Worker Safety and Health Program for Chemical Data Gap Investigation Phase 3 Soil Chemical Sampling at Area IV, Santa Susana Field Laboratory Ventura County, California

Prepared for:

Department of Energy
Energy Technology and Engineering Center
P.O. Box 10300
Canoga Park, California 91309

Prepared by:

CDM Federal Programs Corporation
555 17th Street, Suite 1200
Denver, Colorado 80202

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CDM Smith

Worker Safety and Health Program
for Chemical Data Gap Investigation
Phase 3 Soil Chemical Sampling at Area IV
Santa Susana Field Laboratory
Ventura County, California

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Prepared by: _____ 4/11/2012
Paul Opem, CSP Date
CDM Smith Inc.
Health and Safety Manager
(303) 383-2483

Approved by: _____ 4/11/2012
John Wondolleck Date
CDM Smith
Project Manager
(303) 383-2315

I certify that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete.

Concurrence By: _____ 4/11/2012
Shawn Oliveira, CIH, CSP Date
CDM Smith
Corporate Health and Safety Manager
(406) 293-8595

Document Revision Log

One of the core functions of an Integrated Safety Management System (ISMS) is to provide mechanisms for continual improvement. This document will be periodically reviewed and updated, as necessary, to reflect changes in CDM Federal Programs Corporation's (CDM Smith's) Worker Safety and Health Program (WSHP).These changes will be documented on the following Document Revision Log:

Revision Number	Revision Date	Contact Person	Affected Pages	Description of Revision
0	April 2012	J. Wondolleck	All	Original Draft

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Acronyms and Abbreviations

ACGIH	American Conference of Governmental Industrial Hygienists
AEC	Atomic Energy Act of 1954
AHA	activity hazard analysis
ANSI	American National Standards Institute
Boeing	The Boeing Company
CCR	California Code of Regulations
CDM Smith	CDM Federal Programs Corporation
CDMU	CDM Smith University
CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
CRZ	contamination reduction zone
CSE	confined space entry
dB	decibels
dBA	decibels, A-weighted
dBP	decibels, peak
D&D	decontamination and decommissioning
DAA	Drug and Alcohol Administrator
DHHS	Department of Health and Human Services
DOE	United States Department of Energy
DHP	direct hydraulic push
DTSC	Department of Toxic Substances Control
EAP	Employee Assistance Program
EIS	Environmental Impact Statement
EMS	Environmental Management System
EPA	United States Environmental Protection Agency
ES&H	environmental, safety, and health
ETEC	Energy Technology Engineering Center
GFCI	ground fault circuit interrupter
GC/MS	gas chromatography/mass spectrometry
H&S	health and safety
HASP	health and safety plan
HRP	Human Reliability Program
Hz	Hertz
IDLH	imminent danger to life and health
IDW	investigation-derived waste
ISMS	Integrated Safety Management System
LEL	lower explosive limit
MUTCD	Manual of Uniform Traffic Control Devices
MRO	medical review officer
MSHA	Mine Safety and Health Administration
NASA	National Aeronautics and Space Administration
NBZ	Northern Buffer Zone
NIOSH	National Institute for Occupational Safety and Health
NFPA	National Fire Protection Association
OSHA	Occupational Safety and Health Administration
PAP	Personnel Assurance Program
PSAP	Personnel Security Assurance Program

PCB	polychlorinated biphenyls
PM	project manager
PPE	personal protective equipment
PQM	Project Quality Management
QA	quality assurance
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RPM	Regional Performance Manager
the Rule	10 CFR Part 851
SCBA	self-contained breathing apparatus
SSO	site safety officer
SSFL	Santa Susana Field Laboratory
STS	standard threshold shift
SLM	sound-level meter
TDP	testing designated person
TWA	time-weighted average
UL	Underwriter's Laboratory
VCAPCD	Ventura County Air Pollution Control District
WBS	work breakdown structure
WSHP	Worker Health and Safety Program

Section 1

Purpose and Scope

1.1 Purpose

This Worker Health and Safety Program (WSHP) applies to work performed by CDM Federal Programs Corporation (CDM Smith), and subcontractors on behalf of CDM Smith, under contract number DE-AM09-05SR22404 with the United States Department of Energy (DOE), for environmental planning and support activities at the Santa Susana Field Laboratory (SSFL). The WSHP describes CDM Smith's methods for complying with the requirements in 10 Code of Federal Regulations (CFR) Part 851 (the Rule), Worker Safety and Health Program, Subpart C, Specific Program Requirements. The WSHP includes the regulations and standards specifically required by 10 CFR 851, and is to be used in conjunction with CDM Smith's Corporate Health and Safety (H&S) Program and Integrated Safety Management System (ISMS) Description as an overall H&S management approach to SSFL activities.

Under 10 CFR 851, requirements for worker safety programs are intended to be complementary to those established in the ISMS. The intent of the Rule is to establish "requirements for an effective worker safety and health program that will reduce or prevent injuries, illnesses, and accidental losses by providing DOE contractors and their workers with a safe and healthful workplace."

Through establishment of its WSHP in accordance with 10 CFR 851, CDM Smith integrates safety and health into all site activities performed to support the contract.

1.2 Background

The SSFL is located in southeastern Ventura County, California, and has an area of approximately 2,850 acres south of Simi Valley. The SSFL is separated into four administrative areas. The Boeing Company (Boeing) owns all of Area IV, the location of SSFL where DOE's Energy Technology Engineering Center (ETEC) was located. DOE does not own any of the land that comprised the 90-acre ETEC area, with ownership and management performed by Boeing and its predecessor companies.

At present all of Area II and most of Area I are owned by Boeing, except for 42 acres of Area I that is owned by the Federal government and administered by the National Aeronautics and Space Administration (NASA). Areas I, II, and III were used by predecessors of Boeing, NASA, and the Department of Defense for rocket engine and laser testing. Environmental contamination resulting from activities in Areas I, II, and III is the responsibility of Boeing and NASA and is not part of the scope of CDM Smith's sampling effort. DOE was and remains responsible for operation of the ETEC located in Area IV.

The ETEC facility within Area IV had several purposes, one of which was the development and testing of components used in metallic sodium systems. The other main purpose was the testing of small, experimental nuclear reactors. Nuclear operations at the ETEC included 10 nuclear research reactors, 7 critical facilities, the Hot Laboratory, the Nuclear Materials Development Facility, the Radioactive Materials Handling Facility, and various test and radioactive material storage areas. In addition to the handling and processing of radioactive materials, these DOE facilities also used non-radioactive chemicals, a variety of specialty metals, and other hazardous materials (e.g., polychlorinated biphenyls [PCBs], solvents, and lead-based paints) in their operations.

All nuclear research in Area IV was terminated in 1988 when DOE shifted its focus at SSFL from research to decontamination and decommissioning (D&D) activities. D&D of the sodium test facilities started in 1996, when DOE determined that the entire ETEC facility was surplus to its mission. At that time, DOE began formal closure of its facilities in Area IV and began cleanup activities in preparation for return of the property to Boeing. DOE discontinued D&D and demolition of the remaining facilities in 2008, but has continued surveillance, maintenance, monitoring, and investigation activities. This includes investigation of soil and groundwater, as required under the California Department of Toxic Substances Control (DTSC) Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and the United States Environmental Protection Agency (EPA) radiological investigation.

1.3 Scope of Work

CDM Smith has been contracted by the DOE to conduct a variety of environmental support activities assisting in the closure of DOE's ETEC at SSFL. These activities range from providing community participation support, review of historical documents needed to understand the environmental uses at ETEC, conducting biological and cultural resource surveys, preparation of an Environmental Impact Statement (EIS), the sampling of environmental media (soil, water, air, biological), and building material waste characterization as necessary to describe the impacts of the final D&D and demolition of ETEC. CDM Smith's scope does not include the operation, management, D&D, nor demolition of any structures related to ETEC.

CDM Smith's work activities, described in this WSHP, the Phase 3-specific Health and Safety Plan (HASP, Appendix B), or any other phase-specific HASPs, incorporate the procedures and elements of CDM Smith-prepared SSFL work plans, in accordance with California Code of Regulations (CCR), Title 8, Section 5192 (b)(3), including the *Work Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV*, Santa Susana Field Laboratory (CDM Smith 2012a) and the *Master Field Sampling Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV*, Santa Susana Field Laboratory (CDM Smith 2012b).

As part of a radiological characterization study, EPA is in the process of collecting surface and subsurface soil samples throughout Area IV of SSFL and the Northern Buffer Zone (NBZ). In an Agreement in Principle and subsequently in a signed Administrative Order on Consent, the DTSC, and DOE agreed that soil collected by EPA shall also be analyzed for chemical composition. The DTSC and DOE agreed that CDM Smith shall prepare soil samples collected by EPA for shipment and have them analyzed for chemicals. This activity is being conducted under a sampling program termed the "co-located soil chemical analysis study."

CDM Smith's site-specific H&S training, procedures and protocols, contained within the ISMS Description, WSHP, Phase 3 HASP, and activity hazard analyses (AHAs), are designed to incorporate Boeing H&S requirements for entities working in areas under their management and control.

DOE Order 450.1, *Environmental Protection Program*, requires contractors who are responsible for the management and operation of the DOE-owned facilities to implement sound stewardship practices that are protective of natural and cultural resources that may be impacted by DOE operations. The objective must be accomplished by implementing an Environmental Management System (EMS) at DOE sites. As mentioned in Section 1.2, CDM Smith does not maintain or operate the SSFL facilities. Therefore, this requirement is not applicable to CDM Smith's current scope of work at the SSFL; however, CDM Smith has incorporated environmental compliance and sustainability goals into our

SSFL work plans. CDM Smith is committed to collaborating with our clients to develop lasting environmental solutions that meet current needs while preserving resources for future generations.

1.4 Flow Down of 10 CFR 851 Requirements

CDM Smith flows down this expectation and requirement to subcontractors and their employees through contract language. In the contract, CDM Smith specifically requires subcontractors to meet the requirements of 10 CFR 851.

In addition, CDM Smith's safety requirements apply to all employees and subcontractors involved in CDM Smith-controlled operations. Planning and performing work in accordance with these established controls is designed to protect workers, the public, and the environment. CDM Smith's Corporate H&S Manual, ISMS Description, WSHP, Phase 3 HASP, and AHAs provide the basis for integrating safety controls and requirements during task order operations at SSFL. All CDM Smith operations at SSFL are to be performed in a manner consistent with these established processes.

Generally, subcontractors are hired for their specialized expertise and are expected to be knowledgeable on H&S aspects regarding their activities. Subcontractors are expected to have an H&S program and to adhere to applicable federal, state, and local safety regulations as well as all H&S contractual requirements pertaining to their work. CDM Smith may request project HASPs, safe operating procedures, and/or safety manuals from subcontractors for review prior to allowing subcontractors to work for CDM Smith at SSFL. This flow down of H&S requirements to subcontractors ensures that the H&S activities of subcontractors are integrated with CDM Smith project activities.

Please note that references within this WSHP to CDM Smith H&S at SSFL also include an environmental component, commonly referred to as environmental, safety, and health (ES&H) within safety industry practices.

Section 2

ISMS Overview

2.1 CDM Smith ISMS at SSFL

The basis of CDM Smith's ISMS for field activities conducted at the SSFL is the CDM Smith H&S Program, including the firm's philosophy and principles. The policies, mechanisms, and procedures for implementing the ISMS are contained in this WSHP. Safety is integrated into management and work practices at all levels, addressing all types of work and all types of hazards to ensure safety for workers, the public, and the environment. For work in Area IV of SSFL, CDM Smith will also integrate any necessary site-specific training and protocols required by Boeing to identify and mitigate hazards in the field.

2.2 Implementation

The DOE, through DOE P 450.4, has established seven principles to guide the implementation of the ISMS. The figure below provides these seven guiding principles and the five core functions upon which CDM Smith's ISMS is based. Functionally, implementation of the ISMS will follow the quality concept of "Plan-Do-Check-Act" into its management system approach. Utilizing this concept will allow CDM Smith to maintain a continual improvement cycle within the ISMS framework. These improvements are expected to reduce onsite hazards and risks in a systematic manner.

Specific roles and responsibilities establishing how work will be executed utilizing the Plan-Do Check-Act principles are demonstrated below.

The ISMS for CDM Smith activities at SSFL is articulated in the CDM ISMS Description. Overarching institutional requirements for all work activities at SSFL are contained in the ISMS Description and implemented through the WSHP. The ISMS Description and this WSHP shall be reviewed annually and revised as necessary.

2.2.1 ISMS Core Functions

This section is meant to briefly summarize the five core functions of CDM Smith's ISMS at SSFL. Each function is elaborated on within CDM Smith's ISMS Description for the SSFL.

The five core management functions of the ISMS, described below, provide a structure for project planning, implementation, and continual improvement. These functions operate as a continual cycle and are tailored to address the type of work activity and the hazards involved to adequately protect workers, the public, and the environment. Furthermore, these functions are integrated across the contract level and the activity level of the project.

2.2.1.1 Define Scope of Work

This core function refers to the way the project objectives are translated into work elements, expectations are set, tasks are identified and prioritized, and resources are allocated. CDM Smith's scope of work for the SSFL project includes the following activities: familiarization of historical activities at the site that may have resulted in environmental contamination, a data gap analysis to determine data needs for site characterization and cleanup, collection of required environmental data,

EIS scoping with the community, and preparation of an EIS at SSFL as defined through the contract document. The scope is translated into work breakdown structure (WBS) elements as necessary, to provide a structure for prioritizing and planning tasks, allocating resources, tracking budget and performance, and reporting.

2.2.1.2 Analyze the Hazards

This core function identifies hazards associated with conducting the work at several stages of the project. Some hazards may be identified in project contract documents and others may be identified and analyzed during the Project Quality Management (PQM) process. The identification of hazards in the contract and scoping stage of a project allows budget resources to be allocated to the monitoring and mitigation of hazards.

The following process and hazard analysis matrix (Figure 2-3) will be used as the framework for hazard analysis.

2.2.1.3 Develop and Implement Hazard Controls

When hazards are identified and analyzed, controls are developed to mitigate the hazards. The controls, documented in any phase-specific HASP or AHA for work at SSFL, are based on agreed-upon applicable standards and requirements. Controls and required training specific to hazards are identified and documented in the HASP and AHA forms. The H&S director will review and approve the HASP and AHA forms. If, during the implementation of the work, new hazards are identified, the HASP or AHA will be modified to address the new hazard.

Boeing's standard procedures for communicating and mitigating facility-specific hazards will be considered for the controls implemented by CDM Smith while working at SSFL.

2.2.1.4 Perform Work within Controls

This core function relates to the confirmation of readiness and performing the work safely. Readiness for work performed on the SSFL facility is confirmed through the field planning meeting. The meetings are attended by the project manager (PM), task manager, site safety officer (SSO), all members of the field team, and others integral to the success of the project as determined by the PM. The project plans, including the HASP, and work tasks are reviewed. H&S equipment, monitoring requirements, and protocols are also reviewed, as well as the availability of monitoring equipment and personal protective equipment (PPE).

2.2.1.5 Feedback and Continuous Improvement

CDM Smith's expectation is that all workers, managers and supervisors, and contractors working on the SSFL project contribute to continual improvement. Contributions shall be achieved through:

- Promoting a culture of safety awareness
- Hazard recognition and analysis
- Participation in H&S inspections
- Involvement in safety training
- Voluntary ideas to improve the WSHP
- A sense of responsibility for the well-being of managers, supervisors, workers, and contractors
- Ownership of a more protective work environment

CDM Smith will implement the processes included in Table 2-1 to document safety observations, identify hazards, obtain feedback, and assess ISMS performance.

Table 2-1 – SSFL Safety Evaluation Processes

Activity	Personnel	Frequency
Safety Inspections	Task Manager	Weekly
	SSO	Daily
	Workers	Voluntary
Bi-weekly Risk Review	Task Manager	Bi-weekly
	H&S Director	Bi-weekly
	SSO	Bi-weekly
	Contractor	Bi-weekly
Monthly Risk Review	Regional Performance Manager	Monthly
	Project Manager	Monthly
	Task Manager	Monthly
	H&S Director	Monthly
	SSO	Monthly
Quarterly Risk Review	Federal Programs President	Quarterly
	Regional Performance Manager	Quarterly
	Project Manager	Quarterly
	Task Manager	Quarterly
	H&S Director	Quarterly
Quality Assurance Audits	QA Personnel	Annually
H&S Committee	Regional Performance Manager	Monthly
	Project Manager	Monthly
	Task Manager	Monthly
	H&S Director	Monthly
	SSO	Monthly
	Workers	Monthly
	Contractors	Monthly

The following describes each of the safety evaluation processes used at SSFL by CDM Smith.

- **Safety Inspections**—Safety inspections will be performed using the Predictive Solutions™ data collection tool to record observations. Employees may accompany the H&S director, manager, or supervisor during their safety inspections. Those responsible for corrective and mitigative actions include workers, supervisors and managers, and the H&S committee. Situations identified during an inspection that could be expected to cause a fatality, serious injury, or illness in the immediate future will be stopped and immediately communicated to senior management to ensure prompt mitigation.

- **Bi-weekly Risk Review**—Every 2 weeks during CDM Smith field work, observations and safety input information will be summarized into a Bi-weekly Risk Review that will be attended by the PM, task manager, SSO, and contractor safety personnel. The purpose of this Bi-weekly Review is to formally discuss safety performance, any identified concerns, and corrective action implementation during the previous 2-week period. The Bi-weekly Review is intended to serve as a means to identify any safety concerns with existing activities, and to subsequently focus training, communication, and inspection activities for the next 2-week period at the site level.

- **Monthly Risk Review**—A Monthly Risk Review will be prepared by the SSO based on the safety observations and Bi-weekly Risk Reviews performed in the previous month. The purpose of this Monthly Risk Review is to summarize pertinent safety metrics, safety concerns, and resource allocation, and present this information to the Regional Performance Manager (RPM), H&S director, PM, and contractor management.
- **Quarterly Risk Review**—A Quarterly Risk Review will be prepared by the H&S director and SSO, and presented to the CDM Smith president, RPM, and PM. The intent of this review is to perform a high level review of established metrics, ISMS performance, and overall resource allocation.
- **Quality Assurance (QA) Audits, Yearly HASP Program Reviews, Yearly ISMS Management Assessments**—QA audits are designed to assist in identifying programmatic and operational deficiencies that could subsequently impact the safety of site employees. These tools will provide recommendations to CDM Smith project management at SSFL for both ISMS and HASP-level improvements to further enhance the protection of workers, the public, and the environment.
- **Feedback from the H&S Committee**—Feedback from members of the H&S committee is critical to the success of the WSHP, and a valuable tool when evaluating whether implemented practices are working as intended or require modification to better suit actual field operations.

2.2.2 ISMS Guiding Principles

This section is meant to briefly summarize the seven guiding principles of CDM Smith's ISMS at SSFL. Each principle is elaborated on within CDM Smith's ISMS Description for the SSFL.

2.2.2.1 Line Management Responsibility for Safety

Development, administration, and maintenance of the WSHP are the responsibilities of the H&S director, who reports to the CDM Smith president. Implementation of CDM Smith's H&S program is a coordinated effort between senior management and H&S staff. It is accomplished through the identification and designation of SSOs by the PM with the concurrence of the H&S director. Those designated individuals implement the requirements of the program with appropriate resources, training, and support.

2.2.2.2 Clear Roles and Responsibilities

The organizational structure of the management and worker roles and responsibilities is described in Section 3 of this document and mirrors the structure of CDM Smith's overall H&S program. All CDM Smith team members are responsible for ensuring that H&S information is efficiently communicated among the field team and management positions.

2.2.2.3 Competence Commensurate with Responsibilities

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

- Educate employees on CDM Smith's safety culture, expectations, and resources
- 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

- Comply with regulatory requirements

2.2.2.4 Balances Priorities

During the scoping and planning of project work, the protection of the public, workers, and the environment is considered at every step of the project. The scoping and planning process involves identifying and prioritizing H&S concerns such as hazards, risks, system deficiencies, and opportunities for improvement. Balancing priorities associated with H&S concerns include completion of the following goals:

- Reviewing relevant project information to identify issues related to H&S performance
- Recognizing and prioritizing issues during the review of the project scope
- Developing objectives for risk control based on the issues identified
- Formulating implementation plans to accomplish the objectives

2.2.2.5 Identification of Safety Standards and Requirements

CDM Smith uses the following project specific standards and requirements to specify the safety, health, and environmental controls to be used during project work activities:

- 10 CFR 851, Worker Safety and Health Program
- 10 CFR 835, Occupational Radiation Protection
- 10 CFR 850, Chronic Beryllium Disease Prevention Program
- 29 CFR 1904.4 through 1904.11, 1904.29 through 1904.33, 1904.44 and 1904.46, Recording and Reporting Occupational Injuries and Illnesses
- DOE P 450.4, Integrated Safety Management System Policy
- 29 CFR 1910, Occupational Safety and Health Standards
- 29 CFR 1926, Safety and Health Regulations for Construction
- American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices
- American National Standards Institute (ANSI) Z88.2, American National Standard for Respiratory Protection
- ANSI Z136.1, Safe Use of Lasers
- ANSI Z49.1, Safety in Welding, Cutting, and Allied Processes
- National Fire Protection Association (NFPA) 70, National Electrical Code
- NFPA 70E, Standard for Electrical Safety in the Workplace
- CDM Smith Injury and Illness Prevention Program
- CDM Smith Project Specific HASPs
- CDM Smith Project Quality Management Program

2.2.2.6 Hazard Controls Tailored to Work Being Performed

DOE Guide 450.3-3, *Tailoring for Integrated Safety Management Applications*, provides and encourages the flexibility to tailor all ISMS management functions, including the development of hazard controls, to maximize efficiency. Hazard controls are developed through phase-specific HASPs and completion

of phase-specific AHA evaluations. CDM Smith's ISMS achieves hazard mitigation through the preferred order (hierarchy) of controls discussed in Section 5.2.

2.2.2.7 Operations Authorization

All CDM Smith staff working on the SSFL facility will comply with Boeing's requirements for accessing Area IV, including safety, site orientation, and security requirements. The CDM Smith PM and task manager will closely coordinate the initiation of field activities with DOE and Boeing. Conditions for accessing the site and initiating activities will be communicated to CDM Smith staff during the field planning meetings required under CDM Smith's QA Program.

2.3 Readiness Review

Discussed in Section 2.2.1, readiness for CDM Smith work performed at SSFL is confirmed through the field planning meeting. The meetings are attended by the PM, task manager, SSO, all members of the field team, and others integral to the success of the project as determined by the PM. The project plans, including the HASP and work tasks, are reviewed. H&S equipment, monitoring requirements, and protocols are also reviewed, as well as the availability of monitoring equipment and PPE.

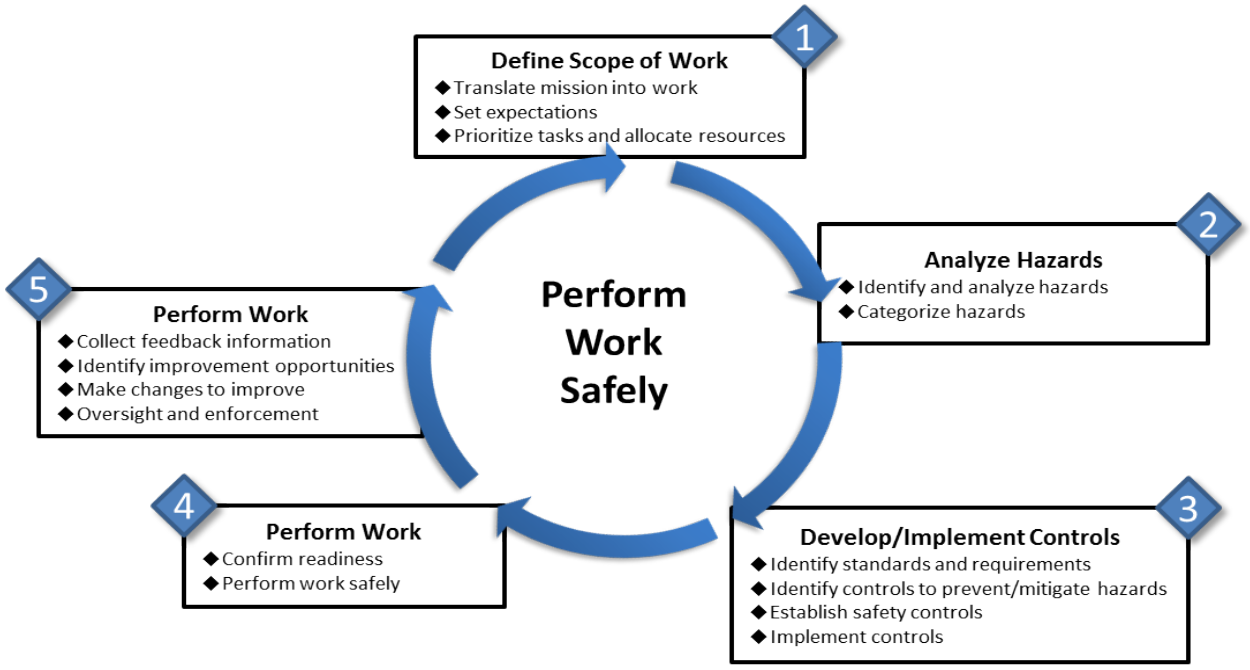
Additional readiness confirmation is implemented at the start of field work. The PM or task manager conducts a Field Sampling Assessment. This is a qualitative audit to assess the equipment, facilities, personnel, training, procedures, record-keeping, and data management aspects of the field work to ensure conformance with the project plans.

All CDM Smith employees are responsible for learning and recognizing the hazards associated with the assigned tasks. Other primary employee responsibilities that support the safe performance of work include:

- Following the guidelines presented in HASPs and AHAs, procedures outlined in safety meetings and training courses, and the instructions of their SSO and managers
- Reporting unsafe conditions or practices and offering suggestions to maintain safe working conditions and correcting unsafe conditions where possible
- Utilizing the stop work authority given to all employees to stop or suspend work when warranted by serious recognized hazards

All CDM Smith site personnel must understand the requirements of the HASP and agree to its provisions. The SSO will distribute the HASP to CDM Smith personnel and subcontractors as they are assigned to the project. Employees must review the HASP and sign the acknowledgement at the end of the plan before beginning fieldwork. The PM will monitor distribution and review of the HASP by employees. Subcontractors to CDM Smith must acknowledge and accept the provisions of the site HASP, or CDM Smith must have an agreement in place that subcontractors will perform work under their own HASP that has been reviewed and accepted by CDM Smith. In all cases, subcontractor H&S requirements will either be more stringent than CDM Smith requirements or subcontractors must accept the provisions of the CDM Smith site HASP.

Once controls are identified and established, CDM Smith will utilize the Predictive Solutions™ system to perform safety observations related to that particular hazard and its associated control. The safety observations will allow for real-time evaluation of established controls by all levels of the CDM Smith team. Evaluation of these observations will allow for continuous improvement of the use and implementation of hazard controls.



The Seven Guiding Principles

1. Line management responsible for safety
2. Clear roles and responsibility
3. Competence commensurate with responsibilities
4. Balanced priorities
5. Identification of safety standards and requirements
6. Hazard control tailored to work
7. Operations authorization

Figure 2-1
Five Core Functions and the Seven Guiding Principles

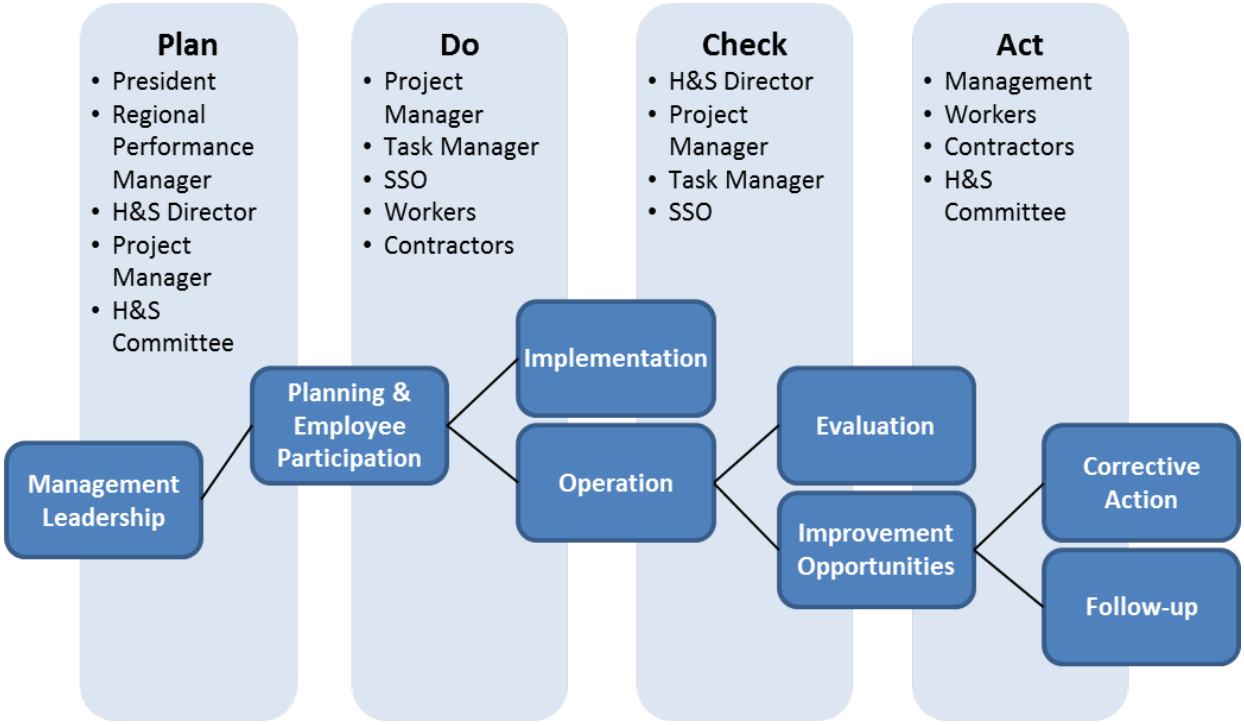


Figure 2-2
Plan-Do-Check-Act

Severity			
High – Death or disability	4 - Serious	4 - Serious	5 - High
Medium – Lost work day, recordable or minor injury	2 - Low	3 - Medium	4 - Serious
Low – First aid or minor medical treatment	1 - Negligible	2 - Low	3 - Medium
Frequency of Exposure	**Low – Remote**	**Medium – Probable**	**High- Frequent**

Hazard Analysis Score	**Remedial Action**
5 - High	Operation not possible
4 Serious	High priority mitigation
3 - Medium	Mitigate at appropriate time
2 - Low	Mitigation with lower level controls
1 - Negligible	Mitigation discretionary

Figure 2-3
Hazard Analysis Matrix

Section 3

Rights and Responsibilities

3.1 Management and Worker Responsibilities

Responsibility for implementation of the WSHP is shared by all levels of the CDM Smith organization. Management, however, is ultimately responsible for the H&S of the workforce.

CDM Smith management's responsibilities at SSFL include the following:

- Establishing written policies, goals, and objectives for the WSHP.
- Using qualified worker H&S staff to direct and manage the program.
- Assigning WSHP responsibilities, evaluating personnel performance, and holding personnel accountable for H&S performance.
- Providing mechanisms to involve workers and any elected representatives in the development of WSHP goals, objectives, and performance measures and in the identification and control of workplace hazards.
- Providing workers with access to information regarding the WSHP.
- Establishing procedures for workers to report without reprisal job-related fatalities, injuries, illnesses, incidents, and hazards. Also, establish procedures to make recommendations regarding ways to eliminate or minimize and control those hazards.
- Providing for prompt response to the above reports and recommendations.
- Providing regular communication with workers about workplace H&S matters.
- Establishing procedures that permit workers to stop work or decline to perform a task due to reasonable belief that the task presents an imminent risk of death, serious physical harm, or any other serious hazard to workers.
- Informing workers of their rights and responsibilities by appropriate means, including posting the DOE Worker Protection Poster where it is accessible to all workers.

Successful implementation of the ISMS and WSHP requires dedication and participation from all members of the organization. For the system to work effectively, each person within this ISMS organization must understand his/her roles, responsibilities, and management's expectations. Each team member has an active role and responsibility to maintain a healthy and safe workplace.

3.1.1 CDM Smith President

The CDM Smith president issues the organization's policy, sets the example for a positive forward safety culture, and assumes overall responsibility for the implementation of the ISMS. The president is responsible for assessing information provided by the RPM during a management review and directs actions to continually improve the ISMS and WSHP.

3.1.2 Regional Performance Manager

The CDM Smith RPM provides visible guidance and operational leadership for implementing the ISMS and WSHP culture consistently during field operations. The RPM is responsible for assessing information provided by the PM at SSFL and communicating the information to the president.

3.1.3 Project Manager

The CDM Smith PM oversees the day-to-day activities of CDM Smith personnel and subcontractors performing work. The PM is the primary avenue for H&S information exchanged between CDM Smith employees performing field work, subcontractors, and senior management. Additionally, the PM will work in unison with the H&S director. The PM has stop work authority if unsafe activities are observed.

3.1.4 Task Manager

The CDM Smith task manager assists the PM in managing daily CDM Smith and subcontractor operations at SSFL. The task manager is available to site workers on a daily basis and a first line of contact for H&S concerns and issues. The CDM Smith task manager has stop work authority if unsafe activities are observed.

3.1.5 H&S Director

The CDM Smith H&S director is a senior officer of the firm and a qualified safety professional who directs the development, implementation, and maintenance of the WSHP for the SSFL site.

3.1.6 Site Safety Officer

The CDM Smith SSO is responsible for implementing the WSHP and reporting directly to the PM, while receiving technical guidance and direction on H&S matters from the H&S director.

It is important that the SSO understand their role related to EPA and Boeing. The SSO monitors compliance with CDM Smith's site-specific HASP, which incorporates the Boeing requirements by reference, and communicates findings to the PM. The SSO has stop work authority if unsafe activities are observed.

3.1.7 Radiological Controls Manager

The CDM Smith radiological controls manager is responsible for ensuring that workers performing CDM Smith contractual activities are protected from radiological-related hazards. The radiological controls manager has stop work authority if unsafe activities are observed.

3.1.8 All Project Workers

All project employees share the following responsibilities in implementing the WSHP effectively:

- Complying with and developing a comprehension of the WSHP as it relates to their work activities
- Learning and recognizing hazards associated with assigned tasks
- Following the guidelines presented in HASPs, procedures outlined in safety meetings and training courses, and the instructions of their SSO and managers

- Reporting unsafe conditions or practices and offer suggestions to maintain safe working conditions; correcting unsafe conditions where possible
- Utilizing the stop work authority given all employees to stop or suspend work when warranted by serious recognized hazards that endanger anyone
- Performing their H&S duties in a satisfactory manner within their functional areas (CDM Smith employee H&S performance is assessed during annual performance reviews)
- Reporting all injuries, illnesses, and accidents to their manager immediately
- Advising the H&S director or site management regarding the use of any medication or other condition that may affect the safe performance of their job responsibilities
- Assisting with accident/incident investigations as necessary
- Assisting in performing H&S inspections in their fields of expertise or work locations
- Participating in monthly H&S committee meetings on a rotating basis

The CDM Smith WSHP hierarchy is provided in Figure 3-1.

3.2 Worker Rights

Project staff members are encouraged to take advantage of the following rights referenced under Rule 851.20(b):

1) All CDM Smith staff working at SSFL participates in the Worker Safety and Health Program on official project time.

2) A number of resources are made available to workers onsite, through CDM Smith's intranet, or as requested from CDM Smith Human Resources or the H&S director. These resources include DOE safety and health publications, CDM Smith's H&S Manual, and the site-specific HASP. Information equivalent to that found on Occupational Safety and Health Administration (OSHA) Form 300 is tabulated yearly and available to workers via the CDM Smith intranet. Input data for OSHA Form 301 is collected from the Injury/Illness Report Form, which is available to workers upon request of the CDM Smith H&S director.

3) CDM Smith workers at SSFL participate in an occupational medical surveillance program to assess worker exposure to chemical, physical, biological, or safety workplace hazards. The results of the medical monitoring are provided to workers following the medical exams. Individual overexposure is considered an "incident" and would be reported on the Injury/Illness Report Form.

4) H&S monitoring during field work at SSFL is performed by the SSO. CDM Smith workers may request to see the results of this monitoring at any time.

5) Workers are consulted and are required to participate in any incident or accident investigations conducted by management. The PM, H&S director, and any other member of management is accessible to CDM Smith workers while at the SSFL site.

6) One of CDM Smith's H&S Principles is that workers have the right to information. This would include the results of inspections and accident investigations. Workers may request this information from the CDM Smith H&S director.

7) All employees have the responsibility to report unsafe conditions or practices and offer suggestions to maintain safe working conditions. Workers are encouraged to correct unsafe conditions where possible. Workers are expected to report safety-related concerns and may do so without fear of reprisal. Workers have the right to a prompt response to reports.

8) If an employee feels that an assigned task is unsafe or poses an imminent risk of death or serious physical harm, they have the right to decline to perform the task and the responsibility to report the hazardous or unsafe conditions to management or the SSO.

9) All employees are specifically authorized to stop or suspend work when warranted by serious recognized hazards that endanger anyone. This authority is a responsibility and employees are expected to use this authority if the circumstances warrant. Workers are informed of this right and responsibility during CDM Smith's New Employee Orientation.

3.3 Employee Concerns Program

Any contractor or subcontractor fulfilling DOE's mission has the right and responsibility to report concerns regarding the environment, safety, health, or management of operations. This program is designed to do the following:

- Encourage open communication
- Inform employees of the proper forum for consideration of concerns
- Ensure employees are able to raise issues without fear of reprisal
- Address employee concerns in a timely manner
- Provide employees an avenue for consideration of concerns

DOE and CDM Smith have established procedures for workers to report, without fear of reprisal, job-related injuries, illnesses, fatalities, incidents, and hazards, and to make recommendations about appropriate ways to control those hazards.

An employee concern may be filed through the following:

- Contacting the CDM Smith SSO, PM, or H&S director by phone or e-mail
- Submitting a downloaded copy of DOE Form RL-F-5480.4, Employee Concerns Reporting-DOE
- Calling the DOE Hotline
- Writing a letter to DOE headquarters
- In person

An employee concern involving an imminent danger to life and health (IDLH) or other serious concern is to be immediately brought to the attention of the SSO and/or DOE office for evaluation and action.

An IDLH is any condition or practice in a workplace that creates a danger that could reasonably be expected to cause a death or serious physical harm without any control or abatement actions.

A serious concern is a hazard or condition that causes a substantial probability that death or serious physical harm, property loss, and/or environmental impact could result.

Federal law prohibits CDM Smith from making reprisals against workers who raise safety concerns. Employees of DOE contractors have the right to file confidential complaints with the local DOE office within 60 days regarding safety and health issues or reprisals, in accordance with 10 CFR 708.

Workers who believe they are being denied the rights described in this section, or believe they are being subjected to reprisals for attempting to exercise those rights, may file a concern following the procedure described in DOE Order 442.1A, *DOE Employee Concerns Program*. Workers may also report these concerns to CDM Smith site management or the CDM Smith H&S director.

3.3.1 Employee Complaints, Problems, and Appeals

When CDM Smith employees believe that any condition is unjust, inequitable, or a hindrance to effective operation, they are strongly encouraged to bring their concern, problem, or complaint to the attention of management, where it will receive an objective and unbiased review. Every effort will be made to resolve the issue in an understanding and supportive atmosphere without prejudice toward the individual and without fear of reprisal or recrimination.

3.3.1.1 Responsibility

Every CDM Smith manager who is responsible for the management and direction of other employees is responsible for the successful administration of the guidelines for appropriate conduct. All managers are responsible for applying both the intent and spirit of this policy.

3.3.1.2 Procedure

1. To ensure prompt attention, employees should verbally notify their manager or Human Resources business partner of any complaint, problem, or appeal as soon as possible, preferably within 5 days following the event that created dissatisfaction. Employees wishing to contact the director of Human Resources may do so by calling 1-800-243-2677.

2. The employee should personally present his or her concerns; however, the individual may elect to be accompanied by a fellow employee.

3. The employee's manager or Human Resources business partner will make every effort to resolve the issue during this meeting. If the issue is beyond the scope of existing policy or precedent, the manager or Human Resources business partner will immediately call upon resources available for assistance in resolving the complaint, problem, or appeal. In any event, the employee will receive a verbal reply from the manager or Human Resources business partner within 5 working days from the initial meeting.

4. If the complaint, problem, or appeal cannot be resolved by the manager or Human Resources business partner within 5 working days, or if the employee is not satisfied with the solution, the complaint, problem, or appeal should be submitted in writing, signed by both the employee and the manager or Human Resources business partner, to the division manager, with a copy to the director of Human Resources.

5. The division manager will consider the data and information presented along with any recommendations, consult with any other available resources, if necessary, and attempt to resolve the issue.

6. A response will be made to the employee within 10 working days of the date on which the question was referred to the division manager, with a copy of the response forwarded to the director of Human Resources.

7. If the complaint, problem, or appeal cannot be resolved by the division manager within 10 working days, or if the employee is not satisfied with the solution, the issue in question will be referred to the director of Human Resources.

8. The director of Human Resources will investigate the matter, assemble all pertinent information, and present the matter for review to the Office of the Chairman, whose decision will be final.

9. All involved parties will be notified of the final decision.

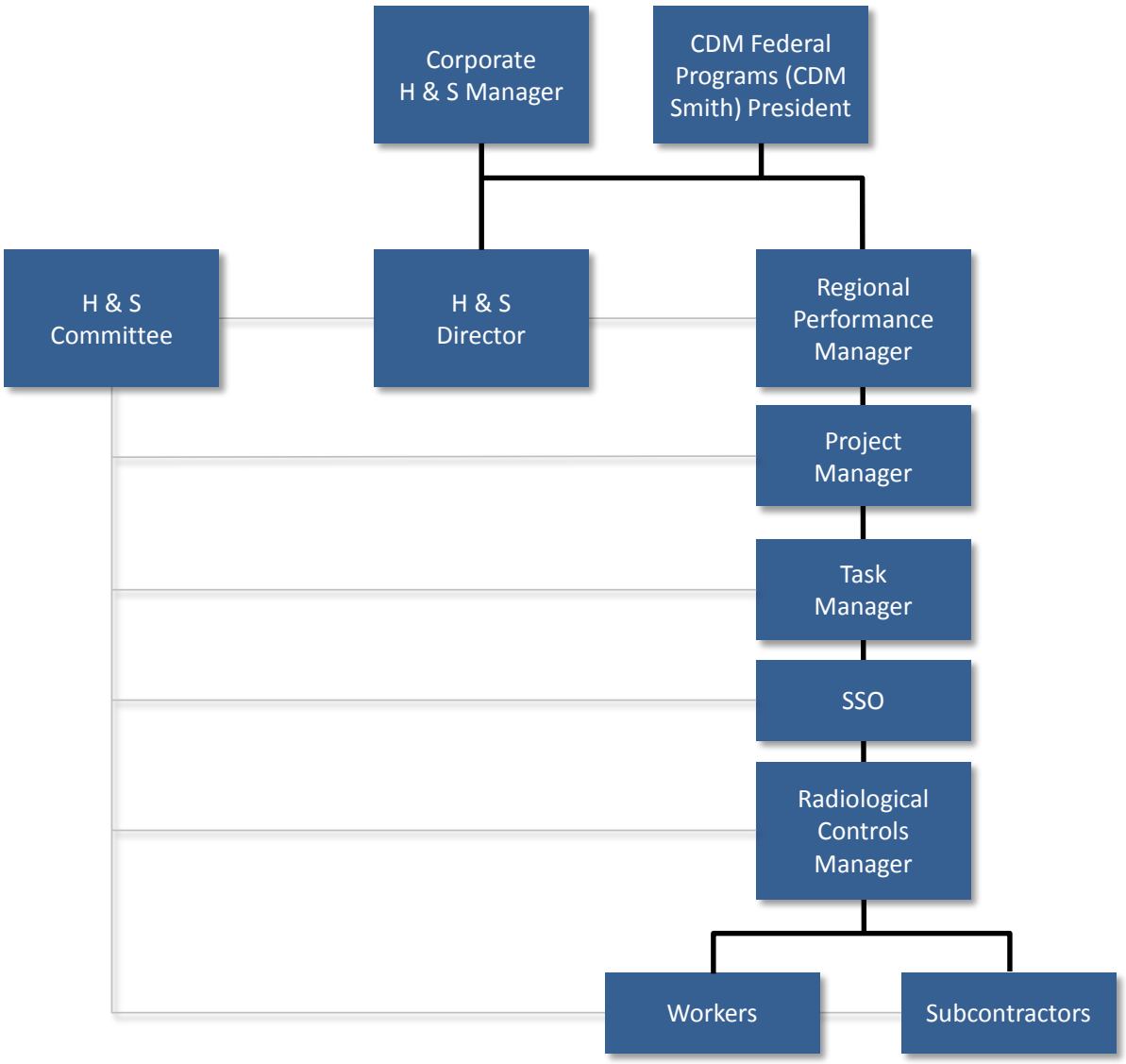


Figure 3-1
CDM Smith WSHP Hierarchy

Section 4

Hazard Identification and Assessment

The following sections describe CDM Smith's compliance with 10 CFR 851.21, *Hazard Identification and Assessment*, during SSFL Task Order activities.

4.1 Hazard Identification Procedures and Assessment of Risk

Monitoring of exposure to chemical hazards in the field is the responsibility of the CDM Smith SSO. All CDM Smith employees working at the SSFL are participants in an occupational medical surveillance program for workers at hazardous waste operations. The medical surveillance program assesses worker exposure to chemical, physical, and biological hazards. Workplace safety and biological hazards are monitored by the CDM Smith SSO. It is also the responsibility of all workers performing CDM Smith operations at SSFL to identify workplace hazards and bring them to the attention of CDM Smith management.

CDM Smith uses a medical consultant to manage the medical surveillance program. The medical consultant will determine the specific content of the examination with concurrence with the CDM Smith H&S director.CDM Smith maintains an H&S database to document and track participation in the medical surveillance program. All medical surveillance exam records are maintained by the medical consultant.

Chemical hazard monitoring is documented by the CDM Smith SSO and is available to CDM Smith personnel upon request. Safety and biological hazards assessments are documented by the CDM Smith SSO, task manager, and CDM Smith safety professionals as required.

Predictive Solutions™ will serve as the communications platform by which field observations identifying existing and potential hazards will be systematically tracked and evaluated against established site expectations and ISMS metrics.

Predictive Solutions™ SafetyNet is a database and communication service that simplifies the collection, analysis, and dissemination of project H&S information. The SafetyNet system employs a user-friendly platform to quickly and efficiently record observations of field activities through the use of a laptop or "smartphone." Field observations are uploaded to the Predictive Solutions™ server and data may then be retrieved and analyzed to assess site H&S performance. The collection of information in this manner allows effective and efficient evaluation of risk indicators, identification of hazards, and prioritization of action items. The following advantages are gained through the use of these services:

- Establishment of baseline H&S performance that predicts unwanted incidents and losses before they occur;
- Field observations are maintained, organized, and communicated in real-time to the project and management teams;
- Performance of categorical trend analyses;
- Customized, preconfigured reporting that may be delivered automatically to any stakeholder;

- Automated follow-up to persons responsible for uncorrected items/corrective actions; and
- Execution of real-time communication, scheduling, and documentation of multiple and varied field operations.

Field observations and input from the work force will be documented and communicated to the project team resulting in safety management in real time.

Observed hazards will be systematically tracked and promptly resolved with an assigned set of parameters detailing persons responsible, corrective action identified, hazard severity, recommendations, and correction due date.

Trending will be performed on collected H&S data to identify leading indicators and risk, and summary reports will be produced to facilitate H&S management.

CDM Smith does not design facilities or modifications of facilities and equipment at SSFL.

Procedures and mechanisms for evaluating operations and procedures to identify workplace hazards are described in Section 5 of CDM Smith's ISMS Description for activities at SSFL.

The job AHA procedure is described in Section 5.2.5 of CDM Smith's ISMS Description, and is summarized as follows.

AHA is a technique and form that focuses on job tasks and identifies hazards before they occur. Focus is placed on the relationships between the worker, the task, the tools, and the work environment. After all existing and potential hazards are identified, steps are taken to eliminate or reduce the hazards. The AHA is a form that documents this information. Examples of when AHAs may be used include drilling, elevated work, sampling, and well inspection. AHAs are to be developed and implemented as new tasks are performed, and existing AHAs will be modified as processes, hazards, or controls are changed.

An AHA will be developed for each CDM Smith site task and will be used as an activity-specific training tool for employees. In addition to job steps, identified hazards, and recommended controls, AHAs will identify the following: monitoring activities, monitoring equipment, established action levels, corrective actions, and persons responsible for safety. AHAs will be reviewed by H&S professionals prior to each task. AHAs will also be reviewed regularly by the H&S Committee for the purpose of continuous improvement.

H&S incident and accident information is compiled and reviewed weekly by CDM Smith H&S management. CDM Smith tracks both OSHA incident rates and interstate Experience Modification Rates.

The interactions of various workplace hazards are considered in the completion, evaluation, and approval of the AHA. Interactions between all workplace hazards will also be assessed through evaluation of the information in Predictive Solutions™ SafetyNet database.

4.2 Closure Facility Requirements

The SSFL Area IV is a closure facility owned and operated by Boeing. CDM Smith is not performing work at SSFL related to design of facilities or modification of facilities, and therefore will not be identifying closure facility hazards.

4.3 Baseline and Subsequent Hazard Assessment

The hazard identification and assessment procedures described in Section 4.1 are to be performed initially to arrive at a baseline evaluation. This information as it relates to CDM Smith site operations will be reviewed by CDM Smith safety professionals and H&S management on a biweekly, monthly, and quarterly basis to maintain protection of workers, the public, and the environment. This process is outlined in Section 5.3.5 of CDM Smith's ISMS Description. Evaluation frequencies may be modified due to changes in site tasks, processes, or hazard controls implemented.

All CDM Smith employees assigned to work on hazardous waste projects, such as CDM Smith's work at SSFL, will be given a pre-assignment physical examination prior to performance of fieldwork. To initiate a pre-assignment hazardous waste physical examination, the direct manager notifies the H&S database administrator via e-mail, memo, or other documented means that an employee is hired or to be assigned hazardous waste work. The H&S database coordinator provides all necessary forms and instructions so that the exam can be scheduled by the employee at a qualified medical facility identified by the medical consultant at a time and location acceptable to the employee.

Employees enrolled in the hazardous waste medical surveillance program must have a periodic exam every 12 to 24 months following the employee's baseline exam. The medical consultant will determine the frequency of examination after he/she reviews the employee's completed periodic medical questionnaire.

Section 5

Hazard Prevention and Abatement

The following sections describe CDM Smith's compliance with 10 CFR 851.22, *Hazard Prevention and Abatement*, during SSFL Task Order activities.

5.1 Process to Prevent or Abate in a Timely Manner

Observed site hazards requiring control or abatement are to be recorded using Preventive Solutions™ SafetyNet as described in Section 4.1 of this WSHP. The field observer will enter the hazard into SafetyNet as an "unsafe" observation, and will then be prompted to include a set of identifying information along with the observation, including:

- Safety category of hazard
- Persons/contractor responsible for correction
- Severity of hazard (e.g., low, medium, high, IDLH)
- Action required
- Comments and recommendations
- Whether hazard has been corrected
- Due date for correction

Observations can be entered into SafetyNet in real time and are immediately available for review by H&S staff and site management. An example of an unsafe observation entry is included below in Figure 5-1.

SafetyNet inspection data is reviewed on a regular basis by CDM Smith H&S professionals. After hazards are identified and analyzed, controls are developed to prevent or abate the hazards in a prompt, timely manner. The controls, documented in SafetyNet, in the AHAs, and any phase-specific HASPs developed for work at SSFL, are based on agreed-upon applicable standards and requirements. Controls and required training specific to hazards are identified and documented in the AHAs and any phase-specific HASPs. The H&S director will review and approve the AHAs and any HASPs.

In documenting and planning for the controls, contingencies for PPEs are identified, if appropriate, even though the primary control is substitution, engineering, or administrative. Hazard controls are presented in Section 5.2.7 of the CDM Smith ISMS Description.

If, during the implementation of the work, new hazards are identified the AHA and HASP will be modified to address the new hazard. Minor administrative changes to an existing AHA or HASP may be made in the field with notification made to the H&S director. This can be done through a formal memo, e-mail, or telephone conversation. Minor changes include changes in personnel, dates and time of work, extending existing tasks, or repeating existing tasks at the same site. Significant changes that may affect the risk analysis of the plan must be reviewed with the H&S director before implementation. Significant changes include upgrading or downgrading levels of PPE not identified on the initial plan, increasing or reducing air monitoring frequencies, discovery of additional contaminants not previously identified, or additional tasks involving intrusive work.

Boeing's standard procedures for communicating and mitigating facility-specific hazards will be considered for the controls implemented by CDM Smith while working at SSFL. The hazard analysis and associated hazard analysis score are the primary criteria used by the ISMS team to evaluate, develop, and implement hazard controls. Elevated hazard analysis scores will receive top priority.

Hazards identified will be prioritized according to the risk presented to workers, with abatement actions implemented accordingly. Interim protective measures will be implemented as necessary to protect workers, the public, and the environment pending any final abatement activities. In all cases, workers will be protected from existing and potential dangerous H&S conditions at the site.

5.1.1 Hazards in Facility Design or Development

CDM Smith is not performing work at SSFL related to design of facilities, modification of facilities, or development of facilities procedures, and therefore will not be identifying facility-related hazards.

5.2 Hazard Control Hierarchy

Hazard controls are developed through the hazard assessment process, AHA evaluations, and any phase-specific HASPs.CDM Smith's ISMS and WSHP achieves hazard mitigation through the following preferred order (i.e., hierarchy) of controls:

A. **Substitution of less hazardous materials, processes, operations, or equipment.** The primary method of hazard control.

B. **Engineering controls.** A primary method of hazard control. Engineering controls are to be considered before implementing administrative controls or PPE.

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.** A tertiary method to mitigate exposure to hazards. Only to be considered when substitution, engineering, and administrative controls are not feasible. Sometimes used on an interim basis until other controls are implemented.

5.3 Purchasing Equipment, Products, and Services

CDM Smith's established procurement process evaluates the potential for introduced hazards when selecting or purchasing equipment, products, and services. The procurement process is reviewed by CDM Smith H&S professionals for the technical services performed at SSFL by CDM Smith and its subcontractors. The supply chain process also enables review of requisitions and vendor H&S documents by CDM Smith H&S professionals.

Equipment, products, and service procedures are incorporated into each AHA developed for CDM Smith operations at SSFL. When new equipment, products, or procedures are introduced, the associated hazards are evaluated and the AHAs are modified accordingly.

Figure 5-1
SafetyNet Observation Example

Section 6

Safety and Health Standards

CDM Smith will comply with the following H&S standards as applicable to SSFL activities: 10 CFR 851, *Worker Safety and Health Program*;

- 10 CFR 835, Occupational Radiation Protection
- 10 CFR 850, Chronic Beryllium Disease Prevention Program
- 29 CFR 1904.4 through 1904.11, 1904.29 through 1904.33, 1904.44 and 1904.46, Recording and Reporting Occupational Injuries and Illnesses
- DOE P 450.4, Integrated Safety Management System Policy
- 29 CFR 1910, Occupational Safety and Health Standards
- 29 CFR 1926, Safety and Health Regulations for Construction
- California Code of Regulations, Title 8, Industrial Relations, and other Titles as applicable
- Ventura County Air Pollution Control District (VCAPCD) Rules and Regulations as applicable
- State of California, Department of Toxic Substances Control, Administrative Order on Consent for Remedial Action
- ACGIH Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices
- ANSI Z88.2, American National Standard for Respiratory Protection
- ANSI Z136.1, Safe Use of Lasers
- ANSI Z49.1, Safety in Welding, Cutting, and Allied Processes
- National Institute of Occupational Safety and Health (NIOSH) Publication No. 8114, Personal Protection Equipment for Hazardous Materials Incidents
- NFPA 70, National Electrical Code
- NFPA 70E, Standard for Electrical Safety in the Workplace
- CDM Smith Injury & Illness Prevention Program
- CDM Smith Project Specific HASPs;
- CDM Smith Project Quality Management Program
- CDM Smith H&S Program as described in CDM Smith's H&S Manual

Section 7
Functional Areas

The following guidelines apply to functional areas of the WSHP during CDM Smith Task Order activities. Additional functional guidelines are contained within CDM Smith's H&S Manual and shall be applied to tasks as necessary.

7.1 Construction Safety

The purpose of CDM Smith's construction safety program is to assure that all work is performed safely and in a manner that protects workers, the public, and the environment. It provides a system for identifying and evaluating potential hazards and implementing a process for controlling them consistent with 29 CFR 1926 and related requirements.

Several techniques and communication channels are utilized to identify, report, and document existing and potential task-related hazards. First and foremost, all CDM Smith and subcontractor employees are encouraged to report identified hazards and potentially unsafe conditions during task operations. Individual employee vigilance and reporting are expected to produce a significant portion of workplace hazard identifications. Implemented techniques of identifying and reporting potential workplace hazards include: regular SSO H&S inspections, periodic management H&S inspections, AHA development and implementation, phase HASP development and implementation, scheduled safety audits, and H&S data trending.CDM Smith site employees are fully empowered to eliminate or mitigate identified deficiencies on-the-spot, which is often the case.

Any identified deficiencies are logged into the Predictive Solutions™ SafetyNet system for evaluation, correction, and tracking on a priority basis. CDM Smith managers, supervisors, and H&S professionals remain heavily involved in the construction safety management process. SafetyNet data, including identified hazards, is available in real time and reviewed on a regular basis by the team to ensure safety performance and prompt, sufficient correction of unsafe conditions at the site.

H&S expectations are formally communicated to CDM Smith subcontractors in contract specifications. Subcontractor construction activities are communicated and evaluated in the same manner as those for CDM Smith employees.

7.1.1 Working Around Heavy Equipment

Good work practices while working around heavy equipment include:

- 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. At CDM Smith projects, 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, workers are required to wear the appropriate class of ANSI high-visibility clothing, in accordance with the requirements of 8 CCR 1590 (a)(5). This includes the required use of an ANSI-Class II safety vest at all times during field activities.

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. Additional clearance shall be maintained in accordance with the requirements outlined below in 8 CCR 2946, Table 2.

Table 2 (8 CCR 2946)

	Nominal Voltage (Phase to Phase)		Minimum Required Clearance (feet)
	600	50,000	10
over	50,000	75,000	11
over	75,000	125,000	13
over	125,000	175,000	15
over	175,000	250,000	17
over	250,000	370,000	21
over	370,000	550,000	27
over	550,000	1,000,000	42

Boom-type lifting or hoisting equipment clearances required from energized overhead high-voltage lines.

Following initial inspections and certification, the operator's competent person (inspector) shall review safety critical drilling related items prior to each day's drilling operations. In addition, the SSO shall review drill rig safety critical items as part of their daily overall H&S inspections.

7.1.2 Working Safely Around Drill Rigs

7.1.2.1 Pre-Mobilization Preparation

- Ensure compliance with OSHA Standard 29 CFR 1926.651(b)(1) by calling or notifying One Call or equivalent to have all utilities within the designated areas of ground disturbance identified and marked. In some cases, ground penetrating radar or magnetometer studies may be needed to identify the location of underground obstructions. If an underground utility is damaged by contractors, the utility in question shall be notified, and then the One Call Center.
- CDM Smith shall retain a copy of the markup ticket for quality control purposes. CDM Smith's Field Team Lead or SSO shall review contractor documentation (e.g., copy of markup ticket) in

order to evaluate whether all assumed utilities have been identified prior to the start of intrusive operations.

- Contract documentation with drillers contracted with CDM Smith shall include CDM Smith's standard contract between "Engineer & Subcontractor for Drilling Services," and "Health and Safety Protocol for Subcontractors" available on the Office of General Council's page of contract forms at http://cdmweb/legalforms/inc.htm.
- Identified hazards and controls shall be included in the AHA for drilling activities, and shall be communicated to all site personnel during initial orientation and ongoing safety training efforts.
- Safe distances from overhead or underground utilities will be confirmed before mobilization.
- The drilling equipment will be operated and maintained in accordance with the manufacturer's operating manual. The operating manual shall be maintained onsite and available for inspection at all times.

7.1.2.2 Drilling Equipment Operator Training

Drilling equipment operators are also required to be licensed to operate such equipment by the State of California. The drilling operator shall submit documentation of their competency and licensing to CDM Smith prior to the start of any related drilling activities. The above requirements shall also apply to operators of Direct Hydraulic Push (DHP) Technology as described in Section 7.1.3.

The use of mechanical drill rigs to collect soil samples and install monitoring wells presents significant hazards to operators and helpers, as well as technicians and engineers who may work in proximity to such rigs. CDM Smith employees that manage or oversee drilling operations shall be aware of the basic hazards of drilling equipment and operations and have an awareness of safe drilling work practices.

Members of the drilling crew shall be trained in the following:

- Operation, inspection, and maintenance of equipment in accordance with the manufacturer's operating manual and in accordance with this WSHP
- Safety features specific to the equipment to be used
- Overhead electrical hazards and underground utilities

7.1.2.3 Drilling Equipment Site Mobilization

Prior to mobilization of drilling equipment onsite, a survey shall be performed to identify overhead electrical hazards, underground utilities, and hazardous agents in the soil.

- The "811" service line shall be contacted to identify and mark underground utilities. Local One Call Centers will then notify the appropriate utility companies of the expected digging plans and arrange for a professional locating crew to mark the approximate location of any lines. A minimum of 72 hours advanced notice will be required to allow sufficient time for the request to be processed. In some cases, additional ground penetrating radar or magnetometer studies may be needed to identify the location of underground obstructions.

- The work area for the drill rig and crew shall be cleared of sticks, logs, brush, and trash. Inspect the area for any potential tripping hazards and remove them. If they cannot be removed, they shall be identified with caution tape or cones.
- Before rig setup, the planned arrangement of equipment shall be such that it does not present a dangerous condition. Take into account slopes of hills, mud, standing water, overhead power lines, etc.
- The equipment operator shall ensure that safe minimum distances are maintained at all times during work, transportation, and non-work activities. The operator shall 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. Additional clearance shall be maintained in accordance with the requirements outlined below in 8 CCR 2946, Table 2.

Table 2 (8 CCR 2946)

	Nominal Voltage (Phase to Phase)		Minimum Required Clearance (feet)
	600	50,000	10
over	50,000	75,000	11
over	75,000	125,000	13
over	125,000	175,000	15
over	175,000	250,000	17
over	250,000	370,000	21
over	370,000	550,000	27
over	550,000	1,000,000	42

- If working in an area of moving vehicular traffic, appropriate traffic control systems shall be in place. Contact local police or traffic control officer before placing any traffic control equipment.
- Do not move the rig with the mast in the upright position.
- Use a spotter when moving the rig from one location to another on the site.

7.1.2.4 Drilling Equipment Set-up

- Boring locations shall be placed to minimize the possibility of contacting underground utilities or structures. Clearance shall be obtained from the site PM before drilling begins.
- Define an exclusion zone around the drill rig that is at least 1.5 times the height of the mast. Only personnel necessary for the immediate task being performed shall be inside the exclusion zone.
- Drilling equipment shall be inspected daily by the operator for operability, hydraulic leaks, frayed cables, cracked push rods, exhaust systems, cleanliness, etc., and documented in an appropriate format such as a critical checklist. The SSO shall verify such inspections are performed and record this verification using the Predictive Solutions™ SafetyNet system.
- Drilling equipment shall be equipped with two easily accessible emergency shutdown devices.
- Drilling equipment shall be set up on stable ground and maintained in a level position.
- Outriggers shall be extended per the manufacturer's recommendation.

- After the rig is set up, but before operation, the work area shall be inspected for eye, bump, and tripping hazards.
- If drilling equipment is parked or disabled on a highway, roadway, or adjacent shoulder, yellow flashing lights and other traffic warning devices (cones, flags, signs, etc.) per 49 CFR 571.5 shall be used during the daytime and reflectors, flares, electric lights, or other effective means of identification shall be used at night.

7.1.2.5 Drill Rig Inspection

The driller shall inspect the rig initially and daily before operation of the rig. Prior to initial use onsite, each piece of drilling equipment, DHP or otherwise, shall be inspected and tested in accordance with the manufacturer's recommendations and in accordance with this WSHP.

Following initial inspections and certification, the operator's competent person (inspector) shall review safety critical drilling related items prior to each day's drilling operations. In addition, the SSO shall review drill rig safety critical items as part of their daily overall H&S inspections.

The above inspections shall consider the following:

- Condition of the vehicle. Brakes shall work and tires shall have adequate tread. It shall have a back up alarm.
- Vehicles shall have all necessary brake lights, headlights, horn, license plates, etc.
- All welds shall be solid, with no sign of visible cracks.
- All gauges shall be functional and legible.
- All machine guards shall be in place.
- Emergency kill switches shall be functional. All site personnel shall be aware of the location and function of the kill switches. The driller shall review these with site personnel.
- Cable and wire rope shall be inspected for fraying, decay, "bird caging," broken strands, kinking, or flattening.
- All hoses shall be secure and in good shape. They shall not be loose, bulging, or leaking.
- High-pressure fittings shall be secure and have whip checks (a pin or wire to prevent the hose whipping in the event of a failure of the connection).
- High-pressure relief valves shall be in working order.
- Wire rope loops shall be secure with at least two clamps.
- The rig shall have a fire extinguisher and first aid kit.
- All tools shall be clean and in good working condition. Hooks, eyes, pins, etc. shall not be corroded or bent. Rod clamps shall be in good condition.
- If a cathead is used, it shall be clean and free of burrs. The cathead rope shall be in good condition and not be frayed or have excessive wear.

- Back-up alarms shall be functional.
- Vehicles shall have all lug nuts and they shall all be tight.

7.1.2.6 Drilling Equipment Operation

- Monitor weather conditions. Drilling operations shall be terminated and the area near the drill rig evacuated during high winds and or storms with the potential for lightning strikes. The lead driller shall be consulted to help assess if weather conditions are safe for drilling.
- Drill crew members shall not wear loose clothing, equipment, or jewelry that might become caught in moving machinery.
- All personnel working around drilling operations shall wear appropriate PPE including a hard hat, safety glasses, and hard-toed work boots.
- Drill crews shall wear appropriate work gloves.
- Hearing protection shall be worn during operations that produce significant noise exposures. (If you cannot hold a conversation using a normal voice with someone within 3 feet of you because of background noise, the use of personal hearing protection is recommended.)
- In areas where there is vehicular traffic, personnel shall also wear high-visibility vests or clothing.
- The drilling equipment operator shall verbally alert site personnel and must visually confirm that personnel are clear from dangerous parts of equipment before starting or engaging equipment.
- Hoists shall only be used for their designated intent and shall not be loaded beyond their rated capacity. Steps shall be taken to prevent two-blocking of hoists.
- The equipment's recommendations shall be followed if rope becomes caught in, or objects get pulled into, a cathead.
- Drill rods shall not be run or rotated through rod slipping devices. No more than 1 foot of drill rod column shall be hoisted above the top of the drill mast. Drill rod tool joints shall not be made up, tightened, or loosened while the rod column is supported by a rod-slipping device.
- Dust shall be controlled at all times.
- Augers shall be cleaned only when the rotating mechanism is in neutral and the auger stopped. Long handled shovels shall be used to remove cuttings from the auger.
- Open boreholes shall be capped and flagged.
- Heavy equipment will be kept in the exclusion zone until the work or shift has been completed and it has been properly decontaminated.
- Personnel will not consume or be under the influence of alcoholic beverages, medication, or drugs while operating heavy equipment. The presence of intoxicating substances onsite is strictly prohibited.

- Work area will be kept clear of obstructions and debris.
- Heavy equipment will not be left running or unattended.
- Drill and samplers will not be left unsecured, balanced across the drill rig, or leaning onto the drill rig.
- Prior to raising a mast, personnel will look overhead and will not move the truck with a mast extended.
- Drill crew personnel shall wear a personal fall arrest harness, connected to a secure tie-off point, when climbing the mast or working where fall exposures exceed 6 feet.

7.1.2.7 Sampling Crew Work Practices

- When sampling activities require working in proximity with heavy equipment or drill rigs, sampling personnel will stand clear of the equipment until sampling is required. They will notify the operator they are going to take a sample and must receive acknowledgment from the operator.
- Drill and samplers will not be left unsecured, balanced across the drill rig, or leaning onto the drill rig.

7.1.3 Working Safely with Direct Hydraulic Push Technology

These guidelines apply to the use of direct hydraulic push (Geoprobe™ or similar) technology during site investigations. In addition to the safety precautions listed below, the equipment shall be operated and maintained according to the manufacturer's instructions.

7.1.3.1 Pre-Mobilization Preparation

- DHP operations are subject to the contract requirements for drill rigs, described in Section 7.1.2.
- The probe rig shall be equal to the task. Hiring a contractor who uses a pneumatic hammer, when direct hydraulic push is more appropriate, requires unacceptable compromises on safety.

7.1.3.2 Direct Hydraulic Push Operator Training

DHP operations are subject to the training requirements for drill rigs, described in Section 7.1.2.

7.1.3.3 Direct Hydraulic Push Site Mobilization

DHP operations are subject to the site mobilization requirements for drill rigs, described in Section 7.1.2.

7.1.3.4 Direct Hydraulic Push Equipment Set-up

DHP operations are subject to the equipment set-up requirements for drill rigs, described in Section 7.1.2.

7.1.3.5 Direct Hydraulic Push Rig Inspection

The driller shall inspect the rig daily before operation of the rig. The inspection shall include the following:

- Condition of the vehicle. Brakes shall work and tires shall have adequate tread. It shall have a back-up alarm. If it is driven over the road, it shall have all necessary brake lights, headlights, horn, license plates, etc.
- All welds shall be solid, with no sign of visible cracks.
- All gauges shall be functional and legible.
- All machine guards shall be in place.
- Emergency kill switches shall be functional. All site personnel shall be aware of the location and function of the kill switches. The driller shall review these with site personnel.
- All hoses shall be secure and in good shape. They shall not be loose, bulging, or leaking.
- High-pressure fittings shall be secure and have whip checks (a pin or wire to prevent the hose whipping in the event of a failure of the connection).
- High-pressure relief valves shall be in working order.
- The rig shall have a fire extinguisher and first aid kit.
- All tools shall be clean and in good working condition. Hooks, eyes, pins, etc. shall not be corroded or bent. Rod clamps shall be in good condition.
- Back-up alarms shall be functional.
- Vehicles shall have all lug nuts and they shall all be tight.

7.1.3.6 Direct Hydraulic Push Rig Operation

- Monitor weather conditions. DHP operations shall be terminated and the area near the drill rig evacuated during high winds and or storms with the potential for lightning strikes. The lead operator shall be consulted to help assess if weather conditions are safe for drilling.
- DHP crew members shall not wear loose clothing, equipment, or jewelry that might become caught in moving machinery.
- All personnel working around DHP operations shall wear appropriate PPE including a hard hat, safety glasses, and hard-toed work boots.
- Drill crews shall wear appropriate work gloves.
- The drill rig shall be operated by one person at a time, including assembly and disassembly of probe rod and accessories. Other field personnel shall stay clear of the probe and vehicle while the probe is in operation, being assembled, or disassembled. This is to ensure the unit is not inadvertently engaged while the operator's hands, fingers, or feet are touching or near moving parts.
- Keep feet clear of the probe as it descends.
- Do not place hands on top of probe rod while the rod is under the probing machine.

- The hydraulic system shall be turned off at the control panel when changing probe rods, inserting the hammer, anvil, or attaching any accessories.
- Do not exert downward pressure on the probe to lift the probe foot over 6 inches off the ground.
- Always take the carrier vehicle out of gear and set the emergency brake before starting the push unit up.
- Always extend the probe unit out from the carrier vehicle and deploy the foot to clear the vehicle roofline before folding the probe unit out.
- The operator shall stand to the control side of the probe machine and stay clear of the probe foot and derrick while operating the controls.
- Do not exert downward pressure on the probe so that the carrier vehicle tires lift off the ground. Reducing the load on the carrier vehicle may allow the vehicle to shift or slide unexpectedly.
- Be aware that the carrier vehicle's catalytic converter may be hot and has the potential to be a fire hazard if the vehicle is parked over combustible material such as dry leaves, grass, etc.
- The hydraulic system shall be shut down and the vehicle engine stopped before attempting to clean or service the probe.
- Use extreme caution when using the machine while it is parked on loose, soft, or uneven surfaces.

7.1.3.7 Sampling Crew Work Practices

DHP operations are subject to the sampling work crew site requirements for drill rigs, described in Section 7.1.2.

7.1.4 Traffic and Work Zone Safety

These guidelines apply whenever CDM Smith employees or subcontractors work in areas exposed to vehicular traffic on public streets or highways.

- All necessary traffic and work zone controls shall be developed and implemented in accordance with established DOE and Boeing site protocol.
- Where vehicular traffic hazards exist because of work at locations near public streets or roads, a system of traffic and work zone controls should be developed to mitigate the hazard. The system should meet the requirements of Part 6 of the Manual of Uniform Traffic Control Devices (MUTCD) published by the Federal Highway Administration, or the applicable state version of the MUTCD.
- In general, when the MUTCD allows the use of traffic safety direction devices, such as cones, CDM Smith will 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 or near vehicular traffic should wear high-visibility clothing such as orange, yellow, or yellow-green shirts, jackets, or vests. During wet or inclement weather, similarly colored rainwear should 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 should meet ANSI standard #107 for High Visibility Safety Apparel.
- 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 some drivers may not pay attention, and vehicles may still enter the work zone.

7.1.5 Excavation

For the protection of all persons involved with all CDM Smith projects, the following excavation rules apply:

- Before excavation work begins, a trenching and excavation notice shall be obtained from CDM Smith. A separate permit must be obtained for each excavation.
- The "811" service line shall be contacted to identify and mark underground utilities. Local One Call Centers will then notify the appropriate utility companies of the expected digging plans and arrange for a professional locating crew to mark the approximate location of any lines. A minimum of 72 hours advanced notice will be required to allow sufficient time for the request to be processed. In some cases, additional ground penetrating radar or magnetometer studies may be needed to identify the location of underground utilities.
- Construction of trenches or excavations that are 5 feet or deeper and into which a person is required to descend require a construction activity permit per the California Department of Industrial Relations.
- 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.
- 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 excavated and available material shall be retained 2 feet or more from the edge of the excavation.
- All excavations shall be barricaded with the appropriate barrier tape and other protective devices as required.
- When entering an excavation that may be considered a hazardous environment by site safety representatives, proper PPE must be worn.

- Full compliance with 29 CFR 1926.650 through 652 is required.
- Full compliance with Title 8 of the CCR, Construction Safety Orders, specifically 8 CCR § 1539 through 1543 is required (California operations only).

7.2 Fire Protection

For the protection of all persons involved with all CDM Smith projects, the following rules apply for use of flammable and combustible liquids:

- "Danger" and "No Smoking" signs shall be posted around all flammable and combustible liquid storage areas.
- All aboveground tanks shall have adequately sized concrete containment, such as slab and walls, to contain spills.
- Tanks shall be vented with a pipe not less than 13-inch inside diameter and shall be 12 feet high from the adjacent ground level.
- Portable fire extinguishers shall be provided, inspected monthly, and maintained as specified in NFPA 10. Records shall be kept on a tag or label attached to the extinguisher, on an inspection check list maintained on file, or by an electronic method that provides a permanent record. The date the inspection was performed and the initials of the person performing the inspection shall be recorded.
- CDM Smith and subcontractor fire extinguishers will be inspected by the SSO regularly and documented via SafetyNet.
- Tanks shall be kept 20 feet from buildings.
- All tanks shall be properly grounded.
- All tanks shall be labeled with the contents and owner's name.
- For the protection of all persons involved with the construction of all CDM Smith projects, the following rules apply around the use of heaters:
  - All temporary heating devices must be approved prior to use on the jobsite.
  - Heaters shall be kept at least 20 feet from buildings and other combustible items.
  - Job-made heaters, solid fuel salamanders, and open fires are prohibited on the jobsite.
- Personnel shall avoid driving, parking, or idling project vehicles or gas-powered construction equipment on dry grass, brush, or other potentially combustible materials. Exhaust systems can reach a temperature of more than 1,000 degrees Fahrenheit; it only takes about 500 degrees to start a brush fire. Personnel shall survey work locations prior to mobilization of equipment to ensure sufficient suitable areas for running of equipment.

7.2.1 Flammable and Combustible Liquids

Combustible material hazards may include materials near ignition sources (hot motor or exhaust system), and transfer and storage of flammable or combustible liquids (if a generator or other portable fueled equipment is used).

Flammable material/Underwriter's Laboratory (UL)-approved flammable liquid containers, labeled with the contents, will be used to store fuel. All fuel containers will be stored at least 15 meters (50 feet) from any facilities and ignition sources or stored inside an approved flammable storage cabinet.

"NO SMOKING" signs will be posted in refueling areas and on fuel storage tanks.

Avoid parking vehicles in area of tall dry grass or other potentially combustible material.

7.3 Firearms Safety

Firearms safety requirements per 10 CFR 851 are not applicable to CDM Smith operations at SSFL. Firearms are expressly forbidden at any CDM Smith worksite.

7.4 Explosives Safety

Explosives safety requirements per 10 CFR 851 are not applicable to CDM Smith operations at SSFL.

7.5 Pressure Safety

CDM Smith operations at SSFL are not expected to contain work on pressure systems, equipment, or related designs.

7.6 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.

- 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 should wire or install electrical systems.
- Ground fault circuit interrupters (GFCIs) should 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 should be used (available from the equipment center).
- Do NOT use your finger or any conductive object to touch 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, should 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 must be grounded with a three-wire circuit. Explosion-safe (explosion-proof or intrinsically safe) tools are required in hazardous areas.

Use the following precautions 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 cardiopulmonary resuscitation (CPR) (if you are qualified) and get medical help.

- Ensure compliance with NFPA 70, National Electrical Code, including NFPA 70E, Standard for Electrical Safety in the Workplace.

CDM Smith operations at SSFL are not expected to involve work on electrical systems. All work involving electrical equipment, performed by CDM Smith or its subcontractors, shall be in compliance with the regulations listed in 10 CFR 851.23, including, but not limited to, 29 CFR 1926, NFPA 70, and NFPA 70E.

7.7 Industrial Hygiene

7.7.1 Respiratory Protection

Respiratory protection is not anticipated to be required during these Task Order activities. Should conditions change, CDM Smith H&S personnel will reevaluate the need for respiratory protection and the types of equipment needed. Types of conditions that may necessitate changes in required respiratory protection include, but are not limited to: contaminant concentrations above air monitoring action levels, observances of increased contaminant levels or new contaminants, and the inability of engineering controls to maintain exposures below prescribed action levels. Action levels and air monitoring details are provided in the Phase 3 HASP. The following section is provided for reference purposes in the event that PPE requirements are upgraded to include respiratory protection.

To protect the health and safety of CDM Smith employees and subcontractors, an awareness of the proper selection, use, and maintenance of respiratory protective devices is needed. These guidelines are applicable to all employees performing duties requiring the use of respiratory protection.

7.7.1.1 Definitions

Some commonly used terms utilized when describing respiratory devices and agents are described in the following list:

- **Approved** – Tested, and listed as satisfactory by the NIOSH or the Mine Safety and Health Administration (MSHA)
- **Contaminant** – A harmful, irritating, or nuisance material in concentrations exceeding those normally found in the ambient air
- **Disinfections** – The destruction of pathogenic organisms, especially by means of chemical substances
- **IDLH** – An atmospheric concentration of any toxic, corrosive, or asphyxiate substance that poses an immediate threat to life, would cause irreversible or delayed adverse health effects, or would interfere with an individual's ability to escape from a dangerous atmosphere
- **Oxygen-Deficient Atmosphere** – An atmosphere containing 19.5 percent or less of oxygen by volume
- **Particulate Matter** – A suspension of fine solid or liquid particles or fibers in air such as dust, fog, fume, mist, smoke, or sprays
- **Pneumoconiosis-Producing Dust** – Dust that when inhaled, deposited, and retained in the lungs may produce signs and symptoms of pulmonary disease

- **Respirator** – An approved device designed to provide the wearer with respiratory protection against inhalation of a contaminated atmosphere and, for some devices, oxygen-deficient atmospheres
- **Vapor** – The gaseous state of a substance that is solid or liquid at an ordinary temperature and pressure
- **Dusts** – Solid particles, mechanically produced, with a size ranging from submicroscopic to macroscopic
- **Fumes** – Solid particles generated by condensation from the gaseous state, generally after volatilization from molten metals, with a size usually less than one micrometer in diameter
- **Mists** – Suspended liquid droplets generated by condensation or by breaking up of a liquid with a size ranging from submicroscopic to macroscopic
- **Gases** – Substances that are gaseous at ordinary temperature and pressures

7.7.1.2 General Requirements

Respirators will be considered an acceptable method of protecting the health of CDM Smith personnel only under the following circumstances:

- When it has been determined that there are no feasible engineering or work practice controls that can be used to adequately control the hazard
- During intermittent, non-routine operations
- During interim periods when engineering controls are being designed or installed
- During emergencies
- As part of a safety procedure where a possibility for an excessive or potentially hazardous condition has been defined
- When the site atmosphere contains at least 19.5 percent and not more than 23.5 percent oxygen
- When contaminants of concern, which must be discernible by the wearers, have warning properties below permissible exposure limits or threshold limit values, or the selected respirator provides the proper level of protection for reasonable anticipated exposure levels

The multiplicity of hazards that may exist in a given operation requires a careful and intelligent respirator selection. The selection is made complex by the many types of respirators available. Each type has its special limitations, application, operational, and maintenance requirements. For these reasons it is important that the individual responsible for the respiratory program is trained and knowledgeable in the basic principles of respiratory selection and use.

The standards governing the development of this program include but are not limited to the following:

- ANSI, Practices for Respiratory Protection, Z88.2-1992
- OSHA, Respiratory Protection, 29 CFR 1910.134

7.7.1.3 Medical Surveillance

Employees will not be assigned to tasks requiring the use of respiratory protection unless they have been determined to be physically able to wear such equipment in accordance with the Medical Surveillance Program described in Section 10 of the CDM Smith Health and Safety Manual.

7.7.1.4 Selection of Respiratory Protective Devices

Selection of respiratory protective devices for projects that require the use of such PPE is performed during the generation of the AHAs and HASPs, as described in Section 8 of the CDM Smith Health and Safety Manual. When selecting the correct respiratory protective devices, there are several factors that must be considered, including the following:

- **Nature of the Hazard.** Before selecting a respirator, the nature of the inhalation hazard must be identified. Oxygen deficiencies, physical hazards, chemical properties, movement and work rate limitations, and actual chemical concentrations and warning properties are all factors that must be considered.
- **Nature of Operation.** The details of the actual operation or process creating the hazard are important in selecting appropriate respiratory protection.
- **Respirator Capabilities and Limitations.** There are limitations associated with each type of respiratory protection devices. These limitations are discussed in Table 7-2.
- **Responsibility of Correct Selection.** The CDM Smith H&S director is responsible for the correct selection of respiratory protective devices. Generally speaking, when Level C personal protective equipment is required, it will consist of a full-face respirator with an MSA GMC-H (GMC P100), NIOSH approval number TC-23C-1283 cartridge, or equivalent. When supplied air respirators are required, they will be equipped with emergency escape bottles.

See Table 7-1 for a description of protection factors used in the selection process.

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 face piece	100
• High-efficiency particulate filter respirator with a half face piece	10
II. Chemical Cartridge and Gas Masks	
• Powered air-purifying respirator with chemical cartridge (full-face)	1,000
• Chemical cartridge respirator with a full face piece	100
• Half-mask chemical cartridge respirator	10
III. Combination Particulate and Gas/Vapor Air Purifying	
• Powered air-purifying respirator with chemical cartridge and high efficiency particulate filer (full-face)	1,000
• Chemical cartridge respirator with a full face piece, chemical cartridge, and filter	100
• Half-mask chemical cartridge respirator with a chemical cartridge and filter	10

Table 7-1 - Respiratory Protection Factors*

Respirator	Protection Factor
IV. Supplied-Air Respirators	
• Type C supplied-air respirator with a full face piece operated in pressure-demand or other positive pressure mode, or with full face piece, helmet, or hood operated in continuous flow	1,000
• Type C supplied-air respirator without full face piece, helmet or hood, operated in pressure-demand or other positive pressure or continuous flow mode	1,000
• Supplied-air respirator with full face piece helmet, or hood not operated in positive pressure or continuous mode	50
• Any other supplied-air respirator	10
V. Self-Contained Breathing Apparatus	
• Combination respirator including a Type C supplied-air respirator with a full face piece 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 face piece operated in pressure-demand or other positive mode	10,000
• Self-contained breathing apparatus with a full face piece operated in demand mode	50
• Self-contained breathing apparatus without a full face piece	10

Footnote:
**Adapted from ANSI Z88.2-1992*
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., (permissible exposure limit) x (permissible factor) = maximum use concentration].

Table 7-2 - Respiratory Protection Devices

General Description	Limitations	CDM Smith Requirements
Air Purifying Respirators		
A half-mask or full face piece respirator equipped with air purifying units to remove gases, vapor, and particulate matter from the ambient air prior to its inhalation. Some air purifying respirators are power-operated and provide respirable air to the face piece (or hood) under a slight positive pressure.	They do not protect against oxygen deficient (<19.5%) atmospheres or atmospheres that are 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. They 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 an MSA GMC-H (GMC P100) , NIOSH approval number TC-23C-1283, cartridge or equivalent. Alternative respirators and cartridges must be approved by the H&S director.
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 air line or while wearing an air cylinder.	Self contained breathing apparatus will be pressure-demand types of devices, and where appropriate, equipped with an emergency escape bottle.

7.7.1.5 Training

Respirators will not be issued to employees who have not been adequately trained in their use. At a minimum, all employees and supervisory personnel who may be required to wear respiratory protective devices will receive training in the following:

- Problems associated with improper respirator usage
- The nature of hazards associated with airborne contaminants
- The capabilities and limitations of respirator types
- The proper care, use, and maintenance of respirators
- The performance of positive and negative field fit checks each time respiratory protection is donned; this includes the importance of the face piece-to-face seal and of not using respirators when a good seal is not achievable
- Understanding that parts from different respirators are not interchangeable
- How to properly inspect respiratory protective devices prior to use
- Successful completion of a fit test for the specific respirator that is to be used

Documentation of training is completed for each individual and maintained in the CDM Smith training tracking system.

7.7.1.6 Fit Testing and Field Checks

Fit testing will be performed on all employees assigned to project work that may require the use of respiratory protective devices. Testing will be performed by the H&S director or another trained and qualified individual in accordance with accepted fit test procedures. Documentation of fit testing is completed for each tested employee and maintained in the CDM Smith training tracking system. Positive and negative pressure field checks are performed immediately prior to use.

All respirators are inspected before and after use. Respirators stored for emergency use only are inspected monthly. Inspections generally cover the following elements:

- Condition of face piece, connecting tubes, cartridges, and straps.
- Condition of the lens. Lenses shall be free of scratches and seated tightly in retainers.
- Flexibility of all rubber parts. Deteriorated pieces shall be replaced.
- Condition of all valves. Exhalation and inhalation valves are to be checked to ensure correct seating.

Self-contained breathing apparatus (SCBA), air cylinder charges, regulators, and warning devices are to be inspected prior to use by individuals trained to perform these inspections. For units stored for emergency use, these inspections are to occur at least monthly.

7.7.1.7 Use, Maintenance, and Care

Employees are not assigned to tasks requiring the use of respiratory protection unless they have been determined to be physically able to wear such equipment, have been trained, and have completed a successful fit test. Once approved, the following rules must be followed:

- Employees requiring the use of respirators must be clean-shaven. Additionally, anything that interferes with the face piece-to-face seal such as glasses, long hair, or skullcaps, will not be permitted when respirators are required.

- All respirators and cartridges are to be NIOSH/MSHA approved.
- Maintenance on respirators is to be performed only by the H&S director or a designate. Only approved replacement parts will be used in respirator repair. Maintenance on SCBA will only be performed by individuals certified by the manufacturer.
- Respirators assigned to and worn by one individual will be cleaned and sanitized after each use. Extreme care is to be taken during the cleaning process to prevent damage from handling.

When not in use, respirators will be stored to protect them from physical damage, sunlight, extreme temperatures, and excessive moisture.

7.7.1.8 Breathing Air

When used, breathing air will be Grade D or better as per the specifications described by ANSI.

7.7.2 Radiation Protection

Radiation protection is discussed in Section 7.11 of this WSHP.

7.7.3 Hazardous Waste Site Control

The following controls are to be followed when performing activities involving exposure to hazardous waste materials.

The migration of contaminants will be prevented or reduced by delineating zones at the site where prescribed operations occur. These zones may be contiguous or non-contiguous based on conditions and activities conducted at the site. Movement of personnel and equipment between zones and onto the site itself will be limited by access control points. By these means, contamination would be expected to be contained within relatively small areas on the site to minimize its potential spread. The contiguous zones used for site operations are:

- Zone 1 – Exclusion Zone
- Zone 2 – Contamination Reduction Zone (CRZ)
- Zone 3 – Support Zone

The SSO will be responsible for delineating these zones based on site conditions and activities.

The outer boundary of the exclusion zone shall be well marked by the use of barrier tape and/or cones and can be adjusted as needed. The exclusion zone can be expanded or reduced by the SSO. All people entering the exclusion zone must wear the level of protection specified by the SSO.

During drilling activities, where feasible, an exclusion zone will be constructed to include a distance of 1.5 times the drill rig's mast height in any direction.

The CRZ provides a transition area between hazardous and clean and/or safe areas. The CRZ can serve as a decontamination area for equipment, supplies, and personnel. It provides additional assurance that the physical transfer of contaminating substances on people, equipment, or in the air is limited through a combination of decontamination, distance between exclusion and support zones, air dilution, zone restrictions, and work functions. The CRZ can also be used for packaging and preparing samples for shipment and as a temporary rest area.

The support zone is considered a clean zone; therefore, potentially contaminated personal protective clothing, equipment, and samples will not be permitted. Normal work clothes are appropriate attire within this zone. The support zone can also serve as a command post, medical station, equipment and supply center, and administrative center for field sampling activities.

The location of facilities in the support zone depends on a number of factors, including:

- Accessibility, topography, open space availability, or other limitations.
- Wind direction. Preferably the support facilities should be located upwind of the exclusion zone; however, shifts in wind direction and other conditions may be such that an ideal location based on wind direction alone does not exist. In this case, a greater distance from the exclusion zone may be required.

The possibility of exposure or translocation of substances will be reduced or eliminated in a number of ways, including the following:

- Setting up physical barriers (as necessary) to exclude unnecessary personnel from the general area. Delineate areas by flagging, warning tape, or equivalent. Only authorized personnel will be permitted beyond the support zone.
- Minimizing the number of personnel and equipment onsite consistent with effective operations.
- Establishing work zones within the site.
- Conducting operations in a manner to reduce the exposure of personnel and equipment and to eliminate the potential for airborne dispersion.
- Implementing appropriate decontamination procedures.
- Ensuring that onsite personnel meet medical, respirator fit test, and training requirements.

7.7.3.1 Personal Hygiene

- Eating, drinking, and chewing gum or tobacco will only be permitted outside the work zone.
- All personnel will wash hands prior to eating or leaving the site.
- Smoking is not permitted anywhere on the site.
- Before initiating any non-routine operation, personnel must consult the SSO about H&S requirements for that operation.

7.7.4 Hazardous Waste Site Decontamination Procedures

The following decontamination procedures are to be followed when performing activities involving exposure to hazardous waste materials.

7.7.4.1 Personal Decontamination

Personnel will remove required protective clothing and wash hands, arms, and face with tap water and anti-microbial detergent. Hands and face will be washed prior to any eating or drinking. Plastic sheeting from decontamination area and disposable protective clothing will be treated as a solid, hazardous waste and will be disposed of as investigation-derived waste (IDW).

7.7.4.2 Prevention of Contamination

To prevent contamination, crew members should:

- Follow procedures for proper dressing prior to entry into the exclusion zone. Proper dressing will minimize the potential for contaminants to bypass the PPE and escape decontamination.
- Protect monitoring and sampling instruments by bagging in Ziplock™ or similar plastic bag. Make openings in the bags for sample ports and sensors that must contact site materials. Another option is to cover equipment and tools with a strippable coating, which can be removed during decontamination.
- Encase any source of contaminants on the site with barriers (e.g., plastic sheeting or over packs).
- No eating, drinking, chewing gum or tobacco, smoking, application of cosmetics, including application of lip balm, sunscreen, or insect repellant is allowed in the exclusion zone.
- Sitting or kneeling in areas of high concentrations of contaminants should be avoided.
- If any PPE becomes defective, the employee should leave the work area via the designated egress area, decontaminate as needed, and replace the defective PPE before returning to work in the exclusion zone.

7.7.4.3 Sample Equipment Decontamination

All sampling equipment will be thoroughly decontaminated between samples using the process described in CDM Smith's Health and Safety Manual.

7.7.4.4 Heavy Equipment Decontamination

Drill rigs, trucks, and other heavy equipment can be difficult to decontaminate. The method generally used is to spray them with water under pressure and scrub accessible areas with soap and warm water. Particular care should be taken where equipment comes into direct contact with contaminated soils such as tires, buckets, or treads. Equipment should be visually inspected to be sure it is free of any visible signs of contamination.

7.7.4.5 Decontamination Solutions, Disposable PPE, and Site Waste

Disposable PPE, disposable sampling equipment, brushes, buckets, waste decontamination solutions, and other potentially contaminated equipment should be secured in drums and labeled. Disposal methods for these materials may depend on client requirements and/or results of site investigation data. The confirmed presence of hazardous materials on the site will require disposal of IDW as hazardous wastes. Extreme care is required when dealing with IDW disposal.

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

7.7.5 Occupational Exposure Monitoring

Occupational H&S monitoring of exposure to hazardous chemicals during CDM Smith operations at SSFL is performed by the CDM Smith SSO or their designee. CDM Smith workers may request to see the results of this monitoring at any time.

Details regarding the frequency and types of air monitoring to be performed, equipment to be used, and the methods of maintenance and calibration, per 8 CCR 5192 (b)(4)(B)(5), are included in the Phase 3 HASP.

7.8 Occupational Medicine

7.8.1 Purpose and Scope

CDM Smith administers an occupational medical surveillance program for the following activities:

- Hazardous waste operations
- Activities that require the use of respiratory protection beyond the use of "loose fitting dust masks"
- Project-specific activities or job assignments that may expose employees to hazards where medical surveillance is required by regulation or it has been determined by the H&S director that a project-specific medical evaluation program or biological monitoring is warranted
- As requested by a client

The occupational medical surveillance program is designed and overseen by a board-certified occupational physician. The medical surveillance program is intended primarily to monitor an employee's fitness for duty and is not intended for the diagnosis or treatment of injury or illness. The functions of the medical surveillance program include:

- Establishing a baseline medical condition prior to project or job assignment
- Monitoring the employee's physical ability to perform assigned job functions
- Identifying the presence or absence of conditions that could be aggravated by the type of work assigned
- Monitoring health trends during hazardous waste and other designated project assignments
- Establishing a medical condition at time of termination or post assignment

In addition, medical exams or evaluations of employees may be provided in the following circumstances:

- Employment-related injuries or illnesses
- Exposures to toxic or hazardous substances
- Medical clearance to return to work

7.8.2 Responsibilities

- **Health and Safety Director** – The H&S director selects and monitors performance of medical contractors and oversees CDM Smith administration of the program.
- **Direct Managers** – Direct managers ensure employees participate in the medical surveillance program when required by project assignment and notify the H&S director of employee termination or reassignment requiring an exit physical examination.

- **Site Safety Officer** – SSOs or their designees coordinate medical appointments and maintain employee medical clearance forms for their office(s).
- **Medical Consultant** – The medical surveillance consultant identifies qualified clinics, medical facilities, and maintains employee medical records. The medical consultant provides the services of a board certified occupational physician to advise on recommended medical protocols, provide medical opinions regarding employee fitness for duty, and provide medical advice as requested.
- **Employees** – Employees selected for activities that include participation in a medical surveillance program are responsible for participating in the program by attending assigned appointments and maintaining their medical qualifications.

7.8.3 Hazardous Waste Medical Surveillance

7.8.3.1 Pre-Assignment Medical Examination

All employees assigned to work on hazardous waste projects will be given a pre-assignment physical examination prior to performance of fieldwork. To initiate a pre-assignment hazardous waste physical examination, the H&S director or direct manager shall notify the H&S database administrator via e-mail, memo, or other documented means that an employee is hired or to be assigned hazardous waste work. The H&S database coordinator will provide all necessary forms and instructions so that the exam can be scheduled by the employee at a qualified medical facility identified by the medical consultant at a time and location acceptable to the employee. Typical content of the exam is given in Table 7-2. The medical consultant will determine the specific content of the examination with concurrence with the H&S director.

7.8.3.2 Periodic Hazardous Waste Medical Exam

Employees enrolled in the hazardous waste medical surveillance program must have a periodic exam every 12 to 24 months following the employee's baseline exam. The medical consultant will 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 7-3. Additional exam elements listed at the bottom of Table 7-3 may be included by the H&S director, or as deemed medically indicated by the examining physician based on the employee's work history.

Table 7-3 - 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 director 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

On or before the first anniversary of any physical exam, the employee will be asked to complete a form to help the medical consultant determine if the employee needs a physical exam, or may be granted a 12-month extension before the next physical. If a determination is made by the occupational physician, based on the employee's work history, a full exam is not needed after 12 months. However, if the employee is expected to use a negative pressure respirator they will need to have a medical release to wear a respirator as described in Section 7.7.1, Respiratory Protection.

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
- At the discretion of the H&S director or medical consultant
- When an employee experiences signs or symptoms of exposure to a toxic or hazardous material and requests an exam

7.8.3.3 Hazardous Waste Exit Exam

When the direct manager learns that an employee in the hazardous waste medical surveillance program is permanently reassigned to non-hazardous waste work or terminates employment, they shall notify the H&S director. The H&S director will coordinate to ensure an exit examination is scheduled. The employee will be scheduled to take an exit physical exam unless the employee has completed the exam waiver form and the following criteria have been met:

- The employee has had a periodic physical exam within the prior 6 months.
- The employee has not participated in work that could produce potential exposure to toxic or hazardous materials.
- The employee has had no signs or symptoms of exposure since the employee's last physical examination.

Or

- The employee refuses to participate in an exit examination. If the employee refused to participate in an exit physical examination, appropriate documentation should be generated for that employee's personnel record by the employee's direct manager or H&S director.

The typical content of the exit exam is listed in Table 7-3.

7.8.3.4 Respirator Medical Qualification

Employees who are required to wear respiratory protection, other than loose fitting disposable dust mask type respirators, and are not enrolled in the hazardous waste medical surveillance program must have a medical evaluation performed to determine if they are medically qualified to wear a respirator. The evaluation should be performed by the medical consultant before the employee is fit tested or required to wear the respirator for personal protection. A full description of the medical evaluation procedure and administrative requirements is provided in Section 7.7.1 Respiratory Protection.

7.8.3.5 Medical Release Forms

Upon completion of a medical exam or evaluation, results shall be reviewed by the medical consultant's occupational physician and a medical release letter shall be sent to the H&S database administrator indicating the medical status of the employee. The medical consultant shall also provide a copy of the results of the exam to the employee.

7.8.3.6 Project-Specific Medical Evaluation and Biological Monitoring

Employees may be assigned to projects that require specific physical requirements, physical skills, or have the potential to create an exposure to a toxic or hazardous substance sufficient to warrant biological monitoring. Examples of such projects may include projects with significant lifting, exposure to extreme heat, physical exertion or exposure to lead, asbestos, mercury, or material at a level where biological monitoring is required by regulation or is warranted based on the evaluation of the hazard by the H&S director. If a medical evaluation or biological monitoring is required for a specific project, substance, or hazard, the details of the medical evaluation or biological monitoring program for the project will be developed by the H&S director in consultation with the medical consultant and outlined in the project-specific H&S plan.

7.8.3.7 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 at CDM Smith should notify their direct manager and contact their SSO or H&S director in accordance with procedures outlined in Section 5 of the CDM Smith H&S Manual or found on the H&S home page. If necessary, an appointment will be arranged at a medical facility identified by the medical consultant at a time and location convenient to the employee.

The H&S director or SSO must be notified by the employee or their direct manager prior to seeking non-emergency medical services for employment-related injuries or illnesses.

7.8.3.8 Return to Work Examinations

An employee desiring to return to work following a leave of absence due to injury or illness, or return to full work status from a restricted work period, must obtain a medical release to work, signed by a licensed physician, stating that the employee is capable of performing assigned duties with or without restrictions and with or without reasonable accommodation. The content of the examination may be determined by the medical consultant and may be performed at a facility selected by the medical consultant at a time and location acceptable to the employee. A medical work status form should be provided to the H&S director.

7.8.3.9 Access to Medical Records and Exposure Data

Employee medical records, including results of medical tests and X–Rays, shall be retained by the medical consultant and kept confidential in accordance with OSHA medical record-keeping requirements, 29 CFR 1910.1020. Medical records, and information obtained in the course of the administration of the CDM Smith medical surveillance program shall be kept confidential and released only under the following conditions:

- An employee, former employee, or their designated representative may obtain a copy of his/her personal records by submitting a written request for the information to the H&S director. The written request must include the employee's name, the address to send the records to, and a phone number to call to verify the identity of the requestor.

- CDM Smith's workers' compensation insurance carrier may request information related to alleged occupational illnesses or injuries with the written permission of the employee.
- The H&S director may obtain medical information without personal identifiers by submitting a written request to the medical consultant.
- Recognized government research and regulatory agencies may obtain medical information without personal identifiers by submitting a written request to the H&S director. The request shall identify the nature and purpose of the information requested.

Air monitoring data and exposure records for specific projects are kept with project H&S records. Employees may obtain access to data related to their exposure or generic data associated with potential exposure of employees in their job classification or performing similar duties by submitting a written request to the H&S director.

7.8.4 Department of Energy Drug and Alcohol Compliance Program

The following requirements apply to all CDM Smith personnel and associated subcontractors performing work under DOE contracts and operated under the authority of the Atomic Energy Act of 1954 (AEC). The requirements defined in this document apply only to DOE contract operations.

7.8.4.1 Purpose

The purpose of this program is for CDM Smith to ensure compliance with the Workplace Substance Abuse Programs as defined in 10 CFR Part 707, Department of Health and Human Services (DHHS) Mandatory Guidelines for Federal Workplace Drug Testing Programs (53 FR 11970, April 1, 1988), and to establish policies, criteria, and procedures for developing and implementing programs that help to maintain a workplace free from the use of illegal drugs and alcohol. This DOE compliant program applies to all contractual operations performed by CDM Smith and associated subcontractors for the DOE.

7.8.4.2 Scope

The scope of this program applies to all CDM Smith operations, contracts, and associated subcontractors, performed at sites owned or controlled by DOE that are operated under the authority of the AEC as well as to any employees performing work under DOE funded contracts or subcontracts. This program specifically prohibits onsite possession, sale, distribution, or manufacturing of illegal drugs for any entity under a DOE contract.

Subcontractors so determined to be within the scope of this program shall be required to agree to comply with its requirements, as a condition of eligibility for performing the subcontract work in accordance with 10 CFR 707.5(A)(1).

7.8.4.3 Policy

It is the policy of CDM Smith to conduct its operations in accordance with all applicable DOE requirements so as to protect the environment, maintain public health and safety, and safeguard the national security.

CDM Smith shall make a good faith effort to maintain a workplace free of substance abuse through implementation of this program in accordance with 10 CFR 707.5(A)(6).

7.8.4.4 Definitions

For the purposes of this DOE compliant program, the following definitions apply:

- **Collection Site Person** means a technician or other person trained and qualified to take urine samples and to secure urine samples for later laboratory analysis.
- **Confirmed Positive Test** means, for drugs, a finding based on a positive initial or screening test result, confirmed by another positive test on the same sample. The confirmatory test must be by the gas chromatography/mass spectrometry method.
- **Counseling** means assistance provided by qualified professionals to employees, especially, but not limited to, those employees whose job performance is, or might be, impaired as a result of illegal drug use or a medical-behavioral problem; such assistance may include short-term counseling and assessment, crisis intervention, referral to outside treatment facilities, and follow-up services to the individual after completion of treatment and return to work.
- **Drug Certification** means a written assurance signed by an individual with known past illegal drug involvement, as a condition for obtaining or retaining a DOE access authorization, stating that the individual will refrain from using or being involved with illegal drugs while employed in a position requiring DOE access authorization (security clearance).
- **Employee Assistance** means a program of counseling, referral, and educational services concerning illegal drug use and other medical, mental, emotional, or personal problems of employees, particularly those which adversely affect behavior and job performance.
- **Hazardous Material** means any material subject to the placarding requirements of 49 CFR 172.504, Table 1, and materials presenting a poison-inhalation hazard that must be placarded under the provisions of 49 CFR 172.505.
- **Illegal Drug** means a controlled substance, as specified in Schedules I through V of the Controlled Substances Act, 21 U.S.C. 811, 812. The term "illegal drugs" does not apply to the use of a controlled substance in accordance with terms of a valid prescription, or other uses authorized by law.
- **Management and Operating Contract** means an agreement for the operation, maintenance, or support, on behalf of the Government, of a Government-owned or controlled research, development, special production, or testing establishment wholly or principally devoted to one or more major programs of DOE.
- **Medical Review Officer (MRO)** means a licensed physician, approved by DOE to perform certain functions under this part. The MRO is responsible for receiving laboratory results generated by an employer's drug testing program, has knowledge of illegal drug use and other substance abuse disorders, and has appropriate medical training to interpret and evaluate an individual's positive test result, together with that person's medical history and any other relevant biomedical information. For purposes of this part a physician from the site occupational medical department may be the MRO.
- **Occurrence** means any event or incident that is a deviation from the planned or expected behavior or course of events in connection with any DOE or DOE-controlled operation, if the deviation has environmental, public health and safety, or national security protection

significance. Incidents having such significance include the following, or incidents of a similar nature:

- Injury or fatality to any person involving actions of a DOE contractor employee.
- Involvement of nuclear explosives under DOE jurisdiction which results in an explosion, fire, the spread of radioactive material, personal injury or death, or significant damage to property.
- Accidental release of pollutants which results or could result in a significant effect on the public or environment.
- Accidental release of radioactive material above regulatory limits.

- **Random Testing** means the unscheduled, unannounced urine drug testing of randomly selected individuals in testing designated positions, by a process designed to ensure that selections are made in a non-discriminatory manner.
- **Reasonable Suspicion** means a suspicion based on an articulable belief that an employee is under the influence of illegal substances, drawn from particularized facts and reasonable inferences from those facts, as detailed further in 10 CFR 707.10.
- **Referral** means the direction of an individual toward an employee assistance program or to an outside treatment facility by the employee assistance program professional, for assistance with prevention of illegal drug use, treatment, or rehabilitation from illegal drug use or other problems. Referrals to an employee assistance program can be made by the individual (self-referral), by contractor supervisors or managers, or by a bargaining unit representative.
- **Rehabilitation** means a formal treatment process aimed at the resolution of behavioral medical problems, including illegal drug use, and resulting in such resolution.
- **Special Nuclear Material** has the same meaning as in Section 11aa of the AEC (42 U.S.C. 2014(aa)).
- **Specimen Chain of Custody Form** is a form used to document the security of the specimen from time of collection until receipt by the laboratory. This form, at a minimum, shall include specimen identifying information, date, and location of collection; name and signature of collector; name of testing laboratory; and the names and signatures of all individuals who had custody of the specimen from time of collection until the specimen was prepared for shipment to the laboratory.
- **Testing Designated Position (TDP)** names a position whose incumbents are subject to drug testing under this part.

7.8.4.5 Baseline Workplace Substance Abuse Program

CDM Smith has developed a written program consistent with the requirements of 10 CFR Part 707.7, the guidelines of the Department of Health and Human Services, and subsequent amendments to those guidelines ("Mandatory Guidelines for Federal Workplace Drug Testing Programs," 53 FR 11970, April 11, 1988; hereinafter "DHHS Mandatory Guidelines"), applicable to appropriate DOE sites. This

program shall be submitted to DOE for review and approval, and includes the following baseline elements:

- Prohibition of the use, possession, sale, distribution, or manufacture of illegal drugs at sites owned or controlled by DOE.
- Education and training for supervisors and employees concerning problems of substance abuse, including illegal drug use, and the availability of assistance through the employee assistance program and referrals to other resources, and the penalties that may be imposed upon employees for drug-related violations occurring on the DOE owned or controlled site.
- Provision for distribution to all CDM Smith personnel, associated subcontractors, all TDPs, and all employees holding government security clearances from any agency engaged in performance on a DOE contract, of a statement which sets forth the policies prohibiting the possession, sale, distribution, or manufacture of illegal drugs at the DOE-owned or controlled site. This statement shall state that the employee shall
  - Abide by the terms of the statement.
  - Notify the employer in writing of the employee's conviction under a criminal drug statute for any violation no later than 10 calendar days after such conviction.
- Provision for written notification to the DOE contracting officer within 10 calendar days after receiving notice from an employee or otherwise receiving actual notice of an employee's conviction of a drug-related offense.
- Provision for imposing appropriate actions in accordance with 10 CFR 707.7, with respect to any employee who is convicted of a drug-related violation occurring in the workplace, within 30 calendar days after receiving such notice of conviction.
- CDM Smith's written policy and procedures under this part shall comply with the requirements of 10 CFR Part 710, "Criteria and Procedures for Determining Eligibility for Access to Classified Matter or Significant Quantities of Special Nuclear Material".
- CDM Smith shall provide for immediate notification to DOE security officials whenever the circumstances in connection with procedures raise a security concern as provided in DOE Orders, rules, and regulations; such circumstances including, but are not necessarily limited to, a determination that an individual holding a DOE access authorization is out of compliance with the requirements of this DOE compliant program, threat to the health and safety of the individuals, the public, or the environment.

Assistance is available to all CDM Smith full-time employees through CDM Smith's Corporate Employee Assistance Program (EAP) that is administered by Horizon Health (1-800-272-7252) under circumstances as provided (see 10 CFR 707.14(b)). This EAP contains, but is not limited to the following components:

- Preventive services, education, short-term counseling, coordination and referral to outside agencies, and follow-up.
- Education and training programs for all onsite employees and supervisors on a periodic basis (e.g. annually), which will include, at a minimum, the following subjects:

- Health aspects of substance abuse, especially illegal drug use; safety, security, and other workplace-related problems caused by substance abuse, especially illegal drug use; the provisions of this rule; the employer's policy; and available employee assistance services.
- Recognition of deteriorating job performance or judgment, or observation of unusual conduct that may be the result of possible illegal drug use.
- Responsibility to intervene when there is deterioration in performance, or observed unusual conduct and to offer alternative courses of action that can assist the employee in returning to satisfactory performance, judgment, or conduct, including seeking help from the EAP.
- Appropriate handling and referral of employees with possible substance abuse problems, especially illegal drug use.
- Policies and practices for giving maximum consideration to the privacy interests of employees and applicants.

7.8.4.6 Identification of TDPs

The TDPs are defined below in accordance with 10 CFR 707.5(B):

- Positions determined to be covered by the Human Reliability Program (HRP), codified at 10 CFR Part 712. HRP employees will be subject to the drug testing standards of this part and any additional requirements of the HRP rule.
- Positions identified by CDM Smith that entail duties where failure of an employee to adequately discharge his or her position could significantly harm the environment, public health or safety, or national security.
- Positions that require a government security clearance (not limited to DOE clearances).
- Positions determined to have the potential to significantly affect the environment, public health and safety, or national security.

7.8.4.7 TDP Drug Testing and Notification Requirements

- CDM Smith's DOE compliant program will provide for urine drug analysis of applicants for TDPs before selection or assignment.
- CDM Smith's DOE compliant program shall provide for random testing for evidence of the use of illegal drugs of employees in TDPs as identified in this section.
- CDM Smith's DOE compliant program shall provide for random tests at a rate equal to 30 percent of the total number of employees in the testing pool for each 12-month period.
- DOE will be notified in writing of the names of the TDPs subject to this requirement, with regular updates as necessary. Periodic reports will be submitted as required by each contract.
- CDM Smith personnel determined to be in Personnel Security Assurance Programs (PSAPs) and Personnel Assurance Programs (PAPs) will be tested at a rate of 100 percent annually for personnel determined to be in these positions.

- Personnel in TDPs who are not free from the use of illegal drugs are prohibited from working under a DOE contract or subcontract.
- Personnel will be provided notification at least 60 days in advance of initiating testing.
- Drug testing will be performed in accordance with 10 CFR Part 707.12.
- CDM Smith and associated subcontractor personnel in a TDP shall provide written notice to CDM Smith of a drug-related arrest or conviction, or receipt of a positive drug test result regarding that employee, as soon as possible but within 10 calendar days of such arrest, conviction, or receipt.
- CDM Smith shall report to DOE appropriate actions, if any, to be taken regarding an employee who is arrested for or convicted of a drug-related offense, or has a positive drug test result (consistent with 10 CFR 707.14).
- CDM Smith Federal shall provide for random, reasonable suspicion, and occurrence-based urine drug analysis for any individual with unescorted access to the control areas of DOE reactors specified in 10 CFR 707.7.

7.8.4.8 Applicant Drug Testing

An applicant for a TDP will be tested for the use of illegal drugs and will be made an offer of employment or assignment contingent upon a negative test result.

Drug Testing for an Occurrence, Accident, or Incident

For an occurrence, accident, or incident requiring immediate notification or reporting as required by applicable DOE Orders, rules, and regulations, CDM Smith will require testing as soon as possible after the occurrence but within 24 hours of the occurrence, unless DOE determines that it is not feasible to do so. All testing will be performed in accordance with DOE and CDM Smith corporate testing requirements.

Drug Testing for Reasonable Suspicion of Illegal Drug Use

Whenever there is reasonable cause or suspicion that an employee may be using illegal drugs, alcohol or controlled substances, CDM Smith will require the employee to submit to a screening test. CDM Smith requires such tests to determine the employee's fitness for duty. Reasonable suspicion is based upon the supervisor's observation of the employee's physical behavior or other performance indicating probable illegal drug, alcohol, or controlled substance use by the employee, which can be substantiated by a second opinion. The supervisor will contact CDM Smith's Drug and Alcohol Administrator (DAA) for assistance.

The following procedures will apply to Reasonable-Cause Testing:

- If the decision is to test the employee, the immediate supervisor, if available, or acting supervisor, along with the DAA will privately inform the employee of the decision.
- The supervisor or DAA will take the employee to the collection facility.
- The employee must follow CDM Smith protocol for screening tests.

- The supervisor will then take the employee home (employee will not drive their vehicle home) or arrange to have the employee taken home.
- The employee will not return to work until the test results are received by CDM Smith from our DAA.

Drugs for Which Testing is Performed

At a minimum, the DOE compliant program will test for the following drugs or classes of drugs: marijuana, cocaine, opiates, phencyclidine, and amphetamines. This drug panel may be expanded to comply with specific contract requirements and applied to employees working under the specific contract.

Drug or Class of Drug	Initial Screen Cutoff	Confirmatory Screen Cutoff
Marijuana	50 ng/mL	15 ng/mL
Cocaine	300 ng/mL	150 ng/mL
Opiates	2,000 ng/mL	2,000 ng/mL
Phencyclidine	25 ng/mL	25 ng/mL
Amphetamines	1,000 ng/mL	500 ng/mL
Methamphetamine	1,000 ng/mL	500 ng/mL

7.8.4.9 Specimen Collection, Handling, and Laboratory Analysis for Drug Testing

This DOE compliant program shall utilize a chain of custody procedure for maintaining control and accountability from point of collection to final disposition of specimens, and testing laboratories shall use appropriate cutoff levels in screening specimens to determine whether they are negative or positive for a specific drug, consistent with the DHHS Mandatory Guidelines [see 10 CFR 707.5(A), 10 CFR 707.12(A), 10 CFR 707.16(E)]. This DOE compliant program shall ensure that only testing laboratories certified by the DHHS, under Subpart C of the DHHS Mandatory Guidelines, are used.

CDM Smith shall use a procedure for collecting samples that allows individual privacy unless there is reason to suspect specimen alteration or substitution in accordance with 10 CFR 707.12(A). If the individual refuses to cooperate with the urine collection (e.g., refusal to provide a specimen, or to complete paperwork), then the collection site person shall inform the MRO and shall document the non-cooperation on the specimen chain of custody form. The MRO shall report the failure to cooperate to the appropriate management authority, who shall report to DOE if the individual holds an access authorization. Individuals so failing to cooperate shall be treated in all respects as if they had been tested and had been determined to have used an illegal drug.

The collection site person shall ascertain that there is a sufficient amount of urine to conduct an initial test, a confirmatory test, and a retest, in accordance with the DHHS Mandatory Guidelines.

7.8.4.10 Medical Review of Results of Tests for Illegal Drug Use

All test results shall be submitted for medical review by the MRO. A confirmed positive test for drugs shall consist of an initial test performed by the immunoassay method, with positive results on that initial test confirmed by another test, performed by the gas chromatography/mass spectrometry method (GC/MS). This procedure is described in paragraphs 2.4 (e) and (f) of the DHHS Mandatory Guidelines.

The MRO will consider the medical history of the employee or applicant, as well as any other relevant biomedical information. When there is a confirmed positive test result, the employee or applicant will be given an opportunity to report to the MRO the use of any prescription or over-the-counter medication. If the MRO determines that there is a legitimate medical explanation for a confirmed positive test result, consistent with legal and non-abusive drug use, the MRO will certify that the test results do not meet the conditions for a determination of use of illegal drugs. If no such certification can be made, the MRO will make a determination of use of illegal drugs. Determinations of use of illegal drugs will be made in accordance with the criteria provided in the Medical Review Officer Manual issued by the DHHS Publication No. (ADM) 88–1526.

CDM Smith personnel who test positive for the purposes of DOE compliance have a right to retest the original urine specimen as employee's cost in accordance with 10 CFR 707.14(F)

7.8.4.11 Action Pursuant to a Determination of Illegal Drug Use

When an applicant for employment has been tested and determined to have used an illegal drug, processing for employment will be terminated and the applicant will be so notified. When an employee who is in a TDP has been tested and determined to have used an illegal drug, CDM Smith shall immediately remove that employee from the TDP; if such employee also holds, or is an applicant for, an access authorization, CDM Smith shall immediately notify DOE security officials for appropriate adjudication, with the following steps taken within 30 days of receiving a notice of illegal drug use:

- CDM Smith will refer the individual to the EAP and will provide the employee an opportunity to complete treatment, rehabilitation, aftercare, and the follow up program in accordance with 10 CFR 707.6. This EAP will be made available to onsite personnel to provide education, short-term counseling, coordination and referral to outside agencies, and follow up. The employee will not receive pay for time away from work for treatment or rehabilitation.

- The employee participating in treatment, rehabilitation, and aftercare programs must sign a form consenting to follow-up counseling for one year with either the EAP, or another independent health care provider. The employee must also agree to follow up screening tests without notice for a period of one year after completion of such a program. Note: Refusal to participate in follow-up counseling and testing will result in termination.

- Following a determination by the site occupational medical department, after counseling or rehabilitation, that the employee can safely return to duty, the contractor may offer the employee reinstatement, in the same or a comparable position to the one held before the removal, consistent with the contractor's policies and the requirements of 10 CFR Part 710. Failure to take the opportunity for rehabilitation, if it has been made available, for the use of illegal drugs, will require significant disciplinary action up to and including removal from employment under the DOE contract, in accordance with the contractor's policies. Any employee who is twice determined to have used illegal drugs shall in all cases be removed from employment under the DOE contract. Also, if an employee who has signed a DOE drug certification violates the terms of the certification, DOE shall conduct a timely review of the circumstances of such violation, and the individual's continued eligibility for a DOE access authorization shall be determined under the provisions of 10 CFR Part 710, "Criteria and Procedures for Determining Eligibility for Access to Classified Matter or Significant Quantities of Special Nuclear Material."

An employee who has been removed from a TDP because of the use of illegal drugs may not be returned to such position until that employee has:

- Successfully completed counseling or a program of rehabilitation.
- Undergone a urine drug test with a negative result.
- Been evaluated by the site occupational medical department, which has determined that the individual is capable of safely returning to duty. An individual who has been notified of a positive test result may request a retest of the same sample at the same or another certified laboratory within 72 hours after learning the test result. The individual shall bear the costs of transportation and/or testing of the specimen. The contractor will inform employees of their right to request a retest under the provisions of this paragraph.

After an employee determined to have used illegal drugs has been returned to duty, the employee shall be subject to unannounced drug testing, at intervals, for a period of 12 months.

7.8.4.12 Records

Confirmed positive test results shall be provided to the MRO, other contractors, and DOE officials with a need to know. Any other disclosure may be made only with the written consent of the individual in accordance with 10 CFR 707.16(a).

CDM Smith shall maintain maximum confidentiality of records related to illegal drug use, to the extent required by applicable statutes and regulations (including, but not limited to, 42 U.S.C. 290dd–3, 42 U.S.C. 290ee–3, and 42 CFR Part 2). DOE shall be kept fully apprised of all aspects of CDM Smith's DOE compliant program, including such information as incidents involving reasonable suspicion, occurrences, and confirmed test results, as well as information concerning test results in the aggregate.

Unless otherwise approved by DOE, CDM Smith shall ensure that all laboratory records relating to positive drug test results, including initial test records and chromatographic tracings, shall be retained by the laboratory in such a manner as to allow retrieval of all information pertaining to the individual urine specimens for a minimum period of 75 years after completion of testing of any given specimen, or longer if so instructed by DOE. In addition, a frozen sample of all positive urine specimens shall be retained by the laboratory for at least 6 months, or longer if so instructed by DOE.

CDM Smith shall maintain as part of its medical records copies of specimen chain of custody forms.

The specimen chain of custody form will contain the following information:

- Date of collection
- Tested person's name
- Tested employee/applicant's social security number or other identification number unique to the individual
- Specimen number
- Type of test (random, applicant, occurrence, reasonable suspicion, follow-up, or other)

- Temperature range of specimen
- Remarks regarding unusual behavior or conditions
- Collector's signature
- Certification signature of specimen provider certifying that specimen identified is in fact the specimen the individual provided

7.8.4.13 Notification Requirements to Department of Energy

Immediate notification to DOE security officials whenever the circumstances in connection with procedures under this part raise a security concern as provided in DOE Orders, rules and regulations; such circumstances including, but are not necessarily limited to, a determination that an individual holding a DOE access authorization has used an illegal drug, or poses a threat to the H&S of the individuals, the public, or the environment.

If a CDM Smith employee in a testing designated position receives a drug-related arrest or conviction, or a positive drug test result , the employee must notify CDM Smith management as soon as possible, but no longer than 10 calendar days of such arrest, conviction, or receipt. CDM Smith management must in turn notify DOE.

Appropriate action, as defined in Section 1.14, is to be taken regarding an employee who:

- Is arrested for or convicted of a drug-related offense
- Has a positive drug test result (consistent with 10 CFR 707.14)

CDM Smith shall ensure to provide for the following penalties upon a convicted employee within 30 calendar days of notice of conviction:

- Appropriate personnel action up to and including termination
- An opportunity to participate in an approved substance abuse rehabilitation program

CDM Smith will report the results of any investigation or drug and alcohol test arising from the performance of work under any DOE contract.

7.8.4.14 Alcohol Testing Policy

CDM Smith personnel may be required to submit to alcohol testing based on specific contractual or site requirements. This testing shall be performed in accordance with the criteria and requirements as defined in the specific contractual or site requirements.

7.9 Biological Safety

CDM Smith operations will be assessed for hazardous flora, fauna (e.g., vermin, insects, etc.), and related hazards prior to the activity. Personnel with knowledge of the site and expertise in the expected tasks will be involved in the production of activity-related AHAs. The AHA shall be used as a tool by all personnel performing a specific task to anticipate, identify, evaluate, and mitigate or control known hazards at SSFL, including biological hazards. Snakes, ticks, and poison oak are among the most prevalent of these hazards, which will be included as part of the biological hazard discussion during the mandatory site-specific H&S training for CDM Smith field personnel.

7.10 Motor Vehicle Safety

Motor vehicles are defined as a sedan, van, sport utility vehicle, truck, motorcycle, or other mode of conveyance intended for use on public roadways. Prior to initial use, vehicles not otherwise inspected by state or local authorities, shall be inspected by a qualified mechanic and found in safe operating condition and in compliance with all required published vehicle safety standards.

All CDM Smith and subcontractor personnel operating motor vehicles and powered industrial equipment shall be appropriately licensed in accordance with California and Federal requirements. Specialty vehicle operators shall be trained in accordance with State of California requirements, in addition to industry best practices.

On a routine basis motor vehicles shall be checked by the operator to assure that the following parts, equipment, and accessories are in safe operating condition:

- Service brakes
- Parking system
- Emergency stopping system
- Tires
- Horns
- Steering mechanism
- Coupling devices
- Seat belts
- Operating controls
- Safety devices
- Accessories including lights, reflectors, windshield wipers, and defrosters where necessary

CDM Smith and subcontractor employees shall obey all State of California driving regulations and DOE and Boeing site traffic protocol. Employees shall obey all State of California driving regulations and DOE site traffic regulations. This includes take precaution driving to and from the field site by driving the speed limit, obeying road signs, wearing seatbelts at all times, driving defensively, and taking safety precautions during extreme weather conditions. CDM Smith's site Motor Vehicle Safety Program shall be reviewed regularly and tailored as necessary to meet the safety needs of the site.

Procedures for employing uniform traffic control devices and road signs are contained in Section 7.1.4, Traffic and Work Zone Safety.

Drivers' safety awareness will be included as part of CDM Smith's initial and periodic employee safety training, and will be a component of the safety incentive program.

CDM Smith shall monitor its employee compliance with motor vehicle safety protocol through the performance of regular H&S inspections.

7.11 Radiological Safety

CDM Smith acknowledges the potential for radiological hazards at SSFL. Radiological safety will be a standard component of CDM Smith's hazard analysis process at SSFL as necessary. CDM Smith will include appropriate notification to Boeing of any activities that are expected to encounter radiological hazards. CDM Smith shall ensure appropriate monitoring for radiological hazards during site

activities, including the enrollment of employees in a dosimetry program and the use of radiation survey instruments.

In accordance with 8 CCR 5192 (c)(6)(A), radiological monitoring protocol has been implemented. All field sampling locations will be surveyed for alpha, beta, and gamma radiation prior to the start of the activity. Soil samples and personnel will also be surveyed for radiological contaminants. Full details regarding radiological monitoring protocol, action levels, and equipment and maintenance are contained in the Phase 3 HASP.

Appropriate radiological safety training will be supplied to workers as needed. All field employees shall receive General Employee Radiological Training. Employees assigned to operate radiological survey instruments shall receive instrument-specific training in order to attain a level of expertise sufficient for performance of their duties.

SAIC is a project lead subcontractor with specific responsibilities to support CDM Smith's efforts related to radioactive materials and radionuclides. In that support SAIC provides project Certified Health Physicist and radiochemistry expertise. SAIC conducts radioactive material hazard assessment and management. SAIC will serve in a safety capacity for any activity involving the characterization of radioactive materials and risk to human health and the environment.

7.11.1 Instrument Handling, Storage, and Check Source Procedures

Handling and storage of radiological instruments will be performed in strict accordance with manufacturer's instructions, industry best practices, regulations, and protocol presented to employees during the radiological instrument portion of site-specific H&S training.

Use of check sources, which contain small amounts of radioactive material to check instrument responses, is also to be included in the instrument training given to employees.

7.12 Confined Space Entry

7.12.1 Purpose and Scope

This program establishes requirements for safe entry into, work in, and exit from confined spaces such as wet wells, manholes, tanks and vessels, or pipelines. It is intended to protect the health of CDM Smith employees and to comply with 29 CFR 1910.146, OSHA's Permit-Required Confined Spaces standard. CDM Smith employees or subcontractors may enter a confined space only when these or equivalent confined space entry procedures are followed.

Confined spaces are dangerous because gases and vapors can accumulate to form oxygen-deficient, explosive, or toxic atmospheres. Entry into the following is considered confined space entry (CSE) unless these procedures provide otherwise. The following are examples of potential confined spaces.

- Tanks
- Manholes
- Water transmission lines
- Stilling wells
- Valve and metering vaults
- Limited-access wet walls
- Vessels
- Pipelines
- Tunnels
- Junction structures
- Un-ventilated dry wells
- Sewers

Depending on the circumstances, some confined spaces may or may not require a permit. CDM Smith treats trenches, vaults, pits, or diked areas as a permit required confined space if they pose a potential for trapping a toxic atmosphere. Only the H&S director may determine that work in such a space does not need a permit.

When there is no potential for an atmospheric hazard, and the physical hazards can be controlled without entry, employees may, with H&S director approval, consider the space a non-permit required confined space. The types of spaces where this might apply include clear wells, sedimentation basins, equalization basins, rapid-mix tanks, flocculation tanks, sand filters, and water plant clarifiers.

7.12.1.1 Definitions

- **Confined Space** - A confined space is an enclosed space which:
  - Is large enough and configured such that an employee can enter and perform assigned work, and
  - Has limited or restricted means of entry or exit, and
  - Is not designed for continuous employee occupancy.
- **Permit required Confined Space** - Confined spaces that have one or more of the following additional characteristics:
  - Contains or has a known potential to contain a hazardous atmosphere, or
  - Contains a material that can engulf an entrant, or
  - Has a configuration that could trap or asphyxiate an entrant, or
  - Contains any other recognized serious safety or health hazard.
- **Emergency** - Any occurrence (including any failure of hazard control or monitoring equipment) or event(s) internal or external to the confined space that could endanger entrants.
- **Engulfment** - The surrounding and effective capture of a person by a liquid or finely divided solid substance.
- **Entry** - The act by which a person intentionally passes through an opening into a permit required confined space. Entry includes ensuing work activities in that space and occurs when any part of the entrant's body breaks the plane of an opening into the space.
- **Hot Work** - Operations that could provide a source of ignition, such as riveting, welding, cutting, burning, or heating.
- **Immediately Dangerous to Life or Health** - Any condition that poses an immediate threat of loss of life; may result in irreversible or immediate severe health effects; may result in eye damage; irritation or other conditions that could impair escape from the confined space.
- **Inerting** - Rendering the atmosphere of a confined space nonflammable, non explosive, or otherwise chemically non reactive by such means as displacing or diluting the original atmosphere with a gas that is non reactive with that space.
- **Isolation** - The process by which a confined space is completely protected from the release of energy or material. Isolation is usually accomplished by such means as blanking or blinding,

removal or misalignment of pipe sections or spool pieces, double block and bleed, or lock out and/or tag out.

- **Limited or Restricted Means of Entry or Exit** - When the entry occurs while crawling, through a manhole, by a ladder, or on a rope. Entries on grade, through doorways, or on stairways that meet OSHA standards are not restricted.
- **Non-Permit-Required Confined Space** – A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain, any hazard capable of causing death or serious physical harm.
- **Not Designed for Continuous Employee Occupancy** - Spaces that are designed for filling with liquids or solids or contaminated air. Most spaces with continuously operating ventilation and lights are designed for human occupancy.
- **Oxygen-Deficient Atmosphere** - An atmosphere containing less than 19.5 percent oxygen by volume.
- **Oxygen-Enriched Atmosphere** - An atmosphere containing more than 22 percent oxygen by volume.

7.12.1.2 Responsibilities

Management Responsibilities

H&S Director – The H&S director is responsible for the development and oversight of the implementation of this program and advising project managers on the applicability of this program to projects. The H&S director will designate CSE coordinators within their assigned units as needed.

Project Managers – PMs are responsible for initial identification of workspaces as potential confined spaces and contacting an H&S director to evaluate the hazards associated the space. In addition, PMs should:

- Obtain any available information regarding permit space hazards and entry operations from the client or operator of the space.
- Coordinate entry operations with the client, subcontractor personnel, CDM Smith personnel and all other personnel who will be working in or near permit spaces.
- Inform the client or operator of the space about the permit space program that CDM Smith will follow and of any hazards confronted or created in permit spaces, either through a debriefing or during the entry operation.

7.12.1.3 Confined Space Entry Team Responsibilities

Unless it is determined that liquids or gases are neither present nor can enter the space during the work period, entry by team members requires, at a minimum, people who fill three roles:

- Entry Attendant(s)
- Confined Space Entrant(s)
- Entry Supervisor

The roles above can be fulfilled with a minimum of two individuals, with one acting as both entry supervisor and attendant or entrant.

CDM Smith achieves confined space safety principally through a detailed plan of cooperation between team personnel in the roles listed in Table 7-4.

Table 7-4 Summary of Entry Team Requirements

Position	Role
SSO	A CDM Smith employee trained and authorized by the H&S director issues entry permits.
Entry Supervisor	An entry team member trained and authorized to sign and certify that entry permit conditions have been met and authorizes entry into a confined space.
Entrant(s)	Entry team members who are trained to perform actual work in confined spaces.
Entry Attendant	A team member outside the confined space who monitors conditions inside and outside of the space.
Rescuers	Personnel trained in first aid, CPR, and confined space rescue methods and are available to respond to emergencies in confined spaces.

CDM Smith employees may fill these roles only when their H&S director determines that they are qualified to do so. The personnel who fill these roles must have completed appropriate training and passed the examination required by these procedures. Documentation of this training is to be maintained on the H&S Database.

- **Confined Space Entry Supervisor** – The CSE supervisor is the individual at the entrance of the confined space who has the responsibility to ensure the provisions of the CSE permit are met in the field and ultimately authorizes entry into a confined space. The CSE supervisor is responsible for:
  - Learning about the hazards of the space, and the materials in it, and how to recognize the signs and symptoms of exposure to any toxic materials in the space.
  - Assuring that the pre-entry checklist on the permit is complete and that conditions are acceptable before any employee enters the space.
  - Verifying that rescue personnel are available, are able to provide assistance if needed and that communications are established to contact rescue personnel.
  - Signing the entry permit authorizing entry into the confined space.
  - Immediately terminating the entry if a non-permitted condition occurs.
- The CSE supervisor may also serve as an entrant or an attendant taking on the additional responsibilities described below.
- **Confined Space Entrants** – CSE entrants are responsible for the following:
  - Learning about the hazards of the space, and the materials in it, and how to recognize the signs and symptoms of exposure to any toxic materials in the space.
  - Reading and understanding the entry permit for spaces they enter.
  - Removing jewelry before entering spaces. (Jewelry can compromise their protective clothing, catch on objects, or cause a spark.)
  - Leaving cigarettes, lighters, and pagers outside the space.

- Avoiding hand to mouth contact during entry.
- Inspecting his/her own and each other's personal safety gear before and during the confined space entry.
- Wearing or carrying appropriate air monitoring equipment during the entry.
- Complying with these procedures and all of the conditions of the permit.
- Following the directions of the entry supervisor and the entry attendant.
- Leaving the confined space and reporting to the entry attendant immediately upon detecting; any non permitted condition, an alarm, or any other changed condition.
- While working in a sub surface space, avoiding looking up.

- **Confined Space Attendants** – Attendants are responsible for the following:
  - Learning about the hazards of the space, the materials in it, and the signs and symptoms of exposure to any toxic materials in the space.
  - Reading and understanding the entry permit.
  - Remaining outside the confined space, immediately available, and in continuous communication with entrants.
  - Leaving their assigned space only when replaced by an equally qualified attendant or to save his or her own life. If the attendant must leave and there is no replacement available, the entrants must exit the confined space.
  - Staying continuously aware of the location and condition of all authorized entrants within the confined space by voice, radio, visual observation, or other equally effective means.
  - Staying continuously aware of conditions in the space.
  - Ordering entrants to exit the confined space at the first indication of hazardous condition (such as instrument alarms, visible releases, or unusual behavior by the entrants).
  - Summoning immediate emergency assistance, if needed.
  - Warning unauthorized persons not to enter or to exit immediately if they have already entered and advise the authorized entrants, and management, of entry by unauthorized persons.
  - Providing support to rescue workers if requested.
  - Keeping objects away from the access hole where they can be accidentally knocked, pushed, or dragged into the confined space. Lower tools or supplies to workers inside by a hand line.
  - When the job is finished and all objects have been removed from the confined space, ensuring the space has been closed.
  - Securing the safety line of any safety harnesses to an extraction tripod, never to movable equipment or a vehicle. Monitor the safety line at all times, taking up extra slack as needed. Keep the safety line away from traffic and moving parts of any equipment.
  - Testing the means of non entry retrieval. You must use a mechanical hoist, unless manual methods would be more effective.

- **Rescue Personnel** – responsibilities of rescue personnel include:
  - Remaining immediately available to provide rescue assistance throughout the entry.
  - Not performing other tasks that would interfere with their ability to provide timely rescue assistance if needed. They may perform other tasks during an entry only if those tasks do not impede response to emergencies.
  - Notifying the attendant if they become unavailable to provide rescue services.

In accordance with 8 CCR 5157 (k)(2), CDM Smith shall coordinate CSE activities with emergency rescue personnel. CDM Smith shall identify local organizations (e.g., fire departments) which may serve as providers of rescue personnel and services prior to the initiation of any CSE activities. Such rescue service shall be listed on the CSE permit. The CDM Smith SSO shall inform the identified rescue services of expected hazards when performing rescues, including recommended hazard controls. The identified rescue services shall also be provided with access to the confined spaces in order to develop the appropriate rescue plans and practice rescue activities.

CDM Smith employees assigned responsibilities as rescue personnel must be qualified in the use of self contained breathing apparatus, be current in First Aid/CPR training as well as having completed CDM Smith CSE training.

Note: Properly trained and equipped rescue units from client plant teams or local fire departments are preferred sources of rescue services if they can provide timely response. If the client plant rescue team or local fire departments are untrained, unequipped, or unavailable to provide rescue services, appropriately trained CDM Smith personnel may be assigned this role. The designated rescue service must be listed on the CSE permit and be contacted prior to the entry to verify they are available for rescue services if needed.

7.12.1.4 Responsibilities on Multi-Employer Confined Space Entries

Team members who do not work for CDM Smith may fill the onsite roles, if they meet the training requirements and agree to fulfill the responsibilities outlined below. A CDM Smith construction inspector, for example, may enter a space while a general contractor's employee serves as the entry attendant, if the general contractor's employee 1) has completed training equivalent to that shown in this program and 2) can fully perform the attendant's role. Only CSE coordinators or H&S directors may evaluate the CSE programs of other organizations.

Although client and subcontractor personnel may participate with CDM Smith personnel in a CSE, this program is for the protection of CDM Smith employees. Clients and subcontractors may use these procedures only if they accept all liability for their use. Subcontractors to CDM Smith that are required to enter confined spaces in the absence of CDM Smith employees should be required to submit a copy of their confined space entry program to CDM Smith for review and provide documentation that employees have had required training.

7.12.1.5 Responsibilities of Clients/Owners of Confined Spaces

Owners and operators of facilities that contain confined spaces or control access to confined spaces have specific responsibilities that are outlined in the OSHA CSE standard. They include:

- Informing CDM Smith that the workplace contains permit spaces and that permit space entry is allowed only through compliance with a permit space program meeting the requirements the OSHA CSE standard;

- Apprising CDM Smith of the elements, including the hazards identified and their experience with the space, that make the space in question a permit space;
- Apprising CDM Smith of any precautions or procedures that they have implemented for the protection of their employees in or near permit spaces where CDM Smith personnel or CDM Smith subcontractors will be working;
- Coordinating entry operations with CDM Smith, when both client/owner personnel and CDM Smith personnel or CDM Smith subcontractors will be working in or near permit spaces; and
- Debriefing CDM Smith at the conclusion of the entry operations regarding the permit space program followed and regarding any hazards confronted or created in permit spaces during entry operations.
- The CDM Smith project manager or CSE supervisor should be proactive in soliciting information on the hazards and configuration of confined spaces.

7.12.1.6 Procedures

Summary

No CDM Smith employee may enter a confined space unless these procedures, or equivalent procedures approved by the CSE coordinator or the H&S director, are followed. CDM Smith's CSE program includes:

- Training for confined space team members.
- Preparation and review of the pre entry checklist.
- Requirements for appropriate safety equipment.
- Coordination with clients.
- Accountability of subcontractors.
- Monitoring for hazardous conditions.
- Procedures for entries.
- Ventilation of hazardous gases.
- Rescue procedures and equipment.
- Periodic reviews of CSE permits and program.

CDM Smith work teams who perform entries at client facilities shall coordinate their schedule and entry procedures with the client. They shall also offer to explain our procedures to the client.

Confined Space Entry Permits

Written entry permits, issued and signed by a H&S director or his designee are required for any entry into, or work in, confined spaces. Work teams that plan to enter a confined space must complete an entry permit form. The permit characterizes possible material and energy inputs to the confined space, identifies the personnel, describes the task, describes monitoring, lists required equipment, and identifies emergency contacts.

Authorization for entry occurs when the entry supervisor confirms permit entry conditions in the field, completes the pre-entry checklist on the entry permit and signs the form in the field.

Most entry permits address a single work project in a single confined space, under specific conditions, for one work period not to exceed 8 hours. Permits may be issued for tasks involving a group of spaces

with common hazard potential (for example, an infiltration or inflow study on several manholes in a single branch line). Permits may be approved for longer periods if the personnel, tasks, and hazards are not expected to change. In either case, the entry supervisor must still sign a copy of the permit prior to each entry.

Employees should note that the permit consists, mostly, of a checklist on which they show the items they will use by marking a "Y" in the boxes that represent the answers they choose. Items not needed should be left blank. Where the form provides a choice (e.g., glasses or goggles) the employee should circle the one chosen. The special instructions space on the permit is used for describing; lock out arrangements, coordination with client or contractor personnel, or the qualifications of the emergency rescue personnel.

The H&S director must be informed of plans to perform hot work (burning, welding, or cutting) or to introduce chemicals to the space, such as cleaning solutions. The H&S director determines safety requirements based on the information he or she receives, therefore, providing complete and accurate information is essential to ensuring a complete permit and a safe entry.

A space may be determined to be a non-permit-required confined space if it is determined to be 1) free of atmospheric hazards and 2) all other hazards are completely controlled and conditions cannot change because the sources of material, energy or possible air contamination are shut off, locked out, or controlled through ventilation. This determination will be made during completion of the pre-entry checklist by the H&S director.

When the entry is complete, the entry supervisor shall write "canceled" across the permit and send it to the H&S director who issued it. The H&S director should maintain a file of cancelled permits.

7.12.1.7 Equipment

Table 7-5 below lists typical equipment that could be included in a permit-required confined space entry.

Table 7-5 Permit-Required Confined Space Entry Equipment

Explosion Proof Lighting	Whole Body Harness
Hard Hat	Tripod
Safety Boots	Winch
Safety Glasses	Retrieval Line or Cable
Goggles	Radios
Protective Coveralls	Fire Extinguishers
Rain Suit	Escape Respirator
Work Gloves	First Aid Kit
Rubber Boots	Traffic Cones
Chemical Protective Gloves	Traffic Barriers
Self Contained Breathing Apparatus	Ventilation Blower
Supplied Air Respirator	Air Monitoring Instrumentation
Air Purifying Respirator	Duct Tape

The equipment needed for a specific entry and space will depend on the analysis of the hazards of the space and work activities to be conducted during the entry. The confined space entry permit should be filled out and reviewed with the H&S director.

Circumstances that could affect equipment needs include the following:

- When the air monitoring equipment reveals no contaminants in the air and if there is no potential source of contaminants or oxygen depletion, respiratory protection is unnecessary. It is suggested that portable ventilation and air monitoring equipment be continuously used during these types of entries.
- An SCBA (self contained breathing apparatus), in stand by working order, ready for use in emergencies may be required for entries where a readily available outside rescue team cannot be identified.
- Another type of retrieval device may substitute for the tripod and winch assembly.
- Only explosion safe equipment may be used in confined spaces that pose a potential flammability hazard. Temporary lighting in these spaces, whether electrically or battery operated, must be low voltage, double insulated, and explosion safe. Tools used in confined spaces will be of a non sparking type unless there is no potential for flammable vapors or gases in the space.

Preparation for Entry

Inspect the area near the confined space for tripping hazards, traffic patterns, and ignition sources, such as lit cigarettes, welding or cutting activities. Provide controls or remove the hazards. If needed, use high visibility traffic cones, fencing, or barricades, post signs and assign a team member to control the area. If working in a public roadway, physically protect the entry with a vehicle. Leave some space between the vehicle and the space in the event the vehicle is hit. Isolate the space as described above.

Inspect the condition of the entry steps of the confined space. Don't rely on manhole rungs or permanent ladders if the space is often wet. If it appears that the steps will not support your weight or if the confined space contains no steps, provide a ladder and approved hoist, winch or some other form of ready entry, exit, and fall protection. Only one person at a time may ascend or descend a ladder. Personnel should not carry tools or other objects in their hands while climbing into or out of the confined space. Raise and lower supplies with a rope and bucket. Be sure knots are secure.

Potential emergencies vary with the type of confined space. The rescue equipment, including extraction device and SCBA, should be inspected and tested prior to space entry.

Co workers should inspect each other's safety equipment before entry into the confined space to determine if it is properly adjusted and in the proper position. Co workers should periodically check the integrity of each other's protective clothing and equipment. Problems, such as a tear in the clothing, should be immediately addressed.

When entrance covers are removed, the opening should be promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and that will protect each employee working in the space from foreign objects entering the space.

If entry into the space requires opening a manhole cover, refer to Section 16.23 of the CDM Smith H&S Manual, Guidelines for Removing and Replacing Manhole Covers.

Air Monitoring

Multichannel gas monitors will be used to test the air in the confined space before and during any confined space entries. This testing will be used to both evaluate the atmosphere within the space and to verify that the atmosphere within the space remains within acceptable ranges during the

performance of the entry work. This monitoring is to be performed in the following order; oxygen concentration, flammable and combustible gas concentrations, and toxic gases and vapors. The testing can also include specific tests for additional contaminants such as hydrogen sulfide or specific toxic gases and vapors that could be present in the confined space.

Prior to entry, the CSE supervisor must test the atmosphere within the confined space by the procedures described below.

- Start up, check voltage, and field check the meters. Do this on site in a clean area, not near or in the confined space.
- Insert the probe about 12 inches into the space. If possible, check for gas in the space without opening the manhole cover or hatch. Read the meters.
- Extend the probe to the level that workers in the space will occupy; read it again. Allow adequate time for sampled gas to reach the gas detectors before recording the reading.
- To the extent possible, measure gas conditions in pockets, corners, and so forth.
- Always check the low areas in the space since some gases are heavier than air (hydrogen sulfide is heavier, methane lighter).

The air monitors must be field checked in accordance with the instructions contained in the instrument manual. If the detector fails the prescribed field tests, it must be recalibrated by the procedures established by the manufacturer. No entry is permitted unless the required measurements have been collected.

Because gases and vapors tend to vary in concentration in a confined space, the entrant closest to the suspected source must wear or carry the meter throughout the duration of the entry.

If any of the following conditions exist, the team must attempt to eliminate the condition using appropriate engineering controls such as forced ventilation. If the condition cannot be corrected, entry maybe allowed using appropriate respiratory protection. All use of respirators must be in accordance with Section 7.7.1, Respiratory Protection. If any of the conditions below develop during the entry, entrants must evacuate the space and an attempt must be made to correct the condition using feasible engineering controls. If the condition cannot be corrected re-entry may be allowed using appropriate respiratory protection following the requirements outlined in Section 7.7.1.

- A toxic material is present above half of its permissible exposure limit
- Flammable gas is present above 10 percent of the lower explosive limit (LEL)
- Oxygen is below 19.5 or above 23.5 percent

The confined space shall be monitored periodically to ensure the safety of employees, and whenever conditions change, such as temporary stoppage of mechanical ventilation or an increase in ambient air temperature. The required frequency of testing shall be a decision of the entry supervisor, based on the ongoing evaluation of the degree of hazard and recommendations from the H&S director.

Isolation of the Space

If material or energy can enter the space during entry, take necessary precautions, such as preventing accidental introduction of materials into the confined space and locking or tagging out energy sources.

Coordinate all lock out/tag outs with the client/owner of the space. Locks, tags and other lock out/tag out equipment can be obtained from the CDM Smith equipment centers.

Before employee(s) enter a confined space, the space shall be isolated to preclude the entry of materials and energy by one or more of the following methods:

- Remove a valve or connection in the piping and cap the open end of the piping leading to the confined space. Do this as close to the space as possible.
- Install a full pressure blank in lines with flanged connections as close to the space as possible.
- Close, lock, and tag at least two valves in the piping leading to the confined space. Lock or tag open a drain valve to the atmosphere and check it to ensure it is not plugged.
- De energize, lock, and tag machinery, pumps, mixers, or other equipment with moving parts or conductors in the confined space.
- Lock the gates to any dump chute or loading port that connects with the space, or station a person at the port throughout the duration of the entry.

All employees working in the confined space shall be informed of the means by which the space was isolated. All blanks or caps shall be made of a material compatible with the liquid, vapor, or gas with which it may contact. Sometimes CDM Smith employees will enter a space through which flow cannot be stopped (e.g., some municipal sewers). In these cases, the procedures documented in the permit must provide equivalent protection.

Ventilation

When air monitoring indicates a need for ventilation, provide a fresh air inflow until acceptable air levels are achieved. Provide local exhaust or continuous general ventilation when the work itself (for example, welding or painting with solvent based paint) generates a toxic atmosphere. Blowers should be coupled with large diameter flexible hose that can direct air into the work area.

The blowers used must meet both the explosion safety and wiring requirements of the National Electrical Code. They shall provide enough airflow to keep contaminant concentrations below 10 percent of the lower explosive limit and below 50 percent of the lower of OSHA's permissible exposure levels or the ACGIH threshold limits values.

Gasoline, diesel, or gas operated equipment used near confined spaces must be oriented so that their exhaust cannot enter the confined space. Exhausted air from the space must be directed away from the work area, downwind, to an area where it presents no hazard.

Ventilation shall continue until acceptable air levels are achieved. Continuing ventilation may be required during entry. All ventilation equipment shall be located upwind to ensure fresh air intake and to ensure that contaminated air does not reach the blower, a potential source of ignition.

7.12.1.8 Rescue Procedures

Entrants

Upon detecting an emergency condition, personnel in the confined space must adhere to the following procedures:

- Immediately inform the attendant of the nature of the hazard.
- Exit the space. Assist incapacitated coworkers toward the exit.
- Take no action for which you are not properly trained and equipped. Do not move co-workers who have suffered or potentially suffered spinal injury and if in no other danger from the confined space. Only doctors and paramedics may treat spinal injuries.

Attendants

Upon detecting an emergency, the entry attendant must:

- Notify the rescue worker(s).
- Remain outside the confined space to lower necessary rescue equipment into the space and render other necessary assistance.
- Withdraw the worker(s) with the safety line.
- Notify the emergency service providers specified in the permit. Give the location of the emergency and any other pertinent information and guide emergency units to the scene.

Rescue Personnel

Upon notification of an emergency, rescue workers must:

- Report to the confined space as quickly as possible
- If appropriate, don an SCBA
- Enter, if safe, to offer assistance to entrants in leaving the space
- Not enter the space, if they cannot provide assistance with minimal risk to themselves

Protection of employee life and health is the first priority of the rescue worker. No employee may enter the confined space without an SCBA until all causes of the incapacitation have been eliminated. Rescue workers require protective clothing as resistant as that of the entrants unless otherwise specified in the permit.

7.13 Heat Stress/Cold Stress

Personnel may be subject to heat stress and cold stress depending on certain conditions at the site. It is important that all employees understand the signs and symptoms of potential injuries associated with working in temperature extremes. Heat stress prevention by CDM Smith shall be in compliance with CCR, Title 8, Section 3395, *Heat Illness Prevention*.

7.13.1 Heat Stress

Heat stress occurs when the body's physiological processes fail to maintain a normal body temperature because of excessive heat. The body reacts to stress related to heat a number of different ways. The reactions range from mild (such as fatigue, irritability, anxiety, and decreased concentration) to severe (such as death). Heat related disorders are generally classified into four basic categories: heat rash, heat cramps, heat exhaustion, and heat stroke. The descriptions, symptoms, and treatment for these diseases are described as follows.

7.13.1.1 Heat Rash

Description - Heat rash is caused by continuous exposure to heat and humid air and is generally aggravated by coarse clothing. This condition decreases the ability to tolerate heat. This condition is the mildest of heat related disorders.

Symptoms - Mild red rash that is generally more prominent in areas of the body in contact with PPE.

Treatment - Decrease the amount of time in PPE and use powder to help absorb moisture.

7.13.1.2 Heat Cramps

Description - Heat cramps are caused by perspiration that is not off-set with adequate fluid intake. This condition is the first sign of a situation that can lead to heat stroke.

Symptoms - Acute, painful spasms occurring in the voluntary muscles (e.g., abdomen and extremities).

Treatment - Remove victim to a cool area and loosen clothing. Have victim drink 1 to 2 cups of water immediately and every 20 minutes thereafter until the symptoms subside. Total water consumption should be 1 to 2 gallons per day. Consult with a physician.

7.13.1.3 Heat Exhaustion

Description - Heat exhaustion is a state of very definite weakness or exhaustion caused by the loss of fluids from the body. This condition is more severe than heat cramps.

Symptoms - Pale, clammy, moist skin with profuse perspiration and extreme weakness. Body temperature is generally normal and the pulse is weak and rapid. Breathing is shallow. The victim may show signs of dizziness and may vomit.

Treatment - Remove the victim to a cool, air conditioned atmosphere. Loosen clothing and require that the victim lay in a flat position with the feet slightly elevated. Have the victim drink 1 to 2 cups of water immediately and every 20 minutes until the symptoms subside. Seek medical attention, particularly in severe situations.

7.13.1.4 Heat Stroke

Description - Heat stroke is an acute and dangerous situation. It can happen in a very short time period. The victim's temperature control system shuts down completely resulting in a rise in body core temperature to levels that can cause brain damage and can be fatal if not treated promptly and effectively.

Symptoms - Red, hot, dry skin, with no perspiring. Rapid respiration, high pulse rate, and extremely high body temperature are other symptoms.

Treatment - Cool the victim quickly. If the body temperature is not brought down fast enough, permanent brain damage or death can result. The victim should be soaked in cool water. Get medical attention as soon as possible.

7.13.1.5 Prevention Measures

There are a number of steps that can be taken to minimize and/or eliminate the potential for heat stress disorders when working in hot atmospheres. Some of these are as follows:

- Acclimate employees to working conditions by slowly increasing workloads over extended periods of time. Do not begin site work activities with the most demanding physical expenditures.
- Where possible, conduct strenuous activities during cooler portions of the day, such as early morning or early evening.
- Provide and encourage all employees to drink lots of tempered water during the course of the work shift and discourage the use of alcohol during nonworking hours. It is essential that fluids lost due to perspiration get replenished.
- During hot periods, use administrative controls to limit exposure.
- Provide cooling devises when appropriate. Mobile showers and/or hose-down facilities, powered air purifying respirators, and ice vests have all proven effective in reducing heat stress potential.

7.13.1.6 Access to Shade

Employees must be afforded access to shade when the temperature exceeds 85 degrees Fahrenheit. When the temperature exceeds 85 degrees Fahrenheit, the employer shall have and maintain one or more areas with shade at all times while employees are present that are either open to the air or provided with ventilation or cooling. The amount of shade present shall be at least enough to accommodate 25 percent of the employees on shift at any time, so they can sit in a normal posture fully in the shade without having to be in physical contact with each other. The shaded area shall be located as close as practicable to the areas where the employees are working.

When the outdoor temperature in the work area does not exceed 85 degrees Fahrenheit, the employer shall provide timely access to shade upon an employee's request, or if the employer can demonstrate that it is infeasible or unsafe to have a shade structure, may utilize alternative procedures for providing safe access to shade if the alternative procedures provide equivalent protection.

Employees shall be allowed and encouraged to take a cool-down rest in the shade for a period of no less than 5 minutes at a time when they feel the need to do so to protect themselves. Such access shall be permitted at all times.

7.13.1.7 High Heat Procedures

CDM Smith shall implement high-heat procedures when temperature equals or exceeds 95 degrees Fahrenheit. These shall include the following to the extent possible:

- Ensuring effective communication by voice, observation, or electronic means is maintained so that employees can contact a supervisor when necessary. An electronic device may be used only if reception in the area is reliable.
- Observing employees for alertness and signs or symptoms of heat illness.
- Reminding employees throughout the work shift to drink plenty of water.
- Close supervision of a new employee by a supervisor or designee for the first 14 days of the employee's employment, unless the employee indicates at the time of hire that he or she has been doing similar outdoor work for at least 10 of the past 30 days for 4 or more hours per day.

7.13.1.8 Training

Employees and supervisors shall be trained regarding heat stress in accordance with the requirements outlined in Title 8, Section 3395, Subsection (f) prior to field tasks.

7.13.1.9 Heat Stress Monitoring

Strenuous field activities that are part of ongoing site work activities in hot weather must be monitored. Employee acclimatization and workloads are to be evaluated and work/rest schedules established as necessary prior to the start of operations.

Heat stress monitoring (temperature and heart rate) may be performed as deemed appropriate by the SSO if some or all of the following criteria are met:

- Periods of high temperatures
- Activities of long duration
- Strenuous activities
- Activities requiring the use of Tyvek or similar impermeable ensembles

Temperatures reach dangerous levels during the peak of the summer, especially when wearing impermeable clothing such as Tyvek. Administrative controls are to be implemented by contractors to prevent or limit prolonged exposure during peak temperature periods. The controls consist of starting earlier in the day to take advantage of lower temperatures, and rotating workers during the afternoon.

When heat stress monitoring is implemented, the following requirements are to be met.

For employees wearing permeable work clothing, the Wet Bulb Globe Temperature Index or physiological monitoring shall be conducted and work/rest schedules established. For employees in impermeable clothing, only physiological monitoring shall be conducted, and work/rest schedules and fluid replacement schedules shall be established. Employees shall conduct heart rate and core temperature monitoring in accordance with the CDM Smith Corporate Health and Safety Manual, and as described below:

1. Heart rates will be monitored in accordance with CDM Smith guidelines. Heart rates will be monitored at beginning of each rest period. Measurement should not exceed 110 beats/minute. If in excess, reduce employee's next work period by 33 percent. If heart rate in excess during next reading, reduce their next work cycle by 33 percent and continue until reading is below 110 beats/minute. The use of heart rate to monitor heat stress and the table in the CDM Smith Corporate Health and Safety Manual comes from the EPA Standard Operating Safety Guides publication 9285.1-03.This information was also included in the famous interagency document, Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (NIOSH/OSHA/USCG/EPA, 1985).

2. Core temperatures will be monitored in accordance with CDM Smith guidelines. Temperatures will be measured orally or by ear at beginning of each rest period. If employee's temperature exceeds 99.6 degrees Fahrenheit, their following work cycle should be reduced by 33 percent, with this procedure continuing until temperature is maintained below 99.6 degrees Fahrenheit.

3. Acclimatization schedule: New workers will be acclimatized to the heat conditions over the first week, with their workload in Level C in the exclusion zone being increased slowly over that period. The acclimatization will be monitored for appropriateness by the SSO.

Given the expected schedule for these activities, the need to implement heat stress monitoring will be continually evaluated by the SSO.

7.13.2 Cold Stress

Persons working outdoors in low temperatures, especially at or below freezing, are subject to cold stress disorders. Exposure to extreme cold for even a short period of time can cause severe injury to the body surfaces and/or profound cooling, which can lead to death. Areas of the body that have high surface area-to-volume ratios, such as fingers, toes, and ears, are the most susceptible.

There are basically two types of cold disorders. They can be classified as localized as is the case with frostbite, or generalized as in hypothermia. The descriptions, symptoms, and treatment for these diseases are described as follows.

7.13.2.1 Hypothermia

Description - As the temperature of the body drops, the thermo-regulatory system attempts to increase the body's generation of heat. This regulation includes the constriction of surface blood vessels, to conserve energy, and the body's production of glucose, to increase the body's metabolic rate, i.e., to be used as fuel to generate heat.

Symptoms - Uncontrollable shivering with the sensation of cold. Slower heartbeat and a weaker pulse are also symptoms.

Treatment - Get individual to a warm environment.

7.13.2.2 Frostbite

Description - Frostbite is a condition in which the fluids around the cells of body tissues freeze. The condition results in damage to and loss of tissue. The most vulnerable parts of the body are the nose, cheeks, ears, fingers, and toes.

Symptoms - Affected areas become white and firm.

Treatment - Get the individual to a warm environment and re-warm the areas quickly. Keep affected areas covered and warm. Warm water can be used to thaw the areas.

7.13.2.3 Preventive Measures

There are a number of steps that can be taken to minimize/eliminate the potential for cold stress disorders when working in a cold environment. Some of these are as follows:

- As with warm environments, individuals can achieve a certain degree of acclimation when working in cold environments. The body will undergo some changes that will increase the body's comfort and also reduce the risk to cold injury.
- Working in cold environments causes significant water losses through the skin and the lungs as a result of the dryness of the air. Increased fluid intake is essential to prevent dehydration, which affects the flow of blood to the extremities and increases the risk of cold injury. Warm, sweet, caffeine-free, nonalcoholic drinks and soups should be readily available.
- Do not allow skin to be continuously exposed to sub-zero temperatures.

7.13.2.4 Cold Stress Monitoring

Air temperature alone is not sufficient to judge the potential for cold-related disorders in a particular environment. Heat loss from convection, air movement at the surface of the skin, is probably the greatest and most deceptive factor in the loss of body heat. For this reason, wind speeds as well as air temperatures need to be considered when evaluating a potential for cold stress disorders. The resultant wind chill index and the potential danger to exposed individuals have been tabulated as shown in Table 7-6.

Table 7-6 - Wind Chill Index

Actual Thermometer Reading (°F)										
Wind Speed in mph	50	40	30	20	10	0	-10	-20	-30	-40
	Equivalent Temperature									
Calm	50	40	30	20	10	0	-10	-20	-30	-40
5	48	37	27	16	6	-5	-15	-26	-36	-47
10	40	28	16	4	-9	-21	-33	-46	-58	-70
15	36	22	9	-5	-18	-36	-45	-58	-72	-85
20	32	18	4	-10	-25	-39	-53	-67	-82	-96
25	30	16	0	-15	-29	-44	-59	-74	-88	-104
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109
35	27	11	-4	-20	-35	-49	-67	-82	-98	-113
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116
Over 40 mph (little added effect)	Little Danger (for properly clothed person)				Increasing Danger (Danger from freezing of exposed parts)			Great Danger (Danger from freezing of exposed parts)		

The human body senses "cold" as a result of both air temperature and wind velocity. Cooling of exposed flesh increases rapidly as the wind velocity goes up. Frostbite can occur at relatively mild temperatures if wind penetrated the body insulation. For example, when the actual air temperature of the wind is 4.4 degrees Celsius (40 degrees Fahrenheit) and its velocity is 48 km/h (30 mph), the exposed skin would perceive this situation as a equivalent still air temperature of -11 degrees Celsius (13 degrees Fahrenheit).

7.14 Housekeeping

For the protection of all persons involved with CDM Smith projects, the following housekeeping rules apply:

- Leads, hoses, and extension cords shall be hung up with a nonconductive material, off all floors, stairways, and walkways. Trash such as drinking cups, cans, and scraps from lunch are not to be thrown down, but disposed of properly in marked containers.
- Available material, equipment, concrete forms, pipe, etc., are to be stacked orderly away from walkways, doors, stairways, and ladders.
- Oil, grease, and other such liquid spills shall be cleaned up at the time of spill and are not to be left unattended.
- Each craft is responsible for housekeeping in their respective work areas.
- Where such items as protruding rebar or anchor bolts create a tripping hazard, they shall be properly protected and conspicuously marked.

7.15 Manual Material Handling

For the protection of all persons involved with CDM Smith projects, the following material handling rules apply:

- An employee shall obtain assistance in lifting heavy objects or power equipment shall be used. Back belts or back braces shall be used as required.
- 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.
- When two or more persons are carrying an object, each employee, if possible, shall face the direction in which the object is being carried.
- 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. Employees shall not attempt to lift beyond their capacity. Caution shall be taken 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 it.
- When performing a task that requires 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 using such tools as screwdrivers and wrenches, employees shall avoid using their 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.
- 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.

7.16 Fall Protection

CDM Smith employees who visit active construction sites may be exposed to falls. 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 should 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 should not use fall arrest equipment until they have been properly trained. Fall protection training can be arranged by contacting your H&S director. Project managers 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 should 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 should 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. CDM Smith personnel shall use full body harnesses for personal fall protection. Fall protection equipment is available from the field equipment centers.
- Fall arrest equipment should 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 1-1/2-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 should consist of rope, wire, or chain and be flagged at intervals of 6 feet or less with high-visibility material. The lowest point should be no less and 34 inches from the surface, and the highest point should be no more than 39 inches. The warning line should be placed at least 6 feet from the edge.

Safety net systems should be installed as close to the working surface as practical, but in no case more than 25 feet below the working surface and should extend outward at least 8 to 13 feet depending on the vertical fall distance. Safety nets should be drop-tested after initial installation and at 6-month intervals. The maximum size of net mesh should not exceed 36 square inches nor be longer than 6 inches on any side. Mesh opening should be secure to prevent enlargement.

- Body belts should not be used for personal fall arrest. Full body harnesses are required.

7.17 Ladders

For the protection of all persons involved with CDM Smith SSFL activities, the following rules apply when use of ladders is involved:

- Wooden ladders shall not be painted so as to obscure a defect in the wood; only a clear, nonconductive finish shall be used.
- All ladders shall be inspected frequently and regularly. Ladders with weakened, broken, or missing steps, broken side rails, or other defects shall be tagged and removed from service.
- Ladders and scaffolds shall be sufficiently strong for their intended use.
- Portable metal ladders shall not be used in the vicinity of energized electrical circuits. (Exception: Such ladders may be used in specialized work, such as high voltage substations, where nonconductive ladders might present a greater hazard. These ladders shall be properly marked.)
- Ladders shall not be placed in front of doors opening toward the ladder unless the door is open, locked, or guarded.
- When ascending or descending ladders, employees shall have both hands free and shall face the ladder.
- Only one employee shall work from a ladder at one time, except for hook type ladders. If two employees are required, a second ladder shall be used.
- Ladders shall not be used as scaffold platforms.
- Boxes, chairs, etc., shall not be used as ladders.

7.17.1 Straight Ladders

- Portable straight ladders shall not be used without nonskid bases.
- The ladder shall be placed so that the distance between the bottom of the ladder and the supporting point is approximately one-fourth of the ladder length between supports.
- Straight ladders shall not be climbed beyond the third step from the top.
- When working from a portable ladder, the ladder must be securely placed, held, tied, or otherwise made secure to prevent slipping or falling.
- When dismounting from a ladder at an elevated position (e.g., from a roof), the employee shall ensure that the ladder side rails extend at least 3 feet above the dismount position, or that grab bars are present.
- Employees shall wear a body harness and lanyard, and tie off to a secure anchor whenever both hands must be used for the job or are exposed to a fall in excess of 6 feet.
- Ladders shall not be spliced together to form a longer ladder.
- A ladder shall not be placed against an unsafe support.

- Employees climbing a ladder with a fall exposure greater than 24 feet shall be protected by an approved cage, ladder-climbing device, or by the use of personal fall arrest equipment.

7.17.2 Step Ladders

- The top two steps shall not be used.
- Stepladder legs shall be fully spread and the spreading bars locked in place.
- Stepladders shall not be used as straight ladders.

When an employee is working on a stepladder over 6 feet high, the employee shall use a body harness and lanyard attached to a substantial anchor.

7.18 Tools and Power Equipment

7.18.1 Hand Tools

For the protection of all persons involved with all CDM Smith projects, the following hand tools rules apply:

- All tools, regardless of ownership, shall be of an approved type and maintained in good condition. Tools are subject to inspection at any time. A foreman has the authority and responsibility to condemn unserviceable tools, regardless of ownership.
- Defective tools shall be tagged to prevent their use or they shall be removed from the jobsite.
- Employees shall always use the proper tool for the job performed.
- Hammers with metal handles, screwdrivers, knives with metal continuing through the handle, and metallic measuring tapes shall not be used on or near energized electrical circuits or equipment.
- Tools shall not be thrown 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.
- Tools shall never be placed unsecured on elevated places.
- All impact tools such as chisels, punches, drift pins, etc., that become mushroomed or cracked shall be dressed, repaired, or replaced before further use.
- Chisels, drills, punches, ground rods, and pipes shall be held with suitable holders or tongs, not with the hands, while being struck by another employee.
- Shims shall not be used to make a wrench fit.
- Wrenches with sprung or damaged jaws shall not be used.
- Pipe shall not be used to extend a wrench handle for added leverage unless the wrench was designed for such use.
- Tools shall be used only for the purposes for which they have been approved.

- Tools with sharp edges shall be stored and handled so that they will not cause injury or damage. They shall not be carried in pockets.
- Wooden handles that are loose, cracked, or splintered shall be replaced. The handle shall not be taped or lashed with wire.
- All cutting tools such as saws, wood chisels, knives, or axes shall be kept in suitable guards or in special compartments.
- Tools shall not be left lying around where they may cause a person to trip or stumble.
- When working on or above open grating, a canvas or other suitable covering shall be used to cover the grating to prevent tools or parts from dropping to a lower level where others are present or the danger area shall be barricaded or guarded.
- The insulation on hand tools shall not be depended upon to protect users from shock.

7.18.2 Portable Electronic Tools

For the protection of all persons involved with all CDM Smith projects, the following rules apply when portable electric tools are used:

- The noncurrent-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 system.
- All power tools shall be examined prior to use to ensure general service-ability and the presence of all applicable safety devices. The electric cord and electric components shall be given an especially thorough examination.
- Power tools shall be used only within their capability and shall be operated in accordance with the instructions of the manufacturer.
- All tools shall be kept in good repair and shall be 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.
- Ground fault circuit interrupters will protect all power tools and cord sets.

7.19 Hearing Conservation

7.19.1 Purpose and Scope

The purpose of this section is to prevent permanent and temporary occupational hearing loss that results from overexposure to noise. This section is applicable to all CDM Smith employees and to all equipment and property used by CDM Smith.

7.19.2 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 the Hearing Protection Methods described in this section. 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 [Hz]).
- **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 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 (dBP)** - 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.
- **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.
- **Lav** - The average sound level (in dBA) computed for a chosen averaging time duration.
- **Lav (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.

7.19.3 Responsibilities

7.19.3.1 Health and Safety Director

- Develops and implements a hearing conservation program.
- Provides guidance to employees (and their managers) whose jobs expose them to hazardous noise levels.
- Provides periodic noise monitoring when necessary.
- Periodically reviews the hearing conservation program for compliance standards.
- Provides employees access to noise survey/dosimetry records.
- Coordinates the medical surveillance program that includes baseline and annual audiograms.
- Recommends the selection of hearing protection and specifies performance (attenuation) requirements.
- Notifies management of all areas that have been designated as noise hazard areas.

7.19.3.2 Site Safety Officer

- Reports suspected hazardous noise areas to the H&S director so that noise monitoring can be conducted.

- Ensures that employees who work in designated noise hazard areas (or are otherwise exposed to hazardous noise) receive pre-placement, annual, and termination audiograms.
- Ensures that employees in high-noise areas use hearing protection devices.
- Notifies the H&S director of any changes in operations that require noise determinations or evaluations.
- Ensures that hearing protection devices are available for use by employees.
- Ensures that employees who participate in the Hearing Conservation Program attend required training and provides documentation of such training.
- Ensures that caution signs are posted in designated noise hazard areas.
- Ensures the design and application of engineering controls recommended by the H&S director that are needed to reduce noise exposures to acceptable limits or to the maximum extent feasible.

7.19.3.3 Employees

Responsibilities of 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 manager or SSO of areas, operations, or equipment that may produce hazardous noise.
- Attend hearing conservation training when necessary.
- Participate in the medical surveillance program.

7.19.3.4 Noise Exposure Limits

Protection against the effects of noise exposure shall be provided when sound levels exceed those in Tables 7-7 and 7-8 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 above. 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 7-7 - 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 7-8 - Impulse Noise Permissible Exposure Limits

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

*Peak sound-pressure level.

7.19.3.5 Hearing Protection Methods

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 described in this section, hearing-protective equipment and/or administrative methods of noise-exposure protection must be used.

Personal Hearing Protection

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

- The SSOs 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.

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 above.

7.19.3.6 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.

7.19.3.7 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.

7.19.3.8 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 this section, 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 the medical surveillance program must receive an annual audiogram.
- All CDM Smith employees who have participated in the medical surveillance program shall receive a final audiometric examination before termination of employment with CDM Smith, job changes within the installation that would alter noise exposure, transfer to another installation, or retirement.

7.19.3.9 Audiometric Testing

Medical Personnel

Medical personnel who perform audiometric tests must be qualified, trained, and knowledgeable in operating equipment used and be under the supervision of an audiologist or physician. If manual audiometers are used, the Council for Accreditation in Occupational Hearing Conservation must certify qualifications of personnel who operate the audiometer. Hearing threshold levels will be determined by audiometers calibrated to zero reference levels of the ANSI S3.6 standard for audiometers.

Pure Tone, Air Conduction Testing

Pure tone, air conduction testing shall be conducted at test frequencies of 500; 1,000; 2,000; 3,000; 4,000; and 6,000 Hz for each ear. Audiometric test equipment shall meet the specification, maintenance, and use requirements of ANSI S3.6. Where a pulsed-tone, self-recording audiometer is used, it will also meet the requirements of 29 CFR 1910.95, Table 3.

- A listening check shall be performed daily before use to ensure that the audiometer is free from distorted or unwanted sounds.
- A functional check shall be performed each day either by using an "acoustical ear" calibrator (dBA sound-level meter with 9A Type Earphone Coupler) or by testing an individual with a known and stable hearing baseline (a "biological check"). A record will be kept of the daily checks. Deviations of 5 dB or more require an acoustical calibration test.
- An acoustical calibration test (using a sound-level meter, octave-band filter set, and a National Bureau of Standards 9A Coupler) shall be performed at least annually (semi-annually for self-recording audiometers), or when a functional check indicates a deviation of 5 dB or more. The acoustical calibration tests shall conform to the requirements of 29 CFR 1910.95, Appendix E. Deviations of 10 dB or more will require an exhaustive calibration.
- An exhaustive calibration shall be performed at least every 2 years, or whenever an acoustical calibration test indicates an error of 10 dB or more. The test will meet the criteria of the current ANSI S3.6 guidelines appropriate for the instrument. Following calibration, the front panel of the audiometer shall be labeled with a tag indicating that is has been calibrated to ANSI S3.6 guidelines and the date of the calibration.
- Rooms used for audiometric testing shall not have background sound-pressure levels that exceed those in the table below. Sound-pressure levels for rooms used for audiometric testing must be checked at least every 2 years.

Table 7-9 - Maximum Background Sound-Pressure Levels for Audiometric Test Booths

Frequency (Hz)	Sound-Pressure Level (dBA)
500	27
1,000	30
2,000	35
4,000	42
8,000	45

- Employees must receive advance written notification of the need to avoid high levels of occupational and nonoccupational noise during the 14 hours immediately preceding an audiometric test. Properly fitted hearing protectors and/or other hearing-protective devices may be used to prevent excessive noise exposures during this period.

A physician or other qualified person shall compare annual audiograms with the employee's baseline audiogram to determine if it is valid and if a standard threshold shift has occurred. It is desirable to review the employee's audiogram record for patterns of change over time. When determining if a standard threshold shift has occurred, allowances for the effects of aging to the hearing threshold level may be made using the procedure described in 29 CFR 1910.95, Appendix F. Audiograms referenced to ASA-1951 must be converted to ANSI S3.6 1969 before hearing threshold levels can be properly determined (see the table below for conversion).

Table 7-10- Threshold Audiogram Conversion ASA-1951 to ANSI-1969

Frequency	dB Difference
250	15
500	15
1,000	10
2,000	10
3,000	10
4,000	5
6,000	10
8,000	10

- To convert an ASA-1951 reference threshold audiogram to ANSI-1969, add the difference in values.
- To convert ANSI-1969 to ASA-1951, subtract the values.
- When evaluation of an audiogram indicates that a standard threshold shift has occurred, a retest shall be scheduled within 30 days to determine if the shift is temporary or permanent. A medical evaluation may be warranted at this time to determine if an acute medical condition is a contributing factor.
- An annual audiogram may be substituted for the baseline when, in the judgment of the audiologist, otolaryngologist, or physician who is evaluating the audiogram, the hearing threshold shown on the annual audiogram indicates significant improvement over the baseline audiogram.

- The employee will be notified of audiometric testing results in writing within 21 days of determination of a permanent threshold sift. The subcontract health care provider retained by CDM Smith shall notify the employer and employee in writing of determinations of permanent threshold shifts.

Criteria for Referral to an Audiologist

The following are criteria for referral to an audiologist for more comprehensive testing:

- Average hearing threshold level greater than 25 dB at 500; 1,000; and 2,000 Hz.
- Single frequency loss greater than 55 dB at 3,000 Hz; or greater than 30 dB at 500; 1,000; or 2,000 Hz.
- Difference in average hearing threshold level between the better and poorer ear of more than 15 dB at 500; 1,000; and 2,000 Hz; or more than 30 dB at 3,000; 4,000; and 6,000 Hz.
- Reduction in hearing threshold level in either ear from the baseline or previous monitoring audiogram of more than 15 dB at 500; 1,000; or 2,000 Hz; or more than 30 dB at 3,000; 4,000; or 6,000 Hz.
- Variable or inconsistent responses or unusual hearing loss curves.

Conditions that Require Follow-Up Review of Employees with Hearing Illness and Responses

- When a permanent threshold shift is detected, a follow-up review must be conducted.
- An employee who is not currently using hearing protection shall be provided (and fitted as necessary) with hearing protectors and shall be trained in their use.
- The employee shall be provided/refitted with hearing protectors that offer greater sound attenuation, as warranted, if hearing protectors are already in use.
- The employee shall be trained/retrained on the hazardous effects of noise and the need to use hearing protection.
- The employee's work area shall be investigated to determine if work practices or changes in equipment or procedures can be made that will decrease noise hazards or if changes have resulted in an increase in noise hazards.
- The employee shall be reassigned to work in a low-noise area, as necessary, to prevent further hearing impairment. The employee will continue to participate in the hearing conservation program.

7.19.3.10 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 *Signs and Decals* below for noise hazard warning sign specifications).

7.19.3.11 Employee Training

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

7.19.3.12 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
- Personnel will be encouraged to use hearing protectors when exposed to hazardous noise in nonoccupational settings (e.g., from lawn mowers, firearms, etc.).

7.19.3.13 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 CDM Smith'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.

7.19.3.14 Signs and Decals

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.

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.

7.20 Personal Protective Equipment

According to past site characterization results, most work activities can be performed using Level D PPE. Therefore, field personnel and subcontractors will don Level D PPE unless specific tasks or working conditions warrant a change as directed by the CDM Smith SSO or H&S director. Specific PPE ensemble requirements are as follows:

7.20.1 Level D

- Steel-toed boots (all site activities)
- Hard hat (all site activities)
- ANSI Class II Safety Vest (all site activities)
- Safety glasses (all site activities)
- Hearing protection (if noisy)
- Cut-resistant work gloves as necessary

Level C ensembles may be required for certain activities as site tasks are evaluated by CDM Smith H&S professionals. Specific level C PPE requirements will be included in task-specific AHAs and any phase-specific HASPs.

For the protection of all persons involved with the field activities, the following requirements apply to use of PPE.

7.20.1.1 Eye Protection

Eye protection shall comply with ANSI Z87.1 requirements. Safety glasses shall be worn at all times at the site.

7.20.1.2 Head Protection

Hard hats which comply with ANSI Z89.1 shall be worn at all times in the work areas unless noted below. No modification to the shell or suspension is allowed unless approved by the manufacturer in writing. Hard hats will be worn with the bill facing forward.

7.20.1.3 Foot Protection

In the work area, steel-toed boots are required. All foot gear must meet the requirements of ASTM International standards F2412-05 (Standard Test Methods for Foot Protection) and F2413-05 (Standard Specification for Performance Requirements for Foot Protection).

7.20.1.4 Hand Protection

Cut-resistant gloves shall be worn if necessary to handle any rough or sharp objects.

7.20.1.5 Safety Vests

Class II safety vests (must bear a label showing ANSI/ISEA 107 compliance) shall be worn at all times when working in the field. Class II vests are designed to protect employees when working near motorized traffic or heavy machinery.

7.20.1.6 Vehicle Safety

Seat belts shall be worn when operating vehicles. Riding in the bed of pickups is prohibited.

7.20.1.7 Shirts and Pants

Shirts covering the full trunk and shoulders are required. Tank tops or midriff shirts are not allowed. Cut-off jeans or shorts shall not be worn on the job site.

7.20.1.8 Hearing Protection

Use of heavy equipment may expose the field team to noise levels that exceed the OSHA limit of 90 dBA for an 8-hour day. All hearing protection must have a minimum noise reduction rating of 27 dB.

7.21 Emergency Response Communication

The following outlines the contact information for emergency response individuals and organizations during site operations.

EMERGENCY CONTACTS	NAME	PHONE
Site Safety Officer/Radiological Technician	James Harris	(818) 466-8007
Site Health and Safety Oversight	Paul Open	(406) 293-1547
Project Manager	John Wondolleck	(925) 899-5371
Field Team Leader	Pamela Hartman	(925) 296-8053
Lead Geologists	Mike Hoffman/Peggy Bloisa	(925) 296-8053
Field Planning Lead	Steve Fundingsland	(720) 264-1107
OE	Stephanie Jennings	(818) 466-8162
EPA	Mary Aycock	(415) 271-1253
State Spill Number	California	(818) 466-8911

EMERGENCY CONTACTS	NAME	PHONE
Fire Department		(818) 466-8911
Police Department		(818) 466-8911
State Police		(818) 466-8911
Health Department	Ventura Co. Emergency Services	(818) 466-8911
Poison Control Center	Nationwide	(800) 222-1222
Occupational Physician	Jerry Berke	(800) 350-4511
EPA Release Report		(800) 424-8802
CDM Smith 24-Hour Emergency		(571) 216-7004
Boeing Communications Center		(818) 466-8911

7.21.1 Medical Emergency

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. CDM Smith and subcontractor first aid kits will be inspected by the SSO regularly and documented via SafetyNet.

Personnel will have a two-way radio with them while in the field and will review procedures for communicating emergencies to the Boeing Communications Center (which has the capability of notifying emergency services)prior to starting work activities. The site contact number is (818) 466-8911 for all medical emergency needs.

The affected employee(s) and / or their supervisor(s) must notify the H&S director of any injury, near-miss, or property damage incident verbally or electronically as soon as possible. They must submit a completed CDM Smith Injury / Incident Report Form to the H&S director within 24 hours of the incident.

Directions to the closest hospital are as follows:

HOSPITAL NAME/ADDRESS	PHONE
West Hills Hospital and Medical Center	(818) 676-4100
7300 Medical Center Drive Los Angeles, CA 91307	
Ambulance	(818) 466-8911 (to Boeing Communications Center)

Route to Hospital:

1) Head east 2.1 miles on F Street /Service Area Road to facility security point.
2) Turn right at Woolsey Canyon Road and continue 2.5 miles.
3) Make sharp right onto Valley Circle Boulevard and continue 1.7 miles.
4) Turn left at Ingomar Street and continue 0.5 miles.
5) Continue onto Saticoy Street and continue 0.4 miles (be aware that Ingomar Street becomes Saticoy Street).
6) Turn right at Woodlake Avenue and continue 0.3 miles.
7) Take third left onto Medical Center Drive and continue 0.2 miles.

Distance to hospital: approximately 8 miles.

A map from the site to the above hospital is provided in Figure 7-1.

7.22 Spill Response Procedures

In the event that a spill or release of suspected hazardous material occurs during project activities, the following procedures will take place:

- Contact the SSO immediately for instructions. Certain small spills may be attempted to be contained by CDM Smith personnel, provided the expertise and equipment is available. For instance, small hydraulic fluid leaks may be contained with absorbent material, which is then placed in an appropriately labeled container and disposed of properly.
- PPE to be used during any attempted cleanups or containment will be determined by the SSO.
- The spill will be reported by the SSO to the PM and documented through SafetyNet. Reporting will be conducted by the PM to EPA and other agencies as required.
- Spills or releases will be handled by CDM Smith in accordance with DOE and governmental regulations.

7.23 Illumination

Areas accessible to employees shall be lighted to not less than the minimum illumination intensities listed in the following Table 7-11 while any CDM Smith work is in progress:

Table 7-11 Minimum Intensities in Foot-Candles

Foot-Candles	Area or Operations
5	General site areas.
3	Excavation and waste areas, accessways, active storage areas, loading platforms, refueling, and field maintenance areas.
5	Indoors: warehouses, corridors, hallways, and exitways.
5	Tunnels, shafts, and general underground work areas; (Exception: minimum of 10 foot-candles is required at tunnel and shaft heading during drilling, mucking, and scaling.) Mine Safety and Health Administration approved cap lights shall be acceptable for use in the tunnel heading.
10	General shops (e.g., mechanical and electrical equipment rooms, active storerooms, barracks or living quarters, locker or dressing rooms, dining areas, and indoor toilets and workrooms).
30	First aid stations, infirmaries, and offices.

7.24 Sanitation

CDM Smith will provide for the following sanitation facilities, services, and equipment at temporary workplaces during SSFL field tasks, in compliance with 29 CFR 1910.120.

7.24.1 Potable Water

- An adequate supply of potable water shall be provided to all employees on the site.
- Potable containers used to dispense drinking water shall be capable of being tightly closed, and equipped with a tap. Water shall not be dipped from containers.
- Any container used to distribute drinking water shall be clearly marked as to the nature of its contents and not used for any other purpose.

- Where single service cups are supplied, both a container for the unused cups and a receptacle for disposing of the used cups shall be provided.

7.24.2 Nonpotable Water

- Outlets for nonpotable water, such as water for firefighting purposes, shall be identified to indicate that the water is unsafe for drinking, washing, or cooking purposes.
- There shall be no connections, open or potential, between a system furnishing potable water and a system furnishing nonpotable water.

7.24.3 Toilet Facilities

- Toilets shall be provided for employees according to the following table.

Table 7-12 – Toilet Facilities

Number of employees	Minimum number of facilities
20 or fewer	One.
More than 20, fewer than 200	One toilet seat and 1 urinal per 40 employees.
More than 200	One toilet seat and 1 urinal per 50 employees.

- Under temporary field conditions, provisions shall be made to assure not less than one toilet facility is available.
- Hazardous waste sites, not provided with a sanitary sewer, shall be provided with the following unless prohibited by local codes: chemical toilets, recirculating toilets, combustion toilets, or flush toilets.
- These requirements for sanitation facilities shall not apply to mobile crews having transportation readily available to nearby toilet facilities.
- Doors entering toilet facilities shall be provided with entrance locks controlled from inside the facility.

7.24.4 Washing Facilities

- For operations where hazardous substances may be harmful to employees, CDM Smith shall provide adequate washing facilities.
- Washing facilities shall be in near proximity to the worksite, in areas where exposures are below permissible exposure limits, and equipped to enable employees to remove hazardous substances from themselves when necessary.

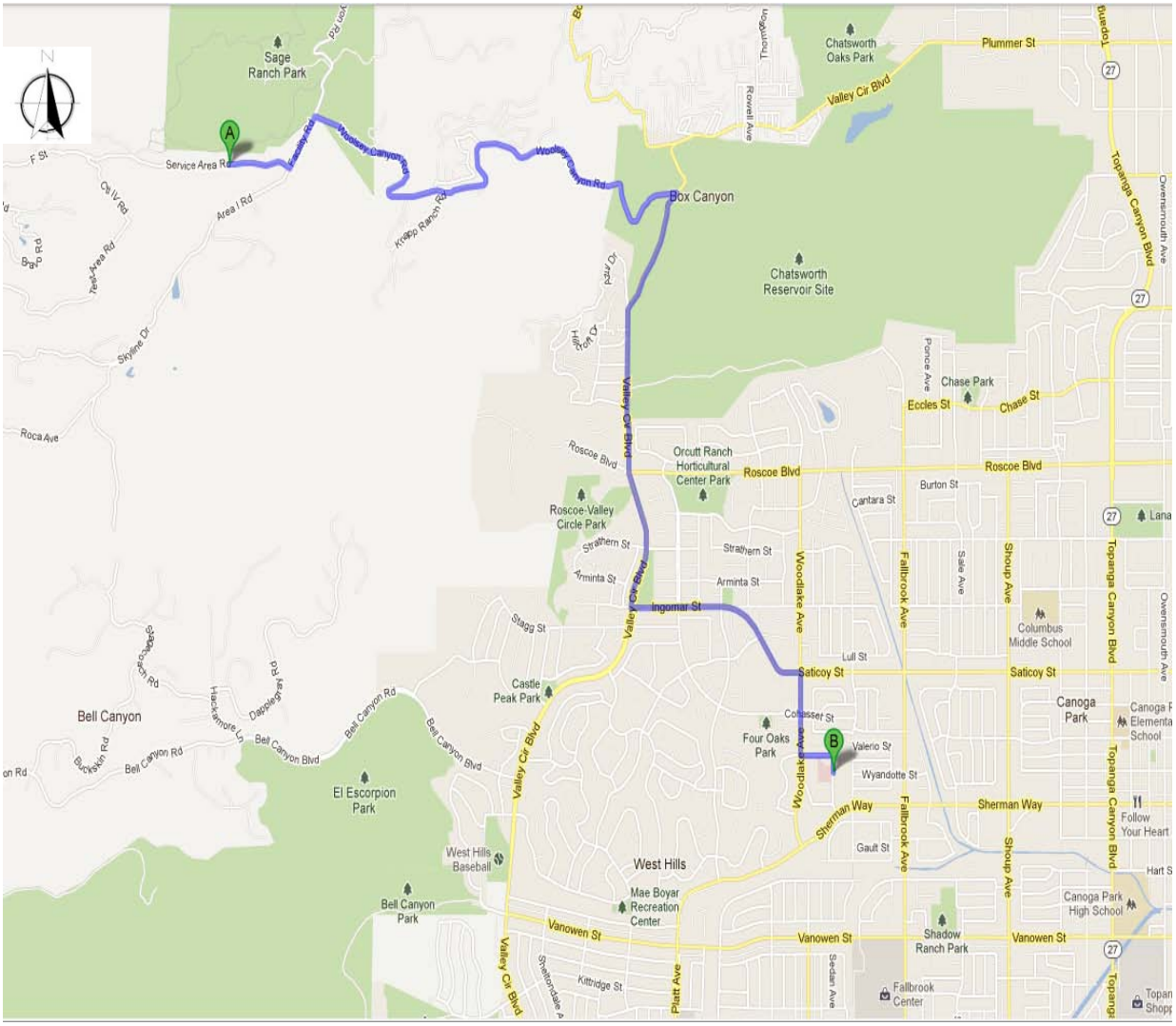


Figure 7-1
Hospital Map - A) SSFL Site Location to B) West Hills Medical Center

Section 8

Training and Information

CDM Smith shall ensure that each of its workers exposed or potentially exposed to site hazards are provided with the appropriate skills, attitude, and knowledge to safely perform their tasks. The following sections describe CDM Smith site training and information requirements.

8.1 Required Initial Training

8.1.1 Site-Specific Training

CDM Smith operations at SSFL contain unique and site-specific hazards that employees must be aware of prior to performing assigned duties. The SSO or their designee shall conduct a site-specific H&S training session with CDM Smith or subcontractor employees that are new to the site to inform them of major site/task hazards, H&S protocol, and means of communicating identified hazards.

The Site-Specific H&S Training covers the following topics:

- CDM Smith's H&S philosophy and principals
- H&S objectives
- Key personnel - roles and responsibilities
- CDM Smith H&S performance
- Emergency notification, evacuation, and related procedures
- First aid assistance
- Hazard communication
- Expected site tasks
- Site-specific contaminants
- Contaminant monitoring equipment
- Expected site hazards
- General Employee Radiological Training
- Radiological survey instrument training

8.1.2 Radiological Training

All employees performing field work at SSFL will complete General Employee Radiological Training, delivered by the SSO, their designee, or an approved vendor.

All employees operating radiological instruments as part of their site duties will receive instrument-specific training delivered by the SSO, their designee, or an approved vendor. Training will include the operation, handling, and storage of instruments, including those used during source checks.

8.1.3 Thirty-Hour OSHA Construction Safety

Personnel who act in an SSO capacity at SSFL must complete an approved 30-hour OSHA Construction Safety course prior to performing duties onsite.

8.1.4 Training for Hazardous Waste Operations

Personnel who perform hazardous waste work at SSFL as defined by 29 CFR1910.120, the OSHA Hazardous Waste Operations and Emergency Response Standard, shall participate in CDM Smith hazardous waste H&S training, which includes:

- 40 hours of initial H&S training
- 8 hours of annual refresher training
- 8 hours of training for supervisors

8.1.4.1 Initial 40-Hour Hazardous Waste H&S Training

CDM Smith provides initial 40-hour hazardous waste H&S training via vendors who have been pre-qualified by the H&S director. Minimum training content must include basic information relevant to hazardous waste operations required by 29 CFR 1910.120.

8.1.4.2 Eight-Hour Hazardous Waste Refresher Training

Personnel actively involved in CDM Smith hazardous waste projects 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 be 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 CDM Smith instructor.
- Attend an 8-hour refresher class approved by the H&S director and provided by a vendor, client, or subcontractor.
- Complete a computer-based 8-hour refresher curriculum approved by the H&S director. An online 8 hour refresher course is available through CDM Smith University (CDMU).

The 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.

8.1.4.3 Eight-Hour Hazardous Waste Supervisory Training

Personnel who act in a management or supervisory capacity on hazardous waste activities may also receive an additional 8 hours of training on supervisory and management issues related to hazardous waste project management. Topics presented include:

- CDM Smith H&S requirements for hazardous waste operations
- Project/site H&S plans
- 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
- 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, complete 3 days of on-the-job training on field hazardous waste projects working with a qualified manager, and be nominated by their manager. The course is given periodically based on need for the course. Hazardous waste supervisory classes are presented by the H&S director or his designee. A vendor presented hazardous waste supervisory course may be substituted, provided the course is approved by the appropriate H&S director and the student receives a briefing from the H&S director on CDM Smith management roles and responsibilities and CDM Smith hazardous waste H&S procedures. In cases where CDM Smith hires an employee with documented hazardous waste supervisory training from another employer, such training shall be considered the same as vendor-supplied supervisor training and the employee shall not be certified as a CDM Smith hazardous waste site manager until briefed on CDM Smith management responsibilities and procedures.

8.1.5 Boeing Site Orientation

All employees working at SSFL will complete the Boeing site-specific H&S orientation course, delivered by Boeing onsite.

8.2 New Hazard/Task-Specific Training

Training shall be provided by CDM Smith to impacted employees as new hazards arise from changing field conditions or new processes/operations at SSFL.

New hazard or task-specific training may be provided by the SSO, CDM Smith safety professionals, managers/supervisors, or via in-house courses (arrangements can be made for training through qualified vendors). Employees may contact their manager to make arrangements for an instructor led hazard- or task-specific training session. Some hazard specific training classes are available online through the CDMU system.

Section 9

Recordkeeping and Reporting

9.1 Recordkeeping

Exposure measurements collected in the field during CDM Smith's work at SSFL, as well as exposure controls, are recorded in field logbooks maintained by CDM Smith. Hazard assessments performed by CDM Smith are recorded in their task-specific AHAs or any phase-specific HASPs. Injuries and illnesses of CDM Smith workers will be recorded in accordance with DOE Manual 231.1-1A (most current version) and 10 CFR 851.23. Related injury/illness data will be analyzed by CDM Smith for trends in order to adequately direct resources and initiatives that provide worker protection. Information regarding noncompliance will be maintained and made available to DOE.

9.2 Reporting and Investigation

While all accidents should be reported using the CDM Smith Injury/Illness Report Form, some accidents may be of such a severity or have the potential to cause severe consequences, that a prompt formal accident investigation is warranted. The need to conduct a formal accident investigation will be determined by the H&S director. A project manager, client officer, corporate manager, resource manager, manager of client service or unit president or equivalent position may also request a formal accident investigation. Investigations will be conducted promptly by the H&S director or someone designated by them.

Injury and illness data will be collected and compiled in accordance with procedures outlined in CDM Smith's H&S Manual. The SSO and H&S director shall follow up with the project manager to ensure that corrective action, if identified in the Injury/Illness Report Form, has been implemented. DOE specific accident reporting procedures (as applicable) will also be enacted.

Workers have the right to request and receive the results of H&S inspections and accident investigations performed at the site. Injuries and illnesses shall be investigated by CDM Smith H&S professionals to determine a root cause and prevent recurrence of events. Site H&S data will be continually reviewed by CDM Smith professionals to identify trends and leading indicators before accidents, injuries, or illnesses occur at the site.

CDM Smith management and site H&S staff shall evaluate the lessons on previous tasks and share this information among all site personnel. This imparted knowledge will be a powerful influence in preventing future incidents and creating a safer, more protective work environment. Lessons learned may be communicated through such means as: activity-specific safety training; tool box safety talks; safety memos; and safety inspections.

Section 10
References

CCR (California Code of Regulations).Title 8, Industrial Relations, Section 5192, Hazardous Waste Operations and Emergency Response.

_____. Title 8, Industrial Relations, Section 1590, Haulage and Earth Moving, General.

_____. Title 8, Industrial Relations, Section 2946, Provisions for Preventing Accidents Due to Proximity to Overhead Lines.

_____. Title 8, Industrial Relations, Section 5157,.Permit-Required Confined Spaces..

_____. Title 8, Industrial Relations, Section 3395, Heat Illness Prevention.

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_____. 2011. Corporate Health and Safety Manual. March.

_____. 2011. Integrated Safety Management System Description, Revision O. October.

_____. 2012a. Work Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV. January.

_____. 2012b. Master Field Sampling Plan for Chemical Data Gap Investigation, Phase 3 Soil Chemical Sampling at Area IV. January.

DOE (U. S. Department of Energy). 2006. 10 CFR Part 851, *Worker Safety and Health Program; Final Rule*. February 9.

_____. 2006. DOE G 440.1-8, Implementation Guide for Use with 10 CFR 851 Worker Safety and Health Program. December 27.

_____. 2003. DOE Order 450.1, *Environmental Protection Program*. January 15.

_____. 1996. DOE P 450.4, *Integrated Safety Management Policy*. October 15.

Attachment A
10 CFR 851 Crosswalk
Crosswalk Between Sections of the Rule, CDM Smith's WSHP, and the Implementation Guide

10 CFR 851 Crosswalk

Crosswalk Between Sections of the Rule, CDM Smith's WSHP, and the Implementation Guide				
Rule Section		CDM Smith's WSHP		Paragraph in Body of Implementation Guide
Section	Subject	Section	Title	
(Subpart C)	Specific Requirements			3.3
	Management responsibilities and worker rights and responsibilities	3	Rights and Responsibilities	3.3.1
(851.20(a))	Management responsibilities	3.1	Management and Worker Responsibilities	3.3.1.1
(851.20.(a)(1))	Policy, goals, and objectives	2	ISMS Overview	3.3.1.1.1
(851.20(a)(2))	Qualified staff	3.1	Management and Worker Responsibilities	3.3.1.1.2
(851.20(a)(3))	Accountability	3.1	Management and Worker Responsibilities	3.3.1.1.3
(851.20(a)(4))	Employee involvement	3.1	Management and Worker Responsibilities	3.3.1.1.4
(851.20(a)(5))	Access to Information	3.1	Management and Worker Responsibilities	3.3.1.1.5
(851.20(a)(6))	Report events and hazards	3.1	Management and Worker Responsibilities	3.3.1.1.6
(851.20(a)(7))	Prompt response to reports	3.1	Management and Worker Responsibilities	3.3.1.1.7
(851.20(a)(8))	Regular communications	3.1	Management and Worker Responsibilities	3.3.1.1.8
(851.20(a)(9))	Stop work authority	3.1	Management and Worker Responsibilities	3.3.1.1.9
(851.20(a)(10))	Inform workers of rights	3.1	Management and Worker Responsibilities	3.3.1.1.10
(851.20(b))	Worker rights and responsibilities	3.2	Worker Rights	3.3.1.2
(851.20(b)(1))	Participate on official time	3.2	Worker Rights	3.3.1.2.1
(851.20(b)(2))	Access to information	3.2	Worker Rights	3.3.1.2.2
(851.20(b)(3))	Notification of monitoring results	3.2	Worker Rights	3.3.1.2.3

Crosswalk Between Sections of the Rule, CDM Smith's WSHP, and the Implementation Guide				
Rule Section		CDM Smith's WSHP		Paragraph in Body of Implementation Guide
Section	Subject	Section	Title	
(851.20(b)(4))	Observe monitoring	3.2	Worker Rights	3.3.1.2.4
(851.20(b)(5))	Accompany inspections	3.2	Worker Rights	3.3.1.2.5
(851.20(b)(6))	Results of inspections and investigations	3.2	Worker Rights	3.3.1.2.6
(851.20(b)(7))	Express concerns	3.2	Worker Rights	3.3.1.2.7
(851.20(b)(8))	Decline to perform in imminent risk	3.2	Worker Rights	3.3.1.2.8
(851.20(b)(9))	Stop work	3.2	Worker Rights	3.3.1.2.9
	Hazard identification and assessment	4	Hazard Identification and Assessment	3.3.2
(851.21(a))	Identify and assess risks	4.1	Hazard Identification Procedures and Assessment of Risk	3.3.2.1
(851.21(a)(1))	Assess workers exposures	4.1 4.3	• Hazard Identification Procedures and Assessment of Risk • Baseline and Subsequent Assessment	3.3.2.1.1
(851.21(a)(2))	Document hazard assessment	4.1	Hazard Identification Procedures and Assessment of Risk	3.3.2.1.2

Crosswalk Between Sections of the Rule, CDM Smith's WSHP and the Implementation Guide				
Rule Section		CDM Smith's WSHP		Paragraph in Body of Implementation Guide
Section	Subject	Section	Title	
(851.21(a)(3))	Record results	4.1	Hazard Identification Procedures and Assessment of Risk	3.3.2.1.3
(851.21(a)(4))	Analyze designs for potential hazards	4.1	Hazard Identification Procedures and Assessment of Risk	3.3.2.1.4
(851.21(a)(5))	Evaluate operations, procedures, and facilities	4.1	Hazard Identification Procedures and Assessment of Risk	3.3.2.1.5
(851.21(a)(6))	Job activity-level hazard analysis	4.1	Hazard Identification Procedures and Assessment of Risk	3.3.2.1.6
(851.21(a)(7))	Review safety and health experience	4.1	Hazard Identification Procedures and Assessment of Risk	3.3.2.1.7
(851.21(a)(8))	Consider other hazards	4.1	Hazard Identification Procedures and Assessment of Risk	
(851.21(b))	Closure facilities hazard identification	4.2	Closure Facility Requirements	3.3.2.2
(851.21(c))	Hazard identification schedule	4.3	Baseline and Subsequent Assessment	3.3.2.3
(851.22)	Hazard prevention and abatement	5	Hazard Prevention and Abatement	3.3.3
(851.22(a))	Hazard prevention and abatement process	5.1	Process to Prevent or Abate in a Timely Manner	3.3.3.1

Crosswalk Between Sections of the Rule, CDM Smith's WSHP, and the Implementation Guide				
Rule Section		**CDM Smith's WSHP**		**Paragraph in Body of Implementation Guide**
Section	**Subject**	**Section**	**Title**	
(851.22(a)(1))	During design or procedure development	Under this Task Order, CDM is not responsible for facility design. Procedural hazard control is described in the following: 5.1	Process to Prevent or Abate in a Timely Manner	3.3.3.1.1
(851.22(a)(2))	Existing hazards	5.1	Process to Prevent or Abate in a Timely Manner	3.3.3.1.2
(851.22(b))	Hierarchy of controls	5.2	Hazard Control Hierarchy	3.3.3.2
(851.22(b)(1))	Substitution	5.2	Hazard Control Hierarchy	3.3.3.2.1
(851.22(b)(2))	Engineering	5.2	Hazard Control Hierarchy	3.3.3.2.2
(851.22(b)(3))	Work practices and administrative	5.2	Hazard Control Hierarchy	3.3.3.2.3
(851.22(b)(4))	Personal protective equipment	5.2	Hazard Control Hierarchy	3.3.3.2.4
(851.22(c))	Purchasing equipment, products, and services	5.3	Purchasing Equipment, Products, and Services	3.3.3.4
(851.23)	Safety and health standards	6	Safety and Health Standards	3.3.4
(851.24)	Functional areas	7	Functional Areas	3.3.5
(851.25)	Training and information	8	Training and Information	3.3.6
(851.26)	Recordkeeping and reporting	9	Recordkeeping and Reporting	3.3.7
(851.26(a))	Hazard abatement tracking	5 9.1	• Hazard Prevention and Abatement • Recordkeeping	3.3.7.1
(851.26(b))	Reporting and investigation	9.2	Reporting and Investigation	3.3.7.2

Crosswalk Between Sections of the Rule, CDM Smith's WSHP, and the Implementation Guide				
Rule Section		CDM Smith's WSHP		Paragraph in Body of Implementation Guide
Section	Subject	Section	Title	
(851.27)	Reference sources	10	References	3.3.8
Appendix A				
1	Construction safety	7.1	Construction Safety	3.6.1
2	Fire protection	7.2	Fire Protection	3.6.2
3	Explosives safety	7.4	Explosives Safety	3.6.3
4	Pressure safety	7.5	Pressure Safety	3.6.4
5	Firearms safety	7.3	Firearms Safety	3.6.5
6	Industrial hygiene	7.7	Industrial Hygiene	3.6.6
7	Biological safety	7.9	Biological Safety	3.6.7
8	Occupational medicine	7.8	Occupational medicine	3.6.8
9	Motor vehicle safety	7.10	Motor Vehicle Safety	3.6.9
10	Electrical safety	7.6	Electrical Safety	3.6.10

Attachment B
Health and Safety Plan for Phase 3
Chemical Data Gap Investigation

In accordance with the AOC, the Phase 3, Chemical Data Gap Investigation Site-Specific Health and Safety Plan has been prepared in accordance with federal regulations (29 CFR 1910.120) and state regulations (Title 8 CCR Section 5192). This plan, CDM Smith's Health and Safety Plan (HASP), has been developed to meet the requirements of the AOC specific to the Site while providing a concise, readily usable plan to be used in the field for all CDM Smith and its subcontractor employees. This HASP, including activity hazard analyses (AHAs), are components of CDM Smith's Health and Safety Program which includes the SSFL Integrated Safety Management System (ISMS) and SSFL Worker Safety and Health Program (WSHP) and the reader is directed to those documents for additional detail on CDM Smith's Health and Safety Program. The following cross-reference has been developed to assist the reader in locating required AOC elements in this HASP and WSHP.

	AOC Requirement for Plan	Location in HASP	Location of Additional Detail in WSHP
1	Site Background/ History/ Work Plan;	Page 3	Section 1
2	Key Personnel and Responsibilities;	Page 1 and 10	Section 3
3	Job Hazard Analysis/ Summary;	Page, 3B, 3C, 3D, 6, AHAs	Section 4
4	Employee Training:	Page 1 and 6	Section 8
5	Personal Protection;	Page 7	Section 7.20
6	Medical Surveillance;	Page 1 and 6	Section 4.3
7	Air Surveillance (environmental monitoring);	Page 5, 8, 13, 16, and 17	Section 7.7
8	Site Control;	Page 3 and 9	Section 7.1 and 7.7
9	Decontamination;	Page 3 and 9	Section 7.7
10	Contingency Planning (Emergency Response);	Page 3d, 10, 11	Section 7.2
11	Confined Space Operations;	Page 10	Section 7.12
12	Spill Containment;	Page 6 and 10	Section 7.22
13	Sanitation;	Page 10a	Section 7.24
14	Illumination; and	Page 10a	Section 7.23
15	Other applicable requirements based on the work to be performed.	Boeing Service Provider Manual (Attachment)	

HEALTH AND SAFETY PLAN FORM
CDM Smith Health and Safety Program

This document is for the exclusive use of CDM Smith and its subcontractors

CDM Federal Programs Corporation (CDM Smith)

PROJECT NAME	SSFL Environmental Support	**PROJECT#**	63376.1203.004	**REGION**	Southwest
SITE ADDRESS	Santa Susana Field Laboratory	**CLIENT ORGANIZATION**		United States Department of Energy	
	Area IV	**CLIENT CONTACT**		Stephanie Jennings	
	Ventura County, California	**CLIENT CONTACT PHONE #**		818 466-8162	

( ) AMENDMENT TO EXISTING APPROVED H&SP?

( ) H&SP AMENDMENT NUMBER? _____ **( ) DATE OF PREVIOUS H&SP APPROVAL** _____

OBJECTIVES OF FIELD WORK:
(e.g. collect surface soil samples):

1. Perform direct push technology (DPT) drilling and collect soil samples. 2. Excavate test trenches and collect soil samples. 3. Hand augering and collection of soil samples. 4. Perform radiation monitoring and volatile organic compound (VOC) monitoring during intrusive activities. 5. Perform geophysical investigation. 6. Perform Archeological/Native American Monitoring - Biological Sensitive Area clearance.

SITE TYPE: *Check as many as applicable*

Active	( )	Landfill	(X)	Unknown	( )
Inactive	(X)	Uncontrolled	( )	Military	( )
Secure	(X)	Industrial	(X)	Other (specify)	
Unsecure	( )	Recovery	( )	Non-developed Land	(X)
Enclosed space	( )	Well Field	( )		

All requirements described in the **CDM Smith Health and Safety Manual** are incorporated in this health and safety plan by reference.

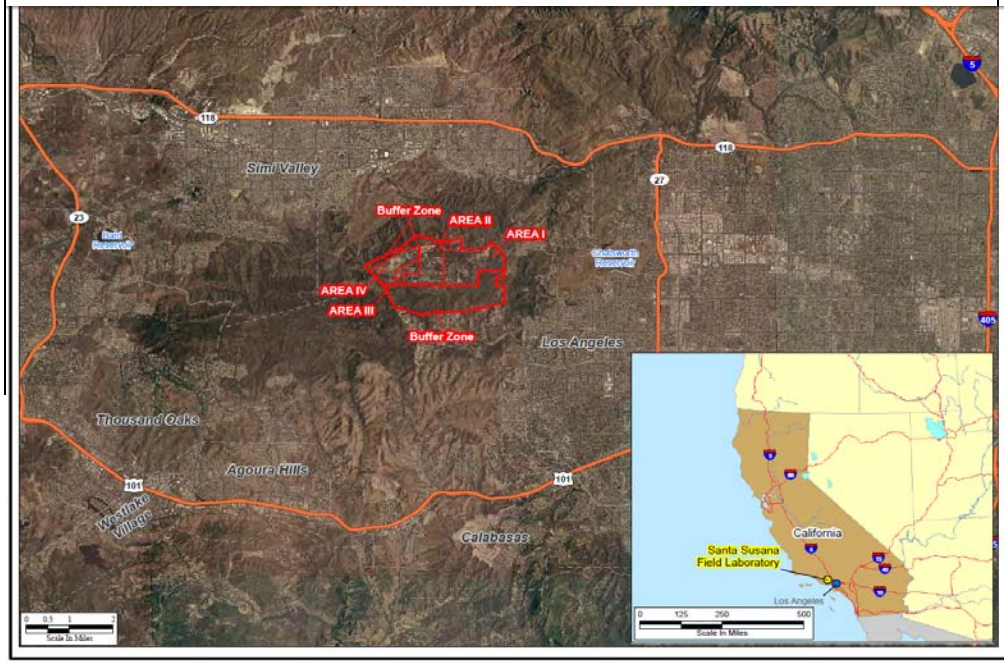
PERSONNEL AND RESPONSIBILITIES

	NAMES OF WORK CREW MEMBERS	Company / Division / Office	Current Training & Medical?	Project or Site Responsibilities	Tasks On Site?
	Mike Hoffman /Peggy Bloisa	CED	Yes	Lead Geologist	1, 2, 3, 4, 5, 6
	Steven Fundingsland	CED	No	Field Planning Lead	NA
	James Harris	CED	Yes	SSO/Radiological Technician	1, 2, 3, 4, 5, 6
	Pamela Hartman	CED	Yes	Field Team Leader	1, 2, 3, 4, 5, 6
	Field Team	CED	Yes	Field Team	1, 2, 3, 4, 5, 6
	John Wondolleck	FSG	No	Project Manager	NA
	Paul Opem	CED	Yes	Site Health and Safety Oversight	1, 2, 3, 4, 5, 6
	Drilling subcontractor (to be determined)			Subcontractor	1
	Excavation subcontractor (to be determined)			Subcontractor	2
	Geophysics subcontractor (to be determined)			Subcontractor	5
	Archeological/Native American Monitor subcontractor (to be determined)			Subcontractor	6
	Biological Surveys (to be determined)			Subcontractor	6
	Utility Locator subcontractor (to be determined)			Subcontractor	1, 2, 3

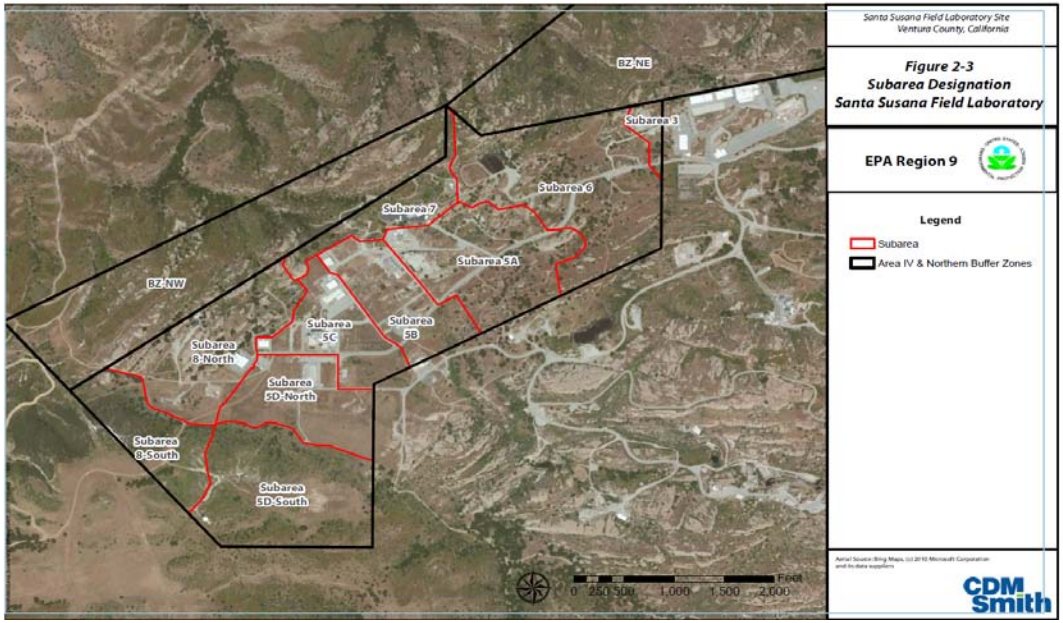
BACKGROUND REVIEW: (x) Complete ( ) Incomplete

SITE MAP: *Show Exclusion, Contamination Reduction, and Support Zones. Indicate Evacuation and Reassembly Points*

General Site Map



Area IV with Subarea Locations



HISTORY: *Summarize conditions that relate to hazard. Include citizen complaints, spills, previous investigations or agency actions, known injuries, etc.*

The SSFL is located in southeastern Ventura County, California, and has an area of approximately 2,850 acres south of Simi Valley. The SSFL is separated into four administrative areas. The Boeing Company (Boeing) owns all of Area IV, the location of SSFL where DOE's Energy Technology Engineering Center (ETEC) was located. DOE does not own any of the land that comprised the 90-acre ETEC area, with ownership and management performed by Boeing and its predecessor companies. DOE was and remains responsible for operation of the ETEC located in Area IV. (continued on pg 3A)

WASTE TYPES: (X) Liquid (X) Solid (X) Sludge (X) Gas ( ) Unknown (X) Other, specify: Potential radioactive

WASTE CHARACTERISTICS: *Check as many as applicable.*

( ) Corrosive	( ) Flammable	(X) Radioactive
(X) Toxic	(X) Volatile	( ) Reactive
( ) Inert Gas	( ) Unknown	
(X) Other: Metals		

WORK ZONES:

During both drilling operations and excavation operations the field sites will have exclusion zones, contamination reduction zones (CRZs), and support zones established and controlled. Personnel will adhere to procedures in CDM Smith SSFL WSHP.

HAZARDS OF CONCERN: *Check as many as applicable.*

(X) Heat Stress	(X) Noise
(X) Cold Stress	(X) Inorganic Chemicals
( ) Explosive/Flammable	(X) Organic Chemicals
( ) Oxygen Deficient	(X) Motorized Traffic
(X) Radiological	(X) Heavy Machinery
(X) Biological	(X) Slips & Falls
( ) Other:	
(X) Other: DUST	

FACILITY'S PRESENT DISPOSAL METHODS AND PRACTICES:

All investigation-derived waste (IDW) will be classified, labeled and stored in sealed containers (e.g., drums). Disposal will be disposed of in accordance with state, Federal, and local regulations, including site-specific procedures as discussed in the field planning meeting. Containerized decontamination water will be stored upright in appropriate containers (e.g., drums) away from vehicle traffic. Containers will be labeled as IDW and the contents specified. Full containers shall be moved using a dolly or heavy equipment to minimize risk of worker injury, spillage, or a tip over.

CDM Smith's Attachments to HASP:

AHA - DPT Drilling
AHA - Hand Augering
AHA - Excavation/Trenching
AHA - Geophysics

Boeing Service Provider Manual
Maintenance and Calibration Procedures for Field Monitoring Equipment
are Maintained at the Site Tralier

HISTORY: *Summarize conditions that relate to hazard. Include citizen complaints, spills, previous investigations or agency actions, known injuries, etc.*

The ETEC facility within Area IV had several purposes, one of which was the development and testing of components used in metallic sodium systems. The other main purpose was the testing of small, experimental nuclear reactors. Nuclear operations at the ETEC included 10 nuclear research reactors, seven critical facilities, the Hot Laboratory, the Nuclear Materials Development Facility, the Radioactive Materials Handling Facility, and various test and radioactive material storage areas. In addition to the handling and processing of radioactive materials, these DOE facilities also used non-radioactive chemicals, a variety of specialty metals, and other hazardous materials (e.g., polychlorinated biphenyls [PCBs], solvents, and lead-based paints) in their operations. All nuclear research in Area IV was terminated in 1988 when DOE shifted its focus at SSFL from research to decontamination and decommissioning (D&D) activities. D&D of the sodium test facilities started in 1996, when DOE determined that the entire ETEC facility was surplus to its mission. At that time, DOE began formal closure of its facilities in Area IV and began cleanup activities in preparation for return of the property to Boeing. DOE discontinued D&D and demolition of the remaining facilities in 2008, but has continued surveillance, maintenance, monitoring, and investigation activities. This includes investigation of soil and groundwater, as required under the California Department of Toxic Substances Control (DTSC) Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) and the United States Environmental Protection Agency (EPA) radiological investigation.

OTHER KNOWN HAZARDS	DESCRIPTION OF HAZARD	MANAGEMENT OF HAZARD
HEAT ILLNESS	Heat Stress may be experienced on this project. One or more of the following conditions indicates excessive heat strain: • Sustained (several minutes) heart rate in excess of 180 beats per minute minus the individual's age in years, for individuals with normal cardiac performance • Body core temperature is greater than 38.5 °C (101.3 °F) for acclimatized personnel; or greater than 38°C (100.4°F) in unselected, unacclimatized workers • Recovery heart rate at one minute after a peak work effort is greater than 120 beats per minute • Symptoms of sudden and severe fatigue, nausea, dizziness, or lightheadedness. An individual may be at a greater risk of heat-related disorders if profuse sweating is sustained over hours or weight loss over a shift is greater than 1.5 percent of body weight.	Daily schedules shall account for weather conditions and temperature and be adjusted as needed to minimize stress. Job-specific controls that may be implemented include: • alternation of tasks to reduce metabolic rate, • increased general air movement, • shielding of radiant heat sources, • adjustment of work/rest schedules and limit of physiological strain. • PPE that is appropriate for the specific work practices/conditions. Potable drinking water shall be provided in the field in sufficient quantity at the beginning of the work shift to provide one quart per employee per hour for drinking for the entire shift. The frequent drinking of water shall be encouraged. Shade is required to be present when the temperature exceeds 85˚F and one or more areas with shade will be provided at all times while employees are present, that are either open to the air or provided with ventilation or cooling. Shade will be available upon request when the temperature does not exceed 85˚F. High-heat procedures shall be implemented when the temperature equals or exceeds 95˚F and include: • use of two-way radios provided by Boeing to CDM so that field team members may contact the Field Team Leader (FTL)/SSO as necessary, • field team members will observe one another as to their level of alertness and signs/symptoms of heat illness, • field team members will remind one another to drink plenty of water throughout the day, • new employees shall be closely supervised for the first 14 days of their employment.

OTHER Know Hazards	DESCRIPTION OF HAZARD	MANAGEMENT OF HAZARD
HEAT STRESS **(continued from Page 6)**	**See page 6**	Training regarding heat illness will be provided to all CDM field team members that includes the: • environmental & personal risk factors for heat illness and the added burden of heat load on the body caused by exertion, clothing, & PPE • importance of frequent consumption of small quantities of water, up to 4 cups/hour, when work environment is hot and employees are likely to be sweating more than usual in the performance of their duties • different types of heat illness & the common signs and symptoms of heat illness • importance of acclimatization • importance to employees of immediately reporting to the employer, directly or through the FTL/HSC, symptoms or signs of heat illness in themselves, or in co-workers • employer's procedures for responding to symptoms of possible heat illness, including how emergency medical services will be provided should they become necessary. • employer's procedures for contacting emergency medical services, and if necessary, for transporting employees to a point where they can be reached by an emergency medical service provider. • employer's procedures for ensuring that, in the event of an emergency, clear and precise directions to the work site can and will be provided as needed to emergency responders. Includes designation of a person to be available to ensure that emergency procedures are invoked when appropriate. Prior to supervising employees performing work that should reasonably be anticipated to result in exposure to the risk of heat illness, effective training shall be provided to the FTL/SSO that will include all of the information provided above; the procedures the FTL/SSO is to follow to implement the provisions discussed above; the procedures the FTL/SSO is to follow when an employee exhibits symptoms consistent with possible heat illness, including emergency response procedures, and how to monitor weather reports and respond to hot weather advisories. If a worker appears to be disoriented or confused, suffers inexplicable irritability, malaise, or chills, the worker will be moved to a cool location for rest and kept under observation. Absent medical advice to the contrary, this will be treated as an emergency with immediate transport to a hospital.

OTHER KNOWN HAZARDS	DESCRIPTION OF HAZARD	MANAGEMENT OF HAZARD
BRUSH FIRES	Field activities may take personnel into remote areas of Area IV at SSFL to perform the surface and subsurface collection of soil samples. Exhaust systems on vehicles can reach a temperature of more than 1,000˚F and it only takes about 500˚F degrees to start a brush fire in the summer. Driving or parking on dry, brushy areas can cause a fire. CDM Smith personnel and subcontractors will not be operating any other equipment that may cause a brush fire.	• Vehicles will only be operated on paved roads or on clearly established, well-maintained dirt roads • Vehicles will not be operated in grass or brush areas where no clearly established dirt road exists • Dry grass/brush contact will be avoided with hot engines, exhausts, and catalytic converters • Vehicles will not be parked on dry grass or brush. • Vehicles will not be operated on poorly maintained dirt roads with grass growing in the centerline. -**In event of a fire that requires site evacuation, the Site will be evacuated in accordance with Boeing's *Service Provider Manual* , "Emergency Procedures - Evacuations (Section 2)".**
BIOLOGICAL HAZARDS	Multiple biological hazards may be encountered, particularly when working in the more remote areas of the site. Potential biological hazards include mountain lions, spiders, stinging insects, snakes, rodents, ticks and mosquitoes, poisonous and noxious plants, and microorganisms left in dried bird and rodent excrement. Snakes including rattlers are numerous in the area and may present problems to field crews. Pacific Poison Oak is present in many locations.	To minimize contact with snakes, individuals walking on site shall avoid tall grass and vegetation and avoid placing hands in concealed areas. All staff working in areas of tall grass or around rock outcrops will be required to wear snake gaiters. Individuals shall avoid heavily vegetated areas which may contain poison oak. If possible, the poison oak will be cleared from the work area before any work activities take place. Controls for biting or stinging insects include: • wearing light colored clothing, • avoiding perfumes and • using insect repellent. Workers will wear proper clothing, including long pants, to deter insect bites. Pants should be tucked inside of, or taped to, work boots. To control potential contact with dust that may be carrying hanta virus, a visual survey of the area to note whether rodents are present will be performed. If it is determined that rodents may be near the work area, or the area is affected by wind blowing dust, specific preventative measures will be taken.

DESCRIPTION AND FEATURES: *Include principal operations and unusual features (containers, buildings, dikes, power lines, hillslopes, rivers, etc.)*

Facility is a former nuclear research and test facility and is no longer in operation. Unusual features include varying slopes and mountainous terrain. Steep slopes may be encountered, particularly during hand augering. Work shall not be performed below others on steep slopes above where rocks, scree, and debris may fall and cause significant injuries to personnel.

SURROUNDING POPULATION: ( ) Residential (X) Industrial ( ) Commercial (X) Rural ( ) Urban OTHER:

HAZARDOUS MATERIAL SUMMARY: ***Highlight or bold waste types and estimate amounts by category.***

CHEMICALS:	**SOLIDS:**	**SLUDGES:**	**SOLVENTS:**	**OILS:**	**OTHER:**
Amount/Units:	*Amount/Units:*	*Amount/Units:*	*Amount/Units:*	*Amount/Units:*	*Amount/Units:*
Acids	Flyash	Paints	Ketones	Oily Wastes	Laboratory
Pickling Liquors	Mill or Mine Tailings	Pigments	Aromatics	**Gasoline**	Pharmaceutical
Caustics	Asbestos	Metals Sludges	**Hydrocarbons**	**Diesel Oil**	Hospital
Pesticides	Ferrous Smelter	POTW Sludge	**Alcohols**	Lubricants	**Radiological**
Dyes or Inks	Non-Ferrous Smelter	Distillation Bottoms	**Halogenated (chloro, bromo)**	**Polynuclear Aromatics**	Municipal
Cyanides	**Metals**	Aluminum	Esters	**PCBs**	Construction
Phenols	**Dioxins**		Ethers	Heating Oil	Munitions
Halogens					
Other - *specify*	Other - *specify*	Other - *specify*	Other - *specify*	Other - *specify*	Other - *specify*
Full listing of materials provided on pg. 13					

KNOWN CONTAMINANTS	HIGHEST OBSERVED CONCENTRATION	PEL/TLV *ppm or mg/m3 (specify)*	IDLH *ppm or mg/m3 (specify)*	Warning Concentration *(in ppm)*	SYMPTOMS & EFFECTS OF ACUTE EXPOSURE	PHOTO IONIZATION POTENTIAL
This is a partial list. Refer to page 13 for a full listing of potential contaminants of concern and their highest observed levels at site.						
Benzene	500 µg/l	0.5 ppm	500 ppm	61 ppm	Eye & nose irritation, headache, giddiness, nausea, fatigue	9.25
Chlorobenzene	1000 µg/l	10 ppm	1,000 ppm	1.3 ppm	Skin & eye irritation, incoordination, drowsiness	9.10
1,1-Dichloroethane	2800 µg/l	100 ppm	3,000 ppm	120 ppm	Skin irritation, drowsiness	11.10
1,1 Dichloroethene	4600 µg/l	1 ppm	>500 ppm	1.1 ppm	CNS, irritant, possible carcinogen	<11.0
Methylene chloride	4000 µg/l	25 ppm	2,300 ppm	160 ppm	Weakness, tingling & numbness, vertigo, nausea	11.35
Vinyl acetate	5000 µg/l	10 ppm	NE	0.12 ppm	Eye, nose & throat irritation	9.19
Metals	See page 13	See page 13	See page 13	DUST	See page 13	DUST
Radionuclides	See page 17	See page 17	See page 17	NA	See page 17	NA

NA = Not Available **NE = None Established** **U = Unknown**

Verify your access to an MSDS for each chemical you will use at the site.

S = Soil SW = Surface Water T = Tailings W = Waste TK = Tanks SD = Sediment
A = Air GW = Ground Water SL = Sludge D = Drums L = Lagoons OFF = Off-Site

SPECIFIC TASK DESCRIPTIONS	Disturbing the Waste?	TASK - SPECIFIC HAZARDS	HAZARD & SCHEDULE
1 DPT drilling and soil sampling	**Intrusive**	Exposure to contaminants, dust generation, heavy equipment, pinch points, crushing, radiological, severe weather, hand/head/eye/foot injury, slips/trips/falls.	**Medium Hazard** March - September 2012
2 Excavate test trenches and soil sampling	**Intrusive**	Exposure to contaminants, dust generation, heavy equipment, pinch points, crushing, radiological, severe weather, hand/head/eye/foot injury, soil cave-in, fall hazard, slips/trips/falls.	**Medium Hazard** March - September 2012
3 Hand augering and soil sample collection	**Intrusive**	Radiological, slips/trips/falls, steep slopes, hand tools, hand/head/eye/foot injury, exposure to contaminants, severe weather.	**Medium Hazard** March - September 2012
4 Radiation and VOC monitoring	**Intrusive**	Radiological, slips/trips/falls, heavy equipment, hand/head/eye/foot injury, exposure to contaminants, severe weather.	**Low Hazard** March - September 2012
5 Geophysics Investigation	**Non-intrusive**	Radiological, slips/trips/falls, heavy equipment, hand/head/eye/foot injury, exposure to contaminants, severe weather.	**Low Hazard** March - September 2012
6 Archeological/Native American Monitor & Biological Clearances	**Non-intrusive**	Radiological, slips/trips/falls, heavy equipment, hand/head/eye/foot injury, exposure to contaminants, severe weather.	**Low Hazard** March - September 2012

SPECIALIZED TRAINING/MEDICAL SURVEILLANCE REQUIRED:

TRAINING: All employees that perform fieldwork will have at a minimum 16 hours of site specific safety training. Site specific radiation, chemical, physical, and biological training will occur in the CDM Smith General Orientation Training, General Employee Radiological Training and Boeing Site Safety Orientation Training.

All team employees who will be entering the exclusion zone during performance of intrusive activities 1, 2, 3, and 4 as described on page 1 have completed 40-hour HAZWOPER training and are current in their 8-hour HAZWOPER refresher training and HAZWOPER medical surveillance examinations. Because the Native American monitors may be required to enter the exclusion zone during intrusive activities, the monitors will have current HAZWOPER training but will not be required to be enrolled in a medical surveillance program. Medical surveillance provision stipulated in 8 CCR 5192 (f) does not to apply to the Native American monitors for this project because the monitors are not expected to be exposed to hazardous substances or health hazards at or above the PELs or, if there is no PEL, above the published exposure levels for these substances, without regard to the use of respirators, for 30 days or more a year AND are not expected to wear a respirator during any part of a day for a period of 30 days or more in a year, or as required by 8 CCR 5144.

The geophysical investigation team performing activity 5 will have current HAZWOPER training and will be enrolled in HAZWOPER medical surveillance program. However, this activity is a non-intrusive activity and therefore an exclusion zone will not be used during performance of this work.

Archeological and Biological specialists performing activity 6 will support sample point staking, an non-intrusive activity. Therefore, only the 16 hour site specific training will be required.
The Site Safety Officer will have the OSHA 8-Hour Supervisory Training and 30-Hour Construction Training.

Workers using RAD instruments will have instrument-Specific Training, including the use of check sources.

INSTRUCTIONS regarding the maintenance, handling, and storage of environmental monitoring instruments are maintained in the field trailer.

MEDICAL SURVEILLANCE: No special medical monitoring beyond that of HAZWOPER medical monitoring is required.

SAFETY INFORMATION FOR DAILY FIELD WORK:

1. Cell phone service is spotty at SSFL, 2-way radios will be used for communication.
2. Daily 'tailgate' safety meetings, including AHA review, will be held in the field.
3. All field vehicle will have a small fire extinguisher and first aid kit.
4. All work areas will be surveyed for gamma radiation prior to set up of equipment.
5. All work areas will be inspected for rodents, snakes and poison oak prior to set up of equipment.
6. The SafetyNet field inspection checklist will be completed daily by field staff with results entered into the computer database.
7. All field work will be performed using the Buddy System.
8. All spills, incidents, exposures and accidents must be reported to Boeing and CDM Smith SSO immediately.

OVERALL HAZARD EVALUATION: ( ) High (X) Medium ( ) Low ( ) Unknown *(Where tasks have different hazards, evaluate each.)*

JUSTIFICATION: Contaminant-related hazard potential is relatively low, however construction-related safety hazards present an increased risk due to heavy equipment, excavation, and trenching tasks. There is also potential for work on slopes.

FIRE/EXPLOSION POTENTIAL: ( ) High ( ) Medium (X) Low ( ) Unknown

PROTECTIVE EQUIPMENT: *Specify by task. Indicate type and/or material, as necessary. Group tasks if possible. Use copies of this sheet if needed.*

BLOCK A

LEVEL: D - Modified

TASKS: 1, 2, 3, 4, 5, 6 (X) Primary

Respiratory: (X) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: ( ) Not needed

(X) Safety Glasses:
( ) Face Shield:
( ) Goggles:

(X) Hard Hat:

(X) Other: Field personnel advised to wear long sleeved shirts to protect against potential poison oak or bio hazards such as ticks. Chemical cream for poison oak is also available onsite.

Boots: ( ) Not needed
(X) Steel-Toe ( ) Steel Shank
( ) Rubber **(X) Leather**
(X) Gaiters or snake boots capable or preventing injury from snake bites

Prot. Clothing: ( ) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:

(X) Other:Tyvek suit at discretion of SSO to prevent visible soil/debris on clothing and **optional to protect against poison oak or bio hazards such as ticks (will require approval of SSO due to potential for added heat stress from Tyvek)**

Gloves: ( ) Not needed
( ) Undergloves:

(X) Gloves: cut-resistant during drilling/trenching and handling of rough or sharp objects (e.g., sample sleeves)

(X) Gloves: Latex/nitrile during sampling

Other: specify below
(X) Dosimeter

(X) ANSI Class II Hi-Vis Safety Vest

(X) Hearing Protection in exclusion zone during drilling/trenching

(X) Sun Screen

BLOCK B

LEVEL : EXIT AREA

TASKS: 1, 2, 3, 4, 5, 6 (X) Contingency

Respiratory: (X) Not needed
( ) SCBA, Airline:
( ) APR:
( ) Cartridge:
( ) Escape Mask:
( ) Other:

Head and Eye: (X) Not needed

( ) Safety Glasses:
( ) Face Shield:
( ) Goggles:

( ) Hard Hat:

( ) Other:

Boots: ( ) Not needed
( ) Steel-Toe ( ) Steel Shank
( ) Rubber ( ) Leather

( ) Overboots:

Prot. Clothing: (X) Not needed
( ) Encapsulated Suit:
( ) Splash Suit
( ) Apron:
( ) Tyvek Coverall or
( ) Saranex Coverall
( ) Cloth Coverall:

( ) Other:Tyvek suit at discretion of SSO if visible soil/debris on clothing

Gloves: ( ) Not needed
( ) Undergloves:

( ) Gloves: cut-resistant during handling of rough or sharp objects

( ) Gloves: Latex/nitrile during sampling

Other: specify below
( ) Dosimeter

( ) Flotation Device If Over Water

( ) Hearing Protection as needed around heavy equipment

( ) Sun Screen

MONITORING EQUIPMENT: *Specify by task. Indicate type as necessary. Attach additional sheets if needed.*

INSTRUMENT	TASK	ACTION GUIDELINES	COMMENTS
Ludlum 192 Micro R Meter (Survey Meter)	**1, 2, 3, 4, 5, 6**	**>2mR/hr: - STOP WORK** activities in the area until site is assessed by the Radiological Controls Manager. Notify RSO and Boeing S&H Officer. Mark off area and post to alert all personnel. Scan surface soil samples. During collection of surface soil samples monitor potential gamma radiation using MicroR detector for health and safety of field workers, and also to aid in the detection of gamma anomalies.	Prior to commencing work in a particular area, perform walk-over surveys using a portable microR meter. All work areas will be surveyed for gamma radiation prior to set up of equipment. Sample and surface soil scans as needed. Storage/handling/maintenance on page 14a. CHP to evaluate survey data as necessary.
Dosimeter	**1, 2, 3, 4, 5, 6**	**Exposure limit: 100 millirems per year:** If dosimter limits are exceeded, the Radiological Controls Manager or SSO will discuss the occurrence with the individual(s) involved to determine root cause. Corrective actions and controls will be implemented to prevent exposure beyond the exposure limit.	Field personnel will wear dosimeters during all field activities.
Ludlum 2241 Digital Survey Meter (Geiger-Mueller) with 44-9 Pancake Probe/ Cs-137 Check Source	**1, 2, 3, 4, 5, 6**	**Detection of any activity >background; immediately notify RSO and Boeing S&H Officer.** During the collection of subsurface soil samples, a Geiger-Mueller (Pancake) probe will be used to screen each soil core to identify radiological activity. Record readings on the soil boring log for each core interval collected. Evaluated readings in the field to determine if there is a hazardous condition for field or laboratory workers, or an indication of potential subsurface radiological contamination.	All intrusive work activities will be monitored. This will primarily involve surveys of soil samples, personnel and equipment. Storage/handling/maintenance on page 14b.
DataRAM Dust Monitor (Thermo Fisher Scientific pDR-1000AN)	**1, 2, 3**	**0.25mg/m^3 or Visible Dust: STOP WORK.** Work practices and engineering controls are to be assessed; work shall not resume until dust levels are maintained below the action level and there is no visible dust. If dust levels can't be controlled utilizing engineering controls and work practices, the SSO shall consult with CDM Smith's H&S Director for implementation of additional controls, changes in work practices, or upgrading of PPE. Work shall not proceed unless approved by the H&S Director.	Use administrative and engineering controls (e.g. primarily water application) to suppress all visible dust.DataRAMs are to be utilized to obtain real-time readings in the breathing zones of operators and laborers performing the following: DPT drilling and sampling; excavation and test trench sampling; and hand augering/sampling. Readings are to be collected and documented during each day of activities.
Photoionization Detector 10.6 eV Lamp MiniRAE 3000 PID/Isobutylene calibration gas 100 ppm, 34 liter	**1, 2, 3, 4, 5, 6**	**0-1 ppm: Level D; > 1 ppm sustained for 5 minutes: STOP WORK**. The SSO shall consult with CDM Smith's H&S Director for: implementation of additional controls, changes in work practices, or upgrading of PPE. Work shall not proceed unless approved by the H&S Director.	All intrusive work activities will be continuously monitored. Calibration information on page 15. For maintenance see "User Manual" in field office.
Combustible Gas Indicator		0-10% LEL — *No explosion hazard* 10-25% LEL — *Potential explosion hazard; notify SHSC* >25% LEL — *Explosion hazard; interrupt task/evacuate* 21.0% O2 — *Oxygen normal* <21.0% O2 — *Oxygen deficient; notify SHSC* <19.5% O2 — *Interrupt task/evacuate*	(X) Not Needed

DECONTAMINATION PROCEDURES

ATTACH SITE MAP INDICATING EXCLUSION, DECONTAMINATION, & SUPPORT ZONES AS PAGE TWO

Personnel Decontamination	**Sampling Equipment Decontamination**	**Heavy Equipment Decontamination**
Summarize below or attach diagram;	*Summarize below or attach diagram;*	*Summarize below or attach diagram;*
Following activities in the exclusion zone: Personnel will remove required protective clothing and wash hands, arms, and face with potable water and anti-microbial detergent. Hands and face will be washed prior to any eating or drinking. Plastic sheeting from decontamination area and disposable protective clothing will be treated as a solid, hazardous waste and will be disposed of as investigation-derived waste (IDW). Shower as soon as possible after completion of daily site work.	Sampling equipment such as hand augers, trowels, split spoons or other equipment that is used to collect several samples must be cleaned and decontaminated between samples to prevent cross contamination. Equipment shall be cleaned using the following: brush/soapy water solution with potable water, portable sprayer, or disposable wipes as appropriate.	All drilling equipment will be cleaned before and after completing each boring. This includes any portions of the drill rig that may come in contact with site soils, sampling devices, and instruments, such as slugs and sounders. Excavation equipment will also be cleaned following excavation activities. Particular care should be taken where equipment comes into direct contact with contaminated soils such as tires, buckets, or treads. The following procedure will be used to decontaminate large pieces of equipment, such as casings, pipe and rods, and those portions of the rig that may contact site soils. • The external surfaces of equipment will be washed with potable water and Alconox, or equivalent laboratory-grade detergent. • If necessary, equipment will be scrubbed until all visible dirt, grime, grease, oil, loose paint, rust flakes, etc., have been removed. • The equipment will then be rinsed with potable water. Equipment should be visually inspected to be sure it is free of any visible signs of contamination.
( ) Not Needed	( ) Not Needed	( ) Not Needed
Containment and Disposal Method	**Containment and Disposal Method**	**Containment and Disposal Method**
Disposable PPE, disposable sampling equipment, brushes, buckets, waste decontamination solutions, and other potentially contaminated equipment will be secured in drums and labeled. Disposal methods for these materials may depend on client requirements and/or results of site investigation data. The confirmed presence of hazardous materials on the site will require disposal of IDW as hazardous wastes. Extreme care is required when dealing with IDW disposal.	Wash solutions from sampling equipment decontamination will be collected and disposed of as IDW.	Waste decontamination solutions will be placed in drums and labeled. Disposal methods for decontamination water may depend on client requirements and/or results of site investigation data. The confirmed presence of hazardous materials on the site will require disposal of IDW as hazardous wastes. Extreme care is required when dealing with IDW disposal.

HAZARDOUS MATERIALS TO BE BROUGHT ONSITE

Preservatives		*Decontamination*		*Calibration*	
(X) Hydrochloric Acid	( ) Zinc Acetate	(X) Alconox ™	( ) Hexane	(X) 100 ppm isobutylene	( ) Hydrogen Sulfide
(X) Nitric Acid	( ) Ascorbic Acid	(X) Liquinox ™	( ) Isopropanol	( ) Methane	( ) Carbon Monoxide
(X) Sulfuric Acid	( ) Acetic Acid	( ) Acetone	( ) Nitric Acid	( ) Pentane	( ) pH Standards
(X) Sodium Hydroxide	( ) Other:	( ) Methanol	( ) Other:	( ) Hydrogen	( ) Conductivity Std
		( ) Mineral Spirits		( ) Propane	( ) Other:

EMERGENCY CONTACTS

Water Supply

EPA Release Report #:	800 / 424 - 8802
CDM Smith 24-Hour Emergency #:	FSG 406 / 293 - 1547
Facility Management (BCC Business Number)	818 / 466-8900
Facility Management (BCC Emergency Number)	818 / 466-8911
CHEMTREC Emergency #:	800 / 424 - 9300

SAFETY NARRATIVE: *Summarize below*

Notification Requirments - All incindents will be immediately reported to the following contacts: 1) John Jones, (DOE), Shawn Oliveria, (CDM Smith), Boeing Communication Center (BCC), and Boeing Person In Charge (PIC).

Excavations, trenches and confined spaces - Personnel are NOT PERMITTED to enter any trenches or confined spaces. Samples to be collected from excavator bucket or pile developed for that purpose outside of trench location. If excavation or confined space entry is required, the SSO will be notified and all apprpriate training and safety procedures will be implemented. **Dust control** shall be practiced during all project activities. Visible dust shall be prohibited. Engineering controls such as application of water via hoses and portable sprayers shall be implemented during all intrusive activities. **Steep slopes** may be encountered, particularly during hand augering. Care shall be taken not to work below others above on steep slopes where rocks, scree, and debris may fall and cause significant injuries to personnel. The SSO will evaluate all work on steep slopes for need of fall protection prior to performing tasks. **EMERGENCY EVACUATION** - See Boeings "Emergency Procedures for Evacuations" on page 11 of this plan. In event of a fire, earthquake or other emergency condition, the Site will be evacuated in accordance with Boeing's *Service Provider Manual* , "Emergency Procedures - Evacuations (Section 2)" which is included as an attachment to this HASP. "***SAFETY NARRATIVE"*** continued on page 10a.

HEALTH AND SAFETY PLAN APPROVALS (H&S Mgr must sign each plan)

Prepared by	Steve Fundingsland	Date	Apr 10, 2012
HSM Signature		Date	Apr 10, 2012

EMERGENCY CONTACTS	**NAME**	**PHONE**
Health and Safety Director	Shawn Oliveira	406-293-1547
Health and Safety Manager	Paul Opem	303-370-5253
Site Safety Officer	Jim Harrison	818-466-8007-
Project Manager	John Wondolleck	303-264-2315
Geologist	Peggy Blosia	925-639-1413
Radiological Controls Manager	Dennis R. Chambers	636-288-2715
Client Contact	Stephanie Jennings	818-466-8162
Other *(Boeing Communication Center, BCC Emergency)*		818 890-8911
Boeing Person In Charge (PIC)		Boeing Radio
SSFL Spill Number	BCC Emergency	818-890-8911
State Spill Number	California	(800) 852-7550
SSFL Fire Department	BCC Emergency	818-890-8911
SSFL Site Security	BCC Emergency	818-890-8911
Police/State Police		818 890-8911
Health Department		916-445-4171
Poison Control Center	Nationwide	800-222-1222
Occupational Physician	Dr. Jerry Berke	800-350-4511

MEDICAL EMERGENCY **PHONE**

Hospital Name:	West Hills Hospital and Medical Center	818 676 - 4100
Hospital Address	7300 Medical Center Drive Los Angeles, CA 91307	
Name of Contact at Hospital:	Emergency	
Name of 24-Hour Ambulance:	Call BCC emergency number above	
Route to Hospital:	**map on pg. 12**	

1) Head east 2.1 miles on F Street/Service Area Road to facility security point.
2) Turn right at Woolsey Canyon Road and continue 2.5 miles.
3) Make sharp right onto Valley Circle Boulevard and continue 1.7 miles.
4) Turn left at Ingomar Street and continue 0.5 miles.
5) Continue onto Saticoy Street and continue 0.4 miles (be aware that Ingomar Street becomes Saticoy Street).
6) Turn right at Woodlake Avenue and continue 0.3 miles.
7) Take third left onto Medical Center Drive and continue 0.2 miles.

Distance to Hospital approx. 8 miles

SAFETY NARRATIVE (con't)

Additional safety procedures and information can be found in the CDM Smith SSFL *Worker Safety and Health Program* (WSHP), which functions as the overall site health and safety plan for SSFL.

The following sections of the WSHP contain particularly important information related the tasks addressed in this HASP: 7.1.1 Working Around Heavy Equipment, 7.1.2 Working Safety Around Drill Rigs, 7.1.3 Working Safely with Direct Hydraulic Push Technology, 7.1.5 Excavations, 7.13 Heat Stress.

Sanitation - Potable water, washing and eyewash stations, and portable toilet facilities will be provided and serviced by a commercial contractor and located proximal to the work zones.

Illumination - All field work will be performed during daylight hours; therefore, no artificial illumination will be used for this investigation.

2.0 EMERGENCY PROCEDURES

2.1 Evacuations

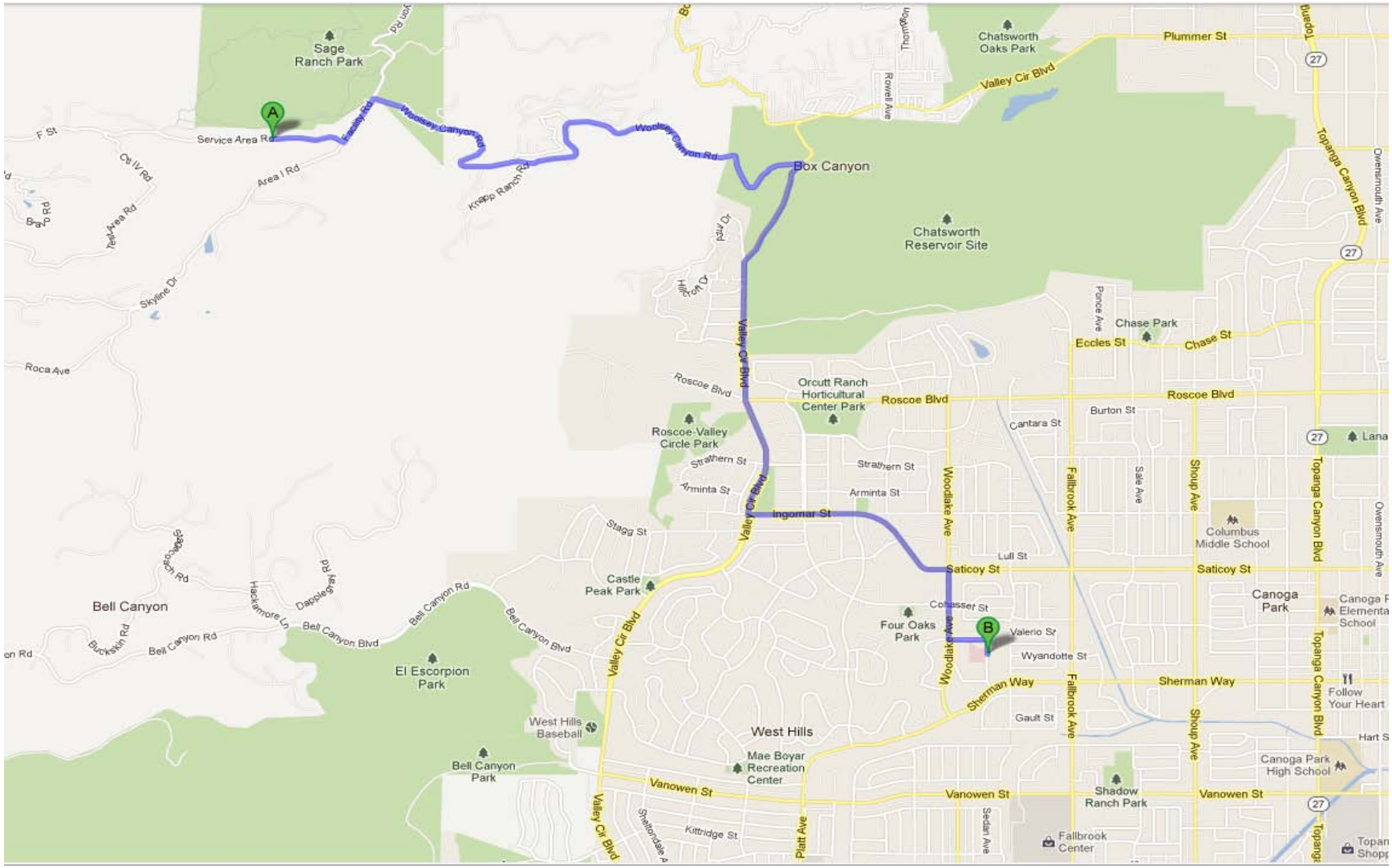
a. In the event of a building or site evacuation, immediately evacuate through the nearest safe exit and report to your designated assembly point. If you do not know your assembly point, check with your immediate supervisor or Boeing Onsite Activity Representative. In all cases, instruction and directions given by your supervisor, security, or other emergency response personnel shall be followed.

b. In the event of a building or site incident in which you are asked to "Shelter In Place," follow the posted directions, or direction from the designated emergency response personnel, to the closest designated "Shelter in Place" location.

c. Do not leave the assembly point or shelter-in-place location until authorized to do so by Boeing or local emergency response agencies.

The Emergency Procedures above are from BOEING 's *Service Provider Manual*

Hospital Map: A) SSFL Site Location to B) West Hills Medical Center



Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Acetaldehyde		C-25 ppm	2,000 ppm	0.066 ppm	Irritation, cough, CNS depression, pulmonary edema	10.21
Acetic acid		10 ppm	50 ppm	24.3 ppm	Pharyngeal edema, bronchitis, crying, irritation	10.66
Acetic anhydride		C-5 ppm	200 ppm	0.14 ppm	Pharyngeal irritation, cough, crying	10.00
Acetone	**150 mg/kg**	500 ppm	2,500 ppm	62 ppm	Irritated eyes, headache, dizziness	9.69
Acetone Cyanohydrin		C-5 Mg/m3	NE	NA	Irritated eyes, mucous membrane, headache, weakness, confusion	NA
Acetonitrile		20 ppm	500 ppm	1,160 ppm	Asphyxia, nausea, chest pain, weakness	12.22
Acetophenone		10 ppm	NE	0.6 ppm	Irritated eyes, headache, dizziness, drowsiness	9.27
2-Acetylamino fluorene		NE	Carc.	NA	Reduced function of liver, & kidneys	NE
Acetylene		2,500 ppm	6,250 ppm	NA	Inert asphyxiant, flammable gas	11.40
Acetylsalicylic acid (Aspirin)		5 mg/m3	NE	Dust	Tinnitus, nausea & vomiting	Dust
Acrolein		C-0.1 ppm	2 ppm	2 ppm	Irritated eyes, mucous membrane, delayed pulmonary edema	10.10
Acrylamide (skin)		30 µg/m3	60 mg/m3	NA	Numb limbs, weakness sweaty hands, fatigue	9.50
Acrylic acid (skin)		2 ppm	NE	0.1 ppm	Eye watering, CNS stimulation, severe respiratory difficulties	10.90
Acrylonitrile		2 ppm	85 ppm	1.6 ppm	Headache, light head, sneezing	10.91
Adipic Acid		5 mg/m3	NE	Dust	Depression, dyspnea, ataxia	Dust
Adiponitrile (skin)		2 ppm	500 ppm	NE	Headache, light head, irritation burns eyes,	10.91
Aldrin (skin)	**6.5 mg/kg**	250 µg/m3	25 mg/m3	<1 mg/m3	Headache, dizziness, nausea, jerks of limbs	NA
Allyl alcohol (skin)		0.5 ppm	20 ppm	1.4 ppm	Eye & bronchi irritation, pulmonary edema	9.67
Allyl chloride		1 ppm	250 ppm	0.5 ppm	Irritated eyes & nose, pulmonary edema, deep muscle pain	10.05
Allyl glycidyl ether (AGE)		1 ppm	50 ppm	<10 ppm	Irritated eyes & nose, narcosis	NA
Allyl propyl disulfide		2 ppm	NE	NA	Eye, nose, & throat irritation	NA
Aluminum (dust)	**47700 mg/kg**	5 mg/m3	NE	Dust	Coughing, spitting, pulmonary fibrosis	Dust
Aluminum alkyls or soluble salts		2 mg/m3	NE	Dust	Coughing, spitting, pulmonary fibrosis	Dust
4-Aminodiphenyl		NE	Carc.	NE	Headache, dyspnea, weakness, urinary burning, lethargy	NA
2-Aminopyridine		0.5 ppm	5 ppm	NE	Headache, nausea, respiratory distress	8.00
Amitrole		200 µg/m3	NE	NA	Reduced thyroid function, goiter	NA
Ammonia		25 ppm	300 ppm	17 ppm	Irritated nose & throat, chest pain	10.18
Ammonium chloride (fume)		10 mg/m3	NE	NA	Mild irritation of eyes, nose & throat	NA
Ammonium per- fluorooctanoate		0.01 mg/m3	NE	NA	eye irritation, sore throat, sneezing, jaundice	NA
Ammonium sulfamate (dust)		10 mg/m3	1,500 mg/m3	no odor	Coughing	Dust
Amyl acetates (skin)		50 ppm	1,000 ppm	0.067 ppm	Irritated eyes & nose, narcosis banana odor	9.90
Aniline (skin)		2 ppm	100 ppm	2.4 ppm	Headache, weakness, dyspnea	7.70
Anisidine (skin)		500 µg/m3	50 mg/m3	NA	Headache, dizziness, cyanosis,	7.44
Antimony compounds	**87.0 mg/kg**	500 µg/m3	50 mg/m3	Dust	Irritated nose, cough, headache, diarrhea	Dust
ANTU		300 µg/m3	100 mg/m3	NA	Vomit, dyspnea, cyanosis	NA
Arsenic, inorganic	**87.1 mg/kg**	10 µg/m3	5 mg/m3	Dust	Nasal ulcers, fever, bronchitis, melanosis, peripheral neuropathy	Dust
Arsine		0.05 ppm	3 ppm	<1 ppm	Headache, weakness, stomach & back pain, nausea	9.89
Asbestos		0.1 f/cc	Carc.	Dust	Dyspnea, restricted pulmonary function	Dust
Asphalt fumes (petroleum)		0.5 mg/m3	Carc.	Dust	Irritation of eye nose & throat, nausea, headaches	Dust
Atrazine		5 mg/m3	NE	NA	Incoordination, dyspnea, convulsions	NA
Azinphos (-methyl) (skin)		200 µg/m3	10 mg/m3	NA	Small pupils, blurred vision runny nose, headache, "tight" chest	NA
Barium (soluble) compounds		500 µg/m3	50 mg/m3	NA	Muscle spasms, slow pulse, bronchial irritation	NA
Barium sulfate (dust)	**781 mg/kg**	5 mg/m3	NE	Dust	Few symptoms, chronic baritosis	Dust
Benomyl (dust)		5 mg/m3	NE	Dust	Dermatitis	Dust
Benzene	**8.4 mg/kg**	0.5 ppm	500 ppm	61 ppm	Eye & nose irritation, headache, giddiness, nausea, fatigue	9.25
Benzidine (skin)		NE	Carc.	NA	Hematuria, anemia, painful & irregular urination	NA
Benzoyl chloride		C-0.5 ppm	NE	NA	Severe Irritation of eyes, nose, & lung Pulmonary edema	NA
Benzoyl peroxide		5 mg/m3	1,500 mg/m3	no odor	Irritated skin & eyes, sensitization	NA
Benzyl acetate		10 ppm	>50 ppm	NA	Irritated skin & eyes, drowsiness, muscle weakness	NA
Benzyl chloride		1 ppm	10 ppm	0.04 ppm	Irritated eyes, nose, irritable, headache	10.60
Beryllium	**1.86 mg/kg**	2 µg/m3	4 mg/m3	Dust	Respiratory symptoms, weakness, weight loss	Dust
Biphenyl		0.2 ppm	>100 mg/m3	0.01 ppm	Irritated eyes, nose, twitching, breathing difficulty	Dust
Bismuth telluride (dust)		5 mg/m3	NE	Dust	Decreased appetite, weakness, fever, foul breath, diarrhea	Dust

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Boron oxides (includes borates)	**53.0 mg/kg**	1 mg/m3	2,000 mg/m3	Dust	Nausea, conjunctivitis, diarrhea, skin rash	Dust
Boron tribromide		C-1 ppm	NE	NA	Irritant	9.70
Boron trifluoride		C-1 ppm	25 ppm	1.5 ppm	Burns eyes & skin, pneumonia	15.50
Bromacil		10 mg/m3	NE	NA	Weight loss & pallor	NA
Bromine		0.1 ppm	3 ppm	3.5 ppm	Dizziness, headache	10.55
Bromine pentafluoride		0.1 ppm	NE	NA	Coughing, nose bleed, dizziness	>15
Bromoform (skin)		0.5 ppm	850 ppm	530 ppm	Irritated eyes, CNS depression	10.51
Butadiene		1 ppm	2,000 ppm	0.45 ppm	Irritated eyes, light headedness, drowsiness	9.07
Butane		800 ppm	4,500 ppm	No odor	None	10.63
2-Butanone (MEK)	**28 mg/kg**	200 ppm	3,000 ppm	16 ppm	Irritated eyes, dizziness, vomiting	9.53
2-Butoxyethanol (skin)		20 ppm	700 ppm	0.10 ppm	Brown urine, irritated eyes	10.00
Butyl acetate		150 ppm	1,500 ppm	0.3 ppm	Headache, drowsiness, dry & irritated eyes	10.00
Butyl acrylate		2 ppm	NE	0.009 ppm	Eye, nose & throat irritation, narcosis	NA
n-Butyl alcohol (skin)		20 ppm	1,400 ppm	1.2 ppm	Irritated eyes, headache, vertigo, drowsiness	10.04
Butyl alcohol (sec & tert)		100 ppm	1,600 ppm	3.2 ppm	Eye irritation, narcosis	10.10
Butylamine (skin)		C-5 ppm	300 ppm	0.1 ppm	Irritated eyes, headache, skin flush	8.71
Butyl chromate (skin)		C-100 µg/m3	15 mg/m3	NA	Lung & sinus cancer	NA
Butyl glycidyl ether		3 ppm	250 ppm	NA	Irritated eyes, sensitivity, narcosis	NA
n-Butyl lactate		5 ppm	NE	NA	eye, nose, & throat irritation, headache, drowsiness	NA
Butyl mercaptan		0.5 ppm	500 ppm	1 ppb	Narcosis, incoordination, lung irritation, weakness	9.14
Butylphenol (skin)		5 ppm	NE	NA	Contact dermatitis, depigmentation	NA
Butyltoluene		1 ppm	100 ppm	8 ppm	Dry nose, fast pulse, eye, nose & throat irritation	8.28
Butyronitrile		8 ppm	NE	NA	Eye, nose & throat irritation, giddiness, confusion	NA
Cadmium dust	**18.6 mg/kg**	2 µg/m3	9 mg/m3	Dust	Pulmonary edema, tight chest, chills	Dust
Calcium arsenate		C-.002 mg/m3	5 mg/m3	Dust	Nasal ulcers, fever, bronchitis, melanosis, peripheral neuropathy	Dust
Calcium carbonate	**233000 mg/kg**	5 mg/m3	NE	Dust	Considered harmless	Dust
Calcium chromate		1 µg/m3	NE	Dust	Respiratory irritation, skin and nasal ulcers	NE
Calcium cyanamide		500 µg/m3	NE	Dust	Skin sensitization, flush & fever if with alcohol	Dust
Calcium cyanide		C-5 mg/m3	NE	Dust	Weakness, headache, nausea, gasping breath	Dust
Calcium hydroxide		5 mg/m3	250 mg/m3	Dust	Skin & eye irritation	Dust
Calcium oxide		2 mg/m3	25 mg/m3	Dust	Irritated eyes & lungs, pneumonia	Dust
Calcium silicate		5 mg/m3	NE	Dust	Eye, nose and throat irritation, blurred vision	Dust
Calcium sulfate		5 mg/m3	NE	Dust	Nearly harmless	Dust
Camphor		2 ppm	200 mg/m3	0.08 ppm	Irritated eyes, nausea, irrationality, convulsions	8.76
Caprolactam (dust)		1 mg/m3	NE	Dust	Convulsions, salivation, large pupils	Dust
Captafol (skin)		100 µg/m3	NE	NA	Occupational dermatitis, sensitization, conjunctivitis	NA
Captan		5 mg/m3	NE	NA	Rashes, genetic damage	NA
Carbaryl (Sevin)		5 mg/m3	100 mg/m3	Dust	Small pupils, nasal discharge, sweating, blurred vision	Dust
Carbofuran		100 µg/m3	NE	Dust	Small pupils, nasal discharge, sweating, blurred vision	Dust
Carbon black		3.5 mg/m3	1,750 mg/m3	Dust	None expected	Dust
Carbon dioxide		5,000 ppm	40,000 ppm	no odor	Headache, dizziness, elevated pulse pressure	13.80
Carbon disulfide (skin)		4 ppm	500 ppm	0.21 ppm	Nervousness, anorexia, psychosis fatigue, sleep disturbance	10.10
Carbon monoxide		25 ppm	1,200 ppm	no odor	Headache, nausea, cyanosis, fast breath, chest pain	14.00
Carbon tetrabromide		0.1 ppm	NE	NA	Tears, lung irritation & damage	>11.5
Carbon tetrachloride (skin)		2 ppm	200 ppm	250 ppm	Central nervous system depression, nausea, liver damage	11.5
Carbonyl fluoride		2 ppm	NE	NA	Nose bleeds, stuffy nose, nose and throat irritation	NA
Catechol (skin)		5 ppm	NE	NA	Eye, nose & throat irritation, convulsions, incoordination	NA
Cellulose		5 mg/m3	NE	Dust	Dusty lung", spitting	Dust
Cement dust		5 mg/m3	NE	Dust	Coughing, lung irritation	Dust
^{144}Cerium		10 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
^{137}Cesium		60 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
Cesium hydroxide		2 mg/m3	NE	Dust	Extreme corrosion of tissues	Dust
Chlordane (skin)	**660 mg/kg**	500 µg/m3	100 mg/m3	no odor	Blurred vision, delirium, twitches, stomach pain, diarrhea	NA
Chlorinated camphene (skin)		500 µg/m3	200 mg/m3	NA	Nausea, confusion, agitation	NA
Chlorinated diphenyl oxide		500 µg/m3	5 mg/m3	NA	Acne-like dermatitis, liver damage	NA
Chlorine		0.5 ppm	10 ppm	0.08 ppm	Burning eyes, tears, choking	11.50
Chlorine dioxide		0.1 ppm	5 ppm	5.0 ppm	Irritated eyes, coughing, pulmonary edema, wheezing	10.40
Chlorine trifluoride		C-0.1 ppm	20 ppm	NA	Burning eyes, tearing, corneal ulcers	13.00
Chloroacetaldehyde		C-1 ppm	45 ppm	<1 ppm	Irritated skin, eyes, skin burns	10.60

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Chloroacetone (skin)		C-1 ppm	NE	<1 ppm	Irritated skin, eyes, skin burns	<11.0
Chloroacetophenone		0.05 ppm	15 mg/m3	0.016 ppm	Irritated eyes, nose & throat	9.40
Chloroacetyl chloride (skin)		0.05 ppm	NE	NA	Coughing, rash, dyspnea, eye, nose & throat irritation	NA
Chlorobenzene		10 ppm	1,000 ppm	1.3 ppm	Skin & eye irritation, incoordination, drowsiness	9.10
Chlorobenzylidene malononitrile (skin)		C-0.05 ppm	2 mg/m3	0.2 ppm	Burning eyes, crying, coughing, conjunctivitis	NA
Chlorobromomethane		200 ppm	2,000 ppm	400 ppm	Disorientation, dizziness, irritated eyes, nose & throat	10.80
Chlorodifluoromethane (Freon 22)		1,000 ppm	NE	NA	Respiratory depression, bronchitis	12.50
Chloroform	1.9 mg/kg	2 ppm	500 ppm	192 ppm	Mental dullness, headaches, anesthesia, dizziness	11.40
bis (Chloromethyl) ether		0.001 ppm	Carc.	NA	Pulmonary congestion, coughing, irritated eyes, nose & throat	NA
Chloromethyl methyl ether		0.001 ppm	Carc.	NA	Pulmonary congestion, coughing, irritated eyes, nose & throat	10.25
1-Chloro- 1-nitropropane		2 ppm	100 ppm	NA	Irritated eyes & lungs, blood vessel damage	NA
Chloropentafluoroethane (Freon 115)		1,000 ppm	NE	NA	Bronchial construction, decreased compliance, cardiotoxicity	NA
Chloropicrin		0.1 ppm	2 ppm	1.1 ppm	Eye irritation, tears, coughing, vomiting	NA
Chloroprene (skin)		10 ppm	300 ppm	0.4 ppm	Nervousness, irritability	8.80
Chloropropionic acid (skin)		0.1 ppm	NE	NE	Irritated eyes, nose & throat	NE
Chlorostyrene		50 ppm	NE	NA	Irritated eyes & nose, drowsiness, weakness, unsteady gait	8.80
Chlorotoluene		50 ppm	NE	NA	Incoordination, dyspnea, red tears	8.83
Chlorpyrifos (Dursban - skin)		100 mg/m3	NE	Dust	Wheezing, throat spasms, blue lips, salivation, nausea	Dust
Chloro (trichloromethyl) pyridine		10 mg/m3	NE	NA	NA	NA
Chromic acid & chromates (soluble -skin)		50 µg/m3	15 mg/m3	Dust	Respiratory irritation, skin and nasal ulcers	Dust
Chromates (insoluble)		10 µg/m3				
Chromium compounds	593 mg/kg 11.8 mg/kg	500 µg/m3	250 mg/m3	Dust	Lung damage, skin sensitization	Dust
Chromyl Chloride		0.025 ppm	NE	NE	Respiratory irritation, skin and nasal ulcers	NE
Chrysene	12000 mg/kg	200 µg/m3	80 mg/m3	Dust	Eye irritation, dermatitis, bronchitis	7.75
Clopidol		5 mg/m3	NE	NA	No effect known	NA
Coal dust (< 5% SiO2)		400 µg/m3	NE	Dust	Pulmonary fibrosis, spitting	Dust
Cobalt (metal) (dust & fumes)	60.8 mg/kg	20 µg/m3	20 mg/m3	>1 mg/m3	Coughing, respiratory sensitivity, pneumoconiosis, dyspnea	Dust
Cobalt carbonyl		100 µg/m3	NE	NA	Headache, nausea, pneumonia	NA
Cobalt hydrocarbonyl		100 µg/m3	NE	NA	Headache, nausea, pneumonia	NA
Copper (dust)	699 mg/kg	1 mg/m3	NE	Dust	Nasal perforation, metal taste	Dust
Copper (fume)		200 µg/m3	100 mg/m3	Dust	Nasal perforation, metal taste	Dust
Cotton dust		200 µg/m3	100 mg/m3	Dust	Tight chest, coughing, wheezing	Dust
Crag herbicide		5 mg/m3	500 mg/m3	Dust	None known in humans	Dust
Cresol (skin)		5 ppm	250 ppm	0.001 ppm	Depression, dyspnea, weak pulse, skin & eye burning	9.00
Crotonaldehyde		0.03 ppm	50 ppm	0.11 ppm	Irritated eyes, dyspnea	9.70
Crufomate		5 mg/m3	NE	NA	Small pupils, runny nose, headache, excitation, salivation	NA
Cumene (skin)		50 ppm	900 ppm	0.03 ppm	Irritated eyes, headache, narcosis	8.80
Cyanamide		2 mg/m3	NE	Dust	Eye, nose & throat irritation, flush & fever with alcohol	Dust
Cyanides (skin)	1.2 mg/kg	5 mg/m3	25 mg/m3	Dust	Weakness, headache, nausea, gasping breath	Dust
Cyanogen		10 ppm	NE	NA	Weakness, headache, nausea, gasping breath	13.60
Cyanogen chloride		C-0.3 ppm	50 mg/m3	1 ppm	Pulmonary edema, coughing	12.50
Cyclohexane		100 ppm	1,300 ppm	780 ppm	Irritated eyes, drowsiness, narcosis	9.90
Cyclohexanol (skin)		50 ppm	400 ppm	0.16 ppm	Irritated eyes, narcosis	10.00
Cyclohexanone (skin)		20 ppm	700 ppm	3.5 ppm	Irritated eyes, narcosis, headache	9.10
Cyclohexene		300 ppm	2,000 ppm	0.41 ppm	Irritated skin & lungs, drowsiness	9.00
Cyclohexylamine		10 ppm	NE	NA	Severe skin irritation, light headedness, drowsiness, anxiety	7.50
Cyclonite (skin)		0.5 mg/m3	NE	NA	Headache, dizziness, nausea, convulsions	NA
Cyclopentadiene		75 ppm	750 ppm	250 ppm	Irritated eyes, nose	8.58
Cyclopentane		600 ppm	NE	NA	CNS depressant, loss of reflexes	10.52
Cyhexatin		5 mg/m3	80 mg/m3	Dust	Headache, vomiting, psychic disturbance, photophobia	Dust
2,4-D		5 mg/m3	100 mg/m3	Dust	Weakness stupor, muscle twitching	Dust
DDT (skin)	780 mg/kg	1 mg/m3	500 mg/m3	2.9 mg/m3	Numb face, lips & tongue, tremors, apprehension, headache	NA
Decaborane (skin)		0.05 ppm	15 mg/m3	0.35 ppm	Headache, nausea, drowsiness, local muscle spasms	9.90
Decanethiol		C-0.5 ppm	NA	NA	Headache, nausea, drowsiness, irritated eyes, confusion	NA
Decene		100 ppm				
Demeton (Systox) (skin)		50 µg/m3	10 mg/m3	Dust	Aching eyes, headache, & chest pain, small pupils, runny nose	Dust

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Diacetone alcohol		50 ppm	1,800 ppm	0.27 ppm	Irritated eyes, narcosis, corneal damage	NA
Diazinon (skin)		10 µg/m3	NE	NA	Weakness, "tight" chest, small pupils, slurred speech	NA
Diazomethane		0.2 ppm	2 ppm	None	Short breath, flush skin, fever	9.00
Diborane		0.1 ppm	15 ppm	4 ppm	Tight" chest, vertigo, chills, lightheadedness, fever	11.40
Dibrom (Naled) (skin)		0.1 mg/m3	1,800 mg/m3	NA	Small pupils, headache, irritated eyes, tight chest	NA
1,2-Dibromo- 3-chloropropane		0.001 ppm	Carc.	NA	Drowsiness, nausea, vomiting, pulmonary edema	NA
2-N-Dibutyl- aminoethanol (skin)		0.5 ppm	NE	NA	Local irritant effects (skin, eyes), GI irritant	NA
Dibutyl cresol		10 mg/m3	NE	NA	Internal bleeding	NA
Dibutyl phenyl phosphate (skin)		0.3 ppm	NE	NA	Respiratory irritation, headache	NA
Dibutyl phosphate		1 ppm	30 ppm	no odor	Respiratory irritation, headache	NA
Dibutyl phthalate		5 mg/m3	4,000 mg/m3	NA	Irritated bronchi & stomach light sensitivity	NA
Dichloroacetylene		C-0.1 ppm	NE	NA	Headaches, nausea, neurological, kidney, lower respir injury	NA
Dichlorobenzene (skin)	**0.33 mg/kg**	10 ppm	150 ppm	0.7 ppm	Nose, eye irritation, skin blister, headaches, nausea, jaundice	9.10
Dichlorobenzidine (skin)		NE	Carc	NA	Skin sensitivity, headache, dizziness, frequent urination	NA
Dichlorobutene		0.005 ppm	Carc	NA	Nose, eye, & skin irritation, blisters	NA
Dichlorodifluoromethane		1,000 ppm	15,000 ppm	NA	Tremors, cardiac arrhythmias	11.80
Dichlorodimethyl hydantoin		200 µg/m3	5 mg/m3	1.14 ppm	Irritated eyes, throat, & lungs	NA
1,1-Dichloroethane		100 ppm	3,000 ppm	120 ppm	Skin irritation, drowsiness	11.10
1,1 Dichloroethylene		1 ppm	>500 ppm	1.1 ppm	No acute effects	<11.0
1,2 Dichloroethylene	**2.5 mg/kg**	200 ppm	1,000 ppm	1.1 ppm	Irritated eyes, CNS depression	10.00
Dichloroethyl ether (skin)		5 ppm	100 ppm	NA	Tears, irritated nose, coughing, nausea	NA
Dichlorofluoro methane		10 ppm	5,000 ppm	almost no odor	Asphyxia, cardiac arrhythmias	12.39
1,1-Dichloro nitroethane		2 ppm	25 ppm	NA	Irritated eyes, skin & lungs	NA
1,3-Dichloro propene (skin)		1 ppm	NE	NA	Necrosis, edema, tears, respiratory tract irritant	9.82
Dichloro propionic acid		1 ppm	NE	428 ppm	Eye, nose & throat irritation, nausea	NA
Dichloro tetrafluoroethane		1,000 ppm	15,000 ppm	almost no odor	Respiratory irritation	12.20
Dichlorvos (DDVP) (skin)		0.1 mg/m3	100 mg/m3	NA	Small pupils, aching eyes, headache, runny nose	NA
Dicrotophos (skin)		50 µg/m3	NE	NA	Salivation, sweating, small pupils	NA
Dicyclopentadiene		5 ppm	NE	0.011 ppm	Eye & throat irritation, headache	NA
Dicyclopentadienyl iron		5 mg/m3	NE	NA	Cirrhotic liver changes, blood changes	NA
Dieldrin (skin)		250 µg/m3	50 mg/m3	0.041 ppm	Headache, dizziness, vomiting, nausea, convulsions	NA
Diesel exhaust		150 µg/m3	NA	NA	Irritation of the eyes, nose, and throat, cough, phlegm, and dypsnea.	NA
Diesel Fuel		100 mg/m3	NE	10 ppm	Vomiting, diarrhea, insomnia, dizziness, headache	NA
Diethanolamine (skin)		0.46 ppm	NE	0.04 ppm	Eye irritation & burning	NA
Diethylamine		5 ppm	200 ppm	0.06 ppm	Eye, skin irritation	8.00
Diethylaminoethanol (skin)		2 ppm	100 ppm	0.01 ppm	Nausea, respiratory irritation	NA
Diethylene triamine (skin)		1 ppm	NE	10 ppm	Skin, eye & nose & throat irritant, skin sensitization	NA
Diethyl ketone		200 ppm	NE	2.8 ppm	Eye, nose & throat irritation drowsiness	9.32
Diethyl phthalate	**46 mg/kg**	5 mg/m3	NE	NA	Pain in arms and legs	NA
Difluorodibromo methane		100 ppm	2,000 ppm	inadeq.	Irritated nose, drowsiness	11.10
Diglycidyl ether (DGE)		0.1 ppm	10 ppm	5 ppm	Eye, nose & throat irritation, dizziness	NA
Diisobutyl ketone		25 ppm	500 ppm	110 ppb	Irritated eyes & skin, headache, dizziness	9.04
Diisopropylamine (skin)		5 ppm	200 ppm	130 ppb	Nausea, headache, eye irritation, visual disturbances	7.70
Dimethyl acetamide (skin)		10 ppm	300 ppm	46.8 ppm	Jaundice, depression, lethargy, delusions	8.80
Dimethylamine		5 ppm	500 ppm	470 ppb	Irritated eyes, coughing, pulmonary edema	8.20
Dimethylamino- azobenzene		NE	Carc.	NA	Coughing, difficulty breathing, bloody sputum	NA
Dimethylaniline (skin)		5 ppm	100 ppm	NA	Weakness, dizziness, cyanosis	7.14
Dimethyl ethoxysilane		0.5 ppm	Carc.	NA	Skin, nose & eye irritation	NA
Dimethylformamide (skin)		10 ppm	500 ppm	100 ppm	Colic, high blood pressure, face flush, nausea	9.12
1,1-Dimethyl hydrazine (skin)		0.01 ppm	15 ppm	9.2 ppm	Irritated eyes, choking, lethargy, chest pain	8.05
Dimethyl phthalate		5 mg/m3	2,000 mg/m3	NA	Irritated nasal passages, eye pain	9.75
Dimethyl sulfate (skin)		0.1 ppm	7 ppm	almost no odor	Irritated eyes, headache, giddiness, difficult speech	NA
Dinitolmide (zoalene)		5 mg/m3	NE	NA	Suspected allergic contact dermatitis	NA
Dinitrobenzene (skin)	**1100 mg/kg**	0.15 ppm	50 mg/m3	NA	Cyanosis, bad taste, visual disturbance	10.71
Dinitrocresols (skin)		0.2 mg/m3	5 mg/m3	no odor	Sense of well being, headache, fever, fast pulse	NA
Dinitrotoluene (skin)		200 µg/m3	50 mg/m3	almost no odor	Anoxia, cyanosis, anemia	NA
Dinoseb (dinitrobutylphenol)		0.5 mg/m3	NE	NE	Fatigue, thirst, sweating, headache, flushing of the face, nausea, diarrhea	NE

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Dioctyl phthalate (bis 2-ethylhexyl)		5 mg/m3	5,000 mg/m3	NA	Irritated eyes, nausea, diarrhea	NA
Dioxane (skin)	**9.0 mg/kg**	20 ppm	500 ppm	12 ppm	Eye irritation, headache, nausea, drowsiness	9.13
Dioxins	**59.5 mg/kg**		Contact H&S for limits		see polychlorinated dioxins	
Dioxathion (skin)		100 µg/m3	NE	NA	Conjunctivitis, excitability	NA
Diphenyl		0.2 ppm	100 mg/m3	NA	Irritated throat, headache, nausea, fatigue, numbness	8.27
Diphenylamine		5 mg/m3	NE	NA	Fast pulse, eczema	7.40
Dipropylene glycol methyl ether (skin)		100 ppm	600 ppm	100 ppm	Irritated eyes, lightheadedness, headaches	NA
Dipropyl ketone		50 ppm	NE	NA	Narcosis, eye, nose & throat irritation	NA
Diquat		0.1 mg/m3	NE	NA	Abdominal cramping, nausea, vomiting	NA
Disulfiram		2 mg/m3	NE	NA	With alcohol: flushing, nausea, vomiting	NA
Disulfoton (skin)		50 µg/m3	NE	NA	Conjunctivitis, excitability, salivation, small pupils	NA
Diuron		10 mg/m3	NE	NA	None shown	NA
Divinyl benzene		10 ppm	NE	NA	Moderately irritant to eyes & respiratory system	NA
Dodecanethiol		0.1 ppm	NE	NA	Headache, nausea, drowsiness, irritated eyes, confusion	NA
Dust - Total		10 mg/m3	NE	Dust	Respiratory irritation, eye	Dust
Dust - Respirable		3 mg/m3	NE	Dust	irritation, spitting	Dust
Emery (dust)		10 mg/m3	NE	Dust	Pulmonary fibrosis	Dust
Endosulfan (skin)	**2.6, 22.0, 0.33 mg/kg**	100 µg/m3	NE	NA	Headaches, dizziness, nausea, convulsions	NA
Endrin (skin)	**1.2 mg/kg**	100 µg/m3	2 mg/m3	NA	Convulsions, stupor, headache, dizziness	NA
Enflurane		75 ppm	10,000 ppm	slight odor	narcosis, depressed mental function	<11.0
Epichlorohydrin (skin)		0.5 ppm	75 ppm	10 ppm	Stomach pains, respiratory distress, eye irritation, runny nose	10.64
EPN (skin)		100 µg/m3	5 mg/m3	inadeq.	Small pupils, tight chest, runny nose	NA
Ethane		7,500 ppm	7,500 ppm	none	no toxicity flammable	>11.0
Ethanolamine		3 ppm	30 ppm	3 ppm	Irritated skin, eyes, lethargy	8.96
Ethion (skin)		50 µg/m3	NE	Mist	Blurred vision, salivation, nausea, excitation, twitching	Mist
2-Ethoxyethanol (skin)		5 ppm	500 ppm	2.7 ppm	Blood damage, irritated eyes & lungs	NA
2-Ethoxyethyl acetate (skin)		5 ppm	500 ppm	0.06 ppm	Irritated eyes, vomiting, paralysis	NA
Ethyl acetate		400 ppm	2,000 ppm	18 ppm	Irritated eyes & nose, narcosis	10.10
Ethyl acrylate (skin)		5 ppm	300 ppm	0.3 ppb	Irritated eyes & respiratory system	10.30
Ethyl alcohol		1,000 ppm	3,300 ppm	180 ppm	Irritation, lightheadedness, headache, incoordination	10.48
Ethylamine (skin)		5 ppm	600 ppm	27 ppm	Irritated eyes, respiratory irritation, skin burns	8.86
Ethyl amyl ketone		25 ppm	3,000 ppm	NA	Irritated eyes, headache, narcosis	9.19
Ethyl benzene		100 ppm	800 ppm	200 ppm	Eye & nose irritation, headache, narcosis	8.76
Ethyl bromide (skin)		5 ppm	2,000 ppm	25 ppm	Irritated eyes, pulmonary	10.29
Ethyl butyl ketone		50 ppm	1,000 ppm	<100 ppm	Irritated eyes & nose, headache, narcosis	9.15
Ethyl chloride		100 ppm	3,800 ppm	NA	Incoordination, stomach cramps, Cardiac arrhythmia	10.97
Ethylene		200 ppm	7,500 ppm	NA	Practically no toxicity. Explosive.	10.50
Ethylene chlorohydrin (skin)		C-1 ppm	7 ppm	no odor	Vomiting, vertigo, headache, low blood pressure	10.90
Ethylenediamine		10 ppm	1,000 ppm	3.4 ppm	Irritated respiratory system, asthma, skin sensitization	8.60
Ethylene dibromide (skin)		20 ppm	100 ppm	25 ppm	Eye, nose & throat irritation, hives	9.45
Ethylene dichloride		1 ppm	50 ppm	26 ppm	Nervous system depression, irritated eyes, corneal opacity	11.05
Ethylene glycol	**7.0 mg/kg**	C-50 ppm	NE	0.64 ppm	Central nervous system depression, drunkenness, nausea, vomiting	NA
Ethylene glycol dinitrate (skin)		0.05 ppm	75 ppm	NA	Throbbing headache, nausea, flushing, stomach pain	NA
Ethyleneimine (skin)		0.5 ppm	100 ppm	NA	Nausea, headache, skin sensitivity, burning eyes	9.20
Ethylene oxide		1 ppm	800 ppm	420 ppm	Peculiar taste, headache, nausea, dyspnea	10.56
Ethyl ether		400 ppm	1,900 ppm	0.83 ppm	Drowsiness, headaches, excitation, dizziness, eye, nose & throat irritation	9.53
Ethyl formate		100 ppm	1,500 ppm	NA	Irritated eyes & lungs, narcosis	10.61
Ethylidene norbornene		C-5 ppm	NE	0.073 ppm	None known	NA
Ethyl mercaptan		0.5 ppm	500 ppm	0.4 ppb	Headache, nausea, incoordination	9.29
N-Ethylmorpholine (skin)		5 ppm	100 ppm	0.1 ppm	Eye & nose irritation, visual distress	NA
Ethyl silicate		10 ppm	700 ppm	3.6 ppm	Irritated eyes, nose, weeping, dyspnea	9.77
Fenamiphos (skin)		100 µg/m3	NE	NA	Excitation, salivation, nausea, twitches, blurry vision	NA
Fensulfothion		100 µg/m3	NE	NA	Excitation, salivation, nausea, twitches, blurry vision	NA
Fenthion (skin)		200 µg/m3	NE	NA	Excitation, salivation, nausea, twitches, blurry vision	NA
Ferbam (dust)		10 mg/m3	800 mg/m3	Dust	Irritated eyes & respiratory tract, GI distress	7.72
Ferrovanadium (dust)		1 mg/m3	500 mg/m3	Dust	Irritated eyes, bronchitis	Dust
Fibrous glass		5 mg/m3	NE	Dust	Nose & throat irritation, coughing	Dust
Flour dust		0.5 mg/m3	NE	Dust	Asthma, lung funtion, bronchitis	Dust

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Fluorides	**37.1 mg/kg**	2.5 mg/m3	250 mg/m3	Dust	Irritated eyes, stomach pain, diarrhea, excess salivation	Dust
Fluorine		0.1 ppm	25 ppm	100 ppm	Eye, nose & throat irritation, laryngeal spasms, skin burns	15.70
Fonofos (skin)		100 µg/m3	NE	NA	Expected Excitation, salivation, nausea, twitches, blurry vision. Not proven.	NA
Formaldehyde	**21000 mg/kg**	C-0.3 ppm	20 ppm	1 ppm	Irritated eyes, weeping, vomiting, bronchial spasms	10.88
Formamide (skin)		10 ppm	NE	100 ppm	Weight loss, birth defects	10.20
Formic acid (skin)		5 ppm	30 ppm	239 ppm	Irritated eyes, nasal discharge, nausea	11.05
Furfural (skin)		2 ppm	100 ppm	50 ppm	Irritated eyes, headache	9.21
Furfuryl alcohol (skin)		10 ppm	75 ppm	8 ppm	Dizziness, nausea, respiratory depression, hypothermia	NA
Gasoline		300 ppm	NE	10 ppm	Vomiting, diarrhea, insomnia, dizziness, headache	NA
Germanium tetrahydride		0.2 ppm	<50 ppm	NA	Weakness, headache, stomach pain, nausea	NA
Glutaraldehyde		C-0.05 ppm	NE	NA	Eye, nose & throat irritation, skin sensitization	NA
Glycerin (mist)		5 mg/m3	NE	NA	None known	NA
Glycidol		2 ppm	150 ppm	NA	Irritated eyes & skin, narcosis	NA
Grain dust		4 mg/m3	NE	Dust	Coughing, wheezing, short breath	Dust
Graphite dust		2 mg/m3	1,250 mg/m3	Dust	Coughing, short breath, black sputum	Dust
Gypsum		5 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Hafnium		500 µg/m3	50 mg/m3	NA	Irritated eyes & skin	NA
Halothane		50 ppm	10,000 ppm	slight odor	Narcosis, cardiac arrhythmia,	NE
Heptachlor & epoxides (skin)	**1.1, 6.8 mg/kg**	50 µg/m3	35 mg/m3	0.02 ppm	Tremors, convulsions	NA
Heptane		400 ppm	750 ppm	220 ppm	Giddiness, no appetite, pneumonia	9.90
Heptanethiol		C-0.5 ppm	NA	NA	Headache, nausea, drowsiness, irritated eyes, confusion	NA
Hexachlorobenzene (skin)	**500 mg/kg**	2 µg/m3	NE	Dust	Restlessness, anorexia, lung irritation, photosensitivity	Dust
Hexachlorobutadiene (skin)	**100 mg/kg**	0.02 ppm	Carc.	NA	Eye, nose & throat irritation, Kidney damage	NA
Hexachloro- cyclopentadiene		0.01 ppm	NE	0.33 ppm	Skin & mucous membrane irritation, headaches	NA
Hexachloroethane (skin)		1 ppm	300 ppm	NA	Irritated eyes, cancer	11.22
Hexachloronaphthalene (skin)		200 µg/m3	2 mg/m3	NA	Acne, confusion, jaundice	NA
Hexadecanethiol		C-0.5 ppm	NA	NA	Headache, nausea, drowsiness, irritated eyes, confusion	NA
Hexafluoroacetone (skin)		0.1 ppm	NE	NA	Anemia, testicular degeneration	11.81
Hexamethylene diisocyanate		0.005 ppm	10 ppm	NE	Respiratory distress, weakness	NE
Hexamethyl phosphoramide (skin)		NE	>4 ppm	NE	Runny nose, cancer	NE
n-Hexane		50 ppm	1,100 ppm	1,500 ppm	Nausea, headache, giddiness, wrist & foot drop, numb feet & hands	10.17
Hexane (other isomers)		500 ppm	2,800 ppm	1,500 ppm	Nausea, vertigo, anesthetic, euphoria	10.17
Hexane diamine		0.5 ppm	NE	NE	Irritated eyes, nose & throat,	NE
Hexanethiol		C-0.5 ppm	NA	NA	Headache, nausea, drowsiness, irritated eyes, confusion	NA
Hexyl acetate		50 ppm	500 ppm	100 ppm	Irritated eyes, nose & throat, narcosis, headache	NA
Hexylene glycol		C-25 ppm	NE	NA	Irritated eyes, narcosis	NA
Hydrazine (skin)	**0.90 mg/kg**	0.01 ppm	50 ppm	4 ppm	Irritated eyes, temporary blindness, nausea, dizziness	8.10
Hydrogenated terphenyls		0.5 ppm	NE	NA	Reversible skin rash, headache	NA
Hydrogen bromide		C-2 ppm	30 ppm	6 ppm	Irritated eyes, nose & throat, skin burns	11.62
Hydrogen chloride		C-2 ppm	50 ppm	10 ppm	Burns throat & eyes, choking	12.74
Hydrogen cyanide (skin)		C-4.7 ppm	50 ppm	1 ppm	Weakness, headaches, nausea, confusion, fast, deep breathing	13.73
Hydrogen fluoride		0.5 ppm	30 ppm	5 ppm	Irritated eyes, nose & throat, pulmonary edema, stuffy nose	15.77
Hydrogen peroxide		1 ppm	75 ppm	100 ppm	Irritated eyes, nose & throat, corneal ulcer	10.54
Hydrogen selenide		0.05 ppm	1 ppm	1.5 ppm	Nausea, diarrhea, metal taste, garlic breath, Irritated eyes & nose	9.88
Hydrogen sulfide		10 ppm	100 ppm	9.4 ppb	Conjunctivitis, headache, fatigue, photophobia, crying, dizziness	10.46
Hydroquinone		2 mg/m3	50 mg/m3	NA	Irritated eyes, excitement, nausea, colored urine, dizziness	7.95
Hydroxypropyl acrylate (skin)		0.5 ppm	NE	NA	Irritated eyes, skins sensitization	NA
Indene		10 ppm	NE	NA	Irritated eyes, nose & throat, liver damage	8.81
Indium		100 µg/m3	NE	NA	Short breath, pneumonia	NA
Iodine		C-0.1 ppm	2 ppm	1.6 ppm	Irritated eyes, tight chest, weeping, skin sensitization	9.28
Iodoform		0.6 ppm	NE	5 ppb	Irritated eyes, tight chest, weeping, skin sensitization	NA
Iron oxide (dust)		5 mg/m3	2,500 mg/m3	Dust	Benign pneumoconiosis, cough	Dust

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Iron pentacarbonyl		0.1 ppm	NE	NA	Headache, dizziness, fever, coughing, short breath	7.95
Iron salts (soluble)	**99800 mg/kg**	1 mg/m3	NE	NA	Skin & stomach irritation	NA
Isoamyl acetate		50 ppm	1,000 ppm	0.22 ppm	Irritated eyes, nose, & throat, narcosis	9.95
Isoamyl alcohol		100 ppm	500 ppm	1 ppm	Irritated eyes, headache, dizziness, diarrhea	10.09
Isobutyl acetate		150 ppm	1,300 ppm	1.1 ppm	Headache, drowsiness, irritated eyes & lungs	9.97
Isobutyl alcohol		50 ppm	1,600 ppm	3.6 ppm	Irritated eyes, headache, drowsiness	10.09
Isooctyl alcohol (skin)		50 ppm	NE	17 ppm	Skin irritation, incoordination	NA
Isophorone		4 ppm	200 ppm	0.19 ppm	Irritated eyes, nose & throat, headache, narcosis,	9.07
Isophorone diisocyanate (skin)		0.005 ppm	NE	NA	Asthma," loss of breath	NA
2-Isopropoxy ethanol (skin)		25 ppm	NE	NA	Brown urine, lung congestion, anemia	NA
Isopropyl acetate		100 ppm	1,800 ppm	4.1 ppm	Irritated eyes, narcosis, headache	9.98
Isopropyl alcohol		200 ppm	2,000 ppm	43 ppm	Mild irritated eyes, drowsiness, gastrointestinal cramps	10.15
Isopropyl amine		5 ppm	750 ppm	0.2 ppm	Irritated eyes, pulmonary edema, visual disturbance	8.72
Isopropyl aniline (skin)		2 ppm	NE	NA	Eye, nose, throat & skin irritation, brown urine	7.50
Isopropyl ether		250 ppm	1,400 ppm	0.05 ppm	Irritated eyes, respiratory discomfort	9.20
Isopropyl glycidyl ether (IGE)		50 ppm	400 ppm	300 ppm	Irritated eyes, upper respiratory tract	NA
Kaolin		2 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Kerosene		200 mg/m3				
Ketene		0.5 ppm	5 ppm	23 ppm	Irritated eyes & lungs, pulmonary edema, skin sensitization	9.61
Lead arsenate		150 µg/m3	NA	NA	Nasal ulcers, fever, bronchitis, melanosis, peripheral neuropathy	Dust
Lead chromate		0.012 mg/m3	NA	NA	Respiratory irritation, skin and nasal ulcers	Dust
Lead compounds	**9920 mg/kg**	50 µg/m3	100 mg/m3	Dust	Fatigue, pallor, colic, insomnia	Dust
212Lead		10 pCi/l	NE	Dust	Carcinogen. No warning property	Dust
Limestone dust		5 mg/m3	NE	Dust	Irritated eyes & respiratory	Dust
Lindane (skin)	**2.7 mg/kg**	500 µg/m3	50 mg/m3	21 mg/m3	Headache, nausea, clonic convulsions, difficult breathing	NA
Lithium hydride	**67.2 mg/kg**	25 µg/m3	0.5 mg/m3	100 µg/m3	Irritated eyes, nausea, confusion, muscle twitches	NA
Magnesite (dust)		5 mg/m3	NE	Dust	Dusty lung", spitting, chest pain	Dust
Magnesium oxide	**14000 mg/lg**	10 mg/m3	750 mg/m3	Dust	Flu-like fever, cough	Dust
Malathion (dust) (skin)		10 mg/m3	250 mg/m3	10 mg/m3	Small pupils, runny nose, headache, tight chest, incoordination	Dust
Maleic anhydride		0.10 ppm	10 mg/m3	0.5 ppm	Double vision, asthma, photophobia	9.90
Manganese (dust)	**1590 mg/kg**	0.2 mg/m3	500 mg/m3	Dust	Dead face", dry throat, cough metal fume fever, pneumonia	Dust
Manganese (fume)		0.2 mg/m3			Dead face", dry throat, cough metal fume fever, pneumonia	
Manganese cyclopentadienyl tricarbonyl (skin)		100 µg/m3	NE	NA	Skin irritation, depression, pulmonary edema	NA
Marble		5 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Mercury and compounds (skin)	**53.8 mg/kg**	25 µg/m3	10 mg/m3	NA	Severe abdominal pain tremors, weakness, GI irritation, fatigue	10.40
Mercury - alkyl compounds (skin)		10 µg/m3	2 mg/m3	NA	Twitches, dizziness, numbness, hyper salivation	9.00
Mesityl oxide (skin)		15 ppm	1,400 ppm	17 ppb	Irritated eyes, nose & throat, narcosis	9.08
Methacrylic acid (skin)		20 ppm	NE	NA	Irritated eyes, nose & throat	NA
Methane		3000 ppm	6,250 ppm	No odor	No toxicity, explosive	12.80
Methanol (skin)	**4400 mg/kg**	200 ppm	6,000 ppm	160 ppm	Drowsiness, loss of vision, unconsciousness	10.85
Methomyl		2.5 mg/m3	NE	NA	NA	NA
Methoxychlor	**2.3 mg/kg**	5 mg/m3	5,000 mg/m3	NA	Twitches, convulsions	NA
Methoxyethanol (skin)		5 ppm	200 ppm	2.4 ppm	Headache, drowsiness, tremors, weakness	9.60
Methoxyethyl acetate (skin)		5 ppm	200 ppm	0.34 ppm	Brain damage, eye irritation, narcosis	NA
4-Methoxyphenol		5 mg/m3	NE	<1 ppm	Irritated eyes, nose & throat, skin necrosis	NA
Methyl acetate		200 ppm	3,100 ppm	180 ppm	Irritated nose & throat, headache, drowsiness	10.27
Methyl acetylene		1,000 ppm	1,700 ppm	100 ppm	Excitability, tremors, numbness	10.36
MAPP mixture		1,000 ppm	3,400 ppm	100 ppm	Excitability, tremors, numbness	10.36
Methyl acrylate (skin)		2 ppm	250 ppm	75 ppm	Irritated eyes, lungs & skin	9.90
Methyl acrylonitrile (skin)		1 ppm	NE	7 ppm	Vomiting, convulsions, chemical asphyxia	NA
Methylal		1,000 ppm	2,200 ppm	NA	Mild irritation of eyes & throat, anesthesia	10.00
Methylamine		5 ppm	100 ppm	5 ppm	Irritated eyes, coughing, burning throat	8.97
Methyl amyl ketone		50 ppm	800 ppm	0.01 ppm	Irritated eyes, nose & throat, headache, narcosis	9.33
Methyl aniline (skin)		0.5 ppm	100 ppm	NA	Dizziness, headache, dyspnea	7.34
Methyl bromide (skin)		1 ppm	250 ppm	>20 ppm	Headache, visual disturbances, vertigo, tremors	10.53
Methyl t-butyl ether		50 ppm	NE	<0.5 ppm	Drowsiness, eye irritation, incoordination, rapid breathing	<9.40

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Methyl butyl ketone		5 ppm	1,600 ppm	0.085 ppm	Wrist & foot drop, headache, drowsiness, numb feet & hands	9.34
Methyl chloride		50 ppm	2,000 ppm	10 ppm	Nausea, stagger, slurred speech, disturbed vision	11.28
Methyl 2-cyanoacrylate		0.2 ppm	3 ppm	NA	Superglue" adhesion	NA
Methyl cyclohexane		400 ppm	1,200 ppm	500 ppm	Lightheadedness, drowsiness, nose & throat irritation	9.85
Methyl cyclohexanol		50 ppm	500 ppm	500 ppm	Headache, irritated eyes	9.80
Methyl cyclo- hexanone (skin)		50 ppm	600 ppm	NA	Eye, nose & throat irritation, narcosis	NA
Methyl cyclopentadienyl manganese tricarbonyl (skin)		200 µg/m3	NE	NA	Thick tongue" giddiness, nausea, headache	NA
Methyl demeton (skin)		500 µg/m3	NE	<1 mg/m3	Nausea, headache, dizziness, vomiting, "red nose"	NA
Methylene bis chloroaniline (skin)		0.01 ppm	100 ppm	NA	Brown urine, nausea, liver cancer	NA
Methylene biscyclohexyl isocyanate (skin)		0.005 ppm	NE	NA	Chest pain, tremors	NA
Methylene bisphenyl isocyanate		0.005 ppm	75 mg/m3	NA	Chest pain, dyspnea, "asthma"	NA
Methylene chloride	**130 mg/kg**	25 ppm	2,300 ppm	160 ppm	Weakness, tingling & numbness, vertigo, nausea	11.35
Methylene dianiline (skin)		0.1 ppm	4 ppm	0.5 ppm	eye, nose & throat irritation, fever, yellow skin, brown urine	NE
Methyl ethyl ketone (MEK)		200 ppm	3,000 ppm	5.5 ppm	Irritated eyes, dizziness, vomiting	9.53
Methyl ethyl ketone peroxide		C-0.2 ppm	NE	NA	Eye, nose & throat irritation, lung damage	NA
Methyl formate		100 ppm	4,500 ppm	2,000 ppm	Eye & nose irritation, chest oppression	10.81
Methyl hydrazine (skin)		0.01 ppm	20 ppm	3 ppm	Tremors, vomiting, incoordination, diarrhea	7.67
Methyl iodide (skin)		2 ppm	100 ppm	4,300 ppm	Nausea, vertigo, slurred speech	9.54
Methyl isoamyl ketone		50 ppm	NE	0.013 ppm	Eye, nose & throat irritation, narcosis	NA
Methyl isobutyl carbinol (skin)		25 ppm	400 ppm	NA	Eye irritation, headache, drowsiness	NA
Methyl isobutyl ketone		50 ppm	500 ppm	0.88 ppm	Irritated eyes, nose & throat, narcosis, headache	9.30
Methyl isocyanate (skin)		0.02 ppm	3 ppm	2 ppm	Chest pain, dyspnea, asthma, eye, nose, & throat irritation	10.67
Methyl isopropyl ketone		200 ppm	NE	NA	Narcosis, nausea, dizziness, incoordination	NA
Methyl mercaptan		0.5 ppm	150 ppm	1 ppb	Narcosis, cyanosis, headache, nausea, convulsions	9.44
Methyl methacrylate		50 ppm	1,000 ppm	49 ppb	Irritated eyes, nose & throat, narcosis	9.70
Methyl parathion (skin)		200 µg/m3	NE	NA	Sweating, salivation, fast pulse, twitches, diarrhea	NA
Methyl pyrolidone		100 ppm	>400 ppm	<400 ppm	Headache, giddiness, nausea, confusion	NE
Methyl silicate		1 ppm	NE	NA	Early ulceration of cornea	NA
Methyl styrene		50 ppm	700 ppm	0.16 ppm	Irritated eyes, nose & throat, drowsiness	8.35
Metribuzin		5 mg/m3	NE	Dust	Anemia, harm to liver	Dust
Mica (dust)		3 mg/m3	1,500 mg/m3	Dust	Cough, dyspnea, weakness, weight loss	Dust
Mineral wool fiber		1 f/cc	NE	NA	Nose & throat irritation, coughing	Dust
Molybdenum compounds	**23.2 mg/kg**	0.5 mg/m3	1,000 mg/m3	Dust	Loss of appetite, incoordination, eye, nose & throat irritation	Dust
Monocrotophos (skin)		50 ug/m3	NE	Dust	small pupils, salivation, fast pulse, twitches, eye irritation	NA
Morpholine (skin)		20 ppm	1,400 ppm	0.11 ppm	Visual disturbance, cough, eye, nose & throat irritation	8.88
Naphtha (coal tar)		100 ppm	1,000 ppm	300 ppm	Lightheadedness, drowsiness	NA
Naphthalene	**7400 mg/kg**	10 ppm	250 ppm	38 ppb	Eye irritation, headache, confusion, excitement, nausea	8.12
Naphthalene diisocyanate		0.0005 ppm	NE	NE	Irritated nose, throat, choking, pulmonary edema, asthma	NE
Naphthylamine (alpha & beta)		NE	Carc.	NA	Short breath, blood in urine, difficult urination	7.30
Nickel (dust)	**538 mg/kg**	1 mg/m3	10 mg/m3	Dust	Skin sensitivity, chest pain, "asthma"	Dust
Nickel (soluble compounds)		100 µg/m3		Dust	Skin sensitivity, chest pain, "asthma"	Dust
Nickel carbonyl		0.001 ppm	2 ppm	3 ppm	Headache, vertigo, nausea, epigastric pain, pneumonia	8.28
Nickel Sulfide roasting fume		0.1 mg/m3	10 mg/m3	Dust	Skin sensitivity, chest pain, "asthma"	Dust
Nicotine (skin)		500 µg/m3	5 mg/m3	NA	Nausea, salivation, stomach pain, diarrhea, headache	8.01
95Niobium		500 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
Nitrapyrin		5 mg/m3	NE	Dust	NE	Dust
Nitric acid		2 ppm	25 ppm	62 ppm	Irritated eyes, nose & throat, delayed pulmonary edema	11.95
Nitric oxide		25 ppm	100 ppm	1 ppm	Irritated eyes, nose & throat, drowsiness	9.25
Nitroaniline (skin)		3 mg/m3	300 mg/m3	no odor	Cyanosis, dyspnea, diarrhea, irritability, vomiting	8.85
Nitrobenzene (skin)		1 ppm	200 ppm	0.037 ppm	Irritated eyes, nausea, dyspnea	9.92
4-Nitrobiphenyl		NE	Carc.	NA	Headache, dyspnea, weakness, urinary burning	NA

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Nitrochlorobenzene (skin)		0.1 ppm	100 mg/m3	0.002 ppm	Unpleasant taste, dizziness, weakness, nausea	9.99
Nitroethane		100 ppm	1,000 ppm	500 ppm	Dermatitis, crying, short breath	10.88
Nitrogen dioxide		1 ppm	20 ppm	20 ppm	Frothy sputum, dyspnea, cyanosis	9.78
Nitrogen trifluoride		10 ppm	1,000 ppm	No odor	Weakness, dizziness, headache	12.97
Nitroglycerin (skin)	**1200 mg/kg**	0.05 ppm	75 mg/m3	NA	Throbbing headache, nausea, dizziness	NA
Nitromethane		20 ppm	750 ppm	500 ppm	Dermatitis	11.08
Nitronaphthalene		NE	NE	NE	Dermatitis, eye irritation, irritated respiratory system	NE
1-Nitropropane		25 ppm	1,000 ppm	140 ppm	Eye irritation, vomit, diarrhea	10.81
2-Nitropropane		10 ppm	100 ppm	300 ppm	Headache, anorexia, irritated respiratory system	10.71
Nitrosodimethyl amine (skin)	**8850, 26 mg/kd**	NE	Carc.	NA	Diarrhea, stomach cramps, headache, fever	8.69
Nitrotoluene (skin)		2 ppm	200 ppm	1.7 ppm	Cyanosis, headache, dizziness	9.82
Nitrous oxide		50 ppm	>1,000 ppm	none	Cough, fatigue, and nausea	NE
Nonane		200 ppm	NE	NA	Mild tremors, slight incoordination	10.21
Nonanethiol		C-0.5 ppm	NE	NE	Headache, nausea, drowsiness, irritated eyes, confusion	
Octachloro naphthalene (skin)		100 µg/m3	<200 mg/m3	NA	Acne-like dermatitis, jaundice	NA
Octadecanethiol		C-0.5 ppm	NE	NE	Headache, nausea, drowsiness, irritated eyes, confusion	NA
Octane		300 ppm	1,000 ppm	150 ppm	Irritated eyes, nose & throat, pneumonia, drowsiness	9.82
Oil mist		5 mg/m3	2,500 mg/m3	Mist	Nasal irritation	Mist
Osmium tetroxide		0.2 **ppb**	1 mg/m3	0.002 ppm	Tears, conjunctivitis, headache, cough	12.60
Oxalic acid		1 mg/m3	500 mg/m3	NA	Irritated lungs, shock, headache	NA
Oxygen difluoride		C-0.05 ppm	0.5 ppm	0.45 ppm	Intractable headache, respiratory irritation	13.11
Ozone		0.05 ppm	5 ppm	20 ppb	Irritated eyes, nose & throat, pulmonary edema	12.50
Paraffin wax fume		2 mg/m3	NE	NA	Eye, nose & throat irritation	NA
Paraquat dust (skin)		100 µg/m3	1.0 mg/m3	Dust	Irritated eyes, fingernail damage, pulmonary inflammation, nosebleeds	Dust
Parathion (skin)		50 µg/m3	10 mg/m3	480 µg/m3	Small pupils, runny nose, headache, salivation, stomach cramps	NA
Pentaborane		0.005 ppm	1 ppm	1 ppm	Headache, drowsiness, dizziness, tremor, incoordination	9.90
Pentachloronapthalene (skin)		500 µg/m3	NE	NA	Headache, vertigo, "acne", itching, fatigue	NA
Pentachlorophenol (skin)	**410 mg/kg**	500 µg/m3	2.5 mg/m3	9.3 mg/m3	Irritated eyes, & nose, lost appetite, weakness, sweating, sneezing	NA
Pentachloro nitrobenzene		500 µg/m3	NE	NE	Headache, weakness, dyspnea	<10.6
Pentaerythritol		5 mg/m3	NE	Dust	Dusty lung", spitting	Dust
Pentane		600 ppm	1,500 ppm	10 ppm	Eye, nose & throat irritation, drowsiness, pneumonia, headache	10.34
2-Pentanone		200 ppm	1,500 ppm	8 ppm	Irritated eyes, headache, narcosis	9.39
Pentyl acetate		50 ppm				
Perchloromethyl mercaptan		0.1 ppm	10 ppm	<0.1 ppm	Crying, eye inflammation, coughing, dyspnea, vomiting	NA
Perchloryl fluoride		3 ppm	100 ppm	10 ppm	Lung irritation, skin burns, weakness, dizziness, headache	13.60
Perlite		5 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Persulfates		100 ug/m3	NE	Dust	Irritation	Dust
Petroleum distillates (Naphtha)		300 ppm	1,100 ppm	NA	Dizziness, drowsiness, headache, irritated eyes, nose & throat	NA
Phenol (skin)	**20 mg/kg**	5 ppm	250 ppm	0.06 ppm	Skin corrosive, eye irritant, muscle aches, dark urine	8.50
Phenothiazine (skin)		5 mg/m3	NE	NA	Itching, photosensitivity, anemia	NA
Phenylene diamine (skin)		100 µg/m3	<25 mg/m3	NA	Irritated throat, "asthma"	7.58
(di) Phenyl ether		1 ppm	100 ppm	0.1 ppm	Nausea, irritated eyes, nose	8.09
Phenyl glycidyl ether		0.1 ppm	100 ppm	NA	Skin sensitivity, irritated eyes, nose, & throat, narcosis	NA
Phenylhydrazine (skin)		0.1 ppm	15 ppm	NA	Skin sensitization, dyspnea, cyanosis	7.64
Phenyl mercaptan		0.5 ppm	NE	0.3 ppb	Restlessness, fast breathing, weakness, incoordination, paralysis	8.32
N-Phenyl Naphthylamine		NE	Carc.	None	Carcinogen. No warning property	NE
Phenyl phosphine		C-0.05 ppm	NE	NA	Lost appetite, nausea, diarrhea, tears, tremors	7.36
Phorate (skin)		50 µg/m3	NE	NA	Small pupils, headache, salivation, diarrhea, stomach cramps	NA
Phosdrin (skin)		0.01 ppm	4 ppm	NA	Small pupils, headache, salivation, diarrhea, stomach cramps	NA
Phosgene		0.1 ppm	2 ppm	1.0 ppm	Dry burning throat, vomiting, foamy sputum, short breath	11.55
Phosphine		0.3 ppm	50 ppm	0.14 ppm	Nausea, diarrhea, thirst, chills	10.00
Phosphoric acid		1 mg/m3	1000 mg/m3	NA	Irritated upper respiratory tract, burns skin & eyes	NA
Phosphorus (yellow)	**3620 mg/kg**	100 µg/m3	5 mg/m3	NA	Irritated eyes, stomach pain, excess salivation, jaw pain	11.10
Phosphorous oxychloride		0.1 ppm	NE	NA	Eye irritation, dizziness, nausea, headache, chest pain	NA

Continued on next page

Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Phosphorus pentachloride		0.1 ppm	70 mg/m3	NA	Irritated eyes, respiratory system, bronchitis	NA
Phosphorus pentasulfide		1 mg/m3	250 mg/m3	0.005 ppm	Photophobia, dizziness, headache, tears, conjunctivitis	NA
Phosphorus trichloride		0.2 ppm	25 ppm	4 ppm	Irritated eyes, nose, pulmonary edema	9.91
Phthalic anhydride		1 ppm	60 mg/m3	0.12 ppm	Nausea, nasal ulcer & bleeding, bronchitis	10.0
Phthalic (Acid)		10 mg/m3			Nausea, nasal ulcer & bleeding, bronchitis	10.0
Phthalodinitrile		5 mg/m3	NE	NA	Weight loss	NA
Picloram		5 mg/m3	NE	NA	Dermatitis, diarrhea, fast pulse, vaginal bleeding	NA
Picric acid (skin)		100 µg/m3	75 mg/m3	0.4 µg/m3	Weakness, bitter taste, blood in urine, difficult urination	NA
Pindone (Pival)		100 µg/m3	100 mg/m3	NA	Nosebleed, stomach & back pain, smokey urine, profuse bleeding	NA
Piperazine dihydrochloride		5 mg/m3	NE	NA	Eye, nose & throat irritation, skin burns, sensitization	NA
Plaster (dust)		5 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Platinum Metal		1 mg/m3	4 mg/m3	Dust	Cough, dyspnea, cyanosis, skin sensitization	Dust
Platinum Soluble salts		2 µg/m3			Cough, dyspnea, cyanosis, skin sensitization	
239Plutonium		0.003 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
Polychlorinated biphenyl (PCBs - skin)	**5300 mg/kg**	500 µg/m3	5 mg/m3	Mist	Irritated eyes, chloracne	Mist
Polychlorinated dibenzodioxins (hex isomers)	**240 mg/kg**	1 µg/m3 (Company - internal)	Carc.	Dust	Chloracne, loss of feeling, fatigue	
Polychlorinated dibenzofurans (hex isomers)	**240 mg/kg**	1 µg/m3 (Company - internal)	Carc.	Dust	Chloracne, loss of feeling, fatigue	Dust
Polynuclear aromatics		200 µg/m3	80 mg/m3	Dust	Confusion, nausea, eye irritant, headaches, stomach pain	Dust
Portland cement		5 mg/m3	5,000 mg/m3	Dust	Coughing, spitting, wheezing lung irritation sneezing	Dust
Potassium hydroxide	**8590 mg/kg**	C-2 mg/m3	NE	Dust	Eye, nose & throat irritation, nasal ulcers, lung damage	Dust
144Praseodymium		50,000 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
147Promethium		50 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
Propane		1,000 ppm	2,100 ppm	>20,000 ppm	Dizziness, disorientation, excitation	11.00
Propane sultone		NE	NE	<10 ppm	Carcinogen. No warning property.	NE
Propanoic acid		10 ppm	NE	66 ppb	Eye, nose & throat irritation, skin burns, coughing, "asthma"	10.24
Propanethiol		C-0.5 ppm	NE	NA	Headache, nausea, drowsiness, irritated eyes, confusion	NA
Propargyl alcohol (skin)		1 ppm	NE	NA	Eye, nose & throat irritation, tears	10.51
Propriolactone		0.5 ppm	Carc.	NA	Skin irritation, burns, frequent urination	9.70
Propoxur (Baygon)		500 µg/m3	NE	NA	NA	NA
Propyl acetate		200 ppm	1,700 ppm	0.18 ppm	Irritated eyes & nose, narcosis	10.07
Propyl alcohol (skin)		200 ppm	800 ppm	5.3 ppm	Drowsiness, headache, nausea, stomach pain, drowsiness	10.22
Propylene dichloride		75 ppm	400 ppm	0.50 ppm	Eye irritation, drowsiness, lightheadedness	10.87
Propylene glycol dinitrate (skin)		0.05 ppm	NE	0.24 ppm	Disrupted vision, headache, loss of balance	NA
Propylene glycol methyl ether	**8.9 mg/kg**	100 ppm	NE	NA	Eye, nose & throat irritation, tears, anesthesia	NA
Propyleneimine (skin)		2 ppm	100 ppm	NA	Eye, skin burns, cancer	9.00
Propylene oxide		2 ppm	400 ppm	45 ppm	Irritated eyes, throat & lungs, mucous membrane blisters	9.81
Propyl nitrate		25 ppm	500 ppm	NA	Cyanosis, short breath, weakness, headache, very low blood pressure	11.07
Pyrethrum		5 mg/m3	5,000 mg/m3	NA	Sneezing, asthma, itching, runny nose, cancer	NA
Pyridine		1 ppm	1,000 ppm	0.66 ppm	Headache dizziness, nausea, frequent urination, nervousness	9.27
Quinone		100 µg/m3	100 mg/m3	0.5 ppm	Eye irritation, conjunctivitis, corneal ulcers	9.68
226Radium		0.3 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
222Radon with daughters		30 pCi/l	NE	NA	Carcinogen - no warning property	10.70
222Radon without daughters		4,000 pCi/l	NE	NA	Carcinogen - no warning property	
Radon daughters		0.33 WL	NE	NA	Carcinogen - no warning property	
Resorcinol		10 ppm	NE	40 ppm	Disturbed vision, bronchitis	NA
Rhodium (insoluble)		100 µg/m3	100 mg/m3	Dust	Eye irritation, nerve damage	Dust
Rhodium (soluble)		1 µg/m3	2 mg/m3	Dust	Eye irritation, nerve damage	Dust
Ronnel		10 mg/m3	300 mg/m3	NA	Tears, small pupils, increased sensitivity to noise, salivation	NA
Rosin core solder pyrolysis products		100 µg/m3	NE	NA	Eye, nose & throat irritation, bronchitis	NA
Rotenone		5 mg/m3	2,500 mg/m3	222 mg/m3	Numb mucous membranes, nausea, stomach pain, incoordination	NA
106Ruthenium		40 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
Selenium compounds	**7.48 mg/kg**	200 µg/m3	1 mg/m3	Dust	Headache, chill, fever, garlic breath, disturbed vision	Dust
Selenium hexafluoride		0.05 ppm	2 ppm	NA	Lung irritation, pulmonary edema	NA

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Silica (amorphous)		3 mg/m3	3,000 mg/m3	Dust	Dusty lung", spitting, coughing, wheezing, short breath	Dust
Silica (crystalline)		50 µg/m3	25 mg/m3	Dust	Dusty lung", spitting, coughing, wheezing, short breath	Dust
Silicon dust		5 mg/m3	NE	Dust	Dusty lung", Pulmonary fibrosis	Dust
Silicon carbide		5 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Silicon tetrahydride		5 ppm	NE	NA	Blood damage, brown urine, stuffy nose	9.30
Silver (dust)	**63.8 mg/kg**	100 µg/m3	10 mg/m3	Dust	Blue-gray eyes & skin, gastrointestinal irritation	Dust
Silver (metal & soluble)		10 µg/m3			Blue-gray eyes & skin, gastrointestinal irritation	Dust
Soapstone		3 mg/m3	3,000 mg/m3	Dust	Cough, short breath, cyanosis	Dust
Sodium azide (skin)		C-290 µg/m3	NE	NA	Eye irritation, bronchitis, headache, very low blood pressure	11.70
Sodium bisulfite		5 mg/m3	NE	Dust	Eye, nose & throat irritation	Dust
Sodium fluoroacetate (skin)		50 µg/m3	2.5 mg/m3	NA	Hallucinations, face & muscle twitches, numbness	NA
Sodium hydroxide		C-2 mg/m3	10 mg/m3	no odor	Irritated nose, burns eyes & skin, pneumonia	9.00
Sodium hypochlorite		C-2 mg/m3	10 mg/m3	0.08 ppm	Burning eyes, tears, choking	11.50
Sodium metabisulfite		5 mg/m3	NE	NA	Eye, nose & throat irritation	NA
Starch (dust)		5 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Stearates (dust)		5 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Stibine		0.1 ppm	5 ppm	NA	Headache, weakness, nausea, stomach pain, lumbar pain	9.58
Stoddard solvent		100 ppm	20,000 mg/m3	NA	Irritated eyes, nose, throat, dizziness, defatting of skin	<10.4
90Strontium	**270 mg/kg**	2 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
Strontium chromate		0.5 µg/m3	NE	Dust	Carcinogen - no warning property	Dust
Strychnine		0.15 mg/m3	3 mg/m3	no odor	Stiff neck & face muscles, restlessness, apprehension	NA
Styrene (skin)	**5.7 mg/kg**	20 ppm	700 ppm	0.15 ppm	Irritated eyes & nose, drowsiness, weakness, unsteady gait	8.47
Subtilisins (enzymes)		0.06 µg/m3	NE	NA	Short breath, wheezing, "asthma"	NA
Sucrose dust		5 mg/m3	NE	Dust	None known	Dust
Sulfometuron methyl		5 mg/m3	>100 mg/m3	Dust	Cancer	Dust
Sulfur dioxide		2 ppm	100 ppm	3 ppm	Eye, nose & throat irritation, choking, coughing	12.34
Sulfur hexafluoride		1,000 ppm	NE	NA	Essentially nontoxic"	15.30
Sulfur chloride		C-1 ppm	5 ppm	9 ppm	Tears, cough, pulmonary edema, skin & eye burns	9.40
Sulfur pentafluoride		C-0.01 ppm	1 ppm	NA	Difficult breath, pulmonary edema	NA
Sulfur tetrafluoride		C-0.1 ppm	NE	NA	Difficult breath, pulmonary edema	NA
Sulfuryl fluoride		5 ppm	200 ppm	NA	Conjunctivitis, runny nose, pharyngitis, numbness	13.00
Sulfuric acid		0.2 mg/m3	15 mg/m3	>1 mg/m3	Irritated nose & throat, pulmonary edema, conjunctivitis	Mist
Sulprofos		1 mg/m3	NE	NA	Excitement, salivation, small pupils	NA
2,4,5-T		10 mg/m3	250 mg/m3	Dust	Incoordination, skin irritation, rash	Dust
Talc (non- asbestos)		2 mg/m3	1,000 mg/m3	Dust	Dusty lung", spitting, coughing, Potential for asbestos content?	
Tantalum		5 mg/m3	2,500 mg/m3	NA	Lung irritation	NA
TEDP (Sulfotep) (skin)		200 µg/m3	10 mg/m3	NA	Tears, cyanosis, nausea, local sweating, runny nose	NA
Tellurium		100 µg/m3	25 mg/m3	Dust	Garlic odor on breath, sweating, metal taste, dry mouth, nausea	Dust
Tellurium hexafluoride		0.02 ppm	1 ppm	NA	Headache, dyspnea, garlic odor on breath	NA
Temephos dust		5 mg/m3	NE	Dust	Small pupils, runny nose, headache, salivation, stomach cramps	Dust
TEPP (skin)		50 µg/m3	5 mg/m3	NA	Eye pain, tears, chest, nausea, runny nose, diarrhea	NA
Terphenyls (skin)	**1.9, 5.3, 28 mg/kg**	C-0.5 ppm	500 mg/m3	<1 ppm	Irritated eyes, sore throat, headache	8.01
Tetrabromoethane		1 ppm	8 ppm	NA	Irritated eyes, nose, severe headache, stomach pain	NE
Tetrachlorodifluoroethane		500 ppm	2,000 ppm	NA	Irritated skin, conjunctivitis, pulmonary edema	11.30
1,1,2,2-Tetrachloroethane (skin)		1 ppm	150 ppm	7.3 ppm	Nausea, stomach pain, finger tremors	11.10
Tetrachloroethylene	**0.52 mg/kg**	25 ppm	150 ppm	47 ppm	Irritated eyes, nose, throat, flushed face & neck, dizziness	9.32
Tetrachloronaphthalene (skin)		2 mg/m3	<20 mg/m3	NA	Acne, headache, fatigue, vertigo	NA
Tetraethyl lead (skin)		75 µg/m3	40 mg/m3	NA	Fatigue, anxiety, tremors, nausea, convulsions	11.10
Tetrahydrofuran		50 ppm	2,000 ppm	31 ppm	Nausea, dizziness, headache	9.45
Tetramethyl succinonitrile (skin)		0.5 ppm	5 ppm	NA	Headache, nausea, convulsions	NA
Tetranitromethane		0.005 ppm	4 ppm	0.4 ppm	Irritated eyes, dizziness, headache, cyanosis, chest pain	NA
Tetrasodium pyrophosphate		5 mg/m3	NE	NA	Eye, nose & throat irritation	NA
Tetryl (skin)		100 µg/m3	750 mg/m3	NA	Sensitive skin, itching, headache	NA
Thallium (skin)	**0.807 mg/kg**	100 µg/m3	15 mg/m3	NA	Nausea, diarrhea, stomach pain	NA
Thiobis (t-butyl) cresol		5 mg/m3	NE	NA	Gastroenteritis, lung damage	NA

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
Thioglycolic acid (skin)		1 ppm	NE	NA	Weakness, difficult breath, convulsions	NA
Thionyl chloride		C-1 ppm	NE	NA	Eye, nose, skin & throat irritation	NA
Thiram		1 mg/m3	100 mg/m3	NA	Nose & throat irritation, (with alcohol) flushing, vomiting	NA
230Thorium		0.003 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
Thoron (220Rn)- without progeny		7,000 pCi/l	NE	NA	Carcinogen - no warning property	NA
Thoron (220Rn)- with progeny		9 pCi/l	NE	NA	Carcinogen - no warning property	NA
Tin - inorganic	**42.8 mg/kg**	2 mg/m3	100 mg/m3	NA	Irritated eyes & skin, headache	NA
Tin - organic (skin)		100 µg/m3	25 mg/m3	NA	mental disturbance, sore throat	NA
Titanium dioxide	**2330 mg/kg**	5 mg/m3	5,000 mg/m3	Dust	Dusty lung", spitting, coughing	Dust
Tolidine (skin)		NE	NE	NE	Carcinogen - no warning property	NE
Toluene (skin)	**2.3 mg/kg**	50 ppm	500 ppm	1.7 ppm	Fatigue, confusion, euphoria, dizziness, headache, tears	8.82
Toluene-2,4- diisocyanate (TDI)		0.005 ppm	2.5 ppm	2.14 ppm	Irritated nose, throat, choking, pulmonary edema, asthma	NA
Toluidine (skin)		2 ppm	50 ppm	20 ppm	Headache, cyanosis, dizziness, drowsiness, burning eyes	7.44
Tributyl phosphate		0.2 ppm	30 ppm	NA	Respiratory irritation, headache, nausea	NA
Trichloroacetic acid		1 ppm	NE	NA	Burns to the skin or eye	NA
Trichlorobenzene	**85 mg/kg**	C-5 ppm	NE	NA	Nose & eye irritation	NA
1,1,1-Trichloroethane		350 ppm	700 ppm	400 ppm	Headache, CNS depression, loss of balance, eye irritation	11.00
1,1,2-Trichloroethane (skin)		10 ppm	100 ppm	NA	Irritated nose, central nervous system depression	11.00
Trichloroethylene		50 ppm	1,000 ppm	82 ppm	Vertigo, visual disturbance, headache, drowsiness	9.45
Trichlorofluoromethane		C-1,000 ppm	2,000 ppm	no odor	Incoordination, cardiac arrhythmia, tremors	11.80
Trichloronaphthalene (skin)		5 mg/m3	<20 mg/m3	NA	Acne", nausea, lost appetite, vertigo	NA
1,2,3-Trichloropropane (skin)		10 ppm	100 ppm	100 ppm	Irritated eyes, throat, central nervous system depression	NA
Trichlorotrifluoroethane		1,000 ppm	2,000 ppm	45 ppm	Irritated throat, drowsiness	11.99
Triethylamine		1 ppm	200 ppm	0.28 ppm	Irritated eyes, lungs & skin, excitement, salivation, tremors	7.50
Trifluorobromomethane		1,000 ppm	40,000 ppm	NA	Lightheadedness, cardiac arrhythmias	11.40
Trimellitic anhydride		0.005 ppm	NE	NA	Runny nose, wheezing, "asthma," Eye, nose & throat irritation	NA
Trimethylamine		5 ppm	NE	0.002 ppm	Eye, nose & throat irritation, pneumonia	7.82
Trimethyl benzene	**32 mg/kg**	25 ppm	NE	2.4 ppm	Eye, nose & throat irritation, pneumonia	NA
Trimethyl phosphite		2 ppm	NE	0.1 ppb	Corneal ulcers	NA
Trinitrotoluene (TNT) (skin)		100 µg/m3	500 mg/m3	Solid	Throat irritation, coughing, headache, sneezing, foot drop	10.59
Triorthocresyl phosphate (skin)		100 µg/m3	40 mg/m3	NA	Gastrointestinal pain, cramps in calves, foot or wrist drop	NA
Triphenylamine		5 mg/m3	NE	NA	None known	6.86
Triphenyl phosphate		3 mg/m3	1,000 mg/m3	NA	Muscle weakness, paralysis	NA
Tritium (3H)		20,000 pCi/l	NE	None	Carcinogen. No warning property.	>13
Tungsten compounds		5 mg/m3	NE	Dust	Lost appetite, incoordination, tremors, difficult breathing	Dust
Tungsten (soluble)		1 mg/m3	NE	Dust	Lost appetite, incoordination, tremors, difficult breathing	Dust
Turpentine		100 ppm	800 ppm	200 ppm	Irritated eyes, nose, throat, headache, blood in urine	NA
Undecanethiol		C-0.5 ppm	NE	NA	Headache, nausea, drowsiness, irritated eyes, confusion	NA
Uranium - insoluble compounds		200 µg/m3	10 mg/m3	Dust	Dermatitis, lung damage, cancer	Dust
Uranium - soluble compounds		50 µg/m3	10 mg/m3	Dust	tears, cough, nausea, short breath	Dust
Valeraldehyde		50 ppm	NE	12 ppm	Eye, nose & throat irritation	NA
Vanadium Pentoxide (dust)		50 µg/m3	35 mg/m3	Dust	Green tongue, metal taste, coughing, throat irritation	Dust
Vegetable oil mist		5 mg/m3	NE	Mist	None known	Mist
Vinyl acetate		10 ppm	NE	0.12 ppm	Eye, nose & throat irritation	9.19
Vinyl bromide		0.5 ppm	Carc.	NA	Eye irritation, cancer	9.80
Vinyl chloride	**0.27 mg/kg**	1 ppm	Carc.	NA	Weakness, stomach pain, cancer	10.00
Vinyl cyclohexene (skin)		0.1 ppm	Carc.	NA	Skin, eye, nose & throat irritation,	<10.0
Vinyl cyclohexene dioxide (skin)		0.1 ppm	Carc.	NA	Skin, eye, nose & throat irritation, cancer	8.93
Vinyl toluene		50 ppm	400 ppm	50 ppm	Irritated eyes, upper respiratory difficulties, drowsiness	8.20
V M & P Naphtha		300 ppm	NE	NA	Eye irritation, bronchitis	NA
Warfarin		100 µg/m3	100 mg/m3	no odor	Back pain, bloody nose & lips, bruises, membrane hemorrhage, vomiting	NA
Welding fumes		5 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Wood dust (NOS)		1 mg/m3	NE	Dust	Dusty lung", spitting, coughing	Dust
Wood dust (red cedar)		0.5 mg/m3	NE	Dust	Dermatitis, "asthma", wheezing	Dust
Wood dust (beech & oak)		1 mg/m3	NE	Dust	Dusty lung", spitting, coughing, nasal cancer	Dust

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Material	Concentration	PEL/TLV	IDLH	Warning	Signs & Symptoms	IP (eV)
X-Ray & Gamma Radiation		2,000 µR/hr	100 R/hr	NA	carcinogen - no warning property (Company-internal)	NA
Xylene	**16, 13 mg/kg**	100 ppm	900 ppm	5 ppm	Eye, nose & throat irritation, drowsiness, nausea, incoordination	8.44
Xylene diamine (skin)		C-100 µg/m3	NE	100 ppm	Skin, eye, nose & throat irritation, difficult breathing, tears	NA
Xylidine (skin)		0.5 ppm	50 ppm	0.40 ppm	Headache, weakness, cyanosis	7.65
Yttrium		1 mg/m3	500 mg/m3	Dust	Irritated eyes & lungs, liver	Dust
90Yttrium		300 pCi/l	NE	Dust	Carcinogen - no warning property	Dust
Zinc chloride fume		1 mg/m3	50 mg/m3	Dust	Irritated nose, throat, cough, short breath, spitting	12.90
Zinc chromate		10 µg/m3	15 mg/m3	Dust	Cancer upon chronic exposure	Dust
Zinc (dusts)	**1250 mg/kg**	2 mg/m3	NE	Dust	Sweet metal taste, dry throat, cough, tight chest, chills	Dust
Zinc (fumes)		2 mg/m3	NE	Dust	Sweet metal taste, dry throat, cough, tight chest, chills	Dust
Zirconium dust	**24.7 mg/kg**	5 mg/m3	50 mg/m3	Dust	Skin, eye, nose & throat irritation,	Dust
95Zirconium		50 pCi/l	NE	Dust	Carcinogen - no warning property	Dust

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Radionuclide Maximum Detected Results

Analyte	Result Value Units	Maximum Detected Results
Ac-228	pCi/g	1.53
Co-60	pCi/g	0.063
Cs-134	pCi/g	0.05
Cs-137	pCi/g	1.16
Eu-152	pCi/g	0.12
Eu-154	pCi/g	0.37
K-40	pCi/g	25.5
Pu-239	pCi/g	0.021
Pu-241	pCi/g	1.2
Ra-226	pCi/g	0.95
Sr-90	pCi/g	0.45
Th-228	pCi/g	1.3
Th-230	pCi/g	1
Th-232	pCi/g	1.53
U-234	pCi/g	1.12
U-235	pCi/g	0.053
U-238	pCi/g	1.15

Source: Boeing Historical Data
pCi/g = Average Picocuries Per Gram

HEALTH AND SAFETY PLAN SIGNATURE FORM

CDM Smith Health and Safety Plan

All site personnel must sign this form indicating receipt of the H&SP. Keep this original on site. It becomes part of the permanent project files. Send a copy to the Health and Safety Manager (HSM).

SITE NAME/NUMBER: SSFL Environmental Support

DIVISION/LOCATION: CDM Federal Programs Corporation (CDM Smith)

CERTIFICATION:

I understand, and agree to comply with, the provisions of the above referenced H&SP for work activities on this project. I agree to report any injuries, illnesses or exposure incidents to the site Health and Safety Coordinator (SHSC). I agree to inform the SHSC about any drugs (legal and illegal) that I take within three days of site work.

PRINTED NAME	SIGNATURE	DATE

Attachment 1
AHA DPT Drilling

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Task Title: **DPT Drilling**

Prepared By: **Patricia Dentler**

NOTES:
1. **This AHA is used as an addendum to the Phase 3 HASP**
2. **Hazards common to All Activity Steps are combined**

Overall Risk Assessment Code (RAC) (Use Highest Code): M

Risk Assessment Code Matrix

E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk		Probability				
		Frequent	Likely	Occasional	Seldom	Unlikely
SEVERITY	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
DPT DRILLING	Buried utility locate	• Call ”811” to initiate utility locates. The local One Call Center notifies utility companies to arrange for marking the locations of buried lines. A minimum of 72 hours notice, prior to the start of any excavation, is required. • CDM Smith subcontractor will locate utilities onsite • Boeing Service Provider personnel will assist with onsite utility location • All work locations will be cleared of utilities prior to any intrusive work	L
	Power lines/underground utilities	• Identify locations of power lines or underground utilities prior to drilling activities • For work near overhead lines, ensure adequate distance between lines and any part of the drill rig (10 feet for up to 50kV; plus 1 foot for every 25 kV greater than 50 kV) • If the drill bit encounters anything unusual (i.e. PVC or pea gravel), drilling will stop and the SSO will be notified	L
	Equipment Inspection	• Prior to use, all drill rigs and related equipment will be inspected by SSO or designee • Drill rigs and support equipment will be inspected/ documented daily and by the operator • Wire cables must be maintained in good condition, free from kinks or broken strands • Wire cables will be inspected daily; cables with broken strands, weak spots, kinking, or mashed areas will be replaced prior to use • All rotating shafts, pulleys or chains must be covered with protective guards • All drill rigs must be equipped with an emergency kill switch; staff are trained on how to use it	L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
DPT DRILLING (con't)	Water tanks	• All water tanks must be securely fastened to the truck frame • Water tanks should be constructed of materials with adequate side strength, baffled to prevent the sloshing of water side to side, and must have lids with gaskets to prevent water loss	L
	Sampling	• Sampling will be conducted from sample sleeves • Nitrile gloves will be worn when conducting sampling activities	L
	Unauthorized operation	• Only trained and authorized personnel will operate and/or assist in drilling operations • Operators must comply will all applicable state certifications	L
	Crushing injuries	• Drill rods and drill bit stabilizer will be properly stored and transported by using a rack, the rig, or utility trailer • Be aware of and stay away from equipment parts which could cause crushing injury • All vehicles and wheeled equipment will have chocks placed under the wheels to prevent rolling	L
	Mechanical or moving parts	• Personnel will be aware of all mechanical equipment • Personnel will stay out of areas with limited visibility • Extremities and loose clothing will be kept clear of all moving parts • Back-up alarms will be required on heavy equipment • Drill rig operators must provide training to all personnel in exclusion zone regarding known pinch points, moving part hazards, and emergency kill switch	M
	Work zones	• Exclusion zone will be an area with a minimum radius of 1.5 times the drill mast height • Drilling area will be marked off and set up as an exclusion zone using traffic cones	L
	Refueling	• Turn off engine and use proper grounding procedures	
DECON	Fire hazards Electrical	• Turn off all equipment and allow it to cool before refueling • Equipment powered by generator will have a ground-fault circuit interrupter (GFCI)	L L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
ALL ACTIVITY STEPS	Radiologic survey	• All sample points will be surveyed for gamma radiation prior to set up of equipment	L
	Environmental Protection	• Plastic will be placed under the operating equipment as well as in surrounding areas, as needed • If fuel or oil leaks on the plastic sheeting, absorbent pads will be used • Absorbent material (spill kits) will be available during work activities	L
	Housekeeping – slips/trips/falls	• Work locations will be inspected to identify slip, trip and fall issues; hazards will be controlled or marked prior to beginning work activities • All sites will be kept clean and free of trash and other debris • All trash will be properly containerized and removed or staged daily • Cords will be covered or elevated above walking areas • Equipment will be stored when not in use	L
	Eye, foot, head, hand, hearing protection	• Safety glasses, steel-toes boots, hard hats and work gloves will be required during field operations • Activities with splash or potential for flying debris may require side shields, goggles or face shields • Keep hands away from rotating augers, the hammer, and all other moving parts • Hearing protection will be required during drilling operations	L
	Back Injury	• Use proper lifting techniques; bend at knees and grip object with whole hand • Keep back as straight and vertical as possible • Center body weight over feet with arms and elbows kept close to the body • Heavy or large objects shall be carried by two people	L
	Fire Prevention	• Smoking is prohibited on the SSFL property. • Fire extinguishers of the proper classification and size will be present on the drill rig • Fire extinguishers will be fully charged and inspected weekly • Fuels will be stored in appropriate containers • Do not park or operate equipment with hot engines on or near dry grass	L
	Severe weather	• Drilling will stop when rain interferes with the safety of the workers • Drilling activities will stop during lightning • Operators, crew, and other support personnel will move out of the exclusion zone and take shelter in vehicles • The SSO will specify when work may resume; work will not resume until lightning and thunder has stopped for a minimum of 30 minutes • Work during periods of high temperatures (heat stress) is covered in the Phase 3 HASP	L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
ALL ACTIVITY STEPS (con't)	Biologic hazards – Snakes, ticks, poison oak	• All work areas will be inspected for rodents, snakes and poison oak prior to set up of equipment • Avoid areas (long grass, wooded locations) where poison oak, ticks and snakes may be present • Wear boots and long pants that cover the legs, mandatory • Wear gaiters or snake boots capable of preventing injury from a snake bite, mandatory • Tuck pant legs into high boots and tape openings with duct tape, as needed • Apply insecticides	M
	Emergency notification	• Cell phone service is spotty at the SSFL property; a two-way radio will be carried by work crews at all times • All personnel will be aware of the proper notification procedures for summoning emergency assistance • Follow Boeing *Emergency Procedures, Section 2* in the "Service Provider Manual" (See HASP)	L
	Hazard Communication	• MSDSs will be available to personnel for all chemical compounds brought on site by CDM Smith or CDM Smith subcontractors	L
	All Hazards	• CDM Smith will inspect work area using SafetyNet Checklist and enter results into database	L

Daily AHA Briefing Conducted by:		Print Name	Signature	Date
1	Competent Person (Y/N)			
2	Competent Person (Y/N)			

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

PRE-WORK BRIEFING ATTENDANCE

AHA No:	**Job Title: AHA for DPT Drilling**	**Date:**
Field Supervisor:	**Subcontractor(s):**	**Time:**
EMERGENCY ASSEMBLY POINT:		
WORK LOCATION DESCRIPTION:		
I agree to work within the scope of work and follow the work controls described in the briefing.		
Signature	**Print Name**	**Organization**

Attachment 2
AHA Hand Augering

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Task Title: **Hand Augering**

Prepared By: **Patricia Dentler**

NOTES:
1. **This AHA is used as an addendum to the Phase 3 HASP**
2. **Hazards common to all Activity Steps are at the end**

Overall Risk Assessment Code (RAC) (Use Highest Code): M

Risk Assessment Code Matrix

E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk		Probability				
		Frequent	**Likely**	**Occasional**	**Seldom**	**Unlikely**
SEVERITY	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
HAND AUGERING	Buried utility locate	• Call ”811” to initiate utility locates. The local One Call Center notifies utility companies to arrange for marking the locations of buried lines. A minimum of 72 hours notice, prior to the start of any digging, is required. • CDM Smith subcontractor locates utilities onsite • Boeing Service Provider personnel assist with onsite utility location • All work locations will be cleared of utilities prior to any intrusive work	L
	Power lines/buried utilities	• Identify locations of power lines or underground utilities prior to digging activities • If the augering encounters anything unusual (i.e. PVC or pea gravel), augering will stop and the SSO will be notified	L
	Equipment inspection	• Prior to use, all equipment will be inspected by SSO or designee. • Hand augers and support equipment will be inspected/ documented daily and by the operator • Replaceable parts will be inspected daily; worn or weak spots, kinked or mashed areas will be replaced prior to use	L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
HAND AUGERING (con't)	Open holes	• All auger spoils will be kept away from edge of hole and equipment shall not be placed, stored, or operated on the edge of a hole • All auger holes will be immediately backfilled following sample collection. Holes will be backfilled if left unattended	L
	Sampling	• Sampling will be conducted from a sample sleeves • Nitrile gloves will be worn when conducting sampling activities	L
	Steep slopes	• Work crew will assess the sloped work zone for unstable areas, holes and loose rocks or vegetation • Pay close attention to footing while walking • Do not work in areas with excessive scree or loose material • Do not work above/below other working operations • Work will not be done on slopes when it is raining or when soil is saturated	M
	Unauthorized operation	• Only trained and authorized personnel will operate and/or assist in augering operations	L
	Crushing injuries	• Be aware of and stay away from equipment parts which could cause crushing injury • All vehicles and wheeled equipment will have chocks placed under the wheels to prevent rolling	L
	Mechanical or moving parts	• Personnel will be aware of all mechanical or moving parts (slide hammer) • Extremities and loose clothing will be kept clear of all moving parts	M
	Work zones	• Exclusion zone will be an area with a minimum radius of 20 feet around the auger hole • Augering area will be marked off and set up as an exclusion zone	L
SITE SECURITY	Open holes	• Open holes will backfilled immediately following sample collection	L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
ALL ACTIVITY STEPS	Radiologic survey	• All sample points will be surveyed for gamma radiation prior to set up of equipment	L
	Environmental Protection	• Plastic will be placed in the work area and the surrounding areas, as needed • If fuel or oil leaks on the plastic sheeting, absorbent pads will be used • Absorbent material (spill kits) will be available during work activities	L
	Housekeeping – slips/trips/falls	• Work locations will be inspected to identify slip, trip and fall issues; hazards will be controlled or marked prior to beginning work activities • All sites will be kept clean and free of trash and other debris • All trash will be properly containerized and removed or staged daily • Cords will be covered or elevated above walking areas • Equipment will be stored when not in use	L
	Eye, foot, head, hand, hearing protection	• Safety glasses, steel-toes boots, hard hats and work gloves will be required during field operations • Activities with splash or potential for flying debris may require side shields, goggles or face shields • Keep hands away from all moving parts (slide hammer) • Hearing protection will be required when operating noisy equipment (slide hammer)	L
	Back Injury	• Use proper lifting techniques, bend at knees and grip object with whole hand • Keep back as straight and vertical as possible • Center body weight over feet with arms and elbows kept close to the body • Heavy or large objects shall be carried by two people	L
	Fire Prevention	• Smoking is prohibited on the SSFL property • Fire extinguishers of the proper classification and size will be present in the work area • Fire extinguishers will be fully charged and inspected weekly • Fuels will be stored in appropriate containers • Do not park or operate equipment with hot engines on or near dry grass	L
	Severe weather	• Work will stop when rain interferes with the safety of the workers • Work activities will stop during lightning • Work crew will move out of the exclusion zone and take shelter in vehicles • The SSO will specify when work may resume; work will not resume until lightning and thunder has stopped for a minimum of 30 minutes • Work during periods of high temperatures (heat stress) is covered in the Phase 3 HASP	L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
ALL ACTIVITY STEPS (con't.)	Biologic hazards – Snakes, ticks, poison oak	• All work areas will be inspected for rodents, snakes and poison oak prior to set up of equipment • Avoid areas (long grass, wooded locations) where poison oak, ticks and snakes may be present • Wear boots and long pants that cover the legs, mandatory • Wear gaiters or snake boots capable of preventing injury from a snake bite, mandatory • Tuck pant legs into high boots and tape openings with duct tape, as needed • Apply insecticides	M
	Emergency notification	• Cell phone service is spotty at the SSFL property; a two-way radio will be carried by work crews at all times • All personnel will be aware of the proper notification procedures for summoning emergency assistance. • Follow Boeing *Emergency Procedures, Section 2* in the "Service Provider Manual" (See HASP)	L
	Hazard Communication	• MSDSs will be available to personnel for all chemical compounds brought on site by CDM Smith or CDM Smith subcontractor	L
	All Hazards	• CDM Smith will inspect work area using SafetyNet Checklist and enter results into database	L

Daily AHA Briefing Conducted by:		Print Name	Signature	Date
1	Competent Person (Y/N)			
2	Competent Person (Y/N)			

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

PRE-WORK BRIEFING ATTENDANCE

AHA No:	**Job Title: AHA for Hand Augering**	**Date:**
Field Supervisor:	**Subcontractor(s):**	**Time:**
EMERGENCY ASSEMBLY POINT:		
WORK LOCATION DESCRIPTION:		
I agree to work within the scope of work and follow the work controls described in the briefing.		
Signature	**Print Name**	**Organization**

Attachment 3
AHA Excavation Trenching

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Task Title: **Excavation and Trenching**

Prepared By: **Patricia Dentler**

NOTES:
1. **This AHA is used as an addendum to the Phase 3 HASP**
2. **Hazards common to all Activity Steps are at the end**

Overall Risk Assessment Code (RAC) (Use Highest Code): M

Risk Assessment Code Matrix

E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk		Probability				
		Frequent	**Likely**	**Occasional**	**Seldom**	**Unlikely**
SEVERITY	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
EXCAVATION AND TRENCHING	Buried utility locate	• Call ”811” to initiate utility locates. The local One Call Center notifies utility companies to arrange for marking the locations of buried lines. A minimum of 72 hours notice, prior to the start of any excavation, is required. • CDM Smith subcontractor locates utilities onsite • Boeing Service Provider personnel assist with onsite utility location • All work locations will be cleared of utilities prior to any intrusive work	L
	Power lines/buried utilities	• Identify locations of power lines or underground utilities prior to excavation activities • For work near overhead lines, ensure adequate distance between lines and any part of the equipment (10 feet for up to 50kV; plus 1 foot for every 25 kV greater than 50 kV) • If the excavator encounters anything unusual that would indicate an active power line or buried utility (i.e. PVC or pea gravel), excavating will stop and the SSO will be notified	L
	Equipment inspection	• Prior to use, all heavy equipment will be inspected by SSO or designee. • Excavators and support equipment will be inspected/ documented daily and by the operator • Hoses, fittings and cables will be inspected daily; hoses with weak spots, kinking, or mashed areas will be replaced prior to use • All rotating machinery must be covered with protective guards	L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
EXCAVATION AND TRENCHING (con't.)	Open excavations	• Personnel are not allowed inside of excavations • All trench spoils will be kept at least 2 ft. from edge of trench and equipment shall not be placed, stored, or operated on the edge of a trench • Trenches will be appropriately marked with fencing, signs, cones, tape, etc. to warn and protect from entry • Inspect excavation sidewalls after rain storms for evidence of slumping or cave-ins (performed from outside of excavation)	M
	Sampling	• Side wall of the excavation will sampled from the surface to 5 feet below the ground surface. A slide hammer will be used to obtain the sample. Personnel are not allowed to entry excavation • Sampling will be conducted from excavator bucket or a sample pile developed for that purpose • Nitrile gloves will be worn when conducting sampling activities	L
	Water tanks	• All water tanks must be securely fastened to the truck frame • Water tanks should be constructed of materials with adequate side strength, baffled to prevent the sloshing of water side to side, and must have lids with gaskets to prevent water loss	L
	Unauthorized operation	• Only trained and authorized personnel will operate and/or assist in excavating operations • Operators must comply will all applicable state certifications	L
	Crushing injuries	• Be aware of and stay away from heavy equipment parts which could cause crushing injury. • All vehicles and wheeled equipment will have chocks placed under the wheels to prevent rolling	L
	Mechanical or moving parts	• Personnel will be aware of all mechanical equipment • Personnel will stay out of areas with limited visibility • Extremities and loose clothing will be kept clear of all moving parts • Back-up alarms are required on heavy equipment • Excavator operators will provide training to all personnel in exclusion zone regarding known pinch points, moving part hazards, and emergency kill switch	M
	Work zones	• Exclusion zone will be an area with a minimum radius of 20 feet around operating equipment • Excavation area will be marked off and set up as an exclusion zone	L
	Refueling	• Turn off engine and use proper grounding procedures	L
SITE SECURITY	Open Excavations	• The contractor will backfill all open excavations at the conclusion of daily activities. If the excavation can't be backfilled, an orange safety fence with metal stakes will be installed around perimeter of the excavations. This fence will be of sufficient size to keep out wildlife. Also, open excavations will have an egress ramp made of sloped soil to provide wildlife with a route to exit	L
DECON	Fire hazards Electrical	• Turn off all equipment and allow it to cool before refueling • Equipment powered by generator will have a ground-fault circuit interrupter (GFCI)	L L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
ALL ACTIVITY STEPS	Radiologic survey	• All sample points will be surveyed for gamma radiation prior to set up of equipment	L
	Environmental Protection	• Plastic will be placed under the operating equipment as well as in surrounding areas, as needed • If fuel or oil leaks on the plastic sheeting, absorbent pads will be used • Absorbent material (spill kits) will be available during work activities	L
	Housekeeping – slips/trips/falls	• Work locations will be inspected to identify slip, trip and fall issues; hazards will be controlled or marked prior to beginning work activities All sites will be kept clean and free of trash and other debris • All sites will be kept clean and free of trash and other debris • All trash will be properly containerized and removed or staged daily • Cords will be covered or elevated above walking areas • Equipment will be stored when not in use	L
	Eye, foot, head, hand, hearing protection	• Safety glasses, steel-toes boots, hard hats and work gloves will be required during field operations • Activities with splash or potential for flying debris may require side shields, goggles or face shields • Keep hands away from all moving parts • Hearing protection will be required during excavation operations	L
	Back Injury	• Use proper lifting techniques, bend at knees and grip object with whole hand • Keep back as straight and vertical as possible • Center body weight over feet with arms and elbows kept close to the body • Heavy or large objects shall be carried by two people	L
	Fire Prevention	• Smoking is prohibited on the SSFL property • Fire extinguishers of the proper classification and size will be present in the work area • Fire extinguishers will be fully charged and inspected weekly • Fuels will be stored in appropriate containers • Do not park or operate equipment with hot engines on or near dry grass	L
	Severe weather	• Excavation will stop when rain interferes with the safety of the workers • Excavation activities will stop during lightning • Operators, crew, and other support personnel will move out of the exclusion zone and take shelter in vehicles • The SSO will specify when work may resume; work will not resume until lightning and thunder has stopped for a minimum of 30 minutes • Work during periods of high temperatures (heat stress) is covered in the Phase 3 HASP	L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
ALL ACTIVITY STEPS (con't.)	Biologic hazards – Snakes, ticks, poison oak	• All work areas will be inspected for rodents, snakes and poison oak prior to set up of equipment • Avoid areas (long grass, wooded locations) where poison oak, ticks and snakes may be present • Wear boots and long pants that cover the legs, mandatory • Wear gaiters or snake boots capable of preventing injury from a snake bite, mandatory • Tuck pant legs into high boots and tape openings with duct tape, as needed • Apply insecticides	M
	Emergency notification	• Cell phone service is spotty at the SSFL property; a two-way radio will be carried by work crews at all times • All personnel will be aware of the proper notification procedures for summoning emergency assistance • Follow Boeing *Emergency Procedures, Section 2* in the "Service Provider Manual" (See HASP)	L
	Hazard Communication	• MSDSs will be available to personnel for all chemical compounds brought on site by CDM Smith or CDM Smith subcontracts	L
	All Hazards	• CDM Smith will inspect work area using SafetyNet Checklist and enter results into database	L

Daily AHA Briefing Conducted by:		Print Name	Signature	Date
1	Competent Person (Y/N)			
2	Competent Person (Y/N)			

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

PRE-WORK BRIEFING ATTENDANCE

AHA No:	**Job Title: AHA for Excavations and Trenching**	**Date:**
Field Supervisor:	**Subcontractor(s):**	**Time:**
EMERGENCY ASSEMBLY POINT:		
WORK LOCATION DESCRIPTION:		
I agree to work within the scope of work and follow the work controls described in the briefing.		
Signature	**Print Name**	**Organization**

Attachment 4
AHA Geophysical Work/Utility Locate

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Task Title: **Geophysical Work/Utility Locate**

Prepared By: **Patricia Dentler**

NOTES:
1. **This AHA is used as an addendum to the Phase 3 HASP**
2. **Hazards common to all Activity Steps are at the end**

Overall Risk Assessment Code (RAC) (Use Highest Code): M

Risk Assessment Code Matrix

E = Extremely High Risk H = High Risk M = Moderate Risk L = Low Risk		Probability				
		Frequent	**Likely**	**Occasional**	**Seldom**	**Unlikely**
SEVERITY	Catastrophic	E	E	H	H	M
	Critical	E	H	H	M	L
	Marginal	H	M	M	L	L
	Negligible	M	L	L	L	L

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
Geophysical Work	Equipment inspection	• Prior to use, all equipment will be inspected by SSO or designee. • Geophysical and support equipment will be inspected/ documented daily and by the work crew • Replaceable parts and cables will be inspected daily; worn or weak spots, kinked or mashed areas will be replaced prior to use	L
	Steep slopes	• Work crew will assess the sloped work zone for unstable areas, holes and loose rocks or vegetation • Pay close attention to footing while walking • Do not work in areas with excessive scree or loose material • Do not work above/below other working operations • Work will not be done on slopes when it is raining or when soil is saturated	M
	Mechanical or moving parts	• Personnel will be aware of all mechanical equipment or moving parts (GPR carts wheels) • Personnel will stay out of areas with limited visibility • Extremities and loose clothing will be kept clear of all moving parts	L

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
ALL ACTIVITY STEPS	Radiologic survey	• Selected work areas may be surveyed for gamma radiation prior to start of work	L
	Housekeeping – slips/trips/falls	• Work locations will be inspected to identify slip, trip and fall issues; hazards will be controlled or marked prior to beginning work activities • All sites will be kept clean and free of trash and other debris • All trash will be properly containerized and removed or staged daily • Equipment will be stored when not in use	L
	Eye, foot, head, hand, hearing protection	• Safety glasses, steel-toes boots, hard hats and work gloves will be required during field operations • Keep hands away from all moving parts (GPR cart wheels) • Hearing protection will be required when operating noisy equipment	L
	Back Injury	• Use proper lifting techniques, bend at knees and grip object with whole hand • Keep back as straight and vertical as possible • Center body weight over feet with arms and elbows kept close to the body • Heavy or large objects shall be carried by two people	L
	Fire Prevention	• Smoking is prohibited on the SSFL property • Fire extinguishers of the proper classification and size will be present in the work area • Fire extinguishers will be fully charged and inspected weekly • Fuels will be stored in appropriate containers • Do not park or operate equipment with hot engines on or near dry grass	L
	Severe weather	• Work will stop when rain interferes with the safety of the workers • Work activities will stop during lightning • Work crews will take shelter in vehicles or buildings • The SSO will specify when work may resume; work will not resume until lightning and thunder has stopped for a minimum of 30 minutes • Work during periods of high temperatures (heat stress) is covered in the Phase 3 HASP	L
	Biologic hazards – Snakes, ticks, poison oak	• All work areas will be inspected for rodents, snakes and poison oak prior to set up of equipment • Avoid areas (long grass, wooded locations) where poison oak, ticks and snakes may be present • Wear boots and long pants that cover the legs, mandatory • Wear gaiters or snake boots capable of preventing injury from a snake bite, mandatory • Tuck pant legs into high boots and tape openings with duct tape, as needed • Apply insecticides	M

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

Activity Steps	Hazards	Hazard Controls (Engineered, Operational, Documents, PPE, Qualifications)	RAC
ALL ACTIVITY STEPS (con't)	Emergency notification	• Cell phone service is spotty at the SSFL property; a two-way radio will be carried by work crews at all times • All personnel will be aware of the proper notification procedures for summoning emergency assistance. • Follow Boeing *Emergency Procedures, Section 2* in the "Service Provider Manual" (See HASP)	L
	Hazard Communication	• MSDSs will be available to personnel for all chemical compounds brought on site by CDM Smith or CDM Smith subcontractors	L
	All Hazards	• CDM Smith will inspect work area using SafetyNet Checklist and enter results into database	L

Daily AHA Briefing Conducted by:		Print Name	Signature	Date
1	Competent Person (Y/N)			
2	Competent Person (Y/N)			

CDM Smith ACTIVITY HAZARD ANALYSIS
Santa Susana Field Lab

PRE-WORK BRIEFING ATTENDANCE

AHA No:	**Job Title: AHA for Geophysical Work**	**Date:**
Field Supervisor:	**Subcontractor(s):**	**Time:**
EMERGENCY ASSEMBLY POINT:		
WORK LOCATION DESCRIPTION:		
I agree to work within the scope of work and follow the work controls described in the briefing.		
Signature	**Print Name**	**Organization**

Attachment 5
Boeing Service Provider Manual
(March 2010)

DOCUMENT
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Service Provider Manual

March 2010

Emergency Numbers

Prior to the start of work, please write in the correct emergency numbers you are given by your company representative or Boeing Onsite Activity Representative in the space provided below.

Emergency: 911 or from cell phone 818-466-8911

Give the following information:

1. Your name and your employer's name.
2. Phone number from which you are calling.
3. Location of the incident:
   City, street address (if known)
   Building number and floor level
   Column number
   Nearest door number
4. Nature of emergency.

Don't hang up until told to do so!

You are a vital link in the emergency and must relay changes in the state of the emergency.

Boeing Onsite
Activity Representative: _____

Other Numbers: _____

_____

_____

_____

_____

_____

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INTRODUCTION

The Boeing Company is committed to maintaining high safety, health, fire prevention, security, and environmental standards. As a service provider to The Boeing Company, you are expected to maintain the same high standards.

You will be interfacing with Boeing operations and working closely with personnel from various Boeing organizations and related service providers. Therefore, it is important that you, your employees, and your subcontractors are familiar with Boeing safety, health, fire prevention, security, and environmental requirements.

As a service provider, you are responsible for ensuring that all your sub-contractors follow safe work practices and comply with all federal, state, local, and Boeing contract requirements.

This booklet is intended to help you comply with The Boeing Company safety, health, fire, security, and environmental requirements. Nothing herein shall relieve you of your responsibility to comply with federal, state, and local laws, codes, rules, regulations, and Boeing-contract requirements.

Your Boeing Onsite Activity Representative is your primary point of contact. Some work activities you are involved in may require additional coordination with Boeing Environment, Health and Safety (EHS), Fire, Security, and other entities as appropriate. The Boeing Onsite Activity Representative is responsible to ensure this coordination occurs. Throughout this manual activities requiring additional coordination are identified with the statement “Additional coordination is required.”

Please read this booklet, and if you do not fully understand the information provided in all sections or there are site-specific issues, discuss your questions with your supervisor or your Boeing Onsite Activity Representative.

Ensure that each of your personnel and subcontractors that will be performing work for Boeing are aware of the requirements of this manual.

Requirements of some locations or activities may differ from those in this manual. Consult with your Boeing Onsite Activity Representative for questions and additional requirements that may apply to your contract.

Service provider employees violating Boeing requirements are subject to removal from the site and/or disciplinary action.

Your cooperation is expected and appreciated.

1.0 GENERAL INFORMATION

1.1 General Rules

a. All service providers are to stay within assigned work areas. Wandering in non-assigned work areas is strictly prohibited.

b. Use of offensive language and display of offensive materials is not permitted.

c. Horseplay, theft, fighting, harassment, gambling, and possession or use of alcohol or controlled substances, firearms (or other weapons), or ammunition are strictly prohibited.

d. Use of Boeing assets such as equipment, machinery, tools, phones, utilities, etc., is prohibited without prior permission from the Boeing Onsite Activity Representative. The use of Boeing assets by service providers is generally forbidden unless there is a specific business need such as unique tooling required for a project or additional risk incurred in operating portable equipment such as cranes.

e. Use of a photographic or camera-enabled device must be properly authorized using a Camera Permit.

f. Radio frequency devices, such as portable radios, are controlled on Boeing property and must be pre-approved before use.

g. Tobacco use of any kind is prohibited on Boeing property, including Company-owned or leased grounds, parking lots, private vehicles and buildings, in company-owned or leased vehicles, or in pre-delivered products.

h. Animals are not to be brought onto Boeing property. For guide dogs and other human service animals, please coordinate with your Boeing Onsite Activity Representative.

1.2 Badge Identification

a. You must obtain an identification badge and visibly display and wear the badge while on Boeing property.

Exception: In the event that Boeing provides notification that outward display of identification badges is not recommended, identification must still be on your person.

b. Lending or borrowing identification badges is strictly prohibited.

1.3 Vehicles

a. Personal and service provider vehicles and industrial mobile equipment used inside secured Boeing property are allowed with special permission only and may require a Boeing-issued parking pass.

b. Service provider vehicles, personal vehicles, and industrial mobile equipment and accessories shall be maintained in a safe operating condition.

c. Service provider vehicles, equipment, or supplies shall not block entrance ramps, truck doors, plant access aisles, emergency routes, and parking specified for Boeing equipment, facilities, or plant personnel without prior approval from the Boeing Onsite Activity Representative.

d. Posted speed limit and traffic signs shall be followed at all times while on Boeing property.

e. Pedestrians have the right of way at all times.

f. Service provider vehicles are not permitted on flight line ramps without prior approval.

g. Seat belts, when provided, shall be worn at all times.

h. Personnel shall not be transported in the beds of trucks.

i. Do not idle vehicles unnecessarily.

j. Do not idle vehicles in proximity to building air intakes or building entrances.

k. Operation of diesel and gasoline powered equipment is generally prohibited in Boeing buildings. This requirement does not apply to transient vehicles or short-term loading and unloading inside occupied buildings. If a diesel or gasoline powered device is to remain running inside a Boeing building for more than fifteen (15) minutes, then the exhaust shall be piped or vented to the outside of the building or shall use a Boeing approved filtering system.

1.4 Required Postings

The service provider is responsible for ensuring that all federal, state, and local agency permits and posters are placed at the entrance to the job site, or at a location as directed by the Boeing Onsite Activity Representative.

2.0 EMERGENCY PROCEDURES

2.1 Evacuations

a. In the event of a building or site evacuation, immediately evacuate through the nearest safe exit and report to your designated assembly point. If you do not know your assembly point, check with your immediate supervisor or Boeing Onsite Activity Representative. In all cases, instruction and directions given by your supervisor, security, or other emergency response personnel shall be followed.

b. In the event of a building or site incident in which you are asked to "Shelter In Place," follow the posted directions, or direction from the designated emergency response personnel, to the closest designated "Shelter in Place" location.

c. Do not leave the assembly point or shelter-in-place location until authorized to do so by Boeing or local emergency response agencies.

2.2 Emergency Notification

Immediately report all emergency and significant incident situations to the Boeing emergency number listed on page ii of this booklet and your Boeing Onsite Activity Representative.

You must know the building number, grid/column line number, floor level, door number, and location of the nearest phone.

Remember: do not hang up until the dispatcher tells you to do so. You are a vital link in the emergency and must relay changes in the state of the emergency.

Emergency and significant incident are defined as follows.

a. Emergency. Any event requiring emergency personnel and equipment, including but not limited to:

- Visible flame, smoke, noxious odors, or noise that may attract the attention of the surrounding community or that results in the evacuation of personnel.
- An event that places human life, environment, or property at risk.
- Environmental spills or releases.

b. Significant Incident. Any event involving one or more of the following.

- Death, serious injury, or exposure of an individual to

hazardous substances that require attention beyond first aid, hospitalization, or results in permanent impairment.

- Property damage to Boeing or Boeing Customer assets.
- Damage or the potential for damage to a Boeing product or related production component or part.

2.3 Emergency Medical Care

Should you observe a medical emergency, call the appropriate emergency response agency listed on page ii of this booklet.

3.0 FIRE PREVENTION

3.1 Fire Extinguishers

As required and approved by the Boeing Fire Department or a Boeing Security and Fire representative, all service providers shall provide their own Factory Mutual (FM) Approved or Underwriters Laboratory (UL) Listed portable fire extinguishers in good working order. Fire extinguishers approved by the Boeing Fire Department or a Security and Fire Representative for the specific hazards of the location must be readily accessible in the immediate area.

3.2 General Housekeeping

a. Boeing trash receptacles shall not be used for construction debris.

b. All trash and debris receptacles shall be located away from any Boeing building or structure. If construction trash chutes are required, the location and design of the chute shall be approved by the Boeing Fire Department or a Boeing Security and Fire representative.

c. All work areas shall be maintained in a clean state. Clean up and remove trash, scrap, excess materials, and other debris. This shall be done at least daily and whenever the accumulation constitutes a fire hazard.

d. Burning of trash is prohibited.

e. Wood, sawdust, or shavings shall not be used as absorbents for spilled flammable or combustible liquids or petroleum lubricants.

3.3 Equipment Requirements

a. All equipment must be operated in accordance with the manufacturer's instruction manual.

b. All powered equipment shall be refueled outdoors, away from storm drains and clear of structures, with engines shut off. Spill containment must be provided for equipment fueling. Spill clean up kits must be available at refueling locations.

c. Gasoline, liquid propane gas, or propane-powered equipment shall be allowed on building roofs only with prior written approval obtained through the Boeing Onsite Activity Representative. Additional coordination is required.

d. Electrical equipment used in areas where flammable atmospheres (vapors, dusts, or mists) may exist shall have appropriate National Fire Protection Association (NFPA) class and division ratings for explosion proofing.

e. Air monitoring shall be conducted, as necessary, to check for hazardous emissions from powered equipment operating within buildings or enclosed structures. Monitoring results shall be available for review if requested by Boeing.

3.4 Flammable Liquids

a. All flammable liquids, fuels, resins, lubricants, and solvents shall be segregated and labeled. All storage areas for flammable or combustible liquids shall be approved by the Boeing Onsite Activity Representative. Additional coordination is required.

b. Flammable liquids (flashpoint below 100°F or 38°C) shall not be used or stored inside Boeing buildings unless contained in an FM Approved, UL Listed, or Boeing-approved container and only in quantities needed to accomplish the immediate tasks.

c. The use of glass containers is strictly prohibited.

d. Effective methods of spill retention and cleanup of materials are required.

e. Containers and dispensing apparatus shall be electrically bonded and grounded when dispensing or transferring flammable liquids, except for portable containers less than five gallons in capacity and containers made of plastic.

f. The service provider shall comply with all safety regulations and codes pertaining to labeling, handling, and storage of flammable and combustible products.

3.5 Spray Painting, Flammable Resins, and Chemicals

a. Inspection and written approval are required before painting, including spray painting or cleaning with flammable materials. Additional coordination is required.

b. All electrical equipment shall be rated for Class I, Division 1 locations where flammable or combustible liquids are sprayed. Spray operations shall be conducted in well ventilated, unoccupied areas.

c. Only explosion-rated or intrinsically safe electrical equipment, including forklift trucks that are, for example, EE or EX rated, shall be used in areas such as flight hangars, paint booths, and tank lines, where explosion-proof electrical systems are required.

d. A minimum distance of 20 feet from ignition sources is required.

3.6 Heating Devices

a. Open-flame devices and sources of heat and spark-producing

equipment shall not be used in areas with combustible materials or flammable liquids.

b. Open-flame devices and furnaces shall have a constant attendant.

c. The hot-work procedures outlined in section 3.7 shall be followed for heating devices.

3.7 Welding/Cutting Activities

a. A hot-work permit is required prior to performing all open-flame or spark-producing work.

b. Coordinate with the Boeing Onsite Activity Representative regarding hot-work permit requirements at your location.

c. Fire-retardant protective materials (such as fire blankets) shall be used to contain sparks and prevent them from falling against walls, on wooden floors, through flooring, on combustibles or valuable materials and equipment, or into hidden spaces.

d. Flash shields, fire-resistive curtains, or other suitable shields shall be placed around the welding area to protect any adjacent personnel from sparks and arc flash.

e. All flammable materials shall be a minimum of 35 feet away from hot-work areas.

f. Arc welding machines with the potential to interfere with implanted medical devices shall be posted per site safety and health requirements.

g. Local ventilation is required for welding operations that will generate welding fumes inside the building.

h. Service providers shall provide their own FM Approved or UL Listed portable fire extinguishers. Fire extinguishers approved for the specific hazards of the location must be readily accessible and fully charged.

i. The fire watch person shall be assigned and trained in the use of portable fire-fighting equipment. The fire watch person shall be dedicated to the assigned activity and remain on standby a minimum of 30 minutes following the end of any and all open-flame activities.

j. The assigned fire watch person shall notify the Boeing Fire Department, or other agency that issued the hot-work permit, upon completion of work.

k. Hot-work permits shall be removed and destroyed upon completion of work or when they expire.

3.8 Fire Protection Systems

a. Notify the Boeing Onsite Activity Representative 24 hours in advance of all proposed requests for fire protection system closure or impairments. Additional coordination is required.

b. Boeing requests a fourteen (14) day notice for all non-emergency utility shut off events, but realizes situations may arise where this is not always possible. However, under no circumstance shall the notice for non-emergency utility shut off events be less than seven (7) days.

c. Boeing shall be notified and shall approve, before use, the use of fire hydrants or building standpipe systems for temporary water supply. This approval is obtained from the Boeing Onsite Activity Representative. Additional coordination is required.

d. The service provider shall verify with the Boeing Onsite Activity Representative that all fire-extinguishing protection systems (sprinklers) are operational in an area of welding and open-flame cutting. Additional coordination is required.

3.9 Temporary Structures and Enclosures

a. A separation of 25 feet shall be maintained between temporary buildings and storage areas and other buildings or areas. All temporary installations must have prior approval by the Boeing Onsite Activity Representative. Temporary walls or partitions shall be noncombustible.

b. Plastic or Visqueen film shall be fire resistive UL Listed or FM Approved, meeting requirements of NFPA #701, “Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.”

3.10 Storage of Combustible Building Materials

Contact the Boeing Onsite Activity Representative to obtain approval for the storage of combustible materials. Additional coordination is required.

3.11 Roofing

The Boeing Onsite Activity Representative shall be notified of all roof work involving welding, open flame equipment, and spark-producing or hot work before start of the work. Additional coordination is required.

3.12 Emergency Egress

Service providers shall not block or obstruct emergency exits or other means of egress.

4.0 SAFETY REQUIREMENTS

4.1 Project-Specific Safety Plans

a. The service provider shall prepare a written, project-specific safety plan with the details in the plan applicable for work being performed, and submit the plan, upon request, for Boeing review. Project-specific safety plans shall be available and communicated at the location where the work is being performed.

b. The service provider shall submit to The Boeing Company, on request, a copy of its company safety program.

c. The service provider shall provide written notification to the Boeing Onsite Activity Representative of the name and title of the service provider's on-site safety representative for the project.

d. Contact your Boeing Onsite Activity Representative for additional assistance on this section of the manual.

4.2 Personal Protective Equipment

a. The service provider shall provide their employees all required personal protective equipment (PPE) and ensure that it is used. Boeing does not provide PPE to service provider personnel.

b. The service provider employee's PPE shall be appropriate for the job and shall be maintained in a safe and sanitary condition when not in use. All PPE must conform to appropriate industry standards.

c. Examples of PPE are

- Industrial safety glasses with side shields.
- Face protection.
- Body protection.
- Ear plugs and muffs.
- Hard hats.
- Gloves and hand protection.
- Full-body safety harness and lanyards.
- Sturdy, low-heeled shoes with closed toe and heel.

4.3 Hazard Communication / Material Safety Data Sheets

a. The Boeing Company shall provide, on request, the material safety data sheet (MSDS) for any hazardous chemical under Boeing control within the assigned work area.

b. Before any hazardous chemicals arrive on site, the service provider shall furnish to the Boeing Onsite Activity Representative the following information on each hazardous chemical to be used:
    1. The identity of each hazardous chemical;
    2. An MSDS for each hazardous chemical; and
    3. The quantity of each hazardous chemical to be used and/or stored on site.

c. All hazardous chemical containers shall be properly identified and labeled as to their contents. Hazardous chemical container labels must include:
    1. The identity of the hazardous chemical;
    2. The manufacturer of the hazardous chemical; and
    3. Appropriate hazard warnings.

d. The service provider shall bring to the job site only the amount of hazardous chemicals necessary for the project.

4.4 Electrical Safety

a. All electrical incidents or near misses shall be reported immediately to the Boeing Onsite Activity Representative.

b. Equipment used by service providers must be approved by a nationally recognized testing laboratory.

c. The service provider shall supply ground fault circuit interrupters for all temporary electrical wiring cords and portable equipment and tools.

d. The service provider must comply with current OSHA and NFPA 70E standards for safe work on or near energized electrical systems. Work on or near energized exposed movable conductors (e.g., power lines) or energized equipment with exposed conductors operating at 50 volts or greater, shall only be done when approved in writing by the Boeing Onsite Activity Representative. Additional coordination is required.

e. Personal protective equipment and portable electrical equipment (e.g., extension cords, drills, etc.) shall be inspected by the service provider before use and maintained in a safe working condition.

f. Equipment, carts, or other items shall not be stored in front of electrical panels or substations.

g. Combustible materials shall not be stored in any substation or electrical room.

h. After completion of work, substations and electrical rooms shall be secured to prevent unauthorized access.

4.5 Lockout, Tag, Tryout Program

a. Prior to shutdown of any Boeing equipment, building system, or utility, the service provider shall notify the Boeing Onsite Activity Representative.

b. All equipment that could present a hazard from inadvertent activation or release of energy during maintenance or servicing shall have the energy supply locked out and tagged except where the energy supply is needed for testing, troubleshooting, inspecting, or servicing equipment.

c. Before working on any energized system, the service provider shall take the following steps.

1. Isolate the energy source and release all energy or potential energy (e.g., electrical [stored], gravity, kinetic, pressure, thermal, pneumatic, and hydraulic).

2. Refer to machine-specific instructions on controlling multiple energy sources.

3. Install physical lockout device (e.g., lock) with your company lockout tag.

4. Before proceeding with work, test or try out the system to ensure zero energy state.

5. The following information shall be printed on all lockout tags in use:

i. Employee name, company name, date, and phone number (or pager number).

ii. Off-shift contact and phone number (requires someone to be available 24 hours per day).

4.6 Trenching and Excavations

a. Notify and obtain approval from the Boeing Onsite Activity Representative before excavating or opening any trench. Additional coordination is required.

b. Prior to commencing work, a qualified service shall be used to locate the approximate location of subsurface installations such as sewer, telephone, fuel, electric, water lines, or any subsurface installations that may be encountered during excavation work. While the excavation is open, subsurface installations shall be

protected, supported, or removed as necessary to safeguard personnel.

c. Hand-digging shall be required where there is any risk of contacting underground utilities or structures.

d. The service provider shall physically barricade all excavations and trenches, and ensure that proper precautions are taken to prevent unauthorized access to trenches or excavations, trench and excavation equipment (idle or operating), and other service provider equipment used for trench and excavation projects.

e. Daily inspections of excavations, adjacent areas, and protective systems shall be made by a competent person for evidence of hazardous conditions. Inspections shall also be made after every rain storm or other hazard increasing occurrence. If a hazardous condition is observed, personnel shall be removed from the hazard area until the hazardous condition is corrected.

f. The service provider's competent person shall assess the soil condition to determine the method of shoring or sloping required for excavation.

g. All excavations and trenches 5 feet or more in depth shall be benched, shored, sloped, or otherwise protected to ensure that collapse does not occur.

h. Excavated soils must be placed not less than two feet away from the excavation.

i. Place excavated soils on the up-slope side of the trench whenever possible to capture sediment runoff in the event of rain.

4.7 Warning Signs and Barricades

a. Service providers shall supply appropriate signs, barricades, flashing light barricades, ground attendants, and flagging, as required, to keep unauthorized personnel out of potentially hazardous work areas.

b. Highly visible physical barriers such as warning tape shall be used by service providers to identify their work area and to prevent Boeing personnel and others not directly involved with the project from entering.

c. Substantial barricades, such as chain link fencing, standard guardrails, etc., are required around excavations, holes, or openings in floors, roof areas, edges of roofs, and elevated platforms. In addition, barricades are required around overhead work and wherever necessary to warn or protect all personnel.

4.8 Confined-Space Entry

a. All confined-space incidents or near misses shall be reported immediately to the Boeing Onsite Activity Representative.

b. Boeing will provide service providers with information on the hazards identified and protective requirements of existing confined space locations.

c. The service provider shall have and follow its own written confined space entry program, including an entry permit system, monitoring equipment, ventilation, retrieval system, and observation personnel, except as provided for in paragraph 4.8.d.

d. For jointly occupied confined spaces, the service provider shall coordinate its confined-space entry plan with the Boeing Onsite Activity Representative. Additional coordination is required.

e. The service provider shall have its written confined space entry program available at the worksite and post the confined-space entry permit at the point of entry.

f. Upon completion of confined-space entry, provide a copy of the closed permit to the Boeing Onsite Activity Representative.

4.9 Fall-Protection Program

a. A fall-protection plan is required when fall protection systems including anchorage points, static lines, lanyards, and full body harnesses must be utilized because fall hazards cannot be eliminated through the use of passive systems such as hand rails.

b. All fall-protection equipment and devices shall meet American National Standards Institute (ANSI) Z359 standards.

c. The service provider shall provide all necessary fall-protection equipment to its employees.

d. Boeing prohibits the use of “body belts” as fall protection.

e. The service provider shall inspect and maintain its fall-protection equipment and shall promptly remove from the worksite any fall protection equipment found to be defective.

f. Before considering the use of a crane or forklift to lift personnel, the service provider shall consult with the Boeing Onsite Activity Representative. Additional coordination is required.

g. Service providers must have measures in place to protect personnel in the area of elevated work from hazards resulting

from dropped tools, work materials, etc. This may include the use of barricades, spotters, and nets. The inclusion of tool and parts control / inventory provisions in the project specific safety plan may be required. Contact the Boeing Onsite Activity Representative for more information.

4.10 Ladders and Scaffolding

a. Ladders shall be in good condition and used as intended (e.g., do not use portable A-frame step ladders as straight ladders).

b. Portable metal ladders shall not be used for electrical work. The use of metal ladders is completely prohibited at some Boeing sites. Contact the Boeing Onsite Activity Representative prior to use.

c. Ladders shall not be used in front of doorways without posting or otherwise protecting the area.

d. Scaffolding systems shall be erected and regularly inspected by a competent person. All scaffolding shall have work platforms fully planked; all braces, access ladders, proper guardrails, and toe boards must be installed. Where items may fall onto personnel working or passing below, safety netting shall be provided.

e. During scaffolding erection, dismantling, and use, all employees shall be fully protected from fall hazards.

4.11 Work Permits

There may be additional site-specific permit and licensing requirements other than those specified in this document. Check with the Boeing Onsite Activity Representative for further clarification. Additional coordination required.

4.12 Foreign Object Debris / Foreign Object Damage

a. Foreign Object Debris (FOD) is any substance, debris, or article which could find its way into a product system (e.g., aircraft, radar system, satellite, launch system, etc.) and cause damage. Service providers shall take the following steps to prevent Foreign Object Damage.

1. Follow any posted FOD requirements when working in a FOD Critical, FOD Control, or FOD Awareness area.

2. Maintain accountability for all tools, construction materials, hardware, and personal items brought into work areas.

3. Properly contain and secure tools, construction materials,

hardware, and personal items to prevent them from falling off carts, being moved by weather events, or otherwise migrating into product systems.

4. Pick up any dropped tools, debris, or other objects promptly.
5. Clean up and remove trash, scrap, excess materials, and other debris at least daily.
6. Immediately report missing / lost tools and other items to the Boeing Onsite Activity Representative.
7. When work involves loose material (i.e., concrete, asphalt, gravel, dirt, etc.) that can migrate onto product system traveled surfaces or factories where product systems are manufactured, construct FOD barriers as necessary to surround the work area and contain all debris.

4.13 Overhead Crane Operations

a. The service provider shall obtain approval from the Boeing Onsite Activity Representative and schedule any work requiring access to and use of Boeing overhead cranes and crane space, work adjacent to Boeing overhead cranes, or work around Boeing overhead cranes. These activities may require the installation of bridge-crane rail stops, or inactivation of bridge cranes to preclude collision with service-provider equipment. Hazardous energy control requirements are found in section 4.5 Lockout, Tag, Tryout Program.

b. Mechanical, electronic, or other approved crane stop systems shall be installed in front and behind personnel while they are working in an elevated position, or while they are making a lift of materials through the crane travel zone, to protect them from the crane they may be working on and from any other crane entering from another area or adjacent bay.

c. The service provider shall provide and use cranes and rigging that have been proof loaded and have required certifications available at the job site.

d. Service providers that operate Boeing overhead cranes must receive crane safety training using a Boeing reviewed and accepted training curricula.

4.14 Utility Shutdowns

Service providers shall minimize service interruption during unavoidable utility shutdowns. Written authorization must be requested from the Boeing Onsite Activity Representative a minimum

of two weeks before the scheduled utility shutdown or as soon as it is known to be required in order to perform required work.

4.15 Joint Occupancy Issues (Occupied Work Areas)

a. The service provider shall cooperate and coordinate work with The Boeing Company and other Boeing service providers so all work may be promptly and properly performed without undue interference or delay. The service provider shall afford The Boeing Company and other Boeing service providers reasonable opportunity for the execution of their work.

b. For work in close proximity to Boeing products or employees, a joint safety plan may be required. Contact your Boeing Onsite Activity Representative for more information.

4.16 Training

a. The service provider shall ensure that all of its employees are properly trained for all jobs and tasks that require specific training and/or competency to meet all applicable federal, state, and local regulations prior to conducting work for Boeing.

b. All service provider employees shall be trained in, and be knowledgeable of, the project-specific EHS plan.

c. The service provider shall submit to The Boeing Company, on request, validation of the training received.

d. Service provider employees must receive information/orientation as necessary to comply with site specific requirements.

4.17 Radiation Safety

a. Written approval must be obtained through the Boeing Onsite Activity Representative before the following activities occur. Additional coordination is required.

1. Licensed radioactive material (e.g., gamma radiography equipment, moisture density gauges, etc.) are brought onsite.

2. Class 3b or 4 lasers (as indicated by the label on the equipment) are brought onsite.

3. Radio frequency sources capable of exposing personnel above OSHA limits are brought onsite. See section 1.1.f for more information.

4. Machines that produce X-rays (X-ray machines, XRF units, etc.) are brought onsite.

5. Service providers work in any area restricted for purposes of radiation protection.
6. Service providers work with any radioactive material possessed under a Boeing license.

4.18 Compliance with Posted Safety Requirements
The service provider shall comply with all posted safety requirements, including but not limited to: hearing protection, eye protection, confined space entry, access barriers, parking, and driving requirements.

4.19 Traffic Control

a. Service providers delivering and receiving material shall ensure that traffic controls are in place, including flaggers, truck waiting areas, staging areas, and appropriate traffic guidance signs.
b. Any service provider causing a road hazard must place obvious warning devices to alert drivers approaching the hazard. These devices shall remain in place until the hazard is mitigated.

5.0 ENVIRONMENTAL

5.1 ISO 14001 Environmental Management System

a. Service providers at Boeing manufacturing facilities that are ISO 14001 certified must ensure that their employees are made aware of the Boeing Environmental Policy and written procedures established for activities, products, and services necessary to protect the environment.

b. Boeing's environmental management system conforms to the ISO 14001 Environmental Management System (EMS).

c. The Boeing Environmental Policy is communicated to all persons who work for, or on behalf of the organization, including service providers working onsite at Boeing.

d. Service providers must be familiar with and comply with the Boeing Environmental Policy and have knowledge of how their actions may impact the environment, and the consequences of not following proper procedures.

e. Boeing Environmental Policy:

   Boeing is committed to operating in a manner that promotes environmental stewardship. Boeing will strive to:

   1. Conduct operations in compliance with applicable environmental laws, regulations, and Boeing policies and procedures.
   2. Prevent pollution by conserving energy and resources, recycling, reducing waste, and pursuing other source reduction strategies.
   3. Continually improve our environmental management system.
   4. Work together with our stakeholders on activities that promote environmental protection.

f. For more information on the ISO 14001 program contact your Boeing Onsite Activity Representative.

5.2 Hazardous Materials

a. Hazardous materials stored on Boeing sites shall be stored under cover, in containment, and be clearly labeled. Storage areas must be approved by the Boeing Onsite Activity Representative. Additional coordination is required.

b. Secondary containment must be provided for operations involving transfer (e.g., pouring, pumping, or dispensing) of hazardous materials.

c. A utilization report may be required at some locations for hazardous materials that are brought on site. Verify requirements with the Boeing Onsite Activity Representative.

d. Keep containers closed when not in use.

e. When bringing hazardous materials onto a Boeing site, notify the Boeing Onsite Activity Representative. Additional coordination is required.

5.3 Hazardous Waste and Solid Waste Handling and Disposal

a. Service providers must submit a waste management plan to the Boeing Onsite Activity Representative for projects which generate hazardous or non-hazardous wastes. Additional coordination is required.

b. The Boeing Company disposes of all hazardous waste (including universal waste) that is generated on its property, regardless of the party that generates the waste. Service providers shall not take hazardous waste off site. If you are working under a contract on a Boeing site and need assistance with hazardous waste disposal, establishing a waste station, or complying with hazardous waste regulations, contact the Boeing Onsite Activity Representative.

c. All hazardous waste generated by the service provider shall be properly segregated, containerized, and labeled by the service provider, as directed by the Boeing Onsite Activity Representative. Additional coordination is required.

d. Keep all waste containers closed between waste additions to containers.

e. Monitor your waste stations on a daily basis. Inspect the stations for leaks and full containers of waste.

f. When a waste drum becomes full, it must be immediately removed from the work site as directed by the Boeing Onsite Activity Representative. Additional coordination is required.

g. Never allow a hazardous waste drum to accumulate waste for more than 60 days after the date shown on the hazardous waste label affixed to the drum.

h. Never dump or discharge hazardous waste into storm drains, building sanitary sewer drains, rest rooms, or solid-waste containers.

i. Some locations may require service providers to provide periodic reports to the Boeing Onsite Activity Representative

documenting activity related to recyclable materials and construction, demolition, or land clearing (CDL) debris. Contact the Boeing Onsite Activity Representative to determine if this reporting is required. These reports must include:

1. A description of all recyclables, non-hazardous waste, and CDL debris removed from the site.
2. The quantity of recyclables and non-hazardous waste removed from the site by weight, for that period.
3. Classification of the recyclables according to the following categories:
    i. Concrete, asphalt and masonry,
    ii. Clean soil and gravel,
    iii. Metals,
    iv. Stumps and brush,
    v. Recyclables sorted off-site by a 3rd party provider.

5.4 Suspect Materials

a. Asbestos Awareness

1. Notify the Boeing Onsite Activity Representative prior to conducting activities that may disturb asbestos. Additional coordination is required.
2. Boeing project locations may contain asbestos-containing materials. Prior to the start of work, obtain a written asbestos determination from the Boeing Onsite Activity Representative regarding the presence or absence of asbestos-containing materials associated with the work.
3. Abatement of all ACM affected by the project shall be coordinated by The Boeing Company.
4. If, after the project commences, the service provider discovers a possible asbestos disturbance or new suspect materials, stop work immediately and notify the Boeing Onsite Activity Representative. Work shall remain stopped until a resolution can be coordinated by the Boeing Onsite Activity Representative.

b. Lead Awareness

1. Notify the Boeing Onsite Activity Representative prior to conducting activities that may disturb lead. Additional coordination is required.

2. Lead can be found in a variety of different products, such as greases, solders, sealants, paints, coatings, lead shielding in walls and around tables, lead pipes, and counterweights.
3. Operations or processes that may cause lead exposure include but are not limited to:
    i. Spray painting with paints containing lead.
    ii. Grinding, sanding, or welding on lead-based paints.
    iii. Soldering activities.
    iv. Demolition of oxidized lead shielding.
4. All painted surfaces are presumed to contain lead unless determined otherwise.
5. Lead containing paint shall be removed before proceeding with any grinding, sanding, or welding activities.
6. Never use compressed air to remove lead dust.
7. All lead-abatement activities are coordinated through the Boeing Onsite Activity Representative.
8. If, after the project commences, the service provider discovers a possible lead-containing material disturbance or new suspect material, work shall stop immediately until the Boeing Onsite Activity Representative can determine the next course of action.

c. Soils and Remediation
    1. Final disposition of all soil shall be coordinated through the Boeing Onsite Activity Representative. Additional coordination is required.
    2. Immediately contact the Boeing Onsite Activity Representative listed at the front of this document if you notice contaminated soil or water during excavation activities. Watch for fuel and solvent smells, visible oil sheen, and other indications of contamination. Stop work immediately until the Boeing Onsite Activity Representative can determine the next course of action.

5.5 Air Quality
a. If service provider activities may produce emissions of any air pollutant, the service provider must submit a written plan for minimizing these emissions to the Boeing Onsite Activity Representative. Additional coordination is required.

b. The Service Provider shall not emit any air contaminant in sufficient quantities and of such characteristics and duration that is likely to be injurious to human health, plant or animal life, or property, or which unreasonably interferes with enjoyment of life or property. Contact the Boeing Onsite Activity Representative if you are not sure your activity falls in this category.

c. Open burning is strictly prohibited.

d. Vehicles and equipment shall not leave the work site coated with dust, dirt, or mud.

e. Truck loads and roll-off containers with loose materials shall be covered. The service provider shall take appropriate measures to prevent drag-out and fugitive emissions.

f. All service providers shall take measures to prevent overspray and airborne emissions from painting and blasting operations from depositing on adjacent buildings and automobiles. Any such deposits must be swept up immediately.

g. Abrasive blasting and spray-painting operations shall be performed inside a booth designed to capture the blast grit or overspray. Outdoor blasting or painting of structures or items too large to be reasonably handled indoors shall employ control measures, such as curtailment during windy periods, and enclosure of the area being painted or blasted. Contact the Boeing Onsite Activity Representative for specific requirements before starting outdoor blasting or painting activities.

h. For grade-and-fill operations associated with construction and demolition projects, employ water spray as needed to prevent visible dust emissions. The application of water for dust control that does not infiltrate into the ground must be contained by use of the approved erosion and sediment controls.

i. Airborne and blowing dust and debris shall be controlled. The service provider is responsible to obtain any necessary dust control permits. Contact the Boeing Onsite Activity Representative before the start of any activity that may generate dust.

j. All material that contains volatile organic compounds (VOC), such as paints, coatings, sealants, or resins, that are to be used shall be pre-approved through the Boeing Onsite Activity Representative. Additional coordination is required.

5.6 Water Quality

a. If service provider activities may produce wastewater, or if the

service provider may handle hazardous materials in an area that may be exposed to storm water, the service provider must submit a written plan to the Boeing Onsite Activity Representative for handling such wastewater or storm water. Additional coordination is required.

b. Wastewater, including, but not limited to, concrete slurry, water from dewatering, cooling water and storm water, shall be handled in accordance with instructions from the Boeing Onsite Activity Representative or the service provider's written wastewater plan.

c. Never pour any liquid into a storm drain. Potable water cannot be discharged to a storm drain without written permission provided through the Boeing Onsite Activity Representative. Additional coordination is required.

d. Do not use a hose or pressure washer to clean pavement unless the resulting wastewater can be contained. Alternative methods, such as sweeping, shall be used.

e. No vehicle, equipment, or building washing is permitted outside without prior approval from the Boeing Onsite Activity Representative.

f. Equipment and vehicles shall be maintained in good working order to prevent leakage of fluids (e.g., fuel, hydraulic fluids, and antifreeze). Methods to prevent and contain leaks must be implemented by the service provider (e.g., drip pads).

g. Sanitary sewage and industrial wastewater shall be disposed of in accordance with instructions from the Boeing Onsite Activity Representative. Additional coordination is required.

h. Store all hazardous materials and hazardous waste (including contaminated demolition debris) in a covered and contained area to prevent possible storm water or soil contamination. The containment shall be large enough to hold 110% of the volume of the largest container. This applies to materials and waste that are both hazardous and nonhazardous in nature.

i. Implement the Boeing-approved Best Management Practices (BMPs) as needed, to prevent storm water contamination, such as, but not limited to, silt fences, tarps for rain covers, and drain covers.

j. Approved BMPs are available from the Boeing Onsite Activity Representative.

k. The Boeing Onsite Activity Representative will notify service providers regarding the need for a Stormwater Pollution Prevention Plan (SWPPP). If required:

    1. The service provider will submit a SWPPP to the Boeing Onsite Activity Representative. Additional coordination is required.

    2. A copy of the site SWPPP and National Pollution Discharge Elimination System (NPDES) General Permit must be kept at the construction site at all times during construction and prior to notification from the agency that the NPDES permit has been terminated.

    3. The service provider shall maintain a site log book that contains a record of the implementation of the SWPPP and other permit requirements including the installation and maintenance of BMPs, site inspections, and stormwater monitoring.

l. Refueling and mobile equipment repair shall be conducted away from storm drains and waterways. Refueling over unpaved areas must be fitted with temporary containment or spill control. Spill clean-up materials shall be staged on site, in well marked containers, and in sufficient quantity and locations to respond to spills such as hydraulic equipment leaks.

m. Portable toilets must be secured as necessary to prevent them from being blown or knocked over and must be leak free, maintained in good working order, and located at least 100 feet from any waterway or storm water conveyance structure. Portable toilets must be serviced by a permitted company and cannot be dumped at the site.

6.0 Site Specific Requirements EHS Service Provider Manual for the Santa Susana Facility

The following site-specific requirements are provided as an addendum to the Boeing Service Provider Manual.

GENERAL

Buyer Contractor Policies

1. Contractor shall adhere to all applicable federal, state, local, municipal and public laws, ordinances, building codes, rules, regulations and orders now existing or later enacted. Should a conflict arise, the most stringent of these laws, ordinances, codes, rules, regulations, orders or contract requirements shall apply. Should any unforeseen consideration or problems arise, they shall be resolved by mutual agreement, recognizing that personnel safety, the environment, and regulatory compliance is of paramount importance.
2. Contractor is responsible for controlling the manner and methods of its operations and is directly responsible for the safety of its employees and Subcontractor's employees and ensuring regulatory compliance. In the event Contractor's employees or its Subcontractors' employees fail to comply with Federal, State, local, or municipal regulations, or this document, Buyer has the right and obligation to **stop work**, at Contractor's expense, until the issue is rectified to Buyer's satisfaction. Furthermore, violations may be referred to the appropriate regulatory agency(s), which may lead to legal, civil, and/or criminal action.
3. Failure of this document to reference specific laws, ordinance, codes, rules, regulations or orders does NOT excuse Contractor or Contractor's employees from following those regulations that may be applicable to the scope of work being performed by Contractor.
4. The requirements of this document may be modified by the specific safety and environmental rules and procedures of individual operating buildings or facilities. These modifications will be documented in writing.
5. Contractor shall not permit any person to enter upon Buyer's premises, at the work site or elsewhere, except in accordance with Buyer's safety and security requirements.
6. Contractor is solely responsible for the safety and protection of all persons and property while on or near the work site, including the safety and protection of Contractor's employees, agents, delegates, invitees and Subcontractors'.
7. Contractor agrees to indemnify and hold Buyer harmless from prohibiting any Contractor or Subcontractor's employees, agents, or invitees from entering onto the work site or project if, in the sole opinion of The Boeing Company, such employee, agent, or invitee fails to comply with the safety, health, and environmental laws, rules, and regulations, discussed in item 1 of this section.
8. All Contractor and Subcontractor employees that contact or work on asbestos-containing materials during their work activities shall have asbestos awareness training as defined by California Code of Regulations, Title 8. Training shall be completed prior to initiation of work and be current.
9. All Contractor and Subcontractor employees involved in environmental clean-up, investigation or who may disturb or otherwise be exposed to contaminated environmental media must comply with 8 CCR 5192, HAZWOPER, and have current training consistent with their work assignments.
10. Unless stated otherwise in this document, all reference(s) to Contractor shall include Contractor's employees, agents, delegates, invitees and Subcontractor's employees, agents, delegates, invitees.
11. All work must be completed as defined in the schedule that will accompany the specific demolition activity. Onsite activities are expected to be completed within the normal working hours (i.e., 0600 to 1600 Monday through Friday) at the Boeing SSFL site and regular 8 hour shifts. Actual start times will be determined at the specific project task order level.
12. Contractor's personnel, including trucking companies, must be U.S. Persons and will be required to provide documentation, such as a passport, green card, etc. to gain access to and work on the site.

EHS Orientation

Buyer's EHS organization or designee will provide Contractor relevant site-specific hazards, precautions, safety rules and requirements in effect at the worksite. Contractor shall provide this safety information to their Subcontractors. Contractor will be responsible for requiring all of the Contractor's employees to receive this information prior to beginning work at Buyer's facility. These rules will include an explanation of Buyer's:

1. Emergency System
2. Hazardous materials or conditions which may affect Contractor's employees
3. Safety precautions for facilities in which the Contractor may be working
4. Emergency procedures for specific facilities
5. Emergency Equipment, Alarms, or Signals
   a) Fire extinguishers, fire alarm stations, signal lights, sprinkler systems, emergency lights, and component equipment shall not be removed, disconnected, or reconnected without the specific approval from Security and Fire Services through the Onsite Activity Representative (OAR – also may be referred to as Contract Coordinator or PIC). Permission to shut down, remove, modify, or relocate such equipment must be requested through the Onsite Activity Representative.
   b) Fire hydrants and fire service control valves shall not be blocked. Permission for the use of fire hydrants must be obtained from Security and Fire Services through the Onsite Activity Representative.
6. Emergency Exits
   a) Locations
   b) Maintaining clear passage
7. Evacuation procedures and emergency assembly areas
8. Contractor shall keep records showing to whom this information has been given. In the event there is a change in personnel in Contractor's work force, Contractor is responsible for providing any new employees with this information and maintaining all necessary records.
9. Site fire safety rules
10. Existing Buyer regulatory permits and conditions which may be affected or impacted by Contractor's scope of work

Contractor Responsibilities

Note: Boeing defines an "incident" as "any unplanned event/condition that results in personal injury or damage to property, equipment, or environment or an event that has the potential to result in such consequences."

The Contractor is responsible for controlling the manner and methods of its operations and is directly responsible for the safety of its employees and Subcontractor's employees and ensuring regulatory compliance. To accomplish this, the Contractor will do all things necessary to ensure the safety of Contractor's or Subcontractor's, employees, agents, or invitees, including the following:

1. Appoint a Contractor designated representative for project and safety coordination at the job site. The designated representative must be on site while work is being accomplished. Contractor is directly responsible to The Boeing Company for safety performance of all work, including Subcontractors.
2. Use only the site or building entrance designated by Buyer for entering and exiting.
3. Prohibit Contractor and Subcontractor personnel from entering Buyer's buildings or facilities outside scope of worksite.
4. Follow local site access control practice. Buyer may require Contractor's employees to sign a log upon entering and leaving Buyer's buildings, facilities or test sites. The Contractor will also ensure that each Contractor employee is issued and wears a Boeing-issued badge.
5. Ensure that all Contractor and Subcontractor personnel comply with the terms of the contract, including applicable Security and Fire Services and EHS requirements.
6. Provide supervisors and employees who are competent and adequately trained to perform required work.
7. Advise Contractor's employees and Subcontractor's employees of hazards associated with the work to be performed, including any hazard information provided to the Contractor by Buyer. Provide all tools and equipment for the work, including personal protective equipment. The tools and equipment must be properly

maintained and appropriate for safe accomplishment of the work. Buyer has the right to refuse or restrict the use of tools, equipment or hazardous materials.

8. Keep the work area free from safety and health hazards. The Contractor shall promote safety and maintain good housekeeping throughout all phases of construction.
9. For each work area or each specific work site, the Contractor is to place barricades and signs to prevent unauthorized entry. Road detours are to be reviewed and approved by Safety & Fire Protection and the Onsite Activity Representative prior to implementation of any work. The barricades and signs must be in place during the course of work.
10. Keep the Onsite Activity Representative immediately notified and fully informed of any work, which may affect the safety of Buyer's employees or property or which may violate regulatory compliance. This includes providing to the Onsite Activity Representative appropriate Material Safety Data Sheets (MSDS) or other required information about hazardous materials the Contractor will bring onto Buyer's property.
11. Follow specific instructions supplied by Onsite Activity Representative should emergency alarms be activated.
12. Know who to call and what to do in the event of an emergency involving the Contractor's work or employees.
13. Provide first-aid and medical services, know where they are located, and how to obtain them for Contractor's employees when needed.
14. Notify the Onsite Activity Representative immediately of any contractor or subcontractor incident occurring while on Buyer's property. Provide a copy of each incident report to the Onsite Activity Representative within one working day. Contractor is responsible to maintain an adequate supply of investigation forms at the job site.
15. Adjacent asphalt roadway surfaces are to be kept free of building debris such as nails, lumber, scrap metal, etc. Movement of tracked vehicles or other specialized equipment that might damage roadway surfaces shall utilize a transport truck, or other prior approved Contract Coordinator method to prevent damage to asphalt roadway surfaces.
16. Coordinate the use of all radiation producing devices or materials such as radiography equipment and alignment lasers with the Onsite Activity Representative.
17. Contractor must obtain a permit from the Ventura County Fire Department to perform hot work and must comply with the permit provisions. Contractor must also request and obtain a hot work permit from Buyer's Contract Coordinator. Work involving an open flame is to be completed by 15:30
18. Contractor shall avoid driving vehicles over un-cleared paths such that brush may be ignited by catalytic converters or other equipment.

Temporary Offices, Contractor Equipment, & Materials

1. Temporary portable offices and sheds may be erected. All temporary or portable structures are to conform to NFPA 241 "Standards for Safeguarding Construction, Alteration, and Demolition Operations." Materials and equipment may be stored near the job site, subject to the approval of the Onsite Activity Representative. Parking of personal vehicles is to be confined to the areas designated by the Onsite Activity Representative. All temporary structures are to be removed within 10 working days from the completion of the job. The Contractor shall be responsible for any permits required for the installation of construction trailers and equipment.
2. All temporary services installed by the Contractor are to be removed to the satisfaction of the Onsite Activity Representative within 10 working days from the completion of the job. Removal of equipment, scrap and demolition materials shall not exceed ten (10) days upon the completion of the work.

Truck Shipments

1. Shipments should be addressed as follows:
2. Contractor's Name, Santa Susana Field Laboratory, 5800 Woolsey Canyon Road, Canoga Park, CA, 91304
3. The Contractor is to give 72 hours notice, in writing, to the Contract Coordinator prior to any large truck shipments up or down the Woolsey Canyon Road. Specific approval from the Contract Coordinator is to be obtained for each oversize shipment. This allows the Contract Coordinator adequate time for Security and EHS Public Relations Representative notification.

4. Contractor shall cover all end dumps and roll off trucks leaving the property debris. Time shall be allocated to verify the weight of each vehicle at the truck scale located on Boeing property as well as preparation and approval of the manifests. Trucks shall be scheduled in such a manner that a ten-minute gap occurs between each vehicle leaving the site. Trucks shall not depart earlier than 7:00 and not later than 15:30. Trucks shall not convoy through or spend the night in the adjacent neighborhoods. All trucking operations at the site will be factored into the schedule.

Contractor's EHS Training

1. Contractor shall instruct each employee in the recognition and correction of unsafe conduct and conditions and the regulations applicable to Contractor's work environment. The employee shall use these instructions to control or eliminate any hazards or other exposure that could result in an incident.
2. Contractor shall acquaint each Contractor's employees with the safety and emergency equipment available and the procedures to be followed in each type of accident occurrence.
3. At a minimum, each Contractor shall be required to conduct daily safety meetings with Contractor personnel and Subcontractor's employees. Minutes shall be kept onsite and submitted to the Onsite Activity Representative.
4. Contractor shall provide a qualified supervisor who is responsible for maintaining job site safety and environmental compliance during all phases of work. The supervisor shall conduct safety meetings with all personnel daily, monitor site safety and environmental compliance activities continuously and thoroughly investigate all accidents and near misses. Depending on the size and type of project, the supervisor may have other work site responsibilities. Any exceptions to this requirement must be approved by the Buyer.
5. All Contractor personnel must receive an initial orientation by Contractor's supervisor concerning the Contractor's safety procedures, Contractor's Injury & Illness Prevention Program, and the requirements of this Section.
6. Contractors are responsible for training their personnel on all regulatory requirements applicable to their activities on site.
7. All Contractor and Subcontractor employees involved in environmental clean-up, investigation or who may disturb or otherwise be exposed to contaminated environmental media shall have current HAZWOPER training consistent with their work assignments.

Emergency Aid & Emergency Assembly Area

1. The emergency phone number from an onsite phone is 911. The emergency number to use when calling from a cell phone onsite is (818) 466-8911. The Boeing Company provides emergency aid for onsite personnel through Boeing Security & Fire Protection. In the event of an emergency, any one of the Contractor's onsite personnel can notify Security, the Contract Coordinator, or one of The Boeing Company personnel assigned to the facility. Incidents must be reported by calling one of the emergency numbers above.
2. The Onsite Activity Representative will inform the Contractor of the Emergency Assembly Area (EAA) nearest the work area. Contractor employees will be instructed to proceed immediately to this area when the warning devices sound or when instructed by the public address system.

First Aid and Medical Attention

1. All first aid and medical attention for Contractor's workers shall be handled by Contractor in accordance with Cal-OSHA regulations.
2. Contractor shall be required to set up a first aid station in compliance with Cal-OSHA and State regulations.
3. Contractor shall be responsible for properly containerizing trauma scene waste and treating any contaminated work areas. Buyer will direct Contractor where to dispose of the trauma scene waste onsite at The Boeing Company.

Incident Reporting

1. Contractor shall *immediately* notify an Onsite Activity Representative or onsite EHS of any unplanned event, condition, *spill* or *release* that occurs while on Buyer's property that results in personal injury or damage to property, equipment, or the environment or has the potential to do so.
   a) Boeing will notify the Boeing Communications Center (BCC) immediately and ensure appropriate follow-up.
   b) Service Providers must notify BCC directly if on-site Boeing personnel are not immediately available.
2. Contractor shall notify Buyer of the name of Contractor's employee who will be knowledgeable in the prevention of incidents at the job site, and whose duty will be to report immediately in writing to Buyer all incidents occurring at the worksite. If Contractor files an incident report with a public authority, Contractor shall provide a copy of the report to Buyer, prior to issuance.
3. Contractor shall investigate, as a minimum, each incident to determine the cause and implement future corrective measures. Contractor will present a written copy of its initial investigation findings and corrective action measures to Buyer's Health & Safety function through the Onsite Activity Representative, within one working day of being notified that an incident has occurred and provide a final report as soon as practicable.

Definitions

- *Immediately* - without delay, as soon as one can by any means possible
- *Spill* or *Release* – Any unplanned discharge of hazardous materials or water in any form

Initial Actions

1. Ensure your own personal safety. Do not enter an unsafe or unknown environment.
2. Notify Boeing EHS or the On-site Activity Representative immediately. Service Providers - notify BCC directly if on-site Boeing personnel are not immediately available.
3. Render area safe of hazard if you are able to do so safely.
4. Await Boeing EMT or EMS injury support.
   a. Note: Do not transport an individual with a potentially serious injury/illness yourself.
5. Ensure the scene is secured as appropriate. Tape off area/barricade with cones and limit access as necessary.

Personal Attire

1. Contractor's employees shall wear proper clothing while on Buyer's premises. Removal of shirts or wearing of shorts, "tank tops" or open-toed shoes is not allowed.
2. Contractor employees shall wear hard hats (ANSI Z89.1, Class A or Class B rated) at the job site during all phases of construction/demolition activities. The Contractor shall be responsible to ensure that all Contractors' employees adhere to the hard hat policy and that the appropriate signage is posted at the job site.
3. Contractor's employees shall wear appropriate eye protection, consisting as a minimum of safety glasses with side shields (ANSI Z87.1), within Buyer's designated areas and as required by Cal-OSHA to perform construction activities. Dark tinted lenses are prohibited indoors, excluding welding operations or with an ophthalmologist's instruction.
4. Contractor's employees shall wear safety-toe footwear (ASTN F2413) when there is potential for injury or within Buyer designated safety-toed footwear areas.

Buyer Work Safety Permits

Conditions noted on the permit(s) shall be exactly identical to the actual job conditions. When the conditions of a job change, or when new tools requiring permits are needed to do the job, other than those originally covered in the initial permit, **WORK SHALL STOP IMMEDIATELY** because the permit is invalid. Work cannot progress until the situation can be carefully analyzed and a new permit issued for the new conditions.

ENVIRONMENTAL PROTECTION

Asbestos Awareness

1. Contractor shall assume all building materials contain asbestos, and shall not disturb such, unless site surveys, reports, or facility drawings show that asbestos-containing materials (ACM) are not present. If such areas must be disturbed, Contractor shall coordinate with Boeing Onsite Activity Representative to obtain written approval from Buyer's EHS organization.
2. Only Ca/OSHA registered asbestos abatement contractors will be used to disturb asbestos-containing material.

Lead Awareness

A Cal-OSHA-compliant Lead Work Plan must be submitted to the Buyer for review prior to any work involving lead removal or disturbance or that may be reasonably anticipated to generate airborne lead dust.

PCB and Mercury Awareness

The Contractor is advised that various switches, lamps, transformers, liquid-filled capacitors, fluorescent light ballasts, etc. installed throughout SSFL may contain mercury or PCB materials. Disposition of such materials must be coordinated by the Buyer or the Onsite Activity Representative and may not be thrown in the trash or managed as construction debris.

Nature Awareness

1. Endangered species, such as Milk Vetch, Tar Plant, Legless Lizard, and the Coast Horned Lizard exist on the site. Endangered species must not be disturbed by Onsite activities.
2. The SSFL is located within Ventura County. Ventura County is known to contain rodents carrying the Hantavirus. The Contractor may contact Ventura County Dept. of Health Services for assistance and guidance in the protection of its employees.
3. Equipment and procedures may be necessary to protect personnel from wildlife (e.g., rattlesnakes, coyotes, raccoons, bobcats, mountain lions, deer, opossums, etc.) and poisonous plants (poison oak) that are indigenous to the area. Close contact with wild animals should be avoided since they may carry diseases or attack humans when frightened. When necessary, Security & Fire Protection will remove animals from work areas. Spiders, scorpions, deer flies, mosquitoes, ticks, bees, wasps, and other insects live in the area and can be harmful, spread disease, and be irritating to workers.
4. The presence of rodents, rodent excrement or debris and bird excrement or debris must be cleaned and disinfected to prevent potential exposure to animal-borne diseases.
5. The contractor must assess the hazard and implement appropriate protective measures.

Air Quality

The Contractor shall submit to Boeing any intended use of portable generators.

Hazardous Waste

1. Contractor shall store hazardous or potentially hazardous wastes in Buyer provided hazardous waste containers in Buyer approved staging area(s).
2. Contractor shall make a good faith effort to minimize hazardous waste generation.

Soil, Concrete & Asphalt Handling

1. Historical process data shows the potential for soil and/or groundwater and/or concrete/asphalt contamination. If the Contractor discovers any indication of potential contamination spots in the soil, concrete, or asphalt, the Contractor **shall immediately stop the project** and notify the Boeing Onsite Activity Representative.
2. The Contractor **shall stop work** and immediately notify the Boeing Onsite Activity Representative if an excavation reveals subsurface artifacts, such as remnants of ordnance, chemical or waste containers, remnants of historical civilization, etc.
3. The Contractor shall notify the Boeing Onsite Activity Representative one week prior to the start of excavation.
4. All concrete and soil removed shall be transported outside the building and placed on, and covered with, 20-mil polyethylene plastic. Buyer shall notify the Contractor of the approved location.
5. Stormwater must not come into contact with the soil.
6. Contractor shall provide run-on and run-off control.
7. All concrete cutting water shall be captured and containerized in Buyer's approved containers and shall be handled by Buyer's EHS organization.
8. Buyer will sample the soil after the soil has been excavated and will determine if the soil meets hazardous waste requirements.
9. If the soil and/or concrete are found to be contaminated, Buyer will provide the appropriate waste containers. Contractor will load soil into the Buyer provided containers.
10. Buyer shall dispose of contaminated soil and/or concrete.
11. Soil that is found not to be contaminated shall be disposed of by Contractor.
12. After the excavation is complete, for each particular area, the Contractor shall allow Buyer sufficient time to collect soil samples prior to any further construction.

Storm Water Pollution Prevention

1. The Boeing Company expects the Contractor to use equipment that is clean, in good working condition, and free from leaks. Spills (such as oil, coolant, or fuel) from the Contractor's equipment will be cleaned up by The Boeing Company at the Contractor's expense. The Onsite Activity Representative shall be notified immediately in the case of a spill by the Contractor.
2. Contractor activities must not violate SSFL Stormwater Pollution Prevention permit requirements for all soil disturbances under an acre.
3. Contractor must obtain a site specific construction Stormwater Pollution Prevention Permit approval for all soil disturbances over an acre.
4. Contractor shall not discharge wastewater to Buyer's ground, sanitary system, or storm drains unless written authorization has been obtained from Buyer's EHS organization. All equipment or area wash-down water shall be contained and discharged according to instructions from Buyer's On Site Activity Representative.

RADIATION

1. The Contractor shall conduct radiological operations in compliance with applicable state or federal regulations. Unless specified otherwise in writing, the Contractor shall bear primary responsibility for safe conduct of licensed or registered operations while on Buyer's property.
2. The Contractor shall conduct activities in compliance with applicable license or registration requirements. When applicable, contractor shall be responsible for arranging license reciprocity with the cognizant regulatory agencies.

3. When applicable, prior to the conduct of site operations, Buyer's EHS organization shall review and approve Contractor's radiation safety procedures, including, where applicable, compliance with 10 CFR 835, Occupational Radiation Protection, as incorporated by the ETEC Radiation Protection Plan.
4. Activities in Areas 1, 2, or 3 involving the use of radiation generating equipment or radioactive materials shall be conducted in accordance with State of California regulations. Activities in Area 4 may be subject to regulations of the U.S. Department of Energy or the State of California. Coordinate the use of all radiation producing devices or materials, such as radiography equipment, density gauges, or well-loggers) with the On Site Activity Representative.

HEALTH & SAFETY

Department of Energy Requirements

Activities conducted in Area 4 must comply with applicable ETEC closure safety management program elements, including applicable sections of the following:

- ETEC Closure Integrated Safety Management System Description, EID-04694.
- Demolition Contractor Requirements, PB-07-009
- SSFL 10 CFR 851 Compliance Plan (Boeing Worker Safety and Health Program for work performed at ETEC), EPA-00062
- Health and Safety Plan for Contract DE-AC03-99SF21530, EPA-00060

Industrial Hygiene Surveillance

The contractor shall perform, or cause to be performed, appropriate industrial hygiene surveillance where required to demonstrate compliance with the Boeing Service Provider Manual and site-specific addendum, contract provisions or applicable regulatory requirements and make the results of the monitoring available to the Buyer on request, subject to appropriate personal privacy requirements. Areas of attention include, but are not limited to: noise, heat, asbestos, lead, metal fumes, hexavalent chromium, crystalline silica, fugitive dust, and environmental contaminants.

Material Handling, Storage & Disposal

Material Handling

1. Rigging equipment for material handling shall be of the proper size and rating. All rigging equipment shall be inspected by Contractor prior to use on each shift and as necessary during its use to ensure that it is safe. Defective rigging equipment shall be removed from service. All rigging equipment not in use shall be properly secured.
2. Tags or guidelines shall be used for controlling loads.
3. Special custom design grabs, hooks, clamps, or other lifting accessories (for such units as modular panels, prefabricated structures and similar materials) shall be marked to indicate safe working loads and shall be proof tested prior to use of 125 percent of their rated load.

Walking/Working Surfaces

Openings in Floors, Walls and Stairwells

1. The protection of unguarded openings in floors, walls and stairwells shall be in compliance with Cal-OSHA regulations.
2. All holes or openings through floors, decking, or walls at all elevations shall have properly identified hole covers or be barricaded immediately. Floor openings shall be guarded by a standard railing and toeboards or a cover. All open-sided floors or platforms, 30 inches or more above adjacent floor or ground level, shall be

guarded by standard railings or the equivalent on all open sides, except where there is an entrance to a ramp, stairway, or fixed ladder.
3. Equipment or material shall not be stored on a hole-cover.
4. Covers shall be secured in place against accidental displacement and extend adequately beyond the edge of the hole or opening.
5. Covers must be fabricated from minimum 3/4 inch thick exterior grade plywood provided one dimension of the opening is greater than 12 inches. Covers must have a sign on it stating: "DANGER - FLOOR OPENING - DO NOT REMOVE"
6. Stairways, Platforms, Runways, Walkways and Ramps
7. The fabrication and use of temporary stairways, walkways and ramps shall be in compliance with Cal-OSHA and ANSI regulations.
8. On all structures of two or more floors, stairways, platforms, runways, walkways, and ramps shall be provided for employees during the construction period.
9. Handrails and guardrails shall be as required by Cal-OSHA, capable of withstanding a minimum force of 200 pounds in any direction.

Electrical Work

General Requirements

1. Electrical installation or removal work requiring interruption of electrical service to Santa Susana facilities must be pre-approved by the Onsite Activity Representative and scheduled at times designated by The Boeing Company. The Contractor shall notify the Onsite Activity Representative in writing ten working days in advance of electrical work that could result in an interruption of power. The Boeing Company reserves the right to reschedule the interruption of services any time up to the 24-hour period prior to the scheduled shutdown.
2. All electrical work, installation, and wire capacities shall be in accordance with the pertinent provisions of NFPA 70 and 70E and area classifications.
3. The construction and installation of permanent and temporary electrical power transmission and distribution lines shall comply with Cal-OSHA regulations.
4. Prior to starting electrical work which involves cutting, splicing, or tapping existing cables, Contractor will request Buyer to tag and identify all cables present in the area. Contractor shall check to make sure that the circuit to be worked on has been de-energized and the source locked out. Contractor must attach their personal protective locks in parallel with a Buyer facility "blue lock" on the disconnect device. Buyer facility "blue locks" will be installed by the Boeing Onsite Activity Representative. Review single line diagram to be sure there are no alternate power sources.
5. Contractor will check for energized cable with a device intended for the purpose before cutting into the cable or opening a splice or termination. Solidly ground the cable to a known low resistance ground point while working on the cable.
6. Electrical lines/equipment shall be de-energized while work is performed. Appropriate lock-out/tag-out procedures must be followed. Work on energized lines/equipment must be coordinated with the Boeing Onsite Activity Representative and must comply with applicable Boeing and regulatory requirements.
7. At least two people shall be assigned to work on any energized lines/equipment or in substations.
8. When it becomes necessary to transport equipment or machinery under overhead lines in a manner that encroaches on specified clearances, the job must be scheduled so the lines can be de-energized.
9. Operations conducted adjacent to overhead lines should not be initiated until coordinated with the Onsite Activity Representative and local utility officials, as appropriate.
10. Materials and supplies should not be stored under overhead transmission and distribution lines because often times when Contractor's attempt to remove these supplies, they come into contact with the overhead lines.
11. Operations adjacent to overhead lines are prohibited unless one of the following conditions is satisfied:
    a) Power has been shut off and positive means taken to prevent the lines from being energized.
    b) Equipment, or any part, does not have the capability of coming within the minimum clearance allowed by Cal-OSHA from energized overhead lines, or the equipment has been positioned and blocked to assure no part, including cables, can come within the minimum clearances allowed by Cal-OSHA.

Grounding Requirements:

1. All electrical circuits shall be grounded in accordance with the NEC, unless otherwise noted in this Specification.
2. A ground should be provided for non-current-carrying metallic parts of equipment such as: generators (if not exempted by NEC 250-6), electrically powered welders, switches, motor-controller cases, fuse boxes, distribution cabinets, frames, motors of electrically operated cranes, electric elevators, metal frames of non-electric elevators to which electric conductors are attached, other electric equipment and metal enclosures around electric equipment.
3. Portable and semi-portable electrical tools and equipment shall be grounded by a multi-conductor cord having an identified grounding conductor and a multi-contact polarized plug-in receptacle.
4. Semi-portable equipment, flood lights and work lights shall be grounded. The protective ground of such equipment shall be maintained during moving unless supply circuits are de-energized.
5. Tools protected by a system of double insulation, or its equivalent, need not be grounded. Double-insulated tools shall be distinctly marked and listed by UL or approved by FM.
6. Grounding circuits shall be checked to ensure that the circuit between the ground and a grounded power conductor has a resistance which is low enough to permit current flow sufficient to cause the fuse or circuit breaker to interrupt the current.
7. Contractor shall have a policy/program for the use, installation and maintenance of personal protective grounds. The Boeing Onsite Activity Representative will provide available fault current values on the system(s).
8. All 120-volt single-phase 15 and 20 ampere receptacle outlets which are not a part of the permanent wiring of the building or structure shall have ground-fault circuit interrupters (GFCI) for personnel protection or an assured equipment-grounding conductor program. Permanent wiring of electrical circuits should be grounded in accordance with NEC. GFCIs may be sensitive to some equipment such as concrete vibrators. In these instances, other precautions shall be taken to protect the equipment/personnel.

Temporary Wiring:

1. Temporary wiring shall be guarded, buried or isolated by elevation to prevent accidental contact by workers or equipment.
2. Outdoor lighting strings shall consist of lamp sockets and connection plugs permanently molded to the conductor insulation.
3. Flexible cord sets shall be of a type listed by the UL. Flexible cord sets used on construction worksites shall contain the number of conductors required for the service, plus an equipment ground wire. The cords shall be hard usage or extra-hard usage as specified in the NEC. Approved cords may be identified by the word “Outdoor” or letters “WA” on the jacket.
4. Bulbs attached to festoon lighting strings and extension cords should be protected by wire guards or equivalent unless deeply recessed in a reflector.
5. When temporary wiring is used in tanks or other confined spaces, an approved switch, identified and marked, shall be provided at or near the entrance to such spaces for cutting off the current in emergencies.
6. Exposed empty light sockets and broken bulbs shall not be permitted.
7. Temporary lights shall be equipped with heavy-duty electric cords with connections and insulation maintained in safe condition. Temporary lights shall not be suspended by their electric cords unless cords and lights are designed for this suspension. Splices should have insulation equal to that of the cable.
8. Portable electric lighting used in moist and/or hazardous locations such as drums, tanks, vessels and confined spaces shall be operated at a maximum of 12 volts.
9. Temporary lights shall be equipped with guards to prevent accidental contact with the bulb.
10. Attachment plugs for use in work areas shall be constructed so that they will endure rough use. They shall be equipped with a cord grip to prevent strain on the terminal screws.

Excavations & Trenching

1. The sides of all excavations and trenches must be properly sloped, shored or sheeted before entering according to Cal-OSHA regulations and shall be capable of withstanding all soil pressures, including stresses which can be exerted by water, heavy loads or vibrations.
   a) Shoring and sheeting procedures shall be reviewed by Contractor's "Competent Person" before work begins.
   b) Shoring and sheeting shall be removed after trenching installation work has been fully completed.
   c) Contractor may use Cal-OSHA compliant movable steel plate trench boxes or shields during trenching work.
2. Shoring or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.
3. Location of all underground structures or utilities shall be verified and marked before digging begins. Contractor shall take all necessary precautions to prevent any hazard from developing. In the event any underground structure is encountered, Contractor shall provide proper support to the structure sufficient to maintain its integrity and stability. In the event an unexpected or unknown underground utility is encountered, **all work shall immediately stop** until the utility is identified and the hazard has been properly mitigated.
4. All excavations and trenches must have safe accessways and be properly barricaded. Barricades with flashing lights are required at night. Excavated material may be used to barricade one side of the excavation or trench. The edge of the excavated material shall be at least 3 feet from the edge of the excavation or trench. Excavated material must be piled at least 3 feet high when used as a barricade.
5. Check for soil erosion and stability of all excavation walls before entering and after a heavy rain or thaw. Check shoring and sheeting daily or more often in extremely wet weather for stability and for accumulation of water. Checking shall be done by a person who is competent and knowledgeable for this type of work.
   a) Workmen will not be permitted in trenches or excavations until accumulated water has been totally removed.
6. The area must be cleared and approved by Contractor's Designated Representative prior to the start of excavation.
7. Workers will not be permitted in trenches or excavations while equipment is being used next to the edge.
8. The use of explosives will not be allowed at any time, unless written approval from the Contract Coordinator is first obtained.
9. The written excavation plan must be available onsite for review.
10. Earthwork in and around the work area is to be performed in a manner to match adjacent drainage and road elevations.
11. Grading is to be performed in accordance with the International Building Code and in such a manner as to minimize or prevent surface runoff flow into remaining facilities or other structures.
    a) In areas of construction, scarify and grade surface to match natural grade.
    b) Areas excavated to a depth greater than 6 inches are to be filled before grading.
    c) Graded slopes shall not exceed a 4:1 horizontal to vertical grade.
    d) The finish grade is to be smooth, uniform and free of abrupt grade changes and depressions to insure adequate surface draining.
    e) Backfill requirements include the following:
    f) Scarify sub-grade before placing fill material.
    g) Fill material shall not have detrimental amounts of organic materials (lumber, large roots, etc.).
    h) Broken concrete, asphalt concrete pavement and concrete block rubble shall not be incorporated in the fill.
    i) Rocks larger than 6 inches in greatest dimension shall not be incorporated in fill. Clods or hard lumps of earth larger than 6 inches in greatest dimension shall be broken up before compacting the fill material.
    j) Fill material shall be placed in horizontal layers. Each layer will be evenly spread and moistened, as necessary. Each layer spread for compaction shall not exceed 8 inches of compacted thickness.

12. Compaction requirements include:
    a) All layers of earth fill shall be compacted by track rolling, tamping, sheep-foot or pneumatic-tired rollers, and pre-moistened to such extent as will produce the specified relative compaction. At locations where it would be impractical because of inaccessibility to use such compacting equipment, fill layers shall be compacted to the specified requirements by hand directed compaction equipment.
    b) All layers of earth fill shall be compacted to a relative compaction of at least 95%.

Cranes

1. **Comprehensive lift procedures are required for all crane lifts.**
2. Contractor shall comply with the manufacturer's specifications and limitations applicable to the operation of any and all cranes and derricks. Attachments used with cranes shall not exceed the capacity, rating, or scope recommended by the manufacturer. A copy of the crane manufacturer's operating manual shall be available in the cab of each crane at all times. Manufacturer's load rating plates (in view of the operator) shall be attached to all load-hoisting equipment.
3. All cranes and derricks exceeding three (3) tons rated capacity shall not be used unless certified by a Cal-OSHA certifying agent.
4. All equipment used for hoisting will be inspected daily by Contractor before operations are begun. Cranes or other pieces of equipment that have been idle shall be inspected by Contractor before being put into operation. Maintenance and inspection of cranes or equipment shall be in accordance with ANSI standards.
5. Inspection records shall be made available to the Boeing Onsite Activity Representative if requested by Buyer.
6. Operating cranes or equipment in the vicinity of overhead power lines should not start without the special, written approval of the Boeing Onsite Activity Representative. Approval will include an action plan implemented to insure safe operation. This plan may include building barricades, warning signs, a limited device for boom extension, grounding of equipment, use of nylon slings, wearing insulated gloves and boots, and/or limited access. These are preventive measures. First consideration should be given to alternative methods and routes that will keep equipment away from these areas.
7. The riding of crane hooks and/or "wrecking balls" is prohibited. Doing so will result in immediate dismissal.
8. Rigging equipment shall be certified and inspected by qualified state or manufacturer representatives prior to use and as necessary during its use to ensure that it is safe. Inspection documentation shall be submitted to the Boeing Onsite Activity Representative upon request.
9. Only personnel qualified by training and experience shall operate cranes or derricks. Upon request, Contractor shall provide qualification and experience resumes for all operators. Operators will be required to wear hard hat identification.
10. One person shall be designated to perform signaling.
11. During assembly and disassembly of crane booms and derrick sections, all components shall be adequately supported so that these components will not shift or fall.
12. When making a lift with a crane, Contractor shall have the area cleared, roped or barricaded off, and shall have someone supervising the lift. No one shall stand or pass under suspended loads. Tag lines shall be used for controlling loads.
13. Cranes shall not be refueled while in operation.
14. When working near energized lines and equipment, the cranes shall be grounded or isolated.
15. All cranes not in use shall be properly secured.
16. Outriggers must be fully extended for any lift. Where cribbing is used under the outrigger, it must only be used under the pedestal.
17. The use of a crane to hoist employees on a personnel platform is prohibited, except when the erection, use and dismantling of conventional means of reaching the worksite, such as a personnel hoist, ladder, stairway, aerial lift, elevating work platform or scaffold, would be more hazardous, or is not possible because of structural design or worksite conditions.

Miscellaneous Provisions

General:

1. Contractor is solely responsible for Contractor's equipment and goods. Buyer is not responsible for any losses by theft (or by whatever nature) of Contractor's property.
2. Loose clothing, rings and other jewelry shall not be worn around operating tools or machines. Keep sleeves buttoned. Industrial leather gloves shall be worn when using tools, but not with rotating equipment.

Illumination:

Contractor shall ensure that construction areas, aisles, stairs, ramps, runways, corridors, offices, shops, and storage areas where work is in progress shall be adequately lighted with either natural or artificial illumination. Refer to Cal-OSHA Standards for illuminated light levels in all work or access areas.

Sanitation:

1. Contractor shall furnish an adequate supply of potable water, containers, and disposable cups to Contractor's employees for drinking water.
2. Contractor shall furnish adequate toilet facilities for Contractor's employees. All portable toilets shall be kept clean, sanitary, and located in an easily accessible area. If they are to be used at night, the area shall be well lighted.
3. Contractor shall furnish adequate washing facilities adjacent to toilet facilities. All washing facilities shall be kept clean, sanitary, have an adequate water supply, paper towels, and trash bin.

Hand and Power Tools:

1. All hand and power tools and similar equipment, whether furnished by Contractor or Contractor's employees shall be maintained in a safe operating condition. Damaged tools shall be immediately repaired or removed from service. Tools shall be used only for the purpose for which they were designed.
2. Any tools that are designed to have guards must have those guards in place at all times. Any worker removing a guard or using an unguarded tool may be subject to dismissal from the worksite.
3. Grinders are particularly hazardous. Workers shall be trained in their use. While the grinders are rotating, the operator shall assure that he/she is in a balanced position and that the momentum of the disc will carry the tool away from the operator if it becomes stuck.

Powder-Actuated Tools:

1. Powder-actuated tools shall meet ANSI A10.3 or have a California approved number.
2. Only trained workers holding a valid operator's card can use a powder-actuated tool.
3. Containers shall be lockable and bear the label, "POWDER-ACTUATED TOOL", on the outside. The container shall be kept under lock and key storage.
4. The tool shall not be used:
    a) in an explosive environment
    b) on hard or brittle material
    c) on unbacked, thin, soft material
    d) within 1/2 inch of the edge of steel
    e) within 3 inches of the edge of masonry
    f) on thin concrete
    g) on spalled areas
    h) on existing holes
5. Eye protection shall be worn by operators and assistants.
6. The tool shall be inspected prior to use. Defective tools shall not be used.
7. Tools shall not be loaded until ready for use. Tools shall be unloaded if work is interrupted.
8. Upon misfire, the tool shall be held in place for 30 seconds.
9. Warning signs bearing the words "POWDER-ACTUATED TOOLS IN USE," shall be conspicuously posted within 50 feet.

Laser Equipment:
Anticipated laser use for leveling or surveying must be approved by Buyer's EHS organization.

Safety Inspections & Housekeeping:
1. Contractor shall inspect the work area daily to ensure safe working conditions are maintained and all safety procedures are followed. Each inspection shall be documented and provided to the Boeing Onsite Activity Representative or Buyer's EHS upon request.
2. Contractor shall be responsible for properly organizing all activities on the job site to the extent that good housekeeping shall be practiced at all times. This shall include, but not be limited to:
3. As the job progresses, work areas must be kept clean at all times.
4. All materials, tools, and equipment must be stored in a stable position to prevent rolling or falling. Materials and supplies shall be kept away from edges of floors, hoistways, stairways, and floor openings. When exterior walls are being built, materials and supplies shall be kept away from the perimeter of the building.
5. A safe access way to all work areas and storage areas must be maintained. All stairways, corridors, ladders, catwalks, ramps, passageways, and work platforms shall be kept clear of loose material and trash.
6. Forms and scrap lumber with protruding nails and all other debris shall be cleared from work areas, passageways, stairs, and in and around buildings or other structures.
7. Combustible scrap and debris shall be removed at regular intervals. Safe means shall be provided to facilitate such removal.
8. Contractor shall supply an adequate number of dumpsters to insure a clean working area at all times. Contractor shall load and transport all refuse and debris to a suitable disposal area away from the job site and make disposition in a lawful manner. Contractor shall be responsible for daily cleanup of common areas, such as parking lots and roadways. Contractor's parking and staging areas shall also be maintained clean and free of all debris at all times.
9. Contractor shall restrict the use and storage of flammable liquids and gases to a minimum. Store all flammables not actually needed for immediate use outside building, in a secure shelter. Store flammable materials outside building during non-work hours. Store rags or wiping waste with oily or flammable residue away from flammable liquids and in approved closed, metal containers, located outside the building.
10. Contractor shall collect and dispose of flammable debris and dust as it is accumulated.
11. Storage locations for gasoline or other flammable materials used for vehicles or equipment shall be in areas agreed to by the Boeing Onsite Activity Representative. These areas shall be diked to retain spilled material and have appropriately placed fire extinguisher.
12. Cords and hoses shall be kept a minimum of 7 feet overhead or laid flat outside of walkways.
13. Tools and equipment shall not be strewn about where they might cause tripping or falling hazards and shall, at the end of each workday, be collected and stored away properly.
14. Each employee shall be instructed to practice required housekeeping as part of assigned duties.
15. Housekeeping and care of the job site shall be in accordance with the Contract.

APPENDIX 1

DOCUMENT SUBMITTAL REQUIREMENTS

Item No.	Submittal	Time of Submittal	Purpose	No. of Copies
1.	List of Service Company Personnel	5 Days Prior to the Start of Work	Record	1
2.	Material Safety Data Sheets	Prior to the Introduction of the Material Onsite	Record	1
3.	Training Records	2 Weeks Prior to Start of Applicable Task	Record	1
4.	Agency Notifications	Prior to Start of Work	Approval	1
5.	Service Provider Manual Certification	Prior to Start of Work	Record	1
6.	Lead Based Material Work Plan	10 Days Prior to Start of Lead Related Task	Review	1
7.	Air Monitoring Results	As Requested	Record	1
8.	Solvent Usage Log	The Next Day's Daily Report	Record	1
9.	Lift Plans	10 Working Days Prior to Difficult Lifts	Review	1
10.	Detailed Work Schedule	10 Working Days After Award of Contract	Approval	2
11.	Detailed Work Plan	10 Working Days After Award of Contract	Approval	2
12.	Weigh Tickets for Shipments	Within 5 Days of Shipment	Record	1
13.	Daily Activity Report	Daily	Record	1
14.	Daily Safety Meeting Report	Daily	Record	1
15.	Injury and Illness Prevention Plan	Within 10 Days After Contract Award and Prior to Start of Work	Record	1
16.	Health and Safety Plan	Within 10 Days After Contract Award and Prior to Start of Work	Approval	1