



USAID | **VIETNAM**
FROM THE AMERICAN PEOPLE

ENVIRONMENTAL REMEDIATION AT DA NANG AIRPORT

Final Site Health and Safety Plan

USAID

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Section 14 - References

Appendix

Hospital Map

Acronyms and Abbreviations

AHA	Activity Hazard Analysis
AIHA	American Industrial Hygiene Association
ANSI	American National Standards Institute
BPM	beats per minute
BT	body temperature
cc	cubic centimeter
CDM	CDM International, Inc.
CFR	Code of Federal Regulations
CM	construction management
CPR	cardiopulmonary resuscitation
CRZ	contaminant reduction zone
°C	degrees Celsius
°F	degrees Fahrenheit
D&H	dig and haul
dB	decibel
dBA	decibels, A-weighted
dBP	decibels, peak
DC	direct current
DFOW	definable features of work
DOT	Department of Transportation
EPA	U.S. Environmental Protection Agency
EPP	Environmental Protection Plan
FM	Factory Mutual
GFCI	ground fault circuit interrupters
H&S	health and safety
HASP	health and safety plan
HAZWOPER	Hazardous Waste Operations and Emergency Response
HEPA	high efficiency particulate air
HR	heart rate
Hz	hertz
IDLH	immediately dangerous to life and health
IPTD	in-pile thermal desorption
ISEA	International Safety Equipment Association
kV	kilovolt
LEL	lower explosive limit
m ³	cubic meter
mg	milligram
mph	miles per hour
MND	Ministry of National Defense
MSDS	material safety data sheets
MUTCD	Manual of Uniform Traffic Control Devices
NFPA	National Fire Protection Association
NIOSH	National Institute for Occupational Safety and Health
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PFD	personal flotation device

PPE	personal protective equipment
ppm	parts per million
psi	pounds per square inch
QLFT	qualitative fit test
QNFT	quantitative fit test
RWP	Remediation Work Plan
SAP	Sampling and Analysis Plan
SAR	supplied-air respirators
SCBA	self-contained breathing apparatus
SHSO	site health and safety officer
SLM	sound level meter
STS	standard threshold shift
USAID	United States Agency for International Development
TCDD	tetrachlorodibenzo-p-dioxin
TCP	Traffic Control Plan
TLV	threshold limit values
TWA	time-weighted average
UXO	unexploded ordnance
v/v	volume to volume
W	watts

Section I

Program Overview

This site health and safety plan (HASP) was developed for performing environmental remediation activities at the Da Nang Airport site located in Da Nang, Vietnam. Planned site activities include the following:

- Excavation and removal of dioxin-contaminated soil and sediment
- Stockpiling and in-pile thermal desorption (IPTD) treatment of contaminated materials
- Restoration of affected facility areas

This HASP has been prepared for the United States Agency for International Development (USAID) under USAID Task Order #I, EDH-I-00-08-00023-00 by CDM International, Inc. (CDM).

The construction management (CM) contractor has prepared this site-wide HASP to outline project Health and Safety (H&S) Program requirements and responsibilities for site contractors. In addition to the CM contractor, there shall be a dig and haul (D&H) contractor and IPTD contractor, each responsible for specific components of the project. The D&H contractor and IPTD contractor shall each be responsible for preparing a component-specific HASP in accordance with the requirements detailed in this site-wide HASP.

Each contractor, CM, D&H, and IPTD, shall be responsible for meeting the requirements and responsibilities herein and summarized in Section 2.

1.1 Health and Safety Philosophy and Principles

The project and its contractors affirm the following philosophy and principles as the basis of the H&S Program.

1.1.1 Philosophy

The project H&S Program is guided by the belief that our people are our greatest asset and that H&S is a key value that must receive support from every employee. Prevention of occupationally related injuries and illnesses is an integral part of the project's goal for exceptional protection of its employees and the public.

The project shall maintain an H&S Program designed to minimize the number of injuries and illnesses, with an ultimate goal of zero accidents and injuries. The H&S Program shall be equal or superior to the standard practices of the industry, and shall provide the appropriate supervision, training, and protective equipment to keep its employees safe and healthful.

Finally, management and staff share responsibility for H&S; all levels are accountable for specific H&S activities. Participation by each site employee is crucial to the overall success of the H&S Program.

1.1.2 Principles

- Occupationally caused injuries and illnesses are preventable.
- Preventing occupationally caused injuries and illnesses is one of our highest responsibilities.

- The project is committed to providing safe working conditions in the office and in the field.
- Employees have a right to information and training.
- Employees have a right to the results of any H&S inspections or accident investigations conducted.
- Employees have a right to discuss any H&S-related concerns or issues with H&S staff or project management at any time and without fear of reprisal.
- Working safely is a condition of employment and is a shared responsibility between management and staff.
- Injuries and exposures are to be mitigated, managed, and prevented.

1.2 Introduction

Safety is the responsibility of every project employee. Ultimately, however, the successful implementation of the H&S Program depends upon the integrated activities of managers, H&S staff, and employees. Specific responsibilities are outlined in Section 2.

1.3 Scope and Considerations

A primary consideration for all of operations is the H&S of project personnel. The protection of the general public and the environment is also an important consideration in developing and implementing the H&S Program. The application of standardized H&S procedures by trained personnel reduces the possibility of injury or exposure. To be effective, H&S procedures must be:

- Based on available and current information, operational principles, and technical guidance;
- Adjustable to site- or task-specific situations and conditions;
- Understandable, feasible, and appropriate for site conditions;
- Available to site personnel who have been briefed on their use; and
- Performed, implemented, and used by individuals appropriately trained.

The prevention of occupational injuries and illness is of such consequence that it will be given precedence over project operations at all times. To the greatest degree possible, project management will provide all mechanical and physical facilities required for personal H&S in keeping with the required standards, the most current professional practices, and applicable regulations.

The project requires manager and employee cooperation in all H&S matters. Only through such a cooperative effort can an H&S Program in the best interest of all be established and maintained.

1.4 Applicable Health and Safety Requirements

The D&H contractor and IPTD contractor shall be required to achieve compliance with applicable Occupational Safety and Health Administration (OSHA) and Vietnamese H&S regulations and requirements. These regulations and requirements include, but are not limited to, the following.

I.4.1 Vietnam

- Labor Code, Amended 2002.
- Law on Protection of People's Health, 1989.
- Decision No. 3733/2002/QĐ- BYT dated 10-Oct-2002, Promulgating 21 Labor Hygiene Standards, 5 Principles, and 7 Labor Hygiene Parameters.
- 27/2001/QH10: Law on Fire Prevention and Fighting, 2001.
- Decree No. 35/2003/ND-CP, Detailing the Implementation of a number of articles of the Law on Fire Prevention and Fighting.
- TCVN 6962:2001: Vibration emitted by construction works – Maximum permitted levels in the environment of public and residential areas.
- TCVN 5949:1998 - Noise in public and residential areas; maximum permitted noise levels.
- TCVN 3985:1999 Acoustics – Allowable noise levels at the workplace (Replacing TCVN 3985:1985).
- QCVN 19:2009/BTNMT: National Technical Regulation on Industrial Emission of Inorganic Substances and Dusts.

I.4.2 United States

- 29 Code of Federal Regulations (CFR) 1910, OSHA Safety and Health Standard for General Industry
- 29 CFR 1904, OSHA Recording and Reporting Occupational Injuries and Illnesses
- 29 CFR 1926, OSHA Safety and Health Standards for the Construction Industry

I.5 Program Elements and Objectives

The H&S Program shall reduce the number of accidents, injuries, exposures, and illnesses to an absolute minimum. Our goal is zero accidents, exposures, and injuries.

Specific elements that form the foundation of the H&S Program include the following:

Employee Health Surveillance. This includes the administration of baseline and annual/interim physical examinations for employees involved in hazardous waste work and project and material-specific biological monitoring. The project aims to maintain a workplace free from the use of illegal drugs and alcohol.

H&S Education and Training Program. This is a continuous program designed to promote hazard recognition and accident/illness prevention as well as to familiarize each employee with pertinent government regulations. In addition, this program is designed to address potential specific hazards of tasks that employees may be assigned to perform.

Employee Exposure Assessment to Potential Chemical and Physical Hazards. This includes a review of tasks, both administrative and project-related, to ascertain hazard potentials to those individuals assigned to perform those tasks and to take appropriate actions designed to minimize those hazard potentials. This site-wide HASP plan describes hazard potentials, prescribes specific procedures and personnel protective equipment designed to minimize these potentials, and determines types of specific monitoring that may be required to ascertain the effectiveness of these efforts in minimizing these hazards.

The project aims to:

- Ensure that employees assigned to specific tasks are mentally and physically able to perform those tasks.
- Ensure that individuals required to wear personnel protective equipment (PPE) in the performance of specific tasks are able to wear such prescribed equipment and that they have been trained in the selection, use, and maintenance of such equipment.
- Provide a mechanism by which employees assigned to various tasks have been trained in the proper performance of these tasks.
- Provide a mechanism for monitoring specific hazard potentials and the effectiveness of procedures and personal protective equipment in minimizing those potentials.
- Perform regular and frequent proactive safety inspections to identify potential hazards before an accident or injury happens.
- Provide an integrated H&S Program for site contractors to provide employees comprehensive protection from site hazards.
- Incorporate the American National Standards Institute (ANSI)/American Industrial Hygiene Association's (AIHA) Z10, Occupational Health and Safety Management System's quality concept of "Plan-Do-Check-Act" into the site H&S management approach. Utilizing this concept will allow the project to maintain a continual improvement cycle within its H&S Program. These improvements are expected to be realized by the reduction of onsite hazards and risks in a systematic manner.

1.6 Implementation

Design of the H&S Program is the responsibility of USAID's CM contractor; however, all site workers are responsible for complying with the requirements of the overall site HASP and contractor's component-specific HASP, and are critically important to a successful implementation of the H&S Program. Employees shall follow the more stringent practices when multiple requirements apply.

Section 2

Organization and Personnel

2.1 Health and Safety Organization

Responsibility for H&S is shared by all levels of the project. The overarching H&S Program has been developed for the project by USAID's CM contractor; however, to administer the H&S Program effectively each entity shall be integrated into the overall H&S project framework.

2.2 H&S Roles and Responsibilities

Successful implementation of the H&S Program requires dedication and participation from all entities and employee levels of the project organization. The Ministry of National Defense (MND), USAID, USAID's CM contractor, the D&H contractor, and the IPTD contractor each have significant roles in maintaining a healthy and safe workplace.

2.2.1 Ministry of National Defense

MND's H&S responsibilities include:

- Assisting project contractors in the coordination of planned activities with MND operations;
- Evaluating project locations for unexploded ordnance (UXO) and clearing areas of UXO as needed in order to provide safe and protective work environments; and
- Complying with applicable H&S requirements outlined in this HASP when on the project site.

2.2.2 United States Agency for International Development

USAID's and USAID's CM contractor's H&S responsibilities include:

- Implementing an H&S Program that is protective of site employees, the public, and the environment;
- Complying with applicable H&S requirements outlined in this HASP when on the project site;
- Monitoring the site's H&S Program for its effectiveness in achieving safety goals; and
- Evaluating component-specific HASPs submitted by the D&H and IPTD contractors.

2.2.3 Construction Management Contractor

The USAID CM contractor's H&S responsibilities include:

- Developing the site-wide H&S Program;
- Assigning a full-time Site Health and Safety Officer (SHSO) to the site;
- Monitoring H&S Program implementation and D&H/IPTD contractor H&S compliance;
- Performing air and dust monitoring as outlined in this HASP;
- Evaluating required PPE levels and ensembles based on collected monitoring data;
- Complying with applicable H&S requirements outlined in this HASP;

- Conducting regular H&S committee meetings with D&H and IPTD contractors in attendance to discuss site H&S issues, concerns, or trends;
- Documenting regular and frequent H&S inspections, including identifying unsafe activities, assigning corrective actions to responsible persons, and following up on their resolution; and
- Conducting accident investigations as necessary.

2.2.4 Dig and Haul Contractor

The D&H contractor's H&S responsibilities include:

- Preparing a D&H-specific HASP for their project operations;
- Assigning a full-time SHSO to the site;
- Complying with applicable H&S requirements outlined in this HASP;
- Assigning competent persons to definable features of work as required by OSHA;
- Reporting accidents, injuries, and near misses as detailed in this HASP;
- Coordinating activities with the IPTD contractor (e.g., traffic control) and other project entities as necessary to maintain a safe and protective work environment;
- Training employees as required and appropriate to identify hazards and protect themselves while onsite; and
- Participating in the site's H&S committee.

2.2.5 In-Pile Thermal Desorption Contractor

The IPTD contractor's H&S responsibilities include:

- Preparing an IPTD-specific HASP for their project operations;
- Assigning a full-time SHSO to the site;
- Complying with applicable H&S requirements outlined in this HASP;
- Assigning competent persons to definable features of work as required by OSHA;
- Reporting accidents, injuries, and near misses as detailed in this HASP;
- Coordinating activities with the D&H contractor (e.g., traffic control) and other project entities as necessary to maintain a safe and protective work environment;
- Training employees as required and appropriate to identify hazards and protect themselves while onsite; and
- Participating in the site's H&S committee.

Section 3

Health and Safety Education and Training

3.1 General

Ensuring that employees have the appropriate skills, attitude, and knowledge to perform tasks assigned to them safely is a key accident prevention tool. The main goals of the H&S training program are:

- Educate employees on the safety culture, expectations, and resources established in this HASP;
- Train employees to be able to identify hazards correctly;
- Give employees the technical understanding and skills to work in a safe manner;
- Promote safety awareness so that employees develop a safe work attitude; and
- Meet regulatory requirements.

3.2 Responsibilities

Managers and Supervisors of all Contractors –Ensure employees are adequately trained to perform assigned job responsibilities safely.

SHSOs for all Contractors – Prepare and coordinate delivery of project-specific information and training for employees on an as-needed basis. Also, assist managers in the tracking of training requirements needed for various types of work.

Employees of all Contractors – Attend and participate in the required training programs and maintain their training credentials to perform their jobs safely and meet H&S training regulatory requirements.

3.3 Onsite Worker Training Plan

The following outlines training requirements for all project employees, and is designed to prevent occupational injuries and illness at the site. The site training program is in place to provide employees with the knowledge and resources that result in exceptional employee safety in the workplace.

3.3.1 Hazard/Task-Specific Training

Certain hazards or tasks have specific training requirements that must be met to ensure employee H&S and are required by OSHA standards. The following are examples of such hazards or activities that require special training:

- Confined space entry
- Working on scaffolds/fall protection
- Potential exposure to:
 - Dioxin
 - Lead
 - Bloodborne pathogens
- Work subject to the control of hazardous energy (i.e. Lockout/Tagout)
- Changing work conditions that may indicate a new hazard for employees

Managers and supervisors must ensure that their employees have adequate training to perform all assigned tasks and job responsibilities safely. Managers and supervisors shall consult their contractor's SHSO to make arrangements for employee H&S training for specific tasks and projects.

Hazard/task-specific training shall be provided by each contractor's SHSO (or their designee) or managers/supervisors via on-site courses or arrangements can be made for training through qualified vendors. Employees shall contact their SHSO to make arrangements for a hazard or task-specific training session.

3.3.2 First Aid and CPR Training

Each contractor's SHSO shall provide training to their site employees in the availability and locations of first aid kits and materials, in addition to the availability of any of their employees that are trained in cardiopulmonary resuscitation (CPR). CPR training is not a requirement and is a voluntary activity.

Each contractor shall provide onsite first aid kits and materials to its employees in accordance with 29 CFR 1926.50.

3.3.3 Project-Specific Orientation and Tailgate Talks

Employees are greatly influenced by initial impressions. Initial instructions and personal contacts contribute significantly to employee attitudes. Consequently, all new site employees shall receive a site H&S orientation, delivered by their contractor's (CM, D&H, or IPTD) SHSO or manager/supervisor.

The H&S orientation shall occur during the employee's initial visit to the site. The orientation shall cover the following topics:

- Project's H&S philosophy and principals
- H&S objectives
- Key personnel – roles and responsibilities
- Employee H&S performance
- Site-specific H&S information including:
 - Contaminant of concern
 - Exposure mitigation and control measures (e.g., engineering controls, PPE)
 - Emergency notification and evacuation procedures
 - Emergency Response Plans (D&H and IPTD contractors only)
 - First aid assistance
 - Availability of the SHSO
 - Hazard identification and communication

Attendance and meeting content for each H&S orientation shall be documented in a field notebook or other means.

Daily tailgate talks shall be held during the project to review hazards associated with upcoming activities and precautions to be taken as well as review lessons learned during the project and any changes made to project procedures. Daily tailgate meetings shall be conducted by each contractor's

manager/supervisor or SHSO for their employees. Attendance and meeting content shall be documented in a field notebook or other means.

3.3.4 Contaminants of Concern

The main contaminant of concern on the project is tetrachlorodibenzo-p-dioxin, or 2,3,7,8 TCDD (TCDD). TCDD is the most potent form of dioxin, and was present in the Agent Orange used in Vietnam. Past sampling events have shown elevated levels of dioxin to be present in soil and sediment at areas targeted for cleanup at the site.

Employee exposure to TCDD may occur through the following:

- Eating contaminated food, specifically fish;
- Inhalation of contaminated airborne dust;
- Ingestion of contaminated soil, sediment, or other materials; or
- Skin contact with contaminated soil, sediment, or other materials

Exposure to TCDD can produce skin effects in people such as chloracne, which is a severe skin disease with lesions that occur mainly on the face and upper body. Exposure has also been known to produce the following:

- Changes in blood and urine which may be indicative of liver damage; and/or
- Alterations in glucose metabolism and hormonal levels

Studies have also shown that TCDD may be linked to increased risks of several types of cancer in people.

3.3.5 Training for Hazardous Waste Operations

Personnel who perform project hazardous waste work as defined by 29 CFR 1910.120, the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard, shall participate in hazardous waste H&S training, which includes:

- Forty hours of initial H&S training;
- Eight hours of annual refresher training;
- Eight additional hours of training for hazardous waste supervisors and managers; and
- Continuing H&S training.

3.3.5.1 Initial 40-Hour Hazardous Waste H&S Training

Initial 40-hour hazardous waste H&S training shall be provided via vendors who meet the OSHA HAZWOPER qualifications. Minimum training content must include the basic information relevant to hazardous waste operations required by 29 CFR 1910.120. Training shall be completed by employees prior to engaging in onsite OSHA defined hazardous waste work.

3.3.5.2 8-Hour Hazardous Waste Supervisory Training

Personnel who act in a management or supervisory capacity on project hazardous waste activities shall receive an additional 8 hours of training on supervisory and management H&S Program issues in accordance with 29 CFR 1910.120 (e)(4). Topics presented may include:

- H&S requirements for hazardous waste operations;
- Project/site HASPs;
- Accident/incident reporting and investigation;
- Spill prevention and containment;
- H&S roles and responsibilities;
- Hazard recognition;
- Medical surveillance;
- Health hazard monitoring;
- Transportation of hazardous materials; and
- Management of investigation derived waste.

Employees who are approved to take the hazardous waste supervisory course must complete the 40-Hour Hazardous Waste H&S course and complete 3 days of on-the-job training on field hazardous waste projects working with a qualified manager. If the training is provided by a vendor, qualifications should be reviewed to determine the training's suitability.

3.3.5.3 8-Hour Hazardous Waste Refresher Training

Personnel actively involved in project hazardous waste activities shall participate in 8-hour hazardous waste refresher training. To remain eligible for field hazardous waste work, employees must attend an 8-hour refresher training class within 13 months (12 months + 1-month grace period) of the last day of their initial 40-hour training or their last 8-hour refresher training. If the 8-hour refresher training is not completed within the 13-month period, the employee is not eligible to participate in field hazardous waste operations until the 8-hour refresher training is completed and the employee has met all other field H&S requirements (i.e., medical surveillance and fit testing, if necessary).

The 8-hour refresher training requirement may be completed by any of the following:

- Attend an 8-hour refresher class led by a contractor instructor;
- Attend an 8-hour refresher class provided by an approved vendor; or
- Complete a computer-based approved 8-hour refresher curriculum.

The USAID CM contractor's H&S Director may approve alternate ways of completing this requirement that meet the requirements of paragraph (e)(8) of 29 CFR 1910.120, the OSHA standard for hazardous waste operations.

3.3.5.4 Continuing H&S Training

Employees may require ongoing training as operations evolve, work environments change, and new hazards are introduced. For example, chemicals or processes that were not anticipated may become part of a standard site work practice. When such events occur, the contractor's SHSO shall implement continuing employee training as is warranted to protect personnel from the identified hazards.

3.3.5.5 H&S Committee

A site H&S committee shall be implemented comprised of both management and labor personnel from each of the contractors: CM, D&H, and IPTD. The site H&S committee shall be a means of employee involvement and communication for site personnel with regards to H&S issues and training. Committee

membership shall be strictly voluntary, and employees may participate without fear of reprisal by contractor or project management.

The site H&S committee shall meet regularly (i.e., a target of biweekly), with its meeting minutes documented and available to site personnel. The site H&S committee shall be led by the CM contractor’s SHSO, who shall also conduct the regular meetings.

3.3.6 Medical Surveillance and Evaluations

Each contractor shall be responsible for developing and implementing a medical surveillance program for their site employees engaged in field work with hazardous substances, such as TCDD, in accordance with 29 CFR 1910.120. These requirements include, but are not limited to, the following examinations for covered employees.

3.3.6.1 Pre-Assignment Medical Examination

Each contractor shall provide its field employees assigned to work on this project with a pre-assignment HAZWOPER-compliant physical examination prior to performance of fieldwork. Typical content of the exam is given in Table 3-1. Each contractor’s H&S professionals and/or medical consultant shall determine the specific content of the examination.

In addition, each contractor shall provide its assigned field employees with medical analysis for bodily 2,3,7,8 TCDD levels. Contractors shall provide for a pre-work (i.e., baseline) and post-work (i.e., following completion of an employee’s site activities) analysis. Contractors shall provide analytical results to employees as soon as they are available.

Table 3-1. Contents of Hazardous Waste Medical Examination

Baseline Examination	Periodic Examination	Exit Examination	
General Medical Questionnaire	Medical and Exposure History since last exam.	General Medical Questionnaire	
Physical Exam	Physical Exam	Physical Exam	
Visual Acuity	Visual Acuity	Visual Acuity	
Audiometry	Audiometry	Audiometry	
Pulmonary Function Test	Pulmonary Function Test	Pulmonary Function Test	
Blood Chemistry & Urinalysis	Blood Chemistry & Urinalysis	Blood Chemistry & Urinalysis	
Chest X – Ray		Chest X – Ray	
Additional Exam Elements – Performed if requested by H&S Management or Medically Indicated			
Respirator Fit Test	PCB	Audiometry	Chest X-ray
RBC Cholinesterase	Blood Lead/ZPP	Methemoglobin	EKG
Serum Cholinesterase	Urine Heavy Metal	Tetanus/Diphtheria Vac	Cardiac Stress Test

3.3.6.2 Periodic Hazardous Waste Medical Exam

Employees enrolled in the hazardous waste medical surveillance program shall have a periodic exam at least once every 12 months unless the attending physician determines that a longer interval (not greater than once every 2 years) is appropriate. The contractor's H&S professionals and/or medical consultant shall determine the frequency of examination after he/she reviews the employee's completed periodic medical questionnaire. Typical contents of the periodic exam are given in Table 3-1. Additional exam elements listed at the bottom of Table 3-1 may be included by the H&S professionals, or as deemed medically indicated by the examining physician based on the employee's work history.

In addition to the basic periodic physical exam, employees may receive additional medical examinations as follows:

- Following a known acute exposure to a toxic or hazardous material.
- After termination of employment or reassignment to an area where the employee would not be covered if the employee has not had an examination within the last 6 months.
- At the discretion of each contractor's H&S professionals or medical consultant.
- When an employee experiences signs or symptoms of exposure to a toxic or hazardous material and requests an exam.

3.3.6.3 Employment-Related Injury or Illness Medical Evaluations

In a non-emergency situation, employees who are injured or contract an illness that may be related to their employment shall notify their direct manager and contact their SHSO in accordance with procedures outlined in Section 13. If necessary, an appointment shall be arranged at a qualified medical facility at a time and location convenient to the employee.

3.3.7 Compliance Monitoring

Each contractor (i.e., CM, D&H, and IPTD) shall monitor their employee compliance with the requirements of this HASP through regular and frequent H&S inspections as discussed in Section 5.6. The D&H contractor and the IPTD contractor shall also monitor their employees for compliance with the requirements of their respective component-specific HASP.

3.4 Subcontractors

Subcontractors are responsible for providing H&S training for their employees. Examples include 40-hour hazardous waste training, supervisor training, 8-hour refresher training, certain continuing training, and an excavation-competent person. Verification of any required training shall be submitted by the subcontractor prior to being given a notice to proceed.

In some circumstances, subcontractors may participate in site training. Site H&S orientations may include subcontractors when subcontractor personnel are required to know and understand project hazards and procedures. Any training required to address additional activities, which may expose subcontractor employees to additional hazards, is the responsibility of the subcontractor.

Section 4

Hazard Communication

4.1 Purpose and Scope

This H&S Program has been prepared to meet the requirements of the OSHA Standard 1910.1200, Hazard Communication. It includes guidelines on the identification of hazardous chemicals, the preparation and proper use of labels, administration of material safety data sheets (MSDS), and employee training on chemical hazards. Each contractor shall comply with this section's requirements.

4.2 Responsibilities

Managers and Supervisors for all Contractors – Managers and supervisors are responsible for ensuring that employees working under their direction receive adequate information on the chemicals and hazardous materials they may use and be exposed to during the course of their project employment.

SHSOs for all Contractors – Maintain chemical inventory and MSDSs for chemicals used by their contractor on the project. They also coordinate MSDS requests from employees and seek guidance from H&S professionals when needed. The USAID CM contractor's SHSO shall also maintain a central file of project MSDSs as discussed in Section 4.5.

Employees for all Contractors – Active participation in the hazard communication training program. Employees are also responsible for asking for information on the chemicals and hazardous materials they may need to use.

4.3 Chemical Inventory

Each contractor shall maintain a chemical/hazardous material inventory for chemicals and hazardous materials used at the location. Lists of typical materials associated with environmental field activities and offices are provided in Section 4.7.

4.4 Container Labeling

Whenever possible, order chemicals and materials in container sizes convenient for immediate use to allow use of the manufacturer's label as the primary means of identifying the material and precautions recommended. Labels must remain legible and should not be marked or taped over. If the original label becomes illegible for any reason, the container must be relabeled or the container and its contents must be properly disposed of.

If materials must be transferred to a container other than the original, the receiving container must be labeled to identify the contents. No unmarked containers of any size should be left unattended.

4.5 MSDSs

An MSDS is a summary of safety, health, and environmental information associated with a specific chemical or product. Each manufacturer or distributor is required to provide an MSDS for materials they manufacture or distribute.

The D&H contractor and the IPTD contractor are responsible for maintaining an onsite file of MSDSs for all materials used for their project activities. The USAID CM contractor site shall maintain a central file at the project site of MSDSs used by each contractor. As MSDSs are received and filed by the D&H and IPTD contractors, they shall be forwarded to the USAID CM contractor's SHSO, office services coordinator, or other designated individual for inclusion in the project's central MSDS file. The central MSDS file should be periodically reviewed by the USAID CM contractor's SHSO or individual designated to maintain it to ensure MSDSs are present and outdated MSDSs are removed and updated.

For any material they use or are potentially exposed to, employees may request a copy of an MSDS from their contractor's manager/supervisor or SHSO. Indeed, employees are encouraged to seek out and review MSDSs prior to using chemicals or hazardous materials. Employees should contact their contractor's SHSO with any questions regarding the hazards, storage, disposal, or shipping of chemicals or potentially hazardous materials.

4.6 Hazard Communication Training

Each new employee shall have a basic introduction on hazard communication provided during the new employee orientation. The introduction includes:

- An overview of the OSHA hazard communication standard.
- Instructions on how to access MSDSs.
- An explanation of how to read chemical labels and MSDSs.

Hazard specific training shall be provided by each contractor to their employees who may use or be exposed to chemicals or hazardous materials prior to such use or exposure. Training may be conducted during the course of specialized training such as 40-hour OSHA hazardous waste site H&S training and fieldwork pre-job briefings. This training includes:

- A review of chemicals and materials present or anticipated to be present.
- Methods and techniques to detect the presence or release of a material in the work area.
- Discussion on how to minimize or prevent exposure.
- An explanation of the proper use of personal protective equipment.

Section 5

Planning and Hazard Control

5.1 Application and Use of HASP

Employees are expected to work in conformance with this site-wide HASP. Each contractor's managers/supervisors and SHSOs are expected to monitor employee performance with respect to H&S activities and to the extent possible, verify that:

- Project team members are aware of and understand the contents of this HASP.
- PPE is used as described in this HASP.
- Any procedures called for or described in this HASP are followed.
- If the component-specific activities involve subcontractors, that subcontractors also verify that their personnel follow the procedures described in this HASP.

5.1.1 Acknowledgment of Acceptance of Health and Safety Plan

All site personnel must understand the requirements of this HASP and their component-specific HASP and agree to its provisions. Each contractor is responsible for distributing this HASP and their component-specific HASP to personnel as they are assigned to the project. Subcontractor personnel must also acknowledge and accept the provisions of the site HASP.

5.2 Activity Hazard Analysis

5.2.1 Description of Activity Hazard Analysis

Activity Hazard Analyses (AHAs) shall be conducted by the component-specific contractors (i.e., D&H and IPTD) for all site definable features of work (DFOWs) in order to protect employees from specific hazards. The D&H and IPTD contractors' SHSOs shall each ensure that an AHA is conducted for site DFOWs under their contractor's control, regardless of whether it is construction or investigation-related. The AHAs shall supplement this site-wide HASP and the contractor's component-specific HASP. AHAs are required to be completed prior to the start of a DFOW, and identify hazards associated with each step of a work process, in addition to precautions for each hazard.

Each contractor's SHSO will provide instructions and training to site employees regarding the proper completion and utilization of AHAs.

5.2.2 How to Complete the AHA Form

The following are some basic guidelines to follow when completing an AHA form:

- Include the basic project identification at the top.
- Describe the basic activity that will be analyzed. Provide sufficient detail so that someone familiar with the activity will understand what is planned.

- Identify all hazards associated with the activity. The list below provides a list of possible hazards that may be encountered.
- Describe precautions to be taken for each hazard identified. Try to use engineering methods and or administrative and work practices to plan a way to avoid the hazard before prescribing the use of PPE. In many cases it is advisable to include the use of PPE as well in case engineering or other controls fail.
- Identify any specialized training or equipment needed to perform the activity safely.
- The complete AHA should be reviewed by the component-specific contractor's SHSO.

5.2.3 List of Possible Hazards

A list of possible hazards to consider is provided below. It is intended as a reminder of possible hazards that may be encountered and is not intended to be a complete list of all possible hazards.

Partial list of hazards to consider for AHAs:

- Exposure to dioxin and other hazardous chemicals
- Falls from height
- Over water hazards
- Noise
- Exposure to biological waste or organisms
- Working with hand tools
- Working around heavy equipment
- Work in confined spaces.
- Electrical Hazards
- UXO
- Compressed gases, pressure
- Slippery walking and work surfaces
- Excavation and trenching hazards
- Poisonous Plants, Insects, Animal
- Working with sharp tools
- Fire and explosion hazards
- Vehicular traffic
- Moving machinery including gears, belts, etc.
- Hot or cold environments
- Heavy and or frequent lifting/carrying
- Exposure to biological waste, molds, pathogens
- Welding or thermal cutting hazards

5.3 Hierarchy of Controls

The D&H contractor and IPTD contractor shall each achieve hazard mitigation at the site through the following preferred order of controls:

- A. Substitution of less hazardous materials, processes, operations, or equipment.

- B. Engineering controls. A primary method of hazard control, engineering controls are to be considered before implementing administrative controls or PPE. Examples of engineering controls include: isolation; enclosure; ventilation; and source modifications.
- C. Administrative controls. A secondary method to mitigate exposure to hazards, which may supplement engineering controls. Examples of administrative controls include: formal training; staff rotation; environmental sampling; biological sampling; postings; labeling; formal work practices; stop work authority; housekeeping; maintenance/repairs; and medical surveillance.
- D. PPE. Only to be considered when substitution, engineering, and administrative controls are not feasible, or on an interim basis until other controls are implemented. Examples of personal protective equipment include: eye protection; hearing protection, hardhats, safety shoes, gloves, protective clothing, safety harnesses, and respirators.

5.4 Competent Persons

The D&H contractor and the IPTD contractor shall each assign competent persons for each DFOW they perform. A competent person is defined by OSHA as “one who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.”

Competent person designations are not professional certifications but rather are based on the professional judgment of each contractor. Contractors shall designate competent persons for each DFOW that have demonstrated expertise in their respective field and are capable of meeting the definition above.

5.5 Subcontractor Selection

Contractors shall review any subcontractors H&S data or performance prior to selection. Contractors shall make every effort to select those contractors with above average H&S performance in their field.

5.6 Routine Inspections

Jobsite safety inspections will be performed daily by the USAID CM contractor’s SHSO. The USAID contractor’s SHSO shall conduct inspections randomly without advance notice. The inspections will be documented appropriately, with identified H&S issues and deficiencies, subsequent actions, timetables, and responsibilities for correcting the deficiencies included. Deficiencies, depending on severity, may require immediate remediation. The USAID CM contractor’s SHSO shall discuss persistent issues identified through trend analysis and their implemented control measures during tailgate safety meetings, H&S committee meetings, and safety training as necessary.

Each contractor’s SHSO (i.e., CM; D&H; and IPTD) shall also monitor employee compliance with the requirements of this HASP through daily H&S inspections. Inspections shall be documented, including any identified unsafe conditions or issues and the details regarding their assigned correction.

5.7 Air and Dust Monitoring Plan

Air and dust monitoring shall be conducted by USAID's CM contractor in accordance with the Final Site-wide Sampling and Analysis (SAP [USAID 2011a]), and the requirements outlined in Table 5-1 on the following page.

5.7.1 Background and Trend Evaluation

5.7.1.1 Dust Monitoring

The USAID CM contractor shall conduct three, 24-hour days of dust monitoring using DataRAMs or equivalent prior to the start of construction activities. Dust monitors shall be established at each of the prevailing upwind and downwind perimeters of planned work locations. The data shall be used by the USAID CM contractor to evaluate background dust levels and trends at the site.

5.7.1.2 Ambient Air Monitoring

The USAID CM contractor shall conduct three, 24-hour days of ambient air monitoring prior to the start of construction activities. Air monitor media shall be capable of analysis for 2,3,7,8 TCDD. Ambient air samples shall be collected at the prevailing upwind and downwind perimeters of planned work locations. The USAID CM contractor shall arrange for timely analysis of the samples. The data shall be used by the USAID CM contractor to evaluate background levels of 2,3,7,8 TCDD in ambient air at the site.

5.7.2 Perimeter Dust Monitoring

The USAID CM contractor shall conduct dust monitoring using DataRAMs or equivalent during each day of an exclusion zone's construction activities. A dust monitor shall be established at each of the four cardinal directions of the exclusion zone's perimeter.

Action levels shall be initially set at .1 milligram (mg)/ cubic meter (m³) (over background dust levels) over a five-minute average. Background dust levels shall be established daily by the USAID CM contractor prior to the start of construction activities in the exclusion zone.

If the action level is met or exceeded, USAID's CM contractor shall notify the contractor (i.e., D&H or IPTD) in control of the relevant work location to stop work activities in the exclusion zone. The USAID CM contractor's SHSO shall then meet with the contractor's supervisor and SHSO to assess activities contributing to the elevated result. Following the assessment, the USAID CM contractor's SHSO shall direct any appropriate modifications to D&H or IPTD contractor work practices.

Work in the exclusion zone shall continue only if dust levels remain below the action level.

Action levels may be modified by the USAID CM contractor as data is evaluated.

Table 5-1. Da Nang Project Air & Dust Monitoring

	Sampling Type	Activity	Specifics	Action
Pre-Work Activities	Dust Monitoring	N/A	Perform continuous dust monitoring via DataRAM or equivalent for 3, 24-hr days. Collect at prevailing upwind and downwind directions of each planned work location.	Evaluate data.
	Ambient Air Monitoring	N/A	Perform continuous ambient air monitoring for 2,3,7,8 TCDD for 3, 24-hr. days. Collect at prevailing upwind and downwind directions of each planned work location.	Evaluate data.
	Sampling Type	Activity	Specifics	Action
During Work Activities	Perimeter Dust Monitoring	During exclusion zone construction activities	Perform daily dust monitoring via DataRAM or equivalent at each of an exclusion zone's 4 cardinal directions.	Evaluate data and modify work practices as appropriate when dust levels meet or exceed .1 milligrams (mg)/cubic meter (m ³) above background over a 5-minute average.
	Perimeter Ambient Air Monitoring	During exclusion zone construction activities	Collect daily air samples at each of an exclusion zone's 4 cardinal directions. Store samples. Analysis for 2,3,7,8 TCDD shall be performed based upon judgment of USAID's CM contractor.	Evaluate data and modify work practices as appropriate.

5.7.3 Perimeter Ambient Air Monitoring

The USAID CM contractor shall conduct ambient air monitoring during each day of an exclusion zone's construction activities. An air monitor shall be established at each of the four cardinal directions of the exclusion zone's perimeter. Air monitor media shall be capable of analysis for 2,3,7,8 TCDD. The USAID CM contractor shall arrange for proper storage of the samples and their availability for immediate analysis if necessary. The USAID CM contractor may arrange to have particular samples analyzed based upon its professional judgment.

The USAID CM contractor shall use analyzed data to evaluate and modify work practices as necessary. Action levels may be instituted or modified by the USAID CM contractor as data is evaluated.

5.8 Dust Control

The D&H and IPTD contractors shall each use appropriate engineering controls to prevent contaminant migration as a result of project activities. The D&H and IPTD contractors shall each implement and maintain dust control throughout all stages of site activities.

Visible dust emissions are strictly prohibited at all times. Any visible dust emission shall be documented by the contractor's site team and communicated to the USAID CM contractor.

All dioxin handling methods may create a dust hazard. In addition, all stockpiles; haul roads; permanent and temporary access roads; waste staging and storage areas, and other work areas may be sources of a dust hazard. Adequate dust control must be maintained by the D&H and IPTD contractor throughout all site activities.

The application of water, generally via water hoses, water trucks, and portable sprayers, shall be the primary method of dust control. Additional methods include, but are not limited to, covering haul pathways with gravel, and working methodically and with care when handling contaminated materials.

If there is no water source available, adequate, and ready at the work location for dust control, the D&H contractor or IPTD contractor is not permitted to perform activities of any kind.

Contractors shall define their dust control methods in their component-specific HASP.

5.9 Traffic Control

The D&H contractor and IPTD contractor shall ensure that their site traffic is managed in accordance with Part 6 of the Federal Highway Administration's Manual of Uniform Traffic Control Devices (MUTCD) as well as any applicable local regulations. The MUTCD provides traffic management details such as proposed controls, signage, routing, and integration of traffic movement.

The requirements of the site-wide Traffic Control Plan (TCP) are detailed in the project's Final Remediation Work Plan (RWP [USAID 2011b]).

5.9.1 Suitable and Compliant Hauling Equipment

The D&H contractor and IPTD contractor shall each employ the use of hauling equipment that is determined to be safe and compliant with applicable transportation regulations for hazardous waste in both the United States and Vietnam.

All trucks used to haul soil shall be equipped with positive pressure or equivalent filtration systems in their cabs designed to filter for 2,3,7,8 TCDD. Truck drivers shall be required to remain in their cabs during soil/sediment loading with the positive pressure or equivalent system properly employed.

The D&H contractor and IPTD contractor shall perform documented weekly inspections evaluating the cleanliness of cab interiors in their trucks used to haul contaminated soil at the site.

5.10 Unexploded Ordnance Control

The D&H contractor and IPTD contractor shall each define their methods of UXO control in their component-specific HASP. Each contractor shall ensure that respective work locations and areas under their control have been evaluated for UXO and are cleared by the appropriate authority (e.g., MND) prior to conducting site activities.

Section 6

Personal Protective Equipment

The activities performed by site employees will frequently require the use of clothing and equipment that shields and/or isolates employees from chemical and physical hazards that may be encountered.

In order to prescribe PPE requirements effectively, the nature and extent of potential chemical and physical hazards associated with various activities shall need to be assessed by the D&H contractor and IPTD contractor. Prior to mobilization, each contractor shall perform a detailed review of the project site. This shall include a review of the site history, types and quantities of materials handled at the site, types of operations performed at the project site, and types of activities to be performed during the course of the project.

From this review, PPE shall be selected by the D&H contractor and IPTD contractor based on the reasonable anticipation of exposure to the chemical and physical hazard exposure potential.

6.1 Use of Personal Protective Equipment

Contractor employees shall be responsible for using PPE identified in this HASP or any contractor component-specific HASP; as directed by SHSOs or managers; and where recognizable hazards are identified. Employees are also responsible for inspecting PPE assigned to them and having worn out or defective equipment replaced.

Use of PPE is required by OSHA regulations contained in 29 CFR 1910 and 29 CFR 1926, and is reinforced by U.S. Environmental Protection Agency (EPA) regulations in 40 CFR Part 300. These regulations include all individuals who may perform work at hazardous, or potentially hazardous, waste sites, when applicable. Types of protection, relevant OSHA regulation, and the source of the regulation appear in Table 6-1.

PPE in use shall be inspected daily and maintained in serviceable condition by contractor employees. Items of personal issue shall be cleaned and sanitized as appropriate prior to being reissued to another employee. Defective or damaged PPE shall be taken out of service immediately.

Table 6-1. OSHA Standards for the Use of Personal Protective Equipment

Type of Protection	Regulation	Source
General	29 CFR 1910.132 29 CFR 1910.1000-1045	41 CFR Part 50-204.7 General Requirements for Personal Protective Equipment OSHA Rulemaking
Eye and Face	29 CFR 1910.133(a)	ANSI Z87.1- ¹ Eye and Face Protection
Noise Exposure	29 CFR 1910.95	41 CFR 50-204.10 and OSHA Rulemaking
Respiratory	29 CFR 1910.134	ANSI Z88.2- ¹ Standard Practice for Respiratory Protection
Head	29 CFR 1910.135	ANSI Z41.1- ¹ Safety Requirements for Industrial Head Protection
Foot	29 CFR 1910.136	ANSI Z41.1- ¹ Men's Safety Toe Footwear
Electrical Protective Devices	29 CFR 1910.335(a)(2)	NFPA 70E: Standard for Electrical Safety in the Workplace
High-Visibility Safety Apparel	29 CFR 1926.651(d)	ANSI / ISEA 107 National Standard for High-Visibility Safety Apparel

¹American National Standards Institute (ANSI), 1430 Broadway, New York, New York 10018

6.2 Basic Personal Protective Equipment

6.2.1 Eye Protection

Eye protection shall be worn by site personnel during all field activities, and whenever there is a potential hazard of foreign substances or harmful energy affecting the eye.

Safety glasses with side shields meeting the requirements of ANSI Z87.1 are adequate for most activities. Contractors shall analyze planned activities to determine whether additional eye protection is necessary, and state eye protection requirements in their component-specific HASP.

For potential splash hazards of liquids, a face shield or splash hood may be used in conjunction with regular safety glasses. In some exposures, goggles may provide the best form of eye protection. If lasers are used, specialized eye protection using specific lenses for the wavelength and energy emitted by a specific laser may be required.

Contact Lenses – Based on current information related to the use of contact lenses in the industrial work environment, contact lenses may be used in most situations. Eye protection such as safety glasses, face shields, or goggles appropriate for the hazards present should be used as well. If a specific situation or condition arises where the use of contact lenses presents an additional hazard, the hazard should be identified in the contractor’s component-specific HASP or AHA and the use of contact lenses may be prohibited on an activity specific basis.

6.2.2 Hard Hats

Hard hats meeting the requirements of ANSI Z89.1 shall be worn by contractor employees:

- During all field activities.
- Working near exposed electrical conductors.
- Whenever there are potential hazards associated with falling or moving objects.
- Whenever there are overhead objects such as piping, structural elements or other stationary elements that create a bump hazard.

Hard hats shall be worn with the brim facing forwards unless there is a specific safety related reason to turn the hat backwards. In such instances the webbing in the hat shall be repositioned in the hat so that the back of the webbing is at the back of the head.

6.2.3 Foot Protection

Personnel shall wear protective footwear during all field activities, and while performing work activities where there is a danger of foot injuries due to falling or rolling objects, objects piercing the sole, and where employees’ feet are exposed to electrical hazards. Safety footwear shall meet the requirements of ANSI Z41.1 and cover the ankle. Any footwear worn for field work must have a good sturdy tread appropriate for outdoor use and a defined heel.

Chemical Protective Footwear – Chemical protective footwear (or boot covers that cover the foot and approved footwear) shall be worn by contractor employees in the exclusion zone and when there is the potential for footwear to come into direct contact or be splashed with hazardous materials or waste.

6.2.4 Hand Protection

Protective gloves shall be worn by contractor employees during all field activities. Various types of gloves are available for protection against cuts, scrapes, bruises, etc. that may occur during the physical handling of material, equipment tools etc. Cotton, leather, Kevlar®, steel mesh, or other appropriate gloves shall be made available to employees by the contractor depending on the work activity and potential hazards.

Chemical Protective Gloves – Contractor employees performing activities in any exclusion zone, or where there is a potential for direct contact with hazardous or toxic materials, shall wear chemical protective gloves. The selection of glove should be based on the activity and the material of potential

contact (e.g., TCDD). A wide variety of gloves are available, such as Butyl and Viton, and consideration shall be given by the contractors to dexterity, durability, and material compatibility.

6.2.5 High-Visibility Clothing

High-visibility vests or jackets shall be worn by contractor employees at all times when outside of a vehicle or building onsite, including the use of ANSI Class II high visibility clothing whenever personnel work in or around vehicular traffic. High-visibility clothing shall meet the level of visibility required for the work conditions in ANSI / International Safety Equipment Association (ISEA) 107 (1999). See related Section 9.17, Traffic and Work Zone Safety.

Employees in exclusion zones are not required to wear high-visibility clothing, but must remain in visual contact with equipment operators. Each contractor shall limit the number of personnel allowed in an exclusion zone to the absolute minimum needed to perform the job safely.

6.2.6 Chemical Protective Clothing

Contractor personnel shall wear chemical protective clothing when inside of any site exclusion zone or in circumstances where there is the potential for materials to come into contact with the employee's skin or non-chemical resistant clothing. Contractors shall require that their personnel maintain 100 percent skin protection when in an exclusion zone, which includes the coverage of all bodily areas that may directly contact 2,3,7,8 TCDD with impermeable chemical protective clothing. This may include a variety of impermeable chemical protective suits, coveralls, or ensembles designed to be protective of employees exposed to 2,3,7,8 TCDD and reviewed for suitability by contractor H&S management. The USAID CM contractor reserves the right to examine and refuse the use of non-compliant protective ensembles, although the D&H contractor or IPTD contractor shall be responsible for their selection and appropriateness.

Skin protection shall be considered of paramount importance by contractors, and contractors shall be responsible for ensuring that their employees remain free of visible debris and contaminants on their persons. Contractors shall require that any of their employees observed with visible mud, dirt, debris, or the like are directed to immediately return to the decontamination facility and undergo a decontamination shower and change out of their ensembles for clean PPE, or decontaminate the appropriate material if possible in the contaminant reduction zone (CRZ).

Selection consideration shall be given to such factors as size, durability, chemical compatibility, and heat stress potential. Project managers are particularly reminded to consider the correct size of protective garment for very large and small workers.

Chemical protective suits by nature invoke heat stress among wearers, and contractors shall maintain strict work/rest regimens and adhere to the heat stress guidelines described in Section 10.

6.2.7 Respirators

Contractors shall initially be required to have personnel working in exclusion zones wear a minimum level of protection of full-face air-purifying respirators, with high efficiency particulate air (HEPA) cartridges capable of filtering for 2,3,7,8 TCDD. Respiratory protection requirements may be subject to change to either lower or higher levels of protection based on the USAID CM contractor's evaluation.

Please refer to Section 7 for more details regarding respiratory program procedures, requirements, and levels of protection.

6.2.8 Hearing Protection

Employees shall use hearing protection when noise levels exceed the allowable limit. The D&H contractor and IPTD contractor shall be responsible for monitoring to determine if allowable limits are exceeded. A Hearing Conservation Program (described in Section 11) shall be implemented by the D&H contractor or IPTD contractor if the allowable limits are exceeded.

6.2.9 Personal Flotation Devices

United States Coast Guard-approved personal flotation devices (PFDs) shall be required when working over or near water. The D&H contractor and IPTD contractor shall each analyze their planned activities in order to adequately provide PFDs for their employees working in these environments. The contractors shall also make PFDs available to their employees engaged in activities with the potential for water contact to allow for changing work environments and uninterrupted work activities.

6.2.10 Specialized Protective Equipment

Specialized protective equipment shall be made available and implemented by the D&H contractor and IPTD contractor depending on the anticipated activities and may include:

- Fall protection harnesses and lanyards
- Chaps for work in rough brush
- Shin guards for chain saws
- Face shields
- Spark resistant tools
- Cooling vests

6.2.11 Personal Work Clothing

Employees are expected to supply personal clothing appropriate for their work assignments, including long pants, a shirt with sleeves, and basic outerwear appropriate for normal protection against weather conditions.

6.3 Levels of Protection

Each type of protective equipment has been designed specifically to protect against a reasonably anticipated chemical and physical hazard. In order to standardize PPE ensembles, "levels of protection" have been defined to address those chemical and physical hazards that may be present at hazardous waste sites. The levels of protection are defined accordingly:

Level C This level is worn when criteria for air-purifying respirators are determined to be necessary and a certain level of skin protection is needed.

Level D, Modified This level is worn when activities do not pose a problem from a respiratory protection point of view but may present a skin problem and where cross contamination (e.g., via shoes) needs to be considered.

Level D This level is worn when activities and areas do not present a respiratory or skin hazard.

Detailed equipment, use, and protection associated with each level of required site ensemble appear in Table 6-2.

All workers in exclusion zones shall initially wear Level C or higher PPE ensembles. Ensemble requirements are subject to change per the USAID CM contractor, and any modifications to the requirements require the approval of the USAID CM contractor.

The minimum required ensembles for site workers are outlined in the following table.

Table 6-2. PPE Ensembles

Level	Equipment	Protection Provided	Shall be Used When:
C	<p>Minimum Required:</p> <ul style="list-style-type: none"> ▪ Full face piece, air-purifying, HEPA cartridge-equipped respiratory ▪ Chemical-protective clothing (e.g., overalls and long-sleeved jacket; hooded, one-piece chemical splash suit; disposable chemical-resistant one-piece suit ▪ Inner and outer chemical-protective gloves ▪ Chemical-protective safety boots/shoes or boot/shoe covers ▪ Hard hat ▪ Two-way radio communications ▪ Hearing protection if exposed to noise levels above allowable OSHA limits. 	<p>The same level of skin protection as Level B, but a lower level of respiratory protection.</p>	<ul style="list-style-type: none"> ▪ Performing work in exclusion zones. ▪ The D&H contractor's SHSO or IPTD contractor's SHSO determines it is necessary during site activities. ▪ Directed at any time by the USAID CM contractor.

Table 6-2. PPE Ensembles, continued

Level	Equipment	Protection Provided	Shall be Used When:
D MODIFIED	<p>Minimum Required:</p> <ul style="list-style-type: none"> ▪ Chemical-protective gloves if potential for handling contaminated material. ▪ Work gloves if appropriate for activity (e.g., cut-resistant or leather gloves) ▪ Safety boots/shoes ▪ Work clothes ▪ Safety glasses ▪ Hard hat ▪ ANSI Class II safety vest ▪ Two-way radio communications ▪ Hearing protection if exposed to noise levels above allowable OSHA limits. 	<p>No respiratory protection. Minimum skin protection.</p>	<ul style="list-style-type: none"> ▪ Performing field work in site support zones

Section 7

Respiratory Protection

7.1 Purpose and Scope

The following procedures shall be implemented whenever respirators are used by site personnel. They are intended to protect the health of project employees and comply with 29 CFR 1910.134, OSHA's Respiratory Protection standard. The use of personal respiratory protection shall be considered in the following situations:

- Whenever airborne exposures to hazardous chemicals may pose a hazard to site employees, may exceed established exposure limits, and may not be adequately controlled by other means.
- When the implementation of an engineering or administrative control creates a greater hazard, e.g., would expose employees for longer than the task itself or expose employees to greater safety hazards.
- Whenever respiratory protection may be needed on a precautionary basis until air monitoring data or other objective data is available to assess exposures.
- Whenever an employee desires to use a respirator on a voluntary basis and the use of respiratory protection does not create a significantly greater hazard.

7.2 Responsibilities

Managers and Supervisors of all Contractors – Contractor managers and supervisors shall only assign personnel to activities, where it is anticipated that respirators will be worn, if they are medically qualified, fit tested and trained to use respirators, or will schedule personnel to complete a medical evaluation, fit tests, and training before respirators are used. Contractor managers and supervisors are responsible for having these guidelines implemented on activities they manage where project personnel use or are expected to use respirators.

SHSO of all Contractors – The SHSOs shall ensure that their contractor's employees that are assigned an activity involving the use of respiratory protection devices have been adequately trained, medically cleared to use such devices, and have been fit tested for the respirator that they have been assigned to use.

Medical Consultants of all Contractors – The contractor's medical consultant shall evaluate medical questionnaires, perform medical evaluations, and issue medical releases regarding employee medical qualification to use respiratory protection.

Employees of all Contractors – Project employees are responsible for using respiratory protection in accordance with these guidelines, the manufacturer's instructions, and training.

Subcontractors of all Contractors – Subcontractors where the use of respiratory protection is anticipated shall provide:

- Evidence of a written respiratory protection program that meets the requirements of the OSHA respiratory protection standard (29 CFR 1910.134), and
- Documentation to confirm employee respirator training, fit tests and medical evaluations prior to the use of respiratory protection under contract.

7.3 Procedure

7.3.1 Hazard Evaluation and Selection of Respirators

Contractors are expected to execute an H&S planning process described in Section 5. As a part of this process, hazards that require the use of respiratory protection and the specific type and level of respiratory protection required shall be identified in each contractor’s component-specific HASP and AHA. During the planning process, consideration should be given to the hazardous materials present, the media they are in, the activities that present exposure, and the potential for exposures to exceed threshold limit values (TLVs), permissible exposure limits (PELs), or other established limits. This would include factors such as toxicity, physical state of the contaminant, volatility, concentration, work activities being performed, and proximity to activities that have the potential to generate airborne respiratory hazards.

Information contained in Table 7-1, “Protection Factors” and Table 7-2, “Respiratory Protection Devices” shall also be used during the equipment selection process. The determination to use respiratory protection and the type of respiratory protection needed shall be reviewed by the appropriate contractor’s H&S management.

Table 7-1. Respiratory Protection Factors*

Respirator	Protection Factor
I. Particulate Filter Respirators	
- Powered air-purifying respirator with high-efficiency particulate filter (full-face).	1,000
- High-efficiency particulate filter respirator with a full facepiece.	100
- High-efficiency particulate filter respirator with a half facepiece.	10
II. Chemical Cartridge and Gas Masks	
- Powered air-purifying respirator with chemical cartridge (full-face).	1,000
- Chemical cartridge respirator with a full facepiece.	100
- Half-mask chemical cartridge respirator.	10

Table 7-I. Respiratory Protection Factors*, continued

Respirator	Protection Factor
III. Combination Particulate and Gas/Vapor Air Purifying	
- Powered air-purifying respirator with chemical cartridge and high efficiency particulate filter (full-face).	1,000
- Chemical cartridge respirator with a full facepiece, chemical cartridge, and filter.	100
- Half-mask chemical cartridge respirator with a chemical cartridge and filter.	10
IV. Supplied-air Respirators	
Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure mode, or with full facepiece, helmet, or hood operated in continuous flow.	1,000
Type C supplied-air respirator without full facepiece, helmet or hood, operated in pressure-demand or other positive pressure or continuous flow mode.	1,000
Supplied-air respirator with full facepiece helmet, or hood not operated in positive pressure or continuous mode.	50
Any other supplied-air respirator.	10
V. Self-contained Breathing Apparatus (SCBA)	
Combination respirator including a Type C supplied-air respirator with a full facepiece operated in pressure-demand or other positive pressure or continuous flow mode and an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.	10,000
Self-contained breathing apparatus with a full facepiece operated in pressure-demand or other positive mode.	10,000
Self-contained breathing apparatus with a full facepiece operated in demand mode.	50
Self-contained breathing apparatus without a full facepiece.	10

* Adapted from ANSI Z88.2

Definition: Ratio of contaminant concentration outside respirator to inside.

Use: Allows calculation of maximum use concentration in which a particular type of respirator will provide adequate protection to wearer [i.e., (PEL) x (P.F.) = maximum use concentration].

Table 7-2. Respiratory Protection Devices

General Description	Limitations	Requirements
Air Purifying Respirators		
Full facepiece respirator equipped with air purifying units to remove particulate matter from the ambient air prior to its inhalation. Some air purifying respirators are power-operated and provide respirable air to the facepiece (or hood) under a slight positive pressure.	Do not protect against oxygen deficient (<19.5%) atmospheres or atmospheres that are immediately dangerous to life and health (IDLH). The method of purification is generally chemical or chemical group specific so they cannot be used in atmospheres that contain unknown concentrations of unknown materials. Also cannot be used in atmospheres containing chemicals that present a health risk below their odor or taste thresholds. The useful life of this type of respirator is limited to the concentrations of contaminants, the breathing demand of the wearer, and the removal capacity of the purification medium.	When Level C respiratory protection devices are specified, they will consist of a full-face respirator with HEPA cartridges capable of filtering for 2,3,7,8 TCDD. Alternative respirators and cartridges must be approved by the USAID CM contractor's H&S management.
Atmosphere-Supplying Respirators		
A respirable atmosphere is supplied independent of the ambient air surrounding the wearer. These devices provide protection against oxygen deficiency and most toxic atmospheres.	Some limitations of atmosphere supplying respirators include time limitations of supplied air, bulkiness of equipment, and inherent safety hazards associated with working while dragging an airline or while wearing an air cylinder.	SCBAs will be pressure-demand types of devices, and where appropriate, equipped with an emergency escape bottle.

Voluntary Use of Respirators - Because the use of respirators adds additional risk factors to an operation, and requires compliance with specific regulations, any use of respiratory protection must be reviewed by the appropriate contractor's H&S management. The voluntary use of personal respirators is not permitted without review of H&S management. If the use of respirators is allowed, the procedures in this section must be followed.

Use of Dust Masks – Dust masks may be used to provide protection against nuisance levels of particulate contaminants when the concentration of contaminants does not exceed a PEL, TLV, or other designated action limit. The use of dust masks does not require a medical evaluation; however,

employees must be informed of the proper use and limitations of dust masks. The selection of specific make and model of dust mask should be reviewed by the appropriate contractor's H&S management.

7.3.2 Procurement and Issue of Respirators

Employee respirators shall be supplied by each contractor. The equipment will only be issued to those employees who have received training on the use of respirators, are medically qualified, and have a valid fit test. All respirators, cartridges, and associated equipment will be National Institute for Occupational Safety and Health (NIOSH) approved.

7.3.3 Training

All employees must receive training from their contractor on the proper selection, use, maintenance, and limitations of respirators prior to using respiratory protection. Training includes the following:

- Basic elements of the respiratory protection requirements described above and the OSHA respiratory protection standard.
- When and where respirators are needed.
- The capabilities and limitations of respirators.
- The importance of proper use, maintenance, and fit.
- Instruction on how to inspect the respirator.
- Instruction with respect to donning and doffing respirators.
- Instruction on how to perform positive and negative pressure fit checks.
- Proper maintenance and storage procedures.

Employees who may use respirators several times over a period of years must have had initial respirator training or a respirator refresher training class within 13 months of use of a respirator.

The employee shall be provided an opportunity for the employee to practice inspection and donning and doffing respiratory protective equipment in a non-hazardous atmosphere prior to using the respirator in a potentially hazardous environment.

7.3.4 Medical Approval to Use Respiratory Protection

Employees must undergo a medical evaluation by a physician or other licensed health care provider approved by the contractor's medical consultant prior to wearing a respirator. The medical approval is for a 12-month period. An additional medical evaluation should be performed if:

- An employee reports signs or symptoms related to their ability to use a respirator, or
- A physician, direct manager/supervisor, H&S staff, or SHSO recommends the employee be re-evaluated.

Those employees who actively participate in the hazardous waste medical surveillance program and have received a medical clearance to wear a respirator meet the requirements of the medical approval for respirator use.

The medical consultant shall provide the contractor and the employee with a written recommendation regarding the employee's capability to wear a respirator.

7.3.5 Respirator Fit Tests

Employees must pass a fit test that meets the requirements of 29 CFR 1910.134, OSHA's Respiratory Protection Standard, with the make, model, and size of respirator they will use prior to using the respirator in the field or a potentially hazardous environment. Respirator fit tests may be conducted by qualified vendors, or the appropriate contractor's H&S staff. Fit tests will not be conducted on employees with facial hair that interferes with the face-piece to face fit.

Prior to the fit test procedure, the employee will be first shown how to put on a respirator, how it should be positioned on the face, how to set strap tension, and how to determine an acceptable fit. Then he/she will select the respirator that provides the most acceptable fit from a variety of respirator models and sizes.

If the employee finds the fit of the respirator unacceptable, he/she will select a different respirator. Once a respirator has been selected, a fit test shall be conducted. Fit testing can either be qualitative (QLFT) or quantitative (QNFT) as permitted in the OSHA standard. Fit testing is to be performed in accordance with the mandatory procedures contained in Appendix A to 29 CFR 1910.134: Fit Testing Procedures.

7.3.6 Use of Air Purifying Respirators

Personnel issued respiratory protection should use respirators in accordance with the manufacturer's instructions and the following:

- Beards or other facial hair that prevents and adequate face seal are prohibited.
- Inspect the respirator for defects, wear, or other conditions that may inhibit the effectiveness of the respirator prior to each use. Inspect overall respirator function, tightness of connections, condition of straps, tubes, valves, cartridges, connections, etc.
- Perform a positive and negative pressure fit test of negative pressure, air purifying respirators prior to each use.
- Head coverings, (e.g., Tyvek® hoods or hard hat liners,) if used, must not interfere with the respirator-to-face sealing surface.
- Leave the work area at the first indication of facial irritation, discomfort, increased breathing resistance, contaminant breakthrough, or other indication the respirator is not functioning properly and immediately notify a project manager or SHSO.

7.3.7 Cartridge Change Out Schedules

Cartridges for Gases and Vapors – When air purifying respirators are used for protection, a cartridge change out schedule should be specified in each contractor’s component-specific HASP or activity hazard analysis that specifies the use of air purifying respirators. The cartridge change out schedule shall be developed and reviewed by the appropriate contractor’s H&S management and may be determined using information from the following sources:

- The OSHA Respirator Change Schedule
- Cartridge service life spreadsheet calculators
- Information based on respirator manufacturer service life calculators, if applicable
- End of service life indicators on cartridges certified by NIOSH

At a minimum, cartridges should be changed at the start of each workshift or if an employee experiences contaminant breakthrough.

Cartridges for Particulate Contaminants – Respirator cartridges for particulate contaminants should not be used more than one workshift. Cartridges may need to be changed more or less frequently if users experience changes in breathing resistance.

7.3.8 Supplied Air and Self-Contained Breathing Apparatus

Breathing air for supplied-air respirators (SARs) and SCBAs must meet or exceed the requirements for Grade D breathing air (ANSI G-7.1-1989) including:

- Oxygen content volume to volume (v/v) of 19.5-23.5 percent
- Hydrocarbon content of less than 5 mg/m³
- Carbon monoxide content of 10 parts per million (ppm) or less.
- Carbon dioxide content of 1,000 ppm or less.
- No noticeable odor
- Moisture content in cylinder shall not exceed a dew point of –50 degrees Fahrenheit (°F) at 1 atmosphere pressure

7.3.9 Inspection and Maintenance Procedures for Self-Contained Breathing Apparatus

- Check the cylinder label for a current hydrostatic test date
- Inspect the cylinder for large dents or gouges
- Inspect the cylinder gauge for damage
- Complete a routine inspection
- Fill out the appropriate records with results and recommendations

Routine Inspection: Perform immediately before donning and after cleaning.

- Before proceeding, check that the:
 - O-ring is present on the conical high-pressure fitting

- Bypass valve is closed
- Mainline valve is closed
- Regulator outlet is not covered or obstructed
- Backpack and harness assembly:
 - Visually inspect straps for wear, damage, and completeness
 - Check the wear and function of the belt
 - Check the back-plate and the cylinder holder for damage
 - Check that the cylinder is firmly attached to the back-plate
- Cylinder and high pressure hose assembly:
 - Attach the high-pressure hose connector to the cylinder fitting
 - Check that the belt and the high-pressure hose are not tangled
 - Open the cylinder valve and listen or feel for any leakage around the packing and the hose connection
 - Check the high pressure hose for damage or leaks
- Regulator Function:
 - Cover the regulator outlet with the palm of your hand
 - Open the round golden mainline valve
 - Note the stoppage of air flow after the positive pressure has built up
 - Compare the pressure reading on the cylinder and regulator gauges; they should be the same
 - Close the mainline valve
 - Remove hand from the regulator outlet
 - Open the magenta bypass valve slowly; note its function
 - Close the bypass valve
- Warning Alarm and Regulator Integrity:
 - Cover the regulator outlet again with the heel of your hand
 - Open the mainline valve
 - While covering the regulator outlet, close the cylinder valve
 - Move your hand from the outlet so the air drains out slowly
 - Observe the regulator gauge reading at which the low-pressure alarm sounds; it should start sounding at 550 to 650 pounds per square inch (psi)
 - Remove your hand from the regulator outlet
 - Close the mainline valve
 - Blow air into the regulator for 5 to 10 seconds
 - Draw air from the outlet for 5 to 10 seconds

If a positive pressure or vacuum cannot be maintained, there is a leak. DO NOT USE THE SCBA!

- Face piece and corrugated breathing hose:
 - Inspect the head harness and the face-piece for damage, serrations, and deteriorated rubber
 - Inspect the lens for damage and proper seal in the face-piece; inspect the exhalation valve for damage and dirt build-up

- With the breathing hose separated from the face-piece, inspect the hose connector for damage and presence of a wagon-wheel washer
- Stretch the breathing hose and carefully inspect it for holes and deterioration
- Attach the breathing hose to the face-piece
- Perform a negative-pressure test with the face-piece donned
- Storage:
 - Refill the cylinder to 2,216 psi
 - Close the cylinder valve
 - Tightly connect the high-pressure hose to the cylinder
 - Bleed the pressure from the high-pressure hose by opening mainline valve
 - Close the mainline valve
 - Close the bypass valve
 - Fully extend all of the straps
 - Store the face-piece in a clean plastic bag for protection

7.3.10 Work Practices for Conditions Immediately Dangerous to Life and Health

Except under emergency conditions, all work under IDLH conditions must be preplanned in advance. The preplanning of such work shall involve the appropriate contractor's H&S management. Operations that involve the use of SARs or SCBAs by project employees must be directly supervised by the appropriate contractor's hazardous waste supervisor.

In those instances where employees must work under IDLH conditions the following work practices must be followed:

- The USAID CM contractor shall be notified at least 3 days in advance of any planned work to be conducted under IDLH conditions.
- If such work is required under emergency conditions, the USAID CM contractor shall be notified as soon as possible.
- At least one employee or more, if necessary, shall be located outside the IDLH atmosphere. The number of outside employees shall be determined by the appropriate contractor's H&S management based on the number of employees working in the IDLH atmosphere, the complexity of the task, and complexity of a potential rescue.
- The outside employee(s) shall remain in visual, voice, radio, or signal line communication with the employee(s) working within the IDLH condition.

- The outside employee(s) shall be equipped with pressure demand SCBAs and appropriate rescue and retrieval equipment to aid employees working in the IDLH atmosphere.

7.3.11 Procedures for Care and Maintenance of Air Purifying Respirators

Cleaning Procedure for Respirators used Daily or More Than Once per Week

At the end of each day, respirators used on a daily basis or respirators expected to be used within the next 30 days shall be cleaned and stored as follows:

- Respirator cartridges shall be removed and discarded in labeled bags or containers for final disposal in accordance a project's waste management procedures.
- Respirators shall be rinsed thoroughly with potable water to remove visible dirt, dust, sweat, saliva, etc.
- Respirators shall be rinsed thoroughly with potable water to remove visible dirt, dust, sweat, saliva, etc.
- Wipe respirator down thoroughly with disposable disinfectant towelette.
- Dry off respirator place in plastic bag for storage.
- Store in a clean, dry location.

Cleaning Procedure for Respirators for Long-Term Storage or Intermittent Use

Respirators that will not be used within 30 days should be decontaminated at the location of use and returned to the Equipment Center to be cleaned and stored as follows:

- Remove filters, cartridges, or canisters. Disassemble face-pieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard and replace or repair any defective parts.
- Wash components in warm (43 degrees Celsius [$^{\circ}\text{C}$] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
- Rinse components thoroughly in clean, warm (43°C [110°F] maximum), preferably running water. Drain.
- When the cleaner used does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:
 - Hypochlorite solution (50 ppm of chlorine) made by adding approximately 1 milliliter of laundry bleach to 1 liter of water at 43°C (110°F); or,

- Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6-8 grams ammonium and/or potassium iodide/100 cubic centimeters [cc] of 45 percent alcohol) to 1 liter of water at 43°C (110°F); or,
 - Other commercially available cleansers of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer.
- Rinse components thoroughly in clean, warm (43°C [110°F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on face-pieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
 - Components should be hand-dried with a clean lint-free cloth or allowed to air dry.
 - Reassemble face-piece, replacing filters, cartridges, and canisters where necessary.
 - Inspect the respirator to ensure that all components have been reassembled properly.
 - Respirators shall be stored to protect them from damage, contamination, dust, sunlight, extreme temperatures, excessive moisture, and damaging chemicals, and they shall be packed or stored to prevent deformation of the face-piece and exhalation valve.
 - Upon next use, the employee shall perform a self fit check to ensure the respirator seals and works properly.

Section 8

Safety Program Management

8.1 Regular Health and Safety Reporting

The USAID CM contractor shall provide project management with a monthly H&S report detailing the following:

- Status of the project's H&S Program
- Significant identified hazards or unsafe conditions
- Hazard corrections implemented
- Concerns or issues regarding the H&S Program
- H&S trends

8.1.1 Trend Analysis

The USAID CM contractor shall review its collected H&S inspection data to identify any H&S performance trends. This will serve to identify areas for improvement and better direct resources and training. The USAID CM contractor shall provide its trend analysis in its monthly H&S report and during the H&S meetings.

8.2 Biweekly Health and Safety Meetings

The site H&S committee, discussed in Section 3.3.5.5, shall meet on a biweekly basis. The meetings shall be a means for contractors to discuss H&S issues or concerns, and for the USAID CM contractor's SHSO to report on the status of overall site H&S performance.

Section 9

Work Practices and Guidelines

9.1 Definable Features of Work

Field activities to be performed include the following DFOWs:

D&H Contractor

- Construction of site access roads;
- Excavation of soils and sediments;
- Hauling of soils and sediments;
- Dewatering of sediments;
- Delivery and placement of soil to restore excavated locations;
- General clearing and grading in the vicinity of the IPTD pile structure to create a laydown area; and
- Construction of the IPTD pile structure for the IPTD contractor's use.

IPTD Contractor

- Construction of the IPTD treatment facility;
- Operations and Maintenance of the IPTD treatment facility; and
- Hauling and placement of treated soils and sediments.

An AHA shall be prepared for each DFOW by the contractor conducting the activity.

9.2 Coordination of Activities with Airport and Facilities

The D&H contractor and IPTD contractor shall each ensure that their schedule of planned activities has been coordinated with the applicable Da Nang Airport authorities. This shall prevent interruptions or delays in work progress and serve to better protect site employees and the public.

9.3 Housekeeping

These guidelines are for the establishment and administration of a clean and orderly work environment at field project sites. A continuous housekeeping program strongly tends to prevent accidents. A clean and orderly work environment can be achieved and maintained through ongoing housekeeping efforts undertaken by personnel at all levels. Contractors shall initiate participation in housekeeping activities and good work habits, not only at the end of a work assignment but throughout the evolution of the project.

Contractors shall follow the work practices outlined within their housekeeping program.

- Contractors shall plan the location of equipment and storage facilities to allow the easy flow of personnel, equipment, materials, fire hazards, and to prevent the obstruction of evacuation, fire fighting, or rescue activities.

- Materials shall be stored in a manner that facilitates access of material handling equipment and personnel handling limitations. Lack of sufficient workspace and storage capacity leads to the potential for accidents and decreases efficiency.
- Avoid storage of flammable liquids, such as paints and thinners, unless they are required for specific project needs. If needed, such storage shall be within a metal storage cabinet that has been labeled and approved for the storage of flammable liquids.
- Continuously maintain work areas in a neat and orderly manner.
- Containers shall be provided for the collection of waste, trash, and other nonhazardous refuse. Investigation-derived waste and other waste materials that are potentially hazardous shall be stored and labeled in accordance with OSHA and local regulatory requirements.
- Deploy leads, hoses, and extension cords so they do not present tripping hazards and are not subject to contact with moisture or physical stress. Where possible, they should be hung overhead with nonconductive material and kept away from walkways, doors, stairs, and ladders.
- Protect protruding rebar and anchor bolts and conspicuously mark them.
- Clean small spills that create slip hazards and/or flammability hazards immediately and do not leave them unattended.
- Keep walkways, aisles, stairways, and passageways in a clear and unobstructed condition.
- Prohibit eating and drinking in work areas where there is potential exposure to toxic or hazardous materials. Smoking is limited to designated smoking areas where there is no such exposure.

9.4 Manual Material Handling

Contractor employees shall follow the work practices outlined below when lifting and carrying heavy objects.

- Test any load you are required to lift and compare its weight, volume, and shape to lifting abilities. Employees shall not attempt to lift beyond their capacity.
- Obtain assistance in lifting heavy objects. Back belts or back braces may be used if desired; however, many ergonomists do not believe that these devices create a benefit or provide protection.
- When two or more persons are involved in a manual lift, one person shall provide direction of the lift.
- When two or more persons are carrying an object, each employee, if possible, should face the direction in which the object is being carried.
- When two or more persons carry a heavy object that is to be lowered or dropped, there shall be a prearranged signal for releasing the load.

- The right way to lift is easiest and safest. Crouch or squat with the feet close to the object to be lifted, secure good footing, take a firm grip, bend the knees, keep the back vertical, and lift by bending at the knees and using the leg and thigh muscles. Exercise caution when lifting or pulling in an awkward position.
- Employees shall avoid twisting or excessive bending when lifting or setting down loads.
- When moving a load horizontally, employees shall push the load rather than pull.
- For tasks that require repetitive lifting, the load shall be positioned to limit bending and twisting. The use of lift tables, pallets, and mechanical devices shall be considered.

When gripping, grasping, or lifting an object such as a pipe or board, the whole hand and all the fingers shall be used. Gripping, grasping, and lifting with just the thumb and index finger shall be avoided.

9.5 Electrical Safety

The following work practices can eliminate or minimize the potential for electrical shock, fires, and burns when working on or around electrical equipment. Contractors shall comply with the following:

- Treat all electrical circuits as live until their condition has been verified. Treat even low voltages as dangerous.
- Inspect all electrical equipment and tools before each use. Inspect insulation, fixtures, switches, plugs, fuses, etc. Remove from service any faulty equipment and notify the source of the equipment.
- Do not work with electrical equipment with wet hands or standing in wet areas.
- Only a qualified electrician shall wire or install electrical systems.
- Ground fault circuit interrupters (GFCIs) shall be provided for all areas where electrical equipment or portable electric tools may be used. If a GFCI outlet is not available, a portable GFCI outlet adapter or extension cord shall be used.
- Do NOT use a finger or any conductive object to point to circuits, panels, fixtures, etc.
- Do not install fuses or circuit breakers larger than the circuit rating.
- Conduct a tool count before beginning work and after work is completed.
- Use lockout/tagout procedures whenever working on electrical equipment.
- Use only approved and properly rated lighting devices and tools in vessels, boilers, and confined spaces.
- Use the following precautions when using electrical cords:
- Visually inspect electrical cords before each use for fraying, cuts, or other damage.

- Do not use extension cords for permanent installations.
- Keep extension cords properly covered or raised overhead to prevent tripping hazards and damage from traffic.
- Extension cords or cables shall not be secured with staples, hung from nails, or suspended by bare wire.
- Only use electrical cords that are equipped with a grounding pole on the plug (three pole plugs). Never remove a grounding pole from a cord.
- All electrical equipment, including motors, generators, wiring, and controls, shall be installed so that exposed live parts are properly guarded or insulated to provide adequate protection to operating personnel. Avoid open panels, circuit boxes, and exposed wiring.
- Portable electrically driven tools shall be grounded with a three-wire circuit. Explosion-safe (explosion-proof or intrinsically safe) tools shall be required in hazardous areas.

In wet locations:

- Plugs and receptacles shall be kept out of water unless they are an approved submersible type.
- Where a receptacle is used in a wet location, it shall be contained in a weatherproof enclosure, the integrity of which is not affected when an attachment plug is inserted.
- All temporary lighting strings in outdoor or wet locations (such as tunnels, culverts, valve pits, floating plants, etc.) shall consist of lamp sockets and connection plugs permanently molded to the hard service cord insulation.

If a rescue from electrical equipment is required, use the following precautions:

- Disconnect the circuit before attempting the rescue.
- Make sure you are standing on a dry surface.
- Use a dry belt, rope, coat, or other nonconductive material to loop over the victim and drag them away from the contact.
- Assess the condition of the victim; do not approach if they are still in contact with the circuit.
- Apply first aid and/or CPR (if you are qualified) and get medical help.

9.6 Lockout/Tagout

Any locks or tags placed on equipment must be coordinated with the owner/ operator of the equipment.

These guidelines cover inspecting, servicing, and maintaining equipment where unexpected energization or startup of the equipment has the potential to harm employees. These guidelines are intended to prevent accidents and injuries caused by the accidental release of energy. Project contractors performing logout/tagout of equipment shall comply with the procedures outlined in this section.

9.6.1 Definitions

Lockout – The process of preventing the release of material or energy (mechanical, kinetic, potential, electrical, or chemical) from a power source using physical means, such as a lock to maintain an energy isolation device in the safe position, and prevent the inadvertent energization of machinery, equipment, or a system. Lockout usually involves installing a lock at a power (or flow) source so that equipment supplied by that source cannot be operated. The lockout locks shall be provided only for lockout purposes and shall not be used to lock toolboxes, storage sheds, or other devices.

Tagout – Accomplished by placing a tag on the power source. The tag acts as a warning not to restore energy. It is not a physical restraint. Tags must clearly state Do Not Operate or the like. Identifying information must be applied by hand.

Authorized Employees – Those who physically lock or tagout equipment for servicing or maintenance. Note that these individuals are not necessarily the people who normally operate the equipment. In some cases, the authorized employee may be a representative of a client or third party operator.

Affected Employees – Those whose job requires them to operate equipment subject to lockout or tagout, or those employees who work in areas where lockout or tagout is used.

9.6.2 What Must Be Locked or Tagged Out?

Employees shall implement these guidelines when they are potentially exposed to hazards such as unguarded moving parts, live electrical systems, or flow of material from open pipes, valves, or other systems. This program applies to nonroutine activities. This includes inspections, repair and replacement work, renovation work, and modifications or other adjustments to equipment that may affect employees. For routine activities, mechanical guarding and electrical insulation are the preferred protection.

Some types of energy that lockout/tagout must be used to control include:

Electrical
Fluids and Gases

Mechanical
Hydraulic

Pneumatic
Thermal Gravity

9.6.3 Lockout/Tagout Procedure

When employees perform a service that requires lockout or tagout, they shall coordinate all activities with the operator of the equipment or facility. The following actions should be performed to execute a lockout or tagout:

- Shut down the equipment
- Isolate equipment
- Apply lockout devices or warning tags
- Release stored energy to achieve a “zero energy state”

Shut the Equipment Down and Isolate It - First, locate all energy sources that power the piece of equipment you will work on. Always look for hidden energy sources. Many machines have more than one power source, so you must study the machines and power sources involved. Notify any affected employees before you start a lockout procedure, then shut off each power and material feed to the equipment.

Every power source has its own procedure for shutoff. Shutoff may be accomplished by pulling a plug, opening a disconnect switch, removing a fuse, closing a valve, bleeding the line, or placing a block in the equipment. Generally, follow this sequence of events:

- Shut down the machine by following the normal method for shutdown.
- Turn off the energy at the main power source.
- Turn the machine switch back on to confirm that the power source has been deactivated.
- Attempt to restart the machine to guarantee that the power is shut off, then return the switch to the off position.

Apply Lockout Devices – Make absolutely sure the power cannot be supplied unless you know about it. If several people will work on a piece of equipment, each must apply his/her own lock. Use a multiple lockout device that can accommodate several locks at once. All personal locks shall be accompanied by a tag that identifies the employee(s), is signed and dated by the employee(s) and specifies the work activity being performed. This prevents any accidental startups while another employee may still be working on the machinery.

When all energy sources are locked, inform others of the lockout situation. One way to do this is by applying a tag to the power source. Note: Never use another employee’s lock and never lend your lock to another employee.

Safe Release of Stored Energy – Equipment must be at “zero energy state” before servicing or maintenance work can begin. To achieve a zero energy state, release energy by draining valves, releasing springs, bleeding air or hydraulic pressure, or supporting elevated weights. When you are finished, test the machine to ensure that all energy was disconnected or released.

Putting the Power Back On – After servicing is finished, make sure all tools and personnel are removed from the area and replace all machine guards. Only then can you remove your tag and lock and

reconnect all sources of energy. You may then restart the equipment in accordance with normal startup procedures.

9.6.4 Training and Inspections

Training – All affected contractor employees must be trained in the purpose and use of lockout and tagout before the effort begins. All authorized employees shall be trained in recognition of hazardous energy sources, hazardous energy sources in use, and how to follow the lockout/tagout procedure. The appropriate contractor shall conduct retraining when an audit shows deficiencies with the procedures or at the request of a manager.

Inspections – When these procedures are applied to a single site for more than a month, an inspection must be done by an authorized employee. This inspection should include questions to determine if employees understand the purpose of lockout/tagout, if proper locks and tags are being used, and if established procedures are being followed.

9.6.5 Special Conditions

Other Contractors - Contractors and facility operators shall inform each other of their lockout/tagout procedures in enough detail for their employees to recognize the function of locks or tags that they may observe during their work. Work shall not proceed until the need, function, and ownership of all locks or tags are clarified. Under no circumstance shall employees or subcontractors remove locks or tags of others.

Shift and Personnel Changes – The employees ending their shift shall remove their locks before leaving. However, they may only remove their lock if it is safe to operate the equipment or another lock is put in place that is under the control of someone on the next shift. When a piece of equipment will remain unsafe until the employee next returns, that lock may remain in place.

Power Sources that Cannot be Locked Out – When a power source cannot be physically locked out, a tagout may be used without locks.

Plug-Supplied Equipment – Any employee who works on an appliance or device that obtains its power through a flexible cord shall apply a plug lockout device to its attachment plug or keep the plug in his or her control throughout that effort.

9.7 Compressed Gas Cylinders

Contractor employees that perform work involving compressed gas cylinders should be familiar with their hazards and safe practices. Contractors shall comply with the following practices when working with compressed gas cylinders.

9.7.1 Identification and Labeling

- All gas cylinders shall be clearly labeled with their contents and manufacturer.
- Do not accept a compressed gas cylinder for use that does not legibly identify its contents by name.
- Never rely on the color of the cylinder for identification.

- Gas lines leading from a remote compressed gas supply shall be labeled to identify the gas, the laboratory or area served, and the relevant emergency telephone numbers.
- Signs shall be posted in areas where flammable compressed gases are stored, identifying the substances and appropriate precautions (e.g., HYDROGEN - FLAMMABLE GAS - NO SMOKING - NO OPEN FLAMES).

9.7.2 Engineering Controls / Design Considerations

- Keep hazardous gas cylinders in gas cylinder cabinets or racks, with the exception of cylinders containing a nontoxic flammable gas and cylinders used in fume hood applications. Those must be firmly braced to prevent falling.
- Place a smoke detector adjacent to flammable gas cylinders, connected if possible to the building alarm system. If possible, interlock smoke detector activation with the shutdown of hazardous gas flow.
- Connect all ducts used to exhaust hazardous compressed gas cylinders or gas-carrying components to a source of exhaust ventilation.
- Place a safety shower or eyewash with a shower wand in areas where corrosive gases are used or stored.
- Make sure that all gas piping is compatible with the gases used and capable of withstanding full cylinder pressure.
- Never lubricate, modify, force, or tamper with a cylinder valve. Use the appropriate regulator on each gas cylinder.
- Use check valves when there is the possibility of backflow into the cylinder.

9.7.3 Using Cylinders

- Always use safety glasses with side shields when handling and using compressed gases, especially when connecting and disconnecting compressed gas regulators and lines.
- Never use a cylinder that cannot be identified positively.
- Never use a cylinder of compressed gas without a pressure-reducing regulator attached to the cylinder valve.
- Use regulators and pressure gauges only with gases and pressure ratings for which they are designed and intended.
- Do not use oil or grease as a lubricant on valves or attachments to oxygen cylinders.
- Never use oxygen as a substitute for compressed air.

- Test cylinders with toxic, corrosive, and pyrophoric gases for possible leaks when receiving, installing, disconnecting, or shipping. Always close the cylinder valve before attempting to stop leaks between the cylinder and regulator.
- Damaged or leaking cylinders should be removed from service and tagged as “DAMAGED or DEFECTIVE.”

9.7.4 Storing Cylinders

- Keep cylinders in storage upright, secure, and locked into a compact group.
- Cylinders containing the same gas shall be stored in a segregated group; empty cylinders shall be stored in the same manner.
- Properly secure cylinders with chain, rope, or brackets to prevent falling. Valve protection caps must be fully screwed on unless the container is in active service.
- Protect cylinders stored outside from standing water by providing proper drainage. Where outdoor storage is necessary, an overhead cover is required to avoid rain damage and overheating in sunlight.
- For short-term experiments using hazardous gases, select the smallest cylinder available.
- Return corrosive gas cylinders to the gas supplier within 1 year to avoid regulator and cylinder valve problems due to corrosion.
- Some small cylinders, such as lecture bottles and cylinders of highly toxic gases, are not fitted with rupture devices and may explode if exposed to high temperatures. Use and store these with great care.
- Never place cylinders where they may become part of an electric circuit.
- Avoid areas that are damp or subject to other corrosive materials.
- Do not store flammables, toxic gases, and oxidizers adjacent to each other. Store cylinders in well ventilated locations.
- Areas containing hazardous gas in storage must be appropriately placarded.
- Cylinders in storage must be separated from flammable or combustible liquids and from easily ignitable materials (such as wood, paper, packaging materials, oil, and grease) by at least 40 feet (12 meters) or by fire-resistant partition having at least a 1-hour rating.
- Maintain at least a 20-foot separation between fuel and oxygen cylinders, or install a firewall a minimum of 5 feet high with a 30-minute fire rating.
- Empty cylinders must be closed and the valve cap secured. They must be clearly tagged or marked as MT or EMPTY.

9.7.5 Transporting Cylinders

- Never transport a cylinder with a regulator attached.
- Cylinders larger than lecture-bottle size should be chained or strapped to a wheeled cart during transport to ensure stability.
- Only trained personnel using approved trucks may transport cylinders.
- To protect the valve during transportation, the cover cap should be screwed on hand tight and remain on until the cylinder is in place and ready for use.
- Handle only one cylinder at a time.
- Secure cylinders in a basket or similar device when moving them using a crane or derrick. Do not use slings, ropes, or electromagnets for lifting cylinders. Do not allow cylinders to strike each other.

9.7.6 Piping Incompatibilities and Restrictions

- Do not use copper piping for acetylene.
- Do not use plastic piping in any portion of a high-pressure system.
- Do not use cast iron pipe for chlorine.
- Do not conceal distribution lines where a high concentration of a leaking hazardous gas can build up and cause an accident.
- Distribution lines and their outlets must be clearly labeled as to the type of gas contained.
- Piping systems should be inspected for leaks on a regular basis, preferably weekly. Special attention should be given to fittings.

9.7.7 Emergency Procedures

- Do not remove leaking cylinders from their ventilated enclosures until the leakage has stopped.
- Trip the remote emergency gas shutoff valve/button, if present.
- Close the main cylinder valve to stop or slow the leak. The hazardous gases should be contained in their enclosure until it is clearly safe to approach.
- Do not extinguish a flame involving a combustible gas until the source of gas has been shut off.

9.7.8 Training

Employees that handle or use compressed gases need the following training:

- Safe handling practices for hazardous substances contained in gas cylinders: corrosive, explosive, toxic, etc.

- Identification and signs
- Storage and transportation requirements
- Emergency procedures

9.8 Fall Protection

Contractor employees may be exposed to falls during the course of their work at the site. To prevent injuries from falls, contractors shall comply with the following work practices concerning fall protection.

A fall exposure is considered to exist when an employee is within 6 lateral feet of a change in elevation of 6 vertical feet or more. Typical exposures can include:

- Excavations
- Roofs
- Leading edge of a surface (floor)
- Floor openings

All employees shall use fall protection 100 percent of the time when exposed to a fall in excess of 6 feet or when required by rules such as those of a client or the owner or operator of a facility. Fall protection may consist of any of the following:

- Guardrails
- Safety nets
- Positioning systems
- Warning systems
- Personal fall arrest systems

Employees shall not use fall arrest equipment until they have been properly trained. Contractor SHSOs and site managers shall ensure fall protection is available and used as required for all employees for whom they are responsible and that employees receive adequate training in the use of the equipment.

The following work practices and guidelines shall be considered for protection against falls:

- Before working or walking on a surface, consider the strength and structural integrity of the surface. Can it support employees and any needed equipment or material safely? Employees shall work on those surfaces only when the surfaces have the requisite strength and structural integrity.
- When not protected by any other means of fall protection, such as safety nets or scaffold with proper guardrails, employees shall use full body harnesses, lanyards with double-locking snap hooks, and an adequate anchorage (fall arrest equipment). To achieve 100 percent fall protection, employees may need to use a two-lanyard system and/or vertical or horizontal lifelines, retractable lifelines, or other approved positioning devices.
- Employees shall rig fall arrest equipment so that it minimizes the potential for a fall arrest event or any potential free-fall, lateral swing, or contact with any lower object. Under no circumstances shall fall arrest equipment be rigged so that an employee can free-fall more than 6 feet.

- Anchorage points for fall arrest equipment shall be capable of supporting 5,000 pounds per employee attached. Anchorage points for fall arrest equipment shall be located above the employee's body harness attachment point where practical.
- When vertical lifelines are used, a separate lifeline shall protect each employee. The lifeline shall be properly weighted at the bottom and terminated to preclude a device such as a rope grab from falling off the line.
- Horizontal lifelines shall be limited to two persons at one time between supports and maintain a safety factor (strength/requirement) of at least 2.
- Before each use, employees shall visually inspect all fall arrest equipment for cuts, cracks, tears or abrasions, undue stretching, overall deterioration, mildew, operational defects, heat damage, or acid or other corrosion. Equipment showing any defect shall be withdrawn from service. All fall arrest equipment subjected to impacts caused by a free-fall or by testing shall be removed from service. Personnel shall use full body harnesses for personal fall protection.
- Fall arrest equipment shall be stored in a cool dry place not subjected to direct sunlight.
- Fall arrest equipment shall not be used for any other purpose, such as towropes or hoist lines.
- Proper guardrails shall be installed on open sides of all walkways and runways where the fall distance exceeds 4 feet. Proper guardrails shall be installed on open sided floors where the fall distance exceeds 6 feet. All floor openings or floor holes shall be protected by guardrails or hole covers. If hole covers are used, they shall be strong enough to support the maximum intended load, secured against displacement, and properly labeled.
- When guardrails are used for fall protection, they shall consist of a top rail, intermediate rail, and toeboard. The top rail shall have a vertical height of 42 inches, the midrail shall be at 21 inches, and the toeboard 4 inches. When wood railings are used, the post shall be of at least 2-inch by 4-inch stock spaced not to exceed 8 feet, the top rail shall be of at least 2-inch by 4-inch stock, and the intermediate rail shall be of at least 1-inch by 6-inch stock. If pipe is used, it shall be at least 1½-inch nominal diameter. If structural steel is used, it shall be of 2-inch by 2-inch by 3/8-inch angles or equivalent. If wire rope is used for railings, it shall have a diameter of at least 2 inches and shall be stretched taut to allow no more than a 3-inch deflection.
- When operating a scissor-lift work platform, the lift shall have guardrails on all open sides, with the door access chains or rails in place.
- Employees operating aerial lifts shall wear a body harness and lanyard attached to the aerial lift. Employees shall not attach the lanyard to an independent structure.
- Employees riding in a crane-suspended work platform shall wear a body harness and lanyard attached to the grab rail of the platform.
- Employees working on or near wall forms or rebar shall wear a body harness lanyard and/or positioning device when exposed to a fall in excess of 6 feet.

- Positioning devices shall be rigged to prevent a free-fall greater than 24 inches.
- Stairs, ladders, or ramps shall be provided for all access ways where there is a change in elevation greater than 19 inches.
- Manila or synthetic rope shall not be used as guardrails.
- Employees shall not stand or sit on guardrails.
- Personal fall arrest systems shall not be attached to guardrail systems.
- If warning lines are used, they shall consist of rope, wire, or chain and be flagged at intervals of 6 feet or less with high-visibility material. The lowest point shall be no less and 34 inches from the surface, and the highest point shall be no more than 39 inches. The warning line shall be placed at least 6 feet from the edge.
- Safety net systems shall be installed as close to the working surface as practical, but in no case more than 25 feet below the working surface and shall extend outward at least 8 to 13 feet depending on the vertical fall distance. Safety nets shall be drop-tested after initial installation and at 6-month intervals. The maximum size of net mesh shall not exceed 36 square inches nor be longer than 6 inches on any side. Mesh opening shall be secure to prevent enlargement.
- Body belts shall not be used for personal fall arrest. Full body harnesses are required.

9.9 Excavations

Contractor employees who work in or around excavations are exposed to many of the same excavation hazards as construction personnel. Contractor employees shall learn to recognize these hazards and avoid situations that put themselves, other employees, and subcontractors at risk. Contractor employees shall comply with the following safe excavation work practices.

9.9.1 Pre-Excavation Activities

- Before excavation, the location of any underground utilities such as gas, sewer, electricity, and telephone lines shall be determined and marked. On private property, government facilities, etc., the owner may need to be asked to locate underground utilities. In some cases, it may be necessary to use nonintrusive subsurface investigation techniques to identify underground utilities and installations.
- Excavations shall be conducted under the direction of a “competent person.” OSHA defines “competent person” as an individual who, by way of training and/or experience, is knowledgeable of applicable standards, is capable of identifying workplace hazards relating to the specific operation, is designated by the employer, and has authority to take appropriate actions. For excavations, the competent person shall be on site and is responsible for ensuring the following:
 - Performing inspections before the start of each shift and as needed throughout the shift to ensure a safe operation.

- Removing employees from the hazardous area when there is evidence of a possible cave-in.
- Identifying and correcting hazards associated with the excavation.
- The contractor responsible for the excavation (e.g., D&H contractor) shall provide the competent person.
- For many excavations an excavation permit must be completed before excavating. The permit is usually generated by the owner/operator of a facility or sometimes a prime contractor. If necessary, the permit shall be completed by the competent person for that excavation.
- Surface encumbrances (buildings, utility poles, pavement, or other structures that may be undermined by the excavation) that have a potential to create a hazard to employees or become subject to physical damage must be removed, supported, or neutralized, as necessary, before the start of any excavation work.
- The competent person must evaluate soil conditions and determine the shoring or sloping requirements for the trench or excavation, based on the soil evaluation. If no attempt is made to determine soil type, excavations shall be sloped at an angle not steeper than 1.5 (horizontal) to 1 (vertical) (34 degrees), or a trench box or other protective system shall be used. For excavations greater than 20 feet (6 meters) in depth, sloping and/or shoring systems must be designed by a professional engineer.

9.9.2 During Excavation

- The competent person must inspect the trench or excavation daily before performing any work within the trench or excavation deeper than 5 feet.
- For trenches less than 5 feet deep, the competent person must inspect and evaluate the potential for a cave-in.
- All excavations that are 4 feet deep or deeper shall have a ladder for access into the excavation with no more than 25 feet of lateral travel in any direction.
- All excavations that are 5 feet deep or deeper and excavations shallower than 5 feet in unstable soil shall be sloped, braced, or shored to prevent cave-ins.
- No material, including trench spoil, may be stored within 2 feet of the edge of the excavation.
- All excavations shall be barricaded with the appropriate barrier tape and other protective devices to protect against falls or other inadvertent entry.
- If possible, excavations should not be left open. If an excavation must be kept open, proper covers, fencing, and security should be provided to prevent public access to the excavation during nonworking hours.
- Tools, equipment, or heavy machinery shall not be placed near an excavation where they may affect the structural stability of the walls or fall into the excavation.

- When mobile equipment is operated adjacent to an excavation, or when such equipment is required to approach the edge of an excavation, and the operator does not have a clear and direct view of the edge of the excavation, a warning system such as barricades, hand or mechanical signals, or stop logs shall be used. Where possible, the grade should slope away from the excavation.
- Place any environmentally impacted soils on plastic liners and cover the spoil piles to prevent further spreading of the contamination. The liners and covers shall be durable enough for the intended period of storage.
- For excavations that may contain a hazardous atmosphere, air monitoring should be conducted before entry and periodically during the work to ensure that a safe atmosphere is maintained during excavation work. Air monitoring shall be performed for explosive/flammable vapors, oxygen, and any hazardous gases that may be present such as hydrogen sulfide, carbon monoxide, or other hazardous gases that may be present as a result of activities conducted in the excavation or contaminants in the soil. Use forced ventilation if needed. Acceptable entry conditions are:

Oxygen content	20.5 percent to 23.5 percent
Flammable atmosphere	<10 percent of the lower explosive limit (LEL)
Hydrogen sulfide	<10 ppm
Carbon monoxide	<25 ppm
Toxic vapor/gases	<one half compound exposure limit

Note: If air monitoring results indicate levels outside of the conditions above, employees and subcontractors shall not enter the excavation and shall contact their SHSO for guidance.

- Heavy equipment, tools, or individuals shall not operate/work within 10 feet of any power line or exposed electrical distribution component unless it has been de-energized and visibly grounded or provided with an effective insulating barrier.
- Workers shall wear required PPE.
- The competent person must evaluate soil conditions and stability as new soil layers are uncovered.
- Do not stand under any live load, including an excavator bucket.
- Stand away from any vehicle being loaded or unloaded to avoid being struck by any spillage or falling materials.
- Do not stand in the swing radius of excavation equipment.

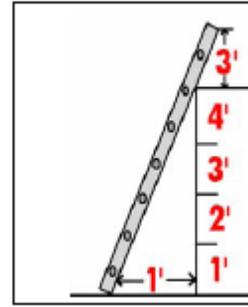
9.10 Ladders

The following guidelines shall be followed by contractor employees when using ladders.

9.10.1 Portable Ladders

- Ladders shall be used to travel from one elevation to another. Except where it is not feasible, work shall not be performed from ladders. When it is necessary to perform work at high elevation, scaffolds or mobile lift equipment shall be used.
- If it is necessary to work from a ladder:
 - The ladder shall be secured to prevent it from slipping or falling.
 - When possible, employees working more than 6 feet above grade should wear a body harness and lanyard and tie off to a secure anchor, **(not the ladder!)** or have another employee hold the ladder.
- Before using any ladder it shall be inspected. Look for:
 - Missing non-skid feet.
 - Worn or frayed ropes.
 - Cracks in sides or rungs.
 - Missing rivets or other fasteners.
 - Bent or missing spreaders.
 - Bowed or distorted members.
 - Loose rungs.
 - Any condition that could cause a safety problem.
- Ladders that have fallen or been misused shall be checked for excessive dents or damage.
- Ensure that tie-off rope is attached and in good condition.
- Ensure that the spreaders and locking mechanisms on stepladders are in good condition.
- Ensure that hinges move easily and are in good condition.
- Ladders should not be painted. Paint can hide damage and defects.
- Select the correct type of ladder for the job. Only fiberglass ladders shall be used at electricity-generating facilities. Only nonconductive ladders shall be used for work involving electricity or the use of electrically powered tools. Make sure the ladder is long enough to reach the desired point without compromising recommended safe-use procedures.
- Secure ladders by tying the top or bottom to a fixed structure that will support more than the anticipated total load. Maintain an adequate slope with the base at least one quarter of the length of the ladder away from the supporting structure.

- The ladder shall extend 3 feet above any landing you will access.
- Do not leave unattended step or straight ladders standing. They shall be closed, lowered to the ground, and placed where they do not present tripping hazards.
- Keep the area around the base and top of the ladder free of tripping hazards, and barricade the area if the base or top projects into a passageway.
- When either the length or the weight of a ladder makes it difficult to handle, two people shall raise and secure the ladder. One shall secure the feet while the other walks under the ladder from the opposite end until it is raised enough to place or move. Raise the extension, if needed. Reverse the process for lowering the ladder.
- Extension ladders must be equipped with necessary irons, locks, and hooks and assembled so the sliding (upper) section is on top of the base (lower) section. In addition, extension ladder sections shall overlap at least 3 feet. If the ladder extends more than 4 feet above the top tie-off, place a barrier or flag on the ladder to prevent personnel from climbing beyond a safe point.
- Ensure that shoes/boots are free of mud, oil, or grease before ascending or descending a ladder. Ladder rungs shall be cleaned immediately if they become soiled to reduce slipping hazards.
- Employees shall use a tool pouch or bucket-and-line to raise or lower materials, rather than carrying them while ascending or descending a ladder.
- Only one employee shall climb or descend a ladder at a time.
- When climbing or descending a ladder, face the ladder and maintain three points of contact at all times. (i.e., two feet and one hand, two hands and one foot.)
- Straight ladders shall not be climbed beyond the third step from the top.
- Excavations and trenches more than 4 feet deep shall have a ladder (or ladders) that extends at least 3 feet above the ground surface placed so that personnel will not travel more than 25 feet horizontally to get to a ladder.
- When storing ladders, take the following precautions:
 - Ladders stored horizontally should have support in a sufficient number of places to prevent sagging and permanent set.
 - Tie together or secure ladders that are stored vertically to keep them from falling into aisles or equipment.
 - Do not store wooden ladders near radiators, stoves, or other heat sources that could dry the wood and cause deterioration.



- Do not store wooden ladders near steam lines or other places where they are kept wet or damp enough to rot wood.
- Clean ladders after every use before returning them to storage. Remove all mud, oil, and grease.

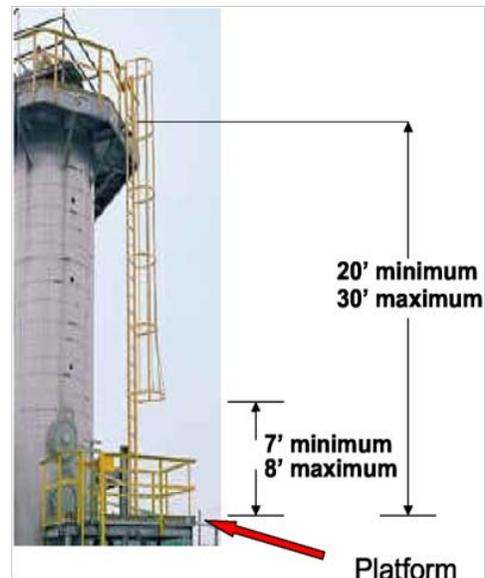
9.10.2 Stepladders

- Stepladder legs shall be fully spread with the spreader bars locked in place.
- Stepladders shall not be used as straight ladders.
- The top two steps shall not be used.
- Do not leave tools or materials on the top shelf of a stepladder, remove them before descending a ladder and/or moving it.

9.10.3 Fixed Ladders

Fixed ladders more than 20 feet high must be caged unless other fall prevention safety devices are installed and used. Fixed ladders with cages exceeding 20 feet in height shall have landing platforms installed every 30 feet. Use of the body harness and lanyard described in Section 9.8 would meet this requirement.

Fixed ladders shall be securely attached to an immobile structure and attachments shall be inspected annually for signs of deterioration or detachment. Repairs must be made immediately.



9.11 Tools and Power Equipment

9.11.1 Hand Tools

Contractor employees who have a need to use basic hand tools shall comply with the following work practices:

- All tools shall be of an approved type and maintained in good condition. Tools are subject to inspection at any time. Contractor managers and supervisors have the authority and responsibility to condemn unserviceable tools, regardless of ownership.
- Tag defective tools to prevent their use or removal from the job site.
- Use the proper tool for the job performed.
- Do not use hammers with metal handles, screwdrivers, knives with metal continuing through the handle, and metallic measuring tapes on or near energized electrical circuits or equipment.

- Do not throw tools from place to place or from person to person. Tools that must be raised or lowered from one elevation to another shall be placed in tool buckets or firmly attached to hand lines.
- Do not place tools unsecured on elevated places.
- Dress, repair, or replace all impact tools such as chisels, punches, drift pins, etc., that become mushroomed or cracked before further use.
- Use suitable holders or tongs, not the hands, to hold chisels, drills, punches, ground rods, or pipes that are struck by another employee.
- Do not use shims to make a wrench fit.
- Do not use wrenches with sprung or damaged jaws.
- Do not use pipe or other means to extend a wrench handle for added leverage unless the wrench was designed for such use.
- Use tools only for the purposes for which they have been designed.
- Store and handle tools with sharp edges so that they will not cause injury or damage. They shall not be carried in pockets.
- Use eye protection when using or working around impact type tools (e.g., hammer, chisel, ax, hatchet, etc.).
- Replace wooden handles that are loose, cracked, or splintered. The handle shall not be taped, glued, or lashed with wire.
- Keep all cutting tools such as saws, wood chisels, knives, or axes in suitable guards or in special compartments.
- When using such tools as screwdrivers and wrenches, avoid using your wrists in a bent, flexed, extended, or twisted position for long periods of time. Employees shall maintain their wrists in a neutral or straight position.
- Do not leave tools lying around where they may cause a person to trip or stumble.
- When working on or above open grating, use a canvas or other suitable covering to cover the grating to prevent tools or parts from dropping to a lower level where others are present, or barricade or guard the danger area.
- Do not depend on the insulation on hand tools to protect users from shock.

9.11.2 Electric Tools

Contractor employees who have a need to use electric power tools shall comply with the following work practices:

- The non-current carrying metal parts of portable electric tools such as drills, saws, and grinders shall be effectively grounded when connected to a power source unless the tool is an approved double-insulated type or the tool is connected to the power supply by means of an isolating transformer or other isolated power supply, such as a 24-volt direct current (DC) system.
- All power tools shall be examined before use to ensure general serviceability and the presence of all applicable safety devices. The electric cord and components shall be given a thorough examination for cracks, exposed wires, or other defects.
- Power tools shall be used only within their capability and shall be operated in accordance with the manufacturers' instructions.
- The use of eye protection is required when using or working around power tools.
- Operators shall take care to use appropriate hand positions on cutting tools such as saws, drills, or grinders to avoid hand injury.
- All tools shall be kept in good repair and disconnected from the power source while repairs are being made.
- Electrical tools shall not be used where there is a hazard of flammable vapors, gases, or dusts until that hazard is firmly under control.
- GFCI shall be used with all electric power tools.
- All guards and safety interlocks with which the tools were purchased shall be in place and in working order.
- Any tool that is identified as defective shall be tagged "not for use," and set aside for repair and/or discarded.
- Do not wear loose or frayed clothing while operating power tools and equipment. Hair should not stick out from hard hats.
- Do not use electrical cords to transport, suspend, hoist, or lower tools.
- Do not allow power cords to lie in water.
- Disconnect rotating tools from the power source before adjusting, servicing, or cleaning them. Follow the lockout procedure described in Section 9.6.
- Do not modify tools.

9.11.3 Pneumatic Tools

Contractor employees that use pneumatic power tools shall comply with the following work practices:

- Compressed air and compressed air tools shall be used with caution.
- Pneumatic tools shall never be pointed at another person.
- Pneumatic hose connections shall be secured by some positive means to prevent them from becoming accidentally disconnected. Chicago fittings have wire holes to allow such security.
- Pneumatic power tools shall be secured to the hose by some positive means to prevent the tool from becoming accidentally disconnected.
- Safety clips or retainers shall be securely installed and maintained on pneumatic impact tools to prevent attachments from being accidentally expelled.
- Compressed air shall not be used for cleaning purposes except when reduced to less than 30 psi and then only with effective chip guarding and PPE.
- Compressed air shall not be used to blow dust or dirt from clothing (or skin).
- The manufacturer's safe operating pressure for hoses, pipes, valves, filters, and other fittings shall not be exceeded.
- The use of hoses for hoisting or lowering tools shall not be permitted.
- All compressed air hoses exceeding 30 psi shall have a safety device at the source of supply or branch line to reduce pressure in case of hose failure or disengagement of a connection.
- Before making adjustments or changing air tools, the air shall be shut off at the air supply valve ahead of the hose. The hose shall be bled at the tool before breaking the connection. Disconnection at the quick-change connectors is one way to meet this goal.
- Eye protection is required when using or working around pneumatic tools.
- Use hearing protection if noise exposure is a concern (i.e., if it is too loud to conduct a normal conversation).
- Pneumatic tools shall be operated only by persons trained in their use.
- A pneumatic tool used where it may contact exposed live electrical parts shall have a nonconductive hose and an accumulator to collect moisture.
- Employees shall not use any part of their bodies to locate or attempt to stop an air leak.
- All guards and safety interlocks must be in place and functional.

9.11.4 Engine-Powered Tools

Contractor employees that use engine-powered tools shall comply with the following work practices:

- Stop the engine and allow it to cool before refueling, servicing, or maintenance.
- Use care in refueling. Clean up any small spills of fuel or oil immediately.
- The use of eye protection is required when using or working around engine-powered tools.
- Use hearing protection if noise exposure is a concern (i.e., if it is too loud to conduct a normal conversation).
- If possible, disconnect the spark plug before performing an adjustment, maintenance, or service.
- Use tools in well ventilated areas to eliminate any accumulation of fumes.
- Do not use tools in a flammable or explosive atmosphere.
- Equip engines with spark-arresting mufflers.
- Avoid contact with hot engine components.
- All guards and safety interlocks shall be in place and functional.

Chainsaws

Before Starting the Saw

- Check controls, chain tension, and all bolts and handles to ensure they are functioning properly and adjusted according to the manufacturer's instructions.
- Fuel the saw at least 10 feet from sources of ignition.
- Check the fuel container for the following requirements:
 - Must be metal or plastic
 - Must not exceed a 5 gallon capacity
 - Must be approved by the Underwriters Laboratory, Factory Mutual (FM), the Department of Transportation (DOT), or other nationally-recognized testing laboratory.

While Running the Saw

- Keep hands on the handles, and maintain secure footing while operating the chainsaw.
- Clear the area of obstacles that might interfere with cutting the tree or using the retreat path.
- Do not cut directly overhead.
- Shut off or release throttle prior to retreating.

- Shut off or engage the chain brake whenever the saw is carried more than 50 feet, or across hazardous terrain.
- Be prepared for kickback; use saws that reduce kickback danger (chain brakes, low kickback chains, guide bars, etc.).
- Wear chaps, shin guards, and suitable PPE.

9.12 Working Around Heavy Equipment

Contractor employees shall comply with the following work practices while working around heavy equipment:

- Assume the operator cannot see you. The operator's vision may be blocked by blind spots. He or she is frequently concentrating on their work and equipment and may not notice a site visitor.
- If you must approach the operator, be sure you have made eye contact with the operator and they know you will be approaching them before approaching the equipment. Verbal contact, direct or by radio, is even better. Do not approach if the equipment is moving or in operation.
- Stay clear of pinch points and swing areas of equipment. These areas shall be taped or barricaded off; however, when equipment moves frequently, you cannot count on other organizations to mark these zones.
- Do not walk near a moving piece of equipment. It could turn or rotate any minute. Modern construction equipment moves fast and in any direction.
- On a noisy site, you may not notice the equipment's back-up alarm. Keep aware of what is happening around you.
- Never walk under a load on a crane or hoist. Indeed, avoid the area under the hook or bucket.
- Do not cut across the path of equipment backing up.
- Wear your hardhat and safety glasses. The safety glasses protect your eyes from dust and debris and the hardhat provides protection for your head and makes you more visible on the site.
- On sites where there is frequent vehicle or construction equipment movement, wear high-visibility clothing.

Maintain a clearance of at least 10 feet between any part of the machine or its load and any electrical line or apparatus carrying up to 50,000 volts. One foot of additional clearance is required for every additional 30,000 volts.

9.13 Working Near or Over Water

When working on, over, or near water, basic water safety precautions must be taken. Such areas include banks and shores of lakes, dock areas, working from vessels of any kind, aeration basins, or any other areas where a danger of drowning may exist.

Contractors shall comply with the following procedures when working near or over water at the project site.

- Employees shall wear Coast Guard-approved PFDs (either vests or jackets) where a potential danger of drowning exists. PFDs are required when working from any type of boat or floating platform.
- The PFDs should be inspected before and at the end of each use for wear, torn stitching or straps, inoperable buckles, or other defects.
- Ring buoys with at least 90 feet of line shall be provided and readily available for emergency rescue operations. Distance between ring buoys shall not exceed 200 feet.
- At least one lifesaving skiff shall be immediately available at locations where employees are working over or adjacent to water, unless the width of the water body is small enough to allow any potential rescue to occur from the bank (as would be the case with most aeration basins).

In some circumstances, additional precautions may be required by OSHA regulations. If you are planning to conduct work where water hazards may be present, be sure to take all appropriate precautions. Contractors working over or near water shall review the full text of the OSHA Standard for Work Over or Near Water, and comply with all of its applicable requirements.

9.14 Flammable and Combustible Liquids

Work with flammable or combustible liquids exposes the employees to fire, explosion, and toxicity hazards. Contractor employees shall comply with and implement the following controls.

9.14.1 Storage and Handling

- Only approved containers and portable tanks shall be used for the storage and handling of flammable and combustible liquids.
- Approved safety cans shall be used for the handling and use of flammable liquids in quantities greater than 1 gallon.
- For quantities of 1 gallon or less, only the original container or approved safety cans shall be used for storage, use, and handling of flammable/combustible liquids.
- If flammable or combustible liquids must be shipped, the individual offering the material for shipment must have completed approved hazardous material training.
- Flammable or combustible liquids shall not be stored near exits, stairways, or pathways that people normally use for safe passage.
- No more than 25 gallons of flammable/combustible liquids shall be stored in a room outside of a storage cabinet or tank approved for the purpose.
- Quantities of flammable and combustible liquids in excess of 25 gallons shall be stored in an acceptable or approved cabinet meeting the requirements of 29 CFR 1926.152(b)(2)(i).

- Cabinets shall be labeled in conspicuous lettering, “Flammable - Keep Fire Away.”
- Not more than 60 gallons of flammable or 120 gallons of combustible liquids shall be stored in any one storage cabinet. Not more than three cabinets may be located in a single storage area.

9.14.2 Outdoor Storage

- For storage of flammable and combustible liquids outdoors, containers (not more than 60 gallons each) shall not exceed 1,100 gallons in any one pile or area. Five feet of clearance shall separate piles or groups of containers. These containers shall remain at least 20 feet from any other building or structure.
- Within 200 feet of each pile of containers, there shall be a 12-foot wide access way to permit approach of fire control apparatus.
- The storage area shall be graded in a manner to divert possible spills away from buildings or other exposures, or shall be surrounded by a curb or earth dike at least 12 inches high. Provisions shall be made for the controlled draining of accumulations of groundwater or rainwater, or spills of flammable or combustible liquids when curbs or dikes are used.
- At least one portable fire extinguisher, having a rating of not less than 20 pounds, shall be located not less than 25 feet or more than 75 feet from any flammable or combustible liquid storage area located outdoors.
- Precautions shall be taken to prevent the ignition of flammable/combustible vapors. Sources of ignition include, but are not limited to: open flames; lightning; smoking; cutting and welding; hot surfaces; frictional heat; static, electrical, and mechanical sparks; spontaneous ignition, including heat-producing chemical reactions; and radiant heat.

9.14.3 Dispensing Flammable and Combustible Liquids

- Areas where flammable or combustible liquids are dispensed at one time, in quantities greater than 5 gallons from one tank or container to another tank or container, shall be separated from other operations by a distance of 25 feet or by construction having a fire resistance of at least 1 hour. Adequate natural or mechanical ventilation shall be provided to maintain the concentration of flammable/combustible vapor at or below 10 percent of the LEL.
- Static electricity is generated by the contact and separation of dissimilar material, such as when fluid flows through a pipe or from an orifice into a tank. If the accumulation of static charge is sufficient, a static spark may occur. Transfer of flammable/combustible liquids from one container to another shall be done only when containers are electrically bonded and grounded to prevent such accumulation of static charge (Figure 9-1).

- The management of flammable and combustible liquids is much more complicated than is indicated by the length of this section, which reviews only those issues appropriate to the incidental use of these materials.

Storage and handling of the mobile and combustible liquids shall comply with the requirements of National Fire Code No. 30 (see http://www.nfpa.org/Codes/NFPA_Codes_and_Standards/List_of_NFPA_documents/NFPA_30.aspr).

9.15 Hazardous Waste Site Controls

Work sites designated as hazardous waste sites must control access to the work area to only authorized personnel and conform to general work practices expected at hazardous waste site operations as required by the OSHA Standard for Hazardous Waste Operations, 29 CFR 1910.120. Contractors shall comply with the following procedures regarding hazardous waste site controls.

9.15.1 Access Control

Controlled access to project work areas is required to protect personnel working on the site as well as to limit the potential for transporting contaminants off site. Details of site-specific access control procedures shall be included in the D&H and IPTD contractor's component-specific HASP.

Contractors shall comply with the following practices regarding access control:

- Set up physical barriers and assign personnel to prevent nonauthorized persons from entering the work site.
- Keep the number of personnel and equipment on site to the minimum required to do the project effectively and safely.
- Establish work zones within the site.
- Establish controlled access points to be used by authorized personnel.
- Track the entry and exit of personnel through a check-in, checkout system.
- Establish a formal decontamination corridor from exclusion zones.

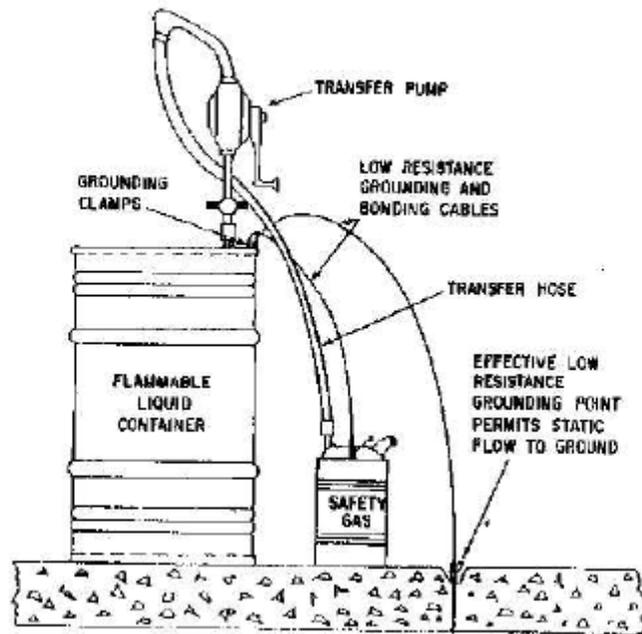


Figure 9-1. Typical Grounding System

9.15.2 Work Zones

The D&H contractor and IPTD contractor are required to establish work zones to prevent the spread of site contaminants to non-contaminated areas on or off site. Movement between zones shall be restricted to those that need access to a specific area, and entry and exit between zones shall be through designated access control points. A description of the required three work-zone system is provided below.

Exclusion Zone – The exclusion zone shall include any area where contamination is known or suspected. Areas of air, water, soil, or sediment that are contaminated with hazardous materials shall be included in the exclusion zone. The zone shall be well known to site workers. The zone shall be defined with caution tape, signage, traffic cones, fencing and barriers. The need will be location-specific and the specific method shall be identified in the contractor’s component-specific HASP. Work practices that shall be followed in the exclusion zone include:

- Employees in the exclusion zone must wear the PPE designated in this site HASP, the contractor’s component-specific HASP, and as modified by the USAID CM contractor for tasks executed within the zone.
- No eating, drinking, chewing gum or tobacco, smoking, application of cosmetics, including application of lip balm, sunscreen, or insect repellent is allowed in the exclusion zone.
- Sitting or kneeling in areas of high concentrations of contaminants shall be avoided.
- If any PPE becomes defective or visibly contaminated, the employee shall leave the work area via the designated egress area, and decontaminate or replace the items as needed in the decontamination facility before returning to work in the exclusion zone.
- Prescription drugs shall not be used within the exclusion zone unless approved by the contractor’s medical consultant. The use of illegal drugs or consumption of alcohol is prohibited.
- When leaving the exclusion zone, employees shall exit via the designated access/ egress point(s) and follow decontamination procedures described in the contractor’s component-specific HASP.

Contaminant Reduction Zone – A CRZ shall be established to provide a transition between the exclusion zone and the support zone. The CRZ shall be set up at the access control points of the exclusion zone and will vary in size depending on the complexity of activities that need to occur within the zone. The CRZ shall include the 3-stage decontamination facility and any equipment decontamination pads established for equipment exiting the exclusion zone. The specific requirements for personnel PPE while in the CRZ shall be outlined in the contractor’s component-specific HASP. The CRZ shall be placed in an area that is not contaminated at the boundary of the exclusion zone.

Support Zone – The support zone shall be established near the entrance to the site and is far enough from the exclusion zone and CRZ that specialized protective clothing or respirators are not used. The use of normal Level D field PPE such as hard hats, safety glasses, high visibility clothing, and safety work boots is expected except for areas such as office trailers, break and lunch areas, or other areas designated as having no known or anticipated hazards. Operational support activities and equipment

storage and maintenance areas are located in the support zone. No equipment or personnel shall go from the exclusion zone to the support zone without passing through the CRZ's decontamination facility and being decontaminated in accordance with the contractor's component-specific HASP.

9.15.3 Considerations when Establishing Work Zones

Work zones shall be large enough to perform tasks within the zone safely, with no exposure to hazards to personnel outside the zone, but they should also be small enough to be able to secure and control access. Some considerations in establishing work zones include:

- Physical and topographical features of the site
- Dimensions of the contaminated area
- Weather
- Physical, chemical, and toxicological characteristics of contaminants and chemicals used in the zone
- Potential for exposure to site contaminants
- Fire and explosion potential
- Planned operations and space needed to perform the work safely
- Surrounding areas
- Decontamination procedures
- History of job site

9.15.4 General Hazardous Waste Site Work Practices

- **Buddy System** - Work shall be scheduled so that no person works unobserved within the exclusion zone at any time. Each worker within the exclusion zone shall maintain visual contact with at least one other worker on the site. All site personnel shall remain aware of each other and monitor each other's condition.
- **Eating, drinking, chewing gum or tobacco, and smoking** are prohibited within the contaminant reduction and exclusion zones. (**Exception for heat stress:** Squirt bottles of water, Gatorade, or other fluids may be consumed via squirt bottles in the contaminant reduction zone with the approval of the contractor's H&S management. Open bottles, cups, etc. shall not be permitted.)
- Sitting or kneeling shall be avoided in areas of known or suspected areas of contamination.
- Hands and face shall be thoroughly washed when leaving the work area.
- Defective PPE shall be repaired or replaced immediately.

9.16 Decontamination at Hazardous Waste Sites

Proper decontamination helps protect employees and prevents the contamination of uncontaminated areas. Decontamination protects all site personnel by minimizing the transfer of harmful materials into

clean areas. It helps protect the community by preventing uncontrolled transportation of contaminants from the site.

9.16.1 Worker Hygiene and Prevention of Contamination

To prevent contamination, contractor employees shall:

- Follow procedures in the contractor's component-specific HASP for proper dressing before entry into the exclusion zone. Proper dressing will minimize the potential for contaminants to bypass the PPE and escape decontamination.
- Eliminate direct contact with TCDD-contaminated materials, such as soil or sediment.
- Require that employees have no exposed bodily areas which may permit direct contact with dioxin-contaminated material when entering exclusion zones. Workers shall regularly monitor themselves and others for rips, loose material, or exposed areas which permit contamination to contact personnel or non-chemical protective clothing. Personnel with exposed areas or faulty PPE shall immediately exit the exclusion zone and enter the decontamination facility to correct the problem.
- Excavate soils or sediment using mechanized means (e.g., backhoes), with techniques such as hand-digging to be employed by contractors only if no other means is feasible.
- Protect employees from any source of contaminants on the site with signage, fencing, and barriers as appropriate.
- Stress work practices that minimize contact with hazardous substances. Use remote sampling and handling techniques when appropriate.
- Limit the number of employees in the exclusion zone to the absolute minimum needed to perform the job safely.
- Supply all decontamination facilities, excluding those used for equipment decontamination, with potable water. The D&H contractor and IPTD contractor shall also provide for monitoring of their potable water delivery systems on a basis adequate to maintain its potable state.
- Protect monitoring and sampling instruments by bagging. Make openings in the bags for sample ports and sensors that must contact site materials, or cover equipment and tools with a strippable coating, which can be removed during decontamination.

The D&H contractor and IPTD contractor shall provide 3-stage shower facilities that are easily accessible for employees leaving exclusion zones under their control. This shall entail the setup of multiple 3-stage decontamination facilities if there is ongoing construction work in multiple exclusion zones simultaneously that prevents quick facility access by employees. Setup plans for 3-stage decontamination facilities, whether centralized or separate, shall be provided in each contractor's component-specific HASP.

Every employee leaving the exclusion zone shall undergo full decontamination in a three-stage decontamination facility.

Each contractor shall require that its employees remain free of visible contamination when in exclusion zones. If contractor employees become visible contaminated, they are responsible for immediately leaving the exclusion zone and entering the decontamination facility to decontaminate themselves or arrange for a change of PPE.

9.16.2 Decontamination Equipment Selection

In selecting decontamination equipment, contractors shall consider whether the equipment must be decontaminated for reuse or can be easily disposed.

Recommended equipment for decontamination includes:

- Storage tanks or appropriate treatment systems
- Three-stage decontamination facilities (potable water is required)
- Drains or pumps
- Long-handled brushes
- Pressurized sprayers for washing and rinsing
- Curtains, enclosures, or spray booths
- Long-handled rods and shovels
- Wash and rinse buckets
- Containers for the storage and disposal of contaminated material

9.16.3 Decontamination Design

Decontamination facilities shall be located in the CRZ, i.e., the area between the exclusion zone (the contaminated area) and the support zone (the clean area), and described in the contractor's component-specific HASP.

Site-specific factors that affect the decontamination facility design must be considered. Typical factors include:

- The availability and delivery of potable water for decontamination.
- The chemical, physical, and toxicological properties of the wastes.
- The amount, location, and containment of contaminants.
- The potential for and location of exposure based on assigned worker duties, activities, and functions.
- The potential for wastes to permeate, degrade, or penetrate materials used for personal protective clothing and equipment, vehicles, tools, buildings, and structures.
- The proximity of incompatible wastes.
- The movement of personnel and/or equipment among different zones.
- The emergencies that may arise.
- The methods available for protecting workers during decontamination.
- Decontamination shall be an organized process by which levels of contamination are reduced.

- The decontamination process shall consist of a series of steps performed in a specific sequence. For example, outer, more heavily contaminated items are decontaminated first, followed by the decontamination and removal of inner, less contaminated items. The process shall be described in each contractor's component-specific HASP.
- Personnel who wish to enter clean areas of the decontamination facility, such as locker rooms, must be appropriately decontaminated first.

9.16.4 PPE for Decontamination Facility Workers

Contractors shall describe the level of PPE required for any work performed in/on the decontamination facility in their component-specific HASP.

9.16.5 Decontamination Methods

All personnel, clothing, equipment, and samples leaving the contaminated area of a site shall be decontaminated to remove any visible material that may have adhered to them.

The selected decontamination method should be reviewed for any safety and health hazards. If the selected method poses a direct health hazard, measures shall be taken to protect both the decontamination personnel and the workers to be decontaminated.

All proposed decontamination methods for personnel, sampling equipment, heavy equipment, and other materials shall be described by the contractor in their component-specific HASP.

9.16.6 Sampling and Monitoring Equipment Decontamination

Sampling equipment often becomes grossly contaminated. Sampling equipment such as trowels, split spoons or other equipment that is used to collect samples must be cleaned and decontaminated between samples to prevent cross contamination. These items shall be cleaned and decontaminated in accordance with the project's SAP. Dirt and wash solutions from sampling equipment decontamination shall be collected by the D&H or IPTD contractor and entered into the site dioxin waste disposal stream.

Once grossly contaminated, testing and monitoring instrumentation can be difficult to decontaminate without causing damage to the instrument. Care shall be taken in the field to prevent contamination of field instruments by avoiding direct contact between the instrument and contaminated soils, water, or surfaces. In some cases it may be necessary to place instruments in plastic bags, leaving small openings for sampling ports, detectors, and exhaust ports. The plastic bags can then be removed as the instrument comes out of the exclusion zone. The outside of instruments shall be decontaminated as necessary.

9.16.7 Heavy Equipment Decontamination

Trucks, backhoes, and other heavy equipment can be difficult to decontaminate. The D&H contractor and IPTD contractor shall establish decontamination pads in a CRZ immediately outside of exclusion zones to perform heavy equipment decontamination. All heavy equipment traffic used in exclusion zones shall be routed to decontamination pads upon exiting the exclusion zone. All spent decontamination water shall be captured by the contractor for disposal as outlined in Section 9.16.8, Decontamination Water, Disposable PPE, and Site Wastes.

Contractors shall employ wash methods with water under pressure and scrubbing of particular areas as necessary. Particular care shall be taken where equipment comes into direct contact with contaminated soils such as tires, buckets, or treads. In severe cases, tires may need to be replaced or parts disposed of. Equipment shall be visually inspected by the D&H contractor or IPTD contractor to be sure it is free of any visible signs of contamination before leaving the CRZ.

Contractors shall not permit heavy equipment to leave the decontamination pad with remaining visible contamination.

The D&H contractor and IPTD contractor shall each describe the set up and placement of heavy equipment decontamination pads in their component-specific HASPs.

9.16.8 Decontamination Water, Disposable PPE, and Site Wastes

Post-decontamination water (i.e., grey water) shall be captured by the D&H contractor and IPTD contractor from equipment decontamination pads and personnel decontamination facilities. All captured grey water shall be placed in drums, tanks, or containers clearly labeled as containing dioxin waste. The D&H contractor or IPTD contractor shall dispose of the captured grey water in dewatering waste piles, IPTD treatment piles, or in accordance with local governmental and environmental regulations. The D&H contractor and IPTD contractor shall coordinate disposal activities to reduce the potential for disruption of planned treatment activities. Proposed methods for disposal of grey water shall be described in each contractor's component-specific HASP.

Potentially contaminated equipment, disposable PPE, respirator cartridges, disposable sampling equipment, brushes, buckets, and any other contaminated site wastes (with the exception of soil being treated) shall be secured by each contractor in approved containers and labeled. Disposal methods for these materials shall be in accordance with applicable local regulations and industry best practices, and shall be described in each contractor's component-specific HASP.

Care shall be taken during work and decontamination activities to minimize waste materials generated.

9.17 Traffic and Work Zone Safety

Contractors shall comply with the following practices whenever employees or subcontractors work in areas exposed to vehicular traffic.

- Where vehicular traffic hazards exist a system of traffic and work zone controls shall be developed to mitigate the hazard. The system should meet the requirements of Part 6 of the MUTCD published by the Federal Highway Administration.
- In general, when the MUTCD allows the use of traffic safety direction devices, such as cones, the contractor shall supplement those direction devices with a physical barrier, such as a truck.
- All traffic control systems on public roads must be coordinated with local traffic control officials as required by applicable law.

- Periodically evaluate effectiveness of temporary traffic control setups by walking or riding the job area looking for evidence of poor controls and near misses such as swerving traffic, motorists braking quickly, skid marks, blind spots, etc.
- Give motorists plenty of advanced warning of upcoming work zones.
- All employees working within designated work zones outside of the exclusion zone or near vehicular traffic shall wear ANSI Class II high-visibility clothing such as orange, yellow, or yellow-green shirts, jackets, or vests. During wet or inclement weather, similarly colored rainwear shall be worn.
- During night work, between the hours of sunset and sunrise, high-visibility clothing should incorporate reflective striping or fabric and be visible at a distance of 1,000 feet. This clothing shall meet ANSI standard #107 for High Visibility Safety Apparel.
- All employees working near traffic and vehicles must maintain situational awareness at all times. Stay mindful that warning signs and cones inform drivers to take action but that some drivers may not pay attention, and vehicles may still enter the work zone.

9.17.1 Motor Vehicle Safety

- Personnel must be licensed, authorized, and qualified drivers in order to operate motor vehicles and powered industrial equipment onsite.
- Personnel shall comply with local traffic laws and site requirements, including the use of seat belts at all times, when operating motor vehicles onsite.
- Vehicles shall be inspected prior to each use, with defective equipment reported and vehicles taken out of service if necessary to maintain personnel safety.
- Seat belts shall be worn on all heavy equipment, including forklifts and vehicles. No riders other than the operator shall be allowed on any piece of mobile equipment. When pickup trucks are used to transport employees, benches with backrests shall be provided or the employees must sit down in the bed area, not on the side rails.
- Motor vehicle safety shall be discussed regularly during tailgate safety meetings.

9.18 Welding and Cutting

For the protection of all persons involved with welding and cutting, contractors shall comply with the following practices:

- Before performing welding, cutting, grinding, or any other “hot work” in a hazardous area, contractor employees shall obtain a Hot Work Permit. Hazardous areas are those areas where there is the presence or the potential of the presence of flammable or combustible materials, liquids, gases, vapors, mists, or dusts.

- Only experienced and properly trained persons shall perform welding and cutting. Before welding or cutting is started, the area shall be inspected for potential fire hazards.
- When welding or cutting in elevated positions, precautions shall be taken to prevent sparks or hot metal from falling onto people or flammable material below.
- Suitable fire extinguishing equipment shall be immediately available at all locations where welding and cutting equipment is used. Personnel assigned as fire watch shall be trained in fire extinguisher use.
- Welders or their assistants shall not carry matches when engaged in welding or cutting operations.
- If welding or cutting cannot be conducted safely, the operation shall not be performed.
- A fire watch shall be maintained wherever welding or cutting is performed in locations where combustible materials present a fire hazard. A fire check shall be made of the area two hours after completion of welding.
- Where combustible materials such as paper clippings, coal, or wood shavings are present, the floor shall be swept clean for a radius of 35 feet before welding. Combustible floors shall be kept wet or protected by fire-resistant shields. Where floors have been wetted down, personnel operating arc welding or cutting equipment shall be protected from possible shock.
- To protect the eyes, face, and body during welding and cutting, the operator shall wear an approved helmet or goggles, proper protective gloves, and clothing. Helpers or attendants shall wear proper eye protection. Other employees shall not observe welding operations unless they use approved eye protection.
- Proper eye protection shall be worn to guard against flying particles when the helmet or goggles are raised.
- Machinery, tanks, equipment, shafts, or pipes that could contain explosive or highly flammable materials shall be thoroughly cleaned and decontaminated prior to the application of heat.
- In dusty or gaseous spaces where there is a possibility of an explosion, welding or cutting equipment shall not be used until the space is adequately ventilated.
- Welders shall place welding cable, hoses, and other equipment so that it is clear of passageways, ladders, and stairways.
- Where the work permits, the welder should be enclosed in an individual booth or shall be enclosed with noncombustible screens. Workers or other persons adjacent to the welding areas shall be protected from rays by shields or shall be required to wear appropriate eye and face protection.
- After welding or cutting operations are completed, the welder shall mark the hot metal or provide other means of warning other workers.

Potentially hazardous materials are materials used in fluxes, coatings, and coverings, filler metals used in welding and cutting, or materials released to the atmosphere during welding or cutting operations.

While welding or cutting, adequate ventilation or approved respiratory protection equipment shall be used. Special precautions shall be taken when using materials that contain cadmium, fluorides, mercury, chlorinated hydrocarbons, stainless steel, zinc, galvanized materials, beryllium, and lead.

In addition to the above welding and cutting rules, special attention must be given to the equipment used:

9.18.1 Gas Welding and Cutting

- Only approved gas welding or cutting equipment shall be used.
- Approved backflow check valves shall be used on gas welding rigs in both gas and oxygen lines.
- Welding hose shall not be repaired with tape.
- Matches shall not be used to light a torch; a torch shall not be lighted on hot work. A friction lighter or other approved device shall be used.
- Oxygen, acetylene, or fuel gas cylinders shall not be taken into confined spaces.

9.18.2 Electric Welding

- Only approved electric welding equipment shall be used.
- The electric welding machine shall be properly grounded prior to use.
- Rules and instructions supplied by the manufacturer or affixed to the machine shall be followed.
- Welders shall not strike arc with an electrode whenever there are persons nearby who might be affected by the arc. When electrode holders are to be left unattended, the electrodes shall be removed and the holders shall be so placed or protected that they cannot make electrical contacts with employees or conducting objects.
- When the welder must leave his work or stop work for any appreciable length of time, or when the welding machine is to be moved, the power supply switch to the equipment shall be opened.

9.19 Powered Industrial Trucks

Contractor employees shall comply with the following rules during the use of powered industrial trucks or forklifts:

- Only authorized persons shall be permitted in the cab or on the equipment. Only those designated persons who are trained and qualified shall operate a powered industrial truck. Training shall consist of both formal and practical training.
- Industrial trucks shall be examined daily before being placed in service. The vehicle shall not be placed in service if any condition is found that would adversely affect safety.
- No unauthorized person shall be permitted to ride on a truck.

- Industrial trucks shall not be altered unless approved by the truck manufacturer.
- Load limits, as specified by the manufacturer, shall not be exceeded under any circumstances.
- Operating and maintenance procedures, as specified by the manufacturer, shall be followed.
- Any power-operated industrial truck not in safe operating condition shall be removed from service. Authorized personnel shall make all repairs.
- No load shall be lifted until its weight has been determined.
- Only stable or safely arranged loads shall be handled. Caution shall be exercised when handling off-center loads that cannot be centered.
- Trucks shall not be driven up to anyone standing in front of any fixed object.
- No person shall be allowed to stand or pass under the elevated portion of any truck, whether loaded or empty.
- When a truck is left unattended, out of view or is located more than 25 feet away, the load engaging means shall be fully lowered, controls shall be neutralized, power shut off and brakes set. Wheels shall be blocked if on an incline.
- The truck operator shall be required to look in the direction of, and keep a clear view of, the path of travel.
- When ascending or descending grades in excess of 10 degrees, loaded trucks shall be driven slowly with the load upgrade.
- No truck shall be operated with a leak in the fuel system until the leak has been corrected.
- Truck operators shall exercise extreme caution when in close proximity to energized lines or equipment. The operator shall maintain ten feet of clearance from the energized source.

9.20 Fire Protection

Each contractor shall be responsible for complying with the fire protection requirements in 29 CFR 1910 Subpart L, including providing portable fire extinguishers which are distributed appropriately throughout work locations. Contractors shall ensure that employees are sufficiently trained in the use of such equipment.

9.21 Scaffolds

Contractor employees shall comply with the following practices when working from scaffolds:

- All scaffolds shall be checked before use to ensure it is of sufficient strength and rigidity to safely support the weight of persons and material to which it will be subjected. Scaffolds shall be designed and erected to be able to support its own weight and at least 4 times the maximum intended load applied or transmitted to it.

- Questions regarding the capability of a particular scaffold should be addressed to the competent person responsible for the scaffold. Check to see if a scaffold tagging system is in use at the site.
- Scaffolds over 6 feet in height require a standard guardrail. If a standard guardrail is not feasible, employees shall use another form of fall protection such as a personal fall arrest system (harness).
- Scaffold planks shall be secured in place and extend the end supports by at least 6 inches and (unless they are cleated) no more than 12 inches.
- Scaffold platforms and ramps shall be at least 18 inches wide.
- Wooden scaffold planks shall be marked for use as scaffold planking and shall not be painted (see below).



Grade stamp courtesy of Southern Pine Inspection Bureau



Grade stamp courtesy of West Coast Lumber Inspection Bureau

- Footing and anchorage points for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement. Unstable objects such as barrels, boxes, loose brick, or concrete blocks shall not be used to support scaffolds or planks.
- Screw jacks shall not extend more than 12 inches.
- Scaffolds shall be erected level, plumb, and braced to prevent swaying and displacement.
- Ropes shall not be used as guardrails.
- Do not stand on any object to increase reach when on a scaffold, including ladders, step stools, etc.
- The installer of the scaffold shall survey and clear the scaffold site of debris that would endanger secure footing for the scaffold or cause a rolling scaffold to tip over.
- Use ladders for access to scaffold platforms. Scaffold rails or braces may only be used if specifically designed by the manufacturer as an access ladder.
- Scaffolds that are 3 times higher than the smallest base dimension must be secured to the building or other solid structure at the second lift and every other lift thereafter.

- Rolling scaffolds may be used only on smooth, level surfaces unless the wheels are contained in wooden or channel-iron runners that are level and stabilized. The following precautions must be observed when working on mobile scaffolds:
 - Check overhead clearances before moving scaffolds. Maintain safe clearance from electrical lines.
 - Remove or secure tools and materials on the deck before moving a rolling scaffold. Do not ride a rolling scaffold while it is being moved.
 - Apply the force as close to the base as practical to move a rolling scaffold.
 - All wheels and casters on rolling scaffolds must have a positive locking device, securely fastened to the scaffold, to prevent accidental movement.
 - Casters or wheels must be locked when the scaffold is in use.

9.22 Mechanized Personnel Lifts

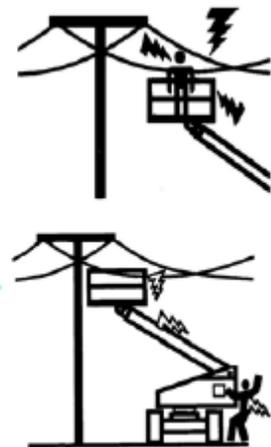
Contractor personnel working from mechanized lift equipment shall comply with the following practices.

9.22.1 Pre-Operations

- Only trained, authorized, and qualified personnel shall operate lift equipment. They shall demonstrate an understanding of safe and proper operation and maintenance of the unit.
- Precautions to avoid all known hazards in the work area must be taken by operators and their supervisor before starting the work.
- Perform a prestart inspection and function check before placing the machine into operation.

9.22.2 Power lines

- Maintain safe clearance from electrical lines and apparatus. The machine does not provide protection from contact with or proximity to an electrically charged conductor.
- Maintain a clearance of at least 10 feet between any part of the machine or its load and any electrical line or apparatus carrying up to 50,000 volts. One foot of additional clearance is required for every additional 30,000 volts.
- Allow for boom sway, rock, or sag and electrical line swaying in estimating these distances.



9.22.3 Wind and Temperature

- Do not add notice boards or similar items to the platform. The addition of such items increases the exposed wind area of the machine.
- Do not operate machine when wind conditions exceed 30 miles per hour (mph).

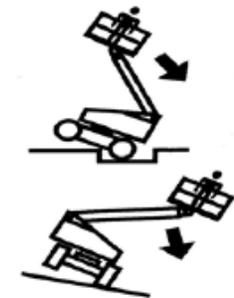
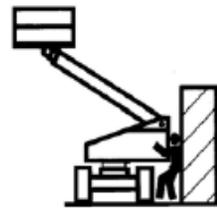
- Some mechanized lifts can only be operated in nominal ambient temperatures of 0°F to 104°F. Consult the manufacturer to optimize operation outside this range.

9.22.4 Signs and Warning Labels

- Read and obey all dangers, warnings, cautions, and operating instructions on machine and in the operators and safety manual.
- Be familiar with location and operation of ground station controls.
- Do not operate any machine on which danger, warning, caution, or instruction placards, or decals are missing or illegible.

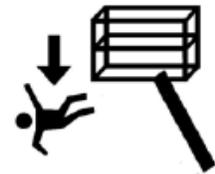
9.22.5 Driving and Crushing Hazards

- Watch for obstructions around machine and overhead when driving.
- Always position boom over rear (drive) axle in line with direction of travel. Remember, if boom is over front (steer) axle, direction of steer and drive movement will be opposite from normal operation.
- Do not use high-speed drive when in restricted or close quarters, or when driving in reverse.
- Keep nonoperating personnel at least 6 feet away from machine during driving operations.
- Check travel path for persons, holes, bumps, drop-offs, obstructions, debris, and coverings that may conceal holes and other hazards.



9.22.6 Operation

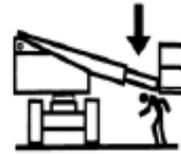
- Read and understand the manufacturer's operating manual.
- Operation with boom raised is restricted to a firm, level, and uniform surface. Ensure a firm, level, and uniform supporting surface before raising or extending boom.
- Never position ladders, steps, or similar items on unit to provide additional reach for any purpose.
- When riding in or working from platform, both feet must be firmly positioned on the floor.
- Personnel shall wear a full-body harness and lanyard of a length that prevents a fall arrest event, (i.e., short enough so they are unable to fall over the railing).
- Check clearance above, on sides, and bottom of platform when raising, lowering, swinging, and telescoping boom.



- Never slam a control switch or lever through neutral to the opposite direction. Always return switch to neutral and stop, then move switch to the desired position. Operate levers with slow, even pressure.

9.22.7 Barricading, Crushing Hazard

- The operator is responsible for avoiding operation of the machine over ground personnel and warning them not to work, walk, or stand under a raised boom or platform. Position barricades or warning tape/cones.
- Ensure that operators of other overhead and floor machines are aware of the aerial platform's presence. Disconnect power to overhead cranes. Position barricades or warning tape/cones.
- Keep personnel away from pinch points. Position barricades or warning tape/cones.



9.22.8 Transfer to a Structure, Falling Hazard

- To avoid falling, use extreme caution when entering or leaving platform above ground. Enter or exit through gate only. Platform floor must be within 1 foot of adjacent safe and secure structure. Allow for platform vertical movement as weight is transferred to or from platform.
- Transfers between a structure and the aerial platform expose operators to fall hazards. This practice should be discouraged wherever possible. Where transfer must be accomplished to perform the job, two lanyards with an approved fall protection device will be used. One lanyard should be attached to the aerial platform. The other to the structure. The lanyard that is attached to the aerial platform should not be disconnected until such time as the transfer to the structure is complete. Otherwise, do not step outside of platform.

9.22.9 Machine Capacity and Tip Hazards

- Ensure that ground conditions are adequate to support maximum tire load indicated on the tire load decals located on the chassis adjacent to each wheel.
- Never exceed manufacturer's rated platform capacity - refer to capacity decal on machine. Distribute loads evenly on platform floor.
- Do not carry materials on platform railing.



9.22.10 Improper Use

- Do not remove, modify, or disable footswitch by blocking or any other means. Do not disable safety interlocks or limit switches.
- Never "WALK" the length of the boom to gain access to or leave platform.
- Do not use the lift, swing, or telescope functions for the boom to move either the machine or other objects.

- Never use boom for any purpose other than positioning the platform containing personnel, tools, and equipment.
- Do not use the boom as a crane. Structural damage or tipping may occur.
- Never operate a malfunctioning machine. If a malfunction occurs, shut down the machine, tag it as DO NOT USE, and notify your project manager or direct manager.
- Do not assist a stuck or disabled machine by pushing or pulling except by pulling at chassis tie-down lugs.

9.22.11 Towing and Hauling

- Do not tow a machine except in an emergency. See the applicable section in the applicable operators and safety manual for emergency towing procedures.
- Lock turntable before traveling long distances or before hauling machine on a truck or trailer.

9.23 Rigging Equipment

Contractor employees shall comply with the following practices when rigging equipment:

- All rigging equipment shall be of sufficient strength, proper type, and safe for its intended use.
- Rigging equipment shall not be loaded in excess of its recommended safe working load.
- Prior to each use, a competent person shall inspect all slings, fasteners, and attachments for damage or defects. Damaged or defective equipment shall be immediately removed from service.
- Makeshift lifting devices formed from bolts, rods, or reinforcing steel shall not be used.
- Slings shall not be shortened with knots, bolts, or other makeshift devices.
- Slings used in a basket hitch shall have the load balanced to prevent slippage.
- Slings shall be securely attached to the load by the use of hooks with retaining devices or by the use of shackles or other positive latching device.
- Slings shall be padded or protected from the sharp edges of their loads.
- A sling shall not be pulled from under a load when the load is resting on the sling.
- Slings shall be long enough to provide the maximum practical angle between the sling leg and the horizontal plane of the load.
- Shackle pins shall never be replaced with bolts or other non-approved devices.

- Only hooks with approved retaining devices shall be used. Hooks shall never be rigged so that they are points loaded at the tip of the hook unless they are designed for that purpose. The load shall be securely seated in the saddle of the hook.
- When eyebolts are used, care shall be taken to ensure the bolt is not side loaded.
- Chain falls, come-alongs, and other such devices shall not be loaded beyond their rated capacities.
- Chain falls, come-alongs, and other such devices shall always be rigged for a straight pull.
- The chain or hoist cable for chain falls, come-alongs, or other such devices shall not be wrapped around a load and used in place of a sling unless specifically designed for that purpose.

9.24 Cranes, Derricks, and Hoisting Equipment

Contractor employees shall comply with the following practices when using cranes, derricks, or hoisting equipment:

- Operator certifications and annual inspection certificates shall be reviewed when a crane comes to the jobsite. If the operator does not have a current certification, they shall not operate the crane. No crane shall be operated until the annual inspection certificate is reviewed.
- Only authorized persons shall be permitted in the cab or on the equipment.
- Only those designated persons who are trained and qualified shall operate the hoisting equipment.
- Cranes shall be inspected on a daily basis via use of a Daily Crane Inspection Report.
- No person shall be permitted to ride the hook, sling, or load of any hoisting equipment.
- Load limits as specified by the manufacturer shall not be exceeded under any circumstances.
- Operating and maintenance procedures as specified by the manufacturer shall be followed.
- Before a lift is attempted, the lifting mechanism shall be level and firmly supported with the hoist line centered over the center of gravity of the load to be lifted.
- No load shall be lifted until its weight has been determined.
- For the first lift of each day, the load shall be test lifted at least several inches and the brakes checked.
- With every load, the slings and bindings shall be checked and shall be readjusted as necessary to ensure safety and stability.
- Signals to the equipment operator shall be given by one person designated to perform the task. The operator shall, however, obey a “stop” signal (a clenched fist) given by anyone.

- No employee shall be under a suspended load or inside the angle of a hoist line. No employee shall stand or work near a cable, chain, or rope under tension unless the nature of his work requires it.
- Hoist lines, ropes, or wire cables shall not be guided by hand when standing within reach of the drum or sheave.
- Wire rope loops shall be made by proper splicing or mechanical clamping of the tail section. Wire rope clips shall not be used to form eyes in wire rope bridles or slings.
- Operators shall not leave their position at the controls of cranes, hoists, derricks, or other lifting devices while the load is suspended.
- Operators of cranes, derricks, hoists, and other hoisting equipment shall exercise extreme caution when in close proximity to energized lines or equipment. The operator shall keep the equipment at least ten feet away from all lines energized up to 50 kilovolts (kV) and 0.4 inch more for each 1 kV over 50 watts (W).
- Tag lines shall be used on all loads.
- All spreader bars shall be tagged with the rated capacity.

Section 10

Temperature Extremes

10.1 Heat Stress

Project employees may be exposed to hazards associated with hot work environments. Factors that contribute to heat exposure include temperature, humidity, PPE, radiant heat, sunlight, access to drinking water, exposure duration, and work activity. Individuals vary widely in their susceptibility to heat stress. Factors that may influence individual susceptibility to heat stress include the following:

- Lack of physical fitness
- Lack of acclimatization
- Age
- Dehydration
- Obesity
- Alcohol and drug use
- Infection
- Sunburn
- Diarrhea
- Chronic disease

The following outlines D&H and IPTD contractor requirements and guidelines when their employees or subcontractors perform work:

- In ambient air temperatures above 80°F
- That involves heavy physical labor in temperatures above 70°F
- In chemical-protective clothing above 70°F

10.1.1 Hazards Associated with Heat Stress

Heat Stroke – Heat stroke is a serious medical emergency and can lead to death if left untreated. It is an acute and dangerous reaction caused by the failure of heat regulating mechanisms of the body. Persons who are elderly, obese, chronically ill, alcoholic, diabetic, or have circulatory system problems are at greater risk.

- Symptoms include:
 - Red, hot, dry skin
 - Nausea
 - Headache
 - Weakness
 - Dizziness
 - Elevated body temperature (BT)
 - Rapid respiration and pulse
 - Coma
 - Loss of consciousness
- Treatment for heat stroke:
 - Heat stroke is a serious medical emergency. Emergency medical services shall be contacted if heat stroke is suspected.
 - Move the victim to a cool place (shade, air conditioned building, vehicle).
 - Remove heavy clothing.
 - Cool the victim with ice packs, wet towels, or cloth.

- Keep head and shoulders elevated.
- Keep victim's airway open, check breathing, and pulse.

Heat Exhaustion – A state of exhaustion or weakness caused by loss of fluids through perspiration and inadequate fluid replacement. Severe cases may result in loss of consciousness (fainting). This condition can progress to heat stroke if left untreated.

- Symptoms include:
 - Pale, clammy, moist skin; heavy sweating; and extreme weakness.
 - BT is normal, pulse is weak and rapid, breathing is shallow.
 - The person may have a headache, nausea, or feel dizzy.
- Treatment for heat exhaustion:
 - Remove the victim to a cool location (shade, air conditioned building, or vehicle).
 - Allow the victim to lie down and prop their legs up.
 - Cool the victim with wet towels, cloth, or cold packs.
 - If the victim is not nauseous, they should drink water slowly.
 - If the victim loses consciousness, transport to local medical facility.
 - Continue treatment until symptoms are gone. Consult with contractor medical consultant before returning to work.

Heat Cramps – Heat cramps are a condition that can progress to heat exhaustion or heat stroke.

- Symptoms include:
 - Severe cramping of the arms, legs, and abdomen
- Treatment includes:
 - Removing the victim to a cool location; loosen clothing
 - Having the victim slowly drink cool water
 - Resting the cramping muscles

Heat Rash – Heat rash is a mild red skin rash in areas where the body is in contact with clothing or protective gear. The area is likely to itch and can be a source of irritation. Treatment includes decreasing the amount of time in protective gear and applying talcum powder to absorb moisture. When possible, wear breathable clothing to prevent a buildup of moisture within the clothing.

10.1.2 Heat Stress Monitoring

Since the susceptibility to heat stress hazards can vary greatly from one individual to another, often the best way to monitor for heat stress is through observing employees and individual physiological monitoring. When working in conditions that have the potential to create heat stress, either heart rate (HR) or BT shall be monitored by the D&H contractor and IPTD contractor in accordance with frequencies that are at least as stringent as the suggested frequency given in Table 10-that follows. This includes any work by employees wearing chemical protective ensembles.

Table 10-1. Suggested Frequency of Physiological Monitoring for Fit and Acclimatized Workers^a

Adjusted Temperature^b	Normal Work Ensemble^c	Impermeable Ensemble
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5° to 90°F (30.8° to 32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5° to 87.5° F (28.1° to 30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5° to 82.5°F (25.3° to 28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5° to 77.5° F (22.5° to 25.3°C)	After each 150 minutes of work	After each 120 minutes of work

^a For work levels of 250 kilocalories/hour.

^b Calculate the adjusted air temperature (Ta adj) by using this equation: $Ta \text{ adj } ^\circ F = Ta \text{ } ^\circ F + (13 \times \% \text{ sunshine})$. Measure air temperature (Ta) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow (100 percent sunshine - no cloud cover and a sharp, distinct shadow; 0 percent sunshine - no shadows).

^c A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

- **Heart Rate** – HR shall be measured by the radial pulse for 30 seconds as early as possible in the initial rest period. On an individual basis, if the HR exceeds 110 beats per minute (BPM), that individual shall not return to work until their HR drops below 110 BPM and they are fully recovered. If more than one worker has an HR that exceeds 110 BPM, a work rest regimen or other control measures shall be implemented to maintain HRs below 110 BPM.
- **Body Temperature** – The BT shall be measured using a clinical oral thermometer or a clinical ear thermometer. On an individual basis, if the BT exceeds 99.6°F, that individual shall not return to work until their BT drops below 99.6°F and they are fully recovered. If more than one worker has a BT in excess of 99.6°F, a work rest regimen or other control measures shall be implemented to maintain BTs below 99.6°F.
- Personnel shall monitor themselves and each other for the development of symptoms such as sudden fatigue, nausea, dizziness, irritability, malaise, flu-like symptoms, and lightheadedness.
- Contractors shall supply a qualified third party emergency medical technician to conduct evaluation of employees' HR, BT, and physical symptoms when 10 or more contractor employees are conducting activities with a heat stress potential.

10.1.3 Heat Stress Controls and Prevention

- Contractors shall develop a work/rest regimen to maintain physiological parameters within limits described above and prevent development of initial symptoms of heat stress related conditions. If the physiological limits are exceeded or symptoms develop, the work period shall be reduced and rest period increased. Rest areas should be cool (in areas such as shade, air conditioned buildings, or vehicles) and away from heat exposure.

- In extreme heat conditions, employees may wear heat-control clothing such as ice vests or cool suits. Physiological monitoring shall still be conducted and work/rest regimens implemented to keep physiological parameters within recommended limits.
- Mobile showers or hoses can be used to cool down workers in waterproof protective clothing.
- Shield sources of radiant heat.
- Provide shaded work areas.
- When possible, conduct activities in early morning and late evening to avoid the hottest parts of the day.
- Allow employees to become acclimatized to the heat by performing less strenuous activities for the first few days. Schedule more physically demanding work later.
- Provide adequate, cool drinking water for consumption during break periods.
- Avoid consumption of beverages such as coffee, tea, or colas that act as diuretics and dehydrate the body.

Section II

Hearing Conservation

II.1 Purpose and Scope

Contractors (CM, D&H, and IPTD) shall develop a hearing conservation program for their employees that complies with the practices outlined in this section.

II.2 Definitions

Action Level – An exposure to an 8-hour time-weighted average of 85 decibels measured with a dosimeter or sound-level meter on the A-scale at slow response; or equivalently, a dose of 50 percent measured as per Subsection II.5.5. The action level is the criterion for instituting noise surveys and employee participation in the audio metric testing program.

Administrative Control – Any procedure that limits noise exposure by control of work schedules.

Audiogram – A chart, graph, or table that results from an audiometric test. An audiogram shows an individual's hearing threshold level as a function of frequency (Hertz).

Audiologist – A professional who specializes in the study and rehabilitation of hearing and who is certified by the American Speech, Hearing, and Language Association or licensed by a state board of examiners.

Audiometer – An electronic instrument that measures hearing threshold levels and conforms to the requirements and specifications of the current ANSI Standard S3.6.

Baseline Audiogram – An audiogram against which future audiograms are compared. It may also be described as a reference, pre-placement, pre-assignment, or entrance audiogram.

Biological “Functional” Calibration Check – An audiometric test that uses one or more individuals with known, stable hearing levels to check proper functioning and stability of an audiometer and to identify any unwanted or distracting sounds.

Cut-Off Level – All sound levels at or above the cut-off level are averaged into the calculations that relate to noise exposure. All sound levels below the cut-off level are not included.

Deafness – The condition in which the average hearing threshold level for pure tones at 500; 1,000; 2,000; and 3,000 Hertz (Hz) (frequencies used for speech) is at least 93 decibels (reference ANSI S3.6-1969). This is generally accepted as representing a 100 percent hearing handicap for normal speech.

Decibel (dB) – A unit of measurement of sound-pressure level. The decibel level of a sound is related to the logarithm of the ratio of sound pressure to a reference pressure. The dB has meaning only when the reference is known. The internationally accepted reference pressure used in acoustics is 20 micropascals.

Decibels, A-Weighted (dBA) – A sound level reading in decibels made on the A-weighting network of a sound-level meter at slow response.

Decibels, Peak (dB_P) – A unit used to express peak sound-pressure level of impulse noise.

Dose Criterion Sound Level – The average sound level at a given dose criterion length for which the dose represents 100 percent of the allowable exposure. OSHA requires a dose criterion sound level of 90 dBA for an exposure duration of 8 hours. ARC has a dose criterion level of 85 dBA for an 8-hour exposure, per Section 29.6.

Dose Criterion Length – The permissible exposure duration (in hours) for a given dose criterion sound level for which the dose represents 100 percent of the allowable exposure.

Eight-Hour Dose – The actual dose (as a percentage) accumulated over the duration of the work shift and based on a regulations defined criterion level and criterion length.

Engineering Control – Any mechanical device, physical barrier, enclosure, or other design procedure that reduces the sound level at the source of noise generation or along the path of propagation of the noise to the individual. This does not include protection equipment such as earmuffs, plugs, or administrative controls.

Hazardous Noise – Noise generated by an operation, process, or procedure that is of sufficient duration and intensity to be capable of producing a permanent loss of hearing in an unprotected person. Generally, this is interpreted as persistent noise levels equal to or greater than 85 dBA or combinations of higher intensities for durations shorter than 8 hours.

Hertz (Hz) – A unit of measurement of frequency that is numerically equal to cycles per second.

Impulsive or Impact Noise – Variations in noise levels that involve peaks of intensity that occur at intervals of greater than 1 second. If the noise peaks occur at intervals of 1 second or less, the noise is considered continuous.

L_{av} – The average sound level (in dBA) computed for a chosen averaging time duration.

L_{av} (80) – The average sound level (in dBA) computed for a chosen averaging time duration, using an 80-dBA cut-off level. The 80-dBA cut-off level is used by Fed-OSHA for hearing conservation compliance requirements.

Manager – A broad term that can refer to managers, program and project managers, direct managers, site managers, supervisors, department heads, group heads, branch chiefs, owners, and/or persons that operate in a management capacity or supervisory roll with respect to affected employees.

Medical Pathology – A disorder or disease. For the purposes of this chapter, a condition or disease that affects the ear and should be treated by a physician specialist.

Monitoring Audiogram – An audiometric test obtained at least annually to detect shifts in an individual's threshold of hearing by comparison to the baseline audiogram.

Noise – Unwanted sound.

Noise Dose – A measure of cumulative noise exposure over a stated period, which takes into account both the intensity of the sound and the duration of the exposure.

Noise Dosimeter – An electronic instrument that integrates cumulative noise exposure over time and directly indicates a noise dose.

Noise Hazard Area – Any work area with a noise level of 85 dBA or greater.

Otolaryngologist – A physician who specializes in the diagnosis and treatment of disorders of the ear, nose, and throat.

Representative Exposure – The measurements of an employee's noise dose, or an 8-hour time-weighted average sound level that a qualified person deems representative of the exposure of other employees in that work area or job classification.

Standard Threshold Shift (STS) – An average hearing threshold shift of 10 dB or more at 2,000; 3,000; and 4,000 Hz in either ear. A threshold shift can be temporary or permanent. Temporary threshold shift is a change in hearing threshold, primarily due to exposure to high-intensity noise that is usually recovered in 14 to 72 hours. Any loss that remains after an adequate recovery period is termed permanent threshold shift.

Sound-Pressure Level – The term used to identify a sound measurement (expressed in decibels) obtained with a sound-level meter that has a flat frequency response. This is mathematically equivalent to 20 times the common logarithm of the ratio of the measured A-weighted sound pressure to the standard reference pressure of 20 micropascals (measured in decibels). For use with this standard, slow time response is required in accordance with the current ANSI.S1.4.

Sound-Level Meter (SLM) – An electronic instrument for the measurement of sound levels that conforms to the requirements for a Type II sound-level meter as specified in ANSI S1 .4-1971.

Time-Weighted Average (TWA) Sound Level – The sound level that, if constant over an 8-hour workday exposure, would result in the same noise dose as is measured.

TWA (80) – The time-weighted average level that corresponds to a noise dose computed with an 80-dBA cut-off level.

11.3 Responsibilities

Employees of all Contractors

Responsibilities of contractor employees who work in high noise areas are:

- Wear and maintain hearing protection as required
- Cooperate with H&S personnel in activities undertaken to evaluate hazardous noise
- Notify direct or project manager of areas, operations, or equipment that may produce hazardous noise
- Attend hearing conservation training when necessary

- Participate in the medical surveillance program

11.4 Noise Exposure Limits

Protection against the effects of noise exposure shall be provided by each contractor (CM, D&H, and IPTD) to its employees when sound levels exceed those in Tables 11-1 and 11-2 below. Noise exposure limits are generally applied as an 8-hour exposure limit of 85 dBA. For exposures of shorter or longer durations, the exposure limit may be adjusted as indicated in the table. Hearing conservation program elements are expected to be implemented whenever employee noise exposures equal or exceed an 8-hour time-weighted average of 80 dBA measured as per Subsection 11.5.5. Hearing conservation program elements include exposure monitoring, audiometric testing, medical monitoring, and training. The dose criterion of 80 dBA for an 8-hour exposure is referred to as the action level.

Table 11-1. Continuous Noise Permissible Exposure Limits

Duration (Hours)	Sound Level (dBA)*
16	80
8	85
4	90
2	95
1	100
0.5	105
0.25	110
0.125 or less	115

*Measured on the A-scale of a standard sound-level meter set at slow response.

Table 11-2. Impulse Noise Permissible Exposure Limits

Sound Level (dBP)*	Permitted Impulses/Day
140	100
130	1,000
120	10,000

*Peak sound-pressure level.

11.5 Hearing Protection Methods

11.5.1 Engineering Controls

Where feasible, facilities and equipment will be procured, designed, operated, and/or modified in such a manner as to prevent employee exposure to continuous noise levels above 85 dBA over an 8-hour TWA or impulsive noise above 125 dBP. Any reduction in employee noise exposure, even if not reduced below 85 dBA, is beneficial. If engineering controls fail to reduce sound levels to within the limits of this section, hearing-protective equipment, and/or administrative methods of noise-exposure protection must be used.

11.5.2 Personal Hearing Protection

PPE is to be used only temporarily or if engineering controls are not feasible or practical.

- The contractor's SHSO shall enforce the use of earmuffs and/or plugs by employees assigned to work in areas where they will be exposed to continuous noise (without regard to duration of exposure) in excess of 85 dBA or to impulse noise in excess of 140 dB. Disposable earplugs and/or earmuffs will be made available for employee use (if desired) if noise exposures under 85 dBA create a nuisance. Earplugs will be provided for the exclusive use of each employee and will not be traded or shared.
- Hearing protectors must attenuate employee noise exposure to a level of 85 dBA or below. Both earmuffs and plugs are required where noise levels equal or exceed 110 dBA. For employees with standard threshold shift, protectors must attenuate exposure to an 8-hour TWA of 80 dBA. Estimation of the adequacy of hearing-protector attenuation should be performed according to the methods OSHA specifies in 29 CFR 1910.95 App B, Methods for Estimating the Adequacy of Hearing Protector Attenuation.
- If reusable preformed earplugs are used, they will be permanently issued to the employee and fitted to the employee under medical supervision. During fitting, the employee will be instructed in the proper method of insertion, storage, and cleaning of the earplugs. Earplugs will be checked during annual medical examinations.
- Earmuffs will be provided for employees when analysis of noise environments shows that the attenuation provided by earplugs is not sufficient to reduce noise exposures below 85 dBA. The user shall inspect earmuffs on a regular basis.
- Special hearing-protective equipment, such as sound-suppression communication headsets, may be used in noise hazard areas. These devices should be inspected regularly. Sound-suppression headsets may not be used if they have been damaged, altered, or modified in any way that affects the attenuation characteristics. If replacement parts (such as ear cup seals) are available, the headsets may be repaired and reused. If sound-suppression headsets are not permanently issued to employees, such equipment must be cleaned and sanitized before reissuance.

11.5.3 Administrative Controls

If hearing-protective equipment or engineering controls are not sufficient to attenuate noise to less than 85 dBA, the duration of time spent in the noise hazard area shall be limited so as not to exceed the exposure limits specified in Section 11.4.

11.5.4 Noise Monitoring

- Measurement of potentially hazardous sound levels shall be conducted when any information, observation, or calculation suggests that an employee could be exposed to a noise level in excess of an 8-hour TWA. This includes, but is not limited to, times when representative exposures need to be documented, when employees complain of excessive noise, or when it is difficult to understand a normal conversation if the speaker and the listener face each other at a distance of 2 feet. Any new equipment, operation, job, or procedure with the potential for creating hazardous noise should be

evaluated with regard to noise emissions before startup. All continuous, intermittent, and impulsive sound levels from 80 to 130 dBA will be integrated into the noise measurements.

- Both noise dosimetry and area monitoring will be repeated periodically, or whenever any changes to facilities, equipment, work practices, procedures, or noise-control measures alter potential noise exposures.
- Employees and/or their representatives will be provided an opportunity to observe noise dosimetry and area monitoring activities.
- Areas determined to have noise levels at or above 85 dBA must be posted as noise hazard areas.
- Affected employees (employees whose exposures have been determined to exceed the action level) shall be notified of the results of noise monitoring.

11.5.5 Noise-Measurement Methods

- Sound-level meters must meet Type II requirements of ANSI S1.4 and must be capable of measuring sound in the range of 80 to 130 dBA.
- Noise dosimeters must meet Class 2A-90/ 80-5 requirements of ANSI S1.25 and be capable of integrating sound levels of 80 dB and above.
- Employee noise doses may be ascertained by using either a noise dosimeter or sound-level meter. If a sound-level meter is used to estimate an employee's dose, the noise survey will include a time and motion study to document the variations in the employee's noise exposure during the working shift. If an employee moves about or noise intensity fluctuates over time, noise exposure is more accurately estimated by personal dosimetry. Regardless of the method chosen, a sufficient number of readings/measurements will be made to accurately reflect noise exposure.
- Employee exposure measurements will be made in such a manner as to accurately represent the actual exposure to noise.
- When using a noise dosimeter to determine an employee's noise exposure, the microphone will be attached to the employee in the area of the employee's shoulder.
- When using a sound-level meter, the microphone should be positioned not less than 2 inches nor more than 2 feet from the employee's ear.
- Measurements will be made with the employee at his/her regular work stations(s).
- Before and after each use, dosimeters and sound-level meters will be calibrated using acoustical calibrators to verify the accuracy of the measuring equipment.
- If any sound-level meter or noise dosimeter is dropped, or if the microphone receives a sharp impact, a calibration check shall be performed to ensure that it is still working properly before taking additional measurements.

- Sound-level meters and noise dosimeters that are not working properly or are out of calibration shall not be used to determine an employee's noise exposure.

11.6 Medical Surveillance Program

Program Participation

- Whenever an employee is routinely occupationally exposed to continuous noise at or above the action level or to impact or impulsive noise in excess of the limits specified in Section 11.4, the employee shall be enrolled in a medical surveillance program. Employee noise exposure shall be determined without regard to any sound attenuation provided by the use of hearing protectors.
- Each employee placed in a job that required participation in a medical surveillance program shall undergo a physical examination before being assigned to duties that involve exposure to high-intensity noise. The examination shall include a baseline audiogram, a medical examination to determine any preexisting medical pathology of the ear, and a work history to document past noise exposures. The history shall include a detailed review of past work histories and possible occupational and nonoccupational noise exposures.
- When it is discovered that employees have been working where they encounter hazardous noise or incur exposures that exceed the action level and have not had a physical examination, one shall be conducted within 30 days. The audiogram must follow at least 14 hours of no known exposure to sound levels in excess of 80 dBA. This interval should be sufficient to allow recovery from noise-induced temporary threshold shift.
- Personnel who suffer from acute diseases of the ear shall not be placed in hazardous noise areas until the condition has abated, particularly if such diseases preclude the wearing of hearing protectors, cause hearing impairment, or produce tinnitus.
- All employees who are participants in an medical surveillance program must receive an annual audiogram.

11.7 Noise Hazard Warning Signs

Caution signs that clearly indicate a hazard of high noise levels and the requirements to wear hearing protection shall be posted at the entrance(s) to, and the periphery of, noise hazard areas. Decals or placards with similar statements shall be affixed to power tools and machines that produce hazardous noise levels. Signs and decals shall have wording in black letters on a yellow background (refer to Section 11.10 for noise hazard warning sign specifications).

11.8 Employee Training

- Each employee who participates in the hearing conservation program shall receive annual training. The training must include, but not be limited to:
 - A review of the effects of noise on hearing (including permanent hearing loss)

Noise Control Principles

- The purpose, advantages, disadvantages, and attenuation characteristics of various types of ear protectors
- Instruction on selection, fitting, use, and care of hearing protectors
- An explanation of the audiometric testing and its purposes

11.9 Records Maintenance

- Audiogram and noise-exposure records shall be maintained as a permanent part of employee medical records. If noise-exposure measurement records are representative of the exposures of other employees participating in the hearing conservation program, the range of noise levels and the average noise dose will be made a permanent part of the medical records of the other employee as well.
- In addition to audiometric test data, each medical record will, as a minimum, identify:
 - The audiometric reference level to which the audiometer was calibrated at the time of testing
 - The date of the last calibration of the audiometer
 - The name, social security number, and job classification of the employee tested
 - The employee's most recent noise exposure assessment
 - The date(s) hearing conservation training was received
- Records of the background sound-pressure levels in the audiometric test rooms and data and information concerning calibration and repair of sound-measuring equipment and audiometers (as well as all audiometric test data) will be maintained by the contractor's medical consultant in accordance with OSHA and other applicable regulations.
- Accurate records of noise surveys/monitoring, results of the special noise studies, and records of special actions or engineering controls installed to control noise exposures will be maintained for the duration of the affected employee's employment, plus 30 years.

11.10 Signs and Decals

11.10.1 Noise Hazard Warning Sign Specifications

Warning signs must read:

**CAUTION
NOISE AREA
MAY CAUSE HEARING LOSS**

**USE PROPER
HEARING PROTECTION**

IN THIS AREA

The lettering is almost always all caps, black, and on a yellow background.

11.10.2 Noise Hazard Warning Decal Specifications

Decals must have a yellow background and black lettering (all caps). The decal must be self-adhesive on the side opposite the written warning. The written warning must read:

**CAUTION
NOISY EQUIPMENT MAY CAUSE HEARING LOSS
USE PROPER
HEARING PROTECTION**

The word caution is in yellow lettering with a black background superimposed on the yellow background of the label. As shown, the word caution is 2 point sizes larger than the lettering in the rest of the warning.

Section 12

Emergency Response Plan

The following provides requirements and guidelines for the development of each contractor's emergency response procedures. The D&H contractor and IPTD contractor shall include an Emergency Response Plan in their component-specific HASP. Emergency Response Plans and procedures to ensure employee's safety in case of emergencies shall be reviewed by each contractor with their employees.

12.1 Emergency Coordinator

Each contractor's SHSO shall be responsible for emergency coordination activities. A supervisor will be designated by each contractor prior to the start of work and will act as the primary emergency coordinator in the absence of the SHSO during emergency situations. The SHSO/supervisor will be familiar with all aspects of the site emergency response procedures, all operations and activities at the site, the location and characteristics of hazardous substances handled, the location of all records, and the site layout.

Personnel training shall be conducted by each contractor's SHSO or a qualified representative through initial briefings and periodic review for their personnel involved in site activities. Training elements shall include an overview of the facility, detailed instructions on site-specific operations, and the use of emergency equipment such as first aid kits, fire extinguishers, and two-way radios if alternate communication is needed. This training shall be included in each contractor's employee H&S orientation, and shall be documented and filed onsite.

12.2 Medical Emergencies

Emergency first aid treatment may only be administered by trained individuals. The purpose of treatment is to maintain life and/or prevent further injury until professional treatment can be obtained.

An emergency contact number and hospital map shall be determined by each contractor (and included in the D&H and IPTD contractor's component-specific HASP) and distributed to onsite contractor personnel for all medical emergencies. Personnel shall have a means of contacting the emergency number or an available supervisor with the capability while in the field, and supervisors shall review availability of service prior to starting work activities. A map showing a nearby hospital is located in the Appendix and listed in Section 12.4.1; however, each contractor is responsible for verifying this information and the medical service availability prior to beginning onsite work.

Each contractor shall provide training to its employees in medical emergency contact procedures during their H&S orientation. Each contractor shall make emergency contact numbers and procedures available to its employees at each work location.

12.3 Evacuation and Communications

Each contractor shall be responsible for designating an assembly point for employees. When an evacuation is necessary, all field team members shall go to the designated assembly point. This area will be located upwind of the site and will be dependent on the normal prevailing wind. Each contractor's SHSO will designate any other assembly points at the morning safety meeting or daily tailgate meeting, as appropriate.

All emergency communications will be conducted by direct vocal communication. If employees work on multiple areas concurrently, communication between employee groups will be by means of cell phones or hand-held radios.

12.4 Medical Support

12.4.1 Offsite Medical Facility

Offsite Medical Facility

Binh Dan General Hospital
376 Tran Cao Van
Tel: (0511) 371-4030 & 371-4031

A map to the facility is provided in the Appendix.

Each contractor shall be responsible for verifying the directions to the facility listed above and its availability of emergency services prior to arriving onsite. Other local facilities may need to be evaluated by each contractor.

12.4.2 First Aid Medical Support

In the event of an accident requiring first aid, each contractor's SHSO shall be responsible for coordinating the first aid and/or requesting aid from a medical service. If the person requiring attention is capable of being moved without further injury, the contractor's SHSO may transport the injured party to obtain medical assistance. Site support vehicles may be used to transport injured or ill personnel.

12.5 Fire Emergencies

Every member of each contractor's field team shall be responsible for observing and reporting any fire, and conditions that could potentially lead to fires.

If an employee observes a fire, the employee may attempt to quench the fire with a fire extinguisher if one is readily available. If the fire cannot be readily extinguished, the employee shall notify all personnel on site to evacuate the area immediately. All onsite personnel shall convene at the reassembly point identified by the contractor's SHSO, who in turn shall immediately notify the fire department and applicable services. The contractor shall be responsible for notifying the USAID CM contractor's SHSO and USAID project management as soon as possible.

When an employee observes a condition that potentially increases the chance for a fire, the employee shall immediately inform the contractor's SHSO of the condition. The contractor's SHSO shall immediately cease any field activity that increases the risk of fire until appropriate controls are in place. The contractor's SHSO shall be responsible to take whatever actions are necessary, including withdrawal from the area to eliminate or reduce the hazardous condition.

The D&H and IPTD contractors shall be responsible for providing fire emergency information in their component-specific HASP, including emergency notification numbers and procedures. Each contractor shall also make this information available to its site employee at each work location.

12.6 Severe Weather Response Procedures

The basic components of these severe weather response procedures provide a framework to manage early warning notification and response if severe weather conditions are encountered during the course of operations at the site. Each contractor's severe weather response procedures shall be further defined in their component-specific HASP.

The contractor's SHSO is responsible for implementation of these severe weather response procedures.

Each contractor's SHSO shall have the capability to obtain local weather forecasts 24 hours in advance of expected operations. A means of obtaining real time weather reports for local conditions shall be maintained during all site operations. Each contractor's SHSO is responsible for communicating severe weather conditions to their field team, and ensuring that an appropriate rally point is established.

Efforts shall be made to secure equipment and materials in a severe weather event.

Severe weather events also impact driver safety, and must be emphasized during a severe weather evacuation event.

12.6.1 Expected Weather Hazards

Lightning

If lightning is observed during work activities, work shall be halted by the contractor's SHSO or a site supervisor until weather conditions improve and lightning is not observed in the general proximity of the site.

Prior to the start of field activities, the contractor's SHSO shall work with the field team to identify a site evacuation and rally point capable of providing protection from a lightning strike.

High Winds

If high winds are expected, or are encountered during work activities, appropriate action shall be taken to ensure the protection of site workers and the surrounding community. The contractor's SHSO or a site supervisor shall determine if the winds prevent proper dust suppression or present a hazard to personnel and the public which warrants a temporary shutdown of operations.

Thunderstorms

Flooding resulting from a thunderstorm presents a significant safety hazard, and must be continually monitored if a severe weather event is expected. If flooding can't be properly controlled and presents a hazard to personnel and the public, the contractor's SHSO or a site supervisor shall temporarily shutdown operations until the hazards are abated.

Seasonal Weather Extremes

The weather in Da Nang at certain times of the year can be especially hazardous.

The rainy season (approximately September through December) can be highly susceptible to flash flooding and wet conditions that are dangerous and change rapidly. Soil conditions will also be impacted

and will affect the stability of excavations, heavy equipment, and driving surfaces. Personnel shall be particularly vigilant when working during rain events.

The contractor's SHSO or site supervisor shall evaluate whether to implement a temporary shutdown of activities during such conditions or events.

12.7 Spill Response and Reporting

The D&H contractor shall develop spill response and reporting procedures in accordance with the requirement of the project's RWP, and which are to be detailed in the D&H contractor's Environmental Protection Plan (EPP). The developed spill response and reporting procedures shall be followed by each contractor (CM, D&H, and IPTD).

Section 13

Accident Reporting

Each contractor shall immediately report all work-related injuries or illnesses, regardless of how minor, to the USAID CM contractor's SHSO. Each contractor shall include the procedures for written documentation of work-related injuries or illnesses in their component-specific HASP. Unless there are extenuating circumstances, the completed reporting documentation shall be provided to the USAID CM contractor's SHSO within 2 working days of the incident.

The employee or the employee's manager shall first report the accident to their contractor's SHSO as soon as practical. Priority shall be given to securing necessary medical services and employee care prior to the initiation of reporting and investigation.

Related injury/illness data will be analyzed by the USAID CM contractor's SHSO for trends in order to adequately direct resources and initiatives that provide worker protection.

13.1 Accident Investigations

13.1.1 When Accident Investigations are Conducted

The need to conduct a formal accident investigation shall be determined by the USAID CM contractor's SHSO. A project manager or equivalent position may also request a formal accident investigation. Investigations shall be conducted by the USAID CM contractor's SHSO or someone designated by them.

13.1.2 Purpose and Guidelines of Investigations

The purpose of the investigation is to objectively determine factors that contributed to or caused the incident to identify corrective actions to be taken to prevent re-occurrence. It is not intended to find fault with individuals or companies. Guidelines for conducting investigations are provided below:

- Initiate the investigation as soon as possible. While first priority should be given to ensure injured employees receive proper first aid and medical care, the passage of time delays corrective actions and allows facts to become distorted, forgotten, or lost.
- Where possible, the accident scene should remain undisturbed until the investigation is conducted. Some changes and alterations may need to be done to prevent further injury or damage.
- If possible, take photographs of the scene. Take pictures from multiple angles and the surrounding area.
- Prepare sketches/diagrams.
- Accurately measure distances, weights, and other factors associated with the accident.
- Identify and interview witnesses independently as soon as possible after the accident.
- Interview the injured employee/individual as soon as their condition allows. In many instances, the injured may be the only witness.

- The following information should be considered when interviewing witnesses and collecting observations:
- Weather conditions at time of accident
- Adjacent distractions
- Employee attitudes
- Training records
- Pre-job planning efforts
- Fatigue

13.2 Near Misses

Contractor employees shall report the near miss details to their SHSO or manager immediately following its occurrence. The contractor's SHSO or manager shall be responsible for informing the USAID CM contractor's SHSO as soon as possible. Near misses are to be reported in all cases. Once reported, the USAID CM contractor's SHSO shall decide if a formal investigation, similar to an accident investigation, is necessary. Near misses have serious potential consequences to the safety of site personnel and all cases are to be investigated by the USAID CM contractor's SHSO for root cause to prevent a reoccurrence at the site.

13.3 Employee's Duty

It is the duty of all site employees to inform their SHSO or manager of any accidents or near misses. Only by doing so can the project adequately ensure that future accidents are prevented. Every employee who does so is free from reprisal in any way.

Employees may request and receive the results of site accident investigations and safety inspections.

13.4 Lessons Learned

Each contractor shall evaluate the lessons that can be learned following each incident, and shall share this information among their site personnel. This knowledge will be a powerful influence in preventing future incidents and creating a safer, more protective work environment. Examples of means to communicate lessons learned include, but are not limited to, the following: activity-specific safety training; H&S committee meetings; safety memos; and safety inspections.

Section 14

References

American National Standards Institute (ANSI)/American Industrial Hygiene Association's (AIHA) Z10, *Occupational Health and Safety Management Systems*. 2005.

ANSI Z87.1. *Eye and Face Protection*.

ANSI Z88.2. *Standard Practice for Respiratory Protection*.

ANSI Z41.1. *Safety Requirements for Industrial Head Protection*.

ANSI Z41.1. *Men's Safety Toe Footwear*.

ANSI / ISEA 107. *National Standard for High-Visibility Safety Apparel*.

Part 6 of the Manual on Uniform Traffic Control Devices (MUTCD), *Temporary Traffic Control*, Federal Highway Administration. 2003.

National Fire Protection Association (NFPA) 70E. *Standard for Electrical Safety in the Workplace*.

29 Code of Federal Regulations (CFR) 1910, Occupational Safety and Health Administration (OSHA) *Safety and Health Standard for General Industry*.

29 CFR 1904, OSHA *Recording and Reporting Occupational Injuries and Illnesses*.

29 CFR 1926, OSHA *Safety and Health Standards for the Construction Industry*.

41 CFR Part 50-204.7 *General Requirements for Personal Protective Equipment*.

OSHA Rulemaking.

41 CFR 50-204.10. *Occupational Noise Exposure*. OSHA Rulemaking.

USAID 2011a. Final Site-Wide Sampling and Analysis Plan. Environmental Remediation Project Da Nang Airport. March.

USAID 2011b. Final Remediation Work Plan. Environmental Remediation Project Da Nang Airport. March

Appendix

Hospital Map

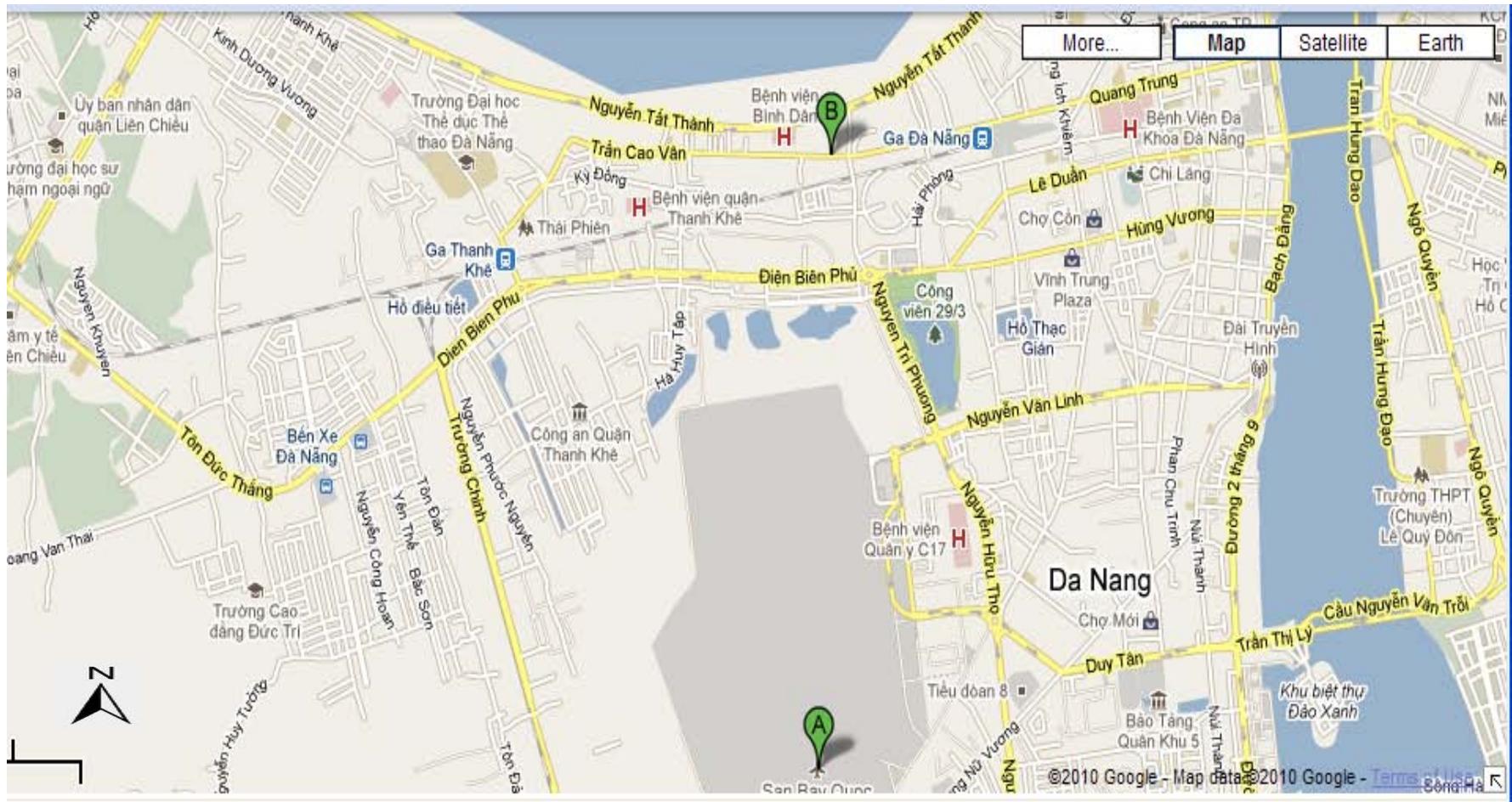
Hospital Map & Location

A: Da Nang International Airport, Da Nang, Vietnam

Approximate distance to hospital: 3 miles

B: **Binh Dan General Hospital**, 376 Tran Cao Van,
Tel: (0511) 371-4030 & 371-4031

Approximate time to hospital: 6 minutes



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