT ON | | |
| 0320 | CAUGHT IN | 0100 | BUILDING OR WORKING AREA |
| 0330 | CAUGHT BETWEEN | 0110 | WALKING/WORKING SURFACE (FLOOR, STREET, SIDEWALKS, ETC.) |
| | PUNCTURED, LACERATED | | |
| 0410 | PUNCTURED BY | 0120 | STAIRS, STEPS |
| 0420 | CUT BY | 0130 | LADDER |
| 0430 | STUNG BY | 0140 | FURNITURE, FURNISHINGS, OFFICE EQUIPMENT |
| 0440 | BITTEN BY | 0150 | BOILER, PRESSURE VESSEL |
| | CONTACTED | 0160 | EQUIPMENT LAYOUT (ERGONOMIC) |
| 0510 | CONTACTED WITH (INJURED PERSON MOVING) | 0170 | WINDOWS, DOORS |
| 0520 | CONTACTED BY (OBJECT WAS MOVING) | 0180 | ELECTRICITY |

| | | | |
|---|---|---|---|
| 0200 | ENVIRONMENTAL CONDITION | 0631 | CARBON MONOXIDE |
| 0210 | TEMPERATURE EXTREME (INDOOR) | 0640 | MIST, STEAM, VAPOR, FUME |
| 0220 | WEATHER (ICE, RAIN, HEAT, ETC.) | 0641 | WELDING FUMES |
| 0230 | FIRE, FLAME, SMOKE (NOT TOBACCO) | 0650 | PARTICLES (UNIDENTIFIED) |
| 0240 | NOISE | 0700 | CHEMICAL, PLASTIC, ETC. |
| 0250 | RADIATION | 0711 | DRY CHEMICAL - CORROSIVE |
| 0260 | LIGHT | 0712 | DRY CHEMICAL - TOXIC |
| 0270 | VENTILATION | 0713 | DRY CHEMICAL - EXPLOSIVE |
| 0271 | TOBACCO SMOKE | 0714 | DRY CHEMICAL FLAMMABLE |
| 0280 | STRESS (EMOTIONAL) | 0721 | LIQUID CHEMICAL - CORROSIVE |
| 0290 | CONFINED SPACE | 0722 | LIQUID CHEMICAL - TOXIC |
| 0300 | MACHINE OR TOOL | 0723 | LIQUID CHEMICAL - EXPLOSIVE |
| 0310 | HAND TOOL (POWERED; SAW, GRINDER, ETC.) | 0724 | LIQUID CHEMICAL - FLAMMABLE |
| 0320 | HAND TOOL (NONPOWERED) | 0730 | PLASTIC |
| 0330 | MECHANICAL POWER TRANSMISSION APPARATUS | 0740 | WATER |
| 0340 | GUARD, SHIELD (FIXED, MOVEABLE, INTERLOCK) | 0750 | MEDICINE |
| 0350 | VIDEO DISPLAY TERMINAL | 0800 | INAMINATE OBJECT |
| 0360 | PUMP, COMPRESSOR, AIR PRESSURE TOOL | 0810 | BOX, BARREL, ETC. |
| 0370 | HEATING EQUIPMENT | 0820 | PAPER |
| 0380 | WELDING EQUIPMENT | 0830 | METAL ITEM, MINERAL |
| 0400 | VEHICLE | 0831 | NEEDLE |
| 0411 | AS DRIVER OF PRIVATELY OWNED/RENTAL VEHICLE | 0840 | GLASS |
| 0412 | AS PASSENGER OF PRIVATELY OWNED/RENTAL VEHICLE | 0850 | SCRAP, TRASH |
| 0421 | DRIVER OF GOVERNMENT VEHICLE | 0860 | WOOD |
| 0422 | PASSENGER OF GOVERNMENT VEHICLE | 0870 | FOOD |
| 0430 | COMMON CARRIER (AIRLINE, BUS, ETC.) | 0880 | CLOTHING, APPAREL, SHOES |
| 0440 | AIRCRAFT (NOT COMMERCIAL) | 0900 | ANIMATE OBJECT |
| 0450 | BOAT, SHIP, BARGE | 0911 | DOG |
| 0500 | MATERIAL HANDLING EQUIPMENT | 0912 | OTHER ANIMAL |
| 0510 | EARTHMOVER (TRACTOR, BACKHOE, ETC.) | 0920 | PLANT |
| 0520 | CONVEYOR (FOR MATERIAL AND EQUIPMENT) | 0930 | INSECT |
| 0530 | ELEVATOR, ESCALATOR, PERSONNEL HOIST | 0940 | HUMAN (VIOLENCE) |
| 0540 | HOIST, SLING CHAIN, JACK | 0950 | HUMAN (COMMUNICABLE DISEASE) |
| 0550 | CRANE | 0960 | BACTERIA, VIRUS (NOT HUMAN CONTACT) |
| 0551 | FORKLIFT | 1000 | PERSONAL PROTECTIVE EQUIPMENT |
| 0560 | HANDTRUCK, DOLLY | 1010 | PROTECTIVE CLOTHING, SHOES, GLASSES, GOGGLES |
| 0600 | DUST, VAPOR, ETC. | | |
| 0610 | DUST (SILICA, COAL, ETC.) | 1020 | RESPIRATOR, MASK |
| 0620 | FIBERS | 1021 | DIVING EQUIPMENT |
| 0621 | ASBESTOS | 1030 | SAFETY BELT, HARNESS |
| 0630 | GASES | 1040 | PARACHUTE |

**INSTRUCTIONS FOR SECTION 6 - PUBLIC FATALITY**

**a. ACTIVITY AT TIME OF ACCIDENT** - Select the activity being performed at the time of the accident from the list below. Enter the activity name on the line and the corresponding number in the box. If the activity performed is not identified on the list, select from the most appropriate primary activity area (water related, non-water related or other activity), the code number for "Other", and write in the activity being performed at the time of the accident.

**WATER RELATED RECREATION**

1. Sailing
2. Boating-powered
3. Boating-unpowered
4. Water skiing
5. Fishing from boat
6. Fishing from bank dock or pier
7. Fishing while wading
8. Swimming/supervised area
9. Swimming/designated area
10. Swimming/other area
11. Underwater activities (skin diving, scuba, etc.)
12. Wading
13. Attempted rescue
14. Hunting from boat
15. Other

**NON-WATER RELATED RECREATION**

16. Hiking and walking
17. Climbing (general)
18. Camping/picnicking authorized area
19. Camping/picnicking unauthorized area
20. Guided tours
21. Hunting
22. Playground equipment
23. Sports/summer (baseball, football, etc.)
24. Sports/winter (skiing, sledding, snowmobiling etc.)
25. Cycling (bicycle, motorcycle, scooter)
26. Gliding
27. Parachuting
28. Other non-water related

**OTHER ACTIVITIES**

29. Unlawful acts (fights, riots, vandalism, etc.)
30. Food preparation/serving
31. Food consumption
32. Housekeeping
33. Sleeping
34. Pedestrian struck by vehicle
35. Pedestrian other acts
36. Suicide
37. "Other" activities

b. PERSONAL FLOTATION DEVICE USED - If fatality was water-related was the victim wearing a person flotation device? Mark the appropriate box.

**INSTRUCTIONS FOR SECTION 7 - MOTOR VEHICLE ACCIDENT**

**a. TYPE OF VEHICLE -** Mark appropriate box for each vehicle involved. If more than one vehicle of the same type is involved, mark both halves of the appropriate box. USACE vehicle(s) involved shall be marked in left half of appropriate box.

**b. TYPE OF COLLISION -** Mark appropriate box.

**c. SEAT BELT** - Mark appropriate box.

**INSTRUCTIONS FOR SECTION 8 - PROPERTY/MATERIAL INVOLVED**

**a. NAME OF ITEM** - Describe all property involved in accident. Property/material involved means material which is damaged or whose use or misuse contributed to the accident. Include the name, type, model; also include the National Stock Number (NSN) whenever applicable.

**b. OWNERSHIP** - Enter ownership for each item listed. (Enter one of the following: USACE; OTHER GOVERNMENT; CONTRACTOR; PRIVATE)

**c. $ AMOUNT OF DAMAGE** - Enter the total estimated dollar amount of damage (parts and labor), if any.

**INSTRUCTIONS FOR SECTION 9 - VESSEL/FLOATING PLANT ACCIDENT**

**a. TYPE OF VESSEL/FLOATING PLANT** - Select the most appropriate vessel/floating plant from list below. Enter name and place corresponding number in box. If item is not listed below, enter item number for "OTHER" and write in specific type of vessel floating plant.

**VESSEL/FLOATING PLANTS**

1. ROW BOAT
2. SAIL BOAT
3. MOTOR BOAT
4. BARGE
5. DREDGE/HOPPER
6. DREDGE/SIDE CASTING
7. DREDGE/DIPPER
8. DREDGE/CLAMSHELL, BUCKET
9. DREDGE/PIPE LINE
10. DREDGE/DUST PAN
11. TUG BOAT
12. OTHER

**COLLISION/MISHAP**

1. COLLISION W/OTHER VESSEL
2. UPPER GUIDE WALL
3. UPPER LOCK GATES
4. LOCK WALL
5. LOWER LOCK GATES
6. LOWER GUIDE WALL
7. HAULAGE UNIT
8. BREAKING TOW
9. TOW BREAKING UP
10. SWEPT DOWN ON DAM
11. BUOY/DOLPHIN/CELL
12. WHARF OR DOCK
13. OTHER

**b. COLLISION/MISHAP - Select from the list below the object(s) that contributed to the accident or were damaged in the accident.**

**INSTRUCTIONS FOR SECTION 10 - ACCIDENT DESCRIPTION**

DESCRIBE ACCIDENT - Fully describe the accident. Give the sequence of events that describe what happened leading up to and including the accident. Fully identify personnel and equipment involved and their role(s) in the accident. Ensure that relationships between personnel and equipment are clearly specified. Continue on blank sheets if necessary and attach to this report.

**INSTRUCTIONS FOR SECTION 11 - CAUSAL FACTORS**

a. Review thoroughly. Answer each question by marking the appropriate block. If any answer is yes, explain in item 13 below. Consider, as a minimum, the following:

(1) DESIGN - Did inadequacies associated with the building or work site play a role? Would an improved design or layout of the equipment or facilities reduce the likelihood of similar accidents? Were the tools or other equipment designed and intended for the task at hand?

(2) INSPECTION/MAINTENANCE - Did inadequately or improperly maintained equipment, tools, workplace, etc. create or worsen any hazards that contributed to the accident? Would better equipment, facility, work site or work activity inspections have helped avoid the accident?

(3) PERSON'S PHYSICAL CONDITION - Do you feel that the accident would probably not have occurred if the employee was in "good" physical condition? If the person involved in the accident had been in better physical condition, would the accident have been less severe or avoided altogether? Was over exertion a factor?

(4) OPERATING PROCEDURES - Did a lack of or inadequacy within established operating procedures contribute to the accident? Did any aspect of the procedures introduce any hazard to, or increase the risk associated with the work process? Would establishment or improvement of operating procedures reduce the likelihood of similar accidents?

(5) JOB PRACTICES - Were any of the provisions of the Safety and Health Requirements Manual (EM 385-1-1) violated? Was the task being accomplished in a manner which was not in compliance with an established job hazard analysis or activity hazard analysis? Did any established job practice (including EM 385-1-1) fail to adequately address the task or work process? Would better job practices improve the safety of the task?

(6) HUMAN FACTORS - Was the person under undue stress (either internal or external to the job)? Did the task tend toward overloading the capabilities of the person; i.e., did the job require tracking and reacting to many external inputs such as displays, alarms, or signals? Did the arrangement of the workplace tend to interfere with efficient task performance? Did the task require reach, strength, endurance, agility, etc., at or beyond the capabilities of the employee? Was the work environment ill-adapted to the person? Did the person need more training, experience, or practice in doing the task? Was the person inadequately rested to perform safely?

(7) ENVIRONMENTAL FACTORS - Did any factors such as moisture, humidity, rain, snow, sleet, hail, ice, fog, cold, heat, sun, temperature changes, wind, tides, floods, currents, dust, mud, glare, pressure changes, lightning, etc., play a part in the accident?

( 8) CHEMICAL AND PHYSICAL AGENT FACTORS - Did exposure to chemical agents (either single shift exposure or long-term exposure) such as dusts, fibers (asbestos, etc.), silica, gases (carbon monoxide, chlorine, etc.,), mists, steam, vapors, fumes, smoke, other particulates, liquid or dry chemicals that are corrosive, toxic, explosive or flammable, byproducts of combustion or physical agents such as noise, ionizing radiation, non-ionizing radiation (UV radiation created during welding, etc.) contribute to the accident/incident?

(9) OFFICE FACTORS - Did the fact that the accident occurred in an office setting or to an office worker have a bearing on its cause? For example, office workers tend to have less experience and training in performing tasks such as lifting office furniture. Did physical hazards within the office environment contribute to the hazard?

(10) SUPPORT FACTORS - Was the person using an improper tool for the job? Was inadequate time available or utilized to safely accomplish the task? Were less than adequate personnel resources (in terms of employee skills, number of workers, and adequate supervision) available to get the job done properly? Was funding available, utilized, and adequate to provide proper tools, equipment, personnel, site preparation, etc.?

(11) PERSONAL PROTECTIVE EQUIPMENT - Did the person fail to use appropriate personal protective equipment (gloves, eye protection, hard-toed shoes, respirator, etc.) for the task or environment? Did protective equipment provided or worn fail to provide adequate protection from the hazard(s)? Did lack of or inadequate maintenance of protective gear contribute to the accident?

(12) DRUGS/ALCOHOL - Is there any reason to believe the person's mental or physical capabilities, judgment, etc., were impaired or altered by the use of drugs or alcohol? Consider the effects of prescription medicine and over the counter medications as well as illicit drug use. Consider the effect of drug or alcohol induced "hangovers".

b. WRITTEN JOB/ACTIVITY HAZARD ANALYSIS - Was a written Job/Activity Hazard Analysis completed for the task being performed at the time of the accident? Mark the appropriate box. If one was performed, attach a copy of the analysis to the report.

**INSTRUCTIONS FOR SECTION 12 - TRAINING**

a. WAS PERSON TRAINED TO PERFORM ACTIVITY/TASK? - For the purpose of this section "trained" means the person has been provided the necessary information (either formal and/or on-the-job (OJT) training) to competently perform the activity/task in a safe and healthful manner.

b. TYPE OF TRAINING - Mark the appropriate box that best indicates the type of training; (classroom or on-the-job) that the injured person received, before the accident happened.

c. DATE OF MOST RECENT TRAINING - Enter YYYYMMDD of the last formal training completed that covered the activity task being performed at the time of the accident.

**INSTRUCTIONS FOR SECTION 13 - CAUSES**

a. DIRECT CAUSES - The direct cause is that single factor, which most directly lead to the accident. See examples below.

b. INDIRECT CAUSES - Indirect causes are those factors which contributed to but did not directly initiate the occurrence of the accident.

**Examples for section 13:**

a. Employee was dismantling scaffold and fell 12 feet from unguarded opening.

Direct cause: failure to provide fall protection at elevation. Indirect causes: failure to enforce USACE safety requirements; improper training/motivation of employee (possibility that employee was not knowledgeable of USACE fall protection requirements or was lax in his attitude towards safety); failure to ensure provision of positive fall protection whenever elevated; failure to address fall protection during scaffold dismantling in phase hazard analysis.

b. Private citizen had stopped his vehicle at intersection for red light when vehicle was struck in rear by USACE vehicle. (Note: USACE vehicle was in proper/safe working condition).

**Direct cause:** failure of USACE driver to maintain control of and stop USACE vehicle within safe distance.

**Indirect cause:** failure of employee to pay attention to driving (defensive driving).

**INSTRUCTIONS FOR SECTION 14 - ACTION TO ELIMINATE CAUSE*(s)***

**DESCRIPTION** - Fully describe all the actions taken, anticipated, and recommended to eliminate the cause(s) and prevent reoccurrence of similar accidents/ illnesses. Continue on blank sheets of paper if necessary to fully explain and attach to the completed report form.

**INSTRUCTIONS FOR SECTION 15 - DATES FOR ACTION**

a. **BEGIN DATE** - Enter the date YYYYMMDD when the corrective action(s) identified in section 14 will begin.

b. **COMPLETE DATE** - Enter the date YYYYMMDD when the corrective action(s) identified in section 14 will be completed.

c. **DATE SIGNED** - Enter YYYYMMDD that the report was signed by the responsible supervisor.

d.e.. **TITLE AND SIGNATURE -** Enter the title and signature of supervisor completing the accident report. For a GOVERNMENT employee accident/illness the immediate supervisor will complete and sign the report. For PUBLIC accidents the USACE Project Manager/Area Engineer responsible for the USACE property where the accident happened shall complete and sign the report. For CONTRACTOR accidents the Contractor's project manager shall complete and sign the report and provide to the USACE supervisor responsible for oversight of that contractor activity. This USACE supervisor shall also sign the report. Upon entering the information required in 15c., 15d., 15e., 15f. and 15g. below, the responsible USACE supervisor shall forward the report for management review as indicated in section 16.

f. **ORGANIZATION NAME** - For GOVERNMENT employee accidents enter the USACE organization name (Division, Branch, Section, etc.) of the injured employee. For PUBLIC accidents enter the USACE organization name for the person identified in block 15d. For CONTRACTOR accidents enter the USACE organization name for the USACE office responsible for providing contract administration oversight.

g. **OFFICE SYMBOL** - Enter the latest complete USACE Office Symbol for the USACE organization identified in block 15f.

**INSTRUCTIONS FOR SECTION 16 - MANAGEMENT REVIEW (1st)**

**1ST REVIEW** - Each USACE FOA shall determine who will provide 1st management review. The responsible USACE supervisor in section 15d. shall forward the completed report to the USACE office designated as the 1st Reviewer by the FOA. Upon receipt, the Chief of the Office shall review the completed report, mark the appropriate box, provide substantive comments, sign, date, and forward to the FOA Staff Chief (2nd review) for review and comment.

**INSTRUCTIONS FOR SECTION 17 - MANAGEMENT REVIEW (2nd)**

**2ND REVIEW** - The FOA Staff Chief (i .e., FOA Chief of Construction, Operations, Engineering, Planning, etc.) shall mark the appropriate box, review the completed report, provide substantive comments, sign, date, and return to the FOA Safety and Occupational Health Office.

**INSTRUCTIONS FOR SECTION 18 - SAFETY AND OCCUPATIONAL HEALTH REVIEW**

**3RD REVIEW** - The FOA Safety and Occupational Health Office shall review the completed report, mark the appropriate box, ensure that any inadequacies, discrepancies, etc. are rectified by the responsible supervisor and management reviewers, provide substantive comments, sign, date and forward to the FOA Commander for review, comment, and signature.

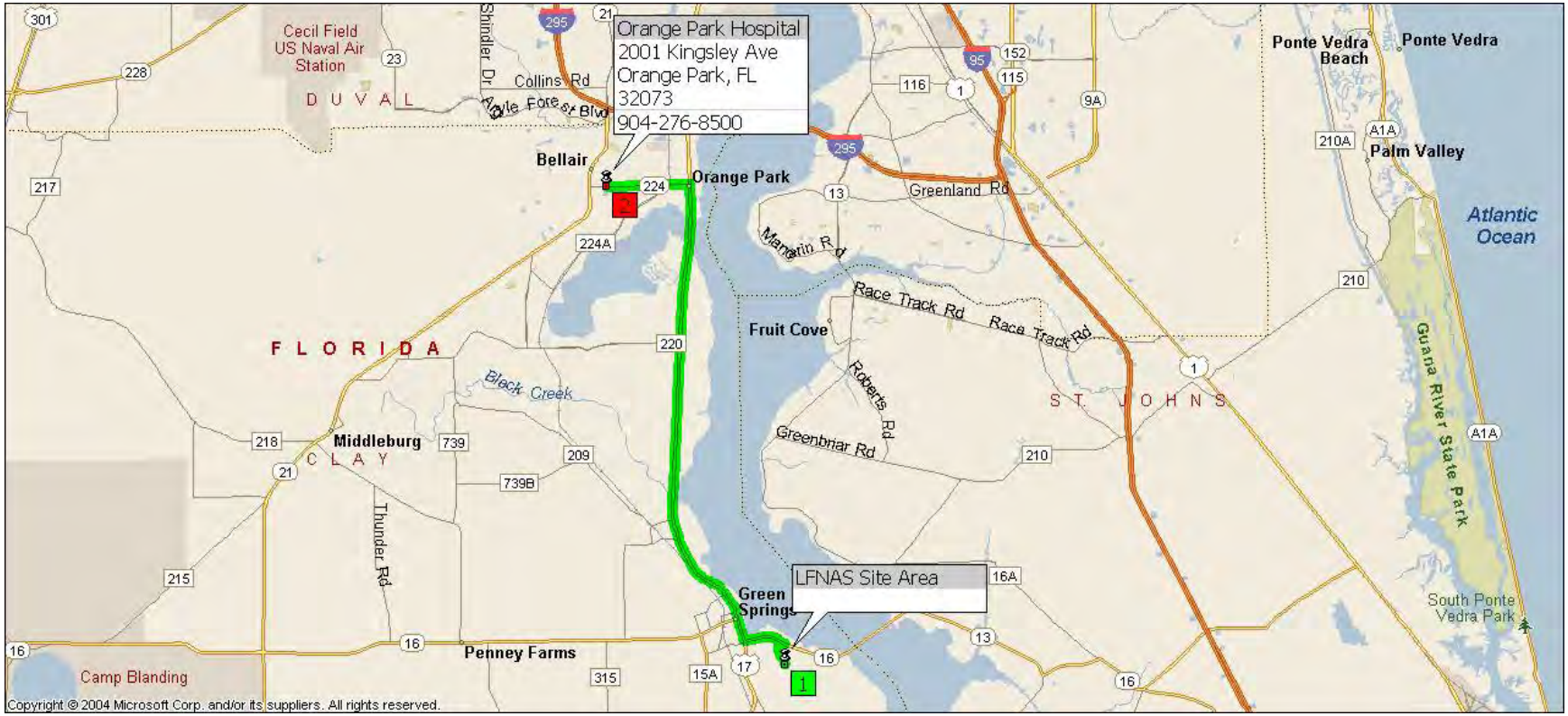
**INSTRUCTION FOR SECTION 19 - COMMAND APPROVAL**

**4TH REVIEW** - The FOA Commander shall (to include the person designated Acting Commander in his absence) review the completed report, comment if required, sign, date, and forward the report to the FOA Safety and Occupational Health Office. Signature authority shall not be delegated.

# ATTACHMENT 6

# HOSPITAL AND OCCUPATIONAL CLINIC LOCATION MAP

# HOSPITAL ROUTE MAP AND DIRECTIONS



| Time | Mile | Instruction | For |
|---|---|---|---|
| **9:00 AM** | **0.0** | **Depart LFNAS Site Area on Local road(s) (North)** | **0.3 mi** |
| 9:00 AM | 0.3 | Turn LEFT (West) onto Bunker, then immediately turn RIGHT (North) onto Gaylord | 0.2 mi |
| 9:02 AM | 0.4 | Road name changes to J Louis | 0.1 mi |
| 9:03 AM | 0.6 | Turn RIGHT (East) onto Martin | 0.1 mi |
| 9:03 AM | 0.7 | Road name changes to Reynolds Blvd | 174 yds |
| 9:04 AM | 0.8 | Turn LEFT (West) onto SR-16 [St Augustine Hwy] | 1.2 mi |
| 9:06 AM | 2.0 | Turn RIGHT (North) onto US-17 [SR-15] | 13.3 mi |
| 9:24 AM | 15.3 | Turn LEFT (West) onto SR-224 [Kingsley Ave] | 2.3 mi |
| **9:28 AM** | **17.6** | **Arrive Orange Park Hospital [2001 Kingsley Ave, Orange Park, FL 32073]** | |

## *SUMMARY*

Driving distance: 17.6 miles
Trip duration: 28 minutes
Driving time: 28 minutes

# OCCUPATIONAL CLINIC MAP AND DIRECTIONS

| Time | Mile | Instruction | For | Toward |
|---|---|---|---|---|
| **9:00 AM** | **0.0** | **Depart LFNAS Site Area on Local road(s) (North)** | **0.3 mi** | |
| 9:00 AM | 0.3 | Turn LEFT (West) onto Bunker, then immediately turn RIGHT (North) onto Gaylord | 0.2 mi | |
| 9:02 AM | 0.4 | Turn RIGHT (East) onto Roland | 0.2 mi | |
| 9:03 AM | 0.6 | Keep STRAIGHT onto Local road(s) | 0.3 mi | |
| 9:04 AM | 0.9 | Turn RIGHT (East) onto SR-16 [St Augustine Hwy] | 3.9 mi | |
| 9:09 AM | 4.8 | Bear RIGHT (East) onto SR-13 [SR-16] | 4.0 mi | |
| 9:13 AM | 8.8 | Turn LEFT (East) onto SR-16 | 9.1 mi | |
| 9:22 AM | 17.8 | Take Ramp (RIGHT) onto I-95 | 6.5 mi | I-95 / Miami |
| 9:28 AM | 24.3 | At exit 311, turn RIGHT onto Ramp | 0.3 mi | SR-207 / St. Augustine Beach / Palatka |
| 9:28 AM | 24.6 | Keep LEFT to stay on Ramp | 21 yds | SR-207 / St Augustine / St Augustine Bch / Anastasia State Pk |
| 9:28 AM | 24.6 | Keep STRAIGHT onto Local road(s) | 32 yds | |
| 9:29 AM | 24.6 | Turn LEFT (North-East) onto SR-207 | 3.8 mi | |
| 9:33 AM | 28.4 | Turn RIGHT (East) onto SR-312 | 1.0 mi | |
| 9:34 AM | 29.4 | Turn RIGHT (South) onto US-1 | 0.3 mi | |
| 9:35 AM | 29.7 | Turn LEFT (East) onto Local road(s) | 21 yds | |
| **9:35 AM** | **29.7** | **Arrive Healing Arts clinic [120 Health Park Blvd, St Augustine, FL 32086]** | | |

## *SUMMARY*

Driving distance: 29.7 miles
Trip duration: 35 minutes
Driving time: 35 minutes

# ATTACHMENT 7

# BOAT INSPECTION FORMS AND FLOAT PLAN

| SAFETY INSPECTION FOR LAUNCHES, MOTORBOATS AND SKIFFS | Date of Inspection: |
|---|---|
| Contractor or Unit: Shaw Environmental, Inc.<br>Name of Equipment:<br>Subcontractor (if applicable): | Contract No. or Activity:<br>Superintendent: |
| Inspected by (Signature) | Witness (Signature) |

| | NOTE: Safety and Health Requirements Manual (EM385-1-1) references in parentheses. | Yes | No | N/A |
|---|---|---|---|---|
| 1 | Is a qualified crew person assigned to assist with deck duties under the following circumstances: (19.C.01)<br>A. When extended trips (more than 2 hours) are made from the work site?<br>B. When conditions of navigation make it hazardous for an operator to leave the wheel while underway?<br>C. When operations other than tying-in require the handling of lines?<br>D. When operating at night or in inclement weather?<br>E. When towing? | | | |
| 2 | Are all motor boats, launches and skiffs posted with the number of passengers and weight they can carry? | | | |
| 3 | Is there a PFD available for each passenger and crew member? | | | |
| 4 | Do all launches and motor boats that are less than 26 feet in length have at least one 1A-10B:C fire extinguisher on board? | | | |
| 5 | Do all launches and motor boats that are less than 26 feet or more in length have at least 2 1A-10B:C fire extinguisher on board? | | | |
| 6 | Do all launches and motorboats that have gasoline or liquid petroleum gas power plants or equipment in cabins, compartments, or confined spaces have a built-in automatic CO2 or other equally effective type of fire extinguishing system? | | | |
| 7 | Are all cabins, launches and motorboats equipped with “kill (dead man) switches”? | | | |
| 8 | Have all motorboat operators completed the following training?<br>A. A boating safety course meeting the USCG Auxiliary, National Associate of Safety Boating Law Administrators (NASBLA), or equivalent; and<br>B. Motorboat handling training, based on the type of boats they will operate, provided by qualified instructors (in-house or other)<br>C. Operators must pass a written and operational test<br>D. Current USCG licensed personnel are exempt from the boating safety training, but they shall complete the written exam and operational test. | | | |
| 9 | Does the boat meet the minimum flotation requirements of the USCG? | | | |
| 10 | 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? | | | |
| 11 | Is the fuel supply hose in satisfactory condition? | | | |
| 12 | Is the hull in a good condition? (No obvious leaks.) | | | |
| 13 | Is the battery, battery connections, and battery cables in good condition? | | | |

| REMARKS: | | | |
|---|---|---|---|
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

This Form prepared by Shaw is consistent with SAD Form 1437b-R. Previous editions may be used for contract submittals prior to Nov 03. Reference: EM 385-1-1, 3 November 2003 edition.

# U.S. Coast Guard Courtesy Inspection Checklist

| Subject | | Subject | |
|---|---|---|---|
| **1. Numbering** (Proper spacing, contrasting color, minimum 3" block letters.) | Yes❑ No❑ N/A❑ | **15. Dewatering Device** (Pumps must work, extra manual bailer.) | Yes❑ No❑ N/A❑ |
| **2. Registration/Documentation** (Papers must be on board) | Yes❑ No❑ N/A❑ | **16. Overall Vessel Condition** (Bilge & equipment area clean, well maintained. Not overloaded, overpowered, or no automotive parts.) | Yes❑ No❑ N/A❑ |
| **3. Navigation Lights** (Must operate and show proper configuration) | Yes❑ No❑ N/A❑ | **17. Electrical Systems** (Batteries secure, terminals covered, well-organized wiring, proper fuses/circuit breakers.) | Yes❑ No❑ N/A❑ |
| **4. Sound Producing Device** (Horn, whistle, or other device) | Yes❑ No❑ N/A❑ | **18.Galley/Heating Systems** (secure system, proper tank installation. No flammable material nearby.) | Yes❑ No❑ N/A❑ |
| **5. Bell** (Boats 12m [39.4ft.] or longer) | Yes❑ No❑ N/A❑ | **19 State Requirements** (Comply with all state safety requirements.) | Yes❑ No❑ N/A❑ |
| **6. Personal Flotation Device** (PFD) (One wearable for each passenger, min. 2. Boats 16' & over also one type IV.) | Yes❑ No❑ N/A❑ | **20. Marine Sanitation Device** (Approved device, overboard discharge sealed.) | Yes❑ No❑ N/A❑ |
| **7. Fire Extinguishers** (Mounted , min. for size & type of boat, HALON/FE241/CO2 - current tag.) | Yes❑ No❑ N/A❑ | **21. Marpol Trash Placard** (Boats 26 ft. & over, written plan 40 ft. & over.) | Yes❑ No❑ N/A❑ |
| **8. Visual Distress Signal (VDS) Inland** (VDS, flag, signal light, etc.) | Yes❑ No❑ N/A❑ | **22. Pollution Placard** (Boat 26 ft. & over, with machinery | Yes❑ No❑ N/A❑ |

| | | | |
|---|---|---|---|
| | | compartment.) | |
| **9. Visual Distress Signal (VDS) International** (minimum flares/aerial rockets or approved signals, not expired.) | Yes❑ No❑ N/A❑ | **23. Navigation Rules** (Boats 12m [39.4 ft.] and over.) | Yes❑ No❑ N/A❑ |
| **10. Ventilation** (For closed compartments with potential for explosive vapors and an ignition source. Installed blower must work. Warning posted.) | Yes❑ No❑ N/A❑ | **24. FCC Marine Radio License** (All radios, radar, EPIRB, etc.) | Yes❑ No❑ N/A❑ |
| **11. Backfire Flame Arrester** (Approved type, tight installation, clean.) | Yes❑ No❑ N/A❑ | **Items Which Are Not Required For the CME Decal** The following items are not required for the CME decal. These additional items are required under Federal and State laws. The Vessel Examiner has checked these items to assist the boater in determining if the vessel meets requirements of these laws. | |
| **12. Fuel System** (Tanks secure. Over 7 gal. are considered permanent & must be grounded/vented. Hoses in good condition. No leaks. | Yes❑ No❑ N/A❑ | **25. CG Capacity Plate** (Visible, monohull powerboats, under 20 ft.) | Yes❑ No❑ N/A❑ |
| **13. Anchor & Anchor Line** (Suitable for the boat and boating area.) | Yes❑ No❑ N/A❑ | **26. Certificate of Compliance Label** (Monohull powerboats, under 20 ft., all boats with installed engines, except outboards, mfg. after 10/31/72.) | Yes❑ No❑ N/A❑ |
| **14. Alternate Propulsion** (Boats under 16 ft. paddle, oar, etc.) | Yes❑ No❑ N/A❑ | **27. Hull Identification Number** (All boats mfg. after 10/31/72.) | Yes❑ No❑ N/A❑ |
| Notes: | | | |

# Lee Field NAS Float Plan

| | |
|---|---|
| Name of Vessel's Operator: | |
| Telephone Number: | |
| Name of Vessel: | |
| Registration/Certificate No.: | |
| Description of Vessel:<br>Type:<br>Make:<br>Color of Hull:<br>Color of Trim:<br>Most distinguishing identifiable feature: | |

Number of persons onboard:

| Name: | Age: | Address & Emergency Contact Telephone Number |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |

Engine Type: _____ H.P.: _____ Normal Fuel Supply: _____

| | |
|---|---|
| Survival equipment on board: (check as appropriate)<br>Life Jackets □<br>Flares □<br>Paddles □<br>Smoke Signals □<br>VHF Radio/Cell Phone □<br>Loran/GPS □<br>Bell, Whistle or Horn □ | First Aid Kit □<br>Fire Extinguisher □<br>Boat Hook □<br>Bow Line □<br>Emergency Position Indicating Radio Beacon (EPIRB) □<br>Knife □<br>Anchor □ |

Trip Itinerary:

Date and Time of Departure:

Departure From:

Departure To:

Estimated Time of Return: _____ In no case later than: _____

Activate Search Time: _____

Supervisors Name: _____

Radio Call Sign: _____

Float Plan Closing Time: _____

Signature of Operator for Closing Float Plan:

Additional Information: US Coast Guard Jacksonville Sector (904) 564-7500
Sheriffs Office (904) 284-7575
Green Cove Springs Police Dept (904) 529-2220

Additional phone numbers as applicable:

# ATTACHMENT 8

# HURRICANE PROTECTION PLAN

# HURRICANE PREPAREDNESS PLAN GUIDELINE
## FORMER LEE FIELD NAVAL AIR STATION
## GREEN COVE SPRINGS, FLORIDA

**Prepared for:**

**U.S. Army Corps of Engineers**
**Jacksonville District**
**Jacksonville, FL 32207-0019**

**Prepared by:**

**Shaw Environmental & Infrastructure, Inc. (a CB&I company)**
**312 Directors Drive**
**Knoxville, Tennessee 37923**

**May 2014**

# *TABLE OF CONTENTS*


1.0 Introduction ..... 1-1
- 1.1 Purpose ..... 1-1
- 1.2 Scope ..... 1-1
- 1.3 Discussion ..... 1-1

2.0 Definitions ..... 2-1
- 2.1 Conditions of Readiness (CORS) ..... 2-1

3.0 Responsibilities ..... 3-1

4.0 Emergency Operating Procedures ..... 4-1
- 4.1 Condition V - Early Preparedness ..... 4-1
- 4.2 Condition IV ..... 4-1
- 4.3 Condition III ..... 4-2
- 4.4 Condition II . ..... 4-2
- 4.5 Condition I ..... 4-3
- 4.6 Resume Site Operations ..... 4-3

5.0 Debriefing ..... 5-1

6.0 References ..... 6-1


**ATTACHMENTS**


ATTACHMENT A Hurricane Preparedness Responsibility Checklists
- Hurricane Preparedness Checklist
- Condition V – Hurricane Preparedness Checklist
- Condition IV (Landfall within 72 hours) – Hurricane Preparedness Checklist
- Condition III (Landfall within 48 hours) – Hurricane Preparedness Checklist
- Condition II – Hurricane Preparedness Checklist
- Condition I – Hurricane Preparedness Checklist
- Resume Site Operations –Hurricane Preparedness Checklist

ATTACHMENT B EMERGENCY PHONE NUMBERS

ATTACHMENT C HURRICANE TRACKING MAP

# *1.0 INTRODUCTION*

## 1.1 PURPOSE

This procedure outlines the general responsibilities and actions to be taken in preparation for and response to a hurricane or hurricane warnings at the former Lee Field Naval Air Station (LFNAS), Clay County, Florida. All personnel should understand that predicting the occurrence and path of a hurricane is difficult, however the risk can be minimized and controlled by following the recommended procedures in this plan.

## 1.2 SCOPE

This procedure is applicable to all contractor personnel, including Shaw's subcontractors, temporary construction facilities, and remediation equipment present at the former LFNAS project site. These guidelines will be used in conjunction the former LFNAS facility or local specific procedures.

## 1.3 DISCUSSION

This procedure provides information on how to better protect personnel and property in the event of a hurricane. In Florida attention must be paid to all hurricanes, since there is no way to determine with 100 percent accuracy whether a hurricane will actually hit the area until a few hours before landfall. Historically, Gulf coast areas have suffered the most severe damage from hurricanes.

The following table demonstrates that the accuracy of forecasting where a hurricane landfall will occur is very low more than 24 hours in advance of a storm.

| Hours Before Landfall | Maximum Probability Values |
|---|---|
| 72 Hours | 10 Percent |
| 48 Hours | 13-18 Percent |
| 36 Hours | 20-25 Percent |
| 24 Hours | 35-45 Percent |
| 12 Hours | 60-70 Percent |

## *2.0 DEFINITIONS*

The following definitions apply to various terms used in this document.

### 2.1 Conditions of Readiness (CORS)

**Condition V** - Destructive winds are possible at the site within 96 hours. Normal daily jobsite cleanup and good housekeeping practices.

**Condition IV** - Destructive winds are possible at site within 72 hours. Normal daily jobsite cleanup and good housekeeping practices. Collect and store in piles or containers, scrap lumber, waste material, and rubbish for removal and disposal at the end of each work day. Maintain the construction site, including storage areas, free of accumulation of debris. Stack lumber in neat piles less than 4 feet high. Remove all trash debris and other objects which could become missile hazards. Contact client representative for Condition requirements, updates, and completion of required actions.

**Condition III** - Destructive winds are possible at the site within 48 hours. Maintain Condition IV requirements. Begin securing the jobsite for and taking those actions necessary for Condition I, which cannot be completed within 18 hours. Cease all routine activities which might interfere with securing operations. Begin collecting and stowing all gear and portable equipment. Make preparations for securing buildings. Review requirements pertaining to Condition II and continue action as necessary to attain Condition III readiness. Contact the weather station on base for weather and CORS updates and completion of required actions.

**Condition II** - Destructive winds are possible at the site within 24 hours or a Small Area Storm is anticipated within 6 hours. Curtail or cease routine activities until securing operations are complete. Reinforce office facility support structures. Secure machinery, tools, equipment and materials, or remove from job site. Expend every effort to clear all missile hazards and loose equipment from the jobsite. Contact client representative for weather and CORS updates and completion of required actions. Follow all local recommendations for evacuation and use designated evacuation routes.

**Condition I** - Destructive winds are possible at the site within 12 hours or a small area storm is imminent within 1 hour. Perform and complete all remaining actions required for lower conditions of readiness. Secure the jobsite and leave the premises. It is recommended the site be evacuated prior to Condition I situations.

**Destructive Winds** - Generally winds reaching or exceeding the force of a tropical storm ($\geq$ 39 mph or 34 knots). Winds from any storm system (tropical or otherwise) that are determined to have the potential to cause property damage or personal injury which would warrant the site to initiate a Condition IV alert.

**Gale** – Non-tropical windstorm with winds 33 to 55 knots.

**Hurricane Watch** - An announcement for specific areas where a hurricane or an incipient hurricane poses a possible threat to a coastal area, generally within 36 hours.

**Hurricane Warning** - A warning that sustained winds of 74 MPH (64 knots) or higher, associated with a hurricane are expected in a specified coastal area in 24 hours or less.

**Hurricane -** A tropical cyclone in which the maximum sustained surface wind is 64 knots (74 MPH) or greater.

**Missile Hazard -** Any object that may become airborne during high winds.

**Severe Weather -** Any storm of tropical or non-tropical origin that has the capacity to produce destructive winds

**Small Area Storms** – Thunderstorms or tornadoes.

**Small Area Storms Condition I -** Destructive winds, heavy rain, lightening and hail are imminent within 1-hour.

**Small Area Storms Condition II -** Destructive winds, heavy rain, lightening and hail are expected within 6-hours.

**Storm** – Non-tropical windstorm with winds 33 to 55 knots.

**Storm Surge -** An abnormal rise in sea level accompanying a hurricane or other intense storm, and whose height is the difference between the observed level of the sea surface and the level that would have occurred in the absence of the storm.

**Storm Tide -** The actual sea level resulting from the astronomical tide combined with the storm surge. This term is used interchangeably with "Hurricane Tide."

**Tornado** – Violent rotating columns of air with winds 100 to 250 knots.

**Tropical Depression -** A tropical low pressure system in which the maximum sustained surface wind is 33 knots (38 MPH) or less.

**Tropical Storm -** A tropical low pressure system in which the maximum surface wind ranges from 34 to 63 knots (39 to 73 MPH) inclusive. This is the strength at which the National Hurricane Center applies a name to the storm.

**Tropical Storm Watch -** Tropical storm conditions pose a threat to a coastal area generally within 36 hours.

**Tropical Storm Warning -** A warning for tropical storm conditions with sustained winds within the range of 39 to 73 MPH which are expected in a specified coastal area within 24 hours or less.

## *3.0 RESPONSIBILITIES*

***Project Manager – Ken Cunningham***

The Project Manager (PM) is responsible for ensuring that all adequate measures have been taken to prepare for hurricanes and to protect Shaw site personnel and property in the event of a hurricane. The PM will ensure that ample resources are available to implement this plan and that all personnel are aware of this plan and their responsibilities.

***Site Manager/Site Safety and Health Officer – Shane Yenchi / Burney Chance and Zach Parham***

The Site Supervisor and Site Safety Officer (SS/SSHO) will monitor weather information, including the National Weather Service probability values for landfall. The SS/SSHO will maintain the necessary emergency supplies, and will periodically tour the site to ensure that proper steps are being taken to protect site personnel and property. The SSHO will develop the emergency contact list and post the list in a prominent area in the office trailer. The SS/SSHO will communicate all hurricane information to site personnel, and keep the site personnel continually informed of the measures to be taken. The SS is responsible for the coordination and direction of site equipment shut-down and will oversee the preparation of site facilities for any imminent storm. The SS will oversee the coordination of both pre- and post-storm operations and will ensure that the proper material, equipment, and supplies are utilized to implement this procedure. The SS is also responsible for the back-up of critical computer files at the site and will oversee the securing of the site computers and project files prior to any storm.

Note: When personnel identified in Section 3.0 leave the site, they are responsible for notifying the Project Manager of a designated back-up person. The back-up person will be instructed in their responsibilities in the event of a hurricane.

# *4.0 EMERGENCY OPERATING PROCEDURES*

## 4.1 Condition V - Early Preparedness

The SS/SSHO will notify the PM and HSM when a tropical storm has been named and/or any severe weather has the potential to produce destructive winds at the site within 96 hours. This will initiate Condition of Readiness (CORS) Condition V. This phase will continue until:

- The storm or condition is downgraded
- The storm track poses no threat to the site
- Condition IV begins

During Condition V, the progress of the storm will be monitored and tracked. The client will be contacted at least twice daily for Condition Requirements updates and to inform them of completion of required actions for Condition V.

See Appendix A for the Hurricane Preparedness Responsibility Punch List - Condition V.

## 4.2 Condition IV - (Destructive winds are possible within 72 Hours)

This CORS starts when Shaw is aware through the National Weather Service (NWS) or National Oceanic and Atmospheric Administration (NOAA) that severe weather is within 72 hours of posing a threat to the project location. The SM/SSHO will ensure that the following steps are taken:

- Monitor the storm and inform the PM and Health and Safety Manager of its progress
- Check PPE supplies and equipment to determine if any shipments are required or if pending shipments should be advanced or postponed

During Condition IV, the progress of the storm will be continuously monitored and tracked. The SM/SSHO will instruct site personnel to begin general cleanup of all loose materials which may pose a hazard during high winds or rain. This will include removal of all debris, trash, and other debris that may become missile hazards. All form lumber will be stacked in neat piles less than 4 feet high. The client representative will be contacted at least twice daily for Condition Requirements updates and to inform him of completion of required actions for Condition IV.

The SM/SSHO will keep all site personnel advised of the status of the storm and site preparation activities. Due to the urgency and amount of work involved in preparing for a threatening storm, all construction operations which might interfere with securing operations, such as starting a major excavation, sampling event, etc., will cease.

The SM/SSHO will ensure that the following steps are taken:

- Fill fuel tanks in all equipment on-site
- Secure stockpiled material on-site.
- Make sure all portable generators and light plants if applicable are operational and make arrangements to secure additional ones if needed.
- Review requirements for Condition II with all crew members.
- Maintain condition IV requirements.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition IV.

## 4.3 Condition III - Tropical Storm Warning (Destructive winds are possible Within 48 Hours)

This CORS starts when severe weather places the project site under a tropical storm warning. Condition III activities will also start if a threatening tropical storm is upgraded to a hurricane, or a severe storm approaching the site has generated destructive winds in other locations. The PM and SM/SSHO will determine when to cease all operations based upon current weather conditions and/or as directed by the client representative. If the storm or Condition is downgraded, the PM, SM, and SSHO will meet with the client to decide if a downgrade of the CORS is appropriate. Actions for Condition III will be maintained and the following shall also be completed:

- Machinery, tools, equipment, and materials will be secured or removed form the site.
- Take actions to secure jobsite necessary for Condition I that cannot be completed within 18 hours.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition III.

## 4.4 Condition II - Destructive Winds are anticipated <u>within 24 hours</u> or a small area storm is anticipated <u>within 6 hours</u>.

Condition II begins when destructive winds are anticipated within 24 hours, a small area storm is anticipated in 6 hours, and/or as directed by the client. The PM and SM/SSHO will determine when to demobilize from the site based upon weather conditions. During this phase:

The SM will:

- Secure machinery, tools, equipment and materials or remove them from the jobsite.
- Conduct a roll call of personnel on-site and inform the SSHO
- Notify personnel, on leave, of schedule changes
- Personnel needing to leave the project to attend to personal matters will notify their SM immediately.
- Valuable records, files, and equipment will be boxed in preparation for movement to a safe location.
- Move large office equipment away from doors and windows
- Tape or board the windows in the office trailers

The SM/SSHO will ensure that the following step is taken:

- All visitors from the site are evacuated
- Make a final site walk-through to determine that the site is secure and clear all missile hazards from the jobsite
- Inform the Project Manager and Health and Safety Manager that all personnel are being released from the site

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition II.

## 4.5 Condition I - Destructive winds are anticipated <u>within 12 hours</u> or a Small Area Storm is imminent <u>within 1 hour</u>.

- Complete all remaining actions required for lower conditions of readiness.
- Secure jobsite access and evacuate to safe refuge.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Condition I.

## 4.6 Resume Site Operations

The PM will contact the client representative to determine when site operations will resume. Although the hurricane/severe weather has passed, hazards may still exist because of water damage, other hazardous conditions, dangers from electric shock, poisonous snakes, etc.

The SM/SSHO will conduct a damage survey with the USACE. Photographs of the storm damage at the site will be taken by the SM/SSHO. They will develop a prioritized recovery plan from the survey findings. Subsequently, all site personnel will be notified when it is safe to return to work. Required personnel and subcontractor expertise will be mobilized to the site to repair any damaged equipment.

See Appendix A for the Hurricane Preparedness Responsibility Checklist - Resume Site Operations.

## *5.0 DEBRIEFING*

Following the return to work of site personnel, the Site Manager will conduct a debriefing with site personnel. The debriefing will accomplish the following objectives:

- Finalize a recovery plan
- Review the Hurricane Plan for effectiveness
- Suggest and agree on improvements to the plan
- Incorporate plan changes

When completed, the PM and SM/SSHO will meet with site personnel to discuss any corrective actions or changes in this plan.

## *6.0 REFERENCES*

The following references and sources of information may be consulted for additional guidance on hurricane preparedness and response.

- Disaster Planning Guide for Business and Industry, Federal Emergency Management Administration (FEMA).

- U.S. Department of Commerce; National Oceanic and Atmospheric Administration (NOAA)

# *ATTACHMENT A*

# *HURRICANE PREPAREDNESS RESPONSIBILITY CHECKLISTS*

**HURRICANE PREPAREDNESS CHECKLIST**
**Itemized Equipment Checklist, Condition III.**

| Equipment | Secure in Place | Remove from Project Site |
|---|---|---|
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |
| | | |

**HURRICANE PREPAREDNESS CHECKLIST**

# Condition V

**Date/Time Entered Condition V:_____**

**Severe Weather/Tropical Storm: _____**

**Action Items:**

- ☐ Project Manager Notified
- ☐ Track of Storm Poses No Threat
- ☐ Storm or Condition is Downgraded
- ☐ Upgrade to Condition IV

**Storm Location:**

Date/Time:_____ Date/Time:_____

Location/Coordinates:_____ Location/Coordinates:_____

Date/Time:_____ Date/Time:_____

Location/Coordinates:_____ Location/Coordinates:_____

**Condition V Action Items Complete:_____**

**Date:_____**

**HURRICANE PREPAREDNESS CHECKLIST**

## Condition IV (Landfall within 72 hours)

**Date/Time Entered Condition IV:_____**

**Action Items:**

- ☐ Notify Project Manager and Health and Safety Manager
- ☐ Notify Site Personnel
- ☐ Assemble Shift personnel to begin preparation
- ☐ Track storm on hurricane tracking map (Attachment C) (if applicable)

**The Project Foremen will ensure the following steps are taken:**

- ☐ Secure all heavy equipment located at the site in accordance with manufacturer's specifications.
- ☐ All equipment fuel tanks will be filled.
- ☐ All subcontractors with equipment or supplies on-site will be notified to begin removal procedures
- ☐ Ensure all generators and lights are operational and make arrangements to secure additional ones if needed.

**Condition IV Action Items Complete:_____**

**Date:_____**

**HURRICANE PREPAREDNESS CHECKLIST**

## Condition III (Landfall within 48 hours)

**Date/Time Entered Condition III:_____**

**Action Items:**

- ☐ Provide the status of the storm to site personnel on an hourly basis
- ☐ Remove all valuable records, files, and small equipment from the trailers
- ☐ Take actions to secure job-site necessary for Condition I that cannot be accomplished in 18 hours
- ☐ Recheck all items on checklist IV to ensure they are complete (ie.: gas tanks are still filled)

See itemized equipment checklist (itemized list of equipment to be secured/removed and CORS for action)

**Condition III Action Items Complete:_____**

**Date:_____**

**HURRICANE PREPAREDNESS CHECKLIST**

# Condition II

**Date/Time Entered Condition II:_____**

**Action Items:**

- ☐ Evacuate all visitors from the site
- ☐ Conduct a role call of site personnel and inform the SSO
- ☐ Move large office equipment away from doors and windows
- ☐ Check the status all incoming shipments of supplies and equipment
- ☐ Remove all unnecessary vehicles from the site
- ☐ Secure heavy equipment in accordance with manufacturer's specification
- ☐ Tape or board trailer windows
- ☐ Secure all valuable records and equipment
- ☐ Release personnel from the site
- ☐ Recheck all items on checklist IV and III to ensure they are complete (i.e.: gas tanks are still filled)

**Condition II Action Items Complete:_____**

**Date:_____**

**HURRICANE PREPAREDNESS CHECKLIST**

# Condition I

**Date/Time Entered Condition I:_____**

**Action Items:**

- ☐ Complete all action items for lower conditions of readiness
- ☐ Secure job-site access and evacuate to safe refuge

**Condition I Action Items Complete:_____**

**Date:_____**

**HURRICANE PREPAREDNESS CHECKLIST**

## Resume Site Operations

**Date/Time Resume Site Operations:_____**

**Action Items:**

- ☐ Conduct a damage survey and notify Project Manager and Health and Safety Manager
- ☐ Notify all site personnel when to return to work
- ☐ Develop a prioritized recovery plan
- ☐ Inspect electrical equipment before re-energizing to detect and repair damage
- ☐ Inspect trailers for structural damage. Repair as needed.
- ☐ Provide bottled water for drinking until normal drinking water is deemed safe to drink
- ☐ Remove storm debris from site
- ☐ Notify client representative of the resumption of site activities

**Resume Site Operations Action Items Complete:_____**

**Date:_____**

# *ATTACHMENT B*

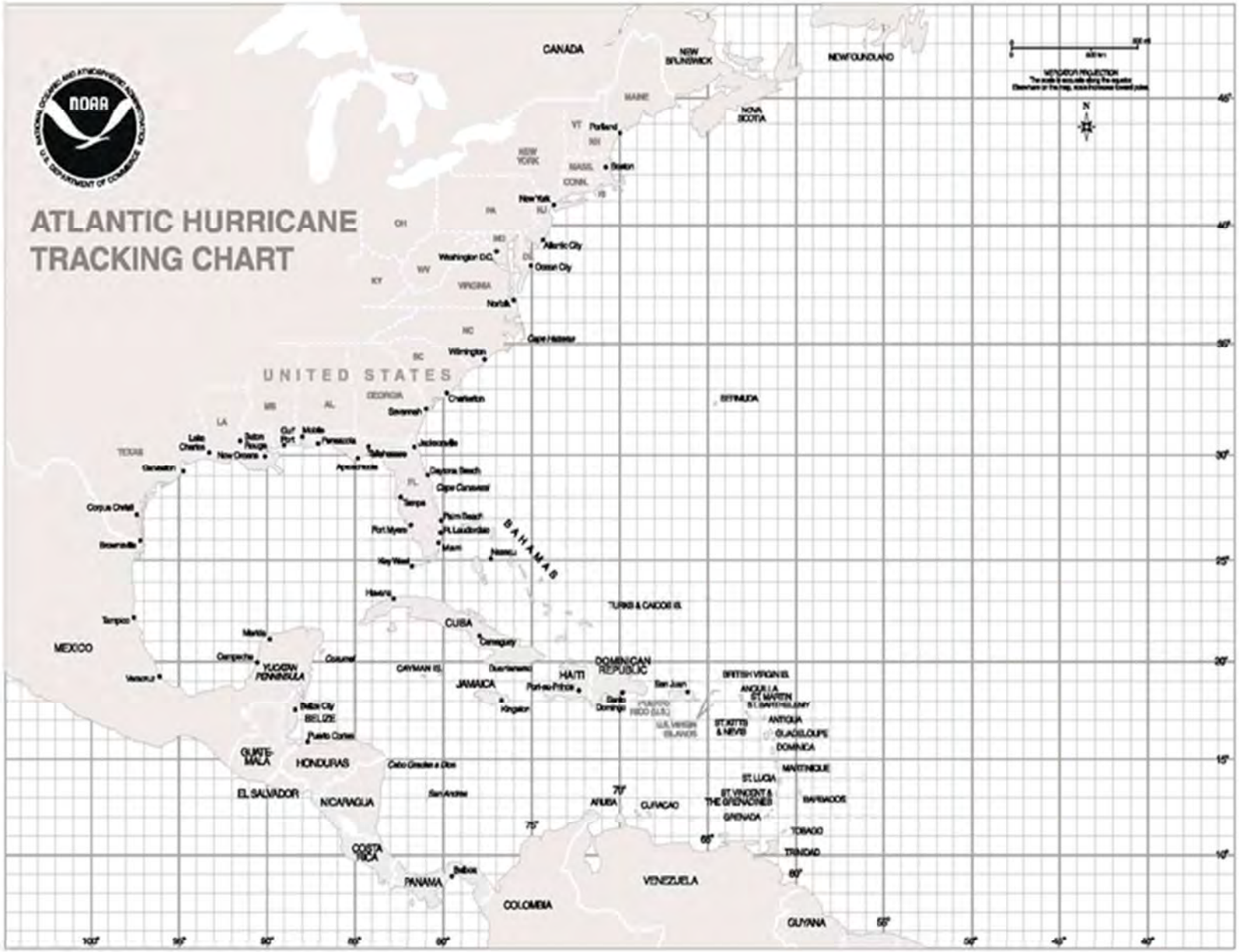
## *EMERGENCY PHONE NUMBERS*

**Emergency Telephone Numbers**

| Agency | Phone Number |
|---|---|
| Green Cove Springs Fire Department | (904) 529-2233 |
| Emergency (Ambulance, Fire Department, Sheriff's Office) | 911 |
| Clay County Sheriff | (904) 284-7575 |
| Orange Park Medical Center (Emergency Services) | (904) 276-8500 |
| Healing Arts Urgent Care Occupational Clinic | (904) 823-3401 |
| CORE Health Services | (877) 347-7429 |
| Game and Fresh Water Fish Commission of Florida (reporting alligator nuisance) | (904)758-0525 |
| National Response Center | (800) 424-8802 |
| Poison Control Center | (800) 222-1222 |
| EPA Region IV | (404) 347-3931 |
| **Key Project Personnel:** | |
| Ken Cunningham, Shaw PM | Direct dial: (865) 692-3585<br>Cell (865) 607-0406 |
| Zach Parham, Shaw Site Supervisor | Office (865) 670-2675<br>Cellular: (865) 386-5604 |
| Shaw Health and Safety Manager, Doug Russell | Direct dial: (865) 692-3584<br>Cellular: (865) 414-9545 |
| Shaw Environmental, Health, and Safety HOTLINE (Incident Notification) | (866) 299-3445 |
| Dr. William Nassetta, CORE Occupational Physician | (877) 347-7429 |

# *ATTACHMENT C*

## *HURRICANE TRACKING MAP*


ATLANTIC HURRICANE
TRACKING CHART
NOAA
CANADA
NEW BRUNSWICK
NEWFOUNDLAND
NOVA SCOTIA
MAINE
VT
NH
NEW YORK
MASS.
CONN.
RI
PA
NJ
OH
MD
DE
WV
KY
VIRGINIA
NC
SC
UNITED STATES
GEORGIA
MS
AL
LA
TEXAS
FL
Portland
Boston
New York
Atlantic City
Washington D.C.
Ocean City
Norfolk
Cape Hatteras
Wilmington
Charleston
Savannah
Jacksonville
Mobile
Pensacola
Gulf Port
Baton Rouge
New Orleans
Lake Charles
Galveston
Corpus Christi
Brownsville
Apalachicola
Tallahassee
Daytona Beach
Cape Canaveral
Tampa
Palm Beach
Ft. Lauderdale
Miami
Fort Myers
Key West
Nassau
BAHAMAS
Havana
CUBA
Camaguey
TURKS & CAICOS IS.
BERMUDA
MEXICO
Tampico
Veracruz
Merida
Campeche
YUCATAN PENINSULA
Cozumel
Belize City
BELIZE
Puerto Cortez
GUATEMALA
HONDURAS
EL SALVADOR
NICARAGUA
Cabo Gracias a Dios
San Andres
CAYMAN IS.
JAMAICA
Kingston
Guantanamo
HAITI
Port-au-Prince
DOMINICAN REPUBLIC
Santo Domingo
San Juan
PUERTO RICO (U.S.)
U.S. VIRGIN ISLANDS
BRITISH VIRGIN IS.
ANGUILLA
ST. MARTIN
ST. BARTHELEMY
ST. KITTS & NEVIS
ANTIGUA
GUADELOUPE
DOMINICA
MARTINIQUE
ST. LUCIA
ST. VINCENT & THE GRENADINES
BARBADOS
GRENADA
TOBAGO
TRINIDAD
ARUBA
CURACAO
COSTA RICA
Bocas
PANAMA
COLOMBIA
VENEZUELA
GUYANA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
U.S. DEPARTMENT OF COMMERCE
MERCATOR PROJECTION
N
W
E
S
45°
40°
35°
30°
25°
20°
15°
10°
100°
95°
90°
85°
80°
75°
70°
65°
60°
55°
50°
45°
40°