



DEPARTMENT OF THE ARMY  
PITTSBURGH DISTRICT, CORPS OF ENGINEERS  
WILLIAM S. MOORHEAD FEDERAL BUILDING  
1000 LIBERTY AVENUE  
PITTSBURGH, PA 15222-4186  
June 2, 2009

REPLY TO

Project Management Branch

MARK CRITZ  
OFFICE OF CONGRESSMAN JOHN P. MURTHA  
P.O. BOX 780  
JOHNSTOWN, PA 15907

Dear Mr. Critz

Enclosed for your information are the final work plans for the Shallow Land Disposal Area. The work plans include the following documents:

1. Accident Prevention Plan (APP)
2. Backfill and Restoration Plan (BRP)
3. Contractor Quality Control Plan (CQCP)
4. Radiation Protection Plan (RPP)
5. Regulation Compliance Plan (RCP)
6. Site Operations Plan (SOP)
7. Sampling and Analysis Plan (SAP)
8. Waste Management Transportation and Disposal Plan (WMTD)
9. Water Management Plan (WMP)

This project is being conducted by the U.S Army Corps of Engineers under the Formerly Utilized Sites Remedial Action Program (FUSRAP). Also included for your use are two CD's with the above information on them.

If you have any questions or need additional information please feel free to contact me at 412-395-7377 or email me at [william.j.lenart@usace.army.mil](mailto:william.j.lenart@usace.army.mil).

Sincerely,

William J. Lenart  
Project Manager SLDA

JUN 04 2009

**FINAL**

**WASTE MANAGEMENT, TRANSPORTATION AND  
DISPOSAL (WMTD) PLAN**

**SHALLOW LAND DISPOSAL AREA  
FORMERLY UTILIZED SITES REMEDIAL ACTION  
PROGRAM (FUSRAP)  
SITE REMEDIATION  
PARKS TOWNSHIP  
ARMSTRONG COUNTY, PENNSYLVANIA**

**May 2009**



**US Army Corps  
of Engineers ®**

*Prepared for:*

**U.S. ARMY CORPS OF ENGINEERS  
BUFFALO DISTRICT  
Buffalo, New York  
PITTSBURGH DISTRICT  
Pittsburgh, Pennsylvania**

Contract Number W912P4-07-D-0002

*Prepared by:*

**CABRERA SERVICES, INC.**

473 Silver Lane  
East Hartford, Connecticut 06118

**JUN 04 2009**

**FINAL**

**RADIATION PROTECTION PLAN (RPP)**

**SHALLOW LAND DISPOSAL AREA**

**FUSRAP SITE REMEDIATION**

**PARKS TOWNSHIP**

**ARMSTRONG COUNTY, PENNSYLVANIA**

**May 2009**



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473 Silver Lane  
East Hartford, Connecticut 06118

**FINAL**

**ACCIDENT PREVENTION PLAN**

**SHALLOW LAND DISPOSAL AREA  
FUSRAP SITE REMEDIATION**

**PARKS TOWNSHIP  
ARMSTRONG COUNTY, PENNSYLVANIA**

**May 2009**



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**Formerly Utilized Sites Remedial Action Program**

Contract Number W912P4-07-D-0002

*Prepared by:*

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473 Silver Lane  
East Hartford, Connecticut 06118

**JUN 04 2009**

**FINAL**

**REGULATORY COMPLIANCE PLAN**

**SHALLOW LAND DISPOSAL AREA**

**FUSRAP SITE REMEDIATION**

**PARKS TOWNSHIP**

**ARMSTRONG COUNTY, PENNSYLVANIA**

**May 2009**



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473 Silver Lane  
East Hartford, Connecticut 06118

JUN 04 2009

JUN 04 2009

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**CONTRACTOR QUALITY CONTROL PLAN**

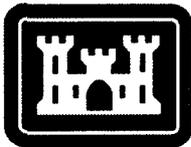
**SHALLOW LAND DISPOSAL AREA**

**FUSRAP SITE REMEDIATION**

**PARKS TOWNSHIP**

**ARMSTRONG COUNTY, PENNSYLVANIA**

**May 2009**



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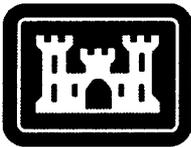
**FINAL**

**SITE OPERATIONS PLAN**

**SHALLOW LAND DISPOSAL AREA  
FORMERLY UTILIZED SITES REMEDIAL ACTION  
PROGRAM (FUSRAP)  
SITE REMEDIATION  
PARKS TOWNSHIP  
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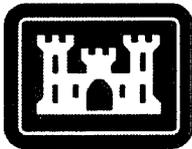
**WATER MANAGEMENT PLAN**

**SHALLOW LAND DISPOSAL AREA  
FUSRAP SITE REMEDIATION**

**PARKS TOWNSHIP**

**ARMSTRONG COUNTY, PENNSYLVANIA**

**May 2009**



**US Army Corps  
of Engineers** ®  
Buffalo District

*Prepared for:*  
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**JUN 04 2009**

**JUN 04**

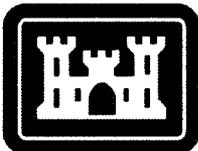
**FINAL**

**SAMPLING AND ANALYSIS PLAN**

**SHALLOW LAND DISPOSAL AREA**  
**FUSRAP SITE REMEDIATION**  
**PARKS TOWNSHIP**  
**ARMSTRONG COUNTY, PENNSYLVANIA**

**May 2009**

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BUFFALO DISTRICT  
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Contract Number W912P4-07-D-0002

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**CABRERA SERVICES, INC.**  
473 Silver Lane  
East Hartford, Connecticut 06118

**JUN 04 2009**

**FINAL**

**BACKFILL AND RESTORATION PLAN**

**SHALLOW LAND DISPOSAL AREA**

**FUSRAP SITE REMEDIATION**

**PARKS TOWNSHIP**

**ARMSTRONG COUNTY, PENNSYLVANIA**

**May 2009**



**US Army Corps  
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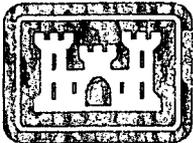
**JUN 04 2009**

**FINAL**

**ACCIDENT PREVENTION PLAN**

**SHALLOW LAND DISPOSAL AREA  
FUSRAP SITE REMEDIATION  
PARKS TOWNSHIP  
ARMSTRONG COUNTY, PENNSYLVANIA**

**May 2009**



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East Hartford, Connecticut 06118

|                                     |  |         |               |
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| <input checked="" type="checkbox"/> | APPROVAL RECOMMENDED                                     | 5/14/09 | FUB           |
|                                     | ACCEPTANCE   | Date    | Initials      |
| <input type="checkbox"/>            | APPROVAL RECOMMENDED<br>SUBJECT TO COMMENTS<br>INDICATED | Date    | Initials      |
| <input type="checkbox"/>            | DISAPPROVAL RECOMMENDED                                  | Date    | Initials      |
|                                     | APPROVED/DISAPPROVED                                     | 5/14/09 | James D. Boyd |
|                                     | Accepted   | Date    | Signature     |

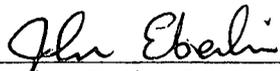
**ACCIDENT PREVENTION PLAN (APP)  
SLDA FUSRAP SITE, PARKS TOWNSHIP, ARMSTRONG COUNTY,  
PENNSYLVANIA**

Contract Number W912P4-07-D-0002

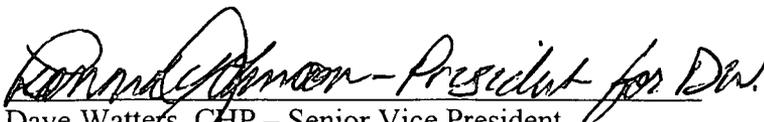
**APP APPROVALS**

By their specific signature, the undersigned certify that they prepared, reviewed, or provided comments on this APP for remediation of the SLDA FUSRAP Site, Parks Township, Armstrong County, Pennsylvania.

APPROVED BY:

  
\_\_\_\_\_  
John Eberlin – Project Manager  
Cabrera Services, Inc.

5/19/09  
Date

  
\_\_\_\_\_  
Dave Watters, CHP – Senior Vice President  
Cabrera Services, Inc.

5/21/09  
Date

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## LIST OF APPENDICES

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**APPENDIX A: SITE SAFETY AND HEALTH PLAN**

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**ACRONYMS AND ABBREVIATIONS**

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|          |   |
|----------|---|
| AHA      | Activity Hazard Analysis                          |
| ALARA    | As Low as Reasonably Achievable                   |
| APP      | Accident Prevention Plan                          |
| CABRERA  | Cabrera Services, Inc.                            |
| CFR      | Code of Federal Regulations                       |
| FOL      | Field Operations Leader                           |
| HAZWOPER | Hazardous Waste Operations and Emergency Response |
| MSDS     | Material Safety Data Sheets                       |
| OSHA     | Occupational Safety and Health Administration     |
| PPE      | Personal Protection Equipment                     |
| RPP      | Radiation Protection Plan                         |
| RWP      | Radiation Work Permits                            |
| SLDA     | Shallow Land Disposal Area                        |
| SSHO     | Site Safety and Health Officer                    |
| SSHP     | Site Safety and Health Plans                      |
| USACE    | U.S. Army Corp of Engineers                       |
| VPO      | Vice President of Operations                      |

## 1.0 BACKGROUND INFORMATION

This Accident Prevention Plan (APP) establishes standard safety and health procedures for Cabrera Services, Inc. (CABRERA) personnel and subcontractors involved in the field implementation of the *Site Operations Plan for the Shallow Land Disposal Area (SLDA) FUSRAP Site Remediation, Parks Township, Pennsylvania* (CABRERA, 2009a), which involves potential exposure to hazardous substances, radioactive material, and/or physical hazards. This document meets the Hazardous Waste Operations and Emergency Response (HAZWOPER) requirements set forth by the Occupational Safety and Health Administration (OSHA) in the Code of Federal Regulations (CFR) Title 29, Parts 1910.120 and 1926.65, and the United States Army Corps of Engineers *Health and Safety Requirements Manual*, USACE EM 385-1-1, 3 November 2003 (USACE, 2003). Site specific health and safety hazard analysis and implementation of project safety measures are contained within the Site Safety and Health Plan (SSHP), which has been prepared as Appendix A to this APP.

The APP establishes the work practices necessary to ensure protection of personnel assigned to perform on-site activities, as well as the local community and the environment during project implementation. The objective of the APP is to anticipate, identify, evaluate, and control safety and health hazards, in addition to providing emergency response procedures relative to operations conducted at the site. Specific hazard control methodologies have been evaluated and selected in an effort to minimize the potential for accident or injury.

Field activities specified in the SOP and supporting plans (CABRERA, 2009a) will be performed in accordance with internal CABRERA policies and procedures, other applicable site health and safety regulations, OSHA requirements, and other applicable Federal, State, and local requirements. On-site personnel will follow the guidelines specified in this APP, be alert to potential changes in site hazards, and exercise reasonable caution at all times.

Any revisions to the APP will be made with the knowledge and concurrence of both CABRERA and USACE.

The levels of personal protection and the procedures specified in the APP are based on the best information available from reference documents and current site data. Therefore, these recommendations represent the minimum health and safety requirements to be observed by all personnel engaged in this project. Unforeseeable site conditions may warrant a reassessment of protection levels and controls stated.

The APP is considered a working document and may be modified during fieldwork based upon review of additional information regarding unexpected site conditions and/or implementation issues. Revisions to the APP will be made with the knowledge and concurrence of both CABRERA and the USACE and must have prior approval by the CABRERA Corporate Safety & Health Manager and the Site Safety and Health Officer (SSHO).

### 1.1 Safety and Health Policy

CABRERA is committed to providing a safe and healthy work environment for its employees and contractors as detailed in the *CABRERA Corporate Health and Safety Manual* (CABRERA, 2005). Attaining this objective requires the commitment of each employee to create and maintain an injury free, environmentally safe workplace. This commitment requires strict adherence to established safety rules and practices. Procedures are developed and implemented to ensure state and federal occupational safety and health regulations are adequately and completely addressed.

Each employee is responsible for performing work in accordance with established procedures and ensuring that unsafe acts and conditions are eliminated from the workplace. As a condition of employment, personnel will be accountable for adhering to safety rules, practices and procedures. Additionally, when an employee(s) believes unsafe conditions exist, he/she is empowered to suspend or stop work pending resolution of the condition by appropriate supervision and/or management. CABRERA will provide the resources and tools necessary to ensure employees are capable of fulfilling their occupational safety responsibilities.

CABRERA employees, managers and supervisors are responsible for adhering to this policy and applicable Safety and Health programs. Managers and supervisors will ensure the expectations for safe work performance are conveyed to all employees and will continually evaluate safety performance to identify areas for improvement.

## **1.2 Project Safety Goal**

Cabrera Services, Inc. regards safety as a most important company value. CABRERA has established a goal of zero accidents for this project. The process of planning the project work is done in order to identify, evaluate, and control the site hazards and to help achieve the goal of zero accidents.

Safety performance at each CABRERA project site is reviewed and Project Managers and Site Supervisors are held accountable for maintaining safe working conditions. Annual performance evaluations include safety as a key metric on which their overall job ratings are made.

## 2.0 RESPONSIBILITIES AND LINES OF AUTHORITY

The personnel responsible for safety and health at both the corporate and project levels are identified in the following sections. As the project progresses, it may be necessary to modify some organizational aspects, such as personnel responsibilities and authorities, so that individual tasks can be performed as efficiently and safely as possible. This APP will be revised to reflect any changes to the overall organizational structure, which changes will be communicated to all parties involved.

Responsibilities and lines of authority are discussed in more detail in Section 2 of the SSHP (Appendix A).

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### 3.0 TRAINING

The project training program is in compliance with 29 CFR 1910.120(e), and is designed to ensure that workers receive the training they need to work safely on field assignments. Site safety and health training requirements are based on the job hazard assessments contained in the APP and relevant OSHA requirements. The CABRERA Corporate Safety & Health Manager oversees implementation of this training program and is responsible for ensuring that personnel are adequately and currently trained for all tasks they are asked to perform. Personnel who have not been trained to a level required by their job function and responsibility are not permitted to participate in or supervise field activities.

Training requirements are provided in Section 4 of Appendix A (SSHP).

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#### 4.0 SAFETY INSPECTIONS

Safety reviews and inspections are conducted by all tiers of management and are documented. A list of all corrective action items is required to be maintained showing the corrective action, responsible person, and the proposed completion date. Follow-up inspections will be conducted by health and safety personnel to verify implementation of corrective measures.

The SSHO will inspect the site daily and identify areas of safety concerns or suggestions for safety improvement. Supervisory personnel will also inspect the site daily to identify changing conditions or potential hazards. Identified potential hazards will be brought to the attention of the Field Operations Leader (FOL).

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## 5.0 INCIDENT REPORTING

All occupational injuries/illnesses, vehicle accidents, and near miss incidents must be promptly reported and investigated. Reporting the incident to the PM must be made as soon after the incident as possible but in no instance greater than 24 hours. Incidents will be investigated and written report generated.

After the incident has stabilized, all incidents involving a fatality, major injury/illness, or resulting in significant property damage will be immediately reported to the PM. The PM will notify the CABRERA Vice President of Operations (VPO), Corporate Safety & Health Manager, and the USACE Project Manager.

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## 6.0 RADIATION SAFETY PROGRAM

A radiation safety program will be implemented during field activities to protect workers' health and safety. It includes requirements for conducting contamination surveys and occupational radiation exposure monitoring activities. The goal is to ensure that worker doses are maintained as low as reasonably achievable (ALARA).

Descriptions of the Radiation Safety Program are provided in Appendix A (SSHP), Section 7, and the *SLDA Radiation Protection Plan* (CABRERA, 2009b).

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## 7.0 HAZARDS ASSESSMENT

A hazards assessment is performed to identify and quantify the hazards associated with the project specific requirements, and to evaluate the risks to workers. Using this information, appropriate control methods were selected to eliminate the identified risks if possible, or to effectively control them. Detailed Activity Hazard Analyses (AHA) can be found in Appendix A (SSHP).

Sections 3 and 5 of Appendix A (SSHP) provide descriptions of the Hazard Assessments and the Activity Hazard Analysis.

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## 8.0 PERSONAL PROTECTIVE EQUIPMENT

Site safety and health hazards will be eliminated or reduced to the greatest extent possible through engineering controls and work practices. Where hazards remain, a combination of engineering controls, work practices, and PPE will be used to protect personnel. If conditions are identified requiring a lower or a higher level of protection, then PPE will be upgraded or downgraded as appropriate.

Section 10 of Appendix A (SSHP) provides a description of levels of protection and PPE to be used.

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## **9.0 MEDICAL SURVEILLANCE**

The medical surveillance requirements are specified in Section 13 of Appendix A (SSHP).

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## **10.0 ENVIRONMENTAL MONITORING**

Sections 8 and 9 of Appendix A (SSHP) provide descriptions of action levels and monitoring to detect hazards in the work area and surrounding environment.

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## 11.0 SITE CONTROL

The site control program includes the following site-specific information:

- A site map, indicating site perimeter and work zones
- Visitor access
- Site security
- Work zones (where workers will place barricades or traffic cones to mark the work area)
- Hazard communication
- Safety briefing

The site control program is updated regularly to reflect current site conditions, work operations, and procedures. Section 6 of Appendix A (SSHP) provides descriptions of Site Control methods.

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## 12.0 DECONTAMINATION

Section 11 of Appendix A (SSHP) provides details of the decontamination procedures.

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### 13.0 EMERGENCY RESPONSE

If, during the performance of this project, the presence of hazardous or potentially hazardous conditions is discovered, personnel will leave the area and immediately notify appropriate emergency response personnel.

Section 12 and Attachment C of Appendix A (SSHP) discuss Emergency Response Procedures, including the route to the nearest emergency medical facility (hospital).

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## **14.0 SPILL RESPONSE**

The primary responsibility for response to a hazardous material spill or release rests with on site project personnel.

Section 12 of Appendix A (SSHP) describes the Spill Response Procedures.

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## 15.0 REFERENCES

- CABRERA, 2005, *Corporate Health and Safety Manual, Revision 2*, August 2005.
- CABRERA, 2009a, *Site Operations Plan, SLDA FUSRAP Site*, Cabrera Services, Inc., May 2009.
- CABRERA, 2009b, *Radiation Protection Plan, SLDA FUSRAP Site*, Cabrera Services, Inc., May 2009.
- OSHA, US Occupational Safety and Health Administration; Department of Labor, Title 29, Code of Federal Regulations, Parts 1910 and 1926.
- USACE, 2003, *Safety and Health Requirements*, Engineer Manual 385-1-1. November 2003.

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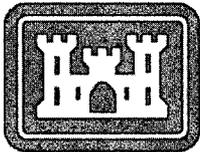
**APPENDIX A**  
**Site Safety And Health Plan**

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**FINAL**  
**APPENDIX A**  
**SITE SAFETY AND HEALTH PLAN**

**SHALLOW LAND DISPOSAL AREA**  
**FUSRAP SITE REMEDIATION**  
**PARKS TOWNSHIP**  
**ARMSTRONG COUNTY, PENNSYLVANIA**

May 2009



**US Army Corps  
of Engineers** ®  
Buffalo District

*Prepared for:*

**US ARMY CORPS OF ENGINEERS**  
**BUFFALO DISTRICT**  
Buffalo, New York  
Formerly Utilized Sites Remedial Action Program

Contract Number W912P4-07-D-0002

*Prepared by:*

**CABRERA SERVICES, INC.**  
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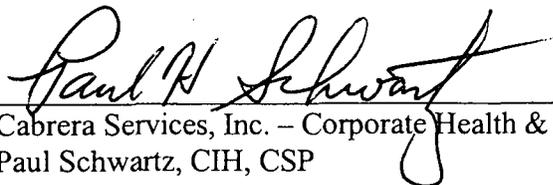
**SITE SAFETY AND HEALTH PLAN (SSHP)  
SLDA FUSRAP SITE, PARKS TOWNSHIP, ARMSTRONG COUNTY,  
PENNSYLVANIA**

Contract Number W912P4-07-D-0002

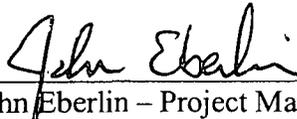
**SSHP APPROVALS**

By their specific signature, the undersigned certify that this SSHP is approved for use during remediation of the SLDA FUSRAP Site, Parks Township, Armstrong County, Pennsylvania.

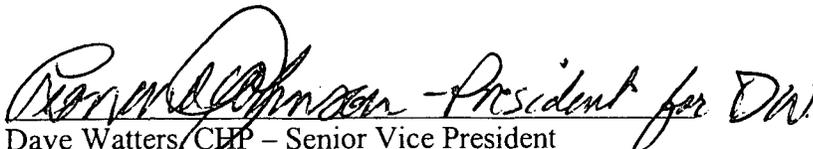
APPROVED BY:

  
Cabrera Services, Inc. – Corporate Health & Safety Manager  
Paul Schwartz, CIH, CSP

5/18/09  
Date

  
John Eberlin – Project Manager  
Cabrera Services, Inc.

5/19/09  
Date

  
Dave Watters, CHP – Senior Vice President  
Cabrera Services, Inc.

5/21/09  
Date

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**ABBREVIATIONS, ACRONYMS, AND SYMBOLS**


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|          |   |         |  |
|----------|---|---------|--|
| ACGIH    | American Conference of Governmental Industrial Hygienists | NIOSH   | National Institute of Occupational Safety and Health |
| AHA      | activity hazard analysis                                  | NRC     | Nuclear Regulatory Commission                        |
| ALARA    | As Low as Reasonably Achievable                           | OSHA    | Occupational Safety and Health Administration        |
| BBP      | Blood borne Pathogens                                     | PADEP   | Pennsylvania Department of Environmental Protection  |
| CABRERA  | Cabrera Services, Inc.                                    | PE      | Professional Engineer                                |
| CD       | compact disc  | PID     | photo ionization detector                            |
| CFR      | Code of Federal Regulation                                | PM      | Project Manager                                      |
| CGI      | Combustible Gas Indicator                                 | POC     | point of contact                                     |
| CHP      | Certified Health Physicist                                | PPE     | Personal Protective Equipment                        |
| CIH      | Certified Industrial Hygienist                            | ppm     | parts per million                                    |
| CPR      | Cardiopulmonary Resuscitation                             | psi     | pounds per square inch                               |
| CQCP     | <i>Contractor Quality Control Plan</i>                    | QC      | quality control                                      |
| CQCSM    | Contractor Quality Control Systems Manager                | QCM     | Quality Control Manager                              |
| CRZ      | Contamination Reduction Zone                              | RCOC(s) | Radiological Contaminant(s) of Concern               |
| CZ       | Contamination Zone  | RPP     | Radiation Protection Plan                            |
| CSP      | Certified Safety Professional                             | RSO     | Radiation Safety Officer                             |
| dBA      | Decibels (A-weighted scale)                               | SAP     | Sampling and Analysis Plan                           |
| FOL      | Field Operations Lead                                     | SLDA    | Shallow Land Disposal Area                           |
| FSS      | Final Status Survey                                       | SM      | Site Manager   |
| ft       | feet  | SOP     | <i>Site Operations Plan</i>                          |
| FUSRAP   | Formerly Utilized Sites Remedial Action Program           | SRSL    | Site Radiation Safety Lead                           |
| HAZWOPER | Hazardous Waste Operations and Emergency Response         | SSHO    | Site Safety and Health Officer                       |
| HSM      | Health and Safety Manager                                 | SSHP    | Site Safety and Health Plan                          |
| HP       | Health Physics  | TLV     | Threshold Limit Value                                |
| kV       | kilovolt  | TWA     | time weighted average                                |
| LEL      | Lower Explosive Limit                                     | USACE   | United States Army Corps of Engineers                |
| MSDS     | Material Safety Data Sheet                                | VOCs    | volatile organic compounds                           |
|          |   | WNV     | West Nile Virus                                      |

## 1.0 INTRODUCTION

### 1.1 BACKGROUND AND PURPOSE

Cabrera Services Inc. (CABRERA) has been selected by the United States Army Corps of Engineers – Buffalo District (USACE) under Contract Number W912P4-07-D-0002-0001 to remediate the Shallow Land Disposal Area (SLDA) Formerly Utilized Sites Remedial Action Program (FUSRAP) Site in Armstrong County Pennsylvania, hereafter referred to as the “SLDA Site” or “Site.” The SLDA Site has been identified as containing various levels of residual radioactive material in soil and associated debris from previous operations, including Americium-241 (Am-241), Plutonium-239 (Pu-239), Plutonium-241 (Pu-241), Radium-228 (Ra-228), Thorium-232 (Th-232), Uranium-234 (U-234), Uranium-235 (U-235), and Uranium-238 (U-238). Descriptions of the site history and the source of contamination, as well as remediation of that contamination, are provided in the *Site Operations Plan* (SOP) (CABRERA, 2009a).

This Site Safety and Health Plan (SSHP) presents safety and health procedures CABRERA personnel and subcontractors will follow in performing remediation of contaminated soils, sediment, and debris from disposal trenches located on the Site. On-site handling processes may include physical separation, size reduction, and radiological sorting. The procedures presented herein are designed to reduce the risk of exposure to physical, chemical, and biological hazards associated with remediation field work performed at this Site. Procedures designed to reduce the risk of exposure to radiological hazards during remediation are described in the accompanying *Radiation Protection Plan* (RPP) (CABRERA, 2009b), which includes electronic copies of CABRERA’s Corporate Operating Procedures. The procedures in this SSHP and the RPP are intended for use during all phases of remediation field work associated with the areas identified above and applies to all CABRERA personnel as well as subcontract personnel involved in site remediation.

CABRERA is responsible solely for compliance with the provisions of the SSHP by CABRERA employees and other designated personnel under the direct supervision of CABRERA management. Personnel supervised by organizations other than CABRERA must adhere to an approved health and safety program prepared and administered by that organization. An approved health and safety program must be in compliance with all applicable and relevant Federal regulations. When personnel other than CABRERA employees are present on site, CABRERA will inform them it is the responsibility of their employer to provide them with health and safety information (including training, medical monitoring, equipment, etc.) that is in compliance with relevant regulations. Personnel other than those explicitly authorized by contract or subcontract agreement or specifically mentioned in this Plan may not use CABRERA’s SSHP and RPP without the permission of CABRERA.

In the event that activities occur on site by personnel that are not under contract to CABRERA, the USACE can require that those activities conform to this SSHP.

This Plan:

- Identifies the location and setting in which the work will be conducted,
- Describes the work which will be conducted,
- Discusses the hazards likely to be encountered during the project,

- Presents the standards and procedures that will ensure that all activities are conducted in a safe manner and will avoid accidents,
- Outlines emergency and contingency plans for the protection of on-site personnel during unusual occurrences, and
- Designates the responsibilities for implementation of all standards and procedures.

The evaluation of hazards, specifying levels of protection, and the safety procedures presented herein are based on information available at the time this Plan was prepared. The specifications described herein represent the minimum health and safety requirements to be observed by remediation personnel. The procedures described herein are conservative health and safety requirements to be observed by all personnel. Site conditions may warrant a reassessment of protection levels resulting in protection levels and controls that may be more or less restrictive than previously required by this SSHP. Revisions to the SSHP must have prior concurrence with CABRERA's Corporate Health and Safety Manager (HSM) and Site Safety and Health Officer (SSHO) and the USACE's Contracting Officer.

On-site personnel will follow the safety and health procedures described in the SSHP and RPP, be alert to the hazards associated with working on the site, and exercise reasonable caution at all times. On-site personnel will be required to read and acknowledge their understanding and agreement to abide by the requirements of the SSHP and RPP by signing the SSHP Acknowledgment Form included in ATTACHMENT A.

A copy of this SSHP and the RPP will be kept in CABRERA's site office for easy reference. In addition to the daily tailgate safety meeting, additional safety in-briefings will be conducted on site whenever new field teams and/or visitors arrive on site. Any modifications to the Plan or RPP necessitated by changing field conditions will be explained and documented by an addendum to the Plan. This SSHP and the RPP will also be available for review by USACE representatives when requested.

This SSHP has been developed and the remediation activities described herein will be performed in accordance with the following documents:

- CABRERA's *Corporate Health and Safety Manual*, (CABRERA, 2005), a copy of which is included in electronic (Compact Disc [CD]) format as Attachment B.
- USACE Engineer Manual (EM) 385-1-1, *Safety and Health Requirements Manual*, (USACE, 2003)
- USACE EM 385-1-92, *Safety and Occupational Health, Requirements for Hazardous, Toxic and Radioactive Waste Activities*, (USACE, 2007)
- US Department of Labor, Occupational Safety and Health Administration (OSHA), Chapter 29, Sections 1910.120 and 1926 of the Code of Federal Regulations (29 CFR 1910.120 and 1926)
- US Environmental Protection Agency (EPA), Office of Emergency and Remedial Response, *Standard Operating Safety Guides* (EPA, 1988)
- National Institutes of Occupational Safety and Health (NIOSH)/OSHA/United States Geological Survey/EPA *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, October 1985

- US Department of Transportation Hazardous Materials Transportation Regulations, Chapter 49 CFR 100-199.

This SSHP is a working document and is subject to change based on review and the implementation of additional tasks.

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## 2.0 ORGANIZATIONAL STRUCTURE

### 2.1 KEY PERSONNEL

Although no changes are currently foreseen, it may be necessary during the project to modify some elements of CABRERA's project organization, such as personnel, responsibilities, and authorities, so that individual tasks can be performed safely and efficiently. Any changes to the overall CABRERA project organization will be recorded in the appropriate sections of this SSHP. Any such changes that become necessary will be communicated to USACE in advance of their implementation.

Figure 2-1 shows the organizational structure of CABRERA's project team. Key emergency responders are identified and emergency response contact information is provided in Attachment C.

#### 2.1.1 USACE Project Personnel

USACE Pittsburgh District's Project Manager will be the primary point of contact (POC) with the site property owners, United States Environmental Protection Agency (EPA), the Nuclear Regulatory Commission (NRC), and Pennsylvania Department of Environmental Protection (PADEP). USACE personnel will be responsible for decisions concerning technical issues and strategies, set the basic policies in accordance with work assignments, and provide quality assurance oversight. USACE will maintain personnel on site to provide direction during field operations associated with site remediation.

#### 2.1.2 Project Manager

CABRERA's Project Manager (PM) for this effort will be John Eberlin. He is responsible for evaluating the appropriateness and adequacy of the technical services provided for the project, and for developing the technical approaches and level of effort required to address each task. He is also responsible for the day-to-day conduct of work, including integration of input from supporting disciplines, USACE, and subcontractors. He will work closely with the Site Manager (SM) and Contractor Quality Control Systems Manager (CQCSM) during implementation of the field program. Specific responsibilities include:

- Initiating project planning and directing project activities;
- Ensuring that qualified technical personnel are assigned to various tasks, including subcontractors;
- Identifying and fulfilling equipment and other resource requirements;
- Monitoring project activities to ensure compliance with established scopes, schedules and budgets;
- Ensuring overall technical quality and consistency of all project activities and deliverables; and
- Serving as the primary Cabrera POC with the USACE.

CABRERA's PM, Quality Control Manager (QCM) and CQCSM have overall responsibility for ensuring that all activities are performed in accordance with USACE, EPA, PADEP requirements, as well as this SSHP and other project work plans.

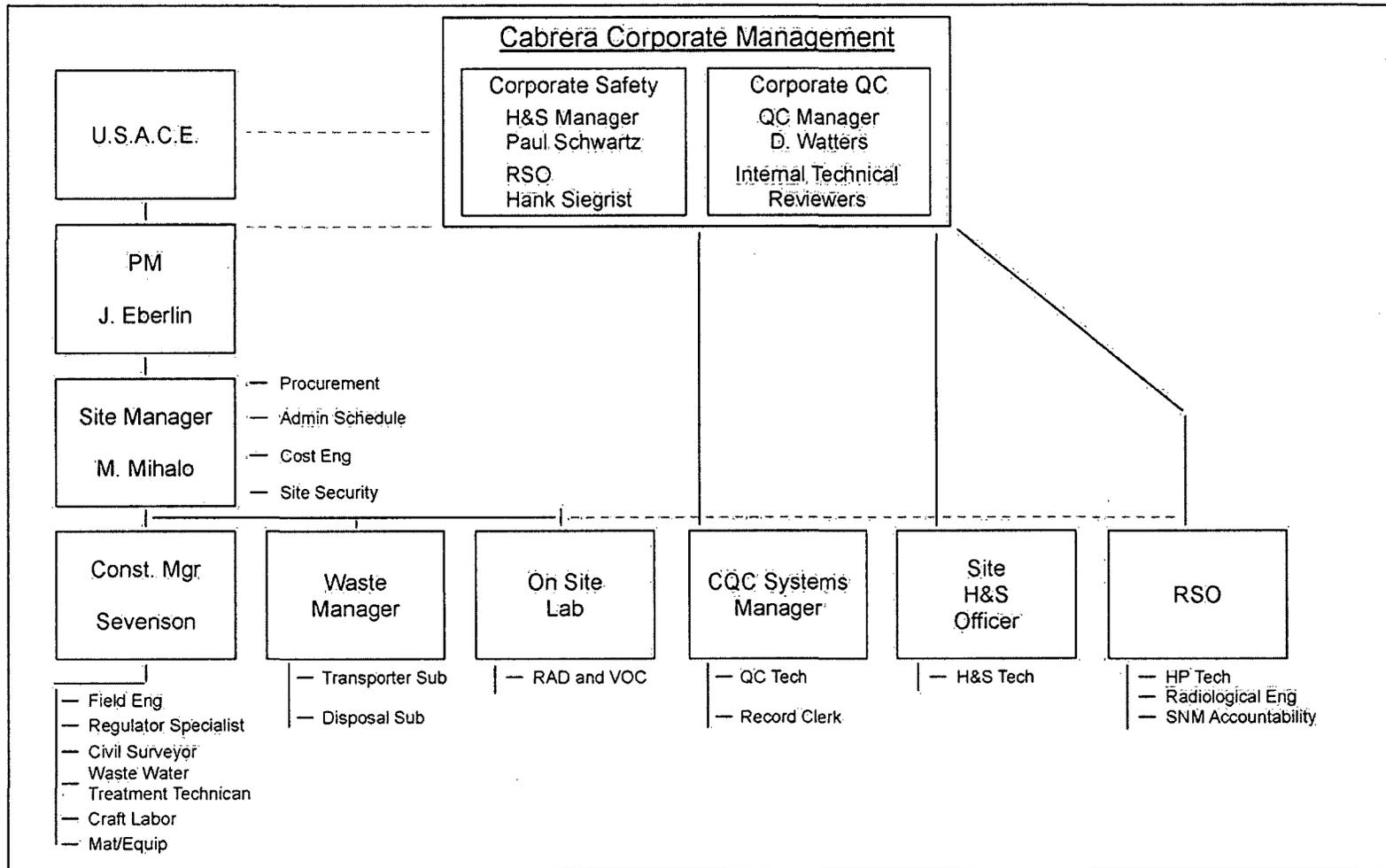


Figure 2-1 Project Organization Chart

### 2.1.3 Corporate Health and Safety Manager

CABRERA's Corporate Health and Safety Manager, Mr. Paul Schwartz, Certified Industrial Hygienist (CIH), Certified Safety Professional (CSP) is responsible for CABRERA's overall health and safety program. His duties in that capacity include development of procedures, providing/coordinating health and safety training, review and approval of project/site-specific SSHPs and revisions thereof, working with the PM and Field Operations Lead (FOL) to ensure sufficient resources are planned and provided to implement the SSHP, serve as an internal safety and industrial hygiene consultant and resource to the SSHO as well as the PM and FOL in evaluating and recommending safe practices, and performing audits to verify proper implementation of the SSHP.

### 2.1.4 Corporate Radiation Safety Officer

Mr. Hank Siegrist, Professional Engineer (PE), Certified Health Physicist (CHP) is CABRERA's Corporate Radiation Safety Officer (RSO). In this capacity, he is responsible for oversight and review of all CABRERA radiological activities and data. Mr. Siegrist is responsible for reviewing radiological data deliverables from analytical laboratories, interfacing with the laboratory client services coordinators and coordinating the resolution of laboratory problems. The Corporate RSO has the authority to direct such activities, stop work (and restart based on consultation with the PM) and to take appropriate actions, as required, to address radiological emergency situations. He will work directly with the FOL, SSHO, and in concert with the Site Radiation Safety Leader (SRSL) to ensure that CABRERA's RPP and *Sampling and Analysis Plan* (SAP) (CABRERA, 2009c) are properly implemented and followed.

### 2.1.5 Corporate Quality Control Manager

The Corporate QCM is responsible for the quality of CABRERA's work. The Corporate QCM will be responsible for assuring the project team implements the policies and procedures required under the USACE contract and assuring that corrective action is taken if performance does not meet internal or USACE quality requirements. He will work closely with the CABRERA PM, CQCSM, and Independent Technical Reviewers to ensure established protocols and procedures are implemented, the work performed in accordance with the USACE's Statement of Work, CABRERA's SOP, and other supporting work plans.

The QCM is responsible for directing planning, implementing and tracking quality control (QC) activities and maintaining internal communication on QC matters. He, or a designee, may conduct periodic Site and project audits as part of this process. He may conduct periodic audits of on-site procedures, including safety procedures. The duties also include QC task staffing and ensuring that QC data evaluation, data verification, and reporting procedures are followed. The ultimate goal of these activities is to perform work and produce data that satisfy the project objectives as defined in the project *Contractor Quality Control Plan* (CQCP) (CABRERA, 2009d).

### 2.1.6 Field Operations Lead

The FOL reports directly to the PM and is responsible for the overall direction and management of field project tasks associated with completing the remediation at the Site. This includes oversight of field staff and subcontractors and ensuring that procedures for field activities are executed in the proper manner, activities are properly documented, the prescribed SOW is completed, and communication protocols are followed.

The FOL is responsible for managing the cleanup activities in accordance with the SOP and supporting project plans, including this SSHP. The FOL will monitor work progress and schedule, advise the PM of variances, and assist in the preparation of work progress schedules, project reports, drawings, and required compliance submittals.

### **2.1.7 Site Safety and Health Officer**

The project SSHO reports directly to CABRERA's corporate Health & Safety Manager. The SSHO communicates and coordinates with the PM and FOL. The SSHO is responsible for ensuring site personnel have the proper training, safety-related licenses, and are medically-qualified to perform the work. The SSHO works with the FOL in performing daily health and safety briefings to site personnel in the field; coordinates additional site-specific safety training with the Corporate Health and Safety Manager and PM; works with the PM and FOL to ensure sufficient safety-related equipment, instruments, Personal Protective Equipment (PPE) and other materials are available to support safe field remediation; leads field air quality and other safety-related monitoring activities; and verifies the SSHP is followed. The SSHO is a focal point, along with the FOL for safety-related communications with field personnel and answering safety-related questions for field personnel. The SSHO has authority to issue stop work orders on-site tasks that he/she believes may be unsafe. When stopped, work will not recommence until the Corporate Health & Safety Manager, Corporate RSO, and PM approve the restart.

The SSHO is also responsible for maintaining personnel training certificates, medical monitoring files (as needed), and preparing accident investigation forms (USACE Form ENG 3394) in accordance with the accident avoidance and reporting procedures of the SSHP.

### **2.1.8 Site Radiation Safety Leader**

The SRSL will meet the qualification requirements as outlined in USACE *Safety and Health Requirements Manual*, EM-385-1-1, which includes but is not limited to formal and "hands-on" training in radiation protection and knowledge of radiation physics, use of monitoring instruments, and knowledge of applicable regulations.

The SRSL is responsible for ensuring that radiation health and safety procedures designed to protect field personnel and the public are maintained throughout the project. The SRSL coordinates the establishment of radiologically controlled areas, monitoring radiation exposure levels, and inspecting all material/equipment entering or leaving Radiation Control Areas for compliance with the RPP and other applicable requirements. The SRSL is also responsible for overseeing the maintenance and quality control check of the on-site radiological instruments and will provide instrument data records to the CQCSM for storage in on-site files.

The SRSL, who reports directly to the Corporate RSO and coordinates with the SSHO, FOL, and PM, has the following project responsibilities:

- Support the SSHO in the on-site implementation of the SSHP and ensure that all project personnel follow the radiological requirements of the SSHP;
- Assist the FOL and SSHO in the daily tailgate safety meetings and report any incidents that occur on-site to the FOL and Corporate RSO;
- Develop and maintain the Radiation Work Permit procedures for applicable areas of the Site;

- Note changes in site conditions or procedures and suggest revisions to the SSHP and site procedures as necessary to ensure adequate safety precautions are in place;
- Acquire and implement input from the Corporate RSO, as necessary, to maintain the site radiological safety program;
- Provide on-site administration of the personnel exposure monitoring procedures for on-site personnel;
- Ensure compliance with all applicable regulations concerning the handling and transportation of radioactive material; and
- Provide/ensure that Cabrera general radiation worker and site specific radiation training is provided to all onsite personnel who enter Radiological Controlled Areas.
- Responsible for control and use of licensed and non-licensed ionizing radiation sources utilized for daily QC of radiation detection systems.
- Provide point of contact for onsite radiation regulatory interfaces.

### 2.1.9 Other Field Personnel

Other field team members are responsible for performing field activities as stipulated in this plan and will report directly to the FOL. The field team members and responsibilities will consist of the following, in addition to the personnel listed above:

- Craft Labor – Equipment Operators, Laborers, and Truck Drivers will be present on site during the field work to facilitate excavation, packaging, and on-site staging of waste, and backfilling. These craft labor, as well as an electrical subcontractor who will install electrical service to the site at the start of the project, will be local to the site.
- HP Technician(s) – HP Technician(s) will perform periodic instrument checks, perform radiological surveys (e.g., scans of intermodal containers, railcars, debris and remediation equipment), and collect and prepare soil samples for on-site and off-site laboratories' analysis. The HP Technician(s) will also maintain radiological zones and controls, perform surveys of personnel and equipment, and complete instrument and data records with oversight by the SRSL. One of the HP Technicians will operate an on-site gamma spectroscopy laboratory part time while on-site. In that capacity, his duties will include gamma spectroscopy counts of samples, log data, maintain documentation and perform instrument QC functions in an on-site radiological laboratory during the field work

Each person assigned work on the Site is ultimately responsible for their own health and safety while working on this project. Primary safety responsibilities of each person working on the Site includes taking all reasonable precautions to prevent injury to themselves and to their fellow site workers and being alert to potentially harmful situations. Field personnel are responsible for:

- Performing only tasks that they can do safely and in which they have been trained;
- Notifying the SSHO of special medical conditions (i.e., allergies, contact lenses, etc.);
- Notifying the SSHO of prescription and/or non-prescription medication the worker may be taking that might cause drowsiness, anxiety or other unfavorable affects;
- Preventing spillage and splashing of materials to the greatest extent possible;

- Practicing good housekeeping by keeping the work area neat, clean, and orderly;
- Immediately reporting all injuries to the SSHO;
- Complying with the SSHP and all health and safety recommendations and precautions, properly using the PPE as determined by this SSHP and/or the SSHO; and
- Stop work and immediately notify the SSHO if conditions arise or are observed that are believed to be an imminent hazard.

### 3.0 HAZARD ASSESSMENT

The SSHO will make the final determination of PPE levels for hazardous contaminants prior to the start of site preparation and remediation activities.

#### 3.1 TASKS TO BE PERFORMED

Remediation will consist of the following functional tasks:

- **Task 1 - Mobilization:** Mobilization consists of setting up site trailers; moving heavy equipment, project personnel and materials to the Site; performing utility locations and civil surveys; and conducting project-specific training for remediation workers. (Initial PPE will be Level D).
- **Task 2 - Site Preparation:** Site preparation consists of installation of temporary electric service, setting up and delineating work areas, staging and setup of equipment and material, and constructing a temporary waste storage and processing area. Clearing of small trees and brush will be performed as necessary to gain access to excavation areas. Initial restricted areas and radiological boundaries will be established as required to maintain contamination controls over potentially contaminated areas, radioactive material storage areas, and other Radiological Control Areas (RCAs). A temporary structure (enclosure) will be constructed for use in sorting, sizing, stabilizing, packaging and preparation of waste conveyances for removal from the Site. Radiation exposure monitoring and environmental air sampling equipment and devices will be established at pre-determined restricted area boundary locations. Controls may change as radiological field conditions change during remediation. (Initial PPE will be Modified Level D).
- **Task 3 - Establish Decontamination/Frisking Areas:** A temporary decontamination (decon) pad/area will be set up for use in frisking and equipment decon. A personnel frisking station will be established at selected exit points from contaminated excavation areas as well as the equipment decon pad. (Initial PPE will be Level D).
- **Task 4 - Construct Wastewater Treatment Plant:** A Wastewater treatment plant will be constructed for collecting water from excavations and equipment decon. Secondary containment will be constructed beneath the Wastewater Treatment area for containment of inadvertent minor drippage from hoses. (Initial PPE will be Level D).
- **Task 5 - Excavation/Stabilizing/Sizing/Packaging/On-Site Staging of Contaminated Soil and Buried Waste:** Overburden soil will be removed from each burial location and set-aside for use as backfill, as appropriate. Excavation will be performed with a crawler excavator to the maximum extent practical. Slope stability for deeper excavations will be established by benching soil, as necessary. Further excavated soil contaminated with radioactive contaminants of concern (RCOCs) at concentrations above project cleanup goals, debris and other buried waste will be moved to the temporary structure/enclosure for further characterization, large debris removal, stabilization, if necessary, sorting, size reduction and packaging for off-site transport and disposal. Intact, sealed containers of waste uncovered within the burial pit will be vented prior to removal by puncturing the lid of the container remotely, if determined necessary by the SSHO. The container(s) will be removed from the pit, placed in an overpack for safe transport to the temporary

structure for further content inspection, processing, as necessary, packaging and preparation for transport for disposal. Excavation within each burial pit will proceed until all disposed material is removed and remaining soil meets the clean-up goal for the RCOCs. Soil sampling and on-site radiological analysis, airborne dust monitoring, water collection, and routine on-site radiological surveys will be performed during these activities to assure contamination controls are effective. (Initial PPE will be Level C).

- **Task 6 – Equipment Decontamination:** Large construction equipment (i.e., excavators, hydraulic breaker, loading and lifting frames, etc.) used for remediation and located within RCAs will be decontaminated prior to being moved between excavation areas of the Site and prior to final demobilization. Small equipment, tools and equipment (i.e., cutting torches, chain saws, shovels, brooms, radiological instruments, etc.) will either be wrapped in plastic sheeting or be decontaminated prior to being moved between excavation areas. Decontamination (if cost-effective) or disposal of small equipment/supplies will occur prior to final demobilization from the Site. Decontamination will consist of removing bulk surface soil with shovels and/or cloth, and subsequent water wash and/or steam cleaning. A radiological survey will be performed prior to releasing equipment from RCAs. Additional decontamination will be performed as needed based on radiological survey results. (Initial PPE will be Level C).
- **Task 7 – Backfilling and Demobilization:** Excavation areas will be backfilled and site restoration performed following a Final Status Survey (FSS) performed under a separate HP contract with USACE and USACE approval of FSS results. Subcontractors will deliver fill materials and topsoil. CABRERA will backfill and compact fill material in the excavations, place topsoil, and perform final grading. A land survey subcontractor will perform topographic surveying of the excavation areas following backfilling and final grading. A landscaping subcontractor will amend the soil with organics, fertilizer, lime as necessary, hydroseed, place straw mulch, and apply water under CABRERA's supervision to complete site restoration. Remediation, support zone (trailers, portajohns, etc.), and site restoration equipment will be demobilized from the site in a phased manner following last use. Electric service will be disconnected by an electrical subcontractor. (Initial PPE will be Level D).

The SSHO, in consultation with the FOL, SRSL and Corporate RSO, and the Corporate Health and Safety Manager as appropriate, will upgrade PPE beyond that specified in Section 10.0 of this SSHP in response to changes in field conditions. Upgrading PPE for radiological contaminants will be in accordance with the project-specific RPP. Conditions that may warrant changes in PPE may include, but are not limited to, discovery of buried chemicals or unanticipated radiological materials.

### 3.2 CHEMICAL CONTAMINANTS OF CONCERN

Previous site investigation results indicate the potential presence of VOCs and metals during soil excavation and material handling. However, as documented in Section 8.0 of this SSHP, worker exposure to these chemical constituents is expected to be relatively low during remediation. Levels of personal protection identified in Section 10.0 are anticipated to fully protect worker health and safety for these constituents.

### 3.3 HAZARD COMMUNICATION

The following will apply to all commercial products containing hazardous substances brought on site during the project, in accordance with the OSHA Hazard Communication Standard, 29 CFR 1910.1200 as follows:

- CABRERA's Hazard Communication Program, as described in the *Corporate Health and Safety Manual*, approved Safety Procedure HSM-002 (CABRERA, 2005) will be followed for hazardous materials brought on site. This program, a copy of which can be found on the attached CD in ATTACHMENT B, will be made available to all site personnel;
- The SSHO will maintain a Material Safety Data Sheet (MSDS) for each hazardous material brought to or used on-site.
- The SSHO will affix a hazard communication label providing information on health and physical hazards information to each container of hazardous material for those containers of hazardous materials not supplied with an adequate hazard label;
- The SSHO will train site personnel working with hazardous materials in accordance with the requirements of 29 CFR 1910.1200;
- The SSHO will maintain an inventory of hazardous materials used on site;
- The SSHO will inform personnel, including those employed by subcontractors, of the hazards of hazardous materials on site and the location of appropriate MSDSs; and
- Subcontractors are required to provide MSDSs to Cabrera and obtain approval of the SSHO prior to bringing hazardous materials on site.

### 3.4 ELECTRICAL HAZARD IDENTIFICATION

While conducting field operations, care will be taken to ensure sufficient clearance between equipment and any energized power lines that may be installed or encountered along the way. EM-385-1-1, section 11.E.04.c, table 11-1 lists the following distances that must be observed; 0 to 50 kilovolt (kV) - 10 feet (ft); 51 to 200 kV - 15 ft; 201 to 300 kV - 20 ft; 301 to 500 kV - 25 ft; 501 to 750 kV - 35 ft; and 751 to 1000 kV - 45 ft. To mitigate electrical hazards associated with lighting, generators, and/or equipment brought onsite the following controls will be implemented:

- Portable electrical equipment will be inspected prior to use to ensure double insulation and/or proper grounding;
- Electrical connections will be made through ground fault circuit interrupters (GFCIs); and
- Cords will be inspected for fraying or other damage daily prior to use. Any cords that fail to meet safety standards will be taken out of service and replaced.

### 3.5 RADIOLOGICAL HAZARDS

Site RCOCs are Americium-241 (Am-241), Plutonium-239 (Pu-239), Plutonium-241 (Pu-241), Radium-228 (Ra-228), Thorium-232 (Th-232), Uranium-234 (U-234), Uranium-235 (U-235),

Uranium-238 (U-238). Site radiological hazards and the radiation control program are discussed in detail in the site-specific RPP.

### **3.6 PHYSICAL HAZARD IDENTIFICATION**

#### **3.6.1 On-Site Movement of Heavy Equipment and Trucks**

Vehicular traffic in the work areas is expected to consist of heavy equipment and work support vehicles, including excavators, loaders, dozer, water truck, and pickup trucks. Site personnel should always be aware of the location and direction of operation of equipment. All personnel working in excavation/remediation and waste management areas as well as haul roads and the rail spur will be required to wear orange reflective vests to help make them more visible to equipment operators. Personnel in support areas such as trailer locations and parking lots, as well as personnel in vehicles arriving and leaving the site will be reminded to be aware of vehicular traffic and take appropriate precautions. Operators of heavy equipment and support vehicles must use seat belts and observe established speed limits. Safe speed limits will be established and, as appropriate, modified as site conditions change.

#### **3.6.2 Excavation Safety**

All excavations greater than four feet deep will be performed under the supervision of a "competent person" trained in excavation and trenching safety as defined in 29 CFR 1926.650-652. This person will be capable of identifying actual and predictable hazards in the excavation as well as the surrounding area for work conditions which are hazardous or dangerous to workers. The competent person will also be familiar with the different types of soil encountered during excavation and the various protective systems that can be used such as sloping, benching, and shoring. The competent person will have the authority to stop work until hazards are eliminated. The Site Manager or SSHO, both of whom are trained as competent persons in excavation and trench safety, will serve as the competent person on this project.

#### **3.6.3 Underground Services**

Prior to any intrusive activities, assurances must be made to preclude the possibility of contact with underground utilities. These include but may not be limited to electrical, communications, water, gas, and steam. Appropriate authorities must be made aware of such activities and a review of all locations where intrusions are planned must be conducted. If necessary, lockout/tagout procedures will be implemented for the safety of personnel performing intrusive activities.

#### **3.6.4 Hot Work**

Hot work (welding, burning, cutting, etc.) conducted onsite must comply with the following requirements:

- The SSHO will establish areas approved for welding, cutting, and other hot work.
- A Hot Work Permit will be completed prior to any welding or torch cutting
- The SSHO is responsible for authorizing welding, cutting, and other hot work in areas not specifically designed or approved for such operations.

- All personnel will be protected from welding radiation, flashes, sparks, molten metal, and slag.
- All welding, burning, and cutting equipment will be inspected daily by the operator. Defective equipment will be tagged and removed from service, replaced or repaired, and reinspected before being placed back in service.
- All welders, cutters, and their supervisors will be properly trained in the safe operation of their equipment, safe welding / cutting practices, and welding / cutting respiratory and fire protection.
- Cutting, welding, or other hot work will be permitted only in areas that are or have been made firesafe.

Cutting or welding will NOT be permitted in the following situations:

- In areas not authorized by the SSHO.
- In the presence of explosive atmospheres (mixtures of flammable gases, vapors, liquids, or dusts with air); explosive atmospheres that may develop inside unclean or improperly prepared drums, tanks, or other containers; and equipment that has previously contained such materials.
- In any area where Combustible Gas Indicator (CGI) readings are in excess of 10% of the Lower Explosive Limit (LEL).
- On storage or process vessels or lines in service that contain flammable or combustible liquids, gases, vapors, or solids.

Before any welding, cutting, or other hot work is permitted, the area will be inspected by the SSHO to ensure that the following requirements have been met:

- Cutting and welding equipment to be used will be in safe operating condition and in good repair.
- Where practical, all combustible material will be relocated at least 50 feet away from the hot work site. Where relocation is impractical, combustibles will be protected with flame-proofed covers or otherwise shielded.
- At a minimum, two fully charged and operable fire extinguishers, appropriate for the type of possible fire (10- A:B:C), will be available at the work area.
- A fire watch will be required whenever hot work is performed in hazardous locations.
- CGI readings are taken and the work area is free of combustible gases and vapors.
- The work area is free of toxic contaminants at concentrations in excess of established threshold limit values or all personnel who will work in the area have been provided respiratory protection and protective apparel appropriate for the degree of exposure.
- When hot work is to be performed on tanks or other vessels that contain or have contained flammable or combustible liquids, the vessel will be properly isolated, purged, cleaned, or made inert as appropriate to reduce the concentrations of flammable / combustible vapors to safe levels.

- A hot work permit will be completed by the SSHO, reviewed with personnel who will perform the hot work, and posted near the job site. The following stipulations apply to the hot work permit:
  - The hot work permit is good only for the date issued and is valid only for the 8-hour shift for which it is issued.
  - If at any time during the hot work operation a change in conditions at the work site is suspected, such as a release of flammable gases or vapors in the work area, work will be stopped immediately and the SSHO will be notified. Such work stoppage invalidates the hot work permit, and a new permit will be completed after inspections and tests have been performed by the SSHO.
  - No erasures or changes of dates on hot work permits will be permitted. A new permit must be completed if any changes are to be made.

### 3.6.5 Confined Space Entry

Confined space entry will be performed in accordance with the requirements of CABRERA's confined space entry program. This program, which complies with 29 CFR 1910.146, is presented in CABRERA's *Corporate Health and Safety Manual*, included in ATTACHMENT B.

Confined space entries performed during this project will be considered permit required confined space entries. As such, a confined space entry permit will need to be completed each day during which confined space entries are performed. Properly trained and equipped personnel will be utilized to perform this work and all equipment will be inspected on a daily basis. Tripods, harnesses, lanyards, and air recirculation and monitoring equipment (i.e., Copus blowers and O<sub>2</sub>/LEL meters, respectively) will be operated and observed by personnel with appropriate training in their respective roles.

### 3.6.6 Ladders

The following guidelines establish the minimum safety standards required for the inspection, setup, and use of portable step, straight, and extension ladders.

#### 3.6.6.1 Inspection

The ladder user is required to perform an inspection of the ladder prior to use and after any event that could result in ladder damage. Ladders which have been determined to be defective will be tagged "out of service" and will either be repaired to a condition meeting their original design or destroyed. A supervisor will be immediately informed of the condition of any defective ladder.

The following guidelines will be followed during ladder inspections:

- The joint between the steps and side rails on a stepladder must be tight and movable parts must operate freely without binding or undue play.
- All rivets, joints, rungs, nuts, and bolts are tight. Ladder extension locks and slip-resistant feet will be in good condition and functioning properly.
- Ladders with broken or missing steps, bent rungs, side rails, or other faulty components are not to be used.

- Ladders are to be clean, free from grease, oil, mud, snow, wet paint, and other slippery materials.
- Ropes, cables and pulleys on extension ladders will be checked to ensure they operate properly and will be replaced if worn or defective.
- Wood ladders will not be coated with any opaque covering, except for identification or warning labels, which may be placed on only one face of a side rail.

### **3.6.6.2 Storage**

Ladders will be stored in such a manner as to provide for ease of access or inspection, and to prevent danger of an accident when withdrawing a ladder for use. Ladders are to be stored on racks designed to protect the ladder from damage. These racks must have sufficient support points to prevent any possibility of excessive sagging. Wood ladders will be stored in a location where there is good ventilation, but where they will not be exposed to the elements. Ladders carried on vehicles will be adequately supported to avoid sagging and securely fastened in position to minimize chafing and the effects of road vibration.

### **3.6.6.3 Setup**

Ladders will be used on site adhering to the following guidance:

- Make sure ladder is fully open, spreaders on stepladders are secure, and in position. Do not place ladder in front of door opening.
- Place on firm, level, non-slippery surface that provides a secure footing. Do not place on boxes, unstable bases, or on scaffolds to gain additional height.
- Portable metal ladders are not to be used in places where they may come in contact with energized parts.
- The correct angle for using straight and extension ladders is for the foot of the ladder to be placed from the wall a distance equal to one-fourth (1/4) the effective length of the ladder. (Effective length = length of ladder from base to point of support.)
- A ladder is not to be used to gain access to a roof or other elevated working surface unless the top of the ladder extends at least 3 feet above the point of support at eaves, gutter, edge, or roof line.
- Secure ladder base when raising and never set up a ladder when it is extended. Top section should only be extended from the ground level. Where possible, use second employee to hold the ladder while it is being extended.
- Ladders will not be repositioned or extended while occupied.
- The ladder must be positioned with both top rails supported unless equipped with a single support attachment.
- On two-section extension ladders, the minimum overlap for the two sections is to be at least 3 feet.

#### **3.6.6.4 Use**

Only employees who have been trained will be permitted to use portable step, straight, or extension ladders. Only Type 1 "Industrial" and Type 1A "Heavy Duty Industrial" wooden, composite, or metal ladders will be authorized for use. The following operational rules will be observed by employees.

- Follow all manufacturer hazard warnings and safety use instructions affixed to ladder.
- Ladders must be attended by either another employee, or tied off when in use.
- Do not use ladders in high winds.
- The top two steps of stepladders are not to be used as steps.
- Personnel using stepladders must face the ladder while climbing up or down and keep body centered between side rails.
- Personnel shall use both hands when ascending or descending while maintaining a firm grip.
- Rope shall be used to raise or lower materials and tools.
- Portable ladders are designed as a one-person working ladder. The ladder base section is to be placed with a secure footing. Safety shoes or feet of good substantial design are to be installed on all ladders.

#### **3.6.6.5 Training**

Employees will be trained to recognize hazards related to ladder use and the procedures to follow to minimize these hazards. Training on the safe use of ladders will be conducted prior to an employee being allowed to use a ladder. This training will be conducted by a local health and safety representative or supervisor familiar with safe ladder use and will consist of a review of this procedure, applicable OSHA standards, and a demonstration of correct ladder usage. The evaluation of correct usage will be tailored to the employee's anticipated work situation. The employee will have to demonstrate that he/she knows and understands how to safely use a ladder, is familiar with the content of this procedure, and can demonstrate overall ladder use skills.

#### **3.6.7 Scaffolds**

Scaffolds shall be designed, erected, inspected and maintained by a trained competent person following all applicable USACE and OSHA regulations. Prior to commencing any activity which requires work in elevated areas, all provisions for access and fall protection shall be delineated in the hazard analysis and accepted by the designated authority for the activity.

Scaffolds shall not be erected or used in the immediate vicinity of power lines or electrical conductors until such are insulated, deenergized, or otherwise rendered safe against accidental contact.

Where persons are required to work or pass under a working platform, a screen consisting of 18 gauge US Standard wire mesh or equivalent shall be provided between the toe board and the guardrail and extending over the entire opening.

### **3.6.7.1 Design**

Scaffold design shall include the following considerations:

- Scaffolds and their components shall be capable of supporting without failure at least 4 times the maximum anticipated load.
- The dimensions of the members and materials used in the construction of scaffolds shall conform to the sizes shown in the tables in Section 22, EM 385-1-1.
- All scaffolds shall be plumb and level.
- Scaffolds shall bear on base plates upon sills or other adequate foundation.
- Working levels of scaffolds shall be fully planked or decked.

### **3.6.7.2 Planking**

Scaffold planking shall be installed as follows:

- All planking of platforms shall be either overlapped or secured from movement.
- Scaffold planks shall extend over the end supports not less than 6 inches (unless the planking is manufactured with restraining hooks or equivalent means) nor more than 12 inches.
- Planking shall be supported or braced to prevent excessive spring or deflection and secured and supported to prevent loosening, tipping or displacement.

### **3.6.7.3 Access**

Personnel access to scaffolds shall include the following provisions and precautions:

- An access ladder or equivalent safe access shall be provided.
- Where a built-in ladder is part of a scaffold system, it shall conform to the requirements for ladders.
- Workers shall not climb the braces of the scaffold.
- When a scaffold height exceeds four times the minimum scaffold base dimension, the scaffold shall be secured to the wall or structure.

### **3.6.8 Fall Protection**

Site personnel working greater than four feet above the ground will implement fall protection procedures consistent with CABRERA's Fall Protection Program provided in Safety Procedure HSM-012, a copy of which can be found in the *Corporate Health and Safety Manual* included as ATTACHMENT B. Fall protection on this project may include the use of tripods, safety harnesses, appropriately-sized lanyards, and railings when appropriate. Fall protection measures will be implemented on this project during pumping collected water into and decontamination of water storage tanks, and as appropriate during entry into deep excavations. Tripods, harnesses, and lanyards will be inspected and maintained by personnel trained in accordance with 29 CFR 1926.503. Fall protection equipment will be inspected on a daily basis prior to and on days when in use for signs of wear.

### 3.6.9 Hand Tools

Only tools that are in good condition will be used during fieldwork. Improper and defective tools contribute to accidents. The following safe practices will be observed when using hand tools, in addition to the *Use, Inspection and Maintenance* requirements of Section 13.A.02 of *Health and Safety Requirements Manual*, EM-385-1-1:

- Equipment/tools will be used in the manner for which they were designed;
- Field personnel should be sure of footing before using any tool;
- Tools that have split handles, mushroom heads, worn jaws, defective electrical components or other defects will not be used;
- Makeshift tools or other improper tools will not be used;
- Spark-proof tools or equipment will be used near explosive vapors, gases or residue (i.e., diesel fuel and gasoline); and
- Torch cutting equipment will be inspected before each use.

### 3.6.10 Slips, Trips, and Falls

The most common hazard will be due to wet or uneven ground associated with site excavation/removal activities. As the work will be outdoors, wet ground could contribute to falls and injuries from slipping. Debris and vegetation growth could contribute to falls from tripping. Equipment and materials used during remediation also pose a slip, trip, and fall hazard. Slips, trips, and falls can lead to various injuries, such as foot and back injuries, abrasions, or lacerations. These hazards will be alleviated by safe practices, such as making personnel aware of and marking unsafe areas, clearing vegetation or debris that would contribute to unsafe working conditions, and good housekeeping measures for remediation equipment and material on the ground that could pose such a hazard.

### 3.6.11 Refueling and Storage of Flammable Liquids

Heavy equipment, vehicles, pumps, and generators will use diesel fuel or gasoline. On-site refueling operations will be conducted as necessary, using either subcontractor fleet service refueling trucks, refueling using a 100-gallon diesel fuel tank mounted on a pickup truck, and in approved safety cans. All on-site refueling operations will be performed using proper grounding techniques. A limited volume (five gallons or less) of gasoline may be stored on site in National Fire Protection Association-approved storage containers. Drip pans will be used during refueling to catch inadvertent minor spillage. Smoking will not be allowed during any refueling operations. Personnel conducting refueling will not leave the exact location of refueling until such operations are complete to minimize the potential for overfilling/spills.

### 3.6.12 Illumination

Outdoor work will be conducted during daylight hours; therefore the need for supplemental illumination is not anticipated. Should work extend into months with shorter daylight hours and it becomes necessary to work after sunset, portable flood lights will be used to provide adequate lighting.

### 3.6.13 Severe Weather

In the event of adverse weather conditions site such as lightning, high winds, extreme heat or cold, heavy snow, sleet, or freezing rain, the FOL may instruct the workers to discontinue field operations.

## 3.7 BIOLOGICAL HAZARD IDENTIFICATION

Biological hazards may be encountered in the field, including poisonous plants, wild and/or rabid animals, snakes, and insects.

### 3.7.1 Tick Bites

The Center for Disease Control has noted the increase of Lyme Disease and Rocky Mountain Spotted Fever that are caused by bites from infected ticks that live in and near wooded areas, tall grass, and brush. Ticks are small, ranging from the size of a comma up to about one quarter inch. They are sometimes difficult to see. The tick season extends from spring through summer.

Lyme Disease has occurred in almost all states, with the heaviest concentrations in the Northeast, upper Midwest and along the northern California coast. It is caused by ticks that have become infected with spirochetes. Deer ticks are about one quarter inch in size, and black or brick red in color. Male deer ticks are smaller and all black. The deer tick larvae are extremely small [approximately the size of a period (.)].

Standard field gear (work boots, socks, and long pants), which will be worn during all fieldwork, provides good protection against tick bites, particularly if the joints (i.e., between pant legs and tops of socks) are taped. Nonetheless, the following precautions will be taken when working in areas that might be infested with ticks:

- When in the field, check yourself often for ticks, particularly on your lower legs and areas covered with hair;
- Spray outer clothing, particularly your pant legs, boots, and socks, BUT NOT YOUR SKIN, with an insect repellent that contains permethrin or permamone;
- When walking in wooded areas, avoid contact with bushes, tall grass, or brush as much as possible;
- If you suspect that a tick is present, remove it with tweezers only, and not with matches or a lit cigarette. Grasp the tick near the head with the tweezers and pull gently. Do not use nail polish or any other type of chemical. Be sure and remove all parts of the tick's body. Once removed, disinfect the area with alcohol or a similar antiseptic. Keep the tick in a plastic bag and report the incident to the SSHO or FOL; and
- Look for signs of the onset of Lyme Disease, such as a rash that looks like a bull's eye or an expanding red circle surrounding a light area, frequently with a small welt in the center. This rash can appear from several days to several weeks after the tick bite. The first symptoms of either disease are flu like chills, fever, headache, dizziness, fatigue, stiff neck and bone pain. If immediately treated by a physician, most individuals recover fully in a short period of time. More serious symptoms can occur if left untreated.

The SSHO or FOL should be contacted if any of the above noted signs and symptoms are evident. Site personnel should consult with a physician for an examination and possible treatment if such symptoms occur.

### **3.7.2 Poisonous Plants**

Site personnel need to be alert to the presence of poisonous plants. The most common types of poisonous plant are poison ivy, poison oak, and poison sumac. Skin contact with these plants can cause skin sensitization resulting in reddening, swelling, and itching of the affected areas. Skin exposure can result from either direct contact with the plant or contact with clothing/equipment previously exposed to the plant. Site personnel will receive training in the recognition of poisonous plants and methods for preventing exposure during site safety briefings.

### **3.7.3 Animal or Insect Bites**

Animal bites or stings are usually nuisances (localized swelling, itching and pain) that can be handled by first-aid treatment. The bites of certain snakes, lizards, spiders, and scorpions contain sufficient poison to warrant medical attention. There are diseases that can be transmitted by insect and animal bites [e.g., Rocky Mountain Spotted Fever, Lyme Disease (ticks), rabies [mainly dogs, skunks, raccoons, and foxes], malaria, and equine encephalitis (mosquitoes)]. The greatest hazard and most-common cause of fatalities from animal bites, particularly bees, wasps, and spiders, is from a sensitivity reaction. Shock due to stings can lead to severe reactions in the circulatory, respiratory, and central nervous systems, which also can result in death.

Assigned workers with a history of allergic reactions to bites will be required to have their prescribed treatment with them, and first aid-trained personnel on site will know where the medication is located. Stings or bites will be taken seriously. Anyone stung or bitten, with the exception of mosquito bites, will be required to stop work while that person is observed for signs of severe swelling, shortness of breath, nausea, or shock. Medical attention will be obtained if there is any doubt.

Wild animals should be avoided, particularly wild animals that are unusually passive or aggressive. Any such animals will be reported to the FOL or SSHO. Skunks, raccoons, fox, and bats are wild animals most frequently infected with rabies; however, any warm-blooded animal can be infected. Animals suspected of being infected with rabies that bite an individual will be captured, at the direction of the SSHO or FOL. On-site personnel will not attempt a capture unless it can be done safely and there is no risk of injury from, or bites by, the suspect animal. If on-site personnel cannot capture the animal easily, it should be kept under surveillance and appropriate assistance (such as a municipal animal control officer) will be called to capture the animal. The animal should then be tested. A dead animal suspected of infection should also be preserved and tested. Health departments are often sources of testing or obtaining information about where testing can be done.

The bite area should be washed with soap and water and disinfected with 70% alcohol as quickly as possible, followed by treatment by a doctor or emergency room. Rabies is preventable but treatment must begin immediately. Prompt medical attention and determining whether the animal is infected are very important.

West Nile virus (WNV) is a mosquito-borne disease that can infect humans, birds, horses and other mammals. WNV infection can cause a mild flu-like illness, or may cause no symptoms at

all in most humans. However, in some cases it can cause severe neurological diseases such as encephalitis or meningitis, particularly among the elderly. WNV first appeared in North America in New York City in 1999. Since then, the virus has spread across the continental United States.

WNV is predominantly spread to humans by the bite of an infected mosquito. In 2002 other methods of human transmission were discovered. It has now been shown that WNV can be transmitted to humans who receive infected organs through transplantation, or who receive transfusions of infected blood or blood products. Also, in 2002 there was one case of transmission from a pregnant woman to her fetus and one mother-to-child transmission through breast milk. WNV is NOT spread by casual contact such as touching or caring for someone who is infected.

The following precautions will be taken from June - October, when mosquitoes are most active:

- Wear protective clothing such as long pants and long-sleeved shirts, particularly between dusk and dawn when mosquitoes are searching for a blood meal;
- Avoid shaded, bushy areas where mosquitoes like to rest;
- Limit outdoor evening activity, especially at dusk and dawn when mosquitoes are most active; and
- Use an insect repellent containing DEET to help reduce exposure to mosquitoes.

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## **4.0 TRAINING REQUIREMENTS**

### **4.1 PERIODIC TRAINING**

All personnel assigned to or regularly entering the Site will have received the required minimum hazardous waste site training required in 29 CFR 1910.120(e). Other specific training will be implemented as required by applicable sections of 29 CFR 1910 and 1926 will be performed prior to commencement of the applicable project work activities. Specifics of radiation worker training are discussed in the RPP.

#### **4.1.1 Basic HAZWOPER Training**

Site personnel conducting and directing field remediation will have completed a 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training course and three days of documented field experience under the direct supervision of a trained experienced supervisor in accordance with 29 CFR 1910.120(e). On-site management personnel (the FOL or SSHO/CQCSM) will also have an additional eight hours of HAZWOPER supervisory training. All site personnel conducting and directing field remediation will have completed an annual (eight hour) refresher if initial 40-hour training is over one year old. Copies of training certificates will be kept in project files maintained on site by the CQCSM and will be made available for review by USACE.

Personnel without current HAZWOPER training may gain access to the administrative portions of the Site (e.g., field trailer, Support Zones) but may not enter active work zones or RCAs, as defined in the RPP.

#### **4.1.2 First Aid and Cardio Pulmonary Resuscitation Training**

At least two on-site workers will have current certification in First Aid and Cardio Pulmonary Resuscitation (CPR). The training will be equivalent to that provided by the American Red Cross. These individuals will be on site at all times while active field mobilization, remediation, and site restoration are in progress.

#### **4.1.3 Site-Specific Safety and Health Training/Pre-Entry Briefing**

Site-specific health and safety training will be conducted prior to field activities. The designated SSHO will review the SSHP, project plans, and other associated responsibilities with the field personnel, including subcontractors, and afford them the opportunity to ask questions. A record of this training will be maintained by the SSHO and documented on the form contained in Attachment A.

#### **4.1.4 Blood Borne Pathogen Training**

Individuals who have received First Aid and/or CPR certification and who may need to provide emergency service to an injured/unconscious co-worker will have received awareness level training in controlling exposures to Blood Borne Pathogens (BBP). This training will consist of the following:

- Review of the Blood Borne Pathogen standards;
- Requirements of the Exposure Control Plan (CABRERA, 2005);
- Description of the risks of exposure and how BBP are transmitted;
- Methods of protection against exposure and procedures for decontamination; and
- Post-exposure procedures.

#### **4.1.5 Hearing Conservation Training**

Use of hearing protection is mandatory whenever powered equipment or other devices are used which produce sound levels over 85 decibels (dBA) for individuals with documented threshold shifts. Powered equipment generally will produce sound levels greater than 85 dBA. Hearing protection will be required for personnel working in the immediate area of all heavy equipment (excavator, hydraulic breaker, cutting torches, loader, dozer, pumps, and generator) operation on this project.

#### **4.1.6 Respiratory Protection Training**

The SSHO and SRS� will determine when respiratory protection is required. Site personnel required to use respiratory protection devices will have received equipment-specific training and satisfactorily completed a qualitative fit test for the model to be worn, in accordance with 29 CFR 1910.134. This training covers the use, limitations, inspection, maintenance, and cleaning of respiratory protection devices required for use under the conditions of this SSHP. All site remediation personnel will also have an up-to-date medical clearance to qualify for work requiring respiratory protection.

#### **4.1.7 Personal Protective Equipment Training**

PPE will be provided, used, and maintained in a sanitary and reliable condition on site in accordance with 29 CFR 1910, Subpart I. All PPE will be of design, construction, and materials suitable to protect workers against known or anticipated hazards. PPE will be selected which properly and appropriately fits the employee. Site personnel will be provided with training on the selection, use, and limitations of PPE in accordance with the above-referenced standard. Any concerns regarding the use of appropriate PPE will be brought to the attention of the SSHO or Corporate Health and Safety Manager. The SSHO is responsible for ensuring that sufficient quantities of appropriate PPE are available on site.

#### **4.1.8 Confined Space Entry Training**

Site remediation workers potentially involved with confined space entry on this project will have received confined space entry training in accordance with the requirement outlined in CABRERA's Confined Space Entry Safety Procedure HSM-003 which can be found in the *Corporate Health and Safety Manual*, included as ATTACHMENT B of this SSHP.

#### **4.1.9 Fall Protection Training**

Site remediation personnel potentially exposed to fall hazards will receive training in accordance with 29 CFR 1926.503.

#### **4.1.10 Radiation Worker Training**

All personnel assigned tasks in the radiological control area must complete Cabrera general radiation worker training and site-specific radiation worker training as determined by the SRSL and SSHO. Training will be administered by appropriately-credentialed health physics staff and will contain at a minimum basic radiological topics and protection procedures.

#### **4.2 DAILY SAFETY MEETINGS**

The FOL and/or the SSHO will conduct daily tailgate safety meetings to review the day's work plan and associated activities, and discuss anticipated hazards, PPE, and mitigating measures. The CQCSM will maintain documentation of the names of personnel attending the daily tailgate safety meetings and discussion topics in the on-site project files.

#### **4.3 RECORD KEEPING**

Each site worker is responsible for providing the following information identified below to the CQCSM for record-keeping. These records will become a part of the project file.

- Statement of SSHP Acknowledgment (see ATTACHMENT A);
- 40-hr HAZWOPER training certificates and current eight-hr refresher;
- Fit-for-duty medical approval and clearance for use of respiratory protection; and
- Documentation of site-specific training identified in Section 4.1.

The following records or logs will also be incorporated into the project file:

- Accident Investigation Reports: A written accident report form will be completed by the SSHO and forwarded to the Corporate Health and Safety Manager, PM, and USACE within 24 hours of any on-site accidents or worker injury.
- Revisions to the SSHP: The SSHO, in consultation with the Corporate Health and Safety Manager, PM, and the USACE, will document recommended changes to the SSHP. Revisions approved by the SSHO will be made part of the SSHP and will be distributed to all essential personnel.

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## 5.0 ACTIVITY HAZARD ANALYSIS

Activity hazard analysis (AHA) is an ongoing process from the initiation of the SSHP preparation through the implementation and completion of a project. AHAs are completed for each task of a field project and modified in response to changing field conditions as necessary. Site-specific AHAs for remediation on this project are presented below. The hazards associated with each activity on the project and the measures designed to control or mitigate those hazards are identified in Table 5-1. Equipment and training requirements for the various types of work required to complete the project are included in Table 5-2.

Monitoring equipment and PPE for health and safety protection on the project are described in Sections 9.0 and 10.0 of this SSHP, respectively. Additional field equipment is specified in the SAP for this project. The analysis for radiological hazards and radiological equipment and training requirements are presented in the RPP.

### 5.1 PHYSICAL/CHEMICAL HAZARDS

Additional project-specific physical hazards that have the potential to affect worker and public safety are discussed below. Previous site investigation results indicate that chemical hazards including VOCs and metals may be present in soil. The levels of protection and monitoring requirements outlined in this plan are expected to minimize the risk of remediation worker exposure.

#### 5.1.1 Heavy Equipment Operations

Heavy equipment operations will be conducted in accordance with *USACE Safety and Health Requirements Manual*, EM-385-1-1. The following additional measures will be implemented:

- Underground utilities will be located and identified prior to any intrusive activities;
- The work area around all heavy equipment operation will be barricaded using orange safety fence and marked using safety/radiation work area tape during all excavation activities;
- Emergency/first aid equipment (20-lb Class ABC fire extinguisher/first aid kit/emergency communication equipment [radios, telephones, etc.]) will be readily available to site personnel;
- Physical hazards (overhead and underground) will be identified and marked where applicable;
- Appropriate MSDS for any hazardous materials brought onto the site;
- Site personnel will be trained in routine and emergency operations;
- All heavy equipment will be maintained in accordance with manufacturer's directions, operated by qualified experienced personnel and inspected daily;
- Operators of heavy equipment will be familiar with the emergency shutdown procedures;
- Personnel performing torch cutting operations will receive prior training on it's proper use and maintenance;

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**Table 5-1 Activity Hazard Analyses**

| Task      | Hazards  | Hazard Control  |
|-----------|--|---|
| All Tasks | Housekeeping   | Materials will be stored to prevent intrusion into the work areas. Work areas will be kept organized and free of obstructions.  |
|           | Fire   | Flammable liquids will be stored in safety containers and flammable storage cabinets. Properly rated fire extinguishers, not less than 10-B, will be placed within 50 ft wherever 5 gallons or more of flammable or combustible liquids are used, or not less than 20-B within 25-75 feet of flammable liquid storage areas, within site vehicles, and inside site trailer(s).  |
|           | Electric Hazards                                     | Generators will be grounded unless self-grounded. Extension cords will be properly rated for intended use and will be GFI protected. Authorities will be contacted for clearance or permits prior to any intrusive activity. Elevated parts of machinery, ladders, and antennas will be kept away from overhead electric lines as specified in EM-385-1-1. Qualified electricians will make all electrical installations. A lockout/tag out program will be implemented.  |
|           | Hand tools, manual and power                         | Tools will be inspected prior to use. Damaged tools will be tagged out-of-service until repair can be performed by a qualified person. Tools will be used properly and for their intended purpose.  |
|           | Traffic  | <p>Work areas will be clearly barricaded and appropriate signs displayed. Traffic will be rerouted as necessary. Persons working near roadways, around heavy equipment, or directing traffic will wear high visibility vests.</p> <p>Speed limits will be established for on site traffic and will be modified if site conditions change. Operators of heavy equipment and support vehicles must wear seat belts.</p>   |
|           | Strains and sprains from manually lifting and moving | Employees must be aware of their lifting capacities, use common sense when determining whether to lift an object, and notify supervision if they have any lifting restrictions. In addition to relying on personnel to know their lifting capabilities the NIOSH Ergonomic Guidelines for Material Handling limit of 51 pounds will be used. Proper lifting techniques will be used such as keeping straight back, lifting with legs; personnel will avoid twisting back, get help from others, or will use mechanical equipment. |

| Task   | Hazards  | Hazard Control  |
|--|--|---|
|  | Slip, trips, falls, terrain, or vegetation; uneven walking surfaces, wet ground, ice, or snow  | Work and support zone areas will be visually inspected. Slip, trip, and fall hazards will be either removed or marked and barricaded. Sufficient illumination will be maintained. Site personnel will conduct initial walkovers in groups of two at a minimum. If present ice, snow, and mud will be cleared from steps to reduce slip hazards.   |
| <b>All Tasks, cont'd</b>   | Abrasions and lacerations, hands, or fingers caught between objects  | Personnel will be made aware of the hazard and asked to coordinate carefully the handling and placement of heavy objects. Materials and objects being handled will be inspected for rough or sharp edges, and appropriate precautions will be taken to avoid contact. Personnel will wear work gloves and avoid placing hands between objects.  |
|  | Inclement Weather, including rain, lightning, heat and cold stress, sunburn, poor visibility   | Personnel will have appropriate PPE for working in rain or cold. Personnel will be informed of the heat/cold stress symptoms. Appropriate PPE and fluids will be supplied to workers. Work rest periods will be established in accordance with ACGIH and NIOSH guidelines. Engineering controls (e.g., the vortex cooling unit, ice vests) or process controls (e.g., early morning work schedules, rotating work crews) will be implemented if heat stress is a problem. Work will cease during lightning. Sun block will be used as appropriate. Direct exposure to sun for long periods of time will be avoided, as practical. |
| <b>Tasks 1, 2, 3, 4, and 7:</b> <ul style="list-style-type: none"> <li>• Mobilization</li> <li>• Site Prep/Clearing</li> <li>• Establishing Decon Area</li> <li>• Establishing Water Collection System</li> <li>• Backfilling</li> <li>• Demobilization</li> </ul> | Chemical Hazards - There is a potential for exposure to low levels of VOCs and metals during site excavation activities. The risk level of exposure to site chemicals during these activities is expected to be low based on previous site monitoring data | Modified Level D PPE will be worn. A background survey with a Photoionization Detector (PID), or equivalent, will be conducted to ensure the levels of protection are correct. Dust minimization techniques will be employed during site excavation activities. Action levels established in Section 8.0 will be used.  |
|  | Moving mechanical parts from heavy equipment operations  | Personnel will be made aware of the hazard and will coordinate carefully during equipment operations. Guards will be kept in place during operation. A safe distance will be maintained from moving heavy equipment and personnel will wear orange reflective safety vests in the area. Equipment operators should look in the direction of travel; look before backing up. Arrange traffic flow to prevent foot traffic from crossing the routes of heavy equipment as much as possible.   |

| Task   | Hazards   | Hazard Control  |
|--|---|---|
|  | Striking and being struck by operating equipment, loads, falling objects, and pinch points  | Workers will stay out of the swing area of all equipment and from under loads. No personnel will ride on the equipment unless seats are provided. Workers exposed to traffic hazards will wear traffic/reflector vests.   |
| <p><b>Tasks 5 and 6:</b></p> <ul style="list-style-type: none"> <li>• Excavation/Removal of Contaminated Material</li> <li>• Decontamination of Equipment</li> </ul> | Radiation Hazards - potential handling of contaminated materials & soils  | See RPP.  |
|  | Chemical Hazards - These tasks involve intrusive activities and potential contact with site contaminants. Volatile organic compound (VOC) and metal contamination may exist in the soil being excavated | Since these tasks involve intrusive activities resulting in handling of potentially contaminated materials, the appropriate PPE shall be implemented for these tasks. Initial excavation activities will be monitored with a PID to establish that hazardous conditions do not exist and to ensure the levels of protection are correct. Action levels established in Table 8-1 will be used.   |
|  | Moving mechanical parts from heavy equipment operations   | Personnel will be made aware of the hazard and will coordinate carefully during handling equipment operations. Guards will be kept in place during operation. A safe distance will be maintained from moving mechanical parts. Appropriate PPE will be used.  |
|  | Striking and being struck by operating equipment, loads, falling objects, and pinch points  | Workers will stay out of the swing area of all equipment and from under loads. No personnel will ride on the equipment unless seats are provided. Workers exposed to traffic hazards will wear orange traffic/reflector vests. Vehicles will be chocked during maintenance. Equipment operators should look in the direction of travel; look before backing up. Arrange traffic flow to prevent foot traffic from crossing the routes of heavy equipment as much as possible. |
|  | Noise from equipment operation  | Hearing conservation program will be established, high noise areas identified, and hearing protection provided as appropriate. Latest ACGIH guidelines will be used. Hearing protection shall be worn by personnel working around heavy equipment.  |

| Task  | Hazards  | Hazard Control   |
|---|--|--|
| <b>Tasks 5 and 6, cont'd:</b> <ul style="list-style-type: none"> <li>• Excavation/Removal of Contaminated Material</li> <li>• Decontamination of Equipment</li> </ul> | Confined space entry hazards associated with potential for entry into excavations greater than 4 ft deep | All of the elements of CABRERA's confined space entry program must be in place prior to any confined space entry and all confined spaces on this project will be considered permit required confined spaces. This will include properly trained employees and the proper equipment to perform the confined space entry. This equipment will include safety harnesses and retrieval equipment; confined space entry air monitoring equipment, air movement equipment such as Copus blowers as necessary, and any other equipment that the competent person determines is necessary to perform the work. |
|   | Hazards associated with excavations work   | There will be certain areas where excavations greater than 4 ft will need to be done. These excavations will be supervised by a person with "Competent Person" trenching and excavation training. In these areas the primary hazard control mechanism will be benching of the soil to prevent any cave in type situation.  |
|   | Hazards associated with potential dewatering of excavation sites   | Personnel will not enter excavations with standing water due to the potential for a drowning hazard. All dewatering will occur from the surface with all sump pumps being connected through GFCI guarded electric lines.   |
|   | Pressure washing equipment   | Personnel will be informed of the hazards associated with the operation of pressure washers including water under pressure and steam. Personnel will wear appropriate PPE including splash protection (i.e. face shield or equivalent).  |
|   | Torch cutting  | Personnel will be trained and have experience in the use of oxy/acetylene torches for the cutting operations. Proper storage and transport of gas bottles as well as inspection of torch cutting equipment will be monitored daily. For steel with potential radiological contamination, appropriate control measures will be employed to minimize potential exposure, as dictated in Table 5-5 of the RPP.  |
|   | Underground utilities  | Utility companies will be contacted and all known utilities will be marked prior to any subsurface coring or drilling. The FOL and SSHO will be notified upon the discovery of any buried utilities.   |

**Table 5-2 Equipment and Training Requirements**

| Activity            | Equipment   | Inspection  | Training  |
|---------------------|---|---|---|
| All on-site work    | Not applicable                                    | Daily inspections will be performed on all safety equipment.  | <p>Employees will be trained on the SSHP and the associated hazards including physical hazards. Initial site-specific training will be conducted, and workers will be trained in proper monitoring and decontamination procedures. Safe work practices and good housekeeping will be followed. Personnel will be informed of the contaminants and chemicals at the Site and availability of MSDSs.</p> <p>A minimum of one person will be trained in the OSHA hazardous operations workers training for supervisors.</p> <p>A minimum of two people will be trained in first aid and CPR.</p> <p>Daily safety meetings will be conducted before beginning the work.</p> |
| Equipment Operation | Heavy Equipment                                   | Equipment operators will conduct daily inspections and necessary maintenance of the equipment.  | Equipment will be operated by qualified operators with appropriate OSHA required 40-hr training (and 8-hr refresher if applicable). An initial site-specific training will be conducted, and workers will be trained in proper monitoring and decontamination procedures.   |
|                     | Gas powered generator and torch cutting equipment | Daily inspections and routine maintenance will be performed. Inspections for electrical safety, housekeeping, and lockout/tag out procedures will be performed (as necessary).                                | Same as above.  |
|                     | Radiation detection equipment                     | Daily source and background checks will be performed and documented. Licensed radiation sources used for calibration will have appropriate licensing and documentation and will undergo routine leak testing. | Equipment will be operated by qualified operators knowledgeable and trained in the operation of the equipment and interpretation of results and for radiological hazards.   |

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- Persons involved in handling potentially contaminated soil and debris will handle it in a manner that prevents the spread of contamination. Contaminated material will be direct-loaded to the maximum extent possible. Waste not directly loaded will be temporarily stored on and under Polyethylene sheeting within Contamination Zones (CZs). Equipment will be decontaminated and radiological surveys conducted prior to being removed from CZs. Personnel contamination monitoring will be conducted prior to employees leaving CZs. Solids and rinsate from decontamination will be collected for off-site disposal; and
- Air monitoring will be performed during all excavation/removal operations as described in the RPP.

### 5.1.2 Heat Stress

Heat stress monitoring will be conducted for work performed when the air temperature exceeds 70 degrees Fahrenheit (°F). Personnel performing field activities will be made familiar with the signs and symptoms of heat stress. These symptoms include:

- Heat Cramps: Painful muscle spasms, usually occurring in the abdomen and legs. Heat cramps are often the first signals that the body is succumbing to heat exposure.
- Heat Exhaustion: Dizziness, light-headedness, slurred speech, rapid pulse, confusion, fainting, fatigue, copious perspiration, cool skin that is sometimes pale and clammy, and nausea.
- Heat Stroke: Hot, dry, flushed skin; delirium, and coma (in some cases). Heat stroke is a life-threatening event and requires immediate medical attention.

Heat stress can be prevented by resting frequently in a shaded area and consuming large quantities of fresh, potable water. Dilute electrolytic-replenishing beverages, such as Gatorade<sup>®</sup>, may be used as a secondary source of fluid replacement. If heat exhaustion symptoms are observed, the affected individual will be required to rest in a shaded area and consume liquids until symptoms subside. Immediate medical attention will be provided if symptoms persist or appear to worsen. This will involve limiting the work/rest regimen so that after one minute of rest, a person's heart rate does not exceed 110 beats per minute. Work-rest regimens will be implemented as provided in Table 5-3. Heart rate monitoring will be performed at each break. No worker will be permitted to return to work activities if their heart rate is higher than 110 beats per minute.

**Table 5-3 Recommendations for Work/Rest Cycle Durations to Reduce Heat Stress**

| Work Demand          | ACCLIMATIZED EMPLOYEES |                    |                    |                    | NON-ACCLIMATIZED EMPLOYEES |                    |                    |                    |
|----------------------|------------------------|--------------------|--------------------|--------------------|----------------------------|--------------------|--------------------|--------------------|
|                      | Light                  | Moderate           | Heavy              | Very Heavy         | Light                      | Moderate           | Heavy              | Very Heavy         |
| 100% Work            | 85.1° F<br>29.5° C     | 82.1° F<br>27.8° F | 78.8° F<br>26.0° C | NO<br>WORK         | 81.5° F<br>27.5° C         | 77.0° F<br>25.0° C | 72.5° F<br>22.5° C | NO<br>WORK         |
| 75% Work<br>25% rest | 86.9° F<br>30.5° C     | 83.3° F<br>28.5° C | 81.5° F<br>27.5° C | NO<br>WORK         | 84.2° F<br>29.0° C         | 79.7° F<br>26.5° C | 76.1° F<br>24.5° C | NO<br>WORK         |
| 50% Work<br>50% Rest | 88.7° F<br>31.5° C     | 85.1° F<br>29.5° C | 83.3° F<br>28.5° C | 81.5° F<br>27.5° C | 86.0° F<br>30.0° C         | 82.4° F<br>28.0° C | 79.7° F<br>26.5° C | 77.0° F<br>25.0° C |
| 25% Work<br>75% Rest | 90.5° F<br>32.5° C     | 87.8° F<br>31.0° C | 86.0° F<br>30.0° C | 85.1° F<br>29.5° C | 87.8° F<br>31.0° C         | 84.2° F<br>29.0° C | 82.4° F<br>28.0° C | 79.7° F<br>26.5° C |

Wet Gauge Bulb temperature values expressed in °F and °C. Source: ACGIH, 2002

The next work period will be shortened by 33 percent if, after the next break, the heart rate is higher than 110 beats per minute after one minute of rest, while the length of the rest period stays the same. Resting heart rate will be established prior to start of on-site activities when ambient temperatures exceed 70° F and workers are wearing impervious clothing or when temperatures exceed 85° F.

The victim will be cooled immediately and emergency medical services will be called if symptoms of heat stroke are observed. Workers will not hesitate to seek medical attention if heat stroke is suspected.

One or more of these additional mitigating measures may also be implemented:

- Provide a cool environment in the work vicinity (an air-conditioned box van, for example);
- Use ice vests while in PPE to provide cooling to the worker; and
- Reschedule work for cooler times of the day (night or early morning).

## 5.2 COLD EXPOSURE

Exposure to cold temperatures increases the likelihood and potential for worker disorders or conditions that could result in injury or illness. Extreme low temperatures may not be the only element necessary to create the potential for cold exposure disorders or conditions; strong wind accompanied by cold temperatures can lead to these types of disorders or conditions.

Wind chill factor is the cooling effect of any combination of temperature and wind velocity or air movement. The wind chill index (Table 5-4) will be consulted when planning for exposure to low temperatures and wind. The wind chill index does not take into account the specific part of the body exposed to cold, the level of activity that affects body heat production, or the amount of clothing being worn.

The human body senses "cold" as a result of both the air temperature and the wind velocity. Cooling of exposed flesh increases rapidly as the wind velocity goes up. Frostbite can occur at relatively mild temperatures if wind penetrates the body insulation. For example, when the actual air temperature of the wind is 40° F (4.4° C) and the velocity is 30 miles per hour, the exposed skin would perceive this situation as an equivalent still air temperature of 13° F (-11° C).

The generally recognized cold disorders or conditions are:

- Frostbite - The freezing of tissue that most commonly affects the toes, fingers and face
- Hypothermia - Systemic hypothermia occurs when body heat loss exceeds body heat gain and the body core temperature falls below the normal 99° F

Contributing factors to these disorders or conditions are:

- Exposure to humidity;
- High winds;
- Contact with wetness;
- Inadequate clothing; and
- Poor worker health.

The physical conditions that effect cold exposure disorders or conditions are the same as those associated with heat disorders or conditions, such as physical fitness, alcohol or drug use, and disease.

**5.2.1 Control Measures**

The presence of dead air space between the warm body and clothing and the outside air is essential. Many layers of relatively light clothing with an outer shell of windproof material maintains body temperature much better than a single heavy outer garment worn over ordinary indoor clothing. The more air cells each clothing layer has, the more efficient it insulates against body heat loss. Clothing also needs to allow some venting of perspiration. In addition to adequate clothing, whenever possible, full use will be made of windbreaks and heat tents. Table 5-4 provides time periods at which frost bite can occur based on temperature and wind speed.

**Table 5-4 Wind Chill Factors**

|                  |    | Temperature (F) |    |    |    |    |     |     |     |     |     |     |     |     |     |     |     |     |     |    |
|------------------|----|-----------------|----|----|----|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|----|
|                  |    | 40              | 35 | 30 | 25 | 20 | 15  | 10  | 5   | 0   | -5  | -10 | -15 | -20 | -25 | -30 | -35 | -40 | -45 |    |
| Wind Speed (MPH) | 5  | 36              | 31 | 25 | 19 | 13 | 7   | 1   | -5  | -11 | -16 | -22 | -28 | -34 | -40 | -46 | -52 | -57 | -63 | 5  |
|                  | 10 | 34              | 27 | 21 | 15 | 9  | 3   | -4  | -10 | -16 | -22 | -28 | -35 | -41 | -47 | -53 | -59 | -66 | -72 | 10 |
|                  | 15 | 32              | 25 | 19 | 13 | 6  | 0   | -7  | -13 | -19 | -26 | -32 | -39 | -45 | -51 | -58 | -64 | -71 | -77 | 15 |
|                  | 20 | 30              | 24 | 17 | 11 | 4  | -2  | -9  | -15 | -22 | -29 | -35 | -42 | -48 | -55 | -61 | -68 | -74 | -81 | 20 |
|                  | 25 | 29              | 23 | 16 | 9  | 3  | -4  | -11 | -17 | -24 | -31 | -37 | -44 | -51 | -58 | -64 | -71 | -78 | -84 | 25 |
|                  | 30 | 28              | 22 | 15 | 8  | 1  | -5  | -12 | -19 | -26 | -33 | -39 | -46 | -53 | -60 | -67 | -73 | -80 | -87 | 30 |
|                  | 35 | 28              | 21 | 14 | 7  | 0  | -7  | -14 | -21 | -27 | -34 | -41 | -48 | -55 | -62 | -69 | -76 | -82 | -89 | 35 |
|                  | 40 | 27              | 20 | 13 | 6  | -1 | -8  | -15 | -22 | -29 | -36 | -43 | -50 | -57 | -64 | -71 | -78 | -84 | -91 | 40 |
|                  | 45 | 26              | 19 | 12 | 5  | -2 | -9  | -16 | -23 | -30 | -37 | -44 | -51 | -58 | -65 | -72 | -79 | -86 | -93 | 45 |
|                  | 50 | 26              | 19 | 12 | 4  | -3 | -10 | -17 | -24 | -31 | -38 | -45 | -52 | -60 | -67 | -74 | -81 | -88 | -95 | 50 |
|                  | 55 | 25              | 18 | 11 | 4  | -3 | -11 | -18 | -25 | -32 | -39 | -46 | -54 | -61 | -68 | -75 | -82 | -89 | -97 | 55 |
|                  | 60 | 25              | 17 | 10 | 3  | -4 | -11 | -19 | -26 | -33 | -40 | -48 | -55 | -62 | -69 | -76 | -84 | -91 | -98 | 60 |

"New" Wind Chill Formula:  $T_{(wc)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$

|                   |            |            |           |
|-------------------|------------|------------|-----------|
| Frost Bite Times: | 30 Minutes | 10 Minutes | 5 Minutes |
|-------------------|------------|------------|-----------|

Source: National Weather Service, 2001

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## 6.0 SITE CONTROL

All excavation and removal activities performed in Radiological Control Areas will be performed using radiation work permits as described in the RPP, specifically CABRERA Operating Procedure AP-012, *Radiation Work Permits*, a copy of which is included in the RPP. As the primary site concern is radiological, site control, access, and work zones are discussed in the RPP.

### 6.1 GENERAL SITE ACCESS

Site access during project activities will be through the main gate on State Highway 66 (see Figure 6-1). CABRERA will have primary control and responsibility for Site access during remediation activities. This control will be coordinated with the USACE and property owners prior to mobilization. Site access control will include:

- Allowing only authorized personnel to enter Site areas while the remediation is being performed;
- Ensuring that the site physical barriers (such as the fences, gates, and locks) are maintained;
- Proper posting of the site and individual work areas;
- Implementing sign-in and sign-out protocols for personnel moving on and off site; and
- Ensuring that personnel are properly trained and qualified to be onsite or in specific work areas.

Evaluations of general site access and controls will be coordinated between CABRERA, USACE, and the property owners.

### 6.2 SITE VISITORS

All visitors will be required to notify the FOL upon their arrival at the Site. Once on site, all visitors are required to first report to the field trailer and sign the site entry and exit log. All visitors will receive a brief site safety briefing by the SSHO or his designee on their first visit. Access to Site CZs is contingent on the training requirements summarized in Section 4.0. However, site visitors may be granted access to Support Zones and Contamination Reduction Zones (CRZs) without the requisite training if escorted by CABRERA's SSHO or SRSL. Cabrera Visitor Radiation Safety Training is provided and documented prior to visitor entry into these areas.

### 6.3 ACCOUNTABILITY

A daily sign-in/sign-out log will be kept in the field trailer for Site accountability purposes. The FOL will oversee accountability of all personnel listed as present prior to evacuation in the event of a site emergency. The Site field trailer will serve as the rally point for accountability purposes.

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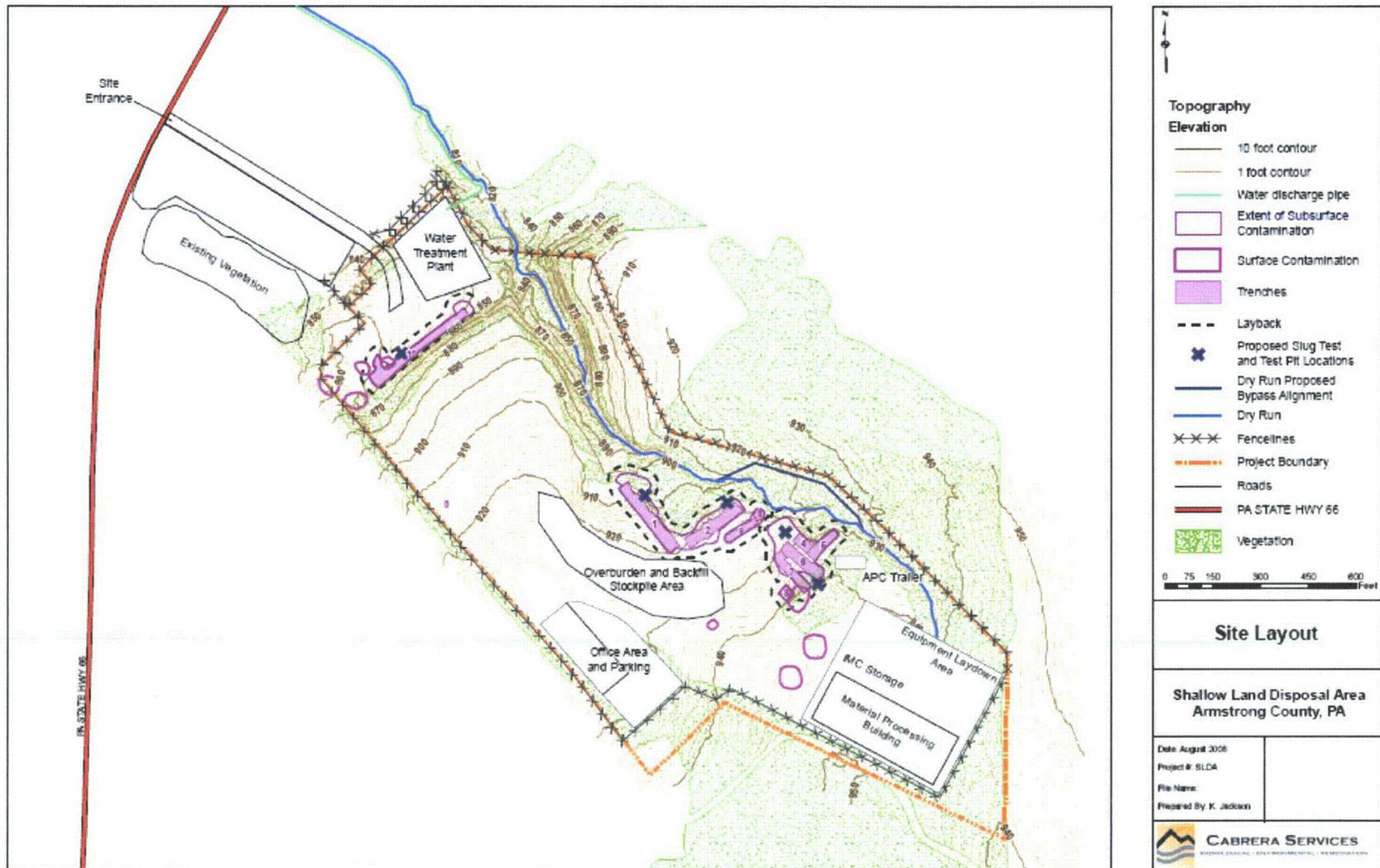


Figure 6-1 Site Layout Map

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#### **6.4 BUDDY SYSTEM**

Hazardous work will be scheduled so employees do not work alone. Each worker will maintain visual contact with another designated co-worker. The "buddy system" will ensure against an employee becoming injured without a co-worker being aware of his or her condition. The FOL will have a cellular telephone and will be responsible for coordination for emergencies that may arise. Individuals will have readily available means of contact (cellular phone or radios) with the FOL.

#### **6.5 SAFE WORK PRACTICES**

General safe work practices that will be followed by site remediation personnel include, but are not limited to:

- Eating, drinking, chewing gum or tobacco, applying cosmetics and smoking are prohibited in work zones and in laboratory/counting areas where samples are handled and surveyed;
- Sitting or kneeling in areas of obvious contamination is prohibited;
- Hands and faces will be thoroughly washed upon leaving the work area;
- Immediately replace defective PPE;
- When respirators are required, facial hair that interferes with the face-to-face piece sealing surface of the respirator or with valve function will not be permitted; and
- Personnel on site will use the buddy system; visual contact will be maintained between team members.

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## 7.0 RADIATION SAFETY PROGRAM

CABRERA will implement the requirement specified in the SLDA Radiation Protection Plan (RPP) during all phases of the project with the potential for occupational or public exposure to ionizing radiation (CABRERA, 2009b). The site RPP describes the project-specific radiation safety program and includes the following:

- Radiation Work Permits;
- Work Zones;
- Radiation Surveys and Monitoring;
- Acceptable Surface Contamination Levels;
- Contamination Surveys;
- Instrumentation and ionizing radiation sources;
- Personal Radiological Monitoring; and
- As Low As Reasonably Achievable (ALARA) Policy
- Onsite radiological assessments.

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## 8.0 HEALTH AND SAFETY ACTION LEVELS

This section provides a summary of Site contaminants previously detected, and presents a hazard assessment for those contaminants to determine if the contaminants pose a significant risk to personnel, and develops Site-specific action levels. This section focuses on organic (e.g. volatile organic compounds or VOCs) and non-radiological inorganic (e.g. metal dust) constituents. Radiological contaminants and action levels for personnel protection are discussed in the RPP.

Site conditions will be evaluated daily and/or weekly, as needed during active remediation work to confirm that hazardous conditions do not exist or provide information to evaluate the need for additional personnel precautions in the form of PPE, respiratory protection and/or engineering controls. Perimeter air monitoring at downwind locations will be performed until sufficient data is collected to confirm that airborne concentrations of potential contaminants are at safe levels. In the event chemical contamination is encountered in workers' breathing zones, task-specific action levels are presented in Table 8-1. Radiological contaminants are discussed in the RPP.

**Table 8-1 Task Specific Action Levels for Direct-Reading Instruments**

| Task/Hazard   | Instrument                                  | Action Level   |
|---|---|--|
| Excavation & Confined Space Entry / VOCs                                | Photoionization Detector                    | Sustained readings of >2 parts per million (ppm) above background readings for more than 15 minutes: Notify Program Safety Manager to re-evaluate conditions for possible engineering controls or PPE upgrade<br><br>Use vinyl chloride detector tubes to determine presence of vinyl chloride<br><br>If vinyl chloride is detected, stop work, notify the SSHP to determine whether PPE upgrade is necessary. |
| Excavation & Confined Space Entry / Combustible Gas & Oxygen Deficiency | Combustible Gas (O <sub>2</sub> /LEL) Meter | 0.1-10%: Determine if response is from instrument drift or from gas/vapor, and if the latter determine the source<br><br>>10% Stop work, notify SSHO and determine the source of gas/vapor   |
| Excavation, Debris Sizing & Soil/Debris Handling / Particulates.        | TSI Dust Trak                               | > 5 mg/m <sup>3</sup> : Dust control measures should be implemented. This is based on the ACGIH and OSHA TWA for respirable nuisance dust  |

\*Readings in the Breathing Zone shall be used to determine respiratory PPE.

## 8.1 NON-VOLATILE CONSTITUENTS

SLDA soils contain several non-volatile constituents, but the maximum expected concentration of each from dust was determined to be less than the regulated Threshold Limit Value (TLV) in each case (summarized in Table 8-2). Periodic dust monitoring for the purpose of confirming that dust levels are below the calculated action level of combined dusts of 2.0 mg/m<sup>3</sup> will be performed. It is anticipated that readings will be taken periodically during the day, particularly where dust concentrations are anticipated to be the greatest. Dust control measures including spray down of soils will be implemented to minimize generation of airborne dust.

**Table 8-2 Dust Exposure Calculation for Non-Volatile Metals in SLDA Soil**

| Chemical                             | Exposure Limit (mg/m <sup>3</sup> ) | Maximum Soil Concentration (mg/kg) | Exposure Limit Based on Single Compound (EL Mix, mg/m <sup>3</sup> ) | Dust Quotient for Each Compound (level/limit) | Problem from Single Compound [5mg/m <sup>3</sup> ]/ELmix] |
|--------------------------------------|-------------------------------------|------------------------------------|--|---|---|
| Aluminum                             | 5                                   | 33,000                             | 151.52   | 6.60E+03                                      | 0.033   |
| Antimony                             | 0.5                                 | 202                                | 2475.25  | 4.04E+02                                      | 0.002   |
| Arsenic                              | 0.01                                | 57.1                               | 175.13   | 5.71E+03                                      | 0.029   |
| Barium                               | 0.5                                 | 1500                               | 333.33   | 3.00E+03                                      | 0.015   |
| Beryllium                            | 0.002                               | 27.1                               | 7.38   | 1.36E+04                                      | 0.068   |
| Cadmium                              | 0.005                               | 20.0                               | 250.0  | 4.00E+03                                      | 0.020   |
| Chromium                             | 0.5                                 | 162                                | 3086.42  | 3.24E+02                                      | 0.002   |
| Cobalt                               | 0.02                                | 137                                | 145.99   | 6.85E+03                                      | 0.034   |
| Copper                               | 1                                   | 97.4                               | 1.03E+04   | 9.74E+01                                      | 0.000   |
| Iron                                 | 5                                   | 94200                              | 53.08  | 1.88E+04                                      | 0.094   |
| Lead                                 | 0.05                                | 54.3                               | 920.81   | 1.09E+03                                      | 0.005   |
| Manganese                            | 0.2                                 | 9900                               | 20.2   | 4.95E+04                                      | 0.248   |
| Mercury                              | 0.025                               | 3.7                                | 6.756E+03  | 1.48E+02                                      | 0.001   |
| Nickel                               | 1                                   | 121                                | 8.264E+03  | 1.21E+02                                      | 0.001   |
| Selenium                             | 0.2                                 | 1.2                                | 1.67E+05   | 6.00E+00                                      | 0.000   |
| Silver                               | 0.01                                | 2.4                                | 4.166E+3   | 2.40E+02                                      | 0.001   |
| Thallium                             | 0.1                                 | 3.5                                | 2.86E+4  | 3.5E+01                                       | 0.000   |
| Vanadium                             | 0.05                                | 75.4                               | 6.63E+02   | 1.51E+03                                      | 0.008   |
| Zinc                                 | 5                                   | 1100                               | 4.545E+03  | 2.20E+02                                      | 0.001   |
|                                      |                                     | 0.00                               | Sum  | 1.12E+05                                      |   |
| Dust Exposure Level at Mixture PEL = |                                     |                                    | 8.910  |   | 0.561   |

Source: AIHA, dustlevl.xls, Chris Marlow

$$\begin{aligned} \text{Dust action level (For one dust)} &= \frac{(1E+6)(\text{Exposure Limit mg/m}^3)}{(\text{Concentration mg/kg})(\text{Safety Factor})} \\ \text{Dust action level (For mixed dusts)} &= \frac{(1E+6) / (\text{Safety Factor})}{\text{Sum of } [(\text{Concentration mg/kg}) / (\text{Exposure Limit})]} \end{aligned}$$

\*Note: The table estimates that using a real-time dust monitor showing a total dust concentration of 8.91 mg/m<sup>3</sup> will maintain permissible dust levels to 56.1% of the PEL for the dusts potentially present on the site. Note that maximum soil concentrations (all subsurface) from the site were used. Manganese is the largest contributor to this potential exposure.

## 8.2 VOLATILE ORGANIC CONSTITUENTS

Organic chemical data consisting of soil sample data from previous investigations (URS Group, 2003) were reviewed to identify the constituent with the highest concentration that would potentially be found in dust emanating from the excavation areas. Specifically, the review focused on VOC data from subsurface soil samples to determine the maximum detected concentration of previously detected contaminants. The maximum detected VOC was 1,2-Dichloroethene, which was detected at a concentration of 570 µg/kg. Although this compound was found in the greatest concentration, other compounds would pose a more significant hazard based on its physical characteristics, chemical behavior, and permissible exposure limit. Table 8-3 shows that three compounds, 1,2-dichloroethane, 1,1-dichloroethene, and vinyl chloride, in a worst case scenario would present a significant health concern. Given the proper set of

conditions, vinyl chloride at 36 µg/kg could cause concentrations to reach over 40 ppm far exceeding the PEL of 1 ppm.

These worst case scenario calculations are extremely useful when considering potential concentrations in confined spaces, head space, or some other location where a maximum concentration may be reached given ideal conditions. Table 8-3 shows that the total vapor concentration would approach 225 ppm. It is highly unlikely that in an outdoor environment these concentrations would ever be reached. However, Table 8-3 can be used to confidently select an action level to ensure exposures are controlled at permissible concentrations. A PID will detect most of the organic compounds identified at the Site so it will be possible to monitor total vapor concentrations during intrusive activities. Total vapor concentrations held below 2ppm would result in exposures below the permissible exposure limit for the compounds present.

It is also important to ensure vinyl chloride does not contribute to an unexpectedly larger proportion of total concentration. Therefore, it will be important to be able to readily identify if vinyl chloride is present. Qualitative measurements will be taken initially with detector tubes to quickly determine if vinyl chloride is present. Positive findings will require immediate upgrade of PPE to Level C until more precise measurements can be made to determine actual vinyl chloride concentrations.

**Table 8-3 Vapor Exposure Calculation for Volatile Organics in SLDA Soil**

| PARAMETER:<br>CONTAMINANT | Maximum<br>Concentration<br>in site soil<br>(mg/Kg) | No.<br>Detects | % of<br>Samples | Worker<br>Exposure<br>Limit<br>(ppm) | Saturation<br>Concentration<br>in Air<br>(ppm) | Saturation<br>Concentration<br>in Air<br>frxn of PEL |
|---------------------------|---|----------------|-----------------|--------------------------------------|--|--|
| Acetone                   | .17   | 52             | 36.4            | 500                                  | 24.63  | 0.05   |
| Benzene                   | .003  | 2              | 1.4             | 0.5                                  | .19  | 0.38   |
| Carbon Disulfide          | .01   | 5              | 3.5             | 4                                    | 1.67   | 0.42   |
| Chlorobenzene             | .002  | 2              | 1.4             | 10                                   | .01  | 0.00   |
| Chloroform                | .008  | 4              | 2.8             | 2                                    | .32  | 0.16   |
| 1,1-Dichloroethane        | .42   | 20             | 14.0            | 100                                  | 47.18  | 0.47   |
| 1,2-Dichloroethane        | .028  | 6              | 4.2             | 1                                    | 1.35   | 1.35   |
| 1,1-Dichloroethene        | .081  | 6              | 4.2             | 1                                    | 19.72  | 19.72  |
| 1,2-Dichloroethene        | .57   | 19             | 13.3            | 200                                  | 40.38  | 0.20   |
| Ethyl Benzene             | .045  | 15             | 10.5            | 100                                  | .29  | 0.00   |
| Methyl Chloride           | .009  | 3              | 2.1             | 50                                   | 23.59  | 0.47   |
| Methyl Ethyl Ketone       | .062  | 9              | 6.0             | 200                                  | 3.06   | 0.02   |
| Methylene Chloride        | .024  | 97             | 64.7            | 25                                   | 6.3  | 0.25   |
| Naphthalene               | .25   | 3              | 2.6             | 10                                   | .06  | 0.01   |
| Tetrachloroethylene       | .099  | 3              | 2.1             | 25                                   | .51  | 0.02   |
| Toluene                   | .031  | 49             | 34.3            | 50                                   | .5   | 0.01   |
| 1,1,1-Trichloroethane     | .11   | 12             | 8.4             | 350                                  | 5.6  | 0.02   |
| Trichloroethylene         | .054  | 19             | 13.3            | 50                                   | 1.88   | 0.04   |
| Vinyl Chloride            | .036  | 4              | 2.8             | 1                                    | 46.84  | 46.84  |
| Xylenes                   | .065  | 41             | 27.3            | 100                                  | .33  | 0.00   |
| <b>Total Vapor</b>        | <b>2.114</b>  |                |                 |                                      | <b>224.39</b>                                  | <b>70.422</b><br><b>70.422</b>                       |

Source: AIHA, soilvapor.xls, Chris Marlow

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## 9.0 CONTAMINATION MONITORING

Direct reading and indirect monitoring equipment will be utilized during Site remediation activities to evaluate potential radioactive and chemical hazards to determine the effectiveness of control measures and to evaluate the PPE requirements. Hazard monitoring is described in the AHAs (Table 5-1). This section presents a summary of the direct reading instruments that will be used to monitor for the inorganic (nuisance dust) and organic constituents identified and discussed in Section 8.0. Monitoring for radioactivity is discussed in the RPP.

### 9.1 DIRECT READING INSTRUMENTS

Monitoring for non-radiological contamination will consist of real-time monitoring using direct reading instruments to identify potential elevated exposure levels. Background readings will be taken in an area known to be free of contamination. Initial readings at the start of activities in areas of known or suspected contaminants will be performed to determine if levels of hazardous contaminants exist that will require a reevaluation of safety requirements.

#### 9.1.1 Dust Monitors

As indicated in section 8.1, above, metal contaminants in dust are not expected to be of significant concern; however, excavation area dust monitoring will be used periodically as an indicator that engineering controls are adequate to maintain nuisance dust levels below threshold guidelines.

Intermittent dust monitoring will be conducted using a Dust Trak or equivalent aerosol monitor with data logging capability during work activities that may result in hazardous particulates becoming airborne. Monitoring locations will be chosen based upon the anticipated tasks as well as wind and weather conditions. The Dust Trak will be calibrated prior to use in accordance with the manufacturers procedures. The location of the Dust Trak monitor will be recorded with GPS surveying equipment, and the time period of operation will be recorded. The SSHO/SRSL will determine the Time Weighted Average (TWA) and maximum concentration of dust identified during the monitor period.

Monitoring will be completed daily during start-up of excavation operations, to establish a baseline and effectiveness of dust suppression engineering controls. Monitoring will be downgraded to once per week if data from the start-up monitoring indicate that engineering controls are adequately mitigating nuisance dust levels.

#### 9.1.2 Photoionization Detectors

PIDs will be used to monitor for VOCs. Periodic readings will be taken at least once during the morning and once in the afternoon each day that excavation activities are performed, and at greater frequencies based on visual or olfactory observations as excavation proceeds. Action will be taken in accordance with the guidelines presented in Section 8.0.

The PID instrument will be calibrated the morning of each day of use in accordance with the manufacturers' procedures. Additional calibration may be completed at the discretion of the instrument operator if significant weather variations occur during the course of the day. Suspect soil will be screened by placing a sufficient quantity of soil collected from the excavation area ground, excavator bucket, or soil pile, into a one-gallon Ziploc baggie, or in a eight-oz. clear

glass jar covered with aluminum foil wrap. The baggie/jar will be sealed, shaken, and the PID probe tip will be inserted into a corner of the baggie or pierced through a small opening in the foil wrap, to evaluate the "headspace," while maintaining a tight seal over the remainder of the opening. This method will be used for screening purposes only; soil gas or soil vapor samples will not be collected for off-site analysis.

## **9.2 PERSONAL AND PERIMETER AIR MONITORING**

Personal and perimeter air monitoring will be performed during the excavation activities on site. Additional details of air sampling are presented in the RPP.

## 10.0 LEVELS OF PROTECTION

All field personnel performing on-site remediation will be required to use the appropriate level of protection for the primary identified site hazard. The SSHO and SRSL will monitor implementation of personal protection.

### 10.1 ANTICIPATED LEVELS OF PROTECTION

Most work associated with this project will be performed in Level D Protection or modified Level D, as defined in Attachment B of OSHA Standard 29 CFR 1910.120 – “Hazardous Waste Operations and Emergency Response.” Specifically, this consists of Level D for Tasks 1, 2, 3, 4, and 7. Level C will be used initially for Tasks 5 and 6 and Modified Level D only if air sampling provides sufficient information to allow for a downgrade. Upgrading or downgrading the level of protection for Site personnel will be reserved to the discretion of the SSHO and SRSL based on extenuating circumstances in addition to available results and information, activities, and site conditions.

#### 10.1.1 Minimum Requirements

Minimum requirements for all tasks include steel-toe and steel shank work boots, with standard field dress consisting of long pants and short sleeved shirts, at a minimum. Hard hats and safety glasses will be worn at all times while on the job site except in the temporary office/break trailer. It will be at the discretion of the SSHO based on tasks, site conditions, and other influencing factors for the use of optional equipment. Use of optional equipment for personal protection will not compromise action levels or the requirements of this Plan.

### 10.2 PPE SELECTION CRITERIA

Hard hats, safety glasses and work boots were selected to provide protection against some of the physical hazards associated with the proposed operations. In addition, Nitrile™ gloves will be used by personnel manually handling contaminated soil, liquids and/or equipment.

### 10.3 PPE MODIFICATION CRITERIA

It is not anticipated that chemical contamination (over and above the hazards previously described) will be encountered on this site. Additional PPE, engineering controls, and contaminant-specific monitoring will be implemented under the direction of the SSHO if monitoring for chemical contaminants (see Sections 8.0 and 9.0) indicate action levels are exceeded. If such site conditions change, the SSHO, in consultation with CABRERA's Corporate Health and Safety Manager, will decide upon the upgraded PPE levels.

### 10.4 PPE TRAINING

Site-specific training will include information concerning use, proper fit, donning, doffing, and the limitations of the protective garments. In addition, as part of physical hazards, the temperature extremes as associated with PPE will be discussed.

**Table 10-1 Protective Equipment for On-Site Remediation Activities**

| PPE Level                  | Activity   | Protective Equipment  |
|----------------------------|--|---|
| D                          | <ul style="list-style-type: none"> <li>• Mobilization/ Demobilization</li> <li>• Site preparation</li> <li>• Land surveying</li> <li>• Excavation (Operators inside cab of construction equipment)</li> <li>• Backfilling, site restoration</li> </ul>   | <ul style="list-style-type: none"> <li>• Steel-toed safety boots</li> <li>• Safety glasses/goggles</li> <li>• Gloves</li> <li>• Hard hat</li> </ul>   |
| C<br>or<br>D<br>(modified) | <ul style="list-style-type: none"> <li>• Dewatering</li> <li>• Sampling</li> <li>• Covering waste stockpiles</li> <li>• Frac tank cleaning (no entry)</li> <li>• Other to be determined by SSHO</li> <li>• Excavation (Personnel not inside of heavy equipment)</li> <li>• Decontamination activities (i.e. pressure-washing)</li> </ul> | <ul style="list-style-type: none"> <li>• Full-face respirators with P-100/organic vapor cartridges (when upgrading to Level C)</li> <li>• Safety boots, with vinyl/rubber outer boots (or rubber steel-toed boots)</li> <li>• Chemical-resistant Tyvek™ clothing</li> <li>• Safety glasses/goggles</li> <li>• Hard hat</li> <li>• Outer rubber gloves over inner surgical Nitrile/latex gloves</li> </ul> |

## 11.0 DECONTAMINATION PROCEDURES

Decontamination is the process of removing or neutralizing contaminants that have accumulated on personnel and/or equipment. This process is critical to health and safety at hazardous material remediation sites. Decontamination protects end users from hazardous substances that may contaminate and eventually permeate the protective clothing, respiratory equipment, tools, vehicles, and other equipment used in the vicinity of the chemical hazard; it protects all site personnel by minimizing the transfer of harmful materials into clean areas; it helps prevent mixing of incompatible chemicals; and it protects the community by preventing uncontrolled transportation of chemicals from the Site. It is anticipated that the primary hazard from a decontamination perspective will be radiological for this project.

### 11.1 PERSONNEL DECONTAMINATION PROCEDURES

Personnel decontamination will be provided by proper removal of PPE in accordance with CABRERA Operating Procedure OP-015, titled *Step-Off Pads*. Additionally, workers will wash their hands and face as soon as possible after egress from the Contamination Zone (CZ) and doffing of PPE. Disposable gloves, Tyvek<sup>®</sup> coveralls, and disposable rubber boots used to protect work clothes will be removed and bagged at the end of each work session (prior to lunch, end of work day) and disposed as non-hazardous solid waste.

### 11.2 EQUIPMENT DECONTAMINATION PROCEDURES

Construction equipment involved in remediation will be decontaminated before moving it between excavation areas or off-site demobilization. Equipment decontamination procedures are detailed in CABRERA Operating Procedure OP-018, titled *Decontamination of Equipment and Tools* and is summarized below.

Construction equipment involved in remediation will initially be decontaminated at the excavation area by removing all loose soil from buckets, tracks and the undercarriage using shovels, brooms and brushes. Subsequent decontamination will be performed as necessary until verified clean, including:

- Low pressure [2,000 pounds per square inch (psi)] wash until visibly clean;
- Low pressure, non-phosphate detergent wash with brushing; and
- High pressure wash (10,000 psi) with hot water if needed.

Additional decon procedures (e.g., the use of solvents or sandblasting) will only be used as a last resort, based on a determination made by the SRSL and CABRERA's Corporate RSO, including consultation with the PM. Other porous parts, (e.g., seats, wiper blades, etc.) which cannot be readily decontaminated, may be removed and treated in the same manner as contaminated soil/debris. Air filters, oil filters and crankcase oil may be replaced prior to final release if the equipment exhibits radiological contamination from surface scans.

A release survey will be completed at the excavation area prior to moving the equipment to the next work location on site. Construction equipment involved in remediation will also be transported to the on-site decontamination pad for a final, thorough decontamination prior to its demobilization off site.

Small tools and other equipment (i.e., field meters, etc.) will be wrapped in plastic prior to being moved between contaminated areas of the Site and will be decontaminated prior to being moved to un-contaminated areas of the site or off site.

Waste water from decontamination procedures will be collected and run through the on site water treatment plant. More detailed information regarding collection of waste water is found in the Water Management Plan.

All equipment will be decontaminated and surveyed in accordance with procedures provided in the RPP. As much equipment as possible will be dedicated for single use for the duration of the project, and will remain within CZs on site until decontaminated, surveyed and verified in conformance with free release limits.

## 12.0 EMERGENCY RESPONSE AND NOTIFICATION PLAN

An emergency situation is defined as a sudden, generally unexpected occurrence demanding immediate action. Emergencies at the SLDA FUSRAP Site may include accidents, injuries requiring medical care, fires, explosions, spills and significant releases to the environment, and extreme weather events, such as severe thunderstorms. This section provides emergency procedures for the SLDA Site during remediation.

CABRERA personnel will contact local Emergency Providers one to two months before mobilizing to the Site to advise them that remediation will be starting. The SSHO will arrange for site visits and orientation for any potential off-site emergency responder organization requesting a site visit. The visit and orientation will include discussion of persons responsible for site activities, the tasks that will be performed, the nature of hazards that may be encountered, and the means available for decontamination.

Pre-planning will include contacting the local fire/police/rescue authorities having jurisdiction and nearby medical facilities that would be utilized for emergency treatment of injured personnel to notify them of upcoming project activities and potential emergency situations. This will be done to ascertain their response capabilities and to obtain a response commitment. CABRERA will also obtain an agreement from a local private environmental response company (i.e., Clean Harbors, Heritage Environmental Services, Pioneer Environmental Services or equivalent) to provide site emergency response services.

Appropriate immediate response must be taken by the first person to recognize the situation if an emergency situation arises. The field crew will immediately notify the FOL and SSHO of the incident, and the appropriate emergency service organization will be contacted. A list of local emergency assistance services, information services, and administrative personnel is provided in Attachment C. A copy of the emergency telephone numbers and directions to the Alle-Kiske Medical Center emergency room (emergency response units should transport injured personnel to the hospital) will be posted at the site office trailer.

The PM, Corporate Health and Safety Manager, and USACE will be notified of any accident, injury or illness that is the result of site activities.

Proper emergency first-aid care will be rendered by a trained person in the event of injury or illness. First-aid equipment and an emergency eyewash station will be available at the job site. Personnel will be notified as to the locations of first-aid equipment during the initial safety briefing session.

Rapid identification of hazardous materials(s) will be attempted if the injury or illness is from exposure to such; this information will be provided to medical personnel. MSDSs will be provided in Attachment E for project chemicals of concern. The MSDS describes first-aid procedures to follow in the event an exposure occurs.

The decision to cease all field activities and evacuate the site will be made by the FOL and SSHO unless the emergency event is extreme and obvious. Field personnel will report to the project office trailer to sign-out, if possible. Local authorities (sheriff, fire department, civil defense) will decide if the emergency requires evacuation of the surrounding community. Responsibility for community evacuations will be with the local authority in charge of the emergency.

## **12.1 PERSONNEL ROLES/LINES OF AUTHORITY**

The roles and responsibilities of CABRERA personnel for response to emergencies at the SLDA Site will be clearly defined and coordinated with any subcontractors, USACE, and emergency service personnel. The responsibilities of specific project individuals and the coordination of emergency service personnel are defined in the following subsections.

### **12.1.1 Field Operations Lead**

The FOL or designee will be present on site at all times during scheduled remediation activities. This individual will be responsible for implementing these procedures and determining appropriate response actions. Specific responsibilities for the FOL include:

- Evaluating and assessing emergency incidents or situations;
- Assigning personnel and coordinating response activities on site;
- Assuring that field personnel are aware of the potential hazards associated with the project;
- Summoning emergency response personnel;
- Notifying the PM and Corporate Health and Safety Manager of an emergency situation;
- Coordinating response to an incident with USACE;
- Assuring that all emergency equipment is routinely inspected and functional;
- Working with the SSHO regarding the correction of any work practices or conditions that may result in injury to personnel or exposure to hazardous substances;
- Assuring that appropriate emergency response agencies are aware of the provisions made herein;
- Evaluating the safety of project personnel in the event of an emergency and providing evacuation coordination if necessary; and
- Maintaining project facilities and assisting site personnel in accessing those facilities.

The FOL will direct all emergency response activities conducted or managed by CABRERA and is ultimately responsible for field implementation and enforcement of this SSHP.

### **12.1.2 Site Safety and Health Officer**

The SSHO is responsible for assisting the FOL in implementing, communicating, and enforcing safety and health policies and procedures during the course of the project. He will also assist in evaluating safety and health concerns with respect to environmental releases and emergency response actions.

### 12.1.3 Site Radiation Safety Lead

The SRSL is responsible for assisting the FOL and SSHO in implementing, communicating, and enforcing radiation safety and health policies and procedures during the course of the project. He will also assist in evaluating radiation safety and health concerns with respect to environmental releases and emergency response actions.

### 12.1.4 Project Manager

The PM will provide support to emergency responders and dedicate appropriate project resources to the response effort. If required, the PM will mobilize additional personnel and equipment to the project site. The PM will notify and provide USACE with recommendations concerning any additional action(s) to be taken.

## 12.2 EMERGENCY CONTACTS AND NOTIFICATION

The appropriate emergency response agencies will be contacted prior to initiating mobilization and site remediation.

The PM, Corporate Health and Safety Manager, Corporate RSO, FOL, SRSL, and SSHO will be notified immediately in the event of an emergency. The FOL will immediately evaluate the incident and, if necessary, notify emergency response personnel. If not previously notified, USACE will be advised of the situation. Telephone numbers for emergency services are presented in Attachment C. The list will be posted in the CABRERA site trailer. Information provided to the emergency contact should include:

- Name and telephone number of the individual reporting the incident;
- Location and type of incident;
- Nature of the incident (fire, explosion, spill, or release) and substances involved;
- Number and nature of medical injuries;
- Potential for additional risks or dangers;
- Potential off-site risks or dangers;
- Movement or direction of spill/vapor/smoke;
- Response actions currently in progress;
- Estimate of quantity of any released materials;
- Status of incident; and
- Other pertinent information.

A complete incident report shall be completed by the SSHO and provided to USACE in an expeditious manner.

### 12.3 MEDICAL EMERGENCY RESPONSE

Minor injuries will be treated on site by qualified First Aid/CPR providers. Emergency medical services (EMS) will be summoned in the event of moderate to severe physical injury. A hospital route map and directions are included in Attachment C. Any injured personnel should be transported to the hospital by the EMS.

The route to the hospital will be posted in the project office trailer prior to the initiation of on-site activities.

### 12.4 PERSONAL EXPOSURE OR INJURY

The following procedures will be implemented in the event of a personal injury (other than first-aid only):

- Administer first-aid and radio the field office (FOL and SSHO) to arrange for dispatch of the EMS, as necessary;
- When the situation has been stabilized, in conjunction with the SSHO and SRSL or HP Technician, decontaminate the injured person. Do not perform decontamination if it interferes with emergency treatment, such as in a life-threatening situation;
- Move the person to the support area if there is no risk of further injury;
- Wait for emergency care, document the event in the logbook, and maintain radio contact with the FOL or SSHO;
- The SRSL will go to the hospital or prompt care facility if the injured person can not be decontaminated at the project-site, monitor the patient and the facility for the presence of loose contamination, and decontaminate the patient or facility as necessary; and
- The injured person will be transported to the hospital if there is a minor injury requiring medical treatment.

The following procedures will be followed in the event of a chemical exposure:

- **Skin Contact** - Flush with water. Remove clothing, flush skin. Obtain medical attention
- **Inhalation** - Remove the person from the area. Administer First-aid/CPR, as needed. Obtain medical attention
- **Ingestion** - Contact the Poison Control Center for immediate treatment, then obtain medical attention. Inducing vomiting may cause further injury to the victim; follow instructions from the MSDS and/or Poison Control Center
- **Eye Contact** - Flush eyes immediately with water for a minimum of 15 minutes. Obtain medical attention

### 12.5 FIRE CONTROL

A 10 pound (lb) A:B:C fire extinguisher will be kept at the field office, on all heavy machinery, and at excavation sites, at a minimum. The following will be implemented in the event of a fire or explosion at the project site:

- Evacuate all personnel to a safe location upwind or crosswind of the incident. Contact the FOL and SSHO;
- If personnel are present who have had training in the use of fire extinguishers, use available fire extinguishers to extinguish fires in their incipient stages;
- Alert the local hospital of the possibility of fire victims, as appropriate; and
- Document the incident in the field logbook and follow the procedures for incident reporting.

## 12.6 SPILL PREVENTION AND CONTROL

This spill prevention and control section sets forth the procedures for coordination of and response to potential spills/discharges of contaminated soil, chemicals, or water.

### 12.6.1 Preemptive Measures

The following measures will be taken to minimize the possibility of spills/discharges:

- Site controls will be maintained so that only authorized personnel have access to work areas;
- Project personnel will be advised of appropriate spill/discharge control measures;
- Appropriate secondary containment structures will be used for storage and transfer of hazardous materials and liquid wastes on site; and
- All chemicals to be used on-site (e.g., HNO<sub>3</sub> and other preservatives) will be stored in an on-site chemical storage cabinet when not in use. After use, the chemicals will be immediately returned to the on-site chemical storage cabinet.

### 12.6.2 Spill Control Equipment

A spill response kit will be available at the site to handle small liquid spills, which could cause contamination to spread to clean areas of the facility and the surrounding environment. The spill response equipment will be placed in a central location. The spill response equipment kit is intended to control spills from solid and liquid waste stored at the SLDA Site as well as any minor spills of fuel, motor oil, etc. The immediate spill response kit will include:

- Broom,
- Dust pan,
- Speedi-Dry™ absorbent,
- Oil boom, and
- Flat shovel and empty drums or overpack drums for re-packing spilled material.

The following materials will be kept on site. They are not required to be specifically dedicated to spill response and may be used for other activities:

- Industrial hygiene and health physics instrumentation,
- Flagging tape,
- Barrier tape/rope (200 ft),
- Extension cord with ground-fault circuit interrupter,
- Duct tape,
- All-purpose markers,
- Five-gallon buckets, and
- Polyethylene sheeting.

### 12.6.3 Spill Response

The FOL and SSHO will be immediately notified if a hazardous material release is observed at the site. An assessment will be made of the magnitude and potential impact of the release. Project personnel will attempt to locate the source of the release, prevent further release, and contain the spilled and/or affected materials, if it is safe to do so. Spill response will be addressed as follows:

- The spill or release area will be approached from upwind;
- Hazards will be identified based on available information from witnesses or material identification documents (placards, MSDSs, logs). The potential hazards will be evaluated to determine the proper personal protection levels, methods, and equipment necessary for response;
- If necessary, the release area will be evacuated, isolated, and secured;
- Work zones, including a controlled area, will be set up;
- If possible, spill containment will initially be made without entering the immediate hazard area;
- Entry to the release area will be made by personnel with the PPE, training, methods and equipment necessary to perform the work. Hazardous spill containment and collection will be performed in four steps as follows:
  - Contain the spill with absorbent socks, Speedi-Dry™ absorbent, booms, granules, or construction of temporary dikes;
  - Control the spill at the source by plugging leaks, up righting containers, over packing containers or transferring contents of a leaking container;
  - Collect the spilled material with shovels, pumps, or heavy equipment as necessary; and
  - Store the spilled material for further treatment or disposal. Treatment and/or disposal options of the material will depend on the amount and type of material.

Evacuation of the area may be warranted if project personnel cannot safely respond to an environmental release. The Leechburg Fire Department will be notified by calling 911, and USACE will be notified in the event of a significant spill. The SSHO will brief emergency responders of the current status and any potential hazards upon their arrival at the Site.

#### **12.6.4 Discovery of Unknown Drums**

The potential presence of buried drums on site has been documented. In the event that drums are encountered, work will be halted in the area of the discovered drums and CABRERA's FOL, SSHO, SRSL, PM, Corporate RSO, and Corporate Health and Safety Manager will be notified immediately. Drums will be handled in accordance with Severson's Drum Handling Procedure included as Attachment D.

#### **12.7 SITE EVACUATION PROCEDURES**

A long blast of an air horn will be sounded in the event that site evacuation is required. Air horns will be located in the project office trailer, each active work area and on all heavy equipment.

Personnel working in an CZ or CRZ will immediately make their way to the access control point for a "head count." Personnel exiting an CZ and CRZ may be instructed to forgo or modify decontamination procedures depending on the severity of the event and allowable time.

Personnel in the Support Zone will immediately report to the access control point for a "head count" and further instructions. The FOL and the SSHO will remain in contact to properly execute evacuation procedures. If the office is inaccessible, personnel will evacuate to a designated upwind location and perform a "head count."

Situations requiring evacuation may include unusually severe weather conditions, fires, or significant chemical spills or releases. USACE and 911 will be notified immediately in the event of project evacuation. A site emergency map that delineates evacuation routes, emergency air horn locations, first aid kit locations, rally point, and CZ perimeters will be provided once the SSHO has evaluated the project site. Exact locations of emergency equipment may be modified by the SSHO. The site emergency map will be updated by the SSHO in the field and project personnel will be notified in the event changes are made.

#### **12.8 EMERGENCY DECONTAMINATION PROCEDURES**

Decontamination procedures are presented in Section 11.0.

#### **12.9 ADVERSE WEATHER CONDITIONS/NATURAL DISASTERS**

Personnel should be aware of the possibility for the occurrence of severe weather such as thunderstorms, hail, snow, or high winds. Necessary precautions or response, directed by the SSHO, will be taken in the event of severe weather. For example, excavation will be suspended when the potential for lightning occurs. Local weather broadcasts and the severe weather alert radio will be monitored by the FOL, SSHO, or designee when the likelihood for severe weather exists.

#### **12.10 EMERGENCY EQUIPMENT**

The following emergency equipment will be maintained at the project site at a minimum:

- Fire extinguishers,
- First-aid kits,

- Emergency eyewash,
- Communication devices, and
- Spill control supplies.

This equipment will be inspected by the SSHO on a monthly basis to verify that they are in good condition, ready to use and easily accessible.

### **12.11 CRITIQUE AND FOLLOW-UP OF EMERGENCY PROCEDURES**

The USACE will be verbally notified immediately and receive a written notification within 24 hours of all accidents or incidents including releases of toxic chemicals, fires, or explosions. The report will include:

- Name, organization, telephone number, and location of the Contractor;
- Name and title of the person(s) reporting;
- Date and time of accident/incident;
- Location of accident/incident (i.e., site location, facility name);
- Brief summary of accident/incident including pertinent details such as type of operation on-going at time of accident;
- Cause of accident/incident, if known;
- Casualties (fatalities, disabling injuries);
- Details of any existing chemical hazard or contamination;
- Estimated property damage, if applicable;
- Nature of damage, effect on contract schedule;
- Safety and security actions taken by the Contractor; and
- Other damage or injuries sustained (public or private).

The FOL and the SSHO will investigate the cause of the incident to prevent its reoccurrence. The investigation should begin as soon as practical after the incident is under control but not later than the first work day after the incident. Investigations will follow the procedures described below:

- Interview witnesses and participants as soon as possible or practical;
- Determine the chronological sequence of events (opinions as to cause should not be solicited at this time);
- Note the location, movement, displacement, liquid levels, sounds, noises, or other sensory perceptions experienced by the participants or witnesses;
- Obtain weather data;
- Ascertain the location and position of all switches, controls, etc.;
- Verify the condition of all safeguards; and

- Determine if a revision to emergency procedures is warranted. Causal factors should be identified after the facts have been collected.

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### 13.0 MEDICAL SURVEILLANCE REQUIREMENTS

Individuals assigned to field remediation tasks will be required to provide current documentation proving medical clearance by an occupational physician, respirator fit testing (if required for performing intrusive tasks), and radiation dosimetry records for the current year, in accordance with OSHA requirements identified in 19 CFR 1910.120 and CABRERA's *Corporate Health and Safety Program* Procedure HSM-011 (CABRERA, 2005). Documentation of medical clearance will be maintained in the field office throughout the remediation project and then will be transferred to CABRERA's permanent project files.

Personnel monitoring during fieldwork will consist of radiation dosimetry, which is described in the RPP. All personnel who receive medical monitoring will receive a written notification of the findings.

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## 14.0 REFERENCES

- ACGIH, 2002, the American Conference of Governmental Industrial Hygienists, *Threshold Limit Values and Biological Exposure Indices*, 2002.
- American Industrial Hygiene Association, [www.aiha.org](http://www.aiha.org), "Dust Calculation Worksheet".
- American Industrial Hygiene Association, [www.aiha.org](http://www.aiha.org), "Soil Vapor Worksheet".
- CABRERA, 2005, *Corporate Health and Safety Manual, Revision 2*, August 2005.
- CABRERA, 2009a, *Site Operations Plan, SLDA FUSRAP Site*, Cabrera Services, Inc., March 2009.
- CABRERA, 2009b, *Radiation Protection Plan, SLDA FUSRAP Site*, Cabrera Services, Inc., March 2009.
- CABRERA, 2009c, *Sampling and Analysis Plan, SLDA FUSRAP Site*, Cabrera Services, Inc., March 2009.
- CABRERA, 2009d, *Contractor Quality Control Plan, SLDA FUSRAP Site*, Cabrera Services, Inc., March 2009.
- National Weather Service, 2001, Windchill Temperature Index Table, National Oceanic & Atmospheric Administration, [www.nws.noaa.gov/om/windchill/index.shtml](http://www.nws.noaa.gov/om/windchill/index.shtml), November 2001.
- OSHA, US Occupational Safety and Health Administration; Department of Labor, Title 29, Code of Federal Regulations, Parts 1900, 1910 and 1926.
- URS Group, 2003, Gamma Walkover Survey, Site Safety and Health Plan, Shallow Land Disposal Area, Parks Township, Armstrong County, PA
- USACE, 2007, *Safety and Occupational Health Requirements for Hazardous, Toxic and Radioactive Waste Activities*. Engineer Manual EM 385-1-92. 1 May 2007.
- USACE, 2003, *Safety and Health Requirements*, Engineer Manual 385-1-1. November 2003.

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**ATTACHMENT A**

*SSHP Acknowledgement Form*

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**ATTACHMENT B**

**Cabrera Corporate Health and Safety Manual and Procedures  
(Electronic Copy on Enclosed CD)**

**ATTACHMENT B**

**Cabrera Corporate Health and Safety Manual and Procedures  
(Electronic Copy on Enclosed CD)**

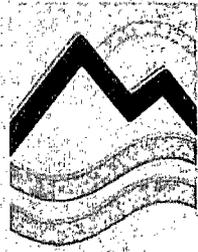
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**Cabrera Services, Inc.**

**List of Approved Safety Programs and Procedures**

| <b>Name</b>                                       | <b>Number</b> | <b>Issue Date</b> | <b>Revision</b> | <b>Date</b> |
|---|---------------|-------------------|-----------------|-------------|
| Occupational Safety and Health Management Process | HSM-001       | June 2001         | 3               | July 2007   |
| Hazard Communication                              | HSM-002       | July 2001         | 2               | July 2007   |
| Confined Space Entry                              | HSM-003       | June 2001         | 1               | Feb 2002    |
| Lockout/Tagout                                    | HSM-004       | June 2001         | 1               | Feb 2002    |
| Personal Protective Equipment                     | HSM-005       | June 2001         | 1               | Mar 2002    |
| Respiratory Protection                            | HSM-006       | June 2001         | 1               | Feb 2002    |
| Job Hazard Analysis                               | HSM-007       | June 2001         | 1               | July 2002   |
| Excavation and Trenching                          | HSM-008       | June 2001         | 1               | July 2002   |
| Heat and Cold Stress Prevention                   | HSM-009       | June 2001         | 1               | Feb 2002    |
| Incident and Near Miss Reporting                  | HSM-010       | Dec 2001          | 1               | Sep 2005    |
| Medical Surveillance                              | HSM-011       | Feb 2003          | 1               | Mar 2004    |
| Fall Protection                                   | HSM-012       | July 2001         | 1               | Mar 2003    |
| Hearing Conservation                              | HSM-013       | Jan 2000          | 0               |             |
| Bloodborne Pathogen                               | HSM-014       | April 2000        | 0               |             |
| Heavy Equipment Operations                        | HSM-015       | May 2001          | 0               |             |
| Portable Ladder Safety                            | HSM-016       | Jan 2008          | 0               |             |
| RESERVED  | HSM-017       |                   |                 |             |
| Aerial Lift Safety                                | HSM-018       | Jan 2008          | 0               |             |
| Emergency Action Plan                             | HSM-019       | Nov 2007          | 0               |             |
| Procedures during OSHA Inspections                | HSM-020       | Mar 2007          | 0               |             |
| Hand and Power Tool Safety                        | HSM-021       | Jan 2008          | 0               |             |
| Fire Prevention                                   | HSM-022       | Jan 2008          | 0               |             |
| Electrical Safety                                 | HSM-023       | Jan 2008          | 0               |             |
| Utility Clearance and Isolation                   | HSM-024       | Jan 2008          | 0               |             |
| Illumination                                      | HSM-025       | June 2008         | 0               |             |

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# CABRERA SERVICES

RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

## OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT PROCESS

### Health and Safety Manual HSM-001

Effective Date

July 2007

Revision 3 (Complete)

Prepared By: Paul H. Schwartz Date: 7/3/07  
Paul Schwartz, CIH, CSP  
Occupational Safety and Health Manager

Approved By: Len Johnson Date: 7/3/07  
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**APPENDICES**

Appendix A

Safety Policies

Policy for Subsidizing Certain Personal Protective Equipment

- Safety Shoes or Boots
- Prescription Safety Glasses

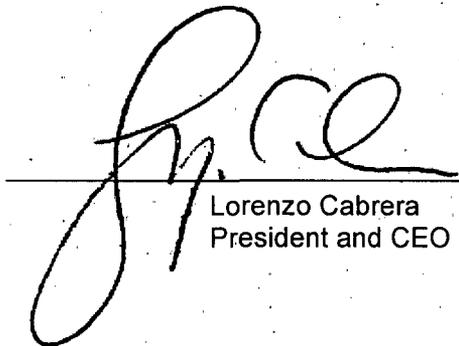
**ACRONYMS**

|                 |   |
|-----------------|---|
| <b>ACGIH</b>    | American Conference of Governmental Industrial Hygienists |
| <b>AHA</b>      | Activity Hazard Analysis                                  |
| <b>CABRERA</b>  | Cabrera Services, Inc.                                    |
| <b>CEO</b>      | Chief Executive Officer                                   |
| <b>CFR</b>      | Code of Federal Regulations                               |
| <b>CHP</b>      | Certified Health Physicist                                |
| <b>CIH</b>      | Certified Industrial Hygienist                            |
| <b>EAP</b>      | Emergency Action Plan                                     |
| <b>ECP</b>      | Exposure Control Plan                                     |
| <b>EMR</b>      | Experience Modifier Rate                                  |
| <b>EPA</b>      | Environmental Protection Agency                           |
| <b>ERP</b>      | Emergency Response Plan                                   |
| <b>FOL</b>      | Field Operations Leader                                   |
| <b>HAZWOPER</b> | Hazardous Waste Operations and Emergency Response         |
| <b>LOTO</b>     | Lockout/Tagout  |
| <b>NRC</b>      | Nuclear Regulatory Commission                             |
| <b>NRRT</b>     | National Registry of Radiation Protection Technologists   |
| <b>OSHA</b>     | Occupational Safety and Health Administration             |
| <b>OSHM</b>     | Occupational Safety and Health Manager                    |
| <b>OSHMP</b>    | Occupational Safety and Health Management Process         |
| <b>PPE</b>      | Personal Protective Equipment                             |
| <b>PM</b>       | Project Manager   |
| <b>PrgM</b>     | Program Manager   |
| <b>QA/QC</b>    | Quality Assurance/Quality Control                         |
| <b>RSO</b>      | Radiation Safety Officer                                  |
| <b>RSP</b>      | Radiation Safety Program                                  |
| <b>S&amp;H</b>  | Safety and Health   |
| <b>SOP</b>      | Standard Operating Procedure                              |
| <b>SSHPL</b>    | Site Safety and Health Plan                               |
| <b>SRPL</b>     | Site Radiation Protection Leader                          |
| <b>SRSO</b>     | Site Radiation Safety Officer                             |
| <b>SSHO</b>     | Site Safety and Health Officer                            |
| <b>TLV</b>      | Threshold Limit Value                                     |
| <b>USACE</b>    | United States Army Corps of Engineers                     |
| <b>UXO</b>      | Unexploded Ordnance                                       |
| <b>VPO</b>      | Vice President, Operation                                 |
| <b>WBGT</b>     | Wet-Bulb Globe Temperature                                |

## 1.0 OCCUPATIONAL SAFETY AND HEALTH POLICY

Cabrera Services, Inc. (CABRERA) is committed to providing a safe and healthy work environment for its employees and contractors. Attaining this objective requires the commitment of each employee to create and maintain an injury free, environmentally safe workplace. This commitment requires strict adherence to established safety rules and practices. Procedures are developed and implemented to ensure state and federal occupational safety and health regulations are adequately and completely addressed. Each employee is responsible for performing work in accordance with established procedures and ensuring that unsafe acts and conditions are eliminated from the workplace. As a condition of employment, personnel will be accountable for adhering to safety rules, practices and procedures. Additionally, when an employee(s) believes unsafe conditions exist, he/she is empowered to suspend or stop work pending resolution of the condition by appropriate supervision and/or management. CABRERA will provide the resources and tools necessary to ensure employees are capable of fulfilling their occupational safety responsibilities.

CABRERA employees, managers and supervisors are responsible for adhering to this policy and applicable Safety and Health programs. Managers and supervisors shall ensure the expectations for safe work performance are conveyed to all employees and will continually evaluate safety performance to identify areas for improvement.



Lorenzo Cabrera  
President and CEO

Issued: 8/1/1999  
Date

Revised: 7/1/2007  
Date

## **2.0 OCCUPATIONAL SAFETY AND HEALTH MANAGEMENT PROCESS**

### **2.1 Introduction**

The Occupational Safety and Health Management Process (OSHMP) is based on the belief that all incidents are preventable. It is established to provide an effective means for eliminating or minimizing exposure to occupational hazards at the job sites as well as in office environments. It employs qualified personnel to supervise and implement the process elements, provides appropriate equipment and facilities, and utilizes written procedures designed to provide protection of personnel against exposure to occupational hazards in a manner consistent with Federal and State regulations.

Occupational safety and health guidance is conveyed in a variety of documents such as the safety procedures outlined in Section 2.1.7 or the Safety and Health (S&H) policies found in Appendix A, one of which is safety equipment reimbursement. This OSHMP describes significant considerations and concepts necessary to make CABRERA's safety processes successful. It emphasizes that corporate guiding principles must be communicated to all levels of the organization. This process is based on the premise that:

- All accidents can be prevented
- Management and supervisory actions play essential roles in preventing accidents
- Training to work safely is essential
- Risk Management requires the involvement of everyone
- Accident prevention is placed on the same level as quality, productivity, and profitability.
- Employees are a company's most valuable resource; therefore, the health and safety of employees shall be included in the company's set of values.

### **2.2 Objectives**

The OSHMP pursues the following objectives:

- To safeguard the health and safety of all personnel whether CABRERA employees or employees of other companies, or members of the general public.
- To plan projects with Health and Safety as a primary consideration so that they can be performed without significant risk to personnel and ensuring the protection of environment.
- To carry out project activities, from mobilization to demobilization, safely to meet the objectives of the project and expectations of the client.

## 2.3 Corporate Health and Safety Principles

Safety and Health initiatives are critical to achieving client expectations, improving performance and fulfilling regulatory compliance. As a result, Health and Safety principles are integrated throughout CABRERA'S management process in all phases of its projects. The following principles are considered essential components of CABRERA'S management process to ensure that risks in all aspects of the Company's activities are evaluated and effectively controlled.

### 2.3.1 Management Commitment

CABRERA regards worker safety and health as a fundamental value of the organization and places the highest priority on reducing the potential for occupational illness or injury. To facilitate this, Corporate management will ensure that:

- Necessary resources are available to ensure hazards are identified, mitigated or controlled,
- Procedures are in place and training is provided to personnel to recognize occupational hazards and their potential health effects, and to minimize exposure to such hazards,
- Supervisors and employees are given the responsibility and authority to ensure a safe work environment,
- Expectations and performance goals focus on safety,
- Personnel are held accountable for safety performance.

Managers will be actively involved in the implementation of the OSHMP and will ensure that employees are involved in the maintenance and implementation of the program. Through the development of goals and the evaluation of performance, managers and supervisors will maintain a presence in work areas to reinforce expectations.

Management will direct performance of frequent work observations and a thorough assessment of the OSHMP, at least annually. Management will provide direction in problem resolution, verify that recommendations for improvement are evaluated and corrective actions are implemented.

### 2.3.2 Employee empowerment

Employees are expected to be able to identify potential safety hazards and bring them to the attention of site supervision. Each employee is also empowered to suspend or stop work performance when an unsafe condition or act is believed to exist. Immediately following work suspension, the employee shall notify their immediate supervisor. Continuation of work shall only be allowed following implementation of corrective actions or resolution of the issue. Work suspensions due to safety concerns and work conditions shall be documented. Corrective actions shall be identified, tracked and completed. Corrective action

development and implementation responsibilities should typically be assigned to the site supervisor or manager.

### *2.3.3 Disciplinary Action*

CABRERA believes that accident prevention is unenforceable without some type of disciplinary policy. In order to maintain a safe and healthful workplace, employees must be aware of all company, State, and Federal safety and health rules and regulations as they apply to the specific job duties. The following disciplinary policy is in effect and will be applied to all safety and health violations.

The following steps will be followed unless the seriousness of the violation would dictate going directly to Step 2 or Step 3.

1. A first time violation will be discussed verbally between the employee's supervisor and the employee. This will be done as soon as possible.
2. A second time offense will be followed up in written form and a copy of this written documentation will be entered into the employee's personnel folder.
3. A third time violation will result in time off without pay or possible termination, depending on the seriousness of the violation.
4. Three violations within a year will result in termination of employment.
5. Violations will be maintained active for 2 years. Employees with previous violations will start this sequence over if there are no violations committed in a 2-year period.

### *2.3.4 Organization*

CABRERA will ensure that sufficient resources are budgeted and dedicated for accomplishing the goals of the OSHMP. Project Managers (PM) will assign the responsibility for managing S&H on specific project sites to persons with sufficient education, experience and qualifications.

Project Management must be diligent when recruiting personnel for field supervisory positions to ensure competency in health and safety disciplines. This will ensure the availability of personnel with crucial S&H education, experience and communication skills so that they are effective in their assignments.

### *2.3.5 Safety and Health Planning*

Accident prevention begins at the bid, proposal and planning stages of a project. Complete and comprehensive work plans, Safety and Health plans, Sampling and Analysis plans, and subcontractor specifications must be prepared with safety and health considerations integrated throughout each phase.

Project - specific Site Safety and Health Plans (SSHP) reflect management's intentions to meet CABRERA and client requirements and their application in the field. Contractors are pre-qualified as to their S&H experience and competency to perform work in accordance with CABRERA and regulatory Health and Safety standards.

S&H is integrated across all phases of the project through planning, design, engineering, procurement, mobilization, field activities, and demobilization

#### *2.3.6 Site-Specific Programs*

Supervisors play a key role in field program execution. They are the eyes of all S&H programs as they monitor compliance with project plans on a daily basis. On project sites, the Field Operations Leader (FOL) is accountable for the administration of programs. All Project SSHPs share (as a minimum) the key elements listed below in compliance with 29CFR1910.120, Hazardous Waste Operations and Emergency Response (HAZWOPER). These broad-based elements are defined and expanded into other program components as appropriate for each site and activity. Other aspects of the program and plan are further tailored for project needs (e.g., training includes but is not limited to new employee orientation, daily communications, toolbox meetings and other specialized opportunities to promote safety awareness). Site Specific Program Elements include at a minimum:

- Safety and Health Risk Analysis
- Employee Training
- Personal Protective Equipment
- Medical Surveillance
- Frequency and Types of Air Monitoring
- Site Control Measures
- Decontamination Procedures
- Emergency Response Plan
- Confined Space Entry

#### *2.3.7 CABRERA Services Safety and Health Program*

The CABRERA Safety and Health Manual contains policies, procedures and practices that are based on Federal and State laws and regulations, National Consensus Standards, recognized best practices, and client requirements. Procedures and field Safe Work Practices are diverse and will be established, reviewed, updated and revised accordingly.

This OSHMP document provides the necessary guidance and purpose behind the written procedures contained in the Health and Safety Manual. The policies and procedures ensure regulatory compliance and exceed the requirements that are mandated by law. As new regulations are promulgated or revisions to existing regulations are issued, the contents of the Health and Safety Manual will be revised accordingly. New procedures will be added to the Health and Safety

Manual as they are warranted by new standards, client or project requirements, or best practice concepts.

Key elements of the overall program are summarized in later sections of this process. They are detailed in their respective procedure document. Key elements of this program include, but are not limited to, the following:

- Hazard Communication
- Confined Space Entry
- Control of Hazardous Sources of Energy (Lockout/Tagout)
- Personal Protective Equipment
- Respiratory Protection
- Fall Protection
- Trenching and Excavation
- Medical Surveillance
- Activity Hazard Analysis
- Incident Reporting
- Accident Investigation
- Emergency Preparedness
- Protection against Temperature Extremes

#### 2.3.8 *Medical Surveillance*

Occupational medical surveillance examinations provide baseline and periodic measurements to detect abnormalities in workers exposed to work-related health hazards. CABRERA's approach is to minimize the potential for exposure through the use of engineering controls, work process modification and the use of personal protection equipment.

The goals of the medical surveillance program include:

- Protect employees
- Meet regulatory (HAZWOPER) and client requirements
- Minimize company liability
- Use comprehensive standardized exam protocols
- Track exam frequency, medical conditions, and lab results
- Provide central oversight and record keeping
- Demonstrate that workers are fit to perform their jobs safely and reliably;
- Provide ongoing assurance that hazard controls minimizes worker exposure
- Provide for effective management of Workers' Compensation claims

Regarding Workers' Compensation claims management, the preferred approach to periods of disability for work injuries is to provide *modified* or *light duty* assignments within a physician's directed limitations and to monitor the employee's rehabilitation progress. CABRERA will work directly with medical personnel overseeing cases to ensure proper claims management.

### 2.3.9 Statistical Reporting

Accident statistics are prepared on a quarterly basis by the Corporate Health and Safety Manager and are posted on CABRERA'S intranet health and safety pages. Lost Time Incident Rate, Lost Workday Rate, Total Recordable Incident Rate, and Lost Day Rate performance are tracked. Also, the workers compensation Experience Modification Rate (EMR) is posted. Adjustments to S&H Programs may be made as a result of these performance indicators.

### 2.3.10 Communications

The Corporate Occupational Safety and Health Manager (OSHM) serves as a central liaison for distributing generic S&H information, procedures and safe work practices. Each employee is encouraged to further distribute communications that they feel can contribute to the health and safety of CABRERA employees. This communication can be made directly via email or through the OSHM.

Project sites must post legally required posters regarding Occupational Safety and Health (OSHA), Nuclear Regulatory Commission (NRC), Department of Labor (DOL) and other applicable agency or contract requirements. The use of posters, banners and signage to communicate other S&H information is encouraged at project sites and will be at the discretion of the FOL.

### 2.3.11 Contractor Pre-Qualification

Contractor prequalification is a process for screening the S&H performance of organizations and/or individuals supplying human resources and services. The U.S. government requires competitive bids and safety performance must be a key element when evaluating credentials among bidders. The process is designed to provide the buyer of human resources and services with an overview of the potential contractor's safety management system. It enables the buyer to determine whether those practices conform to CABRERA'S vision for health and safety and the health and safety culture already established within the organization. Contractor prequalification allows the buyer of contractor services to efficiently and effectively determine the most appropriate contractor for the task.

## 3.0 CABRERA OCCUPATIONAL SAFETY AND HEALTH ORGANIZATION

The occupational safety and health organization includes sufficient personnel to provide support in the planning and conduct of work at each job site. Personnel include qualified, trained, and experienced safety professionals who specialize in the identification, prevention or mitigation and control of physical and/or chemical hazards in the work place.

The primary functions of the health and safety organization include:

- Evaluate proposed work processes
- Ensure safe use of equipment and chemicals in day-to-day operations,

- Establish administrative and engineering controls
- Monitor performance and provide guidance in actual or potentially hazardous environments or in working with hazardous materials,
- Ensure hazards are properly and completely identified,
- Assist line supervisors in the identification and control of safety hazards and communication of hazards to personnel, and
- Ensure training and education in hazard recognition, control safe work requirements.

### **3.1 Corporate Management Responsibilities**

CABRERA management is committed to Safety and Health in all company activities. The following are the primary personnel responsible for the Program.

#### *3.1.1 Chief Executive Officer*

The CABRERA CEO is responsible for defining the corporate S&H objectives and enforcing those objectives. The CEO does this by setting an example that S&H is of utmost importance to all CABRERA activities and considering S&H in all decisions when evaluating personnel.

#### *3.1.2 Vice President of Operations*

The CABRERA Vice President of Operations (VPO) is responsible for the day-to-day S&H activities of all projects. The VPO supports the corporate S&H objectives by setting an example that S&H is of utmost importance and takes this into consideration during any evaluation. The VPO defines the project objectives, allocates resources, determines the chain-of-command, and evaluates the project outcomes. The VPO will:

- Ensure that the Program is reviewed at least on an annual basis.
- Provide the necessary facilities, equipment, and resources to safely and efficiently complete the scope of work.
- Provide adequate personnel and time resources to conduct the site work activities safely.
- Support the efforts of on-site management.
- Assess and recommend appropriate disciplinary action when violations of safety rules or procedures unsafe acts or practices occur.

#### *3.1.3 Corporate Occupational Safety and Health Manager*

The Corporate Occupational Safety and Health Manager (OSHM) is responsible for administering the OSHMP and all of its components, communicating information about S&H policies and initiatives, reviewing and accepting all SSHPs. Additionally, the OSHM shall be responsible for:

- Establishing policies related to S&H for the company and specific projects.
- Providing counsel and advice on S&H matters.
- Establishing and maintaining Company S&H training programs.

- Providing effective liaison between the company and outside governmental or private agency or professional services as may be required.
- Evaluating accident data to develop statistics to determine the overall success of the Company's accident prevention efforts and making recommendations for improvement where appropriate.
- Keeping management informed as to the safety efforts throughout the company.
- Implementing and overseeing the S&H Program.
- Tracking and posting required information, reporting injuries to OSHA, etc.
- Tracking changes in applicable S&H regulations (OSHA, Environmental Protection Agency (EPA), United States Army Corps of Engineers (USACE), etc.) and making changes to the Program as necessary.
- Coordinating with PMs to ensure that trained and qualified safety personnel are available and assigned.
- Coordinating and consulting with the SSHO for field implementation of the SSHP.
- Assisting in site-specific hazards training.
- Working with SSHO's to develop their skills in using monitoring instruments, interpreting results, identifying and remediating hazards, selecting personal protective equipment (PPE) levels, decontamination procedures, emergency/spill response procedures, etc.
- Conducting project S&H inspections and audits.
- Responding to any formal audits by Client representatives or outside agencies.
- Tracking and coordinating all training and medical requirements for all employees.
- Maintaining all training and medical documentation per applicable regulations.

#### *3.1.4 Corporate Radiation Safety Officer*

The Corporate Radiation Safety Officer (RSO) integrates radiation protection disciplines into the OSHMP where applicable and assists the OSHM with all aspects of the corporate radiation safety program (RSP). The RSO will review the S&H Program and SSHP to ensure they comply with applicable State and Federal radiation regulations. The RSO will assist the SSHO in implementation of the RSP at the corporate and project levels. The RSO has the following additional responsibilities:

- Coordinates with the OSHM in developing the RSP portion of the Program.
- Coordinates with the PM and OSHM for the RSP portion of the SSHP.
- Coordinates and provide consultation with the SSHO for field implementation of the RSP.
- Ensures compliance with all applicable regulations concerning the handling of radioactive material.

- Ensures that appropriate levels of radiation training are provided to all on-site personnel who may be exposed to ionizing radiation.
- Maintains NRC license and communicate its requirements to the Company.
- Provides effective liaison between the company and outside governmental or private agency or professional services as may be required.

### **3.2 Field Management Responsibilities**

CABRERA managers, supervisors and employees have the primary responsibility for safe work performance. They are responsible for day-to-day direction and oversight of work activities to ensure that the Company's occupational safety goals and objectives are attained. Supervisors or project managers are responsible for:

- Identifying hazards in the work place,
- Ensuring this information is provided sufficiently early in the work planning process to allow identification of adequate engineering and/or administrative controls,
- Ensuring employees are aware of the hazards in the work place,
- Ensuring employees have the necessary experience, training and qualifications,
- Observing and evaluating employee safety performance,
- Investigating accidents and near misses, and
- Reporting employee work related injuries and illnesses.

Supervisors and project managers shall attempt to eliminate work area hazards as the primary defense against work place injuries and/or work related illnesses. When this is not possible, engineering and/or administrative controls and work practices shall be addressed by qualified personnel to ensure effective corrective measures are taken.

### **3.3 Project Management Responsibilities**

CABRERA managers, supervisors and employees have the primary responsibility for safe work performance at their assigned sites. This is accomplished through implementing procedures for planning and performance work safely. PM's and FOLs shall attempt to eliminate work area hazards as the primary defense against work place injuries and/or illnesses. When this is a not possible, PM's and FOLs shall ensure that the appropriate personnel address engineering and/or administrative controls and work practices.

#### **3.3.1 Regional Vice President (RVP)**

The Regional Vice President (RVP) is responsible for implementing the OSHMP at all project sites and offices under their cognizance. The RVP must ensure that safety is given proper attention from the proposal stage through completion of

each project. The RVPs must demonstrate through their actions that safety is an essential company value that must be consistently enforced and violations of S&H rules and regulations will not be tolerated. Workplace safety and health is conveyed through the RVP's organization by setting goals and objectives that are realistic and achievable. With the assistance from the OSHM, the RVP will set annual expectations for the Program and Project Managers that will serve to establish the importance of maintaining a safe environment at each project site.

### *3.3.2 Program Manager (PrgM)*

The Program Manager (PrgM) is responsible for establishing and executing program administrative matters, program controls, program-related policy matters, and program levels of authority, responsibility, and communication. The Program Manager is responsible for ensuring necessary project health and safety personnel have been assigned to the project team and that necessary health and safety documents, review and notification have been performed before the commencement of site related activities.

### *3.3.3 Project Manager (PM)*

The CABRERA PM has final responsibility for managing all aspects of the work operations, and is responsible to CABRERA management for the safe completion of work activities. Specific safety-related duties include:

- Ensuring information on scope of work, planned work methods, known or potential safety, and chemical, radiological, or biological hazards are provided to the S&H organization early in the work planning process to allow for implementation of adequate engineering and/or administrative controls.
- Ensuring that an approved SSHP is prepared and addresses all aspects of the work to be performed.
- Providing adequate resources and supplies to fulfill all work safety requirements.
- Assigning the FOL and SSHO to provide on-site management of work activities.
- Ensuring employees are aware of the hazards in the work place.
- Ensuring employees have the necessary experience, training and qualifications.
- Contacting the OSHM for guidance regarding any S&H related matters.

### *3.3.4 Field Operations Leader*

At each fieldwork site an FOL will be assigned to manage all CABRERA and subcontractor activities at the site. Ultimately, the FOL is responsible for the implementation of safe work practices at the project site, and to ensure the safety

and health site employees, contractors, and visitors at the site. The FOL is responsible for:

- Day-to-day direction of workers and oversight of work activities to ensure they are performed in a safe manner.
- Ensuring that no work is performed which is not properly addressed in the SSHP (or approved supplemental guidance).
- Implementing and enforcing the SSHP.
- Ensuring that S&H requirements are communicated to all personnel, including site visitors.
- Ensuring that task leads and subcontractors enforce all provisions of the SSHO.
- Coordinating with the SSHO to implement all S&H performance elements.
- Ensuring that CABRERA S&H goals are attained.
- Maintaining the presence of at least one qualified first aid provider on site at all times. (Note that some regulations require two qualified persons on-site (e.g., USACE). This responsibility is shared with the OSHM and PM.
- Ensuring that all personnel assigned to perform on-site activities meet the required training and medical qualifications.
- Contacting the OSHM for guidance regarding any health and safety related matters.
- Conducting daily safety briefings and answering any questions asked.
- Continuously monitoring the work place for unsafe acts or conditions and initiating corrective actions.
- Observing and evaluating employee safety performance.
- Investigating accidents and significant near misses.
- Reporting employee work-related injuries and illnesses to OSHM.

### 3.3.5 Site Safety and Health Officer

The SSHO is responsible for the day-to-day implementation of the SSHP. The SSHO has the authority to shut down any operation that he/she feels jeopardizes the health and safety of site personnel, the environment or local personnel. The SSHO must have a thorough understanding of occupational safety and health concepts and be knowledgeable in OSHA regulations. This credential can be obtained by having demonstrated experience through previous assignments or training. The OSHA 10-hour Construction Safety and Health course is highly recommended as a minimum requirement. In addition, the SSHO has the following responsibilities:

- Advise the FOL of S&H issues at the work site.
- Assist the FOL in the implementation and enforcement of the SSHP.
- Train employees in site-specific hazards.
- Collect and retain necessary training and medical documents and ensure they are transmitted to the corporate office for retention.
- Assist in the development of additional S&H procedures, as required.

- Assist the FOL in the investigation of accidents/incidents and significant near misses.
- Conduct and document weekly safety audits.
- Perform regular and frequent site inspections to identify hazards and observe employees at work.
- Stop work, as required, to maintain S&H.
- Assist in developing site-specific emergency evacuation routes, post local emergency telephone numbers, and arrange emergency transportation.
- Assist in establishing any necessary controlled work areas as designated in the SSHP or other S&H documentation.
- Present site-specific hazards at the daily tailgate safety meetings and maintain attendance logs and records.
- Discuss potential S&H hazards with the FOL, OSHM and the PM.
- Ensure that air monitoring is implemented according to the SSHP or other S&H documentation and forward all employee exposure monitoring information to the OSHM for exposure notification and records retention.
- Implement field elements of the site-specific Respiratory Protection Program and PPE.
- Assist the FOL in maintaining decontamination procedures.
- Serve as the Site Radiation Safety Leader (SRSL) during work activities involving potential radiological hazards.

#### 3.3.6 Site Radiation Safety Officer

The Site Radiation Protection Officer (SRSO) will be assigned to projects anytime CABRERA'S NRC license is invoked. The SRSO must be listed on the NRC License, maintain the credentials listed below or, be appointed by the RSO. These SRSO credentials include but are not limited to:

- Certification by the American Board of Health Physics (CHP)
- Certification by the National Registry of Radiation Protection Technologists (NRRPT)
- Certification by the American Board of Industrial Hygiene (CIH)
- Education in Radiation Protection disciplines by an accredited college or University
- Approved competency by the RSO due to prior experience, education, and hands-on training in the fundamentals of Radiation Protection.

SRSO responsibilities include:

- Implementing work activity radiation monitoring according to the RSP.
- Discussing potential radiological hazards with the FOL, RSO, and the PM.
- Communicating radiological hazards to all on-site personnel.
- Ensuring that the RSP portion of the SSHP is implemented.
- Monitoring the handling and disposal of any radiological waste.
- Ensuring that all personnel follow the radiological control measures.
- Conducting and documenting radiological surveys.
- Enforcing all applicable CABRERA RSP procedures.

- Ensuring that all field instrument QA and quality control (QC) documentation is completed.
- Notifying the RSO of any radiation safety issues that arise on the site.
- Ensuring compliance with NRC regulations and all specific requirements of CABRERA'S NRC license.
- Ensuring personnel directed to administer portions of the RSP are qualified to do so.

### 3.3.7 *Site Radiation Protection Leader*

The Site Radiation Protection Leader (SRPL) fulfills all of the responsibilities as that of the SRPL when CABRERA'S NRC license is not invoked. As a result, the qualifications of the SRPL are relaxed and will be determined by the company RSO and PM.

### 3.3.8 *CABRERA Radiation Workers*

Although all personnel assigned to project sites where radioactive materials are present are required to pass CABRERA'S Radiation Worker exam, CABRERA Radiation Worker designation at project sites as defined by this Process applies to CABRERA employees who perform Radiation Protection tasks directed by the SRSO/SRPL. Such tasks may include:

- Conduct and document radiological surveys.
- Enforce all applicable CABRERA RSP procedures.
- Ensure that all field instrument QA and quality control (QC) documentation is completed.
- Notify the SRSO/SRPL of any radiation safety issues that arise on the site.
- Ensure compliance with NRC regulations and all specific requirements of CABRERA'S NRC license.

### 3.3.9 *Site Specific Personnel*

Some projects by the nature of the tasks or the complexity of the work may require personnel with specialize training and experience. Such personnel may be CABRERA employees or contract employees depending on specific needs. In many instances, these personnel will serve in an advisory capacity providing input to the design or implementation of project activities. Responsibilities of Site Specific Personnel will be defined in each SSHP. Site Specific Personnel may include but are not limited to:

- Project Engineers
- Project Technical Leads
- UXO Supervisors or Technicians
- Certified Health Physicists
- Certified Industrial Hygienists or Certified Safety Professionals
- Professional Engineer or Professional Geologist
- Certified Waste Broker

### 3.3.10 Personnel Assigned to the Project

Each person (CABRERA or subcontractor employee) in the office or at a field site is responsible for his/her own S&H, for completing assigned tasks in a safe manner and for reporting any unsafe acts or conditions to his/her supervisor and/or the FOL/SSHO. All personnel are responsible for continuous adherence to the specified S&H procedures during the performance of their work. No person may work in a manner that conflicts with the letter or intent of safety and environmental precautions expressed in procedures. CABRERA employees are subject to progressive discipline and may be terminated for blatant or continued violations

All personnel are expected to:

- Abide by all written S&H requirements and any supplementary instructions
- Properly use the PPE as required.
- Perform only tasks that they can do safely and in which they have been trained.
- Notify the OSHM or the SSHO of special medical conditions (i.e., allergies, contact lenses, etc.).
- Notify the OSHM or the SSHO of prescription and/or non-prescription medication the worker may be taking that might cause drowsiness, anxiety or other unfavorable affects.
- Practice good housekeeping by keeping their work area neat, clean, and orderly.
- Immediately report all injuries, accidents, or near misses to the OSHM or the SSHO, depending on their work location.

### 3.3.11 Subcontractors

Each CABRERA subcontractor is responsible for the S&H of its employees. CABRERA will not be responsible for the implementation of the contractors' S&H program. CABRERA will perform oversight and inspections of the contractors' work activities and will take appropriate action to ensure safety as needed. Appropriate action will include, but not be limited to, advising the contractor of potential problems or violations, and stopping work.

Subcontractor's management will provide qualified employees and allocate sufficient time, materials and equipment to safely complete assigned tasks. In particular, each subcontractor is responsible for equipping its personnel with any required PPE. CABRERA considers each subcontractor to be an expert in all aspects of the work operations for which they are tasked to provide, and each subcontractor is responsible for compliance with those regulatory requirements which pertain to those services. Each subcontractor is expected to perform its operations in accordance with its own unique safety policies and procedures, and to ensure that hazards associated with the performance of the work activities are properly controlled. Copies of any required safety documentation for a subcontractor's work activities will be provided to CABRERA for review prior to the

start of on-site activities. In the event that subcontractor procedures/requirements conflict with requirements specified in this Program, the more stringent guidance will be adopted and communicated to the subcontractor.

Hazards not listed in the SSHP but known to any subcontractor, or known to be associated with a subcontractor's services, must be identified and addressed to the CABRERA PM or FOL prior to beginning work operations. The FOL or authorized representative has the authority to halt any subcontractor operations, and to remove any subcontractor or subcontractor employee from the site for failure to comply with established S&H procedures or for operating in an unsafe manner.

### *3.3.12 Site Visitors*

Visitors to any CABRERA controlled work area must comply with the S&H requirements of this Program and demonstrate an acceptable need for entry into the work area. All visitors entering any controlled work area must observe the following procedures:

- A written confirmation must be received by CABRERA documenting that each of the visitors has received the proper training and medical monitoring required by the SSHP. Verbal confirmation can be considered acceptable provided such confirmation is made by an officer or other authorized representative of the visitor's organization..
- Each visitor will be briefed on the hazards associated with the site activities being performed and acknowledge receipt of this briefing by signing the appropriate tailgate safety briefing form.
- A CABRERA employee fully trained and qualified for unescorted access to the areas to be visited will escort each site visitor or group.
- All site visitors shall wear the required PPE for entry into the controlled zone. Failure to wear the appropriate PPE will be cause for denial of entry.

If the site visitor requires entry to any controlled area, but does not comply with the above requirements, all work activities within the controlled area must be suspended and monitoring using direct reading instruments must indicate that no airborne contaminant concentrations are present which exceed the established background levels. Until these requirements have been met entry will not be permitted.

## **4.0 MINIMUM REQUIRED SAFETY PROCEDURES**

The Safety Procedures summarized in this section are not an all-inclusive list approved by CABRERA management. These represent the requirements for focused activities that address either inherently hazardous operations or those that must be followed for the OSHMP to be effective. The order in which they are listed does not imply level of importance or degree of hazard. Additionally, other procedures may in fact exceed in importance those listed here depending on the conditions present at a worksite. Examples may include, but are not limited to

“working near water”, “ladder safety”, or “compressed gas safety” to name a few. All written procedures follow this document and address specific requirements in detail.

#### **4.1 Hazard Communication**

Employee exposure to toxic material shall be maintained below the applicable Occupational Safety and Health Administration (OSHA) permissible exposure limits (PEL) or ceiling limits in 29 CFR 1910.1000. In compliance with the OSHA Hazard Communication Standard, employees will be informed of any hazards associated with the materials used in the course of their work.

Use of potentially toxic materials shall be evaluated during work planning. Actual or potential hazards shall be addressed in the AHA for the activity in which they are used. Material safety data sheets shall be available for hazardous chemicals used at the job site. Chemical containers shall be labeled indicating the type and degree of hazard using the hazard identification system identified. When new materials are proposed, the primary objective shall be to utilize the least toxic material whenever possible. Where existing procedures use toxic material, management and supervision should pursue acquisition of a non-toxic replacement.

#### **4.2 Confined Space Entry**

Confined spaces are a significant hazard and one of the leading contributors to serious and sometimes fatal workplace accidents. Work in areas identified as a confined space (permit or non-permit) requires the involvement of numerous work groups to ensure the atmospheric hazards are identified, permits, if required, are approved, attendants are in place, contingency plans are identified and rescue personnel are in place prior to entry. Work in these areas shall be evaluated during the planning process and addressed in the AHA. The AHA shall determine the presence of a confined space and categorize the area as permit required or non-permit required. Extensive planning for confined spaces work shall be required, and sufficient time shall be allowed to properly evaluate existing hazards and those which may result from the proposed work. The planning activities shall include categorization and permit requirement, and preparation and approval of permits and associated contingency plans, such as the required rescue plan.

#### **4.3 Control of Hazardous Sources of Energy (Lockout/Tagout[LOTO])**

Hazardous energy sources include electrical, mechanical, hydraulic, pneumatic, chemical, thermal or other energy, either produced, transferred/transmitted or stored which may cause injury to employees. Of particular concern are hazardous energy sources which may not be visible (underground, within walls or floor slabs or otherwise hidden) during the performance of work, such as excavation, core boring, building renovation, demolition, well drilling, etc.

A comprehensive lockout/tagout program shall be implemented to identify hazardous energy sources in the work area through the JSA. The program shall

ensure that appropriate methods are implemented to lockout and tagout the energy source prior to the performance of work. In areas where underground utilities might be present, it will be necessary to identify the location of those energy sources in the area. The lockout/tagout program shall implement the requirements specified in 29 CFR 1910.147.

#### **4.4 Personal Protective Equipment**

The objective of the Personal Protective Equipment (PPE) Program is to protect employees from the risk of injury or exposure by creating a barrier against workplace hazards. Personal protective equipment is not a substitute for good engineering or administrative controls or good work practices, but should be used in conjunction with these controls to ensure the safety and health of employees. Personal protective equipment will be provided, used, and maintained when it has been determined that its use is required and that such use will lessen the likelihood of occupational injury and/or illness.

#### **4.5 Respiratory Protection**

The purpose of the Respiratory Protection Program is to ensure the protection of employees from respiratory hazards through the proper use of respirators. Respirators are to be used only when engineering controls (e.g. enclosure or confinement of the operation, ventilation or substitution of less toxic materials) are not feasible, while engineering controls are being installed or repaired, or in emergencies. When respirators are to be used, all requirements of this program shall be met. The respiratory protection program meets the requirements of Title 29, Code of Federal Regulations, OSHA 1910.134.

#### **4.6 Activity Hazard Analysis**

Recognizing occupational safety hazards is the most important step in the process leading to prevention and control, and entails identifying potentially harmful materials and processes. Typically, potential health hazards should be identified during the work planning process, which may include:

- Review of proposed processes and identification of hazards, to include chemical and physical hazards, as well as ergonomics
- Discussions with vendors and other industries experienced with similar processes
- Review of data, including material safety data sheets, historical facility/site data, similar tasks performed at the site, available industry data
- Discussions with site personnel responsible for design and/or implementation
- Review of the applicable site location where the work will be performed
- Evaluation of available engineering controls and required support equipment and material existing at the site
- Review of lessons learned and applicable corrective actions to determine applicability to the proposed work
- Evaluation of personal protective equipment

#### 4.7 Trenching and Excavation

Similar to confined spaces, work in excavations present significant hazards and are also one of the leading contributors to serious and sometimes fatal work place accidents. Excavations shall include any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal. Work in these areas also requires the involvement of numerous work groups. Work activities that require excavation shall be addressed during planning and in the activity hazard analysis (AHA). Planning and hazard analysis shall include all phases of excavation, including site preparation, identification of underground hazardous energy sources, design, actual excavation, inspections, work in excavations, worksite maintenance and control, and closure. Procedures for this work shall implement the requirements of 29 CFR 1926, Subpart P, Excavations. Excavations which have the potential for employee engulfment while work is performed in the excavation and, in some instances, the potential for hazardous atmospheres shall be considered permit required confined spaces.

#### 4.8 Incident and Near Miss Reporting and Investigation

Reports required by this program include:

- Mandatory reports required by OSHA;
- Occupational illness and injuries
- "Near miss" incidents
- Deteriorating conditions resulting in or having the potential to create a safety concern
- Employee exposure monitoring results
- Program performance monitoring results

In accordance with 29 CFR 1904.8, the following criteria require an oral report, either by telephone or in person, to the OSHA area office nearest the site of the incident or using the OSHA toll-free emergency telephone number, within eight (8) hours following the incident:

- Any single work related fatality, or
- In-patient hospitalization of three or more employees due to work related injuries. This does not include out-patient care, such as emergency room treatment and patient release.

Reporting requirements apply to either of the conditions stated above which occur within thirty (30) days of an incident. Exceptions are allowed for circumstances when an employer does not learn of a reportable incident at the time it occurs. In such cases, reporting shall occur within eight (8) hours of the time the incident is reported to any agent or employee of the Company. Therefore, it is imperative that employees are aware of the site regulatory reporting requirements and reporting chain. Determination of reporting requirements and incident reporting shall be performed by the OSHM or a designee.

Each report required by 29 CFR 1904 shall include the following:

- Establishment name
- Location of the incident
- Time of the incident
- Number of fatalities or hospitalized employees
- Contact person
- Telephone number
- Brief description of the incident.

When employees of contract companies are utilized and an incident involves employees other than CABRERA permanent employees, OSHA has provided the following interpretation:

*"...all workers who are supervised on a day-to-day basis by a given employer are considered employees of the using firm for recording and reporting purposes." Therefore, all work related fatalities and hospitalizations for incidents which occur under the direct supervision of Cabrera Services, Inc. or during offsite work performed for Cabrera Services, Inc., shall be reported and recorded in accordance with this section, regardless of the employer.*

#### *4.8.1 "Near Miss" Incidents*

"Near miss" incidents should receive the same level of management attention as if the incident resulted in an actual injury or illness. Although regulatory reporting is not required, in-depth "root cause" analysis should be performed and the causes corrected and evaluated.

#### *4.8.2 Other Conditions Having the Potential to Create a Safety Concern*

Conditions which create or have the potential to create a safety concern should be reported to supervision and/or management. Conditions may include missing or malfunctioning guards, improperly secured compressed gas cylinders, etc. The employee or supervisor shall initiate a report to ensure the concern is properly documented and brought to management's attention for correction.

#### *4.8.3 Employee Exposure*

Exposure monitoring and medical surveillance reports shall be provided to employees as required by 29 CFR 1910.20.

### **4.9 Emergency Preparedness**

Emergencies can occur at any time, without warning. Careful planning, with an emphasis on safety, can help employees handle crises and emergencies with appropriate responses, and may save lives. Every CABRERA employee shares responsibility for emergency preparedness. Line managers, program managers and project managers are responsible for ensuring that facilities and projects under their area of responsibility have emergency plans in place, and that all persons – including visitors, contractors, and project-base employees – are familiar with the emergency plans. Line managers are also responsible for

assigning emergency preparedness and response duties to appropriate staff members.

The primary goals of the Emergency Preparedness Plan are:

- To protect lives, property and facilities.
- To prevent or minimize the impact of emergencies and to maximize the effectiveness of CABRERA employees in responding to emergency situations.
- To provide for the continuity of operations and restoration of pre-emergency conditions in an orderly and timely manner.

#### **4.10 Medical Surveillance**

This key element is summarized in Section 2.3.8.

#### **4.11 Office Safety and Ergonomics**

Employees have the potential to receive injuries or illnesses at work regardless of what they are tasked to do. The office environment may not at first appear to contain many hazards, but as everyone should know, hazards do exist and they must be aware of them at all times. Some common office hazards include:

- Tripping hazards caused by clutter or temporary electrical cords
- Fall hazards caused by using chairs or desks instead of ladders
- Electrical hazards caused by overloading circuits or unauthorized repair
- Material handling hazards caused by improperly moving equipment or supplies
- Struck-by hazards caused by falling objects improperly stored on shelves or overloaded shelves
- Lacerations caused by improper use of razors or other cutting or slicing equipment

Office ergonomics is an issue that must be addressed for anyone spending the major portion of their day at computer workstations. Improper workstation design is a source for musculoskeletal conditions ranging from a sore or aching back, neck, or shoulder, to more serious injuries such as carpal tunnel syndrome. Office employees will be made aware of ergonomic concerns through training and communication tools. Most importantly, Cabrera will conduct ergonomic assessments for new employees, existing employees who may have medical conditions that warrant such assessment, or anytime an employee has a concern regarding the ergonomic conditions at their workstation.

#### **4.12 Heavy Equipment Operations**

The Heavy Equipment Operation Procedures establish guidelines to be followed whenever any Cabrera Services' employees work with heavy equipment. The rules are established to:

- Provide a safe working environment,

- Govern operator use of heavy equipment,
- Ensure proper care and maintenance of heavy equipment, and
- Comply with the requirements of 29 CFR 1926, Subpart O.

These procedures establish uniform requirements designed to ensure that heavy equipment operation practices are communicated to and understood by the affected employees. These requirements are also designed to ensure that procedures are in place to protect the health and safety of employees performing activities in proximity to heavy equipment operations.

#### **4.13 Fall Protection**

The use of fall protection is required whenever a fall hazard of six feet or greater exists. Each project will be evaluated for fall hazard potential prior to the onset of work. Where fall hazards exist, the AHA will be completed with the fall protection requirements addressed. Any employee required to use fall arresting equipment must be trained in the proper use and care of the equipment. Furthermore, employees required to work where a fall hazard exists must be trained in the recognition of fall hazards and must report conditions that may warrant the use of fall protection. Such conditions may include but are not limited to work requiring the use of ladders or scaffolds, roof work, working near floor openings or edges, etc.

#### **4.14 Contractor Prequalification**

This key element is summarized in Section 2.3.11.

#### **4.15 Hearing Conservation**

The hearing conservation plan details the process by which exposure to noise at project sites is evaluated and controlled and how workers are medically monitored to ensure the hearing conservation efforts are effective. Ultimately this program is in place to protect the hearing of all workers in the company. Elements of the hearing conservation program include:

- Monitoring
- Audiometric testing
- Hearing protection
- Training and information
- Recordkeeping.

#### **4.16 Exposure Control Plan for Bloodborne Pathogens**

The Exposure Control Plan (ECP) is provided to eliminate or minimize occupational exposure to bloodborne pathogens in accordance with OSHA

standard 29 CFR 1910.1030, "Occupational Exposure to Bloodborne Pathogens."

The ECP includes:

- Determination of employee exposure
- Implementation of various methods of exposure control, including:
  - Universal precautions
  - Engineering and work practice controls
  - Personal protective equipment
  - Housekeeping.
- Hepatitis B vaccination
- Post-exposure evaluation and follow-up
- Communication of hazards to employees and training
- Recordkeeping
- Procedures for evaluating circumstances surrounding an exposure incident.

## **5.0 HAZARD PREVENTION AND CONTROL**

The primary objective of the S&H program is the elimination of hazards. However, if elimination is not possible, controls will be established to minimize potential exposure of employees to the maximum extent practicable. Adequate and thorough hazard prevention and control requires completion or evaluation of numerous elements. In addition to those described in Section 2.3.6, key elements in the hazard control process include:

### **5.1 Work Scope Control**

Work planning and work control processes shall establish requirements to re-evaluate the AHA and the adequacy of safety requirements to prevent or control employee exposure to hazards. The AHA shall be evaluated and modified, if necessary, to address changes in work scope which may introduce a new hazard or different mode of employee exposure. New or revised work plans shall be developed to address occupational health and safety requirements, as necessary, to ensure that work area or process hazards are identified, eliminated or controlled prior to potential employee exposure to the hazard.

### **5.2 Engineering Controls and Work Practices**

Engineering controls and work practices shall be used to minimize employee exposure to workplace hazards to the maximum extent possible. The use of containment, work area or localized ventilation, and specific performance methods, such as the use of water to minimize potential airborne contaminants and area decontamination are the primary controls for minimizing potential employee exposure to work place air contaminants. Other controls may include the use of shields, screens, barriers, cooling or heating devices, robotics, special

designed tools and equipment, PPE, etc. Design of engineering controls and the application of work practices shall ensure that the goals and objectives of the OSHMP are achieved. When necessary, site procedures or work plans shall be prepared and implemented to ensure the proper design, construction, installation, implementation and verification of engineering controls and work practices. The effectiveness of the engineering controls shall be evaluated to ensure the design criteria are met. Periodic work place inspections, surveys and employee monitoring shall be performed to continue to evaluate the effectiveness of engineering controls and work practices.

### **5.3 Administrative Controls**

Administrative controls shall also be identified during performance of the AHA and implemented to minimize employee exposure to work place hazards. Administrative controls may include work scheduling, employee exposure time, limitations placed on the amount of hazardous material allowed, etc. As with engineering controls and work practices, the effectiveness of administrative controls shall be evaluated to ensure the objectives of the program are achieved.

### **5.4 Equipment Maintenance and Inspection**

All tools and equipment shall be maintained in good working condition. Safety devices, such as ground plugs, guards, interlocks, etc. shall not be removed and shall be periodically tested and/or inspected to ensure that they continue to perform as designed. Hoisting and lifting devices, including cranes, fork trucks, powered and manual hoists, hooks, chain, wire rope, slings, shackles, etc. shall be tested, as necessary, and inspected in accordance with applicable standards. Tags, labels, color coding, etc. shall be used, as necessary, to identify inspected equipment and indicate when the next inspection and/or test is due. Tools and equipment not passing inspection and testing criteria shall be readily identified, removed from service, repaired, returned to the manufacturer or owner (rental equipment) or discarded.

## **6.0 HEALTH AND SAFETY TRAINING**

One of the basic requirements and obligations an employer has to each employee is to provide clear, complete and accurate information concerning work place hazards. Employee training shall be commensurate with job responsibilities, potential work area hazards and associated risks.

Implementation of the mandatory training requirements specified in 29 CFR represents a reasonable and prudent starting point for determination of employee training needs. However, determination of training and education shall go well beyond minimum regulatory requirements and address knowledge requirements necessary for employees to perform their assigned tasks safely. When

necessary, practical exercises, on the job training and completion of task qualifications shall be included in the training program.

### **6.1 Employee Training**

Training shall provide employees with the basic tools necessary to perform the following:

- Recognize actual or potential hazards, including the hazard(s) that may be created as a result of their job activities
- Understand the physical or biological effects of exposure to the hazard(s)
- Understand the risks associated with the hazard(s)
- Recognize locations where the hazard(s) may exist
- Understand exposure limits, surveillance and monitoring requirements (if necessary)
- Implement acceptable controls and work practices to eliminate or minimize exposure to the hazard(s), including the correct use of PPE
- Understand and implement procedure and program requirements
- Understand performance limitations
- Understand roles and responsibilities
- Understand contingency plans and emergency response procedures, including reporting requirements
- Understand where and how to obtain additional information

Supervisors must be aware of training and qualification expiration dates. Employees shall be restricted from specific work activities when qualifications expire and retraining is not completed within the time frame allowed. Supervisors are required to ensure:

- Tasks are assigned to properly trained and qualified personnel
- Employee training and qualifications are maintained current
- Employees are scheduled for training and attend as assigned
- New tasks or changes to existing tasks are evaluated for training needs
- Perform or assist in the performance of training effectiveness evaluations

### **6.2 Manager and Supervisor Training**

In addition to the basic knowledge requirements discussed in the previous section, managers and supervisors shall receive additional training and education to perform the following:

- Analyze work under their supervision to identify previously unrecognized potential hazards
- Understand the safety training requirements and processes for ensuring employee training and qualifications are maintained current

- Understand surveillance and monitoring results and threshold values for additional action, including removal of employees from the work environment for medical reasons
- Recognize the signs and symptoms resulting from exposure to hazardous material
- Understand the function, purpose and design/implementation limitations of engineering controls, work practices and PPE and the appropriate applications
- Assist in completing AHA's and implement required safety measures
- Review employee concerns and/or program improvement recommendations and take appropriate action
- Perform incident and near miss investigations and identify and implement corrective actions
- Evaluate employee safety performance
- Establish and monitor progress towards safety performance goals
- Provide recommendations for safety program improvement

### **6.3 New Employee Orientation**

Whenever a new employee comes on board, there is a period of training and learning in which the new employee learns about the company's safety and health programs, emergency action plans, fire protection policy, and any other safety-related issues that the employee must know.

This is also an opportunity to influence the new employee on the safety culture of the company, and positively influence that employee to keep safety always in mind.

The employee orientation should be started during the employee's first day on his or her new job. The entire orientation program may be broken up over a period of a few days, but when it is complete, employees should know the following safety information:

- The organization's safety objectives and goals
- What employees should do if they are injured on the job.
- The procedures for reporting accidents, near-miss incidents, hazards, injuries, and illness.
- What to do in case of an emergency.
- OSHA's recordkeeping requirements and employee access to exposure and medical records.
- The safety rules and safe procedures that apply to their jobs (especially for tasks with OSHA-required training).

## **7.0 ASSESSMENT**

Various tools shall be used to ensure that managers, supervisors and employees continue to meet safety goals and to ensure that the overall safety program is effective in eliminating or minimizing work related safety hazards and associated injuries and illnesses. These tools consist of the following:

- Establishing and monitoring performance goals
- Evaluating project safety performance (injury and illness rates, including "near misses")
- Program assessments

Goals shall be established for the Company and for specific projects. At least quarterly, progress towards these goals shall be evaluated. If less than adequate performance is observed or it appears that the goal may not be achieved, evaluations shall be performed to determine the cause and corrective actions implemented. "Near miss" incidents should be treated the same as an actual injury or illness for evaluation purposes only.

### **7.1 Work Observation**

Work observations should be compiled and trend analysis performed at least quarterly. Specific trends evaluated should include:

- Worker performance issues due to inadequate training, tools, procedures, work plans, etc.
- Department performance issues
- Work process issues
- Poor communications or department interface, inadequate support, etc.

The results of this analysis should be used to determine program improvement needs so that appropriate corrective actions can be initiated and completed.

### **7.2 Program Assessment**

A complete assessment of the Occupational Safety program shall be performed at least annually. A team representing all levels of the organization should perform the assessment. Although Occupational Safety personnel should participate as team members, the assessment team leader should not necessarily be a safety and health professional. The program assessment team shall perform the following:

- Develop a comprehensive program assessment plan
- Conduct the assessment in accordance with the plan, which should include periodic verbal debriefs with project management
- Document the assessment findings and provide recommendations for program improvement
- Validate the findings with project personnel
- Issue the final program assessment report

Program assessment findings and associated recommendations which remain open following the assessment shall be evaluated by management, prioritized,

corrective actions developed and assigned to a responsible individual. This information should be entered into a site action tracking system and periodically reviewed to determine implementation status or implementation problems.

## 8.0 RECORDS

Occupational Health and Safety program records generated at CABRERA shall meet the following requirements:

- Records shall be clear and legible
- Completed forms which are part of a procedure and constitute program records shall indicate the appropriate procedure, number and revision
- When instruments are used to generate data on a record, the instrument type, serial number, calibration date and calibration due date shall be clearly indicated
- Unless otherwise directed, when a form includes more space or blocks than necessary to record data, "N/A" shall be recorded in the unused blocks
- Unless otherwise directed, when large numbers of sequential or consecutive blocks are unused, a single horizontal or diagonal line shall be drawn through the blocks and "N/A" recorded
- When necessary, a legend shall be included on each record to explain the use of acronyms or abbreviations
- All records shall include a completion signature and date
- When necessary or required by procedure, an approval signature and date shall be included

Original medical records and documentation of recordable injuries and illnesses (formerly Forms OSHA No. 200 and No. 101, presently Forms 300 and 301) shall be maintained. Employee medical records shall be secured to maintain confidentiality. Original safety records, which may include surveys, personnel monitoring, instrument calibration, AHA, safety related equipment inspection, etc., shall be maintained by the OSHM at the corporate headquarters. Copies of records shall be reviewed for accuracy and clearly identified as copied material prior to dissemination. Employee medical surveillance records shall not be copied and disseminated except as allowed by acceptable medical procedures.

Employees may request and obtain copies of their personal medical records as specified in 29 CFR 1910.1020.

### 8.1 Occupational Injury and Illness

Recordable work related employee injuries and illnesses shall be documented using Form OSHA No. 300 or equivalent. Determination of whether an injury or illness is recordable shall be in accordance with the requirements in 29 CFR 1904. Reference should be made to the publication Recordkeeping Guidelines for Occupational Injuries and Illnesses. The Form OSHA No. 300 is maintained for a calendar year (January through December) and shall contain the required

information for all recordable injuries and illnesses. Recordable injuries and illnesses shall be promptly documented on the current year Form OSHA No. 300 within 6 working days after receiving information that a recordable case has occurred.

A supplemental record, Form OSHA No. 301, shall be completed for each recordable injury or illness. Completion of this record shall be in accordance with the instruction provided with the form and the guidance provided in the publication Recordkeeping Guidelines for Occupational Injuries and Illnesses.

A summary of the recordable occupational injuries and illnesses shall be posted annually and shall include the following:

- The year's totals from Form OSHA No. 300
- Calendar year covered
- Company name
- Establishment name and address
- Certification signature and title
- Date

If no injuries or illnesses occur during the calendar year, a zero (0) shall be recorded. The completed Form OSHA No. 300 contains the required information. The annual summary shall be posted in the same manner that notices are required to be posted in accordance with 29 CFR 1903.2 (OSHA 2203) no later than February 1 of the following year and shall remain posted until April 30. Forms OSHA No. 300 and 301 shall be retained for a period of five (5) years following the year the form was completed.

## **8.2 Other Program Records**

Employee exposure and medical records shall be maintained in accordance with 29 CFR 1910.1020. This regulation requires the retention of most employee exposure and medical records for the duration of an individual's employment plus a period of thirty (30) years. Exceptions are allowed as follows:

- Health insurance claim records maintained separately from the employee's medical records
- First aid records (not including medical histories) of one-time treatment and subsequent observation of minor scratches, cuts, bums, splinters, and the like which do not involve medical treatment, loss of consciousness, restriction of work or motion, or transfer to another job, if made on site by a non-physician and if maintained separately from the employee's medical records
- Records for employees who work less than one (1) year need not be retained beyond the term of employment

However, records of employee exposure to hazards materials or environments shall be retained for the term of employment plus thirty (30) years. In many cases, personnel monitoring is not conducted until some threshold of potential

exposure is expected. Therefore, to provide evidence of exposure regardless of concentration, it will be necessary to retain sufficient records to demonstrate that the required monitoring was performed and proper protocols were used. These records should also be retained for the same period, i.e., term of employment plus thirty (30) years, and should include the following:

- Incident investigations
- Program assessments and work observations
- Activity Hazard Analyses
- Work area surveys and monitoring results
- Issuance and use of PPE
- Safety related work permits
- Field and laboratory instrument calibration and quality control measurements
- Equipment inspections
- Training and certifications
- Material Safety Data Sheets

## **9.0 SITE SPECIFIC SAFETY AND HEALTH PROGRAM ELEMENTS**

### **9.1 Site-Specific Health and Safety Plan Requirements**

#### *9.1.1 Introduction*

The Site-Specific Health and Safety Plan (SSHP) must include an introduction to the plan. The main purpose of the introduction is to describe what the SSHP will encompass and its applicability to operations. In developing this description the preparer should include:

- Purpose and Objective
- A brief description,
- Background information (e.g., site history, prior site activities),
- Synopsis of site characterization,
- Known site contamination, and
- Site operations to be performed.

While all of the following sections should be included in the SSHP, a site may determine that a portion of a section does not apply (e.g., cold temperature extremes for a tropical climate). If a portion of a section is not applicable, it may not need to be addressed, but an explanation of non-applicability should be provided.

#### *9.1.2 Key Personnel*

It is an accepted practice that the number of key personnel shall be kept to a minimum. However, the key personnel responsibilities must be assigned and accounted for at any hazardous waste site. Both of these concerns may be

accomplished, at the discretion of the Project Manager, by assigning one person to several positions.

At a minimum, the key personnel section in the SSHP shall identify the:

- Overall Project Manager,
- Site Safety and Health Officer (SSHO),
- Additional Safety and Health Personnel,
- Field Team Leader,
- Command Post Supervisor,
- Emergency Response Coordinator,
- Decontamination Station Officer,
- Security Officer, and
- Specialty Team Personnel.

### *9.1.3 Hazard Assessment*

Occupational safety hazards shall be identified and evaluated for work activities. Comprehensive work planning is essential in the early identification of site hazards and is the key to successful performance. Planning shall take place early enough to allow thorough evaluation of the proposed work. Conditions which should be addressed include:

- identification of actual or potential hazards in the work area,
- specification for methods of hazard prevention and/or control,
- determination of personnel and resource requirements
- provisions for area and personnel monitoring
- allowance for appropriate training and education of employees
- emergency preparedness, and
- provisions for sufficient time for the development of support and contingency plans.

Planning should include personnel who may be involved in the task. Work planning shall include involvement from employees who will perform or support the proposed activity and should consider input from employees involved in previous, similar tasks. A thorough analysis should be performed to identify possible changes in processes, experience of personnel and training/qualifications, or introduction or exposure of employees to new or different hazards, etc. The analysis shall adequately address corrective actions from any previous task problems and/or incorporate lessons learned.

Activity Hazard Analysis (AHA), also referred to as Job Safety Analysis (JSA), is a methodology used to identify inherent or potential hazards that may be encountered in the work environment. At a minimum, the hazard assessment shall include the following steps:

- Identification of an operation or job to be assessed,
- Break down of the job or operation,

- Identification of the hazards associated with each task, and
- Determination of the necessary controls for the hazards.

#### 9.1.4 Training

In 29 CFR 1910.120(e) different levels of training are required, depending on the task to be performed. Although training may range from 8 to 40 hours, CABRERA site workers will receive 40 hours as described in the OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) standard. The SSHP will detail specific training requirements. The training program, at a minimum, addresses:

- Key personnel responsible for site safety and health;
- Safety, health and other hazards present on site;
- Use of Personal Protective Equipment (PPE);
- Safe work practices and site Standard Operating Procedures (SOPs);
- Safe use of onsite engineering controls and equipment;
- Medical surveillance program requirements, including signs/symptoms of overexposure;
- Site decontamination procedures;
- Site emergency response/action plan;
- Confined space entry procedures; and
- Site spill containment program/procedures.

Management and supervisors of workers at project sites, will receive an additional 8 hours of training as specified in 29 CFR 1910.120(e)(4).

Additionally, 29 CFR 1910.120 (b)(4)(iii) specifies that a pre-entry briefing be given to each site worker, manager, supervisor and/or any other individual associated with the site. Documentation of these briefings shall be maintained at the site administrative office.

#### 9.1.5 Temperature Extremes

Limitations due to temperature extremes often result in the necessity to modify work schedules, work hours or otherwise reduce the time employees shall spend in chemically protective clothing.

The temperature extreme program, should, at a minimum address:

- Identification of potential hazards early in the planning phase of the development and operation of required contingency plans.
- Proper monitoring of worker physiology.
- Implementation of preventive measures and Standard Operating Procedures (SOPs) early in the operations so that sound worker practices are developed and followed.

- Proper initial training of workers to recognize the symptoms of temperature extreme related disorders or conditions in themselves and their fellow workers.
- Implementation of a "buddy system".
- Proper acclimatization of all workers to new or changing work conditions.

### 1. Heat Stress

Heat stress is a very important consideration when working in an enclosed location with heat generating equipment, where the ventilation and cooling is insufficient to control ambient work area temperatures work controls require the use of multiple layers of protective clothing, which may include water or vapor impermeable clothing.

Determining the potential for heat stress shall typically be based on wet bulb globe temperature (WBGT) index, activity level anticipated (light, moderate or heavy work, including the stress and performance difficulty when using personal protective equipment), and shall be adjusted based on the protective clothing anticipated or required. Action levels shall be based on the ACGIH TLV'S. Outdoor work planning. Where heat stress conditions exist, consideration shall be given to scheduling activities during cooler periods of the workday or night.

### 2. Cold Exposure

Employee exposure to cold temperatures is almost always associated with outdoor work in winter months. Exceptions may include working in an indoor, refrigerated area or working with most liquefied gases, i.e., liquid nitrogen. The hazards due to work in cold weather or working with liquefied gases shall be addressed during planning and in the AHA, as appropriate. Typically, the use of winter clothing and minimizing exposure time is sufficient to protect employees from the hazards of cold exposure. As necessary, appropriate engineering and administrative controls shall be implemented to minimize the hazards associated with cold exposure.

#### 9.1.6 Medical Surveillance

Medical surveillance of workers at hazardous waste sites is necessary to protect the health of the worker, establish fitness for duty, and ensure documentation of exposure to hazardous materials.

The elements of the medical surveillance program contained in the SSHP shall, at a minimum, address:

- Employees covered by the program,
- Frequency of medical exams/consultations,
- Content of medical exams/consultations,
- Information provided to the physician,
- Physician's written opinion, and

- Recordkeeping requirements.

#### *9.1.7 Exposure Monitoring and Air Sampling*

Surveys are used to evaluate risk potential and to establish and communicate potential hazards to workers. Surveys also serve as a basis to generate AHA's, determine stay times, conduct briefings, and maintain an overall awareness of work conditions. Surveys are performed to characterize occupational health hazards, assess personnel exposure to hazardous chemicals, substances and physical hazards, and verify the adequacy of engineering and work area controls. Surveys are conducted in accordance with established procedures to ensure regulatory compliance and to ensure acceptability of data.

Surveys and monitoring shall be sufficient to evaluate not only the type, but the form of material, i.e., particulate, gas, or vapor. When the primary mode of exposure is inhalation, air monitoring shall be representative of the worker's breathing zone. Surface contamination surveys shall also be performed to evaluate exposure potential, effectiveness of control measures and determine the adequacy of area decontamination.

The monitoring component of the SSHP shall be based on all chemical, physical and radiological hazards identified in the site characterization. At a minimum, it shall address:

- Sampling strategy and schedule for personal monitoring (breathing zone), air monitoring (level of protection) and environmental sampling (offsite migration),
- Instrumentation and equipment to be used,
- Calibration and maintenance of instruments and equipment, and
- Quality Assurance/Quality Control (QA/QC) procedures and analytical methods

#### *9.1.8 Site Control*

The site control program is used to control movement of people and equipment in order to minimize worker exposure to hazardous substances. The site control measures program shall, at a minimum, include:

- Site map,
- Site work zones,
- Definition and use of the "buddy system",
- Site communication procedures, including emergency procedures,
- Safe work practices and/or SOPs, and
- Location of nearest medical assistance.

#### *9.1.9 Decontamination*

The decontamination topics contained in the SSHP shall, at a minimum, include:

- Training;
- Location and layout of decontamination stations and areas;
- Decontamination methods;
- Required decontamination equipment;
- SOPs to minimize contact with contaminants during decontamination;
- SOPs for decontamination line personnel; and
- Procedures for collection, storage and disposal of clothing, equipment and any other materials that have not been completely decontaminated.

#### *9.1.10 Emergency Response/Contingency Plan*

The site management must develop and implement an Emergency Response Plan (ERP) in accordance with requirements of 29 CFR 1910.120(l), if the employees at the site are expected to respond to emergencies. The ERP to be included in the SSHP shall, at a minimum, address:

- Pre-emergency planning;
- Personnel roles, responsibilities, and lines of communication;
- Emergency recognition, preparedness drills, and follow-up procedures;
- Safe distances and places of refuge;
- Site security and control;
- Evacuation routes and procedures;
- Decontamination procedures that are not covered in the SSHP;
- Emergency medical treatment and first aid;
- Emergency alerting and response procedures;
- Critique of response and prevention procedures;
- PPE and emergency equipment;
- Site topography and layout;
- Incident reporting procedures;
- List of local emergency response contacts; and
- Potential worst-case weather by season.

#### *9.1.11 Emergency Action Plan*

If employees are expected to evacuate the site and not participate in emergency response activities, the site must have an Emergency Action Plan (EAP) in accordance with requirements of 29 CFR 1910.38(a).

The EAP to be included in the SSHP shall, at a minimum, address:

- Emergency escape procedures and route assignments;
- Procedures to be followed by personnel who stay behind to conduct critical operations before they evacuate;
- Procedures to account for all employees after evacuation;
- Rescue and medical duties for assigned personnel;
- Names and phone numbers of personnel and organizations to be contacted for further information;

- Description of the alarm procedures used to alert personnel of emergency and evacuation situations;
- EAP training requirements and methods to evaluate employee knowledge of the plan, and
- Procedures and frequency for rehearsal, review, and update of the plan.

#### *9.1.12 Confined Space Entry (where applicable)*

The confined space entry program shall, at a minimum, address:

- Personnel duties and responsibilities;
- Identification, posting and evaluation of confined spaces on site;
- Hazard controls (engineering, administrative and PPE);
- Entry permit contents, requirements, and approval;
- Entry procedures;
- Lockout/tagout requirements and procedures;
- Additional safeguards and emergency procedures; and
- Training requirements.

#### *9.1.13 Spill Containment*

The spill containment program provides procedures to contain and isolate the entire volume of a hazardous substance spill and minimizes worker exposure to hazardous substance spills.

The spill containment program shall, at a minimum, address:

- Initial spill actions and response,
- Spill cleanup procedures,
- Organization of the response team, and
- Post-incident review and evaluation.

#### *9.1.14 Work in or over Water*

Work in or over water requires special precautions to prevent drowning and, in cold water, severe health effects due to hypothermia. Activities that require work in or over water shall be specifically identified in the AHA and planning will address the requirements for this type of activity.

## 10.0 REFERENCES

ACGIH, 2002. *TLVs® and BEIs®: Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices*. American Conference of Industrial Hygienists, Cincinnati, Ohio. 2002.

OSHA, 2004. General Industry and Construction Standards, U.S. Code of Federal Regulations 29 CFR 1910 and 1926. U.S. Department of Labor, Occupational Safety and Health Administration. As amended through 2004.

USACE, 1997. *Radiation Protection Manual*. EM 385-1-80. U.S. Army Corps of Engineers. Washington, D. C. May 30, 1997.

USACE, 1997. *Safety and Health Requirements Manual*. EM 385-1-1. U.S. Army Corps of Engineers. Washington, D. C. November 3, 2003.

Appendix A

Safety Policies

## POLICY FOR SUBSIDIZING CERTAIN PERSONAL PROTECTIVE EQUIPMENT

### I. Safety Shoes or Boots

When required for their work assignment, Cabrera Services, Inc, will provide safety shoes to employees. Subsidies will be allowed for employees to purchase footwear meeting ANSI standards at no cost to the employee. The amount of the subsidy will be considered "fair and reasonable" and be sufficient for employees to purchase an adequate pair of shoes or boots at no cost to them. The employee will pay any cost over the established "fair and reasonable" amount. The "fair and reasonable" price will be adjusted periodically to account for cost of living increases. Employees will be eligible for replacement footwear every two years. Replacement footwear will be granted at shorter intervals only if it becomes damaged through work-related activities prior to the replacement date. Written supervisor approval is required.

Fair and reasonable cost through 2007:                      \$100.00

### II. Prescription safety glasses

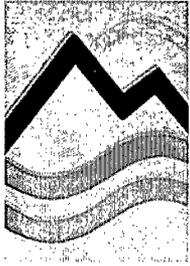
When required for their work assignment, Cabrera Services, Inc, will provide prescription safety glasses with side shields to employees. Subsidies will be allowed for employees to purchase eyewear meeting ANSI standards at nominal cost to the employee. The amount of the subsidy will be considered "fair and reasonable" and be sufficient for employees to purchase prescription eyewear at no cost or a substantially reduced cost. The employee will pay any cost over the established "fair and reasonable" amount. The "fair and reasonable" price will be adjusted periodically to account for cost of living increases. Employees will be eligible for replacement eyewear every two years. Replacement eyewear will be granted at shorter intervals only if they become damaged through work-related activities or a new prescription is required prior to the replacement date. Written supervisor approval is required.

The cost for eye examinations is the employee's responsibility.

Fair and reasonable cost through 2007                      \$120.00

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Vice President, Operations



# CABRERA SERVICES

RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

## HAZARD COMMUNICATION PROGRAM

### Health and Safety Manual HSM-002

Effective Date

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Revision 2

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**HAZARD COMMUNICATION PROGRAM  
CABRERA SERVICES, INC  
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## 1 THE OSHA HAZARD COMMUNICATION STANDARD...

### 1.1 Rights and Responsibilities

Each hazardous substance represents some risk of causing injury or illness. Chemical exposure may cause or contribute to many serious health effects such as burns, rashes, heart ailments, kidney and lung damage, sterility, and cancer. Some chemicals may also pose physical hazards and have the potential to cause fires, explosions, or other serious accidents.

The Occupational Safety and Health Administration (OSHA) established the Hazard Communication Standard (29 CFR 1910.1200) to protect workers against hazardous materials in their workplace. It is very important to understand the hazards of the materials with which we work. This standard requires employers to educate employees about materials that could present a hazard while on-the-job and how to protect employees from these hazards. Hazard information is relayed to employees through container labeling, Material Safety Data Sheets (MSDS), and training.

All employers are required to:

- Provide an up-to-date inventory of hazardous materials.
- Furnish a MSDS for each hazardous material in your workplace.
- Document how labeling, MSDS and training requirements are being met.
- Document how employees are informed of the hazards of non-routine tasks and the hazards associated with unlabeled pipelines.
- Document how contract employees will be informed of hazards.
- Train all employees with potential exposure to hazardous materials.

Training will address:

- Requirements of the HazCom Standard.
- How the HazCom Standard is being implemented in the workplace.
- How to read and interpret information on labels and MSDS.
- How to obtain and use available hazard information.
- Hazards of materials in the work area.
- Protective measures, specific work procedures, and PPE.
- Methods to detect the presence or release of a hazardous material.

Employee responsibilities:

- Store, dispense, transport, use and dispose of chemicals safely.
- Understand the hazards of the materials in the work environment. Read labels and MSDS to become familiar with hazards and proper precautions and work procedures. Ask for other information where needed.
- Participate in training programs and safety meetings the employer offers.
- Use engineering controls and protective equipment supplied by the employer.
- Follow established safe work practices.
- Ask questions if unsure of the hazards of a material and how it should be handled.

It is Cabrera Services' policy to provide a safe and healthful working environment and to provide meaningful information as possible to employees concerning the hazards on job sites. This program outlines responsibilities in implementing the HazCom program and establishes a structure for providing hazard information to employees.

## **1.2 INVENTORY OF HAZARDOUS MATERIALS**

An inventory of hazardous materials used at all sites must be maintained. It is the responsibility of project management to maintain current listings of the hazardous materials used at their sites.

## **1.3 EMPLOYEE TRAINING & INFORMATION**

Employee Hazard Communication training is made available through Cabrera Services, Inc. It is site supervision's responsibility to ensure that all employees have received the appropriate training. Training specific to the hazards in the work areas must be conducted to complement the basic training.

## **1.4 CONTAINER LABELING**

Management must ensure that all containers of hazardous materials in their area have adequate labeling. Materials should be labeled properly by the manufacturer or supplier prior to shipment. If the label is missing, inadequate, or illegible the material should not be used. If labels on existing containers are inadequate replacement labeling must be obtained or developed. If a material is transferred from the original container to another container the new container must contain an appropriate label. Portable containers, such as beakers, test tubes, or buckets, which will be used by only one employee for one work shift do not require labeling.

## **2 MATERIAL SAFETY DATA SHEETS**

MSDS's for hazardous materials used at each site must be compiled and maintained at the site for the duration of the project. These are to be kept in a centralized location accessible to all concerned employees working at that site.

## **3 CONTAINER LABELING**

The container label is an immediate source of information about the material inside the container. All containers of hazardous materials should be properly labeled or tagged with the following:

### **3.1 IDENTIFYING INFORMATION**

- Material Name
- Manufacturer's or Distributor's name and address

### **3.2 HAZARD WARNINGS**

- Signal Words: Caution (the least severe hazard), Warning, or Danger (the most severe warning)
- Physical Hazards: Flammable, Explosive, Reactive
- Health Hazards: Corrosive, Poison, Toxic, including Target Organ Effects (e.g.: toxic to liver & kidneys, lung hazard,
- Precautions for Safe Handling & Use • First Aid Procedures

An example of a label:

**GASOLINE (AUTOMOTIVE, UNLEADED)**

**DANGER:**

**Extremely flammable. Causes irritation to skin and eyes on contact.**

**Toxic to central nervous system, liver & kidneys. Cancer hazard.**

**May be absorbed through skin.**

Avoid heat, sparks, open flames, and other ignition sources.

Avoid contact with skin eyes, mucous membranes, and clothing.

Do not take internally. Avoid breathing vapors.

**FIRST AID**

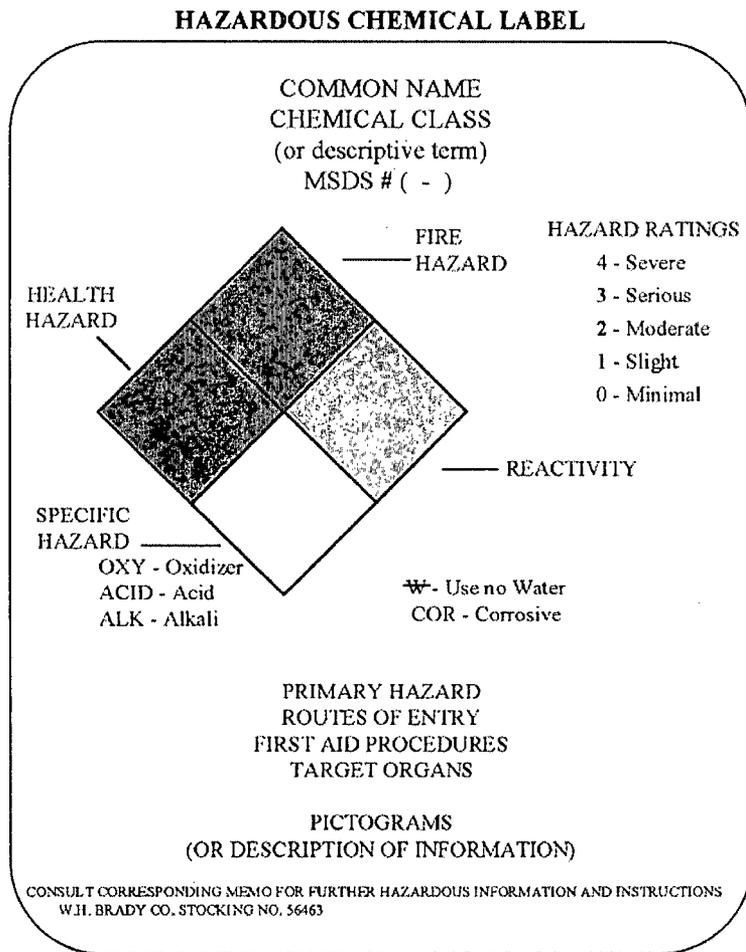
**Skin Contact:** Rinse immediately. Then wash skin thoroughly with soap and water. Continue to flush with water for at least 10 minutes. Remove any contaminated clothing. If discomfort persists, call physician immediately.

**Eye Contact:** Immediately flush with water for 15 minutes (Contact lens wearers -- rinse eyes immediately with water, remove contact lenses, then continue rinsing eyes for at least 15 minutes.) Get prompt medical attention.

**Ingestion:** Induce vomiting. Call physician immediately.

**Inhalation:** Remove from exposure to fresh air immediately. If breathing has stopped, give artificial respiration. Get medical attention immediately.

The following is an example of a label produced from commercially available labeling systems. Labels of this type will not contain all the information needed to use the material safely, however, it does provide a quick identifier of hazard levels.



## 4 MATERIAL SAFETY DATA SHEETS

The Material Safety Data Sheet (MSDS) is a form that contains very specific information about a particular material. The following is a description of the various sections found on a MSDS.

### **I. PRODUCT IDENTIFICATION**

**Identity:** The name of the product used on the label and found on the hazardous material inventory.

**Chemical Name:** The actual chemical name which comprises the product. This may not be applicable for products which are mixtures of pure chemicals.

**Trade Name, common name, & synonyms:** Other names the product is known as.

**Manufacturers Name, Address, & phone numbers:** One or more alternate manufacturers or distributors and the address, daytime and 24-hour emergency phone numbers for each.

### **II. HAZARDOUS INGREDIENTS**

**Ingredients & Percentages:** Hazard Chemical ingredients by percentage. This may be claimed by the manufacturer to be a "Trade Secret" or "Proprietary".

**ACGIH TLV:** The recommended exposure limit for a particular chemical ingredient as established by the American Conference of Governmental Industrial Hygienists.

**OSHA PEL:** The actual legal exposure limit for a particular chemical ingredient as established by OSHA.

**Other Recommended Limits:** Any other recommended exposure limits known for the material.

### **III. PHYSICAL & CHEMICAL CHARACTERISTICS**

**Boiling Point:** The temperature at which the vapor pressure of a liquid equals atmospheric pressure or at which the liquid changes to a vapor. If flammable material has a low boiling point, it indicates a special fire hazard.

**Vapor Density:** The relative density or weight of a vapor or gas compared to an equal volume of air. Air is rated at 1.0. Concentrated vapors which are heavier than air can accumulate in low places such as along floors, sewers, elevators, shafts, etc.

**Vapor Pressure:** The pressure of a vapor at any given temperature in equilibrium with its liquid or solid form. The higher the pressure the greater the chance of inhaling the vapor.

**Melting Point:** The temperature at which a solid becomes a liquid.

**III. PHYSICAL & CHEMICAL CHARACTERISTICS (Continued)**

**Specific Gravity:** The ratio of the weight of a volume of material to the weight of an equal volume of water (with water rated at 1.0). A ratio of less than one means an insoluble material will float on water. If the ratio is greater than one, an insoluble material will sink in water.

**Percent Volatile:** The percentage of a material by volume that will evaporate at an ambient temperature of 70° F. This value is of most use when referring to solid materials in solution, i.e. paints.

**Evaporation Rate:** The rate at which a material is converted to the vapor state at any given temperature and pressure. The differing rates are of concern in assessing the fire and health hazards.

**Solubility in Water:** The solubility of a product by weight in water at ambient temperature is expressed in the following terms: Negligible - less than 0.1%, Slight - 0.1% - 1%, Moderate - 1%- 10%, Appreciable - over 10%, Complete - 100%.

**Appearance & Odor:** A brief description of the appearance and odor of the material under normal room temperature and pressure conditions.

**IV. FIRE & EXPLOSION HAZARD DATA**

**Flashpoint:** The lowest temperature at which a liquid gives off enough vapor to ignite if a source of ignition is present.

**Lower Explosive Limit (LEL):** The minimum concentration of vapor or gas in air below which the spreading of flame does not occur on contact with source of ignition.

**Upper Explosive Limit:** The maximum concentration of vapor or gas in air above which the spreading of flame does not occur.

**Auto Ignition Temperature:** The lowest temperature at which a flammable gas or vapor/air mixture will ignite from its own heat source or a contacted heat source without necessity of a spark or flame.

**Extinguishing Media:** The fire fighting substances to be used on the product if burning. The substances listed by the common name, such as water, foam, fog, dry chemical, and carbon dioxide.

**Special Fire Fighting Procedures:** Any fire fighting actions determined to be unsuitable or unsafe to control a specific type of burning material and any special handling procedures and personal protective equipment to be used.

**Unusual Fire & Explosion Hazards:** The hazards that may occur as the result of overheating or burning of the product, including any special hazards which may need to be considered while extinguishing a fire with one of the types of extinguishing media.

**V. REACTIVITY DATA**

**Stability:** The resistance of the material to undergo chemical or physical change. If the material is listed as unstable there could be a dangerous reaction of decomposition.

**Conditions to Avoid:** Some materials that are normally stable will react under certain conditions to create an unstable oxide or toxic gas. These conditions may include high temperatures, jarring, or inappropriate storage.

**Incompatibility & Materials to Avoid:** Materials that react with the material to create a hazardous condition.

**Hazardous Decomposition Products:** The hazardous materials that may be produced in significant amounts if the material is exposed to burning, oxidation, excessive heat, or allowed to react with other chemicals.

**Conditions to Avoid:** The conditions that could trigger a hazard polymerization reaction to begin.

**VI. HEALTH HAZARD DATA**

**Routes of Entry:** The ways in which the material may enter the body, including inhalation, ingestion, and skin absorption.

**Health Hazards:** Possible health hazards associated with exposure to the product. Acute hazards include immediate effects which have short duration. Chronic hazards include delayed or long term effects.

**Carcinogenicity Listings:** Different sources that list the material or chemical ingredients of 0.1% or more as a known or suspect carcinogen.

**Signs & Symptoms of exposure:** Symptoms resulting from acute and chronic overexposure.

**Medical Conditions Aggravated by Exposure:** Pre-existing medical conditions which are negatively affected by exposure to the material.

**Emergency & First Aid Procedures:** First aid measures to be taken if overexposed to the material.

**VII. PRECAUTIONS FOR SAFE HANDLING & USE**

**Spill or Leak Procedures:** Specific steps to be taken in case the material is released or spilled and methods for control and cleanup including materials and equipment.

**Waste Disposal Methods:** Recommended methods for disposal of waste material resulting from a spill, leak or contamination of the product.

**Handling & Storage Precautions:** Any additional or special precautions for safe handling and storage of the chemical. This may include proper handling and storing to avoid reaction hazards, safe storage life of the product, special packaging requirement, temperature control, etc.

## VIII. CONTROL MEASURES

**Respiratory Protection:** The acceptable type of equipment to be used whenever respiratory protection is needed during routine or unusual conditions to prevent over exposure.

**Ventilation:** The appropriate type of ventilation system needed to capture, contain, or dilute contaminants and minimize worker exposure.

**Protective Gloves:** The special glove design, construction, and material requirements recommended to prevent skin exposure while handling the material.

**Eye Protection:** The appropriate type of eye protection to be used while handling the material.

**Other Protective Equipment or Clothing:** All other protective equipment that must be used when working with the material to minimize exposure.

**Work / Hygienic Practices:** Any specific work practices to be followed when working with the material.

## 5 PHYSICAL HAZARDS OF MATERIALS

### 5.1 FLAMMABLES

Materials with a flashpoint below 100° F. They are easily ignitable and should be stored in special flammable cabinets which are well-ventilated. They should also be stored separately from reactive materials in temperature controlled areas. **Never** use flammable materials around any sources of ignition or smoke in areas where flammables are in use.

### 5.2 COMBUSTIBLES

Combustible materials are those with a flashpoint between 100° F and 200° F. They are not as easily ignited as flammables, but are still considered a fire hazard.

### 5.3 OXIDIZERS

These materials give up oxygen easily to stimulate combustion of other materials. Common oxidizers are hydrogen peroxide, nitric acid, sulfuric acid, and compressed oxygen. Keep oxidizers away from paper, wood, and other easily ignited materials.

### 5.4 PYROPHORICS

Pyrophoric materials can ignite spontaneously below 130° F when they come in contact with oxygen. These commonly include metals in their pure form such as sodium, magnesium, and phosphorus. They are usually stored under nitrogen or helium to prevent contact with air.

### 5.5 INCOMPATIBLE MATERIALS

These chemicals react violently when mixed. Common examples are acids with bases, and some solvents with light metals. Know which chemicals you work with are incompatible, never mix them and store them separately, a safe distance apart.

## **5.6 UNSTABLE MATERIALS**

These materials can react violently to heat, movement, or other conditions. Some chemicals, like ether, may become unstable with age and explode with the slightest shock.

## **5.7 EXPLOSIVES**

Explosives are highly reactive materials that release large amounts of heat and gases which exert sudden pressure released to the surrounding area. Persons working with explosive materials require very specialized training.

## **5.8 POLYMERIZING MATERIALS**

These materials rearrange their own molecules under certain conditions such as high temperatures, age and shock. If the reaction takes place too fast, a fire or explosion may result. Examples of polymerizing materials are styrene and epoxies.

## **5.9 COMPRESSED GASES**

Compressed gases are stored inside containers under pressure. The pressure inside the container can be extremely high and any damage to the container can cause an explosion. Examples of compressed gases are acetylene, ammonia, argon, nitrogen, hydrogen, oxygen, propane, and chlorine gas. Cylinders of compressed gases require special handling and should be treated with care. Contact with liquefied gases can cause frostbite. Working with compressed gas cylinders requires special training in proper handling.

### **5.9.1 *Special Handling for Compressed Gas Cylinders:***

- Secure cylinders at all times.
- Use personal protective equipment provided for your safety.
- Keep cylinders away from fire, sparks, and electricity.
- Never drop cylinders, bang them against one another, or permit anything to fall on them.
- Move cylinders with special hand trucks -- do not drag or roll them on the ground.
- Store with valve caps in place, screwed down to the last thread, even when empty.
- Always check the identity of the gas before using.
- Check hoses and connections to ensure they're tight, in good condition, & leak free.

- Open cylinder valves slowly, pointed away from you and others.
- Never force thread connections -- make sure they match properly.
- Never use a wrench or hammer to open valves with hand wheels.
- Use the proper regulator for the gas being used.
- Mark empty cylinders and store them away from full ones.

## **6 HEALTH HAZARDS OF MATERIALS**

Irritants, corrosives, toxics, carcinogens, & reproductive hazards

### **6.1 ROUTES OF ENTRY:**

Routes of entry are ways in which a material can enter the body to cause a health effect. Knowing the possible routes of entry for a material is essential in determining what kind of protective equipment may be needed when working with the material.

### **6.2 INHALATION:**

Inhalation hazards can be inhaled and enters the body through the respiratory system. These hazards must be addressed by ventilation systems or respiratory protection.

### **6.3 SKIN CONTACT:**

Materials that, upon contact with the skin, can cause an irritation or burn to the area contacted or in some cases go through intact skin and enter the bloodstream. Protective gloves, eyewear, and clothing provide a barrier against this type of hazard.

### **6.4 INGESTION:**

Materials that are ingested pose a health problem. Materials can be ingested if food or other items put in or on the mouth are handled with contaminated hands or if food, drinks, gum, cigarettes, or lip balms are kept in areas where chemicals are used. They can absorb vapors, or dusts and mists can settle on them.

### **6.5 ACUTE VS. CHRONIC EFFECTS:**

- Acute effects: are injuries or illnesses that will be noticeable immediately after exposure or within the first 24 hours after exposure. This would include things like chemical burns or dizziness from solvent exposure.
- Chronic effects: are effects which are delayed and may not be noticeable until 20 - 30 years after exposure. This delay of the onset of symptoms is called the "latency period". Chronic effects include cancer, reproductive effects, and liver or kidney damage.

## **7 FACTORS AFFECTING THE SEVERITY OF HEALTH EFFECTS**

### **7.1 Dose**

The concentration and amount of the material you were exposed to. The higher the concentration and the larger the amount of exposure, the greater the severity of effects.

### **7.2 Duration of Exposure**

How long you were exposed to the material. The longer you are exposed to the material the greater your chances of exhibiting an adverse reaction to exposure or the more severe the effects.

### **7.3 Individual Sensitivity**

Different people exhibit differing degrees of reaction to a material. Some individuals are much more sensitive to certain chemicals than other people.

### **7.4 Reaction**

When two or more materials are combined they may produce new substances. In some cases the new substance may be more harmful than the original ones.

### **7.5 Synergism**

When two or more chemicals produce an effect that is greater than adding their individual effects. For example, exposure to both cigarette smoke and asbestos increase your chances of developing lung cancer 30 to 90 times.

## **8 LOCAL EFFECTS**

### **8.1 Irritants**

Irritants are materials which can cause redness, itching or swelling of the skin, eyes, or mucous membranes of the respiratory and digestive tracts if inhaled or ingested (swallowed).

### **8.2 Corrosives**

Corrosive materials can visibly destroy or change whatever they touch - metal, other chemicals, even flesh. Most corrosives are either an acid or base and come in different concentrations. Common acids are hydrochloric and sulfuric acid; common bases, also known as alkalis, are anhydrous ammonia, ammonium hydroxide, sodium hydroxide, and household bleach. Corrosives are commonly used in metal plating operations, water treatment chemicals, laboratory operations, and battery acid. Most corrosives destroy body tissue - eyes, respiratory tract, digestive tract, and skin on contact. Their vapors and mists can damage your respiratory tract if you inhale them. Mild exposure to the eyes can

cause burning, irritated, watery eyes, or sometime conjunctivitis (eye inflammation). Severe exposure of the eyes to a corrosive material is a medical emergency that needs immediate treatment or blindness may result. A splash can burn the cornea and cause clouding and scarring.

### **8.3 Sensitizers**

Sensitizers are materials that cause no effect on initial exposure, but on repeated exposure can cause severe allergic reactions in certain "sensitized" individuals. The allergic reaction can affect the skin, eyes, nose, or lungs.

### **8.4 Toxics**

Toxic substances enter the body and travel through the bloodstream to cause effects in internal organs such as the liver, kidneys, heart, central nervous system, lungs, and blood.

### **8.5 Poisons**

Poisons are toxic materials which can cause a severe illness or even death on exposure to just a small dose of the material.

### **8.6 Neurotoxins**

Neurotoxic materials cause serious effects to the central nervous system. Irreversible brain damage has been noted in severe cases.

## **9 CELL DAMAGING AGENTS**

### **9.1 Carcinogens**

These materials have been found to cause cancer by causing an uncontrolled growth and spread of abnormal cells in the body.

### **9.2 Mutagens**

Mutagens change or damage the genes or chromosomes. Some types of mutagens can result in cancer or birth defects.

## **10 REPRODUCTIVE EFFECTS**

Reproductive hazards can affect your children or your ability to conceive children. Some effects include lowered sex drive, infertility, sterility, menstrual disturbances, miscarriages, still births, and birth defects.

### **10.1 Teratogens**

Teratogens cause malformations or birth defects by directly damaging tissues in the fetus developing in the mother's womb.

## 10.2 Fetotoxins

These materials cause health problems in a pregnant women, thus affecting the unborn child.

## 11 ENGINEERING CONTROLS

Employers are responsible for installing engineering controls to minimize exposure to hazardous substances. Types of engineering controls include: substitution, isolation, and ventilation.

### 11.1 SUBSTITUTION

A less hazardous material should be substituted for materials currently in use whenever possible. All of the hazards of the possible substitutes should be considered.

### 11.2 ISOLATION

Whenever possible the source of exposure to a hazardous material should be isolated within a process or piece of equipment.

### 11.3 VENTILATION

#### Local Exhaust Ventilation

Ventilation hoods or other types of local ventilation should be installed whenever possible to remove contaminants from the breathing zone of the workers.

#### General or Dilution Ventilation

These types of ventilation provide a continual circulation of fresh air to the work area

## 12 PERSONAL PROTECTIVE EQUIPMENT & CLOTHING

### 12.1 SKIN PROTECTION

Skin damage can range from minor irritations to major life threatening burns. Also, some materials can enter the bloodstream through healthy or cracked skin and attack internal organ systems. You can prevent these types of problems by using the appropriate type of skin protection.

#### 12.1.1 Gloves

Chemical resistant gloves, such as neoprene, rubber, and vinyl, provide protection for hands from contact hazards. Gloves must be matched to the type of chemical for which protection is being provided. The type and thickness of the material the gloves are made of and their coating will affect the durability and permeation rate of the glove against a particular material. Gloves must be checked for holes at the tips and between fingers prior to use. Gloves that are worn or damaged must be replaced. Gloves must be stored in a cool, dry place away from sunlight.

### **12.1.2 Chemical resistant clothing**

Aprons, coveralls, and full body suits can provide protection, against splashes and mists of hazardous chemicals. The type of clothing should be matched to the type of contact hazards and checked for any defects prior to use.

## **12.2 EYE PROTECTION**

### **12.2.1 Safety Glasses /Impact Glasses/Impact Goggles**

This type of eye protection is for airborne particles or projectiles only. They should never be used as protection against chemical hazards.

### **12.2.2 Chemical splash goggles**

These goggles fully surround the eyes and have ventilation side openings to prevent fogging.

### **12.2.3 Face Shields**

This type of protection is actually to provide skin protection for the face. If used in conjunction with chemical splash goggles they can provide additional protection for the eyes, but should never be used alone as eye protection.

## **12.3 RESPIRATORY PROTECTION**

When airborne contaminants exceed established exposure limits and engineering controls such as ventilation are not feasible or inadequate, respirator use is required by law. If required to wear a respirator while on-the-job employees must receive a physical, fit testing, and training on proper respirator use and care.

### **12.3.1 Air Purifying Respirators (APR)**

These respirators filter contaminants from the air through interchangeable cartridges or canisters. To select the proper cartridge, the contaminants and their concentration must be known. The cartridges should be changed out regularly, especially if breakthrough (a warning property such as odor or taste is noticed) occurs, or if breathing becomes difficult. High humidity will cause the cartridges to become saturated faster than usual. APR should never be used in the following situation:

- IDLH atmospheres
- Oxygen-deficient atmospheres
- Concentrations exceed cartridge limit
- Cartridges are not available for the particular contaminants
- Contaminants have poor warning properties (i.e. smell, taste....)

### **12.3.2 Supplied Air Respirators (SAR)**

SAR provide a supply of breathing air to the user through either air tanks worn on the back (Self- Contained Breathing Apparatus - SCBA) or through a long hose connected to a remote source of breathing air (airline respirator). Their use is required in IDLH or oxygen-deficient (<19.5% oxygen) atmospheres, or when the contaminants or their concentrations are unknown.

## 12.4 HEAD PROTECTION

Employees must wear protective helmets when working in areas where there is a potential for injury to the head from falling objects. Some protective helmets are designed to reduce electrical shock hazard and must be worn by employee when working near exposed electrical conductors.

## 12.5 FOOT PROTECTION

Employees must wear protective foot wear when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and where employees' feet are exposed to electrical hazards. **OPEN TOE SHOES ARE NOT ALLOWED.**

## 13 PROPER WORK PRACTICES

Employees are responsible for following safety procedures to protect their safety and health when working with hazardous materials. Employees are also responsible for following the safety procedures that protect the welfare of coworkers. It's very important to take safety precautions seriously -- especially when working with hazardous materials.

In addition to the specific work procedures outlined by the employer, here are some other basic safety tips to help minimize exposure to hazardous materials.

- Read and follow warning instructions on container labels.
- Always wash hands after working with hazardous materials, even if wearing protective gloves.
- No eating, drinking, or smoking in areas where chemicals are used.
- Wearing of appropriate protective clothing and equipment and ensuring that it is clean and is in good condition.
- Contaminated work clothing must be removed prior to departing the premises.
- Employees must immediately report accidents, regardless of severity.
- Employees must know the location of emergency equipment such as eyewashes and safety showers and how to use them properly and be familiar with emergency response procedures and evacuation routes specific to their area.
- Employees must be aware of any signs of the release or spill of materials such as, strange odors, liquid materials on the floor, and strange colored vapor clouds. Notify emergency response teams as soon as a release or spill is detected.

## 14 EMERGENCY RESPONSE

The best way to respond in any emergency is knowing what to do ahead of time. Employees must know where the emergency equipment is (eyewash, safety shower, fire extinguishers,...) and how to use it and keep it in good condition. Know spill clean-up

procedures and waste disposal procedures, and be familiar with evacuation routes for their location.

#### 14.1 IN CASE OF EMERGENCY:

Employees must call the appropriate emergency number and provide the following information:

- Their name
- Their location
- The phone number
- The nature of the emergency,

and stay on the line until the operator has all the necessary information, then:

- Evacuate the area if it is dangerous
- Provide first aid only if trained
- Assist emergency response personnel if requested, otherwise stay back

It is very important to know how to detect if a hazardous material has been spilled or released into the atmosphere. The following are ways that can be used to detect materials. If at any time it is determined there has been a release or spill, follow the emergency instructions listed below for indoor or outdoor releases.

- **SIGHT:** The appearance of a liquid or solid material on the ground or a strange colored vapor cloud
- **SMELL:** A strange odor or the characteristic odor of a hazardous material.
- **SYMPTOMS:** The appearance of symptoms such as irritation or burning of the eyes, nose, mouth, throat, or chest, coughing, shortness of breath, dizziness, drunkenness, or nausea.
- **SOUND:** The sound of escaping gas or warning alarms.

##### 14.1.1 Inside Buildings

- Activation of the nearest fire alarm to evacuate the building.
- Evacuation of the facility.
- Confirmation of the alarm by calling the emergency number.
- Attempt to extinguish a fire with portable fire extinguisher only if you have been trained in the use of fire extinguishers.
- Move at least 75 feet from the building. DO NOT attempt to return to the building unless authorized by a fire protection specialist.

##### 14.1.2 Indoors and an airborne release is observed outside:

- Call the emergency number and report the incident from inside the building, as soon as possible.
- Close any windows and doors that are open.
- Shut off the building air handlers or call facility maintenance and request that the air handlers be shut off.
- **DO NOT** leave the building.

- **DO NOT** activate the fire alarm -- this will cause unsuspecting persons to leave the building.
- **DO NOT** evacuate the building until a qualified professional (Safety, Occupational Health, Fire Protection Specialist, Fireman, etc.) gives the ALL CLEAR.

*14.1.3 Outdoors and an airborne release is observed indoors:*

- DO NOT attempt to contain the release unless trained and equipped to do so.
- If unable to escape the path of the cloud, enter the nearest building and follow the steps above.
- If a building is not close, move upwind away from the release to an area of safety and call the emergency number if possible.
- If downwind of a release and unable to escape the cloud proceed at a right angle to the direction of the release until clear of any vapor path and call the emergency number if possible. Continue to monitor the release source and wind direction to remain clear of danger.

*14.1.4 A release or spill inside:*

- Evacuate the immediate area of the spill.
- **DO NOT** attempt to contain the release unless trained and equipped to do so.
- Call the emergency number and remain out of the area -- warn others not to enter the area. Close off the area where the spill occurred.
- Shut off the building air handlers or request that the air handlers be shut off by the facilities personnel.
- Evacuate the entire building, if instructed to do so by the fire department or Occupational Health Office personnel.

**14.2 CHEMICAL EXPOSURES**

*14.2.1 Eye Contact:*

- Flood the eyes with cool water for 15-20 minutes holding the eyes open with the thumb and index finger.
- Seek medical attention as soon as possible -- call the emergency number. If possible have available the container or MSDS for the material.

*14.2.2 Skin Contact:*

- Rinse off the material as soon as possible using a sink or safety shower for 15-20 minutes.
- Get medical attention as soon as possible. If necessary contact the Emergency number for an ambulance. If possible have available the container or MSDS for the material.

*14.2.3 Inhalation:*

- Get to fresh air immediately.
- Get medical attention as soon as possible. If necessary contact the emergency number for an ambulance. If possible have available the container or MSDS for the material.

**14.2.4 Ingestion:**

- Consult the MSDS for information of treatment. DO NOT induce vomiting unless instructed to do so by the MSDS. Otherwise, dilute the material with 2 or 3 glasses of water or milk.
- Get medical attention as soon as possible. If necessary contact the Emergency number for an ambulance. If possible have available the container or MSDS for the material.

## 15 GLOSSARY OF TERMS

|                       |   |
|-----------------------|---|
| ACGIH                 | The American Conference of Governmental Industrial Hygienists is a voluntary membership organization of professional industrial hygiene personnel in governmental or educational institutions. The ACGIH develops and publishes recommended occupational exposure limits each year called "Threshold Limit Values" (TLV's) for hundreds of chemicals, physical agents, and biological exposure indices. |
| Acute Health Effect   | Health effect which is a result of an intense exposure to a material over a relatively short period of time.  |
| Asphyxiant            | A chemical gas or vapor that can cause death or unconsciousness by suffocation. Simple asphyxiants such as nitrogen, either use up or displace oxygen in the air. They become especially dangerous if in confined or enclosed spaces. Chemical asphyxiants, such as carbon monoxide and hydrogen sulfide, interfere with the body's ability to absorb or transport oxygen to the tissues.               |
| Boiling Point         | The temperature at which the vapor pressure of a liquid equals the atmospheric pressure or at which the liquid changes to a vapor. The boiling point is usually expressed in degrees Fahrenheit. If a flammable material has a low boiling point, it indicates a special fire hazard.   |
| Carcinogen            | A substance or physical agent that may cause cancer in animals or humans.   |
| CAS Number            | Identifies a particular chemical by the Chemical Abstracts Service, a service of the American Chemical Society that indexes and compiles abstracts of worldwide chemical literature called "Chemical Abstracts".  |
| Ceiling Limit         | A description usually seen in connection with a published exposure limit. It refers to the concentration that should not ever be exceeded, even for an instant. It may be written as TLV-C or Threshold Limit Value-Ceiling. (See Also: "Threshold Limit Value")  |
| Chronic Health Effect | A health effect which is the result of long-term exposure to a material over a number of months or years. These effects usually show up long after the first exposure.  |
| Combustible           | Combustible liquids are those having a flash point at or above 100° F and below 200° F, or liquids that will burn. They do not ignite as easily as flammable liquids, however combustible liquids can be ignited under certain circumstances, and must be handled with caution.   |

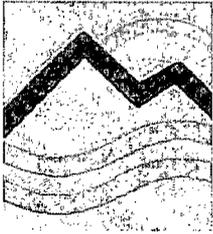
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| Concentration      | The relative amount of a material in combination with another. For example, 5 parts (of acetone) per million (part of air).   |
| Corrosive          | A substance that, according to the DOT, causes visible destruction or permanent changes in human skin tissue at the site of contact, or is highly corrosive to steel. |
| Decomposition      | The breakdown of a chemical or substance into different parts or simpler compounds. Decomposition can occur due to heat, chemical reaction or age.                    |
| Density            | How much a given amount of a substance weighs.  |
| Dermatitis         | An inflammation of the skin.  |
| Evaporation Rate   | The rate at which a material is converted to vapor (evaporates) at a given temperature and pressure when compared to the evaporation rate of a given substance.       |
| Flammable          | Materials with a flashpoint below 100° F which are easily ignitable and burn quickly.   |
| Flashpoint         | The lowest temperature at which a liquid gives off enough vapor to form an ignitable mixture and burn when a source of ignition (sparks, open flame.... ) is present. |
| Hazardous Material | Any substance or compound that has the capability of producing adverse effects on the health and safety of humans.  |
| Ignitable          | A solid, liquid, or compressed gas that has a flashpoint of less than 140° F. Ignitable materials may be regulated by the EPA as a hazardous waste as well.           |
| Incompatible       | The term applied to 2 substances to indicate that one material cannot be mixed with the other without the possibility of a dangerous reaction.                        |
| Ingestion          | Taking a substance into the body through the mouth as food, drink, medicine or unknowingly as on contaminated hands or cigarettes, etc.                               |
| Inhalation         | The breathing in of an airborne substance that may be in the form of a gas, fume, mist, vapor, dust, or aerosol.  |
| Irritant           | A substance that produces an irritation effect when it comes in contact with the skin, eyes, or mucous membranes.   |
| Lethal Dose (LD50) | The dose of a substance or chemical that kills 50% of the test animals in a group within the first 30 days following exposure.  |

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| Lower Explosive Limit      | The lowest concentration of a substance that will produce a fire or flash when an ignition source (flame, spark, etc.) is present. It is expressed in percent of vapor or gas in the air by volume. Below the LEL, the air contaminant is theoretically to "lean" to burn. (ALSO KNOWN AS: "Lower Flammable Limit")  |
| Melting Point              | The temperature at which a solid changes to liquid. A range may be given for mixtures.   |
| Mutagen                    | Anything that can cause a change or mutation in the genetic material of a living cell.   |
| Narcosis                   | Stupor or unconsciousness caused by exposure to a chemical.  |
| Odor Threshold             | The minimum concentration of a substance at which a majority of test subjects can detect and identify the substance's characteristic odor.   |
| OSHA                       | The Occupational Safety and Health Administration, a federal agency under the Department of Labor that publishes and enforces safety and health regulations for most businesses and industries in the U.S.   |
| Oxidizer                   | A substance that gives up oxygen easily to stimulate combustion of organic material (e.g. wood, paper....)   |
| Permissible Exposure Limit | An exposure limit that is published and enforced by OSHA as a legal standard. PEL may be a time-weighted average (TWA) exposure (8 hours), a 15-minute short term exposure limit (STEL) or a ceiling (C).  |
| Polymerization             | A chemical reaction in which two or more small molecules combine to form larger molecules that contain repeating structural units or the original molecules. A hazardous polymerization is the above reaction with an uncontrolled release of energy.  |
| PPM                        | Parts of a vapor or gas per million part of air by volume.   |
| Reactivity                 | A substance's susceptibility to undergoing a chemical reaction or change that may result in dangerous side effects, such as explosion, burning, and corrosive or toxic emissions. The conditions that cause the reaction, such as heat, other chemicals, and dropping, will usually be specified as "Conditions to Avoid" when the chemical's reactivity is discussed on a MSDS. |
| Respirator                 | A device which is designed to protect the wearer from inhaling harmful air contaminants.   |

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| Sensitizer                | A substance that may cause no reaction in a person during initial exposures, but afterwards, further exposures will cause an allergic response to the substance.   |
| Short Term Exposure Limit | The maximum concentration to which workers can be exposed for a short period of time (15 minutes) for only 4 times throughout the day with at least an hour between exposures. Also, the daily TLV-TWA must not be exceeded.   |
| Specific Gravity          | The weight of a material compared to the weight of an equal volume of water. Insoluble materials with a specific gravity of less than 1 will float on water. Insoluble materials with a specific gravity or greater than 1 will sink in water.   |
| Systemic                  | Spread throughout the body, affecting many or all body systems or organs; not localized in an area or spot.  |
| Teratogen                 | An agent or substance that may cause physical defects in the developing fetus or embryo when a pregnant female is exposed to that substance.   |
| Threshold Limit Value     | Airborne concentrations of substances devised by the ACGIH that represent conditions under which it is believed that nearly all workers may be exposed day after day with no adverse effects. TLVs are advisory exposure guidelines, not legal standards, that are based on evidence from industrial experience, animal studies, or human studies when they exist. |
| Toxicity                  | The potential of a substance to exert a harmful effect on humans or animals and a description of the effect and the conditions or concentration under which the effect takes place.  |
| Upper Explosive           | The highest concentration in percent of vapor or gas in air by volume of a substance that will burn or explode when an ignition source is present. Theoretically, above this limit, the mixture is said to be too "rich" to support combustion. The difference between the LEL and UEL is the "Flammable Range" or "Explosive Range" of the substance.             |
| Vapor Density             | The weight of a vapor or gas compared to an equal volume of air. Materials lighter than air have vapor densities less than 1, materials heavier than air have vapor densities greater than 1.  |
| Vapor Pressure            | The pressure exerted by a saturated vapor above its own liquid in a closed container.  |
| Volatility                | A measure of how quickly a substance forms a vapor at ordinary temperatures.   |



# CABRERA SERVICES

RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

## Confined Space Entry Program

### Health and Safety Manual 003

Effective Date

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Revision 1

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Cabrera Services, Inc.  
Confined Space Entry Program

## 1.0 OVERVIEW

- 1.1 This Procedural Instruction documents the permit-required confined space program for Cabrera Services, Inc (CABRERA) personnel. This program includes a description of the Confined Space Entry Permit system, entry procedures for confined spaces, and training requirements for entrants, attendants, and rescue personnel.
- 1.2 The CABRERA Confined Space Program helps employees recognize and reduce the risks associated with entering confined spaces. Following this program ensures compliance with OSHA Regulation 29 CFR 1910.146.
- 1.3 Never enter a space marked "DANGER - Confined Space - Enter by Permit Only" unless you have an approved permit, the atmosphere has been tested, an attendant is on duty, and you have the proper training.

## 2.0 DEFINITIONS AND TERMINOLOGY

Throughout this document, there are frequently used terms and phrases that should be clearly understood. Some of the terms and phrases are defined as follows:

### Definitions

**Acceptable entry conditions:** the conditions that must exist in a permit space before entry is allowed. These conditions ensure that employees involved with a permit- required confined space entry can safely enter into and work within the space.

**Atmosphere:** refers to the gases, vapors, mists, fumes, and dusts within a confined space.

**Attendant:** an individual stationed outside one or more permit spaces who monitors the authorized entrants and performs all attendant's responsibilities contained in this document.

**Authorized entrant:** an individual who has been granted permission to enter a permit-required confined space.

**Biological hazards:** infectious agents presenting risk to the well-being of man or animals, either directly through infection or indirectly through disruption of the environment.

**Blanking or blinding:** the absolute closure of a pipe, line, or duct by the fastening of a solid plate (such as a spectacle blind or a skillet blind) that completely covers the bore and that is capable of withstanding the maximum pressure of the pipe, line, or duct with no leakage beyond the plate.

**Ceiling level:** the maximum airborne concentration of a toxic agent to which an employee may be exposed for a specified period of time.

**Confined space:** an area having all of the following characteristics:

- (i) is large enough and so configured that an employee can bodily enter and perform assigned work
- (ii) has limited or restricted means for entry or exit (i.e., tanks, vessels, silos, storage bins, hoppers, vaults, and pits)
- (iii) is not designed for continuous entrant occupancy.

**Double block and bleed:** the closure of a line, duct, or pipe by closing and locking and/or tagging, two in-line valves and- by opening and locking and/or tagging a drain or vent valve in the line between the two closed valves.

**Emergency:** any occurrence or event internal or external to the permit space that could endanger entrants (this would include any failure of hazard control or monitoring equipment).

**Emergency Response Commander:** on-duty supervisor given authority to coordinate response activities.

**Emergency Response Team:** personnel responsible for confined space rescue at the scene.

**Engulfment:** the surrounding and effective capture of a person by a liquid or finely divided solid substance that can be aspirated to cause death by filling or plugging the respiratory system or that can exert enough force on the body to cause death by strangulation, constriction, or cashing.

**Entry:** the action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in the space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

**Entry permit (permit):** the written or printed document which allows and controls entry into a permit space and contains the information specified in this document.

**Entry supervisor:** an individual (i.e., the foreman or crew chief, supervisor, authorized delegate) responsible for determining if acceptable entry conditions are present in a permit space where entry is planned, authorizing entry and overseeing entry operations, and terminating entry as required by this document.

**Note:** An entry supervisor also may serve as an attendant or as an authorized entrant, as long as that person is trained and equipped as required by this document for each role he or she fills. Also, the duties of entry supervisor may be

passed from one individual to another during the course of an entry operation, as long as someone is present while work is being performed.

**Hazard evaluation:** a process to assess the severity of known, real or potential hazards at or in the confined space.

**Hazardous atmosphere:** an atmosphere that may expose entrants to the risk of death, incapacitation, impairment of ability to self-rescue (that is, escape unaided from a permit space), injury, or acute illness from one or more of the following causes:

(i) flammable gas, vapor, or mist in excess of 10 percent of its lower flammable limit (LFL)

(ii) airborne combustible dust at a concentration that meets or exceeds its LFL

**Note:** This concentration may be approximated as a condition in which the dust obscures vision at a distance of 5 feet (1.52 meters) or less.

(iii) atmospheric oxygen concentration below 19.5 percent or above 23.5 percent

(iv) atmospheric concentration of any substance for which an exposure of a "dose or permissible exposure limit" could result in exceeding the specified allowable dose or permissible exposure limit

(v) any other atmospheric condition that can be immediately dangerous to life or health.

**Hot work:** work within a confined space that produces arcs, sparks, flames, heat, or other sources of ignition.

**Immediately dangerous to life or health (IDLH):** any condition that poses an immediate or delayed threat to life, that would cause irreversible adverse health effects, or that would interfere with an individual's ability to escape unaided from a permit space.

**Immediate-severe health effects:** any acute clinical sign(s) of a serious, exposure-related reaction manifested within 72 hours after exposure.

**Inerting:** the displacement of the atmosphere in a permit space by a non-combustible gas (i.e., nitrogen) to such an extent that the resulting atmosphere is non-combustible.

**Note:** This procedure produces an IDLH oxygen-deficient atmosphere.

**Isolation:** the process by which a permit space is removed from service and completely protected against the release of energy and material into the space by such means as: blanking or blinding; misaligning or removing sections of lines, pipes or ducts, a double block and bleed system, lockout and/or tagout of all sources of energy, or blocking or disconnecting all mechanical linkages.

**LEL/LFL and UEL/UFL:** acronyms for "lower explosive limit/lower flammable limit" and "upper explosive limit/upper flammable limit," respectively. These are the specified minimum/maximum limits for explosive or flammable conditions.

**Line breaking:** the intentional opening of a pipe, line, or duct that is or has been carrying flammable, corrosive, or toxic material, an inert gas, or any fluid at a volume, pressure, or temperature capable of causing injury.

**Lockout/tagout:** the placement of a lock/tag on the energy isolating device which indicates that all sources of energy have been isolated and assures that any sudden start up or activation of machinery or equipment shall not occur until removal of the lock/tag.

**Non-permit-required confined space:** a confined space that does not contain atmospheric hazards or have the potential to contain any hazard capable of causing death or serious physical harm.

**Oxygen deficient atmosphere:** an atmosphere containing less than 19.5 percent oxygen by volume.

**Oxygen enriched atmosphere:** an atmosphere containing more than 23.5 percent oxygen by volume.

**PEL:** an acronym for "Permissible Exposure Limit" which is the allowable air contaminant level established by the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA).

**Permit-required confined space (permit space):** a confined space that has one or more of the following characteristics:

- (i) contains or has a potential to contain a hazardous atmosphere
- (ii) contains a material that has the potential for engulfing an entrant
- (iii) has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section.

**Permit-required confined space program:** the CABRERA program for controlling and protecting employees from permit space hazards. The program also regulates employee entry into permit spaces.

**Permit system:** the CABRERA written procedure for preparing and issuing permits into a permit-required space and for returning, the permit space to service following termination of entry.

**Process Owner/Authorized Delegate:** a person designated by CABRERA as capable (by education and/or specialized training) of anticipating, recognizing, and evaluating employee exposure to hazardous substances or other unsafe conditions in a confined space. This person shall be capable of specifying necessary control and/or protective action to insure worker safety. This person is also authorized to sign confined space permits.

**Prohibited condition:** any condition that arises in a permit space during the authorized entry period that is not allowed by the permit.

**Purging:** the method by which gases, vapors, or other airborne impurities are displaced from a confined space.

**Retrieval system:** the equipment used for non-entry rescue of persons from permit spaces (i.e., retrieval line, full-body harness, wristlets, a lifting device and/or anchor).

**Reclassification of Permit-Required Confined Space:** procedures for downgrading the classification of a permit-required space to a non-permit-required space.

**Testing:** the process by which the hazards that may confront entrants of a permit space are identified and evaluated.

**TLV:** an acronym for "Threshold Limit Value" which is the upper limit of a toxic material to which an average person in average health may be exposed repeatedly on a day-to-day basis with no adverse health effects. Standards for TLV are based on time-weighted averages based on conditions which, it is believed, workers may be repeatedly exposed to during their normal work week with no ill effects.

**Toxic atmosphere:** an atmosphere containing a concentration of a substance above the published or otherwise known safe levels.

### **Confined Space Classification**

- 2.1 Areas classified as confined spaces may include, but are not limited to, underground vaults, tanks, furnaces, vessels, vats, silos, sewers, bins, hoppers, boilers, pits, ditches, pipes, diked areas, and/or wells.
- 2.2 As defined, a permit-required confined space is a confined space that requires a permit before entering because it has one or more of the following characteristics:
  - (i) contains or has the potential to contain a hazardous atmosphere
  - (ii) contains a material that has the potential for engulfing an entrant and/or has an internal configuration that might cause an entrant to be trapped or asphyxiated by inwardly converging walls or by a floor that slopes downward and tapers to a smaller cross section
  - (iii) contains any other recognized serious safety and/or health hazards.

### Reclassification of Permit-Required Confined Spaces

- 2.3 A permit-required confined space may be reclassified as a "non-permit-required confined space" if there are no actual or potential atmospheric hazard and if all hazards within the space are eliminated without entering into the space.
- 2.4 If it is necessary to enter the space to eliminate hazards, such entry shall be in accordance with the permit-required procedures of this document.
- Note:** Testing and inspection during that entry must demonstrate that the hazards within the permit space have been eliminated.
- 2.5 The Process Owner/Authorized Delegate shall provide written documentation to certify that all hazards in a permit space have been eliminated. This certification shall contain the following:
- (i) a record of the procedures and the history of the confined space (i.e., periodic testing and monitoring data, industrial hygiene data,)
  - (ii) the date of the determination
  - (iii) the location of the space
  - (iv) the signature of the person making the determination.
- 2.6 The certification shall be made available to each employee entering the space and shall also be noted in the inventory.
- 2.7 Reclassification as a non-permit-required confined space is only valid for as long as all hazards remain eliminated.
- 2.8 If hazards arise within a non-permit-required confined space, each employee in the space must leave the space immediately. If the space was declassified to a non-permit-required confined space, the space shall be reevaluated and determined whether the space must be reclassified as a permit-required confined space.

### Permit-Required Confined Space Inventory

- 2.9 Confined spaces at CABRERA are sites will be listed in the Permit-Required Confined Space Inventory (see the Appendix). Each permit-required confined space will be marked with a sign stating "DANGER - Confined Space - Enter by Permit Only".

## 3.0 CONFINED SPACE ENTRY PERMIT SYSTEM

### General

- 3.1 Before entry is authorized, the Process Owner/Authorized Delegate shall prepare a confined space entry permit. (A sample "Confined Space Entry Permit" is attached.)

This permit documents the completion of the requirements covered in the "Entry and Rescue Procedures" section of this document.

- 3.2 The permit must be signed by the identified entry supervisor to authorize entry.
- 3.3 The completed permit shall be made available at the time of entry to all authorized entrants. The permit may be posted at the entry portal or made available by any other equally effective means for the entrants to confirm that pre-entry preparations have been completed.
- 3.4 The duration of the permit may not exceed 8 hours.
- 3.5 The entry supervisor shall terminate entry and cancel the entry permit when:
  - (i) the operations covered by the entry permit have been completed or
  - (ii) a condition that is not allowed under the entry permit arises in or near the permit space.
- 3.6 The Process Owner/Authorized Delegate shall retain each canceled entry permit for at least 1 year to facilitate the review of the confined space program. Any problems encountered during an entry operation shall be noted on the permit so that the appropriate actions can be taken.
- 3.7 The Process Owner/Authorized Delegate, the Entry Supervisor, and/or the Emergency Response Commander may revoke permits at any time they feel there may be a safety problem or a violation of permit conditions.

#### Confined Space Entry Permits

- 3.8 The entry permit shall identify:
  - (i) the confined space to be entered
  - (ii) the purpose of the entry
  - (iii) the date and duration of the entry permit
  - (iv) the authorized entrants, by name or other means that will enable the attendant to determine quickly and accurately which authorized entrants are inside the permit space

**Note:** This requirement may be met by inserting a reference on the entry permit as to the means used, such as roster or tracking system, to keep track of the authorized entrants within the permit space.

  - (v) the person(s), by name, currently serving as attendants. If multiple spaces are to be monitored by a single attendant, the permit must include specific instructions and procedures so the attendant can respond to an emergency affecting one or more of the permit spaces without distraction from the responsibilities for the other space(s).

- (vi) the individual, by name, currently serving as entry supervisor, with a space for the signature or initials of the entry supervisor who originally authorized entry
  - (vii) the hazards of the permit space to be entered
  - (viii) the measures used to isolate the permit space and to eliminate or control permit space hazards before entry
  - (ix) the acceptable entry conditions
  - (x) the results of initial and periodic tests performed, accompanied by the names or initials of the testers and when the tests were performed
  - (xi) the rescue and emergency services that can be summoned and the means for summoning those services
  - (xii) the communication procedures used by authorized entrants and attendants to maintain contact during the entry
  - (xiii) equipment, such as personal protective equipment, testing equipment, communications equipment, alarm systems, and rescue equipment, to be provided for compliance with this section
  - (xiv) any other necessary information, given the circumstances of the particular confined space, in order to ensure employee safety
  - (xv) any additional permits, such as for hot work, that have been issued to authorize work in the permit space.
- 3.9 Include the finalized rescue procedures on the permit. Contact the Emergency Response Commander and discuss rescue procedures appropriate to the confined space. Emergency procedures should be reviewed with the attendants.
- 3.10 If conditions are discovered to be different than those described on the confined space permit, then the permit will be canceled and work will be terminated by the Process Owner/Authorized Delegate, the Entry Supervisor, or the Emergency Response Commander. Work will not begin again until all discrepancies found are corrected and a new permit issued. Any change in work conditions or work activity that introduces new hazards into the confined space will require a new permit.

## 4.0 ENTRY AND RESCUE PROCEDURES

### General

- 4.1 This section provides general safeguards and detailed procedures to use when entering a confined space. It also describes the necessary steps for obtaining and providing rescue assistance.

### **Safety Equipment**

- 4.2 The entry permit will define the minimum, necessary equipment for working in a particular confined space. The identified equipment may include some or all of the following:

- Eye and Face Protection
- Head Protection
- Foot Protection
- Body Protection
- Hearing Protection
- Respiratory Protection
- Hand Protection
- Safety Harness and Retrieval Line
- Safety Lines
- Life Jackets (if water is present and protection required)

- 4.3 The use of this equipment will be determined by the Process Owner/Authorized Delegate and/or the Emergency Response Commander.

### **General Safeguards**

- 4.4 Always assume a hazard exists.
- 4.5 Never enter any confined space unless atmospheric testing has been performed for oxygen volume, flammable or combustible gases, and airborne toxic chemicals.
- 4.6 Always consider the special hazards that might arise while working in the space.
- 4.7 Be sure that all supplied energy and possible contaminants are isolated at the source. All energy sources must be locked and tagged out to avoid a sudden start up or release of stored energy from equipment in a confined space.
- 4.8 Always have an attendant at the entrance to the confined space. (The attendant shall never enter the space!)
- 4.9 The space should be completely isolated from potential vapor leaks, flashbacks, and other hazards. When implementing this isolation, always physically disconnect all piping supplying a confined space. In the case of blanked pipes supplying flammable liquids or gases, the disconnect point must be tested for leaks.
- 4.10 Communication between the entrant and the attendant must be maintained, either through two-way radio or visual contact. In the event visual monitoring is not possible, then a voice or alarm activated explosion proof type of communication system is necessary.

### **General Hazards**

- 4.11 Always consider the following potential hazards when dealing with a confined space point of entry/exit:
- (i) type of confined space to be entered
    - (ii) access to the entrance
    - (iii) number and size of the openings
    - (iv) barriers within the space
    - (v) the number of employees to be working in the space
    - (vi) time requirements for exiting the space in the event of a fire
    - (vii) time required to perform a rescue of an injured worker in the space.
- 4.12 Some hazards cannot be eliminated because of the nature of the work or the confined space. These hazards, which are considered physical in nature, include:
- (i) temperature of the confined space
  - (ii) noise
  - (iii) vibration
  - (iv) use of scaffolding
  - (v) presence of surface residues
  - (vi) structural hazards.

#### **Ventilating/Purging Confined Spaces To Be Entered**

- 4.13 A specific method of ventilating or purging the confined space will be required if there is a potential for hazards associated with the products stored or produced, any suspected contaminants, the work to be performed, and/or the design of the confined space.
- 4.14 When ventilating/purging a confined space, the blower controls should be located at least five feet outside the entrance to the space.
- 4.15 An audible alarm should also be installed on the ventilation equipment to signal that there is a system failure.
- 4.16 When a ventilation system is in operation, the air flow shall be measured before each work shift so that a safe environmental level is maintained.
- 4.17 Always test the confined space environment before initiating any ventilation/purging. The results of these tests will determine what form of ventilation/purging is needed.
- 4.18 The ventilation system must be designed such that only fresh air is supplied to the confined space.
- 4.19 If flammable concentrations are present (10 percent or greater of the LEL/LFL), the electrical equipment shall comply with the provisions of NFPA No. 70, National Electrical Code, for hazardous locations and bonding/grounding requirements. Equipment shall be approved as either being explosion proof or intrinsically safe.
- 4.20 Continuous ventilation of a confined space must be maintained where toxic atmospheres are produced as part of the work procedure (i.e., welding or painting) or where a toxic atmosphere may develop due to the nature of the space.

- 4.21 Special precautions must be taken when using a ventilation system that partially blocks an exit opening. Such precautions include a method of providing breathable air to each worker for the time necessary to exit the space and a method of maintaining communications.
- 4.22 If general ventilation is not effective, local exhaust ventilation must be provided.
- 4.23 Special precautions must be taken when vaporization of toxic and/or flammable substances are likely. If the vapor-generating rate can be determined, calculate the lowest acceptable ventilation rate. The ventilation rate must be sufficient to maintain an atmosphere that is below the PEL and/or 10% of the LEL/LFL, whichever is lower. If the vaporization is due to the application of protective coatings or paint, continue ventilation until the buildup of a flammable and/or toxic atmosphere is no longer evident.
- 4.24 If work with fire cannot be avoided (i.e., using an acetylene torch) and the source of fuel cannot be isolated, the space shall require the introduction of an inert gas or steam to displace the oxygen to the point that a flammable atmosphere will not exist. The use of a supplied air breathing system by the worker, continuous monitoring of the atmosphere for the presence of an explosive environment, and monitoring of the flow of the inert gas shall also be required. Because each confined space will have its own infiltration rate, inerting must continue throughout the duration of the work at a rate that will prevent air from entering the space.

#### **Alternate Entry Procedures**

4.25 There are alternate entry procedures for permit-required confined spaces which do not require a permit for entry. These procedures may be used if:

- (i) it can be demonstrated that the only hazard posed by the permit space is an actual or potential hazardous atmosphere
- (ii) it can be demonstrated that continuous forced air ventilation alone is sufficient to maintain that the permit space is safe for entry
- (iii) monitoring and inspection data supporting these items (i and ii) is documented and available to each employee entering the permit space
- (iv) any condition making it unsafe to remove an entrance cover shall be eliminated before the cover is removed
- (v) when entrance covers are removed, the opening is promptly guarded by a railing, temporary cover, or other temporary barrier that will prevent an accidental fall through the opening and protect each entrant in the space from foreign objects entering the space
- (vi) internal atmospheric testing is conducted with a calibrated, direct-reading instrument to verify acceptable atmospheric conditions

(vii) continuous forced air ventilation is properly used (see the section of "Ventilating/Purging Confined Spaces To Be Entered.")

(viii) the Process Owner/Authorized Delegate verifies that the space is safe for entry and that the following information is documented

- (a) the date of the determination
- (b) the location of the space
- (c) the signature of the person making the determination.

**Note:** The certification shall be made before entry and shall be made available to each employee entering the space.

(ix) the space is reevaluated and, if necessary, is reclassified as a permit-required confined space if there are changes in the non-permit-required confined space that might increase the hazards to the entrants.

**4.26** If a hazardous atmosphere is detected during entry:

- (i) each employee shall leave the space immediately
- (ii) the space shall be evaluated to determine how the hazardous atmosphere developed
- (iii) measures shall be implemented to protect employees from the hazardous atmosphere before any subsequent entry takes place.

### **Isolation and Lockout/Tagout of the Confined Space**

**4.27** All provisions of the CABRERA Lockout/Tagout program will apply to work in confined spaces. This program is intended for use when, isolating potentially hazardous energy sources (i.e., electrical, pneumatic, hydraulic, mechanical, chemical, and thermal). Only those individuals that have completed lockout/tagout training for authorized employees may perform the lockout/tagout procedures at CABRERA sites.

**4.28** The isolation points for energy sources found within the confined space shall be listed on the entry permit.

**4.29** If there is a drain line in the confined space that is responsible for removing materials (i.e., water, pellets, grain, etc.) from the space, the line shall be tagged and left open. This is to prevent engulfment should a material be added to the space inadvertently.

### **Cleaning Confined Spaces**

- 4.30 When cleaning a confined space that has a flammable atmosphere above the upper flammable limit, the space shall be purged with an inert gas before the space is ventilated with air. If possible, initial cleaning must be done from outside the tank.
- 4.31 If steam is used to clean a tank:
- (i) it must be allowed to cool prior to entry
  - (ii) ventilation must be maintained during neutralization procedures to prevent a build up of toxic materials
  - (iii) steam shall never be used as a cleaning method if the product stored in the space has an auto ignition temperature 120 degrees or less than the temperature of the steam
  - (iv) the nozzle of the steam hose must be bonded to the tank to reduce the generation of static electricity.

#### **Equipment and Tools for Working in Confined Spaces**

- 4.32 All equipment used in a flammable atmosphere must be approved as either explosion proof or intrinsically safe.
- 4.33 Hand tools must be kept clean and in good repair.
- 4.34 Portable electric tools, equipment, and lighting must be properly grounded and be equipped with ground fault circuit interrupters.
- 4.35 Electrical cords, tools, and equipment must be of heavy duty construction and free of nicks and defects.

- 4.36 Air driven or explosion proof power tools must be used when flammable liquids and/or combustible atmospheres are present. This will reduce, but not eliminate, the risk of explosion. Explosion hazards are still present due to overheating tools, sparks from striking or grinding, and/or discharge of electrostatic charges developed from the flow of compressed air.
- 4.37 Lights used in confined spaces must be of explosion proof design and, where necessary, equipped with guards.
- 4.38 Lighting shall not be hung by the electrical cord, unless it is designed for that use. Under no circumstances will matches or open flames be used for illumination in a confined space.
- 4.39 Never take cylinders of compressed gas into a confined space. An exception to this rule is the cylinders used by self-contained breathing apparatus or resuscitation equipment. Cylinder valves are to be turned off whenever the cylinder is not in use.
- 4.40 Use only hoses designed for the pressure associated with the particular system. The pressure relief valve shall be located outside the confined space.
- 4.41 Ladders shall be secured and placed at an angle such that the bottom is approximately one-fourth the height of the ladder from the wall.
- 4.42 Scaffolding shall meet all requirements contained in OSHA Standard CFR 1910.28, Scaffolding Safety Requirements.

#### **Rescue and Emergency Procedures**

- 4.43 Rescue from confined spaces shall be performed only by approved CABRERA Emergency Response Teams. Under no circumstances should an untrained individual or an individual not equipped with the required safety gear and personal protective equipment enter a confined space to perform rescue.
- 4.44 Retrieval systems or methods shall be used to facilitate non-entry rescue unless the retrieval equipment increases the overall risk of entry or does not contribute to the rescue of the entrant. Retrieval systems shall meet the following requirements:
- (i) each authorized entrant shall use a full body harness, with a retrieval line attached at the center of the entrant's back near shoulder level or above the entrant's head. Wristlets may be used if the use of a full body harness is not feasible or creates a greater hazard and wristlets are the safest and most effective alternative
  - (ii) the other end of the retrieval line shall be attached to a mechanical device or fixed point (i.e., tripod) outside the permit space in such a manner that a rescue can begin as soon as necessary. A mechanical device shall be available to retrieve personnel from vertical type spaces more than 5 feet deep.
- 4.45 When a chemical or substance is associated with a confined space, a MSDS or other similar written information is required to be kept at the work site. This

information shall be made available to the medical facility if an entrant becomes exposed to the substance or chemical while working in the space.

4.46 If persons other than those designated by CABRERA are to perform permit space rescue, the Process Owner/Authorized Delegate shall:

- (i) inform the rescue service of the hazards they may confront
- (ii) provide the rescue service with access to all permit spaces from which rescue may be necessary so that the rescue service can develop appropriate rescue plans and practice rescue operations
- (iii) provide the rescue service with MSDS for those chemicals in which they may be exposed to during a permit space rescue.

## 5.0 PROCEDURE FOR ATMOSPHERIC TESTING

### General

5.1 Atmospheric testing is required for two distinct purposes: evaluation of the hazards of the permit space and verification that acceptable entry conditions exist.

### Evaluation Testing

5.2 The atmosphere of a confined space shall be analyzed using equipment of sufficient sensitivity and specific design to identify and evaluate any hazardous atmospheres that may exist or arise. This analysis is conducted so that appropriate entry procedures can be developed and acceptable entry conditions can be set. The Process Owner/Authorized Delegate or the Emergency Response Commander evaluates and interprets the data and develops the entry procedure.

5.3 Perform atmospheric testing for oxygen, flammable gases and vapors, and potential toxic air contaminants in the following manner.

- (i) perform the testing from outside the confined space (on vertical entries, testing should be done at various levels)
- (ii) perform the initial testing when the ventilation system is not running.

5.4 If the space has an odd shape or remote areas, the testing will need to be done in a progressive manner by taking the equipment into the confined space and clearing areas as the inspector moves forward. The person performing the test must wear protective equipment appropriate to the conditions which may be encountered and inspect for the presence of a particularly dusty environment.

5.5 The acceptable atmospheric conditions are:

- (i) oxygen content: 19.5% to 23.5%
- (ii) flammable gases/vapors content: less than 10% of lower explosion limit/lower flammable limit (verify using Material Safety Data Sheet)

- (iii) Potential toxic air contaminants: below TLV/PEL for associated material (verify using MSDS).
- 5.6 Evaluate the presence of airborne toxic chemicals by use of direct-reading sampling tubes or other appropriate instrument. These results should be 50% or less of the existing exposure limits (PEL and/or TLV).
- 5.7 The Process Owner/Authorized Delegate shall determine whether continuous atmospheric monitoring will be required while the work is being performed. If the space is vacated air monitoring should be performed before reentering the space.
- 5.8 5.08 If ventilation is necessary, atmospheric monitoring should be conducted with the ventilation system running to determine its effectiveness.

### **Verification Testing**

- 5.9 The permit space atmosphere should be tested for residues of all contaminants identified by the evaluation test. Testing for these residues should use the permit specified equipment. The tests verify residual concentrations are within the range of acceptable entry conditions. The actual data results of testing should be recorded on the permit.

### **Duration of Testing**

- 5.10 Measurement for each atmospheric parameter should be made for at least the minimum response time specified by the manufacturer of the test instrument.

### **Testing Stratified Atmospheres**

- 5.11 When monitoring atmospheres that may be stratified, the atmospheric envelope should be tested a distance of approximately 4 feet (1.22 m) in the direction of travel and to each side. If a sampling probe is used, the entrant should wait for the detector response before proceeding.

## **6.0 HAZARD IDENTIFICATION**

- 6.1 A confined space can become unsafe as a result of possible atmospheric contamination (i.e., toxic or flammable vapors, oxygen enriched or deficient atmosphere), physical hazards, the possibility of liquids, gases, or solids being admitted during, occupancy, or the isolation of entrants from rescue personnel.
- 6.2 Hazard identification must consider the past and current use of the space which may have an adverse effect on the atmosphere. The hazard identification should include:
  - (i) a review of the Material Safety Data Sheet (MSDS) for materials currently or previously used in the confined space
  - (ii) the identification of protective coatings which could trap materials, decompose, or deteriorate during operations

- (iii) the decomposition of residues or reaction with cleaning agents or heat from welding, brazing, or cutting (flame or abrasive) operations
  - (iv) the operation of engine powered equipment in the confined space.
- 6.3 Hazard identification must consider the means of entry and exit of the space and any hazard posed by adjacent spaces and/or operations.
- 6.4 Any biological hazard which may be associated with the confined space must be identified and any mechanical hazards (i.e., augers, ribbon blenders, conveyors) must be noted.

### **Hazard Evaluation**

- 6.5 After a potential hazard has been identified, it shall be evaluated by the Process Owner/Authorized Delegate. Each potential hazard will be evaluated with respect to the following:
- (i) the affect or exposure to employee(s)
  - (ii) the extent of the hazard (how toxic are the chemicals, how much material could be inadvertently introduced, etc.)
  - (iii) the probability that the hazard will occur (i.e., certain to improbable)
  - (iv) the consequences of the most likely outcome if the hazard occurs (i.e., space explosion, death by asphyxiation)
  - (v) the potential for changing conditions or activities (i.e., the introduction of chemical agents or hot work, the filling of an adjacent tank that was originally empty, change in weather)
  - (vi) the hazards of various tools which may be used in the confined space
  - (vii) the strategies for controlling the hazards to
  - (viii) the impact on the need for emergency response (i.e., the size of the man way may be such that special equipment is required for rescue).

### **Hazard Reevaluation**

- 6.6 The Process Owner/Authorized Delegate will reevaluate the permit-required confined spaces on an annual basis. This reevaluation will be reflected in the Permit-Required Confined Space Inventory which is issued annually to affected personnel.

## 7.0 RESPONSIBILITIES

### Duties of Authorized Entrant

- 7.1 The authorized entrant shall be trained and qualified to enter the confined space to perform the necessary work. The authorized entrant shall:
- (i) be knowledgeable of the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure
  - (ii) maintain contact with the attendant as necessary so the attendant can monitor entrant status and alert entrants of the need to evacuate if necessary
  - (iii) use the specified personal protective and safety equipment as required
  - (iv) be aware of the external barriers needed to protect entrants from external hazards and to properly use those barriers.
- 7.2 The authorized entrant is required to notify the attendant whenever:
- (i) the entrant self-initiates evacuation of the confined space
  - (ii) the entrant recognizes any warning signs or symptoms of exposure to a dangerous situation
  - (iii) the entrant detects a prohibited condition.
- 7.3 The authorized entrant is required to exit the confined space as quickly as possible whenever:
- (i) an order to evacuate is given by the attendant, entry supervisor, Authorized Delegate, and/or Emergency Response Commander
  - (ii) the entrant recognizes any warning signs or symptoms of exposure to a dangerous situation
  - (iii) the entrant detects a prohibited condition
  - (iv) an evacuation alarm is activated.

**Duties of Attendant**

- 7.4 Be knowledgeable of any hazards associated with the space during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- 7.5 Be aware of possible behavioral effects of hazard exposure in authorized entrants.
- 7.6 Maintain an accurate count of authorized entrants and ensure accurate identification of who is in the permit space.
- 7.7 Remain outside the permit space at all times during entry operations until relieved by another attendant.
- 7.8 Communicate with authorized entrants as necessary to monitor their status and to alert them of the need to evacuate.
- 7.9 Monitor activities inside and outside the space to determine if it is safe for entrants to remain in the space. Order the entrants to evacuate the permit space immediately under any of the following conditions;
  - (i) attendant duties cannot effectively and safely be performed
  - (ii) detection of a condition not allowed by the permit
  - (iii) notice of behavioral changes (hazard exposure) in an entrant
  - (iv) a situation occurs outside the space that could endanger the entrants
  - (v) an uncontrolled hazard is detected in the space.
- 7.10 Summon the Emergency Response Team if an authorized entrant needs assistance to escape from permit space hazards.
- 7.11 Take the following actions when unauthorized persons approach or enter a permit space:
  - (a) keep unauthorized persons away from the entrance
  - (b) request that the unauthorized persons exit the area immediately if they approach the permit space
  - (c) inform the authorized entrants and the entry supervisor if unauthorized persons have entered the permit space.
- 7.12 Never enter the confined space to attempt rescue of entrants.
- 7.13 Never perform any duty that might interfere with the attendant's primary duty of monitoring and protecting the authorized entrants.

### Duties of Entry Supervisors

- 7.14 Become knowledgeable of the hazards that may be faced during entry, including information on the mode, signs or symptoms, and consequences of the exposure.
- 7.15 Check and verify all the information on the permit (all tests specified have been conducted and all procedures and equipment specified are in place) before endorsing the permit and allowing entry to begin.
- 7.16 Oversee the entry operations. These duties include responsibility for, but is not limited to, the following:
- (i) isolating the permit space
  - (ii) purging, making inert, flushing, or ventilating the permit space as necessary to eliminate or control atmospheric hazards
  - (iii) providing pedestrian, vehicle, or other barriers as necessary to protect entrants from external hazards
  - (iv) verifying acceptable entry conditions throughout the duration of an authorized entry.
- 7.17 Make available the following equipment to affected employees and ensure that the equipment is properly maintained, that employees are trained on using said equipment, and that the equipment is properly used:
- (i) communication equipment necessary to safely deal with the work to be performed. Special radio equipment may be required in certain situations
  - (ii) personal protective equipment (if employees are not adequately protected through feasible engineering and work practice controls)
  - (iii) lighting equipment needed to enable employees to see well enough to work safely and to exit the space quickly in an emergency
  - (iv) pedestrian, vehicle, or other barriers and shields as required to protect entrants from external hazards
  - (v) equipment, such as ladders, needed for safe entry and egress by authorized entrants.
- 7.18 Provide at least one attendant outside the permit space for the duration of entry operations.
- Note:** Assigning attendants to monitor more than one permit space is not recommended. However, attendants may be stationed at any location outside the permit space to be monitored as long as the duties described in this document can

be effectively performed for each permit space that is monitored. Safety must be the primary issue in dealing with confined spaces.

- 7.19 Designate the persons who are to have active roles and identify the duties of each (i.e., authorized entrants, attendants, or persons who test or monitor the atmosphere in a permit space).
- 7.20 Notify CABRERA and Contractor employees of precautions or procedures that have been implemented in or near permit spaces.
- 7.21 Coordinate entry operations when CABRERA and Contractor personnel will be working in or near permit spaces. This also includes coordination of employees of other employer's so that they do not endanger each other.
- 7.22 Verify that rescue services are available and that the means for summoning them are operable.
- 7.23 Terminate the entry and cancel the permit when the entry operations have been completed or a condition that is not allowed under the entry permit arises in or near the permit space.
- 7.24 Remove unauthorized individuals who enter or who attempt to enter the permit space during entry operations.
- 7.25 Ensure that entry operations follow the terms of the entry permit and acceptable entry conditions are maintained:
  - (i) whenever responsibility for a permit space entry operation is transferred
  - (ii) at intervals dictated by the hazards and operations performed within the space.
- 7.26 Debrief CABRERA and Contractor employees at the conclusion of the entry operations.

### **Emergency Response Teams**

- 7.27 The CABRERA Emergency Response Teams shall be responsible for:
  - (i) responding to all emergencies involving confined spaces
  - (ii) providing standby fire protection in the event hot work is being performed in a confined space where there is a risk of fire.
- 7.28 The Emergency Response Commander may, on occasion, be asked to perform periodic atmospheric testing and issue confined space permits.

### **Outside Contractors**

- 7.29 Any contractor performing work in a permit-required confined space or performing hazardous work operations in a non-permit-required confined space must have a confined space entry program that meets Federal and State regulations.
- 7.30 The contractor must provide CABRERA with a copy of their confined space entry program for review. If there are differences between the two programs, the contractor must adhere to the more stringent requirements of the two programs.
- 7.31 All contractor personnel (i.e., attendants, authorized entrants, entry supervisors) must be trained in accordance with Federal and State regulations. Written documentation of required training must be presented to CABRERA
- 7.32 Outside Contractors shall be responsible for the following:
- (i) reviewing the requirements of this document
  - (ii) providing written entry permits, all atmospheric monitoring and operational atmospheric monitoring equipment and certification of calibration of such equipment, ventilation equipment, and all required safety equipment (i.e., safety belts, lifelines, personal protective equipment)
  - (iii) having the CABRERA project manager review all permits to verify that all the necessary requirements have been met and all necessary safety precautions have been taken
  - (iv) having the permit initialed by the CABRERA project manager to verify that the permit has been reviewed
  - (v) notifying the CABRERA project manager of the time each entry is expected to begin, the work operation being performed, materials being used in the confined space, and the results of any preliminary air monitoring
  - (vi) obtaining any available information regarding permit space hazards and entry operations from the Process Owner/Authorized Delegate
  - (vii) coordinating entry operations with CABRERA, when both CABRERA and Contractor personnel will be working in or near permit spaces
  - (viii) informing CABRERA either during the entry operation or through a debriefing, of any hazards confronted or created in permit spaces.

**CABRERA**

- 7.33 Develop and implement the CABRERA Confined Space Program.
- 7.34 Specify acceptable entry conditions and issue permits to requesting organizations using the Confined Space Entry Permit System. This system defines how to prepare, issue, use, and cancel entry permits.

- 7.35 Maintain the Permit-Required Confined Space Program. Includes annual reviews, posting signs to identify and inform exposed employees of permit-required confined spaces, and annually update, the confined space inventory.
- 7.36 Make available the following equipment to affected employees and ensure that the equipment is properly maintained, that employees are trained on using said equipment, and that the equipment is properly used:
- (i) testing and monitoring equipment needed to evaluate permit space conditions
  - (ii) ventilating equipment needed to obtain acceptable entry conditions
  - (iii) rescue and emergency equipment needed to comply with Paragraph 4.02 (unless the equipment is provided by rescue services) and any other equipment necessary for safe entry into and rescue from permit spaces.
- 7.37 Develop and implement procedures for rescue and emergency services. These procedures include rescuing entrants, providing emergency services to rescued employees, and preventing unauthorized personnel from attempting a rescues.
- 7.38 Provide training to attendants, entrants, and affected personnel.
- 7.39 Make this document available for inspection by employees and authorized representatives.
- 7.40 Identify and evaluate potential hazards associated with confined spaces and notify CABRERA and Contractor employees of the elements (including identified hazards and prior experiences) which make the associated space a "permit space".
- 7.41 Review entry operations if an employer believes the permit space program may not be sufficient to protect employees. Also, revise the program to correct deficiencies found to exist before subsequent entries are authorized.

**Note:** Examples of circumstances requiring the review of the permit-required confined space program are:

- any unauthorized entry of a permit space
  - the detection of a permit space hazard not covered by the permit
  - the detection of a condition prohibited by the permit
  - the occurrence of an injury or near-miss during entry
  - a change in the use or configuration of a permit space
  - any employee complaints about the effectiveness of the program.
- 7.42 Review the canceled permits within one year after each entry and revise the "Confined Space Program" as necessary. If no entry is performed during a 12-month period, no review is necessary.

## 8.0 TRAINING REQUIREMENTS

### General

- 8.1 Training is required of personnel who are responsible for supervising, planning, entering, or participating in confined space entry and rescue. These persons must be adequately trained in the provisions of the Atlanta Works Confined Space Program prior to entering a confined space. This includes awareness of the "Confined Space Entry Permit System" and the procedures for entering confined spaces.
- 8.2 Training shall be provided to affected CABRERA and contract employees under the direct supervision of CABRERA. This ensures that the employees acquire the understanding, knowledge, and skills necessary to safely perform their assigned duties.
- 8.3 Training shall be provided to each affected employee:
- (i) before the employee is first assigned duties
  - (ii) when there is a change in assigned duties or procedures
  - (iii) whenever there is a change in permit space operations that presents a hazard about which an employee has not been previously trained
  - (iv) whenever the employer has reason to believe;
    - (a) there are deviations from the permit space entry procedures required in this document
    - (b) there are inadequacies in the employee's knowledge or use of these procedures
  - (v) annually.
- 8.4 The training conducted shall establish employee proficiency in the duties listed in the "Responsibilities" section. Training records shall be available for inspection by employees and any authorized representative and shall serve as certification that training has been completed.
- 8.5 Entrants, Attendants, Entry Supervisors, and Rescue Personnel must be trained to know and recognize the signs and symptoms of exposure to a hazard. They should also be made aware of the types of hazards which may be encountered and the consequences of being exposed.
- 8.6 Entrants, Attendants, Entry Supervisors, and Rescue Personnel must be made aware of the protective equipment needed for safe entry and exit, the proper use of the equipment, and the limitations of personal protective equipment and other safety equipment required for entry into confined spaces. Respiratory protection equipment training must be provided in compliance with CABRERA

## Respiratory Protection Program.

- 8.7 Entrants, Attendants, Entry Supervisors, and Rescue Personnel must be informed of how to respond to an emergency situation (see the "Rescue and Emergency Procedures" section). This includes contacting appropriate personnel and proper entry and exit procedures during rescue.

## Emergency Responders

- 8.8 Emergency Responders shall be trained annually in the following procedures:
- (i) those items listed under "Emergency Response Team" in the "Responsibilities" section.
  - (ii) the rescue procedures developed for each type of confined space at CABRERA sites (i.e., underground vaults, manholes, pipes, silos)
  - (iii) the use of the emergency rescue equipment they would be expected to use or operate during an emergency rescue (i.e., personnel protective equipment, rescue equipment, breathing apparatus, medical equipment) -
  - (iv) basic first-aid and cardiopulmonary resuscitation (CPR) techniques
- Note:** At least one member of the Emergency Response Team must be holding certification in first aid and in CPR
- (v) locations of Permit-Required Confined Spaces at CABRERA sites (see "Permit-Required Confined Space Inventory").
- 8.9 Each member of the Emergency Response Team shall participate in a permit space rescue drill at least once every 12 months. These drills must include a simulated permit-required space rescue.
- 8.10 In addition to the "emergency and rescue" type training, each member of the Emergency Response Team shall also receive authorized entrant training.

## Record Keeping

- 8.11 Records of training provided to personnel involved with confined spaces shall be maintained by CABRERA

Job #: \_\_\_\_\_

CABRERA  
**Confined Space Entry Permit**

**General Information**

**Emergency Services**

Date/Time Issued: \_\_\_\_\_ Name of Service: \_\_\_\_\_  
Duration of Permit: \_\_\_\_\_ Phone Number: \_\_\_\_\_  
Date/Time Cancelled: \_\_\_\_\_ Method of Contact: \_\_\_\_\_

**Site Address and description:** \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

**Purpose of Entry:** \_\_\_\_\_  
\_\_\_\_\_

**Confined Space Supervisor:**  
\_\_\_\_\_

**Confined Space Attendant(s):**  
\_\_\_\_\_

**Confined Space Entrants:**

**Time In/Out**

|    |       |       |
|----|-------|-------|
| 1. | _____ | _____ |
| 2. | _____ | _____ |
| 3. | _____ | _____ |
| 4. | _____ | _____ |
| 5. | _____ | _____ |
| 6. | _____ | _____ |

**Personal Protective Equipment (Check all that apply):**

- Safety harnesses and lifelines
- SCBA for entrants
- Air Purifying Respirator
- Hand Protection
- Escape Retrieval Equipment
- SCBA available for Attendant
- Hearing Protection
- Chemical Protective Clothing
- Two-Way Radios
- Airline with SKA-Paks
- Head and Eye Protection
- Steel toed safety shoes

Brand/Type of Chemical Protective Clothing:

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**Communication Procedure to be used by Attendant and Entrants:**

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Hazard Control (Check all that apply):

**Potential Hazards**

- Oxygen deficiency (<19.5%)
- Toxic gases or vapors (>PEL)
- Moving Mechanical Parts
- Poor Lighting
- Caustic chemical (skin)
- Oxygen enrichment (>23.5%)
- Flammable Vapors (>10%LEL)
- Engulfment
- Fall Exposure
- Temperature extremes
- Combustible dust
- Electrical
- Entrapment
- Falling objects

8.11.1 Pre-Entry Hazard Control

- All personnel CSE trained.
- All personnel apprised of work plan and associated hazards in this confined space.
- Local rescue service notified of entry.
- Confined Space Entry Permit reviewed with Entry Supervisor.
- JSA provided and reviewed to guide attendant and entrants during entry.
- Area marked and secured to prevent pedestrian and vehicular traffic.
- Hazardous energy sources controlled.
- Mechanical ventilation utilized to control chemical hazards.
- Natural ventilation utilized.
- Space purged, flushed and vented to remove flammable vapors.
- All electric equipment listed Class I, Division I, Group D and non-sparking tools utilized.
- Fire extinguisher appropriately rated for anticipated flammable hazards.
- Objects stored away from edge at top of space.
- Combustible dust removed from space.

8.12 Air Monitoring

MSA Passport 4 Gas Monitor

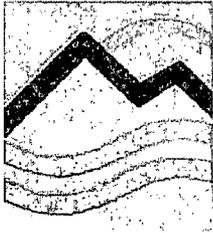
| Time | Oxygen (%) | LEL (%) | CO (PPM) | H2S (PPM) | Monitor's Initials |
|------|------------|---------|----------|-----------|--------------------|
|      |            |         |          |           |                    |
|      |            |         |          |           |                    |
|      |            |         |          |           |                    |
|      |            |         |          |           |                    |
|      |            |         |          |           |                    |
|      |            |         |          |           |                    |
|      |            |         |          |           |                    |
|      |            |         |          |           |                    |
|      |            |         |          |           |                    |
|      |            |         |          |           |                    |

Chemical-Specific Monitoring

Type of Monitor:       PID       Detector tube       Jerome Meter

Chemical(s) Monitored:

| Time | Result for Chemical #1: | Result for Chemical #2: | Result for Chemical #3: | Monitor's Initials |
|------|-------------------------|-------------------------|-------------------------|--------------------|
|      |                         |                         |                         |                    |
|      |                         |                         |                         |                    |
|      |                         |                         |                         |                    |
|      |                         |                         |                         |                    |



# CABRERA SERVICES

RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

## Lockout/Tagout Health and Safety Manual 004

Effective Date

02/20/2002

Revision 1

*Prepared By:  
Cabrera Services, Inc.  
East Hartford, CT*

Prepared By: \_\_\_\_\_  
Paul Schwartz, CIH, CSP – Health & Safety Manager

Date: \_\_\_\_\_

Approved By: \_\_\_\_\_  
David Watters - Principal

Date: \_\_\_\_\_

## Cabrera Services, Inc.

## Lockout/tagout Program

**1.0 OVERVIEW**

- 1.1 This Procedural Instruction documents the Lockout/Tagout Program used at Cabrera Services, Inc. (CABRERA) project sites. This program helps safeguard personnel from the unexpected startup of equipment/machinery or the release of hazardous energy while servicing and/or maintenance is being performed.
- 1.2 This Procedural Instruction provides specific guidelines for the control of potentially hazardous energy sources and establishes minimum requirements for the lockout of energy isolating devices during servicing or maintenance of equipment or machines. This procedural instruction will be used by CABRERA personnel who service, maintain, adjust, clean, or un-jam components from machinery or equipment. Lockout and/or Tagout devices shall be used to ensure that machinery, equipment, or processes are isolated from hazardous energy whenever an employee must remove or bypass a guard, or whenever any part of the body could become injured.
- 1.3 This program shall be used to ensure that the machine or equipment is stopped and isolated from potentially hazardous energy sources and locked out before employees perform any servicing or maintenance where the unexpected energization or start-up of the machine or equipment or release of stored energy could cause injury.
- 1.4 All CABRERA employees shall comply with the restrictions and limitations imposed upon them during the use of lockout/tagout procedures. Employees not complying with the provisions of this procedure will be subject to disciplinary action.
- 1.5 This instruction has been developed as a response to OSHA Regulation 29CFR1910.147, "The Control of Hazardous Energy: Lockout/Tagout".

**2.0 DEFINITIONS**

- 2.1 Throughout this document, there are frequently used terms and phrases that should be clearly understood. Some of the terms and phrases are defined as follows:

**Affected Employee** - An employee whose job requires him/her to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout or tagout, or whose job requires him/her to work in an area in which such servicing or maintenance is being performed.

**Authorized Employee** - A trained employee who performs the actual Lockout or Tagout system procedure on machines or equipment. An authorized employee and affected employee may be the same person when the affected employee's duties include

performing the required maintenance or service on the locked or tagged equipment and when that person has been trained in performing lockout/tagout procedures as outlined in this program.

**Capable of Being Locked Out** - An energy-isolating device is capable of being locked out if it has a hasp or other means of attachment to which, or through which, a lock can be affixed, or it has a locking mechanism built into it. Other energy isolating devices are capable of being locked out, if lockout can be achieved without the need to dismantle, rebuild, or replace the energy isolating device or permanently alter its energy control capability.

**Energized** - Any device either connected to an energy source or containing residual or stored energy.

**Energy Isolating Device** - A mechanical device that physically prevents the transmission or release of energy, including but not limited to the following: A manually operated circuit breaker; a disconnect switch; a manually operated switch by which the conductors of a circuit can be disconnected from ungrounded supply conductors and, in addition, no pole can be operated independently; a line valve; a block; and any similar device used to block or isolate energy. Push buttons, selector switches, and other control circuit-type devices are not energy-isolating devices.

**Energy Source** - Any source of electrical, mechanical, hydraulic, pneumatic, chemical, thermal, gravitational, or other energy source.

**Hot Tap** - A procedure used in the repair, maintenance and service activities which involves welding on a piece of equipment (i.e., pipelines, vessels or tanks) under pressure, in order to install connections or appurtenances. It is commonly used to replace or add sections of pipeline without the interruption of service for air, gas, water, steam and petrochemical distribution systems.

**Kinetic Energy** - Energy in motion.

**Lockout** - The placement of a lockout device on an energy-isolating device, in accordance with this procedural instruction, to ensure that the energy isolating device and the equipment being controlled cannot be operated until the lockout device is removed.

**Lockout Device** - A device (i.e., lock and key), that utilizes a positive means to hold an energy-isolating device in a "safe" position and prevents the energization of a machine or equipment so that machinery or equipment cannot be re-energized.

**Potential Energy** - Energy at rest (stored energy).

**Servicing and/or Maintenance** - Workplace activities, such as constructing, installing, setting up, adjusting, inspecting, modifying and maintaining and/or servicing machines or equipment. These activities include lubrication, cleaning, or un-jamming of machines or

equipment and making adjustments or tool changes, where the employee may be exposed to the unexpected energization or start-up of the equipment or the release of hazardous energy.

**Setting Up** - Any work performed to prepare machines, equipment, or processes to perform its normal production operation.

**Tagout** - The placement of a tagout device, in accordance with this procedural instruction, on an energy-isolating device to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

**Tagout Device** - A prominent warning device, (i.e., tag and means of attachment) which can be securely fastened to an energy-isolating device (see attached Figure 1) to indicate that the energy isolating device and the equipment being controlled may not be operated until the tagout device is removed.

### 3.0 SPECIFIC WRITTEN LOCKOUT/TAGOUT PROCEDURES

3.1 As required by OSHA Standard 29 CFR 1910.147(c)(4), "Energy Control Procedures," this instruction, and the Pre-Use Process, specific written procedures shall be written to effectively isolate and shutdown new and modified pieces of machinery or equipment (except those meeting the criteria in section 3.03). These procedures shall be written by the Project Manager using the following steps:

1. A copy of the "Lockout/Tagout Worksheet" shall be completed by the Project Manager.
2. The Project Manager will then contact the Lockout/Tagout Process Owner to obtain a Lockout/Tagout Document Number for the equipment/machinery and a disk with information for assisting the engineers in completing the specific written procedures.
3. Once the procedures are complete, they will be forwarded to the Lockout/Tagout Process Owner.
4. The Lockout/Tagout Process Owner will file the procedure and place the Lockout/Tagout Document Number identification sticker on the equipment/machinery.

3.2 Any changes or alterations (for example, removal, out-of-service, relocation, changing energy source, etc.) to equipment/machinery that has a written Lockout/Tagout Document Number must be reported to the Lockout/Tagout Process Owner. Written notification must be forwarded with the following information:

- Lockout/Tagout Document Number
- Name of changed/removed item
- Location of changed/removed item
- Type of modification (removed, relocated, change procedure to reflect new de-energization steps, etc.).

3.3 It is not necessary to document the procedures for a piece of equipment

meeting ALL of the following elements:

1. The equipment has no potential for stored or residual energy or reaccumulation of stored energy after shutdown.
  2. The equipment has a single source which can be readily identified and isolated.
  3. The isolation and locking out of that energy source will completely de-energize and deactivate the machine or equipment.
  4. The machine or equipment is isolated from that energy source and locked out during servicing or maintenance.
  5. A single lockout device will achieve a locked-out condition.
  6. The lockout device is under exclusive control of the authorized employee performing the servicing or maintenance.
  7. The servicing or maintenance does not create hazards for other employees.
  8. There have been no accidents involving the unexpected activation or re-energization of the equipment or machine during servicing or maintenance.
- 3.4 All equipment or machinery which fall under the guidelines of paragraph 3.3 must have documentation to support being exempt from the specific written lockout/tagout procedures. This documentation shall be provided to the Lockout/Tagout Process Owner by the Project Manager.
- 3.5 The specific written Lockout/Tagout Procedures are available at CABRERA main office and/or at the project site.

#### **4.0 APPLICATION OF LOCKOUT/TAGOUT PROGRAM**

- 4.1 The procedures described in this instruction apply to all forms of hazardous energy, including (but not limited to) the following:
- Electrical Hazards - from contact with energized electrical panels, relays, switches, etc.
  - Mechanical Hazards - from the movement of presses, rollers, blades, etc.
  - Chemical Hazards - from releases of material in tanks, pipes, or valves, etc.
  - Thermal Hazards - from the release of heat or steam
  - Pneumatic Hazards - from power presses, conveyors, etc.
  - Hydraulic Hazards - from powered industrial trucks, punch presses, etc.
  - Stored Energy - from batteries, spring-actuated devices, capacitors, or gravity.

#### **5.0 EXCEPTIONS TO LOCKOUT/TAGOUT PROCEDURES**

- 5.1 **The CABRERA Lockout/Tagout procedural instruction requirements do not apply to the following:**
- Work performed on corded and plug-connected electrical equipment where:
    - a) exposure to the hazardous energy or start-up of the equipment is controlled by unplugging the equipment from the energy source
    - b) the plug is under the exclusive control of the employee performing the service or maintenance.

- Hot Tap operations involving transmission and distribution systems for gas, steam, water, and petroleum products when performed on pressurized pipelines provided that the following conditions can be demonstrated:
  - a) the continuity of service is essential
  - b) shutdown of the service is impractical
  - c) documentation of procedures followed and the listing of special equipment used that will provide proven, effective protection for employees.

**Note:** Electrical Hot Tap operations do apply as part of the Lockout/Tagout program. They are not included as exemptions and are not recommended procedures (see section 17, "Working On or Near Electrical Circuits and Equipment").

## **6.0 TRAINING**

- 6.1 Initial training shall be conducted for CABRERA employees who work in an area, operate machinery or equipment, or may be in the vicinity where lockout/tagout is being performed. The training will consist of their responsibilities as an affected employee and their requirements as outlined in this procedural instruction.
- 6.2 Initial training shall be conducted for all authorized employees who will perform lockout/tagout procedures on machinery or equipment. The training will consist of the following elements:
  - purpose and scope of the Atlanta Works Lockout/Tagout program
  - recognition of hazardous energy sources applicable to their area
  - the type and magnitude of the hazardous energy
  - the methods and means of lockout/tagout
  - the limitations of using tagout only systems.

## **7.0 RETRAINING AND ANNUAL TRAINING**

- 7.1 Both affected and authorized employees shall be retrained annually and whenever there is a change in their job assignments, a change in machines, equipment or processes that present a new hazard, or when there is a change in the energy control procedures.
- 7.2 Additional retraining shall also be conducted whenever a periodic inspection (see section 16, "Annual Program Review") reveals that there are deviations from or inadequacies in the employee's knowledge or use of energy control procedures.
- 7.3 Retraining shall reestablish employee proficiency and introduce new or revised control methods and procedures, as necessary.

## **8.0 CONTRACTORS RESPONSIBILITIES**

- 8.1 Contract employees under the direct supervision of CABRERA personnel shall receive training in accordance with OSHA Regulation 29 CFR 1910.147 and this procedural

instruction. These contract employees shall comply with the procedures outlined in this procedural instruction.

- 8.2 Contract employees, not under direct supervision of CABRERA who are required to perform lockout/tagout procedures in the course of their assigned tasks, must be trained in accordance with OSHA Regulation 29 CFR 1910.147 and/or this procedural instruction. Such training must be verified by the contractors' supervision upon request of CABRERA

***CABRERA will select contractors that can verify that their employees have received training in lockout/tagout procedures.***

- 8.3 Whenever contractors not under the direct supervision of CABRERA are to be engaged in activities covered by this procedural instruction, the contractor must inform CABRERA of their lockout/tagout procedures, and vice versa.
- 8.4 Whenever contractors not under the direct supervision of CABRERA are working in or on existing CABRERA sites, equipment needs to be locked out by both CABRERA personnel and the Contractor. The contractor will supply their own locks and tags.
- 8.5 Whenever contractors not under the direct supervision of CABRERA are working in or on a new installation that has not been turned over to CABRERA, then only the Contractors locks and tags need to be applied. Locks and tags are to be removed only by the person who applied them (see section 12.06 for exceptions).

## 9.0 RECORDKEEPING

- 9.1 All training course documentation shall be maintained by CABRERA including documentation for contract employee.
- 9.2 Contractors not under the direct supervision of CABRERA shall maintain documentation that includes (but is not limited to) the verification that each of the contractors' employees has received training in accordance with OSHA Regulation 29 CFR 1910.147 and this procedural instruction.
- 9.3 Records of periodic inspections conducted for an annual review (see section 16, "Annual Program Review") of this procedural instruction shall be recorded on form, "CABRERA Periodic Inspection of Lockout/Tagout for Annual Review" (attached). The information required on this form includes:
- machines, processes, or equipment where lockout/tagout procedures were used
  - date of inspection
  - names and organization of authorized employees included in the inspection
  - name of the person performing the inspection
  - date of initial training of authorized employee.

## 10.0 LOCKOUT/TAGOUT DEVICES

- 10.1 This section describes the hardware necessary and the performance requirements of such devices when performing lockout or tagout on machines, processes, or equipment.
- 10.2 Authorized employees will be provided with locks, hasps, tags, chains, wedges, key blocks, adapter pins, self-locking fasteners, blank flanges, or other hardware necessary for isolating, securing, or blocking machines or equipment from energy sources.
- 10.3 Locks will be personalized by stenciled name. These locks are not to be used for any other purpose.
- 10.4 Tags will be of a standard material, size, print, and color (i.e., black, white, and red) (see attached Figure 1).
- 10.5 Locks and keys will be assigned individually. No employee is allowed to use another employee's lockout/tagout devices. Only two keys per lock are permitted. The first of these will remain with the authorized employee at all times. The second will be kept under the responsible charge of the employee's immediate supervisor. The supervisor will maintain second keys, as well as a roster of assigned locks, in a secured location in his/her office area. No employee, other than the supervisor, may have direct access to the second keys.
- 10.6 Tagout devices must be attached using a nylon cable tie wrap. Each tagout device must identify the employee applying the device, the type of maintenance being performed and the date and time that the tagout device was applied.

## 11.0 LOCKOUT/TAGOUT PROCEDURES

- 11.1 This section provides the general requirements for performing lockout and/or tagout procedures of machines, equipment, or processes by CABRERA employees. These requirements are presented in a sequential order of steps and shall be followed by authorized employees in the order they are presented.

### Identification

- 11.2 Before de-energization of any equipment is started, authorized employees shall identify the type and magnitude of the energy, the hazards of the energy to be controlled, and the method or means to control the energy. This information is obtained by referencing the specific written procedures (see section 3.5 of this document) for the equipment being locked and/or tagged out. If you are not familiar with a machine, equipment, or process, you should not attempt to perform lockout/tagout on the item until you have completed this section.
- 11.3 Personal protective equipment (safety glasses, gloves, etc.) and tools specified for use in any given work area and identified in the written lockout/tagout procedures

shall be obtained by the authorized employees. Required personal protective equipment may be verified by the site supervisor/manager. If any questions regarding, or any unusual circumstances arise, when determining the proper personal protective equipment for a specific procedure, contact the Project Manager.

### **Notification**

- 11.4 Authorized employees shall notify affected personnel working on or around equipment or machinery, that servicing and maintenance on the equipment, and shutdown in preparation for lockout/tagout, is about to occur.

### **Equipment Shutdown**

- 11.5 Equipment shall be shutdown in an orderly manner. Therefore, it must be de-energized using normal shutdown procedures (i.e., push stop button, close valve, turn off switch, etc.). If the authorized employee is unfamiliar with the machinery, shutdown should not be attempted by that employee. In this instance, the authorized employee shall reference the written specific procedures (see section 3.5 of this document) for the equipment or machine to determine the proper shutdown sequence.

### **Isolation of Equipment**

- 11.6 Authorized employees shall physically locate and activate all energy isolating devices (i.e., circuit breakers, disconnect switches, line valve, blocks, etc.) as close to the source as possible, to ensure that the energy to the machine or equipment has no way to reach the machine or equipment.
- 11.7 Authorized employees shall isolate all energy sources to machines or equipment found in the identification process (see section 11.2).
- 11.8 After the machinery or equipment has been de-energized at the normal operating controls, authorized employees shall stand to the side of the electrical switch box, face away from the switch when turning off, and use the hand that keeps the body well away from the switch.
- 11.9 Authorized employees shall report broken disconnects or disconnects that cannot be locked out to their supervisor for immediate repair or replacement.
- 11.10 Authorized employees shall not pull an electrical switch while it is under load unless it is designed for that purpose or remove a fuse from an energized fuse holder.
- 11.11 Authorized employees shall not rely on the control switch to lockout a machine or equipment.
- 11.12 Authorized employees shall lock and tagout valves to individual machines if a pump supplies more than one machine and the other machines must remain operational.
- 11.13 Authorized employees shall block all parts of machines or equipment that could move from loss of pressure or where pressure cannot be relieved.

11.14 Authorized employees shall use a blank flange or physically separate lines if a line must be blocked where there is no valve.

#### **Application of Lockout/Tagout Devices**

11.15 Lockout/Tagout devices shall only be applied by the authorized employees performing the work on machines or equipment.

11.16 Whenever possible, authorized employees shall affix a lockout/tagout device to each energy isolating device.

11.17 If more than one person or group will be involved in the lockout/tagout procedures (see section 14, "Group Lockout/Tagout"), each person will place a personal lock on a multiple lock hasp which is connected to the isolating device.

11.18 Lockout devices (i.e., hasp, valve enclosure) shall be affixed in a manner that will hold the energy isolating device in a "safe" or "off" position.

11.19 If an energy isolating device is not capable of being locked out, a "Tagout Only" device shall be used as described in the "Tagout Only System" section of the instruction.

#### **Release of Stored or Residual Energy**

11.20 Potentially hazardous stored or residual energy shall be relieved, disconnected, restrained, or otherwise rendered safe. When locking and/or tagging out a piece of machinery or equipment, the machinery or equipment must reach a "zero energy state" before any servicing or maintenance can begin.

11.21 If there is the possibility of reaccumulation of stored energy to a hazardous level, verification of isolation shall be continued until the servicing or maintenance is completed, or until the possibility of such accumulation no longer exists.

11.22 Authorized employees shall de-energize any accumulation of stored hydraulic or pneumatic energy that may be in the system by bleeding the supply lines through a bleed-off valve and leaving the valves open when possible.

**Note:** Never rely on gauges to determine if an air tank is still under pressure; listen or the discharge of air from the tank.

11.23 Authorized employees shall cycle (move to its rest position) machines or equipment after it has been locked and tagged out to release residual or stored energy.

**Note:** Always test the equipment using a voltmeter, or an equivalent method of testing to determine if there is any electrical energy available to the machine.

11.24 Authorized employees shall release the pressure on springs or block the movement of spring-driven parts that could move as a result of gravity

**Note:** Never insert tools or stops in moving parts of the machine.

11.25 Authorized employees shall allow extreme heat or cold to dissipate and shall use proper protective clothing if thermal energy cannot be allowed to dissipate.

- 11.26 When working on systems involving chemicals, authorized employees shall drain, disconnect and/or blank process piping systems, close valves to prevent the flow of hazardous materials and purge reactor tanks and process lines.
- 11.27 Written instructions unique to the work environment must specify procedures and personal protective equipment necessary for controlling and isolating toxins, corrosives and the thermal effects of chemicals.

#### **Verification of Lockout/Tagout**

- 11.28 The final step before maintenance or servicing can be performed on any machine or equipment is to verify that steps have been followed and all energy has been locked out or dissipated. This final check shall be performed to release any stored or residual energy and to make sure that the correct energy source has been isolated.
- 11.29 Authorized employees shall verify that the isolating device (i.e., main supply disconnect switch or circuit breaker) cannot be moved to the "ON" position.
- 11.30 Authorized employees shall use a voltmeter, other approved test instrument or an equivalent method of testing to check systems and components on electrical equipment.
- 11.31 Authorized employees shall press (activate) "Start Buttons" and other activating controls to ensure that the machine or equipment does not start. On other equipment (piping, springs, flywheels, etc.), attempt to place the isolation device (valve, flange, mechanical block, etc.) in motion to verify that it is locked in place.
- 11.32 Authorized employees shall verify that air, stored electrical, hydraulic, and/or other pressure has been relieved (bled) by checking the readings on gauges or other indicating devices. If possible, listen for the discharge of air or watch for the discharge of hydraulic fluids.
- Note:** Never rely on gauges to determine if an air tank is still under pressure; listen for the discharge of air from the tank.
- 11.33 Authorized employees shall make certain that start switches have been returned to the "neutral" or "off" position after verifying the machinery or equipment.

#### **Removal of Lockout/Tagout for Testing or Positioning Purposes**

- 11.34 If a machine needs to be energized to test or position it, locks can be temporarily removed from the energy isolating device. The following sequence of actions shall be followed:
- Clear the machine or equipment of tools and materials.
  - Remove non-essential employees from the machine or equipment area.
  - Remove the lockout device.
  - Energize the machine or equipment and proceed with testing or positioning.
  - De-energize systems and reapply energy control measures to continue the servicing and/or maintenance.

## **12.0 REMOVAL OF LOCKOUT/TAGOUT DEVICES**

- 12.1 Each lockout/tagout device shall be removed from each energy isolating device by the person who applied the device. (see section 12.06, "Exceptions for Removal of Lockout/Tagout Devices").
- 12.2 Authorized employees shall inspect the work area for operability and make sure that essential equipment, tools, test instruments, rags, brushes, etc. have been removed from the work area.
- 12.3 Authorized employees shall make certain that guards, restraints, or other mechanical parts have been replaced and the machine or equipment has been fully assembled and is safe to operate.
- 12.4 Authorized employees shall notify affected and non-essential employees that lockout/tagout is being removed and the machine or equipment is being re-energized.
- 12.5 Authorized employees shall make sure that affected employees are safely positioned away from machines or equipment, remove lockout/tagout devices, and re-energize the machine or equipment.

### **Exception for Removal of Lockout/Tagout Devices**

- 12.6 When the authorized employee who applied the lockout/tagout device is unavailable to remove it, that device may be removed by the employee's supervisor or by a lead person with permission from and under the direction of the supervisor. The procedure for performing such a removal of the device(s) is as follows:
  - The supervisor shall verify that the authorized employee is not at the CABRERA site
  - The supervisor shall verify that reasonable efforts have been made to contact and inform the original authorized employee the lock or tag has been removed.
  - The supervisor shall verify that the original authorized employee is aware that his/her lock or tag has been removed prior to the employee resuming work.

## **13.0 TAGOUT ONLY SYSTEM**

- 13.1 If an energy isolating device is not capable of being locked out, a tagout device shall be used. The tagout device shall be attached at the same location that the lockout device would have been attached.
- 13.2 Tagout devices shall be affixed in such a manner that will clearly indicate that the operation or movement of energy isolating devices from the "safe" or "off" position is prohibited.
- 13.3 Where a tag cannot be affixed directly to the energy isolating device, the tag shall be located as close as safely possible to the device, in a position that will be immediately obvious to anyone attempting to operate the device.

13.4 Both affected and authorized employees shall be trained in procedures and limitations regarding the use of tags versus locks. These procedures and limitations include:

- Tags are only used as a warning device. They do not provide the physical restraint offered by locks when used to secure energy-isolating devices.
- A nylon cable tie wrap shall be used to attach the tagout device.
- The tag must be completely filled out and provide the authorized employee's name, pager or local phone number, and supervisor's name. Additionally, the tag must state the date and the time at which the tag was applied and the type of maintenance being performed.
- A tag shall never be bypassed, ignored, defeated, or removed.

13.5 When possible, the Project Manager Engineer will modify equipment or machinery not capable of being locked out so that it is capable of being locked out.

#### **14.0 GROUP LOCKOUT/TAGOUT**

14.1 When more than one employee (a group) from various departments, trades or outside contractors are involved in performing maintenance or servicing which require the use of lockout/tagout procedures, authorized employees working on the machinery or equipment shall place a lock and tag on the group lockout device (i.e., multiple lock hasp as shown in Figure 2) for that piece of equipment or machinery. Those employees placing locks and tags on isolating devices are responsible for removing them when work has been completed.

#### **15.0 TRANSFER OF LOCKOUT/TAGOUT**

15.1 When the maintenance or servicing of machinery or equipment required that the lockout/tagout procedures be continued beyond a "normal" shift, or when the individual(s) performing lockout/tagout must leave work or transfer maintenance responsibility and lockout/tagout to other authorized employees, the following steps shall be followed:

- No authorized employee shall may remove their lockout or tagout device until the oncoming authorized employee is ready to lockout.
- No oncoming authorized employee shall utilize the lockout or tagout device of the authorized employee who is leaving.

#### **16.0 ANNUAL PROGRAM REVIEW**

16.1 The use of lockout/tagout procedures described in this procedural instruction shall be reviewed annually to verify the effectiveness of the program. These reviews will be conducted using form, "CABRERA Certification of Lockout/Tagout Inspection," by the CABRERA Lockout/Tagout Process Owner. When discrepancies are found, employees must be retrained in accordance with sections 7.2 and 7.3 of this document.

16.2 The review of procedures will consist of the following:

- Where lockout is being used for energy control, the annual inspection of the procedure will include a review, between the CABRERA Lockout/Tagout Process Owner and selected authorized employee, of that employee's responsibilities under the energy control procedure being inspected; and
- Where tagout only is being used for energy control, the annual inspection of the procedure will include a review, between the CABRERA Lockout/Tagout Process Owner and selected authorized employee, of that employees responsibilities under the energy control procedure being inspected, as well as the limitations of using 'Tagout Only" systems.

## 17.0 WORKING ON OR NEAR ELECTRICAL CIRCUITS AND EQUIPMENT

- 17.1 Exposed circuit parts or equipment to be worked on shall be locked and/or tagged out when there is a danger of injury due to electrical shock, unexpected movement of equipment, or other electrical hazards. The lockout/tagout procedure must be in compliance with the procedures established in this procedural instruction.
- 17.2 Employees shall not work in areas where they are likely to encounter a recognizable dangerous electrical condition unless they have been properly trained to recognize and avoid hazardous electrical conditions.
- 17.3 When working near exposed circuit parts that are or may become energized, employees shall consider exposed conductors and circuit parts energized and dangerous.
- 17.4 Employees must remain alert at all times when working near exposed energized parts or in situations where unexpected electrical hazards may exist. Do not reach blindly into areas which may contain energized parts. If an employee's alertness appears to be recognizably impaired due to illness, fatigue, or other reasons, that employee will not be permitted to work in areas containing exposed energized parts or other electrical hazards.
- 17.5 No employee may enter an area containing exposed energized parts unless adequate illumination is provided. Where lack of illumination or an obstruction prevents observation of the task to be performed, the employee will not be permitted to perform the task, if there is a possibility that exposed energized parts may be contacted.
- 17.6 Employees are not permitted to wear any conductive apparel, such as watches, rings, bracelets, key chains, necklaces, metallic aprons, cloth with conductive thread, or metal headgear where a contact hazard exists with exposed energized parts.
- 17.7 Conductive materials and equipment that are in contact with an employee's body must be handled such that contact with exposed energized conductors or circuit

parts is prevented. These items include ducts, pipes, tubes, conductive hose and rope, metal-lined rules and scales, steel tapes, and chains.

- 17.8 Suitably insulated tools and/or handling equipment must be used when working near exposed energized conductors or circuit parts where it is possible for these items to make accidental contact with the conductors or parts. The insulating materials on these items must be protected during storage or transportation. When removing or installing fuses from an energized fuse terminal, use fuse handling equipment capable of withstanding the circuit voltage. Also, use only nonconductive ropes and hand lines near exposed energized parts.
- 17.9 Protective shields, barriers, or insulating materials must be used to protect employees from exposed energized parts which might be accidentally contacted or where dangerous electric heating or arcing is likely to occur.
- 17.10 Do not use metal ladders or ladders which have vertical metal reinforcement when working on or near exposed energized parts.
- 17.11 When work is performed in a confined or enclosed space, such as a manhole or vault, take precautions to avoid contact with the energized part. This would include items, such as securing a swinging door to prevent being inadvertently knocked into energized circuits.
- Note:** Work in a confined space or permit required confined space must be conducted in accordance "CABRERA Confined Space Program."
- 17.12 Avoid contact with energized overhead lines, either with a body part of a conductive material, tool, or piece of equipment. If contact with energized overhead lines is possible, the lines should be deenergized or guarded. These precautions must be taken prior to the work in the area beginning. If the lines cannot be de-energized or guarded, employees must maintain a safe distance from the conductors. Employees working in elevated positions must avoid contact with energized conductors, unless they are qualified, protected, and authorized to do so.
- 17.13 Housekeeping and janitorial duties are not to be performed adjacent to energized parts where such parts present an electrical contact hazard. Cleaning materials, such as water, steam, conductive cleaning fluid, steel wool, metallic cloth, or silicon carbide are not to be used in the proximity of energized parts.

#### **Working On Exposed Circuit Parts That Are Energized**

- 17.14 Only qualified employees, who have been trained to work safely on energized circuits and, when appropriate, to use the proper personal protective equipment (insulating shielding materials, insulated tools, etc.) will be permitted to work on conductors or circuit parts that have not been de-energized and locked out or tagged out. The training for these employees must have included items in this section and the proper use of the following protective equipment:

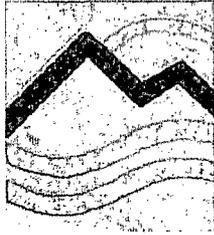
1. Head Protection - Nonconductive head protection must be worn where there is a danger of head injury from electric shock, burns, or flying or falling objects resulting from an electrical explosion.

2. Eye and Face Protection - Safety glasses or face shields must be worn where there is a danger of injury to the eyes or face from electrical arcs, or flashes; or from flying or falling objects resulting from electrical explosion.

3. Hand and Body Protection - Insulating rubber gloves and glove protectors, sleeves, line hoses, blankets, hoods, and mats must be used, as required, to protect the hands and other parts of the body where there is a danger of injury from contacting energized parts.

**17.15** Personal protective equipment must meet applicable ANSI (American National Standards Institute) requirements.

**17.16** Authorized employees shall perform lockout/tagout procedures in accordance with this procedural instruction. Affected employees, upon observing a machine or piece of equipment which is locked and/or tagged out for servicing or maintenance, shall not attempt to start, energize, or use that machine or equipment.



# CABRERA SERVICES

RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

## Personal Protective Equipment Program

### Health and Safety Manual 005

Effective Date

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Revision 1

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**PERSONAL PROTECTIVE EQUIPMENT PROGRAM**

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## Personal Protective Equipment Program

### 1.0 INTRODUCTION

The objective of the **Personal Protective Equipment (PPE) Program** is to protect employees from the risk of injury by creating a barrier against workplace hazards. Personal protective equipment is not a substitute for good engineering or administrative controls or good work practices, but should be used in conjunction with these controls to ensure the safety and health of employees. Personal protective equipment will be provided, used, and maintained when it has been determined that its use is required and that such use will lessen the likelihood of occupational injury and/or illness.

This program addresses eye, face, head, foot, and hand protection. Separate programs exist for respiratory and hearing protection since the need for participation in these programs is established through industrial hygiene monitoring.

- The Cabrera Services Personal Protective Equipment Program includes:
- Responsibilities of supervisors, employees, and Health and Safety personnel
- Hazard assessment and PPE selection
- Employee training
- Recordkeeping requirements

### 2.0 RESPONSIBILITIES

#### 2.1 Supervisors

- Supervisors have the primary responsibility for implementation of the PPE Program in their work area. This involves:
- Providing appropriate PPE and making it available to employees.
- Ensuring employees are trained on the proper use, care, and cleaning of PPE.
- Maintaining records on PPE assignments and training.
- Supervising staff to ensure that the PPE Program elements are followed and that employees properly use and care for PPE.
- Seeking assistance from health and safety personnel to evaluate hazards.
- Notifying the Manager, Health and Safety when new hazards are introduced or when processes are added or changed.

- Ensuring defective or damaged equipment is immediately replaced.

## 2.2 Employees

- The PPE user is responsible for following the requirements of the PPE Program. This involves:
  - Wearing PPE as required.
  - Attending required training sessions.
  - Caring for, cleaning, and maintaining PPE as required.
  - Informing the supervisor of the need to repair or replace PPE.

## 2.3 Health and Safety Personnel

Health and Safety personnel are responsible for the development, implementation, and administration of the PPE Program. This involves:

- Conducting workplace hazard assessments to determine the presence of hazards which necessitate the use of PPE.
- Conducting periodic workplace reassessments as requested by supervisors and/or as determined by health and safety personnel.
- Maintaining records on hazard assessments.
- Providing training and technical assistance to supervisors on the proper use, care, and cleaning of approved PPE.
- Providing guidance to the supervisor for the selection and purchase of approved PPE.
- Periodically reevaluating the suitability of previously selected PPE.
- Reviewing, updating, and evaluating the overall effectiveness of the PPE Program.

## 3.0 PROGRAM COMPONENTS

### 3.1 Hazard Assessment and Equipment Selection

OSHA requires employers to conduct inspections of all workplaces to determine the need for personal protective equipment (PPE) and to help in selecting the proper PPE for each task performed. Prior to the start of each project, a certificate must be completed which lists the specific protective equipment needed for the job. Completion of this document will be a shared responsibility between health and safety, project managers, and field supervision.

If necessary, health and safety personnel, in conjunction with Supervisors, will conduct a walk-through survey of each work area to identify sources of hazards, including impact, penetration, compression, chemical, heat, dust, electrical sources, material handling, and light radiation. Each survey will be documented using the Hazard Assessment Certification Form (Appendix B), which identifies the workplace surveyed, the person conducting the survey, findings of potential hazards, and date of the survey.

Once the hazards of a workplace have been identified, health and safety personnel will determine the suitability of the PPE presently available and as necessary select new or additional equipment which ensures a level of protection greater than the minimum required to protect the employees from the hazards. Care will be taken to recognize the possibility of multiple and simultaneous exposure to a variety of hazards. Adequate protection against the highest level of each of the hazards will be provided or recommended for purchase.

### **3.2 Protective Devices**

All personal protective clothing and equipment will be of safe design and construction for the work to be performed and shall be maintained in a sanitary and reliable condition. Only those items of protective clothing and equipment that meet NIOSH or ANSI (American National Standards Institute) standards will be procured or accepted for use. Newly purchased PPE must conform to the updated ANSI standards which have been incorporated into the OSHA PPE regulations, as follows:

- Eye and Face Protection. ANSI Z87.1-1989
- Head Protection. ANSI Z89.1-1997
- Foot Protection. ANSI Z41.1-1991
- Hand Protection. There are no ANSI standards for gloves, however, selection must be based on the performance characteristics of the glove in relation to the tasks to be performed.

Careful consideration will be given to comfort and fit of PPE in order to ensure that it will be used. Protective devices are generally available in a variety of sizes. Care should be taken to ensure that the right size is selected.

#### *3.2.1 Eye and Face Protection*

Prevention of eye injuries requires that all persons who may be in eye hazard areas wear protective eyewear. This includes employees, visitors, researchers, contractors, or others passing through an identified eye hazard area. To provide protection for these personnel, Supervisors of such areas shall procure a sufficient quantity of goggles and/or plastic eye protectors which afford the maximum amount of protection possible. If these personnel wear personal glasses, they shall be provided with a suitable eye protector to wear over them.

Suitable protectors shall be used when employees are exposed to hazards from flying particles, molten metal, acids or caustic liquids, chemical liquids, gases, or vapors, bioaerosols, or potentially injurious light radiation.

- Wearers of contact lenses must also wear appropriate eye and face protection devices in a hazardous environment.
- Side protectors shall be used when there is a hazard from flying objects.
- Goggles and face shields shall be used when there is a hazard from chemical splash.
- Face shields shall only be worn over primary eye protection (safety glasses or goggles).
- For employees who wear prescription lenses, eye protectors shall either incorporate the prescription in the design or fit properly over the prescription lenses.
- Protectors shall be marked to identify the manufacturer.
- Equipment fitted with appropriate filter lenses shall be used to protect against light radiation. Tinted and shaded lenses are not filter lenses unless they are marked or identified as such.

#### **Prescription Safety Eyewear**

OSHA regulations require that each affected employee who wears prescription lenses while engaged in operations that involve eye hazards shall wear eye protection that incorporates the prescription in its design, or shall wear eye protection that can be worn over the prescription lenses (goggles, faceshields) without disturbing the proper position of the prescription lenses or the protective lenses. Personnel requiring prescription safety glasses must contact the Office Manager to have their request for prescription safety glasses processed.

#### **Emergency Eyewash Facilities**

Emergency eyewash facilities meeting the requirements of ANSI Z358.1 will be provided in all areas where the eyes of any employee may be exposed to corrosive materials. All such emergency facilities will be located where they are easily accessible in an emergency.

#### *3.2.2 Head Protection*

Head protection will be furnished to, and used by, employees, contractors, engineers, inspectors, and visitors at construction sites when hazards from falling or fixed objects are present. Bump caps/skull guards will be issued and worn for protection against scalp lacerations from contact with sharp objects. However,

they will not be worn as substitutes for safety caps/hats because they do not afford protection from high impact forces or penetration by falling objects.

### 3.2.3 *Foot Protection*

All safety footwear shall comply with ANSI Z41-1991, "American National Standard for Personal Protection - Protective Footwear."

Safety shoes or boots with impact protection are required to be worn in work areas where carrying or handling materials such as packages, objects, parts or heavy tools, which could be dropped; and for other activities where objects might fall onto the feet. Safety shoes or boots with compression protection are required for work activities involving skid trucks (manual materials handling cars) or other activities in which materials or equipment could potentially roll over an employee's feet. Safety shoes or boots with puncture protection are required where sharp objects such as nails, wire, tacks, screws, large staples, scrap metal etc., could be stepped on by employees causing a foot injury.

### 3.2.4 *Hand Protection*

Suitable gloves shall be worn when hazards from chemicals, cuts, lacerations, abrasions, punctures, burns, biological agents, and harmful temperature extremes are present. Glove selection shall be based on performance characteristics of the gloves, conditions, durations of use, and hazards present. One type of glove will not work in all situations.

The first consideration in the selection of gloves for use against chemicals is to determine, if possible, the exact nature of the substances to be encountered. Read instructions and warnings on chemical container labels and MSDSs before working with any chemical. Recommended glove types are often listed in the section for personal protective equipment.

All glove materials are eventually permeated by chemicals. However, they can be used safely for limited time periods if specific use and other characteristics (i.e., thickness and permeation rate and time) are known. The health and safety can assist in determining the specific type of glove material that should be worn for a particular chemical.

## 3.3 **Cleaning and Maintenance**

It is important that all PPE be kept clean and properly maintained. Cleaning is particularly important for eye and face protection where dirty or fogged lenses could impair vision. PPE should be inspected, cleaned, and maintained at regular intervals so that the PPE provides the requisite protection. Personal protective equipment shall not be shared between employees until it has been properly cleaned and sanitized. PPE will be distributed for individual use whenever possible. It is also important to ensure that contaminated PPE which cannot be decontaminated is disposed of in a manner that protects employees from exposure to hazards.

### 3.4 Training

Any worker required to wear PPE shall receive training in the proper use and care of PPE. Periodic retraining shall be offered to both the employees and the supervisors, as needed. The training shall include, but not necessarily be limited to, the following subjects:

- When PPE is necessary to be worn.
- What PPE is necessary
- How to properly don, doff, adjust, and wear PPE.
- The limitations of the PPE.
- The proper care, maintenance, useful life and disposal of the PPE.

After the training, the employees shall demonstrate that they understand the components of the PPE Program and how to use PPE properly, or they shall be retrained.

### 3.5 Recordkeeping

Written records shall be kept of the names of persons trained, the type of training provided, and the dates when training occurred. The Supervisor shall maintain their employees' training records for at least 3 years. Health and Safety shall maintain the Hazard Assessment Certification Form for each work site evaluated for at least 3 years.

## 4.0 REFERENCES

American National Standards Institute, American National Standard ANSI Z41-1991, "Personnel Protection - Protective Footwear".  
American National Standards Institute, American National Standard ANSI Z87.1-1989, "Practice for Occupational and Educational Eye and Face Protection".  
American National Standards Institute, American National Standard ANSI Z89.1-1986, "Safety Requirements for Industrial Head Protection".  
OSHA Standard 29 CFR 1910.132, "General Requirements"  
OSHA Standard 29 CFR 1910.133, "Eye and Face Protection"  
OSHA Standard 29 CFR 1910.135, "Head Protection"  
OSHA Standard 29 CFR 1910.136, "Occupational Foot Protection"  
OSHA Standard 29 CFR 1910.138, "Hand Protection"

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## APPENDIX A

### General Guidelines for Choosing Personal Protective Equipment

#### 1. Description and Use of Eye/Face Protectors

a. **Safety Glasses.** Protective eyeglasses are made with safety frames, tempered glass or plastic lenses, temples and side shields which provide eye protection from moderate impact and particles encountered in job tasks such as carpentry, woodworking, grinding, scaling, etc. Safety glasses are also available in prescription form for those persons who need corrective lenses.

b. **Single Lens Goggles.** Vinyl framed goggles of soft pliable body design provide adequate eye protection from many hazards. These goggles are available with clear or tinted lenses, perforated, port vented, or non-vented frames. Single lens goggles provide similar protection to spectacles and may be worn in combination with spectacles or corrective lenses to insure protection along with proper vision.

c. **Welders/Chippers Goggles.** These goggles are available in rigid and soft frames to accommodate single or two eyepiece lenses.

1. Welders goggles provide protection from sparking, scaling, or splashing metals and harmful light rays. Lenses are impact resistant and are available in graduated shades of filtration.

2. Chippers/Grinders goggles provide eye protection from flying particles. The dual protective eye cups house impact resistant clear lenses with individual cover plates.

d. **Face Shields.** These normally consist of an adjustable headgear and face shield of tinted/transparent acetate or polycarbonate materials, or wire screen. Face shields are available in various sizes, tensile strength, impact/heat resistance and light ray filtering capacity. Face shields will be used in operations when the entire face needs protection and should be worn to protect eyes and face against flying particles, metal sparks, and chemical/biological splash.

e. **Welding Shields.** These shield assemblies consist of vulcanized fiber or glass fiber body, a ratchet/button type adjustable headgear or cap attachment and a filter and cover plate holder. These shields will be provided to protect workers' eyes and face from infrared or radiant light burns, flying sparks, metal spatter and slag chips encountered during welding, brazing, soldering, resistance welding, bare or shielded electric arc welding and oxyacetylene welding and cutting operations.

| <b>Eye and Face Protection Selection Chart</b>   |  |  |
|--|--|--|
| <b>Source</b>  | <b>Assessment of Hazard</b>  | <b>Protection</b>  |
| <b>IMPACT</b> - Chipping, grinding, machining, drilling, chiseling, riveting, sanding, etc.  | Flying fragments, objects, large chips, particles, sand, dirt, etc.                    | Spectacles with side protection, goggles, face shields.<br>For severe exposure, use face shield over primary eye protection.   |
| <b>CHEMICALS</b> - Acid and chemicals handling   | Splash<br><br>Irritating mists   | Goggles, eyecup and cover types. For severe exposure, use face shield over primary eye protection.<br>Special-purpose goggles  |
| <b>DUST</b> - Woodworking, buffing, general dusty conditions   | Nuisance dust  | Goggles, eyecup and cover types.   |
| <b>LIGHT and/or RADIATION</b><br>Welding - electric arc<br>Welding - gas<br><br>Cutting, torch brazing, torch soldering<br><br>Glare | Optical radiation<br><br>Optical radiation<br><br>Optical radiation<br><br>Poor vision | Welding helmets or welding shields.<br>Typical shades: 10-14<br><br>Welding goggles or welding face shield.<br>Typical shades: gas welding 4-8, cutting 3-6, brazing 3-4<br><br>Spectacles or welding face shield. Typical shades: 1.5-3<br><br>Spectacles with shaded or special-purpose lenses, as suitable. |

## 2. Head Protection

Head injuries are caused by falling or flying objects, or by bumping the head against a fixed object. Head protectors, in the form of protective hats, must resist penetration and absorb the shock of a blow. The shell of the protective hat is hard enough to resist the blow and the headband and crown straps keep the shell away from the wearer's skull. Protective hats can also protect against electrical shock.

### Protective hats are made in the following types and classes:

- Type I - Helmets with a full brim.
- Type II - Brimless helmets with a peak extending forward from the crown.
- Class A - General service, limited voltage. Intended for protection against impact hazards. Used in mining, construction, and manufacturing.
- Class B - Utility service, high voltage. Used by electrical workers.
- Class C - Special service, no voltage protection. Designed for lightweight comfort and impact protection. Used in certain construction, manufacturing, refineries, and where there is a possibility of bumping the head against a fixed object.

## 3. Foot Protection

There are many types and styles of protective footwear and it's important to realize that a particular job may require additional protection other than listed here. Footwear that meets established safety standards will have an American National Standards Institute (ANSI) label inside each shoe.

a. **Steel-Reinforced Safety Shoes.** These shoes are designed to protect feet from common machinery hazards such as falling or rolling objects, cuts, and punctures. The entire toe box and insole are reinforced with steel, and the instep is protected by steel, aluminum, or plastic materials. Safety shoes are also designed to insulate against temperature extremes and may be equipped with special soles to guard against slip, chemicals, and/or electrical hazards.

b. **Safety Boots.** Safety boots offer more protection when splash or spark hazards (chemicals, molten materials) are present:

- When working with corrosives, caustics, cutting oils, and petroleum products, neoprene or nitrile boots are often required to prevent penetration.
- Foundry or "Gaiter" style boots feature quick-release fasteners or elasticized insets to allow speedy removal should any hazardous substances get into the boot itself.

- When working with electricity, special electrical hazard boots are available and are designed with no conductive materials other than the steel toe (which is properly insulated).

#### 4. Hand Protection

Skin contact is a potential source of exposure to toxic materials; it is important that the proper steps be taken to prevent such contact. Most accidents involving hands and arms can be classified under four main hazard categories: chemicals, abrasions, cutting, and heat. There are gloves available that can protect workers from any of these individual hazards or any combination thereof.

Gloves should be replaced periodically, depending on frequency of use and permeability to the substance(s) handled. Gloves overtly contaminated should be rinsed and then carefully removed after use.

Gloves should also be worn whenever it is necessary to handle rough or sharp-edged objects, and very hot or very cold materials. The type of glove materials to be used in these situations include leather, welder's gloves, aluminum-backed gloves, and other types of insulated glove materials.

Careful attention must be given to protecting your hands when working with tools and machinery. Power tools and machinery must have guards installed or incorporated into their design that prevent the hands from contacting the point of operation, power train, or other moving parts. To protect hands from injury due to contact with moving parts, it is important to:

- Ensure that guards are always in place and used.
- Always lock-out machines or tools and disconnect the power before making repairs.
- Treat a machine without a guard as inoperative; and
- Do not wear gloves around moving machinery, such as drill presses, mills, lathes, and grinders.

The following is a guide to the most common types of protective work gloves and the types of hazards they can guard against:

- a. **Disposable Gloves.** Disposable gloves, usually made of light-weight plastic, can help guard against mild irritants.
- b. **Fabric Gloves.** Made of cotton or fabric blends are generally used to improve grip when handling slippery objects. They also help insulate hands from mild heat or cold.
- c. **Leather Gloves.** These gloves are used to guard against injuries from sparks or scraping against rough surfaces. They are also used in combination with an insulated liner when working with electricity.

- d. **Metal Mesh Gloves.** These gloves are used to protect hands from accidental cuts and scratches. They are used most commonly by persons working with cutting tools or other sharp instruments.
- e. **Aluminized Gloves.** Gloves made of aluminized fabric are designed to insulate hands from intense heat. These gloves are most commonly used by persons working molten materials.
- f. **Chemical Resistance Gloves.** These gloves may be made of rubber, neoprene, polyvinyl alcohol or vinyl, etc. The gloves protect hands from corrosives, oils, and solvents. The following table is provided as a guide to the different types of glove materials and the chemicals they can be used against. When selecting chemical resistance gloves, be sure to consult the manufacturers' recommendations, especially if the gloved hand will be immersed in the chemical.

## Glove Chart

| Type                        | Advantages   | Disadvantages  | Use Against  |
|-----------------------------|--|--|--|
| Natural rubber              | Low cost, good physical properties, dexterity  | Poor vs. oils, greases, organics. Frequently imported; may be poor quality           | Bases, alcohols, dilute water solutions; fair vs. aldehydes, ketones.                            |
| Natural rubber blends       | Low cost, dexterity, better chemical resistance than natural rubber vs. some chemicals | Physical properties frequently inferior to natural rubber                            | Same as natural rubber   |
| Polyvinyl chloride (PVC)    | Low cost, very good physical properties, medium cost, medium chemical resistance       | Plasticizers can be stripped; frequently imported may be poor quality                | Strong acids and bases, salts, other water solutions, alcohols                                   |
| Neoprene                    | Medium cost, medium chemical resistance, medium physical properties                    | NA   | Oxidizing acids, anilines, phenol, glycol ethers   |
| Nitrile                     | Low cost, excellent physical properties, dexterity                                     | Poor vs. benzene, methylene chloride, trichloroethylene, many ketones                | Oils, greases, aliphatic chemicals, xylene, perchloroethylene, trichloroethane; fair vs. toluene |
| Butyl                       | Speciality glove, polar organics   | Expensive, poor vs. hydrocarbons, chlorinated solvents                               | Glycol ethers, ketones, esters   |
| Polyvinyl alcohol (PVA)     | Specialty glove, resists a very broad range of organics, good physical properties      | Very expensive, water sensitive, poor vs. light alcohols                             | Aliphatics, aromatics, chlorinated solvents, ketones (except acetone), esters, ethers            |
| Fluoro-elastomer (Viton)™ * | Specialty glove, organic solvents  | Extremely expensive, poor physical properties, poor vs. some ketones, esters, amines | Aromatics, chlorinated solvents, also aliphatics and alcohols                                    |
| Norfoil (Silver Shield)     | Excellent chemical resistance  | Poor fit, easily punctures, poor grip, stiff   | Use for Hazmat work  |

\*Trademark of DuPont Dow Elastomers

*Glove Type and Chemical Use*

| *Limited service      | VG= Very Good | G= Good                 | F=Fair | P=Poor (not recommended) |
|-----------------------|---------------|-------------------------|--------|--------------------------|
| Chemical              | Neoprene      | Natural Latex or Rubber | Butyl  | Nitrile Latex            |
| *Acetaldehyde         | VG            | G                       | VG     | G                        |
| Acetic acid           | VG            | VG                      | VG     | VG                       |
| *Acetone              | G             | VG                      | VG     | P                        |
| Ammonium hydroxide    | VG            | VG                      | VG     | VG                       |
| *Amyl acetate         | F             | P                       | F      | P                        |
| Aniline               | G             | F                       | F      | P                        |
| *Benzaldehyde         | F             | F                       | G      | G                        |
| *Benzene              | F             | F                       | F      | P                        |
| Butyl acetate         | G             | F                       | F      | P                        |
| Butyl alcohol         | VG            | VG                      | VG     | VG                       |
| Carbon disulfide      | F             | F                       | F      | F                        |
| *Carbon tetrachloride | F             | P                       | P      | G                        |
| Castor oil            | F             | P                       | F      | VG                       |
| *Chlorobenzene        | F             | P                       | F      | P                        |
| *Chloroform           | G             | P                       | P      | P                        |
| Chloronaphthalene     | F             | P                       | F      | F                        |
| Chromic Acid (50%)    | F             | P                       | F      | F                        |
| Citric acid (10%)     | VG            | VG                      | VG     | VG                       |
| Cyclohexanol          | G             | F                       | G      | VG                       |
| *Dibutyl phthalate    | G             | P                       | G      | G                        |
| Diesel fuel           | G             | P                       | P      | VG                       |
| Diisobutyl ketone     | P             | F                       | G      | P                        |
| Dimethylformamide     | F             | F                       | G      | G                        |
| Diocetyl phthalate    | G             | P                       | F      | VG                       |
| Dioxane               | VG            | G                       | G      | G                        |
| Epoxy resins, dry     | VG            | VG                      | VG     | VG                       |
| *Ethyl acetate        | G             | F                       | G      | F                        |
| Ethyl alcohol         | VG            | VG                      | VG     | VG                       |
| Ethyl ether           | VG            | G                       | VG     | G                        |
| *Ethylene dichloride  | F             | P                       | F      | P                        |
| Ethylene glycol       | VG            | VG                      | VG     | VG                       |
| Formaldehyde          | VG            | VG                      | VG     | VG                       |

| Chemical                | Neoprene | Natural Latex or Rubber | Butyl | Nitrile |
|-------------------------|----------|-------------------------|-------|---------|
| Formic acid             | VG       | VG                      | VG    | VG      |
| Freon 11                | G        | P                       | F     | G       |
| Freon 12                | G        | P                       | F     | G       |
| Freon 21                | G        | P                       | F     | G       |
| Freon 22                | G        | P                       | F     | G       |
| *Furfural               | G        | G                       | G     | G       |
| Gasoline, leaded        | G        | P                       | F     | VG      |
| Gasoline, unleaded      | G        | P                       | F     | VG      |
| Glycerine               | VG       | VG                      | VG    | VG      |
| Hexane                  | F        | P                       | P     | G       |
| Hydrochloric acid       | VG       | G                       | G     | G       |
| Hydrofluoric acid (48%) | VG       | G                       | G     | G       |
| Hydrogen peroxide (30%) | G        | G                       | G     | G       |
| Hydroquinone            | G        | G                       | G     | F       |
| Isooctane               | F        | P                       | P     | VG      |
| Isopropyl alcohol       | VG       | VG                      | VG    | VG      |
| Kerosene                | VG       | F                       | F     | VG      |
| Ketones                 | G        | VG                      | VG    | P       |
| Lacquer thinners        | G        | F                       | F     | P       |
| Lactic acid (85%)       | VG       | VG                      | VG    | VG      |
| Lauric acid (36%)       | VG       | F                       | VG    | VG      |
| Lineoleic acid          | VG       | P                       | F     | G       |
| Linseed oil             | VG       | P                       | F     | VG      |
| Maleic acid             | VG       | VG                      | VG    | VG      |
| Methyl alcohol          | VG       | VG                      | VG    | VG      |
| Methylamine             | F        | F                       | G     | G       |
| Methyl bromide          | G        | F                       | G     | F       |
| *Methyl chloride        | P        | P                       | P     | P       |
| *Methyl ethyl ketone    | G        | G                       | VG    | P       |
| *Methyl isobutyl ketone | F        | F                       | VG    | P       |
| Methyl methacrylate     | G        | G                       | VG    | F       |
| Monoethanolamine        | VG       | G                       | VG    | VG      |
| Morpholine              | VG       | VG                      | VG    | G       |

| Chemical                           | Neoprene | Natural Latex<br>or Rubber | Butyl | Nitrile |
|------------------------------------|----------|----------------------------|-------|---------|
| Naphthalene                        | G        | F                          | F     | G       |
| Naphthas, aliphatic                | VG       | F                          | F     | VG      |
| Naphthas, aromatic                 | G        | P                          | P     | G       |
| *Nitric acid                       | G        | F                          | F     | F       |
| Nitromethane (95.5%)               | F        | P                          | F     | F       |
| Nitropropane (95.5%)               | F        | P                          | F     | F       |
| Octyl alcohol                      | VG       | VG                         | VG    | VG      |
| Oleic acid                         | VG       | F                          | G     | VG      |
| Oxalic acid                        | VG       | VG                         | VG    | VG      |
| Palmitic acid                      | VG       | VG                         | VG    | VG      |
| Perchloric acid (60%)              | VG       | F                          | G     | G       |
| Perchloroethylene                  | F        | P                          | P     | G       |
| Petroleum distillates<br>(naphtha) | G        | P                          | P     | VG      |
| Phenol                             | VG       | F                          | G     | F       |
| Phosphoric acid                    | VG       | G                          | VG    | VG      |
| Potassium hydroxide                | VG       | VG                         | VG    | VG      |
| Propyl acetate                     | G        | F                          | G     | F       |
| Propyl alcohol                     | VG       | VG                         | VG    | VG      |
| Propyl alcohol (iso)               | VG       | VG                         | VG    | VG      |
| Sodium hydroxide                   | VG       | VG                         | VG    | VG      |
| Styrene                            | P        | P                          | P     | F       |
| Stryene (100%)                     | P        | P                          | P     | F       |
| Sulfuric acid                      | G        | G                          | G     | G       |
| Tannic acid (65%)                  | VG       | VG                         | VG    | VG      |
| Tetrahydrofuran                    | P        | F                          | F     | F       |
| *Toluene                           | F        | P                          | P     | F       |
| Toluene diisocyanate               | F        | G                          | G     | F       |
| *Trichloroethylene                 | F        | F                          | P     | G       |
| Triethanolamine                    | VG       | G                          | G     | VG      |
| Tung oil                           | VG       | P                          | F     | VG      |
| Turpentine                         | G        | F                          | F     | VG      |
| *Xylene                            | P        | P                          | P     | F       |

## APPENDIX B

## Hazard Assessment Certification Form

|  |           |
|--|-----------|
| Date:                                      | Location: |
| Assessment Conducted By:                   |           |
| Specific Tasks Performed at this Location: |           |

## Hazard Assessment and Selection of Personal Protective Equipment

## I. Overhead Hazards -

- Hazards to consider include:
- Suspended loads that could fall
- Overhead beams or loads that could be hit against
- Energized wires or equipment that could be hit against
- Employees work at elevated site who could drop objects on others below
- Sharp objects or corners at head level

|                     |
|---------------------|
| Hazards Identified: |
|---------------------|

## Head Protection

|  |     |    |
|--|-----|----|
| Hard Hat:  | Yes | No |
| If yes, type:  |     |    |
| <input type="radio"/> <b>Type A</b> (impact and penetration resistance, plus low-voltage electrical insulation)  |     |    |
| <input type="radio"/> <b>Type B</b> (impact and penetration resistance, plus high-voltage electrical insulation) |     |    |
| <input type="radio"/> <b>Type C</b> (impact and penetration resistance)  |     |    |

**II. Eye and Face Hazards -**

- Hazards to consider include:
- Chemical splashes
- Dust
- Smoke and fumes
- Welding operations
- Lasers/optical radiation
- Bioaerosols
- Projectiles

|                     |
|---------------------|
| Hazards Identified: |
|---------------------|

**Eye Protection**

|                           |     |    |
|---------------------------|-----|----|
| Safety glasses or goggles | Yes | No |
| Face shield               | Yes | No |

**III. Hand Hazards -**

- Hazards to consider include:
- Chemicals
- Sharp edges, splinters, etc.
- Temperature extremes
- Biological agents
- Exposed electrical wires
- Sharp tools, machine parts, etc.
- Material handling

|                     |
|---------------------|
| Hazards Identified: |
|---------------------|

**Hand Protection**

| Gloves   | Yes | No |
|--|-----|----|
| <ul style="list-style-type: none"> <li><input type="radio"/> Chemical resistant</li> <li><input type="radio"/> Temperature resistant</li> <li><input type="radio"/> Abrasion resistant</li> <li><input type="radio"/> Other (Explain)</li> </ul> |     |    |

**IV. Foot Hazards -**

- Hazards to consider include:
- Heavy materials handled by employees
- Sharp edges or points (puncture risk)
- Exposed electrical wires
- Unusually slippery conditions
- Wet conditions
- Construction/demolition

|                            |
|----------------------------|
| <p>Hazards Identified:</p> |
|----------------------------|

**Foot Protection**

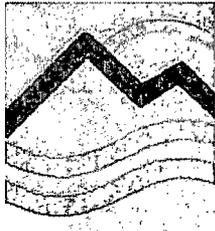
| Safety shoes  | Yes | No |
|---|-----|----|
| <p>Types:</p> <ul style="list-style-type: none"> <li><input type="radio"/> Toe protection</li> <li><input type="radio"/> Metatarsal protection</li> <li><input type="radio"/> Puncture resistant</li> <li><input type="radio"/> Electrical insulation</li> <li><input type="radio"/> Other (Explain)</li> </ul> |     |    |

**V. Other Identified Safety and/or Health Hazards:**

| <b>Hazard</b> | <b>Recommended Protection</b> |
|---------------|-------------------------------|
|               |                               |

I certify that the above inspection was performed to the best of my knowledge and ability, based on the hazards present on \_\_\_\_\_.

\_\_\_\_\_  
(Signature)



# CABRERA SERVICES

RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

## Respiratory Protection Program

### Health and Safety Manual 006

Effective Date

02/202002

Revision 1

*Prepared By:  
Cabrera Services, Inc.  
East Hartford, CT*

Prepared By: \_\_\_\_\_  
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Date: \_\_\_\_\_

Approved By: \_\_\_\_\_  
David Watters - Principal

Date: \_\_\_\_\_

|   |           |
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## **1.0 PURPOSE**

This document describes the Respiratory Protection Program for Cabrera Services, Inc. (CABRERA). The purpose of this program is to ensure that personnel are protected from occupational exposure to oxygen deficient atmospheres and harmful air contaminants. This program complies with the OSHA respiratory protection standard (29 CFR 1910.134).

## **2.0 POLICY**

CABRERA uses accepted engineering control measures to control air contamination to acceptable levels. If contamination levels cannot be adequately controlled using engineering or administrative controls, respiratory protection will be utilized. The inhalation hazards and protective measures associated with each job will be evaluated and addressed for the potential hazards at each site.

## **3.0 RESPONSIBILITIES**

### **3.1 Program Administrator**

The Manager, Health and Safety will serve as the Program Administrator for the CABRERA Respiratory Protection Program. The program administrator will work with company health and safety professionals, Site Safety Coordinators and others in order to implement the respiratory protection program described below. The Program Administrator will:

- 3.1.1* Oversee and manage the program. This includes making assessments of the program and making recommendations for program improvements. This will be accomplished through an audit process conducted on a periodic basis to ensure an effective respiratory protection program and that it is implemented in accordance with the respiratory protection standard.
- 3.1.2* Work closely with Project Managers so that field staff are properly equipped, that equipment is properly maintained, and verify that training is obtained.

### **3.2 Project Managers**

If necessary, each Project Manager will work with the Program Administrator to further ensure the success of this program. Additionally, he/she shall:

- 3.2.1* Assist in implementation of the respiratory protection training program by providing guidance and assistance, as necessary, to site personnel. Work with company safety professionals regarding the type of respirator needed for each work operation involving potentially hazardous air contaminants.

- 3.2.2 Periodically review training records of personnel requiring respiratory protection.
- 3.2.3 Participate in the company's Respiratory Protection Program audit process; ensure deficiencies are documented and corrected in a timely manner. Conduct periodic monitoring of project sites to ensure that the requirements of this program are being effectively implemented.

### **3.3 Managers**

Managers having employees enrolled in the Respiratory Protection Program shall ensure:

- 3.3.1 Medical surveillance examinations are performed to determine that employees are physically capable to wear respiratory protection equipment.
- 3.3.2 Requirements of the Respiratory Protection Program are complied with including proper cleaning, inspection, maintenance, operational procedures, training of employees, respiratory storage, and maintenance of respiratory records.
- 3.3.3 Ensure that employees whose corrective glasses interfere with the facepiece of a respirator are not permitted to wear that type respiratory protection equipment. Provide special corrective glasses or full-face respirator with built-in corrective lens, as necessary.
- 3.3.4 Ensure that employees who cannot obtain a satisfactory respirator facial seal are not assigned to work requiring the use of a respirator. Implement appropriate action with regard to any correctable physical condition.
- 3.3.5 Enforce the site-specific respiratory protection programs.
- 3.3.6 Ensure that a Hazard Assessment is conducted prior to the onset of work at project sites.

### **3.4 CABRERA Employees**

CABRERA employees required to use respiratory protection equipment shall:

- 3.4.1 Use the company provided respiratory protection in accordance with the instructions and training from the CABRERA health and safety staff and/or supervisors.
- 3.4.2 Guard against damage to the respirator.
- 3.4.3 Inspect the respirator prior to each use and promptly report any respirator damage and malfunction to the supervisor.

- 3.4.4 Clean individual issue respirators after each use in accordance with the appropriate written instructions.
- 3.4.5 Store the respirator in a clean and sanitary location.
- 3.4.6 Advise the supervisor if he/she is wearing prescription glasses that interfere with the respirator facepiece seal.
- 3.4.7 Advise the supervisor of any physical problem he/she has which may preclude his/her wearing respiratory protection equipment.
- 3.4.8 Take appropriate action with regard to any correctable physical condition which prevents the wearing of a respirator for assigned tasks.

#### 4.0 DEFINITIONS

**Air-purifying Respirator (APR).** This type of respirator uses an air-purifying filter, cartridge, or canister that removes specific air contaminants by passing ambient air through the air-purifying element.

**Atmosphere-Supplying Respirator.** This is the type of respirator that supplies the user with breathing air from a source independent of the ambient atmosphere, and includes supplied-air respirators (SARS) and self-contained breathing apparatus (SCBA) units.

**Canister or Cartridge (Filter or Air Purifying Element).** A filter, sorbent or catalyst, or combination that removes specific contaminants from the air.

**Demand Respirator.** An atmosphere-supplying respirator that provides breathing air to the facepiece only when a negative pressure is created inside the facepiece by inhalation.

**Emergency Situation.** This can mean any occurrence such as, but not limited to, equipment failure, rupture of containers, or failure of control equipment that may or does result in an uncontrolled significant release of an airborne contaminant.

**Employee Exposure.** Employee exposure to a concentration of an airborne contaminant that would occur if respiratory protection was not being used.

**End-of-Service-Life Indicator (ESLI).** This is a system that warns the user of the approach of the end of adequate respiratory protection.

**Filtering Facepiece (Dust Mask).** This considered a negative pressure particulate respirator with a filter as an integral part of the facepiece or with the entire facepiece composed of the filtering medium.

**Fit Factor.** A quantitative estimate of the fit of a particular respirator to a specific individual. It estimates the ratio of the concentration of a substance in ambient air to its concentration inside the respirator.

**Fit Test** means the use of a protocol to qualitatively or quantitatively evaluate the fit of a respirator. There are two recognized types of fit test:

**Qualitative Fit Test (QLFT).** A pass/fail fit test to assess the adequacy of respirator fit that relies on the individual's response to a test agent.

**Quantitative Fit Test (QNFT).** An assessment of the adequacy of respirator fit by numerically measuring the amount of leakage in the respirator.

**Helmet.** A rigid respiratory inlet covering, provides head protection against impact and penetration.

**Hood.** A respiratory inlet covering that completely covers the head and neck. It may also cover portions of the shoulders and torso.

**Interior Structural Firefighting.** The physical activity of fire suppression, rescue or both, inside of buildings or enclosed structures that are involved in a fire situation beyond the incipient stage. (Refer to 29 CFR 1910.155)

**Loose-Fitting Facepiece.** A respiratory inlet covering that is designed to form a partial seal with the face.

**Negative Pressure Respirator (Tight Fitting).** This is considered a respirator in which the air pressure inside the facepiece is negative during inhalation with respect to the ambient air pressure outside the respirator.

**Physician or Other Licensed Health Care Professional (PLHCP).** This is an individual who is legally permitted scope of practice (i.e., license, registration, or certification) allows him/her to independently provide, or be delegated the responsibility to provide, some or all of the health care services as required.

**Positive Pressure Respirator.** This is a type of respirator where the pressure inside the respiratory inlet covering exceeds the ambient air pressure outside the respirator.

**Powered Air-purifying Respirator (PAPR).** An air-purifying respirator that uses a blower to force the ambient air through air-purifying elements to the inlet covering.

**Pressure Demand Respirator.** A positive pressure atmosphere-supplying respirator that provides breathing air to the facepiece when the positive pressure is reduced inside the facepiece by inhalation

**Respiratory Inlet.** A covering that forms the protective barrier between the user's respiratory tract and an air-purifying device or breathing air source, or both.

**Service Life.** A period of time that a respirator, filter or sorbent, or other respiratory equipment provides adequate protection.

**Supplied-Air Respirator (SAR) or Airline Respirator.** An atmosphere-supplying respirator for which the source of breathing air is not designed to be carried by the user.

**Tight-Fitting Facepiece.** An inlet covering that forms a complete-seal with the face.

**User Seal Check.** An action conducted by the user to determine if the respirator is properly seated to the face.

## 5.0 OSHA REQUIREMENTS AND PROGRAM ELEMENTS

### General Elements of the Program

The general requirements of the respiratory protection program, as described in this section, are listed as follows:

- Selection of Respirators Medical Surveillance
- Fit Testing
- Use of Respirators
- Maintenance and Care
- Breathing Air Quality and Use
- Training - Hazards
- Training - Use, Maintenance and Limitations Program Evaluation

### 5.1 Selection of Respirators

#### 5.1.1 Hazard Evaluation

Selection of respirators will be based on an assessment of the hazards (Hazard Evaluation) in the workplace and will be identified and evaluated prior to the initiation of work. This evaluation will be placed in each site-specific Health and Safety Plan (HASP) for work that requires use of respiratory protection. Each HASP will specify a reasonable estimate of employee exposure to respiratory hazards and identify each contaminant chemical state and physical form. If the concentration cannot be estimated or contaminant cannot be accurately identified, it may be necessary to protect the employee to the fullest extent by

considering maximum potential concentration and most toxic of the likely contaminants. The initial basis for respirator selection includes evaluation of the following:

- Feasibility of engineering controls and administrative controls
- Site-specific hazard information
- Workplace and user factors affecting respirator performance and reliability
- Applicability of NIOSH 42 CFR Part 84 for particulate respirators
- End-of-Service Life Indicators (ELSI) and Cartridge Change-out Schedule
- Work area surveillance needs and anticipated degree of employee exposure or stress.
- Applicability of air monitoring, action levels, or air modeling.

The site HASP will be amended as appropriate, depending on site conditions, work area surveillance, and degree of employee stress during work activity.

#### 5.1.2 Respirators for atmospheres that are not IDLH.

Respirators must be adequate to protect the health of the employee and ensure compliance with all other OSHA statutory and regulatory requirements, under routine and reasonably foreseeable emergency situations

For protection against gases and vapors, atmosphere-supplying respirators, or air-purifying respirators must be equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant(s). If there is no ESLI appropriate for conditions, a change schedule for canisters and cartridges will be established based on objective information or data that will ensure that canisters and cartridges are changed before the end of their service life. Site-specific information and data relied upon and the basis for the canister and cartridge change schedule, the basis for reliance on the data will be incorporated into the Health and Safety Plan.

For protection against particulates, atmosphere-supplying respirators or an air-purifying respirator must be equipped with a filter certified by NIOSH.

If it can be demonstrated that, under all foreseeable conditions, the oxygen concentration can be maintained within the ranges specified in the table below, then any atmosphere-supplying respirator may be used:

Oxygen deficient Atmospheres (% O<sub>2</sub> for which Altitude (ft.)

|                 |           |
|-----------------|-----------|
| Less than 3,001 | 16.0-19.5 |
| 3,001-4,000     | 16.4-19.5 |
| 4,001-5,000     | 17.1-19.5 |
| 5,001-6,000     | 17.8-19.5 |
| 6,001-7,000     | 18.5-19.5 |
| 7,001-8,000     | 19.3-19.5 |

**Note:** Above 8,000 feet, the exception does not apply. Oxygen-enriched breathing air must be supplied above 14,000 feet.

In addition, Cabrera Services, Inc. will ensure that only NIOSH certified respirators are selected and are being used in accordance with the conditions of certifications.

Respirators will be selected from a sufficient number of models and sizes so that the respirator is acceptable to and correctly fits the user.

### 5.1.3 Respirators for atmospheres that are considered IDLH.

Only Self-Contained Breathing Apparatus (SCBAS) or SARs are to be used when the very highest level of respiratory protection is necessary, such as when the contamination levels are at the IDLH level. All oxygen-deficient atmospheres shall be considered IDLH.

A full facepiece pressure demand SCBA certified by NIOSH for a minimum service life of thirty minutes, or a combination full facepiece pressure demand supplied-air respirator with auxiliary self-contained air supply must be used.

Respirators provided for escape from IDLH atmospheres shall be NIOSH-certified for escape from the atmosphere in which they will be used. SAR or cascade airlines must include an in-line escape cylinder of at least five minutes. Airlines may not be longer than 300 feet, and may not be used when severing of the line or entanglement is likely. Only parts and components specified in a system certification can be used. Substitute components are not allowed.

## 5.2 Medical Clearance Certification

Employees performing activities at sites requiring respirator use must have current medical clearance to wear the appropriate respirator. This is accomplished by enrolling the employee in the Cabrera Services, Inc. Medical Surveillance Program prior to assignment once enrolled. Medical evaluation will be required annually, as applicable.

The medical surveillance vendor is Industrial Health Care in E. Hartford, CT, who will be conducting the required medical exams through Cabrera Services, Inc.

### 5.2.1 Health Monitoring

Cabrera Services, Inc. utilizes a Health Monitoring Program designed to determine each employee's health status and fitness (including the ability to utilize respiratory protection) to work in hazardous areas.

Project Managers and the Manager, Health and Safety are required to develop a Health and Safety Plan (HASP) that specifies the action levels and corresponding type of respiratory protection.

#### 5.2.2 Health Monitoring Program Enrollment

The following Cabrera Services, Inc. employees are required to be enrolled in the Health Monitoring Program.

5.2.2.1 Any employee who may wear a respirator for 30 days or more during a year, as per OSHA 29 CFR 1910.134.

5.2.2.2 Any other employee who may be at risk of exposure to hazardous substances for any part of 30 days or more during a year, as per OSHA 29 CFR 1910.120.

#### 5.2.3 Medical Evaluation

The Cabrera Services, Inc. medical provider will provide a medical evaluation to determine the employee's ability to use a respirator, before the employee is fit tested or required to use the respirator in the workplace. Cabrera Services, Inc. may discontinue an employee's medical evaluations when the employee is no longer required to use a respirator.

At a minimum, Cabrera Services, Inc. will provide additional medical evaluations under the following circumstances:

- An employee reports medical signs or symptoms that are related to ability to use a respirator,
- The medical provider, supervisor, or the respirator program administrator informs the employer that an employee needs to be reevaluated;
- Information from the respiratory protection program, including observations made during fit testing and program evaluation, indicates a need for employee reevaluation; or
- A change occurs in workplace conditions (e.g., physical work effort, protective clothing, temperature) that may result in a substantial increase in the physiological burden placed on an employee.

#### 5.2.4 Levels of Clearance

Employees may only perform work on sites where their level of medical certification and the level of protection required are consistent.

### 5.3 Fit Testing

Fit testing will be conducted in accordance with current OSHA requirements. Qualitative respirator fit-testing using required protocols is conducted annually, or

more frequently if conditions arise that affect the face-to-respirator seal. Changes in an employee's facial features (weight loss or gain), illnesses relative to potential respiratory exposures, and employee complaints involving respirator usage will be the criteria used to establish the need for additional respirator fit-testing.

The OSHA approved fit-testing protocols are included in Appendix A of this procedure. The employees will be fit tested using these fit-test protocols, and fit test guide, included in the training program. The protocols selected may vary dependent upon user needs, site-specific requirements, or client mandates. Based on this information, the selection will be decided upon by the Manager, Health and Safety or designee.

Fit testing must be conducted in the negative pressure mode for both air-purifying respirators and air supplied respirators.

Based upon site contaminants, anticipated airborne concentrations, and the respirator Protection Factors (PF), the Health and Safety Manager will decide whether the test subject requires a Qualitative Fit Test (QLFT) or Quantitative Fit Test (QNFT).

QLFT may only be used to fit test negative pressure air-purifying respirators that must achieve a fit factor of 100 or less.

If the fit factor determined through QNFT is  $>$  or equal to 100 for tight-fitting half facepieces, or  $>$  or equal to 500 for tight-fitting full facepieces, the QNFT has been passed with that respirator.

Fit testing will be documented for each tested employee by completing the Cabrera Services, Inc. Fit Test Records included at the end of Appendix C (includes QLFT and QNFT records).

## **5.4 Use of Respirators**

### **5.4.1 Air-purifying respirators**

The type of respirator and cartridge will be specified in the Health and Safety Plan. Wearers must check the match between the Health and Safety Plan's description of the type of cartridge to be used and the information printed on the cartridge. The new cartridge should be checked to assure its quality. Do not use cartridges that rattle, have a peculiar odor, or are damp. Appropriate surveillance shall be maintained of work area conditions and degree of employee exposure or stress. When there is a change in work area conditions or degree of employee exposure or stress that may affect respirator effectiveness, the respirator must be re-evaluated for its continued effectiveness.

End of Life Service Indicator (ESLI) information will be provided in the HSSP. At a minimum, cartridges will be replaced at least daily. Change out may be required more frequently based on the site-specific cartridge change out schedule indicated in every HASP.

In addition, cartridges must be replaced immediately when the wearer detects vapor or gas breakthrough, changes in breathing resistance, or leakage of the facepiece. Breakthrough may take the form of odors; tastes; burning sensations in the eyes, nose, throat or skin; irritation; headache; confusion; or drowsiness. Break-through is accelerated by breathing very humid or misty air. Report any signs of breakthrough immediately to the Site Health and Safety Officer for respiratory-protection reevaluation and/or cartridge replacement.

All personnel must wash their faces and respirator facepieces as necessary to prevent eye or skin irritation associated with respirator use.

All filters, cartridges and canisters used in the workplace must be properly labeled and color-coded with the NIOSH approval label. The label must not be removed and it must remain legible.

Used cartridges are considered hazardous waste, if exposed to substances deemed 'hazardous waste' by the Environmental Protection Agency (EPA), and must be disposed of properly. Cartridges must never be left on a stored respirator.

#### 5.4.2 Cautions and Limitations

They are not for use in oxygen deficient atmospheres or IDLH atmospheres. An IDLH atmosphere is one where contaminants are present in concentrations at IDLH levels (i.e. the IDLH for benzene is 500 ppm). See also the definition of IDLH.

They are not for use where the Maximum Use Concentration (MUC) could be exceeded. This is the maximum concentration that the cartridge or canister will filter (Usually 1,000 ppm for organic vapors).

They are limited to the fit factor established for the particular respirator.

Failure to use and maintain the respirator for its intended purpose can cause injury or death. Approved respirators shall be selected, fitted, used, and maintained in accordance with MSHA, OSHA, and other applicable regulations.

Substitution, modification, additions, or omission of parts can lead to injury or death and is strictly forbidden. Use only exact replacement parts in the configuration specified by the manufacturer.

All filters, cartridges, and canisters used in the workplace must be labeled and color-coded with the NIOSH approval label. The labels must not be removed and must remain legible.

Tight-fitting respirators must not be worn when there is facial hair or any condition that interferes with the face-to-facepiece seal or valve function (e.g., corrective glasses or goggles):

- Any facial hair such as stubble, mustaches, sideburns, beards, facial deformations, low hairlines and bangs which pass between the face and sealing surface of the respirator will produce a break in the face-to-respirator seal and allow the introduction of contaminants into the breathing zone. Persons with these hair conditions shall not be permitted to wear respirators until the hair is removed. At the time of fit-testing, it will be determined if other types of protection are feasible. If this is not possible, the employee shall not be assigned to sites requiring respiratory protection.
- Employees who normally wear corrective lenses have the option to wear them with respirators as long as they do not interfere with the respirator seal. The wearer is responsible for obtaining their own prescription and notifying the Manager, Health and Safety who will obtain special corrective lenses that fit into the respirator face mask. Wearing of contact lenses within the respirator is permitted by OSHA under the final respiratory standard.
- Personal protective equipment shall be worn in such a manner that does not interfere with the seal of the facepiece to the face of the user (e.g., corrective glasses or goggles). . Spectacle temple bars or straps that pass between the sealing surface of a full facepiece and the wearer's face prevent a good seal, thus, must not be worn.

Understand the Service Life. By definition: The service life is a period of time that a respirator, filter or sorbent, or other respirator equipment provides adequate protection.

Voice communications needs to be done by special communication equipment. Consult the manufacturer for installation of such equipment. Do not remove the respirator to speak in a contaminated atmosphere.

Cold weather conditions can cause fogging of full facepiece respirators, valve sticking, and/or stiffness that may prevent a good facial seal. A nose cup installed in the respirator will eliminate fogging. Consult with the manufacturer to discuss other cold weather problems. If it is too cold for the respirator and/or accessory equipment to function, then you must not use them.

### 5.4.3 Voluntary Use of Respirators

Employees who voluntarily wish to use a respirator in work areas or under conditions where it is not required must notify their supervisor.

As indicated in Appendix D of the OSHA standard (29 CFR 1910.134), employers are encouraged to provide information to employees using respirators when not required under the standard.

Respirator use is encouraged, even when exposures are below the exposure limit, to provide an additional level of comfort and protection for workers. However, if a respirator is used improperly or not kept clean, the respirator itself can become a hazard to the worker. Sometimes, workers may wear respirators to avoid exposures to hazards, even if the amount of hazardous substance does not exceed the limits set by OSHA standards. If an employer provides respirators for voluntary use, or if an employee provides their own respirator, that employee needs to take certain precautions to be sure that the respirator itself does not present a hazard.

Employees should do the following:

1. Read and heed all instructions provided by the manufacturer on use, maintenance, cleaning and care, and warnings regarding the respirator's limitations.
2. Choose respirators certified for use to protect against the contaminant of concern. NIOSH, the National Institute for Occupational Safety and Health of the U.S. Department of Health and Human Services, certifies respirators. A label or statement of certification should appear on the respirator or respirator packaging. It will indicate what the respirator is designed for and how much protection it offers.
3. Do not wear your respirator into atmospheres containing contaminants for which your respirator is not designed to protect against. For example, a respirator designed to filter dust particles will not protect you against gases, vapors, or very small solid particles of fumes or smoke.
4. Keep track of the respirator so that someone else doesn't use yours by mistake. -

In addition, it is necessary to ensure that the voluntary employee is medically able to use the respirator and that the respirator is cleaned, stored, and maintained so that its use does not present a health hazard. Employees who voluntarily use dust masks are not required to have medical clearance, and are not subject to the cleaning, storage, and maintenance requirements herein.

### Use of SCBA or SAR

SCBA or SAR will only be used in those areas and for those job functions specified in the site-specific HASP. If SAR's are used, an in-line escape bottle must be attached. Prior to using the SCBA or SAR, the employee will be briefed by a health and safety professional regarding its use, the potential hazards present in the work area, and the consequences of failing to maintain proper respiratory protection.

All air cylinders will be filled with Grade D breathing air. Written certification will be obtained from the vendor stating that the air in the cylinders is Grade D breathing air, prior to filling cylinders. It is recommended that the cylinder air be tested for oxygen content as an additional quality check.

The "Buddy System" will be in effect whenever SCBA or SAR is utilized. Workers will perform their jobs in pairs and will maintain a line of sight or radio contact with the decontamination area at all times. One or more individuals with SCBA ready to don will stand by in the decontamination area to assist in the event of an emergency.

Employees will monitor each other for indications of exposure, injury, or illness. If a change in status occurs, or when a warning alarm sounds (indicating that low levels of breathing air remain in the tank), both workers will stop working and proceed with caution to the decontamination area for assistance.

### Procedures for IDLH atmospheres

A. For all IDLH atmospheres, site personnel must ensure that:

1. One individual or, when needed, more than one individual is located outside the IDLH atmosphere.
2. Visual, voice, or signal line communication is maintained between the individual(s) in the IDLH atmosphere and the individual(s) located outside the IDLH atmosphere.
3. The individual(s) located outside the IDLH atmosphere are trained and equipped to provide effective emergency rescue.
4. The Site Safety Officer and/or Site Superintendent are notified before the trained individual(s) located outside the IDLH atmosphere enter the IDLH atmosphere to provide emergency rescue. They must provide necessary assistance appropriate to the situation.
5. The trained individual located outside the IDLH atmospheres must be equipped with:

- a. Pressure demand or other positive pressure SCBAS, or a pressure demand or other positive pressure supplied-air respirator with auxiliary SCBA; and either
- b. Appropriate retrieval equipment for removing the individual(s) who enter(s) these hazardous atmospheres where retrieval equipment would contribute to the rescue and would not increase the overall risk resulting from entry; or equivalent means for rescue.

## Donning the Respirator

### A. Procedure

1. Inspect the respirator.
2. Loosen all harness strap adjustments.
3. Place chin in chin cup and draw evenly back on strap adjustments. (Bottom two straps first, then two top straps, and finally center top strap).
4. Check to determine that the respirator is centered evenly on the face and that the straps are not uncomfortably tight.

### B. Negative and Positive Pressure Testing

1. Check for leaks and/or proper facial seal.
  - a) **NEGATIVE PRESSURE TEST:** Cover cartridge air ports with the palms of both hands and attempt to pull air into the mask (breathe in) through inhalation ports. For SCBA or SAR, cover the hole at the end of the breathing tube. The mask should remain collapsed slightly while the breath is held for about ten seconds.
  - b) **POSITIVE PRESSURE TEST:** Cover the exhalation valve with the palm of your hand and attempt to exhale (Do Not Forcefully Blow). The mask should bulge slightly with the positive pressure created inside. Maintain this pressure for about ten seconds while monitoring for air intake around the face-to-respirator seal.
  - c) If pressure is not maintained, check and/or readjust the faceplate and straps. Make sure the palms are covering all of the cartridge air ports and/or breathing tube hole. Repeat Steps a and b.

2. Persistent leaks or improper face seals must be reported to the Project Manager/Site Safety Officer/Program Administrator for correction prior to respirator use.

## 5.5 Maintenance and Care

Respirators must be inspected prior to each use. Respirator inspection verifying operating condition and maintenance is an integral part of the Respiratory Protection Program. Respirators must also be cleaned after each use. Cleaning will be accomplished either by using the manufacturer's cleaner/sanitizer or by hand washing with a mild disinfectant solution followed by a thorough rinse and air-drying. The wearer shall be responsible for thoroughly cleaning and disinfecting the respirator after each day of use to ensure that proper respiratory protection is maintained. If respirators are not used over an extended period, they shall be cleaned and inspected monthly. Properly trained personnel will replace or repair respiratory protective equipment using parts designed for that specific respirator. Cabrera Services, Inc. employees shall not make adjustments, repairs, or replacement of components beyond the manufacturer's recommendation or the employee's level of qualification. Repairs to SCBA ducting, admission valves or regulators will be performed only by persons qualified to do so. Records of inspection of SCBA units will be maintained in accordance with 29 CFR 1910.134. Specific procedures are as follows:

### A. Inspection of Respiratory Protective Equipment

#### 1. General

All respirators used in routine situations shall be inspected before each use and during cleaning.

Emergency escape-only respirators shall be inspected before being carried into the workplace for use.

All air supplied cylinders must be inspected monthly (including respirators for emergency situations or for ready use in Level B situations). Air and oxygen cylinders must be maintained in a fully charged state and must be recharged when the pressure falls to 90% of the manufacturer's recommended pressure level. Regulator and warning devices must be verified that they are functioning properly.

In addition, the respirator must be certified by documenting the date the inspection was performed, the name (or signature) of the person who made the inspection, the findings, required remedial action, and a serial number or other means of identifying the inspected respirator. This information must be provided on a tag or label that is attached to the storage compartment for the respirator, is kept with the respirator, or is included in

inspection reports stored as paper or electronic files. This information shall be maintained until replaced following a subsequent certification.

Respirators must be inspected by the wearer for completeness and functional integrity prior to each use.

## 2. Inspection Procedures for air-purifying respirators

Inspect the facepiece, head straps, inhalation valves, exhalation valve, exhalation valve cover, lens cover, spectacles when required], facepiece and appropriate cartridges and/or filters.

A check must be made of the tightness of connections. Inspect the respirator for wear such as cracks, breaks, excessive dirt, warping, frayed harness and lens cover abrasion. Check elastomeric parts for pliability and signs of deterioration.

## 3. Inspection Procedures for SCBAs and SARs

For SCBAS, inspect the breathing tube and the check valve. Stretch the breathing tube and inspect for deterioration, discoloration, pinholes, cuts, or other signs of wear. Inspect the connector at the end of the breathing tube. The threads should be in good condition, and the 'O' ring or rubber gasket should be intact, pliable, and clean.

Check the neck of the air cylinder for the hydrostatic test date. Composite bottles (aluminum wrapped in fiberglass) must be tested every 3 years, and steel bottles every 5 years. After placing the bottle in the backpack, check for stability of the cylinder and integrity of the straps.

For SARs, inspect the breathing tube as above for SCBAS. Airlines should be inspected for deterioration, discoloration, swelling, holes, or cuts. If a Cascade System is used, the compressed gas cylinders must be inspected as above for SCBAS. Cylinder caps should be screwed down completely when the cylinders are not in use.

Any deficiencies must be reported to Health and Safety Officer and corrected prior to use. In the case of SCBAs or SARs used by different offices, records of inspection of these units will be maintained in the office that purchased the units. Any respirator that does not pass the inspection is unacceptable for use. It must be clearly marked "Out of Service - Do Not Use" and sent to the Program Administrator for repair.

## **B. Air Purifying Respirator/Cleaning and Disinfection**

Respirators, which are routinely used, will be cleaned and disinfected after each use. Use manufacturer's recommendations. Procedures, which will be utilized in the absence of the manufacturer's recommendations, are as follows:

1. Remove all cartridges (canisters) and filters plus gaskets and seals not permanently affixed to their seats.
2. Loosen harness adjustment straps.
3. Remove exhalation valve cover.
4. Remove inhalation and exhalation valves.
5. Remove protective faceshield cover.
6. Wash facepiece either in a cleaner/sanitizer powder mixed with warm water or a mild soap/disinfectant solution, preferably in a water temperature of about 120 degrees Fahrenheit. Wash components separately from facepiece. Heavy soil may be removed from the facepiece surface using a medium-soft hand brush.
7. Remove all parts from the wash solution and rinse twice in clean, warm water.
8. Air dry all parts in a designated clean area.
9. Gently pat dry facepieces, valves, and seats to remove any remaining soap residue, water or other foreign material with a clean, damp, lint-free cloth.
10. Inspect all respirator parts, and replace as needed.
11. Reassemble respirator.

### **C. Air-Purifying Respirator/Storage**

Respirators will be stored in plastic bags in a designated location, which offers protection from dust, sunlight, extreme cold, heat, damaging chemicals, and excessive moisture. NEVER STORE RESPIRATORS WITH ADJUSTMENT STRAPS OVER THE FRONT OF THE FACEPIECE.

### **D. SCBA and SAR/Cleaning and Disinfection**

SCBA units must be cleaned after each day of use. Decontaminate by sponging off the tank, back- pack harness, and regulator. Never allow cleaning solution to

enter the regulator. (Do not dunk, soak or hose off.) Only those specifically trained to disassemble the regulator may do so.

Airlines also require cleaning once they are removed to the decontamination area. This is important not only for prevention of cross-contamination, but to avoid premature wearing of the lines due to chemical action. Brightly colored sleeves are available for airlines to protect from excessive contamination, wear, and to identify personnel.

### **E. Procedure for Storage of SCBAs**

1. Refill, clean and inspect the cylinder.
2. Check to ensure the cylinder valve is closed.
3. Connect high pressure hose tightly to the cylinder.
4. Release any pressure remaining in the high pressure hose or regulator.
5. Check to ensure the bypass valve is closed.
6. Check to ensure the mainline valve is closed.
7. Place the cylinder in backpack assembly.
8. Place assembled cylinder and harness in proper container.
9. Loosen straps and lay them flat.
10. Check clean facepiece and place in plastic bag with straps collapsed at the back of the respirator. NEVER STORE FACEPIECE WITH THE STRAPS FORWARD OVER THE LENS.
11. Place facepiece in container with cylinder/backpack assembly and close container.
12. Store unit in a designated area protected from dust, sunlight, extreme heat or cold, excessive moisture or damaging chemicals.  
(Note: This may vary depending on the manufacturer's instructions)

### **F. Storage of SAR Systems**

Once dry, airlines must be carefully coiled and stored in a designated area protected from dust, sunlight, extreme heat or cold, excessive moisture or damaging chemicals. Compressed gas cylinders must be stored upright and securely chained, with the caps in place

## 5.6 Breathing Air Quality and Use

For breathing air quality and use, the following requirements must be met:

A. Compressed breathing air meets at least the requirements for Type I -Grade D breathing air described in ANSI/Compressed Gas Association Commodity Specification for Air, G-7.1-1989, to include:

- Oxygen content (v/v) of 19.5-23.5%
- Hydrocarbon (condensed) content of 5 milligrams per cubic meter of air or less
- Carbon monoxide (CO) content of 10 ppm or less
- Carbon dioxide content of 1,000 ppm or less
- Lack of noticeable odor

B. Ensure that compressed oxygen is not used in atmosphere-supplying respirators that have previously used compressed air.

C. Ensure that oxygen concentrations greater than 23.5% are used only in equipment designed for oxygen service or distribution.

D. Ensure that cylinders used to supply breathing air to respirators meet the following requirements:

- Cylinders are tested and maintained as prescribed in the shipping Container Specification Regulations of the Department of Transportation (49 CFR part 173 and part 178)
- Cylinders of purchased breathing air have a certificate of analysis from the supplier that the breathing air meets the requirements for Type I -Grade D breathing air
- The moisture content in the cylinder does not exceed a dew point of -50 deg.F (-45.6 deg.C) at 1 atmosphere pressure

E. Ensure that compressors used to supply breathing air to respirators are constructed and situated so as to:

- Prevent entry of contaminated air into the air-supply system
- Minimize moisture content so that the dew point at 1 atmosphere pressure is 10 degrees F (5.56 deg.C) below the ambient temperature

- Have suitable in-line air-purifying sorbent beds and filters to further ensure breathing air quality. Sorbent beds and filters shall be maintained and replaced or refurbished periodically following the manufacturer's instructions
- Have a tag containing the most recent change date and the signature of the person authorized by the employer to perform the change. The tag shall be maintained at the compressor

F. For compressors that are not oil-lubricated, ensure that carbon monoxide levels in the breathing air do not exceed 10 ppm.

G. Oil-lubricated compressors must be equipped with a high-temperature or carbon monoxide alarm, or both, to monitor carbon monoxide levels. If only high-temperature alarms are used, the air supply shall be monitored at intervals sufficient to prevent carbon monoxide in the breathing air from exceeding 10 ppm.

H. Ensure that breathing air couplings are incompatible with outlets for nonrespirable worksite air or other gas systems. No asphyxiating substance shall be introduced into breathing air lines.

I. Ensure that breathing gas containers are marked in accordance with the NIOSH respirator certification standard, 42 CFR part 84.

## 5.7 Training-Hazards

### General

Training is required for Cabrera Services, Inc. employees who wear tight-fitting respirators. The training program is an important and critical part of the respiratory protection program. This training program is designed so that each employee obtains the proper training.

The training program will review the general requirements of the standard, training on hazard recognition and in the use, maintenance, care, and limitations of respirators, background of the standard, importance of respirator protection, program evaluation requirements, and recordkeeping. Fit testing will be conducted at the time of training.

Emphasis would be placed on training on hazard recognition and in the use, maintenance, care, and limitations of respirators, through discussions that will be facilitated during training sessions. For example, hazard recognition training would include the following:

- Common hazards that exist are dusts, chemicals, and the oxygen content.
- Dusts include nuisance dusts and toxic dusts such as silica.
- Chemicals can be organic vapors or acid gases such as benzene and hydrogen chloride, respectively.
- Oxygen content can be excessive (greater than 22 percent) or deficient (less than 19.5 percent).

### **5.8 Training In Use/Care/Maintenance/Limitations**

Maintenance, care, use, and limitations training would present information already described in this procedure and is included in the training program.

The training will be conducted in a manner that is understandable to the employee. All questions related to the training must be adequately addressed before employees complete the training.

In addition, employees requiring the training must receive the training prior to use of a respirator in the workplace.

Retraining shall be administered annually, and when the following situations occur:

- Changes in the workplace or the type of respirator render previous training obsolete;
- Inadequacies in the employee's knowledge or use of the respirator indicate that the employee has not retained the requisite understanding or skill; or
- Any other situation arises in which retraining appears necessary to ensure safe respirator use.

In addition, site-specific training will be given to employees who require use of air supplied respiratory protective equipment. This training will be given by a respective health and safety professional.

Before entering designated work areas requiring the use of any respirator equipment, the following criteria must be met:

- A. Documentation of medical certificate (Health & Safety Form, Appendix B)
- B. Documentation of instruction and training in the proper use of respirators. (Health & Safety Form, Appendix E)

- C. Documentation of proper fit testing with the particular type of respirator to be used. (Make, model and size, see Health and Safety Form, Appendix C)
- D. Employees must receive a site-specific safety briefing, which will include the possible type(s) of hazards anticipated in the work area and the possible consequences of failing to maintain the proper respiratory protection.
- E. Respirator must be checked for worn, broken, or malfunctioning parts.
- F. For air-purifying respirators, proper cartridges for the anticipated exposure must be attached to the respirator base.
- G. Respirator seal integrity must be checked by utilizing a positive and negative pressure test each time the respirator is donned.
- H. Neither facial hair nor eyeglass temple bars may interfere with the face-to-respirator seal. Beards are never permitted when respirators are worn.
- I. Failure to meet any one of the requirements listed above shall be considered a failure to meet all of the listed requirements and prohibits the individual from hazardous waste site activities. In addition, Cabrera Services, Inc. employees must follow manufacturer's procedures for inspecting, donning, cleaning, and storing respirators.

### **5.9 Program Evaluation**

Respirator practices will be evaluated by the Program Administrator to determine whether respirators are being utilized properly. Consultation with wearers will be conducted to evaluate the following: levels of discomfort, resistance to breathing, interference with vision, communication and job function, fatigue, and confidence in the respirators effectiveness.

This evaluation will be conducted at least twice a year, and more frequent dependent upon the evaluation results. Information gathered during such evaluations, combined with measurements of hazard levels in the work area and the medical surveillance of users will be reviewed by the Project Manager and the Corporate Health and Safety Manager to maintain the program's effectiveness. Any major policy decisions regarding the Respiratory Protection Program will be at the discretion of the Project Manager and the Corporate Health and Safety Manager.

### **6.0 RECORDKEEPING**

In addition to the Respiratory Protection Program, the following documentation will be maintained in the appropriate local offices:

- A. Medical clearance certification for respirator usage for each employee.
- B. Respiratory protection training documentation for each employee.
- C. Respirator fit testing documentation for each employee.

## **7.0 RESPIRATOR CHANGE-OUT SCHEDULES ([HTTP://WWW.OSHA-SLC.GOV/SLTC/RESPIRATORYPROTECTION/YOONMODEL.HTML](http://www.osha-slc.gov/sltc/respiratoryprotection/yoonmodel.html))**

### **7.1 Rule of Thumb**

- In chapter 36 of the AIHA publication, "The Occupational Environment - Its Evaluation and Control", a "Rule of Thumb" is presented for estimating organic vapor cartridge service life.
- The suggested Rule of Thumb is:
  - If the chemical's boiling point is  $> 70$  °C and the concentration is less than 200 ppm you can expect a service life of 8 hours at a normal work rate.
  - Service life is inversely proportional to work rate.
  - Reducing concentration by a factor of 10 will increase service life by a factor of 5.
  - Humidity above 85% will reduce service life by 50%

### **7.2 Mathematical Models**

- Mathematical models provide one means of estimating service life.
- Models may be generally classified into two categories:
  - Predictive models which estimate the breakthrough time based on chemical and physical properties of the contaminant.
  - Descriptive models which attempt to fit mathematical equations to existing experimental data.

- For many contaminants predictive models are able to accurately calculate breakthrough times.
  - A predictive model has been developed by G. O. Wood. This model utilizes chemical and physical properties to estimate the breakthrough time.
  - In the preamble to the Standard, it is stated that "predictive models are probably not likely to present an acceptable alternative for most employers, and their use would require that a considerable margin of safety be incorporated into any change schedule developed from such estimation techniques."

### 7.2.1 **Wood Mathematical Model**

- Wood, Gerry O., Estimating Service Lives of Organic Vapor Cartridges, American Industrial Hygiene Association Journal, (1994, January), pages 11-15. This paper presents one method for estimating cartridge service life. This is a predictive model and should not be relied upon without experimental confirmation of the calculation.
  - The basic equation for service life is:
    - $t_b$  = breakthrough time (min)
    - $W_e$  = equilibrium adsorption capacity (g/g carbon)
    - $W$  = weight of carbon adsorbent
    - $r_b$  = bulk density of the packed bed (g/cm<sup>3</sup>)
    - $Q$  = volumetric flow rate (cm<sup>3</sup>/min)
    - $C_o$  = inlet concentration (g/cm<sup>3</sup>)
    - $C_x$  = exit concentration (g/cm<sup>3</sup>)
    - $k_v$  = absorption rate coefficient (min<sup>-1</sup>)
  - The parameter  $W_e$  can be estimated using the following equation:
    - $W_o$  = carbon micropore volume (cm<sup>3</sup>/g)
    - $d_L$  = liquid density of adsorbate (g/cm<sup>3</sup>)

- $T$  = absolute temperature ( $^{\circ}\text{K} = ^{\circ}\text{C} + 273$ )
- $r$  = partial pressure corresponding to concentration  $C_x$
- $r_{\text{sat}}$  = saturation vapor pressure at temperature  $T$
- $P_e$  = molar polarization
- $R$  = ideal gas constant (1.987)
- $b'$  = an empirical coefficient with value  $3.56 \times 10^{-5}$
- The parameter  $P_e$  can be estimated using the following equation:
  - $M_w$  = molecular weight
  - $n_D$  = refractive index
- The parameter  $k_v$  has been estimated by Wood from experimental data to be equivalent to the following equation:
  - $I$  = calculated to be 0.000825
  - $S$  = 0.036 for 1% breakthrough
  - $V_L$  = linear airflow velocity (cm/sec)
- Wood uses an example of hexane with the following information:
  - $T = 22^{\circ}\text{C}$  ( $295^{\circ}\text{K}$ ).
  - Pair of cartridges with an work rate of 53.3 L/min.
  - $W_o = 0.454$  [determined from experimental data]
  - $d_L = 0.6603$  [available from scientific handbooks]
  - $P_e = 29.877$  [calculated from available data]
  - $r_{\text{sat}} = 121$  torr [available from scientific handbooks]
  - $r = .38$  torr (500 ppm challenge concentration) [calculated from available data]
  - $V_L = 11.22$  cm/s [calculated from available data]
  - $W = 70.6$  g [calculated from available data]

- $C_o = .00178 \text{ g/cm}^3$  [calculated from available data]
  - $k_v = 4242 \text{ min}^{-1}$
  - The result of this calculation is: 94 minutes.
- Descriptive models use experimental data to calculate parameters which fit the model to the data. Once the model is fit to a set of experimental data, the model is used to calculate values for points where experimental data are not available.
  - The validity of the model is dependant on the accuracy of the experimental data.
  - The model may not account for all significant variables (e.g., humidity, temperature).
  - An equation developed by Yoon-Nelson is presented as an example.

### 7.2.2 *Yoon-Nelson Mathematical Model*

The Yoon-Nelson model is a descriptive model which uses experimental data to calculate parameters which are then entered into the model.

- The basic equation for the model is:
  - $t = \text{breakthrough time (min)}$
  - $\tau = 50\% \text{ contaminant breakthrough time (min)}$
  - $k' = \text{rate constant (min}^{-1}\text{)}$
  - $P = \text{probability of contaminant breakthrough.}$
- The value of  $\tau$  is determined from experimental data.
- The value of  $k'$  has been shown to be related to  $\tau$  by the following formula:
$$k' = \frac{k}{\tau}$$
  - $k = \text{proportionality constant which is constant independant of concentration and varies only slightly with humidity.}$
- The value of  $\tau$  is related to the contaminant concentration by the equation:

- $K''$ ,  $a$  = constants which can be derived from experimental data. They vary with humidity, but for humidity  $\leq 50\%$  they are essentially constant.
- $C_1$  = contaminant assault concentration. (ppm)
- It is possible to determine the constants  $k$ ,  $K''$ , and from a minimum of 3 experimental data points. However, the inclusion of additional data points increases the accuracy of the model.

### 7.3 Experimental Testing

- Protocols for laboratory testing of respirator cartridges have been well established. These protocols call for strict control of test conditions. The data obtained is reliable and accurate.
- However, it does not reproduce all of the variables present in a workplace.
- Ideally respirator cartridges should be tested under conditions which accurately reproduce the work environment or be done in the workplace. Problems with this approach include:
  - Test equipment is bulky and sophisticated.
  - A large number of individual tests are required in order to generate the required breakthrough curves.
  - Personnel conducting the test must be knowledgeable of the workplace and of the test equipment and protocols.
  - Costs associated with the tests may be excessive.
- A limited number of studies have been completed which examine more convenient approaches to estimating service life for respirator cartridges.
  - Work at the University of Michigan provides one approach.
    - A glass tube is filled with sorbent from the respirator cartridge (Respirator Charcoal Tube) then sampled until breakthrough is detected, using a continuous monitor or by chemical sampling. The data obtained from the RCT is extrapolated to the cartridge. Cohen, H. J., Development of a Field Method for Calculating the Service Lives of Organic Vapor Cartridges - Part IV. Results of Field Validation Trials, American Industrial Hygiene Association Journal, (1991), pages 263-270.
- The determination of breakthrough from field data does not require the determination of the full breakthrough curve for the respirator cartridge.



## 8.0 RESPIRATOR SELECTION FLOW CHART





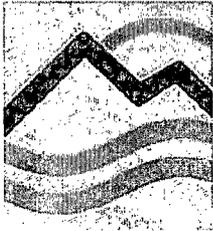








Go to flowchart 4



# CABRERA SERVICES

RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

## Job Hazard Analysis Health and Safety Manual 007

Effective Date

07/17/2002

Revision 0

*Prepared By:  
Cabrera Services, Inc.  
East Hartford, CT*

Prepared By: \_\_\_\_\_  
Paul Schwartz, CIH, CSP – Health & Safety Manager

Date: \_\_\_\_\_

Approved By: \_\_\_\_\_  
David Watters - Principal

Date: \_\_\_\_\_

Cabrera Services, Inc.  
Job Safety Analysis

## 1.0 INSTRUCTIONS

A Job Safety Analysis (JSA) is a process for studying and recording each step of a job, identifying existing or potential hazards, and determining the best way to perform the job in order to eliminate or reduce the risks. The documented JSA is used to further enhance the work plan and procedures.

Typically, the JSA is completed during work planning. Comprehensive work planning is essential in the early identification of worksite hazards and is the key to successful performance. The JSA process should take place early enough to allow:

- Thorough evaluation of the processes/proposed work to identify actual or potential hazards in the work area.
- Evaluate and specify methods of hazard prevention and/or control, emphasizing hazard elimination through the use of process, engineering and/or administrative controls over personal protective equipment.
- Determine personnel and resource requirements.
- Provide area and personnel monitoring.
- Allow for appropriate training and education of employees, as necessary.
- Develop support and contingency plans.

1.1 At the discretion of the Project Manager and/or the Manager, Health and Safety a JSA, Attachment A, shall be completed for work by or for Cabrera Services, Inc. This may include work activities performed in some office environments, dismantling and demolition activities, planned and unplanned work and infrequently performed tests or tasks.

1.2 When evaluating work and determining occupational safety hazards, the following shall be included, when applicable:

- Review of proposed processes and identification of hazards, to include chemical and physical hazards, as well as ergonomics.
- Discussions with vendors and other industries experienced with similar processes.
- Review of data, including material safety data sheets, historical facility data, similar tasks performed at the site, available industry data.
- Discussions with personnel responsible for various site activities
- Review of the applicable site location where the work will be performed.
- Evaluation of available engineering controls and required support equipment and material existing at the site.
- Review of lessons learned and applicable corrective actions to determine applicability to the proposed work.
- Evaluation of personal protective equipment which may be required to perform the work and the additional hazards which may result from use.
- Evaluation of potential hazards resulting from the product of the process.

- 1.3 The First Line Supervisor (FLS) or Project Manager (PM) responsible for the specific task or tasks shall complete a JSA for all work activities. Each JSA shall address all actual or potential hazards associated with all phases of the work and include all affected employees (permanent and contractor). When evaluating large or complex work activities, it may be necessary to break the activity into smaller components and tasks and complete a separate JSA for each task. For work within a Radiologically Controlled Area (RCA) or work with radioactive material, it may be beneficial to generate a JSA for the task described in the Radiation Work Permit (RWP), and for complex work, generate a JSA for each RWP job step.
- 1.4 Emergency response activities are exempt from the JSA requirement. Emergency response activities are directed by procedures, which include sufficient evaluation of risk and the controls necessary to minimize the risk to emergency response personnel.
- NOTE:** The FLS or Project Manager may delegate completion of the JSA. However, the FLS or Project Manager shall be responsible for approving the completed JSA. **The FLS or PM shall perform the following:**
- 1.4.1 Initiate and complete Sections 1, 2 and 3 of Attachment A, Job Safety Analysis, with assistance from support personnel, such as a health and safety professional.
- 1.4.2 Ensure employees who are designated to complete the tasks, as well as support personnel, are involved in determination of occupational safety hazards and appropriate controls.
- 1.4.3 Determine the task risk category, i.e., low, moderate or high, by comparing the hazards determined in Section 2 of Attachment A with the criteria provided for each risk category in Section D of Attachment A or the risk category definitions and record in Section 3.
- 1.4.4 Obtain the required JSA approvals in Section 4 of Attachment A.
- 1.4.5 Implement controls to eliminate or minimize occupational safety hazards identified in the completed JSA prior to allowing work to proceed on the task.
- 1.4.6 Provide all employees involved with the task an opportunity to review the completed JSA prior to performance of assigned duties.
- 1.4.7 For non-routine work, forward the original approved JSA for retention with the work package. For routine work, the FLS or Project Manager shall retain the original approved JSA.
- 1.4.8 Provide the Manager, Health and Safety with a copy of the approved JSA.
- 1.4.9 Utilize the approved JSA during pre-job briefs.

- 1.5 For controls identified in the JSA which requires the development and implementation of contingency or response plans, the FLS or Project Manager shall ensure that these are complete and approved prior to the start of work.
- 1.6 JSAs for non-routine tasks shall be valid for the life of the work package, provided there are no changes in work scope which result in actual or potential hazards which were not addressed in the original JSA. JSAs for routine tasks shall typically be valid for a year (January through December) or until a new hazard is introduced in the work environment.
- 1.7 A new JSA or an amendment to the original JSA shall be completed and approved for work package revisions or work processes which result in actual or potential hazards which were not identified or evaluated in the original JSA or result in a change in task risk category.

## **2.0 RESPONSIBILITIES**

- 2.1 The Manager, Health and Safety is responsible for review and approval of JSAs for high-risk activities with actual or potential atmospheric contaminants greater than 50 percent of the OSHA Permissible Exposure Limit or ACGIH Threshold Limit Value.
- 2.2 The Project Manager coordinating the work is responsible for review and approval of JSAs for high or moderate risk activities.
- 2.3 The FLS or PM directing the performance of work is responsible for completing the JSA in accordance with the requirements of this procedure.
- 2.4 The Manager, Health and Safety or designee is responsible to:
  - 2.4.1 Assist the FLS or PM in completion of the JSA
  - 2.4.2 Ensure medical personnel review and assist in establishing controls for high-risk activities relating to medical response and/or development of rescue plans.
  - 2.4.3 Approve JSAs for all risk categories.
  - 2.4.4 Maintain copies of completed JSAS.
- 2.5 Employees performing work for Cabrera Services, Inc. are responsible to:
  - 2.5.1 Assist in the development of the JSA.
  - 2.5.2 Ensure work is performed within the bounds of the activities evaluated in the JSA.
  - 2.5.3 Notify the FLS or PM when actual or potential hazards not evaluated in a JSA are encountered.

- 2.5.4 Ensure the controls implemented in accordance with the JSA are maintained and utilized, as directed.

### 3.0 DEFINITIONS

- 3.1 Routine Work - tasks performed by employees, who do not change and are performed in areas and with materials of known hazards and the hazards do not change.
- 3.2 Non-Routine Work - planned and unplanned tasks and infrequently performed tests and tasks conducted in support of projects including but not limited to maintenance site characterization decontamination dismantling and demolition.
- 3.3 Low Risk Work - administrative tasks, tasks which do not require hands on work, housekeeping, routine tasks using chemicals with a National Fire Protection Association (NFPA) health, fire or reactivity hazard index rating of 1 or less, or tasks with minimal physical hazards.
- 3.4 Moderate Risk Work - tasks involving:
- Actual or potential health hazards where the failure of any single engineering or administrative control may result in recoverable illness or injury with no long-term health effects.
  - Tasks involving the use of chemicals with a NFPA health, fire or reactivity hazard index rating not greater than 2.
  - Permit required confined space entry,
  - Work over water,
  - Work with de-energized equipment,
  - Potential exposure to toxic material less than 10% of the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) or American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV).
- 3.5 High Risk Work - tasks involving:
- Actual or potential health hazards, where the failure of any single engineering or administrative control may result in serious illness or injury with extended recovery time required or death
  - The use of chemicals with a NFPA health, fire or reactivity hazard index rating greater than 2 permit required confined space entry,
  - Work in excavations,
  - Work in water,
  - Work with hazardous energy sources,
  - Work in a heat stress environment,
  - Potential exposure to toxic material greater than 10% of the OSHA PEL or ACGIH TLV.





# CABRERA SERVICES

RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

## Excavation and Trenching

### Health and Safety Manual 008

Effective Date

07/25/2002

Revision 1

*Prepared By:*  
*Cabrera Services, Inc.*  
*East Hartford, CT*

Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_  
Paul Schwartz, CIH, CSP – Health & Safety Manager

Approved By: \_\_\_\_\_ Date: \_\_\_\_\_  
David Watters - Principal

---

## 1.0 PURPOSE

Studies show that excavation work is one the most hazardous types of construction work. Accidents occur more frequently in excavation work than general construction. The primary type of accident in excavation related is the cave-in. Cave-ins result in an estimated 100 fatalities per year in the United States. When compared to the total number of accidents in all construction activities, the actual number of cave-ins is not large. However, they are very serious in nature, and much more likely to be fatal.

Due to these hazards, this procedure is to ensure that excavation and trenching operations are planned and executed in accordance with regulatory standards and applicable requirements.

## 2.0 APPLICABILITY

This procedure applies to all CABRERA and CABRERA subcontractor personnel and equipment operated at project sites. This procedure applies to site vehicles such as but not limited to, passenger vehicles and light trucks, earth-moving equipment, drill rigs, multi-axle heavy trucks, other testing equipment, and excavation machinery. This procedure does not apply to cranes.

## 3.0 PRECAUTIONS, LIMITATIONS AND REQUIREMENTS

Unsupported, improperly sloped or shored excavations or trenches can collapse with little or no warning, trapping the worker below within seconds. The four main causes of death in these fatal accidents are:

1. Suffocation
2. Crushing
3. Circulation loss
4. Being struck by falling objects

Reports concerning the ratio of injuries to fatalities have measured as high as 10 to 1 and 14 to 1. The state of California has reported 17 to 1 for similar data. Compared to all types of accidents from industries in California, with the injury to fatality ratio calculated at 250 to 1, this ratio is staggering

## 4.0 REFERENCES

- 4.1 Excavations, OSHA 29 CFR 1926, Subpart P Material Handling

## 5.0 DEFINITONS AND ABBREVIATIONS

### 5.1 Benching

Benching is a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near vertical surfaces between levels. **NOTE:** When benching the angle of the bench must be the same angle as if the excavation is being sloped.

### 5.2 Competent Person

A competent person is someone who is capable of identifying existing and predictable hazards in the surrounding area, or working conditions which are unsanitary, hazardous, or dangerous to employees, **and who has the authority to take prompt corrective measures to eliminate them.**

### 5.3 Protective System

A protective system is a method of protecting employees from cave-ins, from material that could fall or roll into an excavation, from an excavation face into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems that provide the necessary protection. Protective systems will comply with the requirements of OSHA 29 CFR 1926 Subpart P, Appendix F, Selection of Protective Systems. The competent person will have the latest copy of this appendix onsite during excavation.

### 5.4 Sloping

Sloping is a method of protecting employees from cave-ins, by excavating to form sides that are inclined away from the excavation. The angle of incline required to prevent a cave-in varies with differences in factors as soil type, environmental conditions of exposure, and application of surcharge loads. The slope for each soil type is:

#### MAXIMUM ALLOWABLE SLOPES

---

SOIL OR ROCK TYPE | MAXIMUM ALLOWABLE SLOPES (H:V)(1) FOR  
| EXCAVATIONS LESS THAN 20 FEET DEEP (3)

|             |                    |
|-------------|--------------------|
| STABLE ROCK | VERTICAL (90 Deg.) |
| TYPE A (2)  | 3/4:1 (53 Deg.)    |
| TYPE B      | 1:1 (45 Deg.)      |
| TYPE C      | 1 1/2:1 (34 Deg.)  |

- Footnote (1) Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
- Footnote (2) A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4H:1V (53 degrees).
- Footnote (3) Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

## 5.5 Soil Type

- **Stable rock** - Natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed.
- **Type A soil** - Examples include clay, silty clay, sandy clay, clay loam, and sometimes silty clay loam and sandy clay loam.
- **Type B soil** - Examples include silt, slit loam, sandy loam and sometimes silty clay loam and sandy clay loam.
- **Type C soil** - Examples include granular soils like gravel, sand loamy sand, submerged soil, and soil from which water is freely seeping, and submerged rock that is not stable.

## 5.6 Trench

A trench (Trench excavation) means a narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 m). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 m) or less (measured at the bottom of the excavation), the excavation is also considered to be a trench.

## 6.0 EQUIPMENT

None.

## 7.0 RESPONSIBILITIES

### 7.1 Safety and Health Manager

The Safety and Health Manager (SHM) is responsible for:

- Administering the excavation and trenching program.
- Ensure that training is accomplished for each employee and that training is completed for each new employee.
- Annual review of the program.
- Maintain the inspection reports.

### 7.2 Field Operations Leader

The field operations leader (FOL) is responsible for:

- Ensuring that the local "before-you-dig" representatives are notified prior to commencing excavation..
- Ensure that all employees comply with the requirements set out in the OSHA standard and this procedure..

### 7.3 Competent Person

The competent person shall:

- Conducting daily inspections of the excavations, adjacent areas, and protective systems prior to the start of the shift and as needed throughout the shift. This inspection will be documented in the Daily Trench Safety Report.
- Conducting an inspection after every rainstorm or other hazard-increasing occurrence.
- Document all inspections on the inspection form provided with this program.
- Remove employees from excavations found to represent hazards and do not allow them back until the necessary precautions have been taken.

## 8.0 INSTRUCTIONS

### 8.1 General

Contact the local "before-you-dig" phone number and the property owner to ensure that underground installations are found. As the notification varies from state to state, the FOL will contact the phone number at least 72 hours before excavation commences.

Ensure underground installations are protected, supported, or removed as necessary to safeguard employees.

Remove or secure any surface obstacles, such as trees, rocks, and sidewalks, that may create a hazard for employees.

Inspect the excavation and adjacent areas at least once a day for possible cave-in, failures of protective systems and equipment, hazardous atmospheres, or other hazardous conditions.

Excavations and trenches 4 feet or greater in depth will be considered a confined space and all provision of the OSHA 29 CFR 1910.1146, Permit-Required Confined Spaces and CABRERA S&HP-004, Confined Space.

Ladders or other means of egress will be provided in each excavation. No more than 25 feet of lateral travel will be required to reach a ladder or other approved safe egress.

Spoil material removed from an excavation and any other material storage must be kept at least 2 feet away from the excavation edge.

Excavations and trenches will be appropriately identified with signs, warnings, and barricades.

Barricades will be kept at least 6 feet from open edges of trenches and excavations.

Walkways, bridges, or ramps with standard guardrails will be provided where employees or equipment are permitted or required to cross over excavations or trenches.

Coordinate with the facility to determine if a permit will be required.

## **8.2 Determination of System**

The determination and design of a ground supporting system will be based on careful consideration of the following:

- Depth of the cut.
- Anticipated changes in the soil due to air, sun, and water.
- Ground movement caused by vehicle vibration or blasting.
- Soil classification and earth pressures.

To protect employees from trench collapse, trenches 4 feet or more in depth will be shored or their walls will be cut back.

### 8.3 Trench Shields

Trench shields or trench boxes will be capable of withstanding forces generated by a cave-in. They can be portable or permanent.

Trench shields or boxes will be used and maintained in accordance with the manufacturer's requirements and in a manner that will prevent employee exposure to hazards.

If equipment or materials are damaged, a competent person will determine if they are suitable for continued use. This review will be documented.

Predictable failures such as sliding, falling, or kick out will be prevented by properly securing connections.

Systems will be installed and removed to protect employees from cave-ins, structural failures, or being struck by the trench system members. (NOTE: It may be necessary to install temporary structures to carry loads until the support system is functional.) Disassembly will progress from the bottom to the top. Members will be released slowly to determine the potential for failure!

Backfilling will progress with the removal of the systems from the excavation.

Excavation of material to a level no greater than 2 feet below the bottom of the support members will be permitted. This level will be permitted provided that the system has been designed to this excavated trench depth and there is no loss of material from behind the support system.

### 8.4 Water Accumulation

Water accumulation can be a serious hazard at excavations. Employees will not work in excavations containing accumulated water; unless adequate precautions have been taken. These precautions include special support or shield systems to prevent cave-ins, water removal, or use of a harness and lifeline.

A competent person will monitor use of water removal equipment in an excavation.

Excavation work that interrupts the natural drainage of surface water will use diversion ditches, dikes or other suitable means to prevent

surface run-off into the excavation. The competent person must inspect the excavation after heavy rains before employees enter excavation.

Inspections are necessary only when employee exposure can be reasonably anticipated. The excavation will be inspected daily by the competent person prior to the start of work and as needed throughout the shift. Inspections will be made after every rainstorm or other hazard-increasing occurrence. The competent person will document inspections.

All employees will be removed from excavations found by the competent person to represent hazards, and will not be allowed back until the necessary precautions have been taken to ensure their safety.

### **8.5 Fall protection**

Standard guardrails will be provided for all walkways over excavations.

Physical barriers will be provided for all remotely located excavations (i.e. walls, pits, shafts, etc.). Upon completion of exploration, these operations will be completely backfilled.

## **9.0 QUALITY ASSURANCE/RECORDS**

### **9.1 Records**

Inspection reports shall be maintained at the project site until the end of the project and will then be maintained in the project file at the East Hartford, CT office.

## **10.0 ATTACHMENTS**

- Daily Trench Safety Report From



**CABRERA SERVICES, INC.  
DAILY TRENCH SAFETY REPORT FORM**

**Proj: Name:** \_\_\_\_\_ **Proj: No.:** \_\_\_\_\_

**Competent Person:** \_\_\_\_\_ **Date:** \_\_\_\_\_

**Weather:** \_\_\_\_\_

|     |   |   |   |
|-----|---|---|---|
| 1.  | All open trenches were inspected.   | Y | N |
| 2.  | Surcharge was located proper distance from toe of slopes?                                   | Y | N |
| 3.  | Were any tension cracks observed along top of any slopes?                                   | Y | N |
| 4.  | Were slopes cut at design angle of repose?  | Y | N |
| 5.  | Was any water seepage noted in trench walls or bottom?                                      | Y | N |
| 6.  | Was bracing system installed in accordance with design?                                     | Y | N |
| 7.  | Was there evidence of significant fracture planes in soil or rock?                          | Y | N |
| 8.  | Was there any evidence of caving or sloughing of soil since the last field inspection?      | Y | N |
| 9.  | Were there any zones of unusually weak soils or materials not anticipated?                  | Y | N |
| 10. | Was there any evidence of significant fracture planes in soil or rock?                      | Y | N |
| 11. | Were there any noted dramatic dips in bedrock?  | Y | N |
| 12. | Where all short-term trench(es) covered within 24 hours?                                    | Y | N |
| 13. | Non-Compliance items photographed?  | Y | N |
| 14. | Trench box(s) certified?  | Y | N |
| 15. | Were hydraulic shores pumped to design pressure?  | Y | N |
| 16. | Type shoring being used _____ Secure?   | Y | N |
| 17. | Did shoring plan include adequate safety factor to allow for equipment actually being used? | Y | N |
| 18. | Traffic in area adequately away from trenching operations with barricades?                  | Y | N |
| 19. | Trees, boulders, or other hazards in area?  | Y | N |
| 20. | Vibrations from equipment or traffic too close to trenching area?                           | Y | N |

**Daily Trench Safety Report (Cont'd)**

21. List heavy equipment near operation \_\_\_\_\_  
\_\_\_\_\_

22. Heavy equipment in use at excavation: \_\_\_\_\_

23. Contractor personnel by trade at site: \_\_\_\_\_  
\_\_\_\_\_

24. Excavation supervisor at site was: \_\_\_\_\_

25. Photographs by station number and direction: \_\_\_\_\_  
\_\_\_\_\_

26. Changed subsurface condition from those anticipated: \_\_\_\_\_  
\_\_\_\_\_

27. Activity by station: \_\_\_\_\_

Trench Box used: \_\_\_\_\_

Manhole Construction: \_\_\_\_\_

Side Sloping: \_\_\_\_\_

Bracing: \_\_\_\_\_

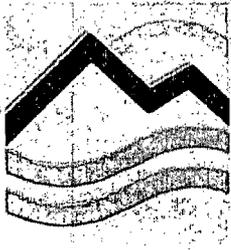
Other (Describe): \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

28. Observations: \_\_\_\_\_  
\_\_\_\_\_

Supervisor or Contractor Representative Signature

Date

\_\_\_\_\_



# CABRERA SERVICES

RADIOLOGICAL · ENVIRONMENTAL · REMEDIATION

## Incident Reporting/Near Miss Notification

### Health and Safety Manual HSM-010

Effective Date

September 2005

Revision 1 (Complete)

*Prepared By:*  
Cabrera Services, Inc.  
East Hartford, CT

Prepared By: Paul Schwartz Date: 5/28/08  
Paul Schwartz, CIH, CSP - Health & Safety Manager

Approved By: Leonard Johnson Date: 5/28/08  
Leonard Johnson, Vice President, Operations

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## 1.0 OVERVIEW

This document describes the Cabrera Services, Inc. (CABRERA) incident and near miss internal notifications and reporting procedures and provides guidance to CABRERA Project Managers and Field Personnel for the implementation of practices outlined herein.

Incident and near miss performance requirements apply to all CABRERA activities at project sites and operational offices. It also applies to those activities performed by contractors and subcontractors. It is the responsibility of the Project or Office Manager to communicate specific instructions for incident notification and reporting.

Incident/near miss analysis, prevention programs, and lessons learned sharing are the responsibility of CABRERA management. Lessons learned sharing is critical to incident prevention. The practice for sharing should continue through on-going communications of incident reports and analysis as they may occur.

Effective near miss management systems delineate seven consecutive stages underlying the reporting and extraction of value from near misses. These stages are shown below:

1. **Identification:** An incident is recognized to have occurred.
2. **Disclosure:** An individual or group reports the incident, and an incident file is opened.
3. **Distribution:** Information pertaining to the incident is transferred to those who will assess follow-up action. Information may also be broadcast to a wider audience to increase awareness.
4. **Direct and Root-Cause Analysis:** The causal and underlying factors that enable an incident are identified.
5. **Solution Determination:** For each cause solutions to prevent recurrence and/or mitigate potential impact are identified.
6. **Dissemination:** Follow-up 'action-items' to implement solutions are relayed to relevant parties. Information is broadcast to a wider audience to increase awareness.
7. **Resolution:** Action items that stem from identified solutions are implemented, and other necessary follow-up action is completed whereupon the incident file is closed.

## 2.0 RESPONSIBILITIES

### 2.1 All Personnel

Any person involved in or observing an accident or near miss must immediately report it to his/her supervisor or CABRERA Representative.

### 2.2 Project Managers

Project Managers (PMs) are responsible and accountable for:

- ensuring that this procedure is implemented relative to their Project
- reporting actions defined in Section 3.0 to the Corporate Health and Safety Manager and their respective Program Manager

### 2.3 Field Site Manager

Field Site Managers (FSMs) are responsible for:

- making an initial assessment of the severity of an incident
- initiating the appropriate investigation process
- assuming ownership of minor incidents on the site

- accepting the Incident Report and implementing the resultant actions, as assigned.

#### **2.4 Relevant CABRERA Vice President or Program Manager**

The appropriate CABRERA Vice President (VP) or Program Manager shall assume the role of Owner for any Major Incident that occurs within his / her group or scope of responsibility.

#### **2.5 Owner**

The Owner is the individual who requested the Incident Investigation to be performed. This will be the VP or Program Manager. The Owner shall:

- appoint the Investigation Team
- draw up the requirements (Section 5.1.1) for the investigation
- assess the business impact on actions prior to authorizing such acting and shall review each action item for confidentiality
- review the selection of the Responsible Party for handling the action items
- review progress reports to ensure that all outstanding action items are being completed within specified deadlines
- shall take appropriate action with the Responsible Party if action items are not being completed within the desired deadline.

#### **2.6 Investigator/Investigation Team**

The Investigator / Investigation Team are responsible for:

- investigating the circumstances leading to the event
- making recommendations to prevent recurrence
- ensuring that the written report is completed.

#### **2.7 Responsible Party**

The Responsible Party is the individual who has been assigned an action item arising from an Owner's Incident Investigation. The Responsible Party must have sufficient authority and expertise to carry out the action. The Responsible Party shall:

- review the validity of assignments of an action item with the Owner, if and when they consider the assignment inappropriate
- accept accountability for ensuring that all of his/her action items are completed by the target date
- notify the Owner if the action items are not being completed within the desired deadline
- ensure that all comments against their action items, updates of the status of their action items and closure of their action items when completed are entered into the Accident and Incident data base.

#### **2.8 Health and Safety Manager**

The Health and Safety Manager (HSM) is responsible for:

- maintaining this procedure (including annual revalidation)
- providing support to the respective Manager in setting up the Investigation Team.
- reviewing the Incident Report to ensure an accurate document with proper root cause analysis is written to ensure that:
  - ⇒ appropriate hazards have been identified
  - ⇒ action items will effectively mitigate the hazards
  - ⇒ action items are clear and provide the Responsible Party with adequate details to implement the action item
- reviewing the selection of the Responsible Party for handling the action item in order to ensure that the action item has been assigned to an individual or job position with sufficient authority

- and expertise to complete the action
- ensuring that all new or reassigned action items are entered in to the Accident and Incident database under the appropriate category
- approving the report in the Accident and Incident database.

### 3.0 DEFINITIONS AND TERMINOLOGY

Throughout this document, there are frequently used terms and phrases that should be clearly understood. These terms and phrases are defined below and are detailed in Appendix D.

#### 3.1 Definitions

*Major Incident:* An incident, including a security incident, involving any one of the following:

1. A fatality associated with CABRERA activities
2. Multiple serious injuries causing hospitalization of one or more workers
3. Significant adverse reaction from regulators, media, or the general public
4. Cost of accidental damage exceeding US \$50,000
5. Chemical spill or Radiological release causing a disruption of planned activities
6. Release of material requiring notification of regulators

*High Potential Incident:* An incident or near miss, including a security incident, where the most serious probable outcome is a Major Incident. The purpose of High Potential incident reporting is to encourage learning from serious incidents. If, after investigation, an incident is found to fit these definitions, it should be reported, even if it is outside the required reporting time frame, or does not explicitly meet these definitions.

*Non-major Incident:* An event resulting in any occupational injury or illness (including first aid), vehicle incident (\$0 cost threshold), any spill or release, regulatory notices of fine or violation, unplanned business interruption, fire/explosion, threat to security, and/or property damage greater than \$500.

*First Aid Case:* A work related injury that requires one time treatment and subsequent observations (for example, Non-Major scratches, burns, cuts, or splinters which do not ordinarily require medical care) and does not result in lost or restricted time. Such treatment and observation are considered first aid even if provided by a physician or registered medical professional

*Near Miss Incident:* A significant unsafe condition, unsafe action, and/or breach in Health, Safety or Environmental (HSE) protocol, policies or procedures that, under slightly different circumstances, would have resulted in an injury, occupational illness, property damage, vehicle incident environmental spill or release, or fire/explosion. A near miss incident is also defined as opportunity to improve environmental, health and safety practice based on a condition, or an incident with potential for more serious consequence.

By this definition a wide variety of incidents are defined as near misses. These include:

- Unsafe conditions
- Unsafe behavior
- Minor accidents/injuries that had potential to be more serious
- Events where injury could have occurred but did not
- Events where property damage results
- Events where a safety barrier is challenged
- Events where potential environmental damage could result

*Health Safety or Environmental (HSE) Opportunity:* An observation or realization that action can be taken to enhance the HSE conditions or standards under which we work. HSE opportunities will always be shared within the project team from which they are reported. These opportunities will be shared beyond the project team if they meet the following criteria:

- Minor deficiencies or limitations on equipment common to CABRERA projects that, through redesign or modification, could improve HSE performance.
- Identification, elimination, and/or modification of “at risk” work practices commonly implemented throughout CABRERA, or that pertain to specific HSE areas of emphasis.
- Substantive best practices from which a broad array of CABRERA projects could benefit, including:
  - Information on innovative technologies or new equipment that could streamline or improve work
  - Work processes or administrative tools that could simplify or increase the effectiveness of HSE policies and systems.

*Positive Safety Observations:* An observation of a positive process, practice or behavior that warrants sharing.

*Vehicle Incident:* Accidents involving vehicles occurring on the road while on Company time and/or heavy equipment used at a project site and result in damage or a work-related injury. Includes work-related operation of vehicles by full-time and project-based CABRERA employees and product delivery vehicles or vehicles operated by CABRERA contractors.

- A zero threshold is applied and reporting is irrespective of whether the accident was judged preventable or non-preventable.
- A CABRERA-operated vehicle is a vehicle driven by a CABRERA employee for work related purposes, although the vehicle may be owned, hired, or leased.
- A contractor-operated vehicle is either a CABRERA owned or leased vehicle or a vehicle under a CABRERA term contract where the driver is not a CABRERA employee.

*Unplanned Material Releases:* Incident involving CABRERA employees or contractors where products or materials are released from their primary containment in an uncontrolled, unplanned fashion. Material releases include spills, leaks, and releases to the environment.

**Spill** - Loss of primary containment from a CABRERA or contractor operation, irrespective of any secondary containment or recovery. When discovered, leakage from vessels is included in spill reporting, but may be reported separately.

**Major Spill** - A spill requiring the notification of regulatory agencies.

**Minor Spill** – A spill that does not require the notification of regulators but disrupts field activities.

- **Leak** - loss of primary containment, has or may have an environmental impact, requires immediate action to repair; released as a liquid (Major and Minor as above).
- **Atmospheric Release** - loss of primary containment with release directly to air (Major and Minor as above), requires immediate action to repair, release of a material as a gas (rather than vaporized from a liquid). If a gas is liquefied under refrigeration, report the release as a liquid spill.

### *Notices of Violations and Other Regulatory Events:*

All notices of violations shall be reported. A notice of violation may be issued by Federal regulatory agencies(OSHA, EPA, NRC, DOT), Federal non-regulatory bodies (USACE, Air Force Safety Center), and state and local authorities.

- **Negative Notice:** a negative notice is one in which a regulation or standard has been violated.
- **Positive Notice:** a positive notice is one in which a statement or commendation is issued as a result of exemplary HSE practices observed either by regulators, media, public, or a client.

## **3.2 Occupational Injury versus Illness**

The potential outcome of an 'insult' to the body. Adverse health effects are differentiated as either an injury or illness/disease for analysis of causal factors. In a working environment, this is determined by the nature of the original event or exposure which caused the effect rather than the resulting condition of the affected employee.

### *3.2.1 Injury*

Injuries are caused by instantaneous identifiable events in the working environment. Illnesses are caused by anything other than identifiable instantaneous events e.g. if repeated or prolonged exposure is involved, the outcome is considered an illness. Additionally, a judgment needs to be made as to whether this exposure was work related. Differentiation is not always straightforward. Some conditions could be classified as either an injury or an illness but not both. For example:

- Hearing loss resulting from an explosion (an instantaneous event) is classified as an injury, whereas if it results from exposure to noise over a period of time it is classified as an illness.
- Contact with a hot surface or caustic chemical causing an instantaneous burn is an injury.
- Sunburn, frostbite and welding flash burns are normally classified as illnesses because they usually result from prolonged or repeated exposure.
- Tendonitis resulting from a one-time blow to the tendons of the hand is considered an injury, whereas repeated trauma or repetitive movement resulting in the same condition is considered an illness.
- Back cases should be classified as injuries because they are usually triggered by an instantaneous event. Classifying back cases as injuries is appropriate not only for cases resulting from identifiable events, but also for cases where the specific event cannot be pinpointed, since back cases are usually triggered by some specific movement (such as a slip, trip, fall, sharp twist, etc.). Such generalizations are necessary to keep record keeping determinations as simple as possible.

### *3.2.2 Illness*

Unlike injuries, illnesses may not be easily recognized. Evaluation by trained medical personnel is desirable for confirmation both of diagnosis and attribution to occupational or non-occupational causation in accordance with the OSHA guidelines. Once a work-related illness is diagnosed, managers are responsible for ensuring that they are reported.

Illnesses frequently involve factors such as multiple causation, historic exposures totally unrelated to the current working environment and may also not result in time away from work or require modified job duties. They may also recur or result in a chronic condition. Occupational illnesses are therefore reported only once - at the time of diagnosis or recognition. As a consequence, the calculation of meaningful severity or frequency is more complicated than for injuries.

## 4.0 INCIDENT/NEAR MISS NOTIFICATION AND REPORTING PROCEDURES

### 4.1 Reporting Major Incidents, Non-Major Incidents, and Near Misses

—Incidents are classified into three basic types – Major (including High Potential Incidents and High Potential Near Misses), Non-Major, and Near Miss as defined in Section 3.

—When an incident occurs, CABRERA employees must submit the appropriate forms. When a Major or High Potential Incident occurs, the Incident Announcement form and the CABRERA Incident or Near Miss Report must be filled out and submitted. The Incident Announcement is not required for a Non-Major Incident or Near Miss/HSE Opportunity.

The guidelines for submitting initial reports are defined in the Incident Notification & Reporting Matrix located on Page 10 in Table 4-2. Injuries should be reported to the CABRERA Project Manager as soon as possible (regardless of the injury classification).

### 4.2 Incident Reporting Sequence

The CABRERA Incident Reporting flow chart below outlines the reporting sequence. The reporting requirements are designed to alert senior management of the incident. The notifications should be made immediately (within one hour). Reports should include basic facts about the incident, actions being taken, agencies and CABRERA personnel notified, and any requests for assistance.

*An incident occurs...*

**Step 1:** The employee determines the type of incident and assesses the severity based on the *Incident Notification and Reporting Definitions Table* (Appendix D) and the *Actual Severity Matrix* (Table 6-1). The initial evaluation determines the appropriate notification process and appropriate forms to use to report the incident.

**Step 2:** Once the severity is assessed, the employee must notify, verbally or via email, the appropriate contacts (e.g., VP Operations, Project Manager, Health and Safety Manager, etc) as specified in the *Incident Notification and Reporting Process Table* (see Table 4-2). In the case of a Major or High Potential incident, CABRERA Management then sends the appropriate Incident Announcement. External notification and reporting procedures (e.g. regulatory) are specific to the portfolio and the locations of the sites.

**Step 3:** The employee fills out the applicable incident report. This is an initial report and the report's status is still pending approval by the appropriate reviewer (PM and/or HSM).

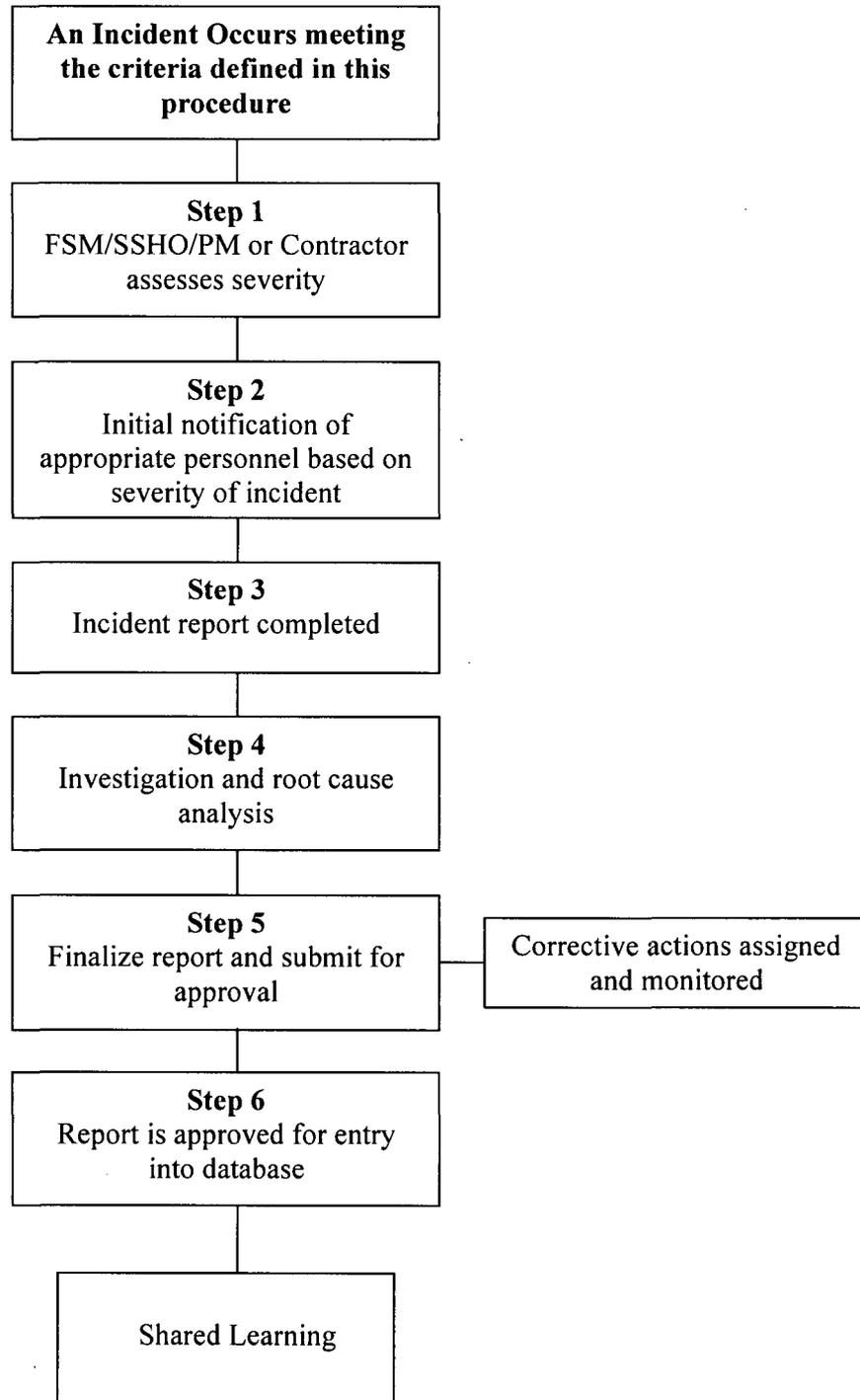
**Step 4:** An incident investigation and root cause analysis occurs. See section 5.0.

**Step 5:** Upon completion of an incident investigation and determination of a root cause, the initial Investigation report must be finalized and submitted for approval. Once approval is obtained, corrective action(s) are identified, assigned, distributed and monitored through completion. Refer to Section 6.0 *Corrective and Preventive Action Reporting & Tracking, the Action Prioritization*.

**Step 6:** The completed incident report is approved.

Figure 4-1

**CABRERA INCIDENT REPORTING FLOWCHART**



### 4.3 Notification of Major Incidents and High Potential Incidents

Reporting Major and High Potential Incident to CABRERA senior management requires the following:

CABRERA Major Incident Announcement is initiated immediately by the PM (or designee) and is provided to a predetermined list of employees as shown in Table 4-1.

For fatalities, in addition to the CABRERA Major Incident Announcement, the PM (or designee) must also provide the VP Operations and the Corporate Health and Safety Manager with a verbal report immediately. Criminal incidents (i.e., workplace violence, burglary, etc) are not exempt from this additional verbal reporting requirement.

An investigation team will be formed within 24 hours. This includes the selection of an outside team leader additional team members, and written instructions.

A fact-finding update will be due within 10 days. This summary describes the basic facts and preliminary recommendations.

Final Reports are due within 60 days. The final report describes the basic causes, final recommendations, and action to be taken.

The CABRERA Major Incident Announcement notification process is accomplished via e-mail with the words **MAJOR INCIDENT ANNOUNCEMENT** or **HIGH POTENTIAL INCIDENT ANNOUNCEMENT** in the e-mail subject area. Copies of the form can be found in Appendices B and C and should accompany the e-mail where applicable. The distribution list for Major and Non-Major Incident Announcements are shown in Table 4-1 and 4-2

**Table 4-1  
Core Distribution List**

| <b>MAJOR INCIDENT</b>                     | <b>HIGH POTENTIAL INCIDENT</b>            |
|---|---|
| <i>Core Distribution List for CABRERA</i> | <i>Core Distribution List for CABRERA</i> |
| Chief Executive Officer                   | Vice President, Operations                |
| Vice Presidents                           | Responsible Project Manager               |
| Office Managers                           | Corporate Health and Safety Manager       |
| Project Managers                          |   |
| Corporate Health and Safety Manager       |   |

**Table 4-2 INCIDENT NOTIFICATION AND REPORTING MATRIX**

| Incident Severity                   | NOTIFICATION  |   |                 | REPORTING   |  |                 |
|-------------------------------------|---|---|-----------------|---|--|-----------------|
|                                     | Notification Required   | Accountability By   | When            | Forms/ Reports  | Accountability By **   | When            |
| <b>MAJOR / HIGH POTENTIAL</b>       | (Core Distribution – see Table 4-1)<br>• CEO<br>• VP Operations<br>• H & S Manager<br>• Project Manager<br>• Office Manager | • Field Site Manager<br>• Site Safety and Health Officer<br>(as applicable) | Immediately     | Major Incident Announcement Form<br>Incident Report<br>OSHA 300 Log (as applicable) | • Project Manager<br>• H & S Manager   | Immediately     |
| <b>NON-MAJOR</b>                    | (Core Distribution - see Table 4-1)<br>• VP Operations *<br>• H & S Manager<br>• Project Manager                            | • Field Site Manager<br>• Site Safety and Health Officer<br>(as applicable) | Within 24 hours | Incident Report<br>OSHA 300 Log (as applicable)                                     | • Project Manager<br>• Field Site Manager<br>• Site Safety and Health Officer<br>• H & S Manager | Within 24 Hours |
| <b>All Injuries</b>                 | • VP Operations*<br>• H & S Manager<br>• Project Manager<br>• Office Manager  | • Field Site Manager<br>• Site Safety and Health Officer<br>(as applicable) | Immediately     | Incident Report<br>OSHA 300 Log (as applicable)                                     | • Project Manager<br>• Field Site Manager<br>• Site Safety and Health Officer<br>• H & S Manager | Within 24 Hours |
| <b>NEAR MISS/ HSE Opportunities</b> | • H & S Manager<br>• Project Manager  | • Field Site Manager<br>• Site Safety and Health Officer<br>(as applicable) | Within 72 Hours | Incident Report   | • Field Site Manager or PM<br>• HSE Coordinator<br>• Contractor HSE point of contact             | Within 72 Hours |

NOTE: If FSM or PM is not available, contractor is responsible for notifying the next applicable level.

\* For all OSHA recordable cases

\*\* Accountable for circulating to the distribution list

In cases of Contractor incidents requiring OSHA 300 Logs, the employer of the contractor is responsible for filling out the form (regardless of work for CABRERA).

## 5.0 INVESTIGATION OF INCIDENTS AND NEAR MISSES

### 5.1 Establish Investigation Team

The responsibility to establish the Investigation Team is with the initiating Project Manager, Health and Safety Manager, and VP of Operations. An Owner for the investigation will be designated. The Project Manager and Health and Safety Manager shall initiate the investigation by issuing "Requirements" to the Investigation Team Leader.

#### 5.1.1 Investigative Requirements

Once established, the requirements shown below and detailed in Appendix A give official status to the investigation. In particular they will:

- identify references
- define the scope of work
- list the team members
- provide objectives/guidance
- indicate requirements for intermediate reporting.

**Note:** The investigation shall remain strictly within the Requirements and deviate from them only after discussion with the Owner.

#### 5.1.2 Team Selection

Incident investigation teams are determined according to the type of incident. Generally, the team will consist of the following:

- a member designated as the Investigation Team Leader
- at least one person knowledgeable in the process involved
- a contract employee, contractor management representative, and/or safety representative if the incident involved the work of a contractor
- a person knowledgeable in incident investigation techniques and system cause analysis
- other persons, as needed, with appropriate knowledge and experience to thoroughly investigate and analyze the incident, i.e., may include persons within the appropriate discipline as a third party representative in major investigations.

**Note:** For Major Incidents, the Investigation Team Leader and/or at least one member shall be an individual not associated with the project.

#### 5.1.3 Team Mobilization

All teams shall be mobilized within 48 hours of the incident.

### 5.2 Conduct Investigation

The Team Leader is responsible for completing the investigation.

#### 5.2.1 Scope and Objectives

The investigation shall:

- Establish the facts surrounding the incident
- Identify and analyze relative people, positions, parts and papers.
- Map evidence; establish chronological list of events to identify critical factors.
- Review the application of management systems and management practices and their impact
- Identify system causes and make recommendations to prevent recurrence.

### 5.2.2 *Fact Finding*

Information on the incident can be obtained by collecting information from people, positions, parts and papers.

Interviews with witnesses shall be carried out as soon as possible after the incident; while the incident is fresh in their minds and before too much discussion has taken place with their colleagues. Witnesses should be interviewed individually, so that they are not interrupted or questioned by others involved. One member of the team shall interview the witness and a second record the interview. The interviewee must sign interview transcripts.

Checklists are useful in the early stages to keep the full range of inquiry in mind, but they cannot cover all possible aspects of an investigation, nor can they follow all individual leads back to system causal factors. To ensure that all facts are uncovered, ask the broad “who, what, where, when, why and how” open-ended questions.

### 5.2.3 *Establish the Sequence of Events*

As the investigation progresses, the investigators should begin to identify the sequence of events and concentrate efforts on increasing their knowledge in areas of uncertainty. As the extent of physical factors involved in an incident becomes clear, the investigators should shift the emphasis of their investigation and questioning to the system causes and the reasons for people’s actions. Establish a chronology of events by date, time and place. The construction of a diagram showing the connections between the various events and conditions leading up to the incident, called Sequence of Events, is a useful technique in the investigation process, especially for more complex incidents.

### 5.2.4 *Establish Findings*

The findings of the investigation should establish the system causes of the incident so that corrective measures can be taken to prevent future incidents.

## 5.3 **Analyze Findings**

### 5.3.1 *Identify Critical Factors and Causes and Make Recommendations*

The investigation process shall identify actions to prevent recurrence. This is achieved by addressing the substandard acts and conditions and by identifying and correcting the latent failures. Not all causes can be completely eliminated and some may be eliminated only at prohibitive cost. Some recommendations will, therefore, be focused on reducing the risk to a tolerable level, while others will be focused on improving protective systems (the defenses) to limit the consequences. At least one recommendation should be made for each finding.

Actions shall be ranked in order of priority as follows.

1. Requires immediate action before activity at the site resumes.
2. Must be completed to an agreed plan.
3. Should be considered but not a priority.

### 5.3.2 *System Cause Analysis*

All incident findings should be reviewed to determine the critical factors, immediate causes and system causes of the incident.

Identification of system causes of an incident may often reveal underlying management system failures that resulted in the incident occurring.

System Cause Analysis is a:

- process for analyzing incidents.
- means to provide consistent and repeatable results.
- means of providing objective and not punitive results.
- means of providing final results from which system causes can be identified. Once identified, actions can be taken to correct the cause and prevent a similar type incident.

After examining all the critical factors involved in an incident and arriving at the system causes, a good check to use is to ask, "If these system causes were corrected, would this prevent the incident from happening again?" If the answer is no, further evaluation is needed.

## 5.4 Compile Report

**Note:** Minor Incidents need only be reported on the Incident Investigation Report form (see *Appendix E*). Major and High Potential Incident Reports must follow the layout described.

### 5.4.1 Records

A copy of all CABRERA Major Investigation Reports shall be kept in the Operational Office files and in Corporate Health and Safety files. The incident shall also be entered into the Accident and Incident Data Base. The original of the report will be kept in the files for the project in which the incident occurred.

### 5.4.2 Report Outline

The report contents should adhere to the following outline:

**Title Page:** Includes title, location and date of the incident and date of the report.

**Executive Summary:** "High-level" summarized description of the incident, highlighting significant findings/conclusions and referencing the investigating team's recommendations. Should be restricted to one page.

**Table of Contents:** A listing of the report contents and page numbers.

**Requirements:** See section 5.1.1 for details.

**Core report:** Critical factors identified during investigation should be addressed clearly and specifically.

**Incident Description:** Describe the situation before the incident, what happened during the incident and actions taken after the incident. The questions who, what, where and when must be answered.

**Discussion of the Evidence & Losses:** This section should provide the logical discussion of the evidence which leads to the conclusion of immediate causes.

**Immediate Causes:** These are "symptoms" of the system causes and may be identified by utilizing the Incident Investigation Report (*Appendix E*) form and the System Cause Analysis Chart (*Section 7.3*).

**System Causes:** Categorized as "Basic Causes" on the Incident Investigation Report (*Appendix E*) and "System Causes" on the System Cause Analysis Chart (*Section 7.3*), they are the "whys" of the immediate causes.

**Recommendations to Prevent Recurrence:** Review each of the immediate and system causes to develop recommended actions to address all identified risks. If causes and recommendations are related to regulations, i.e., Traffic Regulations, OSHA, EPA, etc., those documents should be referenced.

**Signatories:** After the report has been reviewed and approved by the Owner, the Investigation Team Leader will sign the report as the representative of the Investigation Team and the Owner will sign the report to signify acceptance of the findings and recommended actions on behalf of CABRERA.

**Appendices:** **Appendix A - Incident Investigation Report** - This initial report will be completed by the Incident Investigation Team. It is the primary information required to document the incident in the Accident and Incident Reporting database.

**Appendix B - Diagrams and Photographs** - To correlate and illustrate locations and/or progressive locations of people, equipment, etc. that were influential in incident cause and/or prevention.

**Appendix C - Documentation** - This information is generally the most difficult to find, but the most objective. It is the primary reason why at least one team member must be knowledgeable of the process and has a supervisory responsibility over the work being performed. Supporting documentation of relevance to the overall report should be contained in this section. This should include statements from witnesses, photographs or drawings, copies of Work Permits, or other documents of importance. If equipment was damaged the details could be recorded in this section.

**Appendix D - Interviews** - Most information during investigation is obtained from people. They must be interviewed separately and as quickly as practical. The longer the interval between incident and interview, the more distorted the information becomes. Interview statements should not be a verbatim record of each interview, but should summarize the information gained at each interview. The detailed interview notes may be appended to the report or archived as considered appropriate.

**Note:** At least one team member must be trained and competent in interviewing.

#### *5.4.3 Non-Contributory Factors*

The Team may find deficiencies when investigating an incident which have no bearing on the incident or outcome. If recorded these must be clearly stated as such in the report.

### **5.5 Review with Management**

#### *5.5.1 CABRERA Management*

The report will be reviewed with management to confirm that the technical aspects are correct and the requirements have been met. The recommendations should be reviewed and action items assigned to a responsible party with target completion dates and priorities before the report is submitted to the Owner.

#### *5.5.2 Contractors*

For investigations involving customer owned/operated worksites or equipment, located on CABRERA operated areas, efforts will be made to obtain agreement on the report context by CABRERA and customer management.

### **5.6 Agree with Owner**

Each action in the recommendations must have been assigned to a person accountable for the action, a target date for completion and a risk rating (low/medium/high).

The Owner is responsible for making the actions, required completion date, and risk rating, known to the person accountable for the action and assuring timely completion).

### **5.7 Actions**

For all Incident Reports, the basic causes and actions must be approved by the Owner before the final 'approved' or signed off report is produced. Recommended actions must state explicitly what is to be done, when and by whom.

### 5.7.1 Owner

The Owner (Site Manager for Minor Incidents or Accountable VP or Manager for Major Incidents) shall allocate actions to a Responsible Party. The Owner and Responsible Party shall reach an understanding on the scope of the action and the time by which it is to be completed.

### 5.7.2 Responsible Party

The Responsible Party shall ensure that the action is closed out in the Action and Incident Data Base. An action will not be considered finalized until the database has been updated.

### 5.7.3 Close Out of Actions

Each Project Manager shall establish a process for tracking the close out of actions. The Project Manager directly accountable to the VP Operations shall do this on a monthly basis. The VP Operations shall be notified of the number of overdue actions each month.

## 6.0 CORRECTIVE AND PREVENTIVE ACTION REPORTING AND TRACKING

All incidents and near misses are investigated to determine the root cause of the nonconformance, and a corrective and/or preventive action is generated to mitigate impacts caused by the nonconformance and to correct and/or prevent their recurrence. The root cause analysis reviews processes, work operations, concessions, environmental records, service reports and other documentation.

Corrective and preventive actions taken shall be appropriate to the magnitude and frequency of problems experienced and commensurate with the health, safety, and environmental impacts experienced. Corrective actions are actions that will be taken to fix the problem. Preventive actions address the root causes of the problem to prevent recurrence. These action items are prioritized, assigned to responsible person(s), tracked through completion, and verified as successfully completed.

Corrective and preventive actions will be tracked until closure. A database will be the tool that will be used to document and track corrective and preventive actions. Once the work has been completed, an approved reviewer will verify the results in an appropriate manner and then sign off on the incident. The level of accountability varies with the severity of the incident.

Effective corrective and preventive action tracking involves the following activities:

- (1) Identifying Action Items
- (2) Prioritizing Action Items
- (3) Reviewing and Approving Action Items
- (4) Entering Action Items into the database
- (5) Tracking Action Items to Closure and Verified Completed Actions
- (6) Monitoring the Corrective and Preventive Action Tracking Process

The goals of this procedure are to ensure accountability and consistency in reporting and tracking actions across CABRERA and to focus resources on the most significant risks.

In addition, instructions for the prioritization of action items can be found below.

Sections 6.1 – 6.4 provides detailed instructions on how to prioritize the corrective and preventive actions resulting from incident reports.

### 6.1 Determine the Severity and Probability of the Incident

Step 1 in prioritizing action items is to determine the type of impact and Severity Level of the overall

incident. The primary types of impact may be health, safety, environment, property, reputation, business interruption/project delay, or security/criminal act. The Severity rating may be between 1 and 5, with 1 being the most severe and 5 being the least severe.

For incidents that are associated with real HSE impacts, use the Actual Severity Matrix (Table 6-1) to determine the type of impact and Severity Level. For near misses that are associated with potential HSE impacts in the future, use the Potential Risk Matrix (Table 6-2). Table 6-3 provides descriptions of the various severity categories.

**Table 6-1 Actual Severity Matrix**

| Severity Levels | Health | Safety | Environment | Security/<br>Criminal Act | Property Damage | Reputation | Business Interruption |
|-----------------|--------|--------|-------------|---------------------------|-----------------|------------|-----------------------|
|                 | A      | B      | C           | D                         | E               | F          | G                     |
| 1               | A1     | B1     | C1          | D1                        | E1              | F1         | G1                    |
| 2               | A2     | B2     | C2          | D2                        | E2              | F2         | G2                    |
| 3               | A3     | B3     | C3          | D3                        | E3              | F3         | G3                    |
| 4               | A4     | B4     | C4          | D4                        | E4              | F4         | G4                    |
| 5               | A5     | B5     | C5          | D5                        | E5              | F5         | G5                    |

**Table 6-2 Potential Severity Matrix**

| Severity Levels | Health | Safety | Environment | Security/<br>Criminal Act | Property Damage | Reputation | Business Interruption /Unit Outage |
|-----------------|--------|--------|-------------|---------------------------|-----------------|------------|------------------------------------|
|                 | A      | B      | C           | D                         | E               | F          | G                                  |
| 1               | A1     | B1     | C1          | D1                        | E1              | F1         | G1                                 |
| 2               | A2     | B2     | C2          | D2                        | E2              | F2         | G2                                 |
| 3               | A3     | B3     | C3          | D3                        | E3              | F3         | G3                                 |
| 4               | A4     | B4     | C4          | D4                        | E4              | F4         | G4                                 |
| 5               | A5     | B5     | C5          | D5                        | E5              | F5         | G5                                 |

**Probability of Occurrence**

|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| H | M | L | H | M | L | H | M | L | H | M | L | H | M | L | H | M | L | H | M | L |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|

**High** - There is a greater than 1 in 10 chance of outcome being realized

**Medium** - There is between a 1 in 10 and 1 in 1000 chance of outcome being realized

**Low** - There is less than a 1 in 1000 chance of outcome being realized

**Table 6-3 Severity Index Descriptions**

| Index     | Health   |
|-----------|--|
| <b>A1</b> | <ul style="list-style-type: none"> <li>• Multiple persons on-site with over-exposure to harmful effects with onset of severe or life-threatening irreversible health effects e.g., occupationally induced cancer, kidney damage, asbestosis and mesothelioma, genetic or harm to the unborn</li> <li>• Single persons off-site with over-exposure to harmful effects with onset of severe or life-threatening irreversible health effects e.g., cancer, kidney damage, asbestosis and mesothelioma, genetic or harm to the unborn</li> <li>• Multiple persons off-site with over-exposure to harmful effects causing moderate or worse irreversible health effects e.g., asthma, noise induced hearing loss</li> </ul>   |
| <b>A2</b> | <ul style="list-style-type: none"> <li>• Multiple persons on-site with over-exposure to harmful effects with resultant moderate irreversible health effects e.g., asthma, occupational noise induced hearing loss</li> <li>• Single person on-site with over-exposure to harmful effects with onset of severe or life-threatening irreversible health effects e.g., cancer, kidney damage, asbestosis and mesothelioma, genetic or harm to the unborn</li> <li>• Single person off-site with over-exposure to harmful effects with resultant moderate irreversible health effects e.g., asthma, occupational noise induced hearing loss</li> <li>• Multiple persons off-site with over-exposure to harmful effects with mild to moderate reversible health effects e.g., irritation, nausea</li> </ul> |
| <b>A3</b> | <ul style="list-style-type: none"> <li>• Multiple persons on-site with over-exposure to harmful effects with reported and confirmed mild to moderate reversible health effects, e.g., irritation, nausea</li> <li>• Single person on-site with over-exposure to harmful effects with resultant moderate irreversible health effects e.g., asthma, occupational noise induced hearing loss</li> <li>• Single person off-site with over-exposure to harmful effects with mild to moderate reversible health effects e.g., irritation, nausea</li> </ul>  |
| <b>A4</b> | <ul style="list-style-type: none"> <li>• Potential for on-site over-exposure but no reported ill-health effects</li> <li>• Single person on-site with reported symptoms of mild to moderate reversible health effect, e.g., irritation, nausea-confirmed by medical authority</li> <li>• Potential for off-site exposure but no effects identified</li> </ul>  |
| <b>A5</b> | <ul style="list-style-type: none"> <li>• Single person on-site with over-exposure to harmful effects, but no reported ill health effect, e.g., monitoring result shows occupational exposure limit has been exceeded, or one-time event such as failure of local controls or PPE</li> <li>• No impact off-site or detectable off-site exposure</li> </ul>  |

| <b>Safety</b> |   |
|---------------|---|
| <b>B1</b>     | <ul style="list-style-type: none"> <li>• Multiple fatalities amongst persons on-site</li> <li>• Fatality to single person off-site</li> <li>• Multiple permanent injuries to person off-site</li> </ul>   |
| <b>B2</b>     | <ul style="list-style-type: none"> <li>• Fatality to single person on-site</li> <li>• Multiple permanent injuries amongst persons on-site</li> <li>• Permanent injury to single person off-site</li> <li>• Multiple non-permanent injuries to persons off-site</li> </ul> |
| <b>B3</b>     | <ul style="list-style-type: none"> <li>• Permanent injury to single person on-site</li> <li>• Multiple non-permanent injuries (lost time cases) amongst persons on-site</li> <li>• Non-permanent injury to single person off-site</li> </ul>                              |
| <b>B4</b>     | <ul style="list-style-type: none"> <li>• Non-permanent injury (lost time case) to person on site</li> <li>• Multiple recordable (medical treatment) injuries amongst persons on-site</li> </ul>   |
| <b>B5</b>     | <ul style="list-style-type: none"> <li>• Recordable injury (medical treatment) to single person on-site</li> <li>• No impact to persons off-site</li> </ul>   |

| <b>Environment</b> |   |
|--------------------|---|
| <b>C1</b>          | <ul style="list-style-type: none"> <li>• Large uncontrolled release of hazardous material, e.g., requires efforts of emergency responders and agency notification</li> <li>• Impact for beyond the project boundary</li> <li>• Long-term damage affecting extensive area off-site and prolonged clean-up</li> </ul> |
| <b>C2</b>          | <ul style="list-style-type: none"> <li>• Uncontained release of reportable quantity but does not require outside response</li> <li>• Impact on immediate neighborhood beyond facility boundary</li> <li>• Long-term damage affecting limited area off-site and prolonged clean-up</li> </ul>                        |
| <b>C3</b>          | <ul style="list-style-type: none"> <li>• Uncontained release of minimum reportable quantity to an agency</li> <li>• No long-term impact beyond facility boundary</li> <li>• Prolonged damage on-site</li> </ul>   |
| <b>C4</b>          | <ul style="list-style-type: none"> <li>• Release contained on-site</li> <li>• No prolonged damage</li> </ul>  |
| <b>C5</b>          | <ul style="list-style-type: none"> <li>• Contained releases of hazardous material. No off-site impact</li> <li>• Minor damage/quick clean-up</li> </ul>   |

| <b>Security/Criminal Act</b> |  |
|------------------------------|--|
| <b>D1</b>                    | <ul style="list-style-type: none"> <li>• Bomb threat</li> <li>• Hostage taking</li> <li>• Serious sabotage</li> </ul>  |
| <b>D2</b>                    | <ul style="list-style-type: none"> <li>• Serious criminal act leading to prosecution</li> <li>• Serious breach of guidelines on handling security information</li> </ul> |
| <b>D3</b>                    | <ul style="list-style-type: none"> <li>• Criminal act involving police investigation</li> <li>• Breach of company policies leading to dismissal</li> </ul>               |
| <b>D4</b>                    | <ul style="list-style-type: none"> <li>• Breach of company policies leading to formal disciplinary action</li> </ul>   |
| <b>D5</b>                    | <ul style="list-style-type: none"> <li>• Breach of company policies leading to informal warning</li> </ul>   |

| <b>Property Damage</b> |  |
|------------------------|--|
| <b>E1</b>              | <ul style="list-style-type: none"> <li>• &gt; \$50,000</li> <li>• Extensive damage to company property or property belonging to a contractor</li> <li>• Impact at adjacent properties</li> </ul>   |
| <b>E2</b>              | <ul style="list-style-type: none"> <li>• \$10,000 –\$49,999</li> <li>• Damage to large proportion of company-owned equipment</li> <li>• No impact off-site</li> </ul>  |
| <b>E3</b>              | <ul style="list-style-type: none"> <li>• \$1,000 to \$9,999</li> <li>• Damage to a single major piece of equipment</li> <li>• Widespread damage to minor equipment items</li> <li>• Damage to cabling, instrumentation and sampling equipment</li> </ul> |
| <b>E4</b>              | <ul style="list-style-type: none"> <li>• \$250 to \$999</li> <li>• Localized damage to minor equipment items</li> </ul>  |
| <b>E5</b>              | <ul style="list-style-type: none"> <li>• &lt; \$250</li> <li>• Superficial damage</li> </ul>   |

| Reputation/Visibility |  |
|-----------------------|--|
| <b>F1</b>             | <ul style="list-style-type: none"> <li>National or international media coverage</li> <li>Potential prosecution and heavy fine by regulator</li> </ul>          |
| <b>F2</b>             | <ul style="list-style-type: none"> <li>National media attention</li> <li>Possible fines by regulators</li> </ul>   |
| <b>F3</b>             | <ul style="list-style-type: none"> <li>Regional media coverage</li> <li>Extended involvement of regulator focusing on issues beyond immediate event</li> </ul> |
| <b>F4</b>             | <ul style="list-style-type: none"> <li>Local media coverage</li> <li>Increased regulator enforcement at site level e.g., improvement notice</li> </ul>         |
| <b>F5</b>             | <ul style="list-style-type: none"> <li>Complaints from local neighborhood/community</li> <li>No formal action by regulator</li> </ul>                          |

| Business Interruption/Equipment Outage or Failure |  |
|---|--|
| <b>G1</b>   | <ul style="list-style-type: none"> <li>&gt; \$250,000</li> <li>Interruption of project for 1 year or greater</li> <li>Delays or cessation of construction, demolition, excavation activities</li> </ul>  |
| <b>G2</b>   | <ul style="list-style-type: none"> <li>\$100,000-\$249,999</li> <li>Interruption of project for greater than 1 month but less than a year</li> <li>Replacement/extensive repair of major project items, e.g., monitoring equipment</li> </ul>  |
| <b>G3</b>   | <ul style="list-style-type: none"> <li>\$50,000 to \$99,999</li> <li>Project interruption between 1 week and 1 month</li> <li>Replacement/extensive repair of a single major project item</li> <li>Equipment repair/replacement of extensive testing prior to resumption of project</li> </ul> |
| <b>G4</b>   | <ul style="list-style-type: none"> <li>&lt; \$10,000 to \$49,999</li> <li>Project interruption less than 1 week</li> <li>Equipment repair plus testing of equipment</li> </ul>   |
| <b>G5</b>   | <ul style="list-style-type: none"> <li>&lt; \$10,000</li> <li>Project interruption less than 1 day</li> <li>Repairs can be completed without project delays or delays lasting only several hours</li> </ul>  |

## 6.2 Determine the Priority of the Total Incident

Step 2 is to prioritize the incident based on the likelihood (see Step 1) and Severity Levels (see Step 1). Table 6-4 shows how to determine the Priority rating (1, 2, or 3) based on the Likelihood (High, Medium, or Low) and Severity Level (1-5).

**Table 6-4: TOTAL INCIDENT PRIORITY**

| Severity<br>(see Step 1) | Likelihood (see Step 1) |        |     |
|--------------------------|-------------------------|--------|-----|
|                          | High                    | Medium | Low |
| 1                        | 1                       | 1      | 2   |
| 2                        | 1                       | 1      | 2   |
| 3                        | 1                       | 2      | 3   |
| 4                        | 2                       | 3      | 3   |
| 5                        | 3                       | 3      | 3   |

Table 6-5 shows what the priorities A, B, and C signify.

**Table 6-5: PRIORITY DEFINITIONS**

| Priority | Total Incident Priority | Definition   |
|----------|-------------------------|--|
| 1        | <u>High</u>             | 1 <sup>st</sup> Priority – Requires immediate attention and notification of senior management.                                 |
| 2        | <u>Medium</u>           | 2 <sup>nd</sup> Priority – Requires prompt attention by site management (normally within three months).                        |
| 3        | <u>Low</u>              | 3 <sup>rd</sup> Priority – Requires attention during normal course of business activities, but after A's and B's are resolved. |

### 6.3 Classify Individual Corrective and Preventive Actions

In Step 3, each corrective and preventive action associated with the incident will be classified using the classification scheme shown in Table 6-6.

**Table 6-6: INDIVIDUAL ACTION ITEM CLASSIFICATION**

| <b>Classification</b> | <b>Definition</b>  | <b>Examples of Specific Actions</b>   |
|-----------------------|--|---|
| <b><u>Class 1</u></b> | Immediate action to eliminate immediate causes with safeguards and to prevent incident recurrence. Control of accident scene.  | Barricades/Tape, shutdown unit/equipment, Safety Alert, Roadblocks, Change process variable, Housekeeping, PPE  |
| <b><u>Class 2</u></b> | Prompt action to eliminate “contributing or indirect causes,” minimize consequences and to prevent incident recurrence.  | Signs, Engineering out hazard, Reconfigure control systems, Safety Talks, Obtain/update MSDS, Change alarm setting, Revise/implement procedure, Repair/replace equipment, Instructions & Rotation of personnel. |
| <b><u>Class 3</u></b> | Requires action during the normal course of business activities and is necessary to complete the safety management long term process of ensuring incident cannot recur under same circumstances.   | Benchmark industry, Sharing lessons learned, Management system changes, Engineering study, Critique of training module, Organizational changes, Job Task Observations, Routine inspections.                     |
| <b><u>Class 4</u></b> | No requirement for priority action and is not necessary to prevent recurrence of incident. Recommendation is made as a result of the incident investigation, but is not connected to the incident. | As-found drawing revisions not related to the incident, Typos on procedures.  |

### 6.4 Determine Priority of Individual Corrective and Preventive Actions

In Step 4, the priority of each individual corrective and preventive action is prioritized based on the total incident or audit finding Priority (see Step 2) and the individual action item Classification (see Step 3).

**Table 6-7: INDIVIDUAL ACTION ITEM PRIORITIES**

|  | <b>Class 4</b> | <b>Class 3</b> | <b>Class 2</b> | <b>Class 1</b> |
|--|----------------|----------------|----------------|----------------|
| <b>Total Incident/Audit Finding Priority 3</b> | 3              | 3              | 2              | 2              |
| <b>Total Incident/Audit Finding Priority 2</b> | 3              | 2              | 2              | 1              |
| <b>Total Incident/Audit Finding Priority 1</b> | 2              | 2              | 1              | 1              |

The 1, 2, and 3 priority ratings correspond to the priority definitions provided in Table 6-5 above.

## 7.0 ANALYSIS AND PREVENTION

The objective of Root-Cause Analysis is to determine the direct and underlying factors that enable an incident or unsafe condition. Short-term solutions resolve direct causes, farther-reaching and more permanent solutions rectify root-causes. While it is important to recognize the interaction between Root-Cause Analysis and Solution Determination, it is equally important to recognize that these are two distinct activities.

### 7.1 Key Elements of Safety Excellence

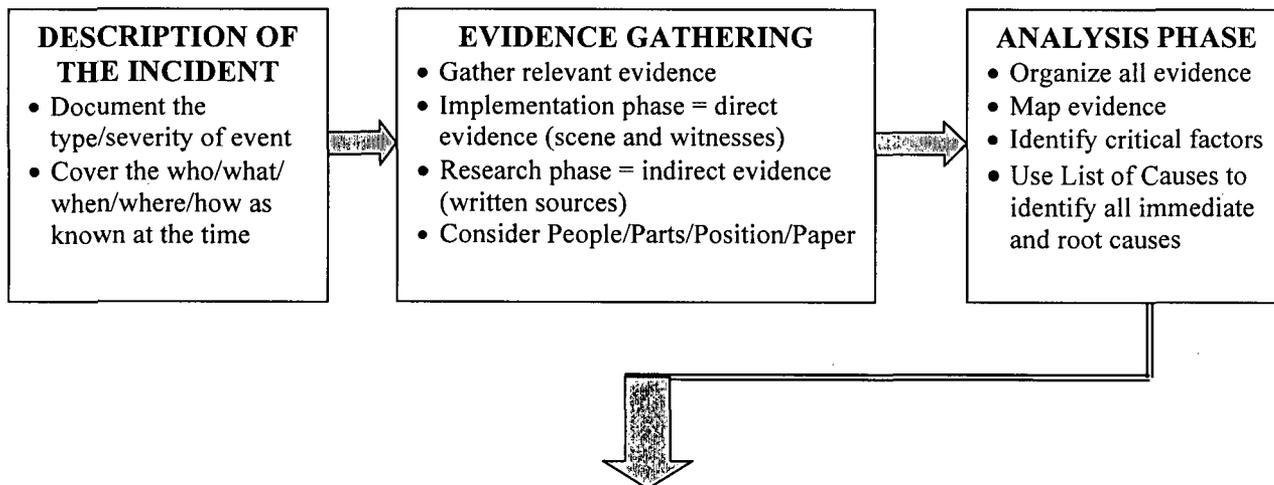
The following key elements must be in place and continually monitored for safety success. Failures or deficiencies in any of these elements can lead to conditions or situations that result in poor safety performance. Root cause analyses can help determine where deficiencies in the system exist and can direct corrective actions to those areas.

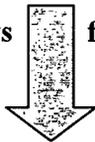
|      |  |
|------|--|
| (1)  | Leadership and Accountability          |
| (2)  | Risk Assessment and Management         |
| (3)  | People, Training and Behaviors         |
| (4)  | Working with Contractors and Others    |
| (5)  | Project Design and Planning            |
| (6)  | Operation and Equipment Maintenance    |
| (7)  | Management of Change                   |
| (8)  | Information and Documentation          |
| (9)  | Customers and Deliverables             |
| (10) | Community Awareness                    |
| (11) | Crisis and Emergency Management        |
| (12) | Incident Analysis and Prevention       |
| (13) | Assessment, Assurance, and Improvement |

### 7.2 Root-Cause Analysis

Figure 7-1 and Tables 7-1, 7-2 and 7-3 present the tools for Root Cause Analysis. Figure 7-1 illustrates the sequence of events for the process. Once necessary information is gathered and organized the lists of causes found in the following tables can be used to identify causes. Numbers in parentheses in tables 7-2 and 7-3 refer to the key safety element noted in section 7.1.

Figure 7-1



Follows  from Section 7.2

**7.3 List of Causes**

*7.3.1 Possible Immediate Causes*

**Table 7-1: Possible Immediate Causes**

| Actions  |   |  |   | Conditions   |  |  |   |
|--|---|--|---|--|--|--|---|
| 1. Following Procedures  | 2. Use of Tools or Equipment  | 3. Use of Protective Methods   | 4. Inattention / Lack of Awareness  | 5 Protective Systems   | 6. Tools, Equipment & Vehicles   | 7. Work Exposures to   | 8. Work Place Environment / Layout  |
| 1-1 Violation by individual<br>1-2 Violation by group<br>1-3 Violation by supervisor<br>1-4 Operation of equipment without authority<br>1-5 Improper position or posture for the task<br>1-6 Overexertion of physical capability<br>1-7 Work or motion at improper speed<br>1-8 Improper lifting<br>1-9 Improper loading<br>1-10 Shortcuts<br>1-11 Other | 2-1 Improper use of equipment<br>2-2 Improper use of tools<br>2-3 Use of defective equipment<br>2-4 Use of defective tools (aware)<br>2-5 Improper placement of tools, equipment or materials<br>2-6 Operation of equipment at improper speed<br>2-7 Servicing of equipment in operation<br>2-8 Other | 3-1 Lack of knowledge of hazards present<br>3-2 Personal protective equipment not used<br>3-3 Improper use of proper personal protective equipment<br>3-4 Servicing of energized equipment<br>3-5 Equipment or materials not secured<br>3-6 Disabled guards, warning systems or safety devices<br>3-7 Removal of guards, warning systems or safety devices<br>3-8 Personal protective equipment not available<br>3-9 Other | 4-1 Improper decision making or lack of judgment<br>4-2 Distracted by other concerns<br>4-3 Inattention to footing and surroundings<br>4-4 Horseplay<br>4-5 Acts of violence<br>4-6 Failure to warn<br>4-7 Use of drugs or alcohol<br>4-8 Routine activity without thought<br>4-9 Other | 5-1 Inadequate guards or protective devices<br>5-2 Defective guards or protective devices<br>5-3 Inadequate personal protective equipment<br>5-4 Defective personal protective equipment<br>5-5 Inadequate warning systems<br>5-6 Defective warning systems<br>5-7 Inadequate isolation of process or equipment<br>5-8 Inadequate safety devices<br>5-9 Defective safety devices<br>5-10 Other | 6-1 Defective equipment<br>6-2 Inadequate equipment<br>6-3 Improperly prepared equipment<br>6-4 Defective tools<br>6-5 Inadequate tools<br>6-6 Improperly prepared tools<br>6-7 Defective vehicle<br>6-8 Inadequate vehicle for the purpose<br>6-9 Improperly prepared vehicle<br>6-10 Other | 7-1 Fire or explosion<br>7-2 Noise<br>7-3 Energized electrical systems<br>7-4 Energized systems, other than electrical<br>7-5 Radiation<br>7-6 Temperature extremes<br>7-7 Hazardous chemicals<br>7-8 Mechanical hazards<br>7-9 Clutter or debris<br>7-10 Storms or acts of nature<br>7-11 Slippery floors or walkways<br>7-12 Other | 8-1 Congestion or restricted motion<br>8-2 Inadequate or excessive illumination<br>8-3 Inadequate ventilation<br>8-4 Unprotected height<br>8-5 Inadequate work place layout<br>•controls less than adequate<br>•displays less than adequate<br>•labels less than adequate<br>•locations out of reach or sight<br>•conflicting information is presented<br>8-6 Other |

Continues on next page

7.3.2 Possible System Causes – Personal Factors

| Table 7-2: Possible System Causes  |   |   |   |  |  |
|--|---|---|---|--|--|
| Personal Factors   |   |   |   |  |  |
| 1. Physical Capability<br>( ) Key Element  | 2. Physical Condition<br>( ) Key Element  | 3. Mental State<br>( ) Key Element  | 4. Mental Stress<br>( ) Key Element   | 5. Behavior<br>( ) Key Element   | 6. Skill Level<br>( ) Key Element  |
| 1-1 Vision deficiency (3)<br>1-2 Hearing deficiency (3)<br>1-3 Other sensory deficiency (3)<br>1-4 Reduced respiratory capacity (3)<br>1-5 Other permanent physical disabilities (3)<br>1-6 Temporary disabilities (3)<br>1-7 Inability to sustain body positions (3)<br>1-8 Restricted range of body movement (3)<br>1-9 Substance sensitivities or allergies (3)<br>1-10 Inadequate size or strength (3)<br>1-11 Diminished capacity due to medication (3)<br>1-12 Other<br>• Not Applicable | 2-1 Previous injury or illness (3)<br>2-2 Fatigue (3) due to workload due to lack of rest due to sensory overload<br>2-3 Diminished performance (3) due to temperature extremes due to oxygen deficiency due to atmospheric pressure variation<br>2-4 Blood sugar insufficiency (3)<br>2-5 Impairment due to drug or alcohol use (3)<br>2-6 Other<br>• Not Applicable | 3-1 Poor judgment (3)<br>3-2 Memory failure (3)<br>3-3 Poor coordination or reaction time (3)<br>3-4 Emotional disturbance (3)<br>3-5 Fears or phobias (3)<br>3-6 Low mechanical aptitude (3)<br>3-7 Low learning aptitude (3)<br>3-8 Influenced by medication (3)<br>3-9 Other<br>• Not Applicable | 4-1 Preoccupation with problems (3)<br>4-2 Frustration (3)<br>4-3 Confusing directions / demands (3)<br>4-4 Conflicting directions / demands (3)<br>4-5 Meaningless or degrading activities (3)<br>4-6 Emotional overload (3)<br>4-7 Extreme judgment / decision demands (3)<br>4-8 Extreme concentration / perception demands (3)<br>4-9 Extreme boredom (3)<br>4-10 Other<br>• Not Applicable | 5-1 Improper performance is rewarded (3)<br>saves time or effort avoids discomfort regains attention<br>5-2 Improper supervisory example (1)<br>5-3 Inadequate identification of critical safe behaviors (3)<br>5-4 Inadequate reinforcement of critical safe behaviors (3)<br>proper performance is criticized<br>inappropriate peer pressure<br>inadequate performance feedback<br>inadequate disciplinary process<br>5-5 Inappropriate aggression (3)<br>5-6 Improper use of production incentives (3)<br>5-7 Supervisor implied haste (3)<br>5-8 Employee perceived haste (3)<br>5-9 Other<br>Not Applicable | 6-1 Inadequate assessment of required skills (2)<br>6-2 Inadequate practice of skill (3)<br>6-3 Infrequent performance of skill (3)<br>6-4 Lack of coaching on skill (3)<br>6-5 Insufficient review of instruction to establish skill (3)<br>6-6 Other<br>• Not Applicable |

Continues on next page



7.3.3 Possible System Causes – Job Factors

| Table 7-3: Possible System Causes  |   |  |  |   |
|--|---|--|--|---|
| Job Factors  |   |  |  |   |
| 7. Training / Knowledge Transfer<br>( ) Key Element  | 8. Management / Supervision / Employee Leadership<br>( ) Key Element  | 9. Contractor Selection & Oversight<br>( ) Key Element   | 10. Engineering / Design<br>( ) Key Element  | 11. Work Planning ( ) Key Element   |
| <p>7-1 Inadequate knowledge transfer</p> <ul style="list-style-type: none"> <li>inability to comprehend</li> <li>inadequate instructor qualifications</li> <li>inadequate training equipment</li> <li>misunderstood instructions (3)</li> </ul> <p>7-2 Inadequate recall of training material (3)</p> <ul style="list-style-type: none"> <li>training not reinforced on the job</li> <li>inadequate refresher training frequency</li> </ul> <p>7-3 Inadequate training effort (3)</p> <ul style="list-style-type: none"> <li>inadequate training program design</li> <li>inadequate training goals / objectives</li> <li>inadequate new employee orientation</li> <li>inadequate initial training</li> <li>inadequate means to determine if qualified for job</li> </ul> <p>7-4 No training provided (3)</p> <ul style="list-style-type: none"> <li>need for training not identified</li> <li>training records incorrect or out of date</li> <li>new work methods introduced without training</li> <li>decision made not to train</li> </ul> <p>7-5 Other</p> <ul style="list-style-type: none"> <li>o Not Applicable</li> </ul> | <p>8-1 Conflicting roles / responsibilities (3)</p> <ul style="list-style-type: none"> <li>unclear reporting relationships</li> <li>conflicting reporting relationships</li> <li>unclear assignment of responsibility</li> <li>conflicting assignment of responsibility</li> <li>improper or insufficient delegation of authority</li> </ul> <p>8-2 Inadequate leadership (1)</p> <ul style="list-style-type: none"> <li>standards of performance missing or not enforced</li> <li>inadequate accountability</li> <li>inadequate or incorrect performance feedback</li> <li>inadequate work site walk-through</li> <li>inadequate safety promotion</li> </ul> <p>8-3 Inadequate correction of prior hazard / incident (12)</p> <p>8-4 Inadequate identification of worksite / job hazards (2)</p> <p>8-5 Inadequate management of change system (7)</p> <p>8-6 Inadequate incident reporting / investigation system (12)</p> <p>8-7 Inadequate or lack of safety meetings (8)</p> <p>8-8 Inadequate performance measurement &amp; assessment (13)</p> <p>8-9 Other</p> <ul style="list-style-type: none"> <li>o Not Applicable</li> </ul> | <p>9-1 Lack of contractor pre-qualifications (4)</p> <p>9-2 Inadequate contractor pre-qualifications (4)</p> <p>9-3 Inadequate contractor selection (4)</p> <p>9-4 Use of non-approved contractor (4)</p> <p>9-5 Lack of job oversight (4)</p> <p>9-6 Inadequate oversight (4)</p> <p>9-7 Other</p> <ul style="list-style-type: none"> <li>o Not Applicable</li> </ul> | <p>10-1 Inadequate technical design (5)</p> <ul style="list-style-type: none"> <li>design input obsolete</li> <li>design input not correct</li> <li>design input not available</li> <li>design output inadequate</li> <li>design input infeasible</li> <li>design output unclear</li> <li>design output not correct</li> <li>design output inconsistent</li> <li>no independent design review</li> </ul> <p>10-2 Inadequate standards, specifications, and / or design criteria (5)</p> <p>10-3 Inadequate assessment of potential failure (2)</p> <p>10-4 Inadequate ergonomic design (2)</p> <p>10-5 Inadequate monitoring of construction (5)</p> <p>10-6 Inadequate assessment of operational readiness (5)</p> <p>10-7 Inadequate monitoring of initial operation (6)</p> <p>10-8 Inadequate evaluation and / or documentation of change (7)</p> <p>10-9 Other</p> <ul style="list-style-type: none"> <li>o Not Applicable</li> </ul> | <p>11-1 Inadequate work planning (6)</p> <p>11-2 Inadequate preventive maintenance (6)</p> <ul style="list-style-type: none"> <li>assessment of needs</li> <li>lubrication / servicing</li> <li>readjustment / assembly</li> <li>cleaning / refurbishing</li> </ul> <p>11-3 Inadequate repair (6)</p> <ul style="list-style-type: none"> <li>communication of needed repair</li> <li>scheduling of work</li> <li>examination of parts</li> <li>parts substitution</li> </ul> <p>11-4 Excessive wear and tear (6)</p> <ul style="list-style-type: none"> <li>inadequate planning for use</li> <li>extension of service life</li> <li>improper loading</li> <li>use by untrained people</li> <li>use for wrong purpose</li> </ul> <p>11-5 Inadequate reference materials or publications (6)</p> <p>11-6 Inadequate audit / inspection / monitoring (13)</p> <ul style="list-style-type: none"> <li>no documentation</li> <li>no correction responsibility assigned</li> <li>no accountability for corrective action</li> </ul> <p>11-7 Inadequate job placement (3)</p> <ul style="list-style-type: none"> <li>appropriate personnel not identified</li> <li>appropriate personnel not available</li> <li>appropriate personnel not provided</li> </ul> <p>11-8 Other</p> <ul style="list-style-type: none"> <li>o Not Applicable</li> </ul> |

Continues on next page

Table 7-3 (continued) Possible System Causes

| <b>Job Factors</b>   |  |   |   |
|--|--|---|---|
| 12. Purchasing, Material Handling & Material Control ( ) Key Element   | 13. Tools & Equipment ( ) Key Element  | 14. Work Rules/Policies/Standards/Procedures ( ) Key Element  | 15. Communication ( ) Key Element   |
| <p>12-1 Incorrect item received (4)<br/>                     inadequate specifications to vendor<br/>                     inadequate specifications on requisition<br/>                     inadequate control on changes to orders<br/>                     unauthorized substitution<br/>                     inadequate product acceptance requirements<br/>                     no acceptance verification performed<br/>                     12-2 Inadequate research on materials / equipment (4)<br/>                     12-3 Inadequate mode or route of shipment (4)<br/>                     12-4 Improper handling of materials (4)<br/>                     12-5 Improper storage of materials or spare parts<br/>                     12-6 Inadequate material packaging (4)<br/>                     12-7 Material shelf life exceeded (4)<br/>                     12-8 Improper identification of hazardous materials (4)<br/>                     12-9 Improper salvage and / or waste disposal (4)<br/>                     12-10 Inadequate use of safety and health data (4)<br/>                     12-11 Other<br/>                     o Not Applicable</p> | <p>13-1 Inadequate assessment of needs and risks (2)<br/>                     13-2 Inadequate human factors / ergonomics considerations (6)<br/>                     13-3 Inadequate standards or specifications (6)<br/>                     13-4 Inadequate availability (6)<br/>                     13-5 Inadequate adjustment / repair / maintenance (6)<br/>                     13-6 Inadequate salvage and reclamation (6)<br/>                     13-7 Inadequate removal / replacement of unsuitable items (6)<br/>                     13-8 No equipment record history (6)<br/>                     13-9 Inadequate equipment record history (6)<br/>                     13-10 Other<br/>                     o Not Applicable</p> | <p>14-1 Lack of PSP for the task (6)<br/>                     lack of defined responsibility for PSP<br/>                     lack of job safety analysis<br/>                     inadequate job safety analysis<br/>                     14-2 Inadequate development of PSP<br/>                     inadequate coordination with process / equipment design (6)<br/>                     inadequate employee involvement in the development<br/>                     inadequate definition of corrective actions<br/>                     inadequate format for easy use<br/>                     14-3 Inadequate implementation of PSP, due to deficiencies (6)<br/>                     contradictory requirements<br/>                     confusing format<br/>                     more than one action per step<br/>                     no check-off spaces provided<br/>                     inaccurate sequence of steps<br/>                     confusing instructions<br/>                     technical error / missing steps<br/>                     excessive references<br/>                     potential situations not covered<br/>                     14-4 Inadequate enforcement of PSP (1)<br/>                     inadequate monitoring of work<br/>                     inadequate supervisory knowledge<br/>                     inadequate reinforcement<br/>                     non-compliance not corrected<br/>                     14-5 Inadequate communication of PSP (8)<br/>                     incomplete distribution to work groups<br/>                     inadequate translation to appropriate languages<br/>                     incomplete integration with training<br/>                     out of date revisions still in use<br/>                     14-6 Other<br/>                     o Not Applicable</p> | <p>15-1 Inadequate horizontal communication between peers (8)<br/>                     15-2 Inadequate vertical communication between supervisor and person (8)<br/>                     15-3 Inadequate communication between different organizations (8)<br/>                     15-4 Inadequate communication between work groups (8)<br/>                     15-5 Inadequate communication between shifts (8)<br/>                     15-6 Inadequate communication methods (8)<br/>                     15-7 No communication method available (8)<br/>                     15-8 Incorrect instructions (8)<br/>                     15-9 Inadequate communication due to job turnover (8)<br/>                     15-10 Inadequate communication of safety and health data, regulations or guidelines (8)<br/>                     15-11 Standard terminology not used (8)<br/>                     15-12 Verification / repeat back techniques not used (8)<br/>                     15-13 Messages too long (8)<br/>                     15-14 Speech interference (8)<br/>                     15-15 Other<br/>                     o Not Applicable</p> |



**CORRECTIVE PHASE: PROPOSALS FOR CORRECTIVE ACTION**

## 8.0 SHARED LEARNINGS

Incident reports contain valuable information that may help reduce the risks of similar types of incidents in the future. This program emphasizes expanding shared learnings.

### 8.1 Assurance of Confidentiality

The rule at 29 CFR 1904.29(b)(6) through (10) requires the employer to protect the privacy of the injured or ill employee. The employer must not enter an employee's name on the OSHA 300 Log when recording a privacy case. The employer must keep a separate, confidential list of the case numbers and employee names, and provide it to the government upon request. If the work-related injury involves any of the following, it is to be treated as a privacy case:

- An injury or illness to an intimate body part or the reproductive system.
- An injury or illness resulting from a sexual assault.
- A mental illness.
- HIV infection, hepatitis, or tuberculosis.
- Needlestick and sharps injuries that are contaminated with another person's blood or other potentially infectious material as defined by §1910.1030.

Other illnesses, if the employee independently and voluntarily requests that his or her name not be entered on the OSHA 300 Log.

### 8.2 Data Aggregation and Analyses

The Health and Safety Manager will develop the Incident and Near Miss database and compile data quarterly, as a minimum, for review and trend analysis. The data will be disseminated Company-wide and will be used along with OSHA statistics to evaluate safety performance and reduce risk throughout Cabrera Services, Inc.

APPENDIX A

INCIDENT INVESTIGATION TEAM REQUIREMENTS

The following Investigation Team members and leadership have been approved by the VP Operations, Project Manager, and the Corporate Health and Safety Manager.

| <i>Name</i> | <i>Position</i> |
|-------------|-----------------|
| 1. ....     | .....           |
| 2. ....     | .....           |
| 3. ....     | .....           |
| 4. ....     | .....           |
| 5. ....     | .....           |
| 6...etc     |                 |

The Team Leader appointed by (Position.....) is (Name.....).

The Team Leader will:

- provide methodology guidance for the Investigation Team
- ensure compliance with the requirements
- ensure compliance with CABRERA procedures for incident investigation
- ensure consensus among Team Members regarding report contents
- ensure persons accountable for actions agree with action(s) and date(s)
- report directly to (position), who is the Owner for this Investigation Team
- provide daily progress updates to the Owner for the duration of the investigation.

OBJECTIVES

1. Identify and review immediate causes of the incident.
2. Identify and analyze relative people, positions, parts and papers.
3. Identify and review system causes of the accident.
4. Map evidence; establish chronological list of events to identify critical factors.
5. Utilize "Comprehensive List of Causes; A Tool for System Cause Analysis" to analyze the incident.
6. Develop recommendations, corrective actions and lessons learned for the Owner's review and approval.

\_\_\_\_\_ (Owner)

**APPENDIX B**  
**CABRERA Major Incident Announcement URGENT**

Send by E-mail to the Core distribution list. Add other addressees as necessary.

|   |                        |                              |                              |
|---|------------------------|------------------------------|------------------------------|
| <b>Operational Office:</b>  |                        | <b>Issued by:</b>            |                              |
| <b>Project:</b>   |                        | <b>Location of incident:</b> |                              |
| <b>Date of incident:</b>  |                        | <b>Time of incident:</b>     |                              |
| <b>Brief account of incident</b> (Report as fact only what you are clear is fact. Specify the status of anything else which you report, e.g., a belief or an estimate): |                        |                              |                              |
|   |                        |                              |                              |
| <b>People:</b>  | <b>No. of injuries</b> | <b>No. of fatalities</b>     | <b>Description / details</b> |
| <b>Employee</b>   |                        |                              |                              |
| <b>Contractor</b>   |                        |                              |                              |
| <b>Third party</b>  |                        |                              |                              |
| <b>Business impact/damage/loss:</b>   |                        |                              |                              |
|   |                        |                              |                              |
| <b>External agencies involved:</b>  |                        |                              |                              |
|   |                        |                              |                              |
| <b>News media coverage:</b>   |                        |                              |                              |
|   |                        |                              |                              |
| <b>What assistance has been requested:</b>  |                        |                              |                              |
|   |                        |                              |                              |
| <b>CABRERA person in charge of response/ investigation</b>  |                        | <b>Project Manager</b>       |                              |
| <b>Office telephone:</b>  |                        | <b>Office telephone:</b>     |                              |
| <b>Mobile telephone:</b>  |                        | <b>Mobile telephone:</b>     |                              |
| <b>Home telephone:</b>  |                        | <b>Home telephone:</b>       |                              |

**Issued at:** << time, date >>

**APPENDIX C**

**CABRERA High Potential Incident Announcement URGENT**

**Operational Office:** \_\_\_\_\_ **Project Manager:** \_\_\_\_\_

**Project:** \_\_\_\_\_ **Location of Incident:** \_\_\_\_\_

**Date of Incident:** \_\_\_\_\_ **Time of Incident:** \_\_\_\_\_

**Brief Account of Incident:**

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**Potential Outcome:**

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**Likely Cause:**

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**Action Taken:**

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**CABRERA person in charge of Response/Investigation:**

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## APPENDIX D

Incident Notification and Reporting Definitions Table

| Incident Category   | Transportation  | Material Release   | Environmental/Safety Event   | Loss of Damage  |   | Security  | Injury/Illness  | Complaints  |
|---|---|--|--|---|---|---|---|---|
|   |   |  |  | Incident Severity   | Road/Third Party Transportation (i.e., Vehicle Incidents)   |   |   |   |
| <b>MAJOR/HIGH POTENTIAL</b><br><br>Refer to Major Incident and High Potential Incident Reporting Guideline              | Any incident resulting in a fatality or multiple serious injuries   | Any spill or release in a sensitive area requiring the notification of authorities or could  | SIGNIFICANT Adverse reaction from authorities                                      | Any accidental damage having a cost exceeding US \$50,000   | Any fire or explosion with offsite or significant onsite impact / any use of fire fighting equipment – High Potential Property Damage >\$50,000 | Any serious threats to security, bomb threats, or burglary – High Potential                 | Any injuries or illnesses resulting in fatalities or multiple serious injuries                | SIGNIFICANT Adverse reaction from media, regulators, clients, or the general public       |
| <b>NON-MAJOR INCIDENTS</b>  | Any incident involving a CABRERA vehicle including under the influence of D&A (\$0 Cost Threshold) Any contractor vehicle incident. | Any spill or release of material that does not require notification to regulators but could have under slightly different circumstances. | Any notice of fine, NOV, consent order, citations, penalties, or regulatory audits | Any unplanned business interruption including hitting underground utilities, product lines, or claim, impact on CABRERA business. | Any other fire / explosion not categorized as a Major Incident Property Damage of \$500 - \$49,999)   | Any non-serious, threat to security including vandalism, theft, or attempted criminal acts. | Any injury or illness resulting in lost time, chemical exposure, OSHA Recordable or First Aid | Any incident that causes adverse reaction from the public, media, regulators, or clients. |
| <b>NEAR MISS / UNSAFE CONDITION</b><br>or Behavior and/or doesn't meet the definitions of a Major or Non-Major Incident | Any light vehicle or incident without injury or property damage Any potential vehicle incident (actual accident did NOT occur)      | Any potential for spill or release   | Any adverse reaction from authorities  | Any complaint that results in loss of productivity thereby having an impact on business.  | Any risk of fire or explosion (i.e. working in LEL conditions, etc.) Property Damage less than \$500  | N/A   | Any potential for an injury/illness.  | N/A   |



| IMMEDIATE CAUSES  |   |
|---|---|
| <b>SUBSTANDARD ACTS</b><br><input type="checkbox"/> Operating equipment without authority<br><input type="checkbox"/> Failure to warn<br><input type="checkbox"/> Failure to secure<br><input type="checkbox"/> Failing to keep the workplace tidy<br><input type="checkbox"/> Making safety device/equipment inoperable<br><input type="checkbox"/> Using defective equipment<br><input type="checkbox"/> Incorrect use of machine and equipment<br><input type="checkbox"/> Failing to use PPE properly<br><input type="checkbox"/> Improper work position for the task<br><input type="checkbox"/> Servicing/working on equipment in operation<br><input type="checkbox"/> Improper lifting<br><input type="checkbox"/> Lack of respect for barriers/signs<br><input type="checkbox"/> Using defective tools<br><input type="checkbox"/> Failing to select PPE properly<br><input type="checkbox"/> Improper loading/placement<br><input type="checkbox"/> Horse play<br><input type="checkbox"/> Improper speed<br><input type="checkbox"/> Outside CABRERA control | <b>SUBSTANDARD CONDITIONS</b><br><input type="checkbox"/> Inadequate guards or barriers<br><input type="checkbox"/> Defect equipment<br><input type="checkbox"/> Substandard housekeeping<br><input type="checkbox"/> Inadequate ventilation<br><input type="checkbox"/> Fire hazards<br><input type="checkbox"/> Inadequate maintenance<br><input type="checkbox"/> Temperature extreme<br><input type="checkbox"/> Climate extreme<br><input type="checkbox"/> Inadequate warning system<br><input type="checkbox"/> Slippery or uneven surface<br><input type="checkbox"/> Restricted access<br><input type="checkbox"/> Inadequate protective equipment<br><input type="checkbox"/> Loose/falling objects<br><input type="checkbox"/> Inadequate lighting<br><input type="checkbox"/> Defect tools<br><input type="checkbox"/> Wrong substances<br><input type="checkbox"/> Explosion hazards<br><input type="checkbox"/> Inadequate warning signs<br><input type="checkbox"/> Force major<br><input type="checkbox"/> Flooding<br><input type="checkbox"/> Outside CABRERA control |

| BASIC CAUSES   |  |
|--|--|
| <b>PERSONAL FACTORS</b><br><input type="checkbox"/> Lack of respect for procedure<br><input type="checkbox"/> Risk not properly identified<br><input type="checkbox"/> Lack of knowledge<br><input type="checkbox"/> Lack of skill<br><input type="checkbox"/> Lack of experience<br><input type="checkbox"/> Physical stress<br><input type="checkbox"/> Lack of physical ability to do the job<br><input type="checkbox"/> Lack of motivation<br><input type="checkbox"/> Distraction<br><input type="checkbox"/> Failure to follow procedure<br><input type="checkbox"/> Lack of training<br><input type="checkbox"/> Psychological stress<br><input type="checkbox"/> Failure to follow instructions<br><input type="checkbox"/> Lack of psychological ability to do the job | <b>JOB FACTORS</b><br><input type="checkbox"/> Inadequate procedure/instructions<br><input type="checkbox"/> Inadequate accountability<br><input type="checkbox"/> Inadequate supervision<br><input type="checkbox"/> Inadequate shift hand over<br><input type="checkbox"/> Inadequate standards<br><input type="checkbox"/> Inadequate maintenance program<br><input type="checkbox"/> Inadequate equipment<br><input type="checkbox"/> Inadequate specification<br><input type="checkbox"/> Inadequate planning<br><input type="checkbox"/> Lack of procedure/instructions<br><input type="checkbox"/> Inadequate monitoring<br><input type="checkbox"/> Inadequate design<br><input type="checkbox"/> Inadequate purchasing<br><input type="checkbox"/> Inadequate tools<br><input type="checkbox"/> Outside CABRERA control |

| LACK OF CONTROL   |                          |                          |   |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
|---|--------------------------|--------------------------|---|--|--------------------------|--------------------------|--------------------------|----------------------------------|--------------------------|--------------------------|--------------------------|-----------------------------------|--------------------------|--------------------------|--------------------------|-----------------------------------|--------------------------|--------------------------|--------------------------|--|--------------------------|--------------------------|--------------------------|---------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------------|--------------------------|--------------------------|--------------------------|-------------------------|--------------------------|--------------------------|--------------------------|----------------------------------|--------------------------|--------------------------|--------------------------|---------------------------|--------------------------|--------------------------|--------------------------|---|--------------------------|--------------------------|--------------------------|-------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------------------|--------------------------|--------------------------|--------------------------|---|--------------------------|--------------------------|--------------------------|-------------------------------------|--|
| <table border="0"> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">B</td> <td style="text-align: center;">C</td> <td></td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>1. Leadership and Accountability</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>2. Risk Assessment and Management</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>3. People, Training and Behaviors</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>4. Working with Contractors and Others</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>5. Facilities Design and Construction</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>6. Operations and Maintenance</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>7. Management of Change</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>8. Information and Documentation</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>9. Customers and Products</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>10. Community and Stakeholder Awareness</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>11. Crisis and Emergency Management</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>12. Incident Analysis and Prevention</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>13. Assessment, Assurance and Improvement</td> </tr> <tr> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td><input type="checkbox"/></td> <td>14. External factors beyond control</td> </tr> </table> | A                        | B                        | C   |  | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 1. Leadership and Accountability | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 2. Risk Assessment and Management | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 3. People, Training and Behaviors | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 4. Working with Contractors and Others | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 5. Facilities Design and Construction | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 6. Operations and Maintenance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 7. Management of Change | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 8. Information and Documentation | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 9. Customers and Products | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 10. Community and Stakeholder Awareness | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 11. Crisis and Emergency Management | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 12. Incident Analysis and Prevention | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 13. Assessment, Assurance and Improvement | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | 14. External factors beyond control | <p>(CHECK )</p> <p>A - inadequate requirements/guidelines</p> <p>B - requirements/guidelines not appropriate</p> <p>C - requirements/guidelines not complied</p> |
| A   | B                        | C                        |   |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 1. Leadership and Accountability          |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 2. Risk Assessment and Management         |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 3. People, Training and Behaviors         |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 4. Working with Contractors and Others    |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 5. Facilities Design and Construction     |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 6. Operations and Maintenance             |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 7. Management of Change                   |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 8. Information and Documentation          |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 9. Customers and Products                 |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 10. Community and Stakeholder Awareness   |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 11. Crisis and Emergency Management       |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 12. Incident Analysis and Prevention      |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 13. Assessment, Assurance and Improvement |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |
| <input type="checkbox"/>  | <input type="checkbox"/> | <input type="checkbox"/> | 14. External factors beyond control       |  |                          |                          |                          |                                  |                          |                          |                          |                                   |                          |                          |                          |                                   |                          |                          |                          |  |                          |                          |                          |                                       |                          |                          |                          |                               |                          |                          |                          |                         |                          |                          |                          |                                  |                          |                          |                          |                           |                          |                          |                          |   |                          |                          |                          |                                     |                          |                          |                          |                                      |                          |                          |                          |   |                          |                          |                          |                                     |  |

| ACTIONS TO PREVENT RECURRENCE |        |                    |                     |          |                 |
|-------------------------------|--------|--------------------|---------------------|----------|-----------------|
| N                             | Action | Responsible person | Priority (1,2 or 3) | Due date | Completion date |
| 1                             |        |                    |                     |          |                 |
| 2                             |        |                    |                     |          |                 |
| 3                             |        |                    |                     |          |                 |
| 4                             |        |                    |                     |          |                 |
| 5                             |        |                    |                     |          |                 |

**CONSEQUENCES**

**PERSONAL INJURY (use extra pages 3 if needed for multi injuries)**

|  |  |  |  |
|--|--|--|--|
| Lost Day Case:<br><input type="checkbox"/> Yes <input type="checkbox"/> No<br><br>Recordable:<br><input type="checkbox"/> Yes <input type="checkbox"/> No<br><br>Injury class:<br><input type="checkbox"/> Recordable fatality<br><input type="checkbox"/> Permanent disability<br><input type="checkbox"/> Occupational illness<br><input type="checkbox"/> Restricted work<br><input type="checkbox"/> First aid treatment<br><input type="checkbox"/> No injury near miss | Type of injury:<br><input type="checkbox"/> Squeezed<br><input type="checkbox"/> Cut<br><input type="checkbox"/> Fracture<br><input type="checkbox"/> Burn<br><input type="checkbox"/> Foreign body<br><input type="checkbox"/> Electrical shock<br><input type="checkbox"/> Internal injury<br><input type="checkbox"/> Chemical exposure<br><input type="checkbox"/> Stretched/twisted<br><input type="checkbox"/> Poisoning<br><input type="checkbox"/> Radiation<br><input type="checkbox"/> Welding flash<br><input type="checkbox"/> Other<br><input type="checkbox"/> Bruise<br><input type="checkbox"/> Psychological<br><input type="checkbox"/> Wound<br><input type="checkbox"/> Strain/sprain<br><input type="checkbox"/> Concussion | Type of event:<br><input type="checkbox"/> Hit against<br><input type="checkbox"/> Hit by<br><input type="checkbox"/> Fall to lower level<br><input type="checkbox"/> Fall to same level<br><input type="checkbox"/> Stuck in<br><input type="checkbox"/> Hooked by<br><input type="checkbox"/> Squeezed between<br><input type="checkbox"/> Contact with(current/temp/chem. etc.)<br><input type="checkbox"/> Overload/strain<br><input type="checkbox"/> Bite/sting<br><input type="checkbox"/> Inhalation<br><input type="checkbox"/> Injection | Body part injured:<br><input type="checkbox"/> Ankle<br><input type="checkbox"/> Arm / shoulder<br><input type="checkbox"/> Finger<br><input type="checkbox"/> Foot<br><input type="checkbox"/> Hand<br><input type="checkbox"/> Head<br><input type="checkbox"/> Skin<br><input type="checkbox"/> Knee<br><input type="checkbox"/> Chest<br><input type="checkbox"/> Thigh / leg<br><input type="checkbox"/> Back<br><input type="checkbox"/> Throat<br><input type="checkbox"/> Tooth<br><input type="checkbox"/> Toe<br><input type="checkbox"/> Ear<br><input type="checkbox"/> Eye<br><input type="checkbox"/> Other<br><input type="checkbox"/> Internal lesions<br><input type="checkbox"/> Mouth<br><input type="checkbox"/> Multiple injuries<br><input type="checkbox"/> Wrist |
|--|--|--|--|

| Name | Company name | Age | Sex  | Experience performing activity | Experience in present position | Shift  | Employment Status  |
|------|--------------|-----|--|--------------------------------|--------------------------------|--|--|
|      |              |     | <input type="checkbox"/> Male<br><input type="checkbox"/> Female |                                |                                | <input type="checkbox"/> Day shift<br><input type="checkbox"/> Night shift<br><input type="checkbox"/> Overtime<br><input type="checkbox"/> Leisure<br><input type="checkbox"/> Training | <input type="checkbox"/> Permanent<br><input type="checkbox"/> Contractor<br><input type="checkbox"/> Subcontractor<br><input type="checkbox"/> Project Based<br><input type="checkbox"/> Vendor<br><input type="checkbox"/> Visitor |

**SPILLS and LOSS OF CONTAINMENT**

| Type of discharge | Total Volume | Volume not recovered | Discharge to  |
|-------------------|--------------|----------------------|---|
|                   |              |                      | <input type="checkbox"/> Sea/water<br><input type="checkbox"/> Air<br><input type="checkbox"/> Ground |

**PROPERTY DAMAGE**

| Description | Loss in \$ |
|-------------|------------|
|             |            |
|             |            |

**LESSONS LEARNED**

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**MANAGEMENT COMMENTS**

|  |
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|  |
|  |
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|  |

**SIGNATURE**

|              |                         |                      |
|--------------|-------------------------|----------------------|
| Investigator | Supervisor for activity | Site/Project Manager |
|--------------|-------------------------|----------------------|



**CABRERA SERVICES, INC.**  
**MEDICAL SURVEILLANCE PROGRAM**

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Lorenzo J. Cabrera  
President & CEO

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Steve Masciulli, CHP, CSP  
Executive Vice President

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Paul H. Schwartz, MSPH, CIH, CSP  
Manager, Health and Safety

Approval Date: January 17, 2000  
Revised:

## INTRODUCTION

Cabrera Services, Inc. is committed to providing a safe and healthy workplace for its employees. One mechanism that is used in reaching its goal of “Zero Lost Time” is the Medical Surveillance Program (MSP), which tracks the health of all field employees.

## PURPOSE

The MSP serves three (3) purposes: first, it is designed to determine if employees are capable of performing operations without adverse health effects to the employee; second, it assures the continued health of employees through medical examinations; and third, it documents the health status of employees, both present and former.

## SCOPE

All field personnel are required to participate in the Medical Surveillance Program if they meet any of the following conditions:

- \* All employees who are or may be exposed to hazardous substances or health hazards at or above the established Permissible exposure Limits (PELs) for these substances, without regard to the use of respirators, for 30 days or more a year; and,
- \* All employees who wear respirators.
- \* All employees who are injured or claim an injury on the job.

### 1. MEDICAL EXAMINATION CRITERIA

Medical examinations through Cabrera Services, Inc.’s chosen medical surveillance provider will provide the following information for baseline and annual physicals:

#### Baseline Physical

1. Medical History
2. Height and Weight
3. Blood Pressure
4. Urinalysis
5. CBC with Differential
6. SMAC 24
7. RBC Cholinesterase
8. Urine for Heavy Metals
9. Blood Lead and ZPP
10. Blood PCB with Isomers
11. 2 View Chest X-Ray
12. B-Reader for Asbestos Exposure

13. EKG (Over 40 Years of Age)
14. Pulmonary Function Test
15. Audiogram
16. DOT Medical Card (if requested)

#### Annual Physical

1. Medical History
2. Height and Weight
3. Blood Pressure
4. Urinalysis
5. CBC with Differential
6. SMAC 24
7. RBC Cholinesterase
8. Urine for Heavy Metals
9. Blood Lead and ZPP
10. Blood PCB with Isomers
11. 2 View Chest X-Ray
12. EKG (Over 40 Years of Age)
13. Audiogram
14. Pulmonary Function Test
15. DOT Medical Card (if requested)

- \* Any individuals who have an acute or chronic sensitivity to the cold or heat will advise the physician of such condition(s) during his/her medical history review.

## **2. EXAMINATION FREQUENCY**

Cabrera Services, Inc. will provide a medical examination to employees in the following circumstances:

1. Prior to hire for fieldwork.
2. Annually, at least once every twelve months.
3. Upon termination or reassignment, unless:
  - The employee has had a medical exam within the last six (6) months and has not developed signs or symptoms indicating possible overexposure to a hazardous substance or health hazard;
  - That the employee has not been injured or exposed above the PEL or published exposure limits; and,
  - The employee was not exposed in an emergency situation when employees were not utilizing appropriate PPE.

4. The physician deems it necessary to require more frequent medical surveillance due to the nature of the exposure, health hazard, injury or condition.
5. When an injury or illness occurs that is potentially occupationally related.

### 3. RESPONSIBILITIES

The following individuals and groups are responsible for implementing the Medical Surveillance Program.

#### 1. Manager of Health and Safety

- Provide Cabrera Services, Inc. Medical Surveillance Program to the medical surveillance provider.
- Audit provider's compliance with accepted or OSHA required criteria
- Review physician's written opinion to determine if additional exams, retest, or restrictions are appropriate.
- Develop and update a list of employees with medical restrictions.
- Periodically update and review MSP.
- Maintain medical files for all current employees.
- Inform "new hires" of the purpose, scope, and frequency of the MSP.
- Inform employees of their right to access these records.
- Work with the cooperation of the Human Resources Department when it has been determined that a new medical surveillance provider will be sought.

#### 2. Human Resources Department

- Inform new hires of purpose, scope, and frequency of the MSP.
- Assure medical examinations for those newly hired or requiring annual examinations are conducted.
- Notify Project Managers of the need to provide pre-employment, periodic and termination examination to employees at the appropriate times.
- Notify the Manager of Health and Safety when a new medical surveillance provider is being sought.
- Notify the Manager of Health and Safety when a non-field employee has experienced an injury (i.e. ergonomic) and arrange for a workstation study/inspected to be completed by the Insurance carrier, if applicable.

#### 3. Project Managers

- Assure that the employee has received the appropriate medical exam at the required frequency.
- Assure that employees are not assigned to a task he/she is incapable of performing due to test failure, medical restriction or retest requirement.

- Notify the Manager of Health and Safety if an unusual hazardous will be encountered that may require special additional examination.

#### 4. Medical Provider

- Submit a qualifications package to Cabrera Services, Inc. for review by the Manager of Health and Safety.
- Review materials provided by Cabrera Services, Inc. in assessing an employee's capability to perform Cabrera Services, Inc. activities.
- Notify Cabrera Services, Inc. of any abnormal results, repeat or additional tests, or medical restrictions.
- Send copies of required medical records to the employee involved and Cabrera Services, Inc.

#### 5. Employee

- Participate in Cabrera Services, Inc. Medical Surveillance Program.
- Notify supervisor of any exposure in excess of allowable limits during routine or emergency situations.
- Notify supervisor if exhibiting signs or symptoms of exposure to toxic material or hazardous substances.

### 4. EXAMINATION RESULTS

Results of the examination will be given to the employee and Human Resources Department.

#### 1. Company Notification

- a) The medical provider will be asked to submit a summary of the medical surveillance examination to Cabrera Services, Inc. This summary will indicate the exams that were administered and a determination of whether the employee is medically qualified to perform the duties of the position without presenting a health or safety risk to either the employee or fellow employee(s). Attachment 1 is the summary form used by the MEDICAL PROVIDER for Cabrera Services, Inc.

#### 2. Physician's Written Opinion

- a) The physician's written opinion will not reveal any specific finding or diagnosis that are unrelated to an occupational exposure.

#### 3. Non-Occupational Related Concerns

- a) When an employee notifies the examining physician, or when it is determined by the examining physician, that a defect or health concern is not occupationally related, the physician will request that the employee complete and sign a "Workers' Compensation Commission Certificate of Acknowledgement of Physical Defect" form. This form will be completed in triplicate, with copies on file with the state Workers' Compensation Commission, Cabrera Services, Inc. Human Resources medical files and with the examining physician.

#### 4. Employee Notification by the Physician

- a) Employees who wish to have a copy of their medical examination will complete the required form prior to leaving the physician's office. A copy of the results will be sent directly to the employee's residence, as well as Cabrera Services, Inc. Human Resource department for their medical files.

#### 5. Immediate Notification

- a) When the examining physician determines that an immediate medical restriction is in order, he/she will notify the Manager of Health and Safety and/or the Human Resources Department verbally of the concern and medical restriction.

#### 6. New Hire Failure to Meet Company Medical Criteria

- a) Based on the physician's written opinion that the prospective employee has a health problem or disability, Cabrera Services, Inc. will ask the following questions concerning the employee:
  - \* Can the employee be reasonably accommodated, as stated under the Americans with Disabilities Act, in order to satisfy requirements of the job?
  - \* Are the requirements of the job such that some are not vital for the individual to perform, i.e. lifting if the person is wheelchair bound or has a chronically bad back, and this specific job function can be designated to other employees?

#### 7. Current Employee's Failure to Meet Company Medical Criteria

- a) Current employees who fail to meet the medical criteria will not be allowed to perform specific task(s), as determined by the examining physician. Necessary and reasonable accommodations will be made for this employee to continue working a normal schedule.

## 8. Permanent Restriction

- a) Employee's whose health status does not improve after an injury will be reassigned to a position that does not compromise the health and safety of the individual with the specific medical problem.

## 5. MEDICAL RESTRICTIONS

In the event that it is necessary to place an employee on medical restriction, the Manager of Health and Safety and the employee will complete the following procedure, to assure compliance with the restriction.

### 1. Notification

- a) The examining physician will notify the Manager of Health and Safety, either verbally or in writing of the medical restriction, on the Physician's Summary Report.
- b) The Manager of Health and Safety will notify the concerned employee of the medical restriction immediately upon notification by the examining physician.
- c) The Manager of Health and Safety, stating the medical restriction and any prohibited activities, will complete a medical restriction form. The Manager of Health and Safety will review the restriction with the concerned employee and both will sign this form. The Project Manager will be notified of specific work functions that the concerned employee will not be allowed to perform. A copy of the Medical Restriction Form can be found in Attachment 2.
- d) A copy of the completed form will be given to the concerned employee, and one will be placed in the employee's medical file.

### 2. Database

- a) All medical restrictions will be entered into the Medical Restriction DataBase. The Manager of Health and Safety will manage the database. A copy of the database will be provided only to the Human Resources Department on a quarterly basis for review. The database will be updated as needed.

## 6. RECORDKEEPING REQUIREMENTS

Cabrera Services, Inc. complies with the recordkeeping requirements of OSHA's recordkeeping standard, 29 CFR 1910.20. A copy of the standard can be found at the end of this program.

### 1. Medical Records Access

- a) Employees are urged to request copies of their medical records at the time of their examination. All employees are given a copy of a Medical Release Form. This form gives the physician permission to send a copy of the results to the employee's residence. The physician will not release medical records to the employee unless this form is properly completed.
- b) The Human Resources department also maintains copies of medical records. Employees can receive copies of their medical records from the Human Resources department by requesting this information directly or in writing. Requests by employees for copies of their medical records will be honored within 15 days. All requests will be documented and placed in the employee's medical file.
- c) Medical records will be sent or hand delivered to the concerned employee ONLY. In the event that the records will be sent, a confirmation letter will be sent along with the records. The confirmation letter must be completed and sent back to the Human Resources department to verify that the employee received the records. Human Resources will file this document in the employee's Medical file.
- d) If the examining physician believed that direct access to the medical records by the concerned employee could be detrimental to the employee's health (i.e. terminal illness or psychiatric condition), then the company may deny access by the employee, and allow an employee's representative access to this information.

## 2. Regulatory Agencies

- a) Regulatory agencies such as OSHA, DOL, EPA, state DEP, etc. will be permitted access to individually identifiable medical records.

## 7. DOCUMENTATION MAINTENANCE AND PROGRAM REVIEW

The corresponding groups will maintain the following records:

### 1. Medical Provider

- a) Work history
- b) Physician's written opinion, recommended limitations, testing results;
- c) Medically related complaints related to occupational exposure by the employee.

### 2. Company

- a) Physician's written opinion, recommended limitations, testing results;
- b) Medical Approval Form;
- c) Medical Surveillance Exam Form;
- d) Hearing Conservation Program results;
- e) OSHA 200 Log for the past five years.

Medical and employee exposure records will be maintained for the duration of employment plus thirty (30) years. Outdated Material Safety Data Sheets (MSDS) will be kept on file alphabetically with the Health and Safety Coordinator.

Cabrera Services, Inc. Manager of Health and Safety will review the Medical Surveillance program annually to determine applicability of tests and the any additional testing that may be needed. Reviews will be documented and appear at the end of this program.

## FALL PROTECTION

### 1. Applicability

This procedure applies to CABRERA SERVICES, INC. facilities and field operations where personnel could be exposed to fall hazards of 6 feet (2 meters) or greater.

### 2. Purpose and Scope

The purpose of this procedure is to provide criteria for the recognition and control of fall hazards.

### 3. Implementation

Facilities - Implementation of this procedure is the responsibility of the Location Manager.

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

### 4. Requirements

#### A. Training

1. Designate a competent person to provide training in fall hazard recognition to each employee who may be exposed to falls. The competent person must be qualified in the following areas:
  - a. The nature of fall hazards in the work area.
  - b. The correct procedures for erecting, maintaining, disassembling, and inspecting the fall protection systems to be used.
  - c. The use and operation of guardrail, personal fall arrest, safety net, warning line, and safety monitoring systems, controlled access zones, and other protection to be used.
  - d. The role of each employee in the safety monitoring system, when used.
  - e. The limitations on the use of mechanical equipment during the performance of roofing work on low-sloped roofs.

- f. The correct procedures for the handling and storage of equipment and materials and the erection of overhead protection.
    - g. The role of employees in fall protection plans.
    - h. The standards contained in 29 CFR 1926 Subpart M.
  2. Prepare a written certification including the name of the employee trained, the date(s) of training, and the signature of the person who conducted the training.
  3. Provide retraining when one of the following situations occur:
    - a. Changes in the workplace render previous training obsolete.
    - b. Changes in the types of fall protection systems or equipment to be used render previous training obsolete.
    - c. Inadequacies in affected employee's knowledge or use of fall protection systems or equipment indicate that the employee has not retained the requisite understanding or skill.

#### B. Fall Protection – General

Ensure that one or more of the fall protection/prevention systems outlined in this procedure is provided at **all** locations where fall hazards of 6 feet (2 meters) or greater exist. These locations include, but are not limited to, excavations, unprotected elevations, ladders, scaffolds, floor holes, wall openings, formwork, rebar tying, and all other locations and operations where potential fall hazards exist.

#### C. Guardrail Systems

1. Provide guardrail systems, when feasible, at all locations where a fall hazard of 6 feet (2 meters) or greater exists. Where guardrail systems are impractical, an alternative form of fall protection as outlined elsewhere in this procedure must be provided.
2. Require that guardrail systems meet the following criteria:
  - a. Toprails must be installed 42 inches (1.1 meters) above the walking/working surface and be capable of withstanding, without failure, a minimum force of 200 pounds (91 Kg) in any outward or downward direction with no more than 3 inches (7.6 cm) of deflection.

- b. Midrails must be installed 21 inches (53 cm) above the walking/working surface and be capable of withstanding, without failure, a minimum force of 150 pounds (68 Kg) in any outward or downward direction.
  - c. Posts must be spaced not more than 8 feet (2.5 meters) apart on centers.
3. Require that there are no openings more than 19 inches (48 cm) wide in any guardrail system.
4. Do not use plastic or steel banding as toprail or midrail.
5. Provide toprails and midrails of at least one-quarter inch (6 mm) nominal thickness or diameter, and smoothly surfaced to prevent cuts and punctures.
6. Flag the toprail with high-visibility material when using wire rope for toprails.
7. Erect guardrails on all sides when using guardrail systems around holes.
8. When guardrails are used around holes that are used for access, such as ladderways, provide a gate or offset the guardrail so that a person cannot walk directly into the hole.
9. When guardrails are used at hoisting areas, place a chain, gate, or removable guardrail section across the access point when hoisting operations are not taking place.
10. Provide guardrail systems at **all** locations above dangerous equipment, whether 6 feet (2 meters) or not.
11. Provide guardrails at all wall openings where the outside bottom edge of the opening is 6 feet (2 meters) or more above lower levels and the inside bottom edge of the wall opening is less than 39 inches (1 meter) above the walking/working surface.
12. Erect guardrail systems on all unprotected sides or edges of ramps and runways when such systems are used.

#### D. Personal Fall Arrest Systems

1. Provide and require the proper use of personal fall arrest systems on all unprotected elevations 6 feet (2 meters) or more above a lower level. Where these systems are impractical, an alternative form of fall protection as outlined elsewhere in this procedure must be provided.

2. All aspects of personal fall protections systems must be designed, installed, and used under the supervision of a qualified person.
3. Maintain a safety factor of at least 2 in all components of a personal fall protection system.
4. **Safety belts (body belts) are prohibited.**
5. Use only full body harnesses, shock-absorbing lanyards, lifelines, and anchorage points which meet the following criteria:
  - a. Body harness design and construction must meet the specifications set forth in 29 CFR 1926.500-.503.
  - b. All snaphooks must be of the locking type.
  - c. Ropes and webbing used in lanyards, lifelines, and body harnesses must be made of synthetic fibers.
  - d. The attachment point (d-ring) of a body harness must be located in the center of the wearer's back near shoulder level, or above the wearer's head.
  - e. Horizontal lifelines must be designed, installed, and used under the supervision of a qualified person; be capable of supporting at least 5,000 pounds (2,270 Kg) per employee attached; and maintain a safety factor of at least 2.
  - f. Lanyards and vertical lifelines must have a minimum breaking strength of 5,000 pounds (2,270 Kg).
  - g. Self-retracting lifelines and lanyards that limit free fall to 2 feet (60 cm) or less must be capable of sustaining a minimum tensile load of 3000 pounds (1,360 Kg) in the fully extended position.
  - h. Self-retracting lifelines and lanyards which do not limit free fall to 2 feet (60 cm) or less, ripstitch, and other shock-absorbing lanyards must be capable of sustaining a minimum tensile load of 5,000 pounds (2,270 Kg) in the fully extended position.
  - i. Anchorage points for personal fall protection systems must be independent of any anchorage point being used to support or suspend platforms and must be capable of supporting at least 5,000 pounds (2,270 Kg) per employee attached.
6. Inspect all fall protection components for wear, damage, and deterioration prior to each use.
7. Require employees to be familiar with the fitting and donning of body harnesses; proper tie-off techniques, and suitable anchorage points.

8. Instruct employees to rig fall protection such that they can neither free fall more than 6 feet (2 meters), nor contact any lower level.
9. Never tie off to guardrail systems or hoists.
10. Require employees to remain tied off 100% of the time at or above 6 feet (2 meters) by means of horizontal lifelines, vertical lifelines, a double lanyard system, or other suitable means.
11. Remove from service any component of a personal fall protection system that has been subjected to impact loading and do not use again until inspected by a competent person and determined to be undamaged and suitable for reuse.
12. Make provisions for the prompt rescue of personnel in the event of a fall, or require that employees are capable of self-rescue.
13. Provide separate vertical lifelines for each employee using a vertical lifeline. 5/8-inch (16 mm) nylon rope is recommended for lifeline use.
14. Protect lifelines against cuts and abrasions.
15. Use rope grabs to attach to vertical lifelines – never use knots.

#### E. Safety Net Systems

1. Provide safety net systems at locations where a fall hazard of 6 feet (2 meters) or greater exists, and other forms of fall protection are not feasible. Where safety net systems are impractical, an alternative form of fall protection as outlined elsewhere in this procedure must be provided.
2. Require that safety net systems meet the criteria set forth in 29 CFR 1926.500 -.503.
3. Install safety nets as close as possible under the walking/working surface on which employees are working, but never more than 30 feet (9 meters) below this level.
4. Require that the potential fall area from the walking/working surface to the net is unobstructed.
5. Install safety nets with enough clearance under them to prevent contact with the surface or structures below when subjected to an impact force equal to the drop test specified below.

6. Extend the outer edge of the net 8 feet (2.5 meters) from the edge of the working surface when the vertical distance from the working level to the net is 5 feet (1.5 meters) or less.
7. Extend the outer edge of the net 10 feet (3 meters) from the edge of the working surface when the vertical distance from the working level to the net is 5 feet to 10 feet (1.5 to 3 meters).
8. Extend the outer edge of the net 13 feet (4 meters) from the edge of the working surface when the vertical distance from the working level to the net is greater than 10 feet (3 meters).
9. Conduct a drop test of the safety net after installation and before being used as a fall protection system; whenever relocated; after major repair; and at 6-month intervals if left in one place.
10. Conduct the drop test by dropping a 400 pound (180 Kg) sandbag, 30 inches (76 cm) in diameter, into the net from at least 42 inches (107 cm) above the highest walking/working level at which employees are exposed to a fall.
11. Inspect safety nets at least once a week, and after any occurrence which could affect the integrity of the system, for wear, damage, and deterioration. Remove defective nets and components from service.
12. Remove all materials, scrap, equipment, and tools which have fallen into the net as soon as possible, but at least before the next work shift.

#### F. Hole Covers

1. Provide covers in roadways and vehicle aisles that are capable of supporting at least twice the maximum axle load of the largest vehicle expected to cross over the cover.
2. Provide walking/working surface hole covers that are capable of supporting at least twice the weight of employees, equipment, and materials that may be imposed on the cover at any one time.
3. Secure covers at the time of installation to prevent displacement by the wind, equipment, or employees.
4. Color code or mark all hole covers with the word "HOLE" or "COVER" to provide warning of the hazard.

#### G. Safety Monitoring Systems, Warning Line Systems, and Controlled Access Zones.

Consult the local CABRERA SERVICES, INC. Health and Safety Representative or CABRERA SERVICES, INC. Health and Safety Manager prior to performing any roofing, overhand bricklaying, leading edge, or other elevated work which may require the use of one or more of these systems.

#### H. Protection from Falling Objects

1. Install toeboards along the edge of the overhead walking/working surface.
2. Require that toeboards are a minimum of 3 ½ inches (9 cm) in height; that they are capable of withstanding at least 50 pounds (22 Kg) of force applied in any downward or outward direction; and that there is no more than ¼ inch (6 mm) clearance between the toeboard and the walking/working surface.
3. Install paneling or screening from the top of the toeboard to the top rail or midrail when tools, equipment, or materials are piled higher than the top of the toeboard.
4. Provide sidewalk sheds or canopies as appropriate.

**Cabrera Services, Inc.**  
**Hearing Conservation Program**

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Lorenzo Cabrera  
President and CEO

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Steve Mascuilli, CHP, CSP  
Executive Vice President

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Paul H. Schwartz MSPH, CIH, CSP  
Manager, Health and Safety

Approval Date: January 31, 2000  
Revised:

## 1.0 POLICY STATEMENT

Cabrera Services, Inc. believes that employees are a company's greatest asset. In order to protect the investment they've made in their employee's safety and health, Cabrera Services, Inc. provides an annual physical that includes a baseline and annual audiogram, training in recognition of noise exposure and use of appropriate hearing protection. This written program is meant to augment the documented practices that have been maintained at Cabrera Services, Inc.

All employees of Cabrera Services, Inc. who are exposed to sound levels at or above 85 dBA, over an 8 hour Time Weighted Average (TWA), will be required to participate in the Hearing Conservation Program.

## 2.0 NOISE MEASUREMENTS

Noise measurements will be made to determine the level of noise exposure for employees of Cabrera Services, Inc.

### 2.1 Procedures

1. Noise level measurements will be made initially.
2. Noise measurements will be made if a substantial change has been made in equipment and/or the manufacturing process.
3. The sampling strategy will be such that employees will be identified for inclusion in the hearing conservation program and to allow the proper selection of hearing protectors.
4. An audiologist, industrial hygienist, or safety professional will make the noise measurements.
5. All sound measurements will be made in accordance with the procedure set forth by the American National Standards Institute's standard Methods for the measurement of sound Pressure Levels S1.13-1971 (R1976).
6. Noise level measurements will be made using a Class 1 sound level meter and/or dosimeters. The instruments will be calibrated with a calibrator that can be traced to the National Bureau of Standards.
7. The noise measurements will be made on a "slow" meter speed.
8. The weighting scale on the measuring instrument will be the "A" scale.
9. All continuous intermittent and impulsive sound levels from 80 dBA to 130 dBA shall be integrated into the noise measurements.
10. Any employee shall be allowed to observe the noise measurements conducted by the audiologist, industrial hygienist or safety professional.

## 3.0 NOTIFICATION

Each employee whose exposure exceeds a TWA of 85 dBA shall be notified in writing of his/her noise level exposure.

### 3.1 Procedures

1. The TWA shall be posted in each working area. Such posting will be in a position such that each employee can readily view it.
2. Such notification shall be made in writing on an annual basis.

## 4.0 AVAILABILITY OF INFORMATION

Cabrera Services, Inc. will make available information regarding noise exposure, hearing tests and training materials.

### 4.1 Procedures

1. Cabrera Services, Inc. will make copies of 29 CFR 1910.95 available to affected employees.
2. Cabrera Services, Inc. will provide any informational materials pertaining to the standard to affected employees.

## 5.0 PERSONAL PROTECTIVE EQUIPMENT

Cabrera Services, Inc. will make hearing protectors available to all employees exposed to an eight (8) hour TWA of 85 dBA or greater.

### 5.1 Procedures

1. The hearing protectors will be provided by Cabrera Services, Inc. at no cost to the employees. The hearing protectors will be replaced as necessary.
2. Employees will be able to select the hearing protectors from a variety of suitable hearing protectors, including both insert protectors and earmuffs, provided by Cabrera Services, Inc.
3. The effectiveness of the hearing protectors will be evaluated to determine and insure that they reduce noise levels to within the levels set forth in 29 CFR 1910.95, Table G-15.
4. The noise reduction characteristics of each of the hearing protectors being utilized will be evaluated to insure that they reduce the noise levels to within the levels set forth in 29 CFR 1910.95, Table G-15. This will be accomplished by measuring the attenuation provided by the different hearing protectors using Methods, described in Appendix B: Methods for Estimating the Adequacy of Hearing Protection Attenuations.

## 6.0 EMPLOYEE EVALUATION

Cabrera Services, Inc. will evaluate each employee for the size and appropriateness of hearing protectors in high noise areas.

### 6.1 Procedures

1. For all new employees, the ear canal will be sized and the appropriate hearing protector selected for that employee. An appropriate hearing protector is defined as one that has a Noise Reduction Ratio (NRR) which reduces the noise levels to within the levels set forth in 29 CFR 1910.95, Table G-16, and which the employee will find comfortable to wear.

2. On an annual basis, each employee will be sized for hearing protectors and the appropriateness of the hearing protectors being utilized will be evaluated. Such sizing and evaluation will occur during the annual hearing test. The criteria are defined in the above procedure.

## **7.0 ENFORCEMENT**

Cabrera Services, Inc. will enforce the correct wearing of hearing protectors.

### **7.1 Procedures**

1. The ultimate responsibility for enforcing the wearing of hearing protectors rests with the supervisor on the respective project.
2. On a day-to-day basis, the supervisors of each shift will insure that the hearing protectors are worn in a correct manner.
3. Enforcement of this policy will be in the following manner. If a supervisor notes that an employee is not wearing hearing protection, or is wearing them incorrectly, then he/she will issue:
  - A verbal warning for the first offense.
  - A written warning for the second offense.
  - If continued violations occur, disciplinary action will result up to and including discharge.

## **8.0 AUDIOMETRIC TESTING**

Cabrera Services, Inc. will have an audiometric testing program which makes annual hearing tests mandatory for all employees whose exposure equals or exceeds an eight (8) hour Time Weighted Average (TWA) of 85 dBA.

### **8.1 Procedures**

1. The hearing tests shall be provided at the pre-employment physical and on an annual basis.
2. The hearing tests shall be provided at no cost to the employees.
3. Audiometric tests shall be performed by an audiologist or a technician who is certified by the Council of Accreditation in Occupational Hearing Conservation. Such technicians will be responsible to an audiologist, otolaryngologist or physician.
4. The annual hearing tests will be conducted utilizing an audiometric booth.

- Each employee will be notified of the need to avoid high levels of non-occupational noise exposure during a fourteen (14) hour period immediately preceding the annual audiometric hearing test. Hearing protectors may be used as a substitute for the requirement that the test must be preceded by 14 hours without exposure to workplace noise. Each supervisor will insure that employees wear hearing protectors before being tested if they are exposed to workplace noise.
- Background sound pressure levels in the audiometric test rooms in the test booth will meet or exceed the minimum requirements as cited in Appendix D: Audiometric Test Rooms in 29 CFR 1910.95.
- Records of audiometer calibration required by 29 CFR 1910.95(H)(5) shall be kept.

## 9.0 AUDIOMETRIC TEST EVALUATION

Each employee's annual hearing test shall be compared to his/her baseline audiogram to determine if a Standard Threshold Shift (STS) has occurred.

### 9.1 Procedures

1. The validity of the audiogram will be determined by an audiologist.
2. Determination of whether a STS has occurred will be determined by an audiologist.
3. Employees will be notified in writing within twenty-one (21) days of determination that a STS has occurred.
4. If the employee has suffered a STS (as defined in 29 CFR 1910.95) then that employee may be retested within thirty (30) days. If the subsequent audiometric testing of an employee whose exposure to noise is less than an 8-hour TWA of 90 dBA indicates that a STS is not persistent, then Cabrera Services, Inc. shall:
  - Inform the employee of the new hearing test interpretation.
  - Consider the retest audiogram as the annual hearing test.
5. The audiologist will review problem audiograms and determine whether there is a need for further evaluation. Cabrera Services, Inc. will provide the information, as cited in 29 CFR 1910.95, necessary to interpret the audiogram.
6. Unless a physician determines that the STS is not work related or aggravated by non-occupational noise exposure, then Cabrera Services, Inc. will take the following steps:
  - Employees not using hearing protection shall be fitted with hearing protectors, trained in their use and care and required to use them.

- Employees already using hearing protectors shall be refitted and retrained in the use of hearing protectors and provided with hearing protectors offering greater attenuation when necessary.
  - If additional testing is required, or if it is suspected that a medical pathology of the ear is caused or aggravated by the wearing of hearing protectors, then the employee shall be referred for a clinical audiometric evaluation or an otological examination, as appropriate. Cabrera Services, Inc. will incur the costs of such examination.
  - If a medical pathology of the ear, unrelated to the use of hearing protectors, is suspected, then the employee will be informed of the need for an otological examination. Cabrera Services, Inc. will not be responsible for the cost of such an examination in this case.
7. An annual audiogram will be substituted for the baseline audiogram when in the judgment of the audiologist who is evaluating the audiogram:
- The STS revealed by the audiogram is persistent
  - The hearing threshold shown in the annual audiogram indicates significant improvement over the baseline hearing test.
  - The contribution of aging to the change in hearing levels will be utilized in determining whether a STS has occurred. The correction factors for aging will be taken from 29 CFR 1910.95, Appendix F: Calculations and Application of Age Correction to Audiograms.

## 10.0 RECORDABILITY

When it has been established that a STS has occurred, an entry on the OSHA 200 Form will be made as required.

### 10.1 Procedures

1. For OSHA 200 record keeping purposes, hearing loss resulting from an instantaneous noise exposure (such as an explosion) will be classified as an injury. It is recordable only if it involves medical treatment, loss of consciousness, restriction of work, or transfer to another job.
2. Hearing loss resulting from anything other than instantaneous exposure will be considered an illness and is recorded in Column 7(f) of the OSHA 200 log.
3. Recordable hearing loss should be entered in the OSHA 200 log within six (6) working days after the employee learns of the STS.
4. Only the initial STS in each ear from non-instantaneous noise exposure will be recorded on the OSHA 200 log.
  - If both ears show an initial STS at the same time, then one (1) illness is recorded on the OSHA 200 log.

- If each ear shows an initial STS at a different time, then two (2) illnesses are recorded on the OSHA 200 log.
5. After the employee has been retested within thirty (30) days as permitted by 29 CFR 1910.95 (G)(7)(ii) and the retest does not show a STS, the employer may line out the original entry.

## 11.0 RESPONSIBILITY

The Manager, Health and Safety will be responsible for arranging to have the annual hearing test accomplished.

### 11.1 Procedures

1. The Manager, Health and Safety will contact the audiologist at least one week in advance of the due date for the annual hearing test and schedule an appointment for the employee.
2. The Manager Health and Safety will furnish to the audiologist a schedule of the person(s) to be tested prior to the hearing tests being done.
3. The Manager, Health and Safety will work with the appropriate supervisor to schedule the hearing test.

## 12.0 PROTOCOL

Audiometric test requirements for both baseline and annual testing will be in accordance with the requirements outlined in 29 CFR 1910.95.

### 12.1 Procedures

1. Audiometric tests will be pure tone air conduction hearing threshold examinations.
2. Test frequencies will be 500, 1000, 2000, 3000, 4000 and 6000 hertz (Hz). The hearing tests will be conducted with manual audiometers that meet the specifications of, and are maintained and are maintained and used in accordance with, American National Standards Specifications for Audiometers S3.6-1989.
3. Hearing tests will be administered in soundproof rooms meeting the requirements listed in 29 CFR 1910.95, Appendix D: Audiometric Test Rooms.

### 13.0 CALIBRATION OF EQUIPMENT

The audiometer utilized in the baseline and annual hearing tests will meet the following calibration requirements.

#### 13.1 Procedure

1. The functional operation of the audiometer shall be checked before each day's use by testing a person with known stable hearing thresholds or utilizing a bio-acoustic device which requires a constant voltage, and by listening to the audiometer's output to determine if such output is free from distorted or unwanted sounds. Deviations of 10 dB(Hz) or greater require an acoustic calibration.
2. Audiometer calibrations will be accomplished acoustically on an annual basis in accordance with 29 CFR 1910.95, Appendix E: Acoustic Calibration of Audiometers.
3. An exhaustive calibration will be performed at least every two (2) years in accordance with the American National Standards Institute's Specifications for Audiometers, S3.61989.

### 14.0 RECORD KEEPING

Cabrera Services, Inc. will maintain records as required by 29 CFR 1910.95.

#### 14.1 Procedures

1. Cabrera Services, Inc. will maintain an accurate record of all employee noise exposure for two (2) years.
2. Cabrera Services, Inc. will retain all employee audiograms during the duration of employment and for thirty years thereafter. These records will include:
  - Name and job classification of the employee.
  - Date of the audiogram.
  - The examiner's name.
  - Date of last acoustic or exhaustive calibration of audiometer.
  - Employee's most recent noise exposure assessment.
3. Measurements of the background sound pressure levels in audiometric test rooms will be maintained.
4. All records will be provided upon written request to the employees, former employees, representatives designated by the individual employees and United States Department of Labor.

## 15.0 CONTROLS

Engineering and administrative controls will be considered when the TWA exceeds 90 dBA for an 8 hour TWA.

### 15.1 Procedures

1. Cabrera Services, Inc. will consider modifications of existing equipment and other engineering noise control procedures to reduce the noise exposure level.
2. Suppliers of equipment will be requested to provide information regarding noise reduction modifications that may be applicable to their product.
3. When the purchase of new equipment is contemplated, the noise characteristics of that equipment will be obtained and submitted to the audiologist for analysis of the impact of this equipment on the employee's noise exposure.
4. Economic and technological feasibility factors will be considered in making engineering and/or administrative changes in equipment or work schedules.
5. When feasible, overexposed employees will be rotated at appropriate intervals to work areas having acceptable noise levels.

## 16.0 TRAINING

Cabrera Services, Inc. will provide education regarding the effects of noise on hearing and training in the use and care of all hearing protectors provided to its employees.

1. Each year, an education/training program will be provided. The training program consists of:
  - A video tape which contains information on the effects of noise on hearing; the purpose of hearing protection; different types of hearing protection; instruction on selection, fitting, use and care of hearing protection.
  - A review of Cabrera Services, Inc.'s written Hearing Conservation Program and its policy on the wearing of hearing protection.
  - Demonstration of correct use of hearing protection.
2. All employees will be encouraged to ask questions regarding the Hearing Conservation Program at Cabrera Services, Inc. for both pre-employment and annual hearing tests.
3. All employees will sign that they have participated in the annual education/training session.

## HEAVY EQUIPMENT OPERATIONS

### 1. Applicability

This procedure applies to Cabrera Services, Inc. field projects where heavy equipment is in operation.

### 2. Purpose and Scope

The purpose of this procedure is to require that heavy equipment be operated in a safe manner, that the equipment is properly maintained and that ground personnel are protected.

### 3. Implementation

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

### 4. Requirements

#### A. Authorized Operators

1. Evaluate operators through documentable experience (resume) and a practical evaluation of skills.
2. Allow only qualified operators to operate equipment.
3. Prohibit equipment from being operated by any personnel who have not been specifically authorized to operate it.
4. Maintain a list of operators for the project and the specific equipment that they are authorized to operate.
5. Require operators to use seat belts at all times in all equipment and trucks.
6. Brief operators on the following rules of operation:
  - a. Operators are in control of their work area.
  - b. Equipment will be operated in a safe manner and within the constraints of the manufacture's Operation Manual.
  - c. Operators will stop work whenever unauthorized ground personnel or equipment enter their work area and only resume

- #### B. Ground Personnel
1. Require that ground personnel on the site have received training

and comply with the following rules of engagement:

- a. All ground personnel must wear orange protective vests when in work areas with any operating equipment.
- b. Ground personnel will stay outside of the swing zone or work area of any operating equipment.
- c. Ground personnel may only enter the swing or work area of any operating equipment when:
  1. They have attracted the operator's attention and made eye contact.
  2. The operator has idled the equipment down and grounded all extensions.
  3. The operator gives the ground personnel permission to approach.
- d. Ground personnel shall never walk or position themselves between any fixed object and running equipment or between two running pieces of equipment.

#### C. Equipment

1. Maintain operations manuals at the site for each piece of equipment that is present on site and in use.
2. Require the operators are familiar with the manual for the equipment and operate the equipment within the parameters of the manual.
3. Require that all equipment be provided with roll-over protection systems (ROPS). Tracked excavators are exempt from ROPS requirements but must have a cab which provides protection from overhead hazards.
4. Verify that seatbelts are present and functional in all equipment.
5. Prohibit the use of equipment, which has cab glass, which is cracked, broken or missing.
6. Require that backup alarms are functional on all trucks and equipment. Tracked excavators must have bi-directional alarms or the operator must be provided with a spotter whenever tracking in either direction.

7. Require all extensions such as buckets, blades, forks, etc. to be grounded when not in use.
8. Require brakes to be set and wheels chocked (when applicable) when not in use.

D. Inspection and Maintenance

1. Require daily inspections of equipment by operators using Daily Heavy Equipment Safety Inspection checklist.
2. Prohibit use of equipment deemed to be unsafe as a result of daily inspection until required repairs or maintenance occurs.
3. Conduct maintenance as prescribed by manufacturer in the Operations Manuals for each piece of equipment.
4. During maintenance/repair, require that:
  - a. Motors are turned off.
  - b. All extensions are grounded or securely blocked.
  - c. Controls are in a neutral position or securely blocked.
  - d. Brakes are set.

**CABRERA SERVICES, INC.**

**DAILY HEAVY EQUIPMENT SAFETY INSPECTION CHECKLIST**

EQUIPMENT ID NO.: \_\_\_\_\_

DATE: \_\_\_\_\_

EQUIPMENT NAME: \_\_\_\_\_

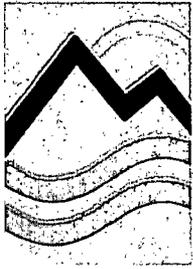
INSPECTOR'S NAME: \_\_\_\_\_

BEG HOURS \_\_\_\_\_ END HOURS \_\_\_\_\_

EMPLOYEE NO.: \_\_\_\_\_

| ITEM INSPECTED                                | CHECK IF SATISFACTORY | COMMENTS |
|---|-----------------------|----------|
| Falling Object Protective Structure (FOP)     |                       |          |
| Roll-Over Protection Structure (ROP)          |                       |          |
| Seat Belts                                    |                       |          |
| Operator Seat Bar(s)                          |                       |          |
| Side Shields, Screens or Cab                  |                       |          |
| Lift Arm Device                               |                       |          |
| Grab Handles                                  |                       |          |
| Back-up Alarm-Working                         |                       |          |
| Lights  |                       |          |
| Guards  |                       |          |
| Horn  |                       |          |
| Anti-Skid Tread Clear of Mud                  |                       |          |
| Safety Signs; i.e., counterbalance swing area |                       |          |
| Fire Extinguisher                             |                       |          |
| General Condition                             |                       |          |
| Fuel Connection                               |                       |          |
| Oil (fuel and no leaks)                       |                       |          |
| Clear of Extra Materials                      |                       |          |
| Controls Function Properly                    |                       |          |
| Damaged Parts                                 |                       |          |
| Hydraulic System (full and no leaks)          |                       |          |
| Parking Brake                                 |                       |          |
| Lift Arm and Bucket                           |                       |          |
| Tires/Tracks                                  |                       |          |
| Steering                                      |                       |          |
| Breathing Air System                          |                       |          |
| Blast Shields                                 |                       |          |
| Gallons of Fuel Added                         |                       |          |
| Quarts of Oil Added                           |                       |          |
| <b>Operator Signature:</b>                    |                       |          |

**INSTRUCTIONS: EACH SHIFT INSPECTS ALL APPLICABLE ITEMS INDICATED. IF AN UNSATISFACTORY CONDITION IS OBSERVED, SUSPEND OPERATION OF THE EQUIPMENT AND REPORT THE UNSATISFACTORY CONDITION TO THE SITE SUPERVISOR IMMEDIATELY.**



# **CABRERA SERVICES**

**RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION**

## **PORTABLE LADDER SAFETY**

### **Health and Safety Manual**

**HSM-016**

Effective Date

January 2008

Revision 0

*Prepared By:  
Cabrera Services, Inc.  
East Hartford, CT*

## PORTABLE LADDERS

### 1. Applicability

This procedure applies to CABRERA office and field locations where portable ladders are used.

### 2. Purpose and Scope

The purpose of this procedure is to require the safe use and proper construction, inspection, and maintenance of ladders at CABRERA office and project locations.

### 3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

Office Locations - Implementation of this procedure is the responsibility of the Location Manager.

### 4. Requirements

#### A. General

1. Provide ladders for safe access to all elevations where permanent or temporary stairways or suitable ramps or runways are not provided
2. Never use ladders with broken or missing rungs or steps, broken or split side rails, or other faulty or defective construction. When ladders with such defects are discovered, they shall immediately be withdrawn from service.
3. Place ladder feet on a substantial base and keep the area around the top and bottom of the ladder clear.
4. Do not place ladders in passageways, doorways, driveways, or any location where they may be displaced by activities being conducted in any other work, unless protected by barricades or guards.
5. Tie, block, or otherwise secure ladders while in use to prevent their being displaced.

6. Never use metal ladders for electrical work or where they or the user may contact electrical conductors.
7. Require that ladders are equipped with non-skid safety feet.
8. Use only Type I Industrial wooden, fiberglass, or metal ladders.

#### B. Straight and Extension Ladders

1. Position straight and extension ladders at such a pitch that the horizontal distance from the top support to the foot of the ladder is about one-quarter of the working length of the ladder (one foot (30 cm) out for every four feet (1.2 meters) vertical).
2. Do not use ladders in a horizontal position as platforms, runways, or scaffolds.
3. Extend the side rails at least 36 inches (91 cm) above the landing. When this is not practical, install grab rails which provide a secure grip.
4. When using two section extension ladders, the two sections must have a minimum overlap of 3 feet (91 cm) for working lengths up to 33 feet (10 meters), and 4 feet (1.2 meters) for working lengths up to 44 feet (13 meters). Extension ladders must not exceed 44 feet (13 meters) in length when extended in accordance with this lap schedule.
5. Do not permit anyone to stand on the top three rungs of a straight or extension ladder.

#### C. Stepladders

1. Always fully open and lock side braces when using stepladders.
2. Use straight or extension ladders for access. Stepladders are meant to be used as temporary elevated working platforms only.
3. Do not place planks on the top steps of stepladders.
4. Never stand on the top two steps of a stepladder.
5. Require that all four feet of the ladder have an even, solid footing.

#### D. Training

Train each employee in the safe, proper use of ladders, including the following:

1. Do not carry materials up or down - use a hand line.
2. Face the ladder when ascending or descending.
3. Position the ladder at the proper pitch.
4. Secure the top and bottom of the ladder to prevent displacement.
5. Require proper extension (3 feet/91 cm) above landing.
6. Never overreach - work only within an arm's length of the ladder.
7. Allow only one person on a ladder at a time.

#### E. Inspections

1. Conduct thorough periodic inspections of all ladders to identify cracks, broken rungs, and deterioration. Ladders found to be in an unsafe condition must be removed from the workplace immediately. When immediate removal is not possible, the ladder shall be conspicuously tagged "DANGER - DO NOT USE" until such time as removal is possible.
2. Inspect each ladder for unsafe conditions before each use.

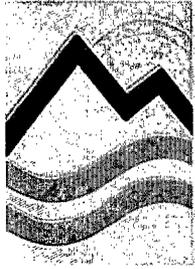
#### 5. Documentation Summary

Place in the Project Safety File

1. Site safety briefings regarding ladder use and inspection
2. Records of ladders taken out of service and/or removed from site

#### 6. References

- A. U.S. OSHA Construction Standard - Stairways and Ladders - 29 CFR 1926, Subpart X
- B. U.S. OSHA Standard - Portable Ladders - 29 CFR 1910, Subpart D
- C. ANSI A.14.1 1982, Ladders
- D. ANSI A.14.2 1982, Ladders



# **CABRERA SERVICES**

**RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION**

## **AERIAL LIFT SAFETY**

### **Health and Safety Manual**

**HSM-018**

Effective Date

January 2008

Revision 0

*Prepared By:  
Cabrera Services, Inc.  
East Hartford, CT*

## AERIAL LIFTS

### 1. Applicability

This procedure applies to CABRERA projects involving the use of scissors lifts, extensible boom platforms, aerial ladders, articulating boom platforms, vertical towers, or any combination thereof.

### 2. Purpose and Scope

The purpose of this procedure is to require the safe use and proper operation of aerial lifts and scissors lifts.

### 3. Implementation

Field Activities - Implementation of this procedure is the responsibility of the Project Manager.

### 4. Requirements

- A. Require that the manufacturer's operating instruction manual be available onsite.
- B. Allow only trained, authorized personnel to operate aerial lifts.
- C. Inspect the unit for unsafe conditions each day prior to use. Units that have been damaged or weakened from any cause must be taken out of service until repairs are completed.
- D. Test the lift controls each day to determine they are in safe working order.
- E. Require that both lower and platform controls are plainly marked as to their function.
- F. Survey the route to be traveled immediately prior to the work trip to check for overhead obstructions, holes in pavement, slopes, ditches, or other potential hazards.
- G. Wear fall protection in the form of a full body harness and lanyard attached to the manufacturer's prescribed anchorage point. Fall protection is not required for scissors lifts utilizing standard guard rails unless specifically required by the manufacturer.
- H. Stand firmly on the floor of the basket when working from an aerial lift. Sitting or climbing on the edge of the basket and/or use of planks, ladders, or other devices for work position are prohibited.

- I. Never exceed the boom and basket load limits set by the manufacturer.
- J. Set the braking system before elevating the basket.
- K. Install wheel chocks before using an aerial lift on an incline, provided they can be safely installed.
- L. Electrically ground or barricade aerial lifts when working near energized lines or equipment and consider the lift to be energized equipment.
- M. Do not pass equipment between a pole or structure and an aerial lift while an employee working from the basket is within reaching distance of energized conductors or equipment that are not covered with insulating protective equipment.
- N. Do not operate lower controls unless permission has been obtained from the employee in the basket, except in case of emergency.
- O. Alteration of the insulated portion of an aerial lift that may reduce the insulating value is not permitted.
- P. Never field modify an aerial lift for uses other than those intended by the manufacturer.

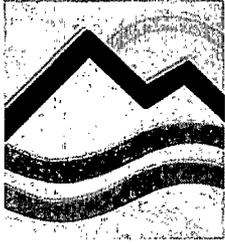
#### 5. Documentation Summary

File the following documents in the Project Health and Safety File

- A. Copy of the cover page of the Manufacturer's Operation Manual.
- B. Training documentation.
- C. List of authorized employees.

#### 7. Resources

- A. U.S. OSHA Standard - Aerial Lifts - 29 CFR 1926.556
- B. U.S. OSHA Standard - Mechanical Equipment (power distribution) - 29 CFR 1926.952
- C. U.S. OSHA Standard - Overhead Lines - 29 CFR 1926.955



# CABRERA SERVICES

RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION

## Emergency Management Plan

### Health and Safety Manual 019

Effective Date

November 2006

Revision 0

*Prepared By:*  
*Cabrera Services, Inc.*  
*East Hartford, CT*

Prepared By: \_\_\_\_\_ Date: \_\_\_\_\_  
Paul Schwartz, CIH, CSP – Health & Safety Manager

Approved By: \_\_\_\_\_ Date: \_\_\_\_\_  
David Watters – Principal

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## **Cabrera Services, Inc. Emergency Management Plan**

### **1.0 INTRODUCTION**

Emergencies can occur at any time, without warning. Careful planning, with an emphasis on safety, can help Cabrera Services, Inc. (CABRERA) employees handle crises and emergencies with appropriate responses, and may save lives. Every CABRERA employee shares responsibility for emergency preparedness. Office Managers are responsible for ensuring that their locations have emergency plans in place, and that all employees are familiar with those emergency plans. Office Managers are also responsible for assigning emergency preparedness and response duties to the appropriate staff members.

There are three phases to emergency management: Preparedness, Emergency Response and Emergency Recovery.

- **Preparedness** includes education, organization and communication about emergency management to all CABRERA employees. Effective and efficient response and recovery are dependent on preparedness.
- **Emergency Response** should involve a trained team to help disseminate emergency instructions, assist evacuations and security, provide first aid, and deal with immediate salvage and preservation issues (i.e., shutting down equipment, power, protecting documents, etc.).
- **Emergency Recovery** should be performed by a team whose responsibilities are to document the effects of the emergency and coordinate restoration according to priorities identified by CABRERA management.

### **2.0 APPLICABILITY**

This procedure applies to CABRERA office and field operations.

### **3.0 PURPOSE AND SCOPE**

This plan establishes policy, assigns responsibilities, and provides guidance to CABRERA offices/field projects regarding emergency action and development of a site-specific Emergency Action Plan (EAP) (see Section 7.0). It includes general information on actions to be taken by CABRERA management and employees in the event of a fire or other emergency that may endanger life or property.

### **4.0 DEFINITIONS**

- *Emergency* – Any unplanned event that can cause death or injury to employees, customers, or the public or that can shut down our business, disrupt operations or cause physical or environmental damage.
- *Evacuation Route* – The shortest path from an affected area to an area of safety, a sheltered area, or a location outside of the building.

## **5.0 OBJECTIVES OF THIS PLAN**

Promote a fast, effective reaction in coping with emergencies.

Save lives and avoid injuries and panic.

Restore order and conditions back to normal levels with a minimum of confusion and as promptly as possible.

## **6.0 IMPLEMENTATION**

### **6.1 Office Locations**

Implementation of this emergency management plan is the responsibility of the Location Office Manager.

### **6.2 Field Activities**

Implementation of this emergency management plan is the responsibility of the Project Manager.

## **7.0 REQUIREMENTS**

### **7.1 Emergency Action Plan Development**

#### *7.1.1 Gather Information*

Each CABRERA office/project must develop an EAP tailored to its specific situation. Office Managers will check with their building manager or landlord regarding evacuation procedures they may have in place and incorporate these procedures into the EAP. Project EAPs must comply with client requirements and specifications.

The Plan must contain and describe the following:

#### **A. Reporting and Responding to Fires and Other Emergencies**

Procedures that personnel should follow to report emergencies should list emergency telephone numbers for fire, paramedics and police. This includes local prefixes on emergency numbers if required (for example dialing 9 before 911).

##### **1. Alarm System**

The emergency alarm system for the building/site as applicable, including the description and location of fire alarm pull boxes, and visual and audible alarms.

Procedures to activate the PA system, such as calling the receptionist or building manager's office, and a description of the announcements to be made, if applicable.

##### **2. Evacuation Routes and Procedures**

Details of the evacuation routes and emergency exits to be used which may include maps and/or written instructions, a description of the building emergency lighting system, and exit signs. There should be a primary evacuation route and exit as well as an alternate evacuation route and exit from each work area. Evacuation route maps may be posted in the offices.

Procedures regarding the use of elevators during emergency procedures, if applicable. In most cases elevator use is prohibited during an emergency; the building manager or landlord should be consulted with regards to these procedures.

Procedures ensuring that no employees have been inadvertently left behind during evacuation procedures.

### 3. Critical Equipment/Operations Procedures

Designated slots for personnel responsible for shutting down critical equipment and the procedures for doing so, if applicable.

### 4. Assisting Disabled Personnel

Provisions that have been made for notifying and assisting personnel with disabilities during an emergency are to accommodate personnel in wheelchairs or those who are temporarily disabled, such as personnel on crutches.

### 5. Personnel Accounting Procedures

Designated primary and alternate assembly areas (or “rally points”) for personnel who are evacuating. These areas should be designated a sufficient distance from the building to ensure that personnel will not be exposed to fire or debris hazards, traffic, and to ensure that they do not interfere with emergency responders.

Responsibilities for an individual and an alternate designated for taking a headcount in the assembly area and reporting missing personnel to emergency responders.

Procedures detailing how employees will be informed that it is safe to re-enter the building or to leave for home.

### 6. Rescue and Medical Duties

The plan will include the following statement:

“CABRERA does not expect or encourage its employees to engage in firefighting, medical treatment, rescue, or other emergency response activities. These activities should only be performed by properly equipped and trained emergency responders. CABRERA recognizes that some of its personnel may have received training in first aid and cardiopulmonary resuscitation (CPR) and may wish to perform these duties on injured personnel.”

## B. Postings

1. Post the Emergency Action Plan where it is available to all employees.

2. Post evacuation maps at all exits and points of egress.

C. Training

Train all employees regarding the requirements of the Emergency Action Plan.

## 8.0 DOCUMENTATION SUMMARY

### 8.1 Office

File these records in the Office Safety Filing System:

- A. Emergency Action Plan
- B. Evacuation Maps
- C. Training Records

### 8.2 Field

File these records in the Project Safety File:

- A. Emergency Action Plan
- B. Evacuation Maps
- C. Training Records

## 9.0 REFERENCES

U.S. OSHA Standard – Emergency Action Plans - 29 CFR 1910.38

U.S. OSHA Fact Sheet – Responding to Workplace Emergencies

## **Appendix A**

### **Emergency Action Plan Elements**

**EMERGENCY ACTION PLAN**

for

**Cabrera Services, Inc.  
473 Silver Lane  
East Hartford, CT 06118  
(860) 569-0095**

November 2006

**10.0 EMERGENCY PERSONNEL NAMES, RESPONSIBILITIES AND PHONE NUMBERS**

**10.1 Designated Responsible Principal**

The Designated Highest Ranking Principal is responsible for:

- Ensuring that each Regional Office maintains an EAP that addresses potential emergency situations at their particular location.

In East Hartford, the Designated Responsible Principal is:

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

*10.1.1 Designated Responsible Principal/Officer or Alternate*

- The Designated Responsible Principal/Officer or Alternate has full authority to decide to implement the EAP if he/she believes an emergency might threaten human health or property.

In East Hartford the Designated Responsible Principal/Officer or Alternates are:

Principal Name: \_\_\_\_\_ Phone: \_\_\_\_\_

Alternate Name: \_\_\_\_\_ Phone: \_\_\_\_\_

**10.2 Program Administrator**

The Program Administrator is responsible for:

- Issuing and administrating this program and ensuring that it satisfies all applicable federal, state, and local requirements.
- Maintaining emergency call lists
- Insuring that emergency equipment is available, maintained, meets standards, and personnel understand how and when to use it
- Maintaining the evacuation procedure
- Providing initial and periodic training on emergency preparedness to employees
- Scheduling and coordinating emergency drills
- Auditing the emergency action plan to assure its continued effectiveness.

In East Hartford, the Program Administrator is:

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

**10.3 Emergency Coordinator**

The emergency coordinator in EH is \_\_\_\_\_. He/she is responsible for:

- Coordinating emergency responses in East Hartford.
- Interfacing between outside emergency responders and building personnel.
- Verifying that all employees have left the building during an emergency requiring evacuation
- Assessing the need for outside emergency assistance
- Coordinating disaster response with outside emergency responders
- Initiating the company’s post emergency actions

Name: \_\_\_\_\_ Phone: \_\_\_\_\_

**10.4 Evacuation Leaders**

The evacuation leaders are responsible for:

- Knowing and understanding the appropriate emergency response at the location
- Understanding specific actions to be taken in their departments in response to various emergencies, including equipment shutdowns
- Assuring that employees in their departments know what to do in case of emergencies
- Accounting for employees during evacuations or shelter situations
- Directing employees to proper evacuation routes and exits
- Assists physically challenged personnel during evacuation

*10.4.1 Evacuation Leaders*

Name: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Name: \_\_\_\_\_ Phone: \_\_\_\_\_  
 Name: \_\_\_\_\_ Phone: \_\_\_\_\_

**10.5 Emergency Medical Team**

The Emergency Medical Team is responsible for:

- Responding to medical emergencies in the facility and providing initial emergency first aid or CPR
- Assessing the need for outside emergency medical response
- Contacting outside emergency medical services and directing them to the scene
- Complying with the company’s bloodborne pathogens program

*10.5.1 Emergency Medical Team*

|             |                    |
|-------------|--------------------|
| Name: _____ | Phone: (860) _____ |
| Name: _____ | Phone: (860) _____ |
| Name: _____ | Phone: (860) _____ |

**10.6 Managers and Supervisors**

Managers and supervisors are responsible for:

- Assuring that employees under their areas of responsibility are trained on the correct actions to take in the event of an emergency
- Accounting for their employees during an evacuation
- Initiating accident investigation reports in the event of personal injury or property damage (CABRERA HSM-010)

**10.7 All CABRERA Employees**

All CABRERA employees are responsible for:

- Knowing what to do in case of an emergency
- Participating in emergency training and drills

Date \_\_\_\_/\_\_\_\_/\_\_\_\_

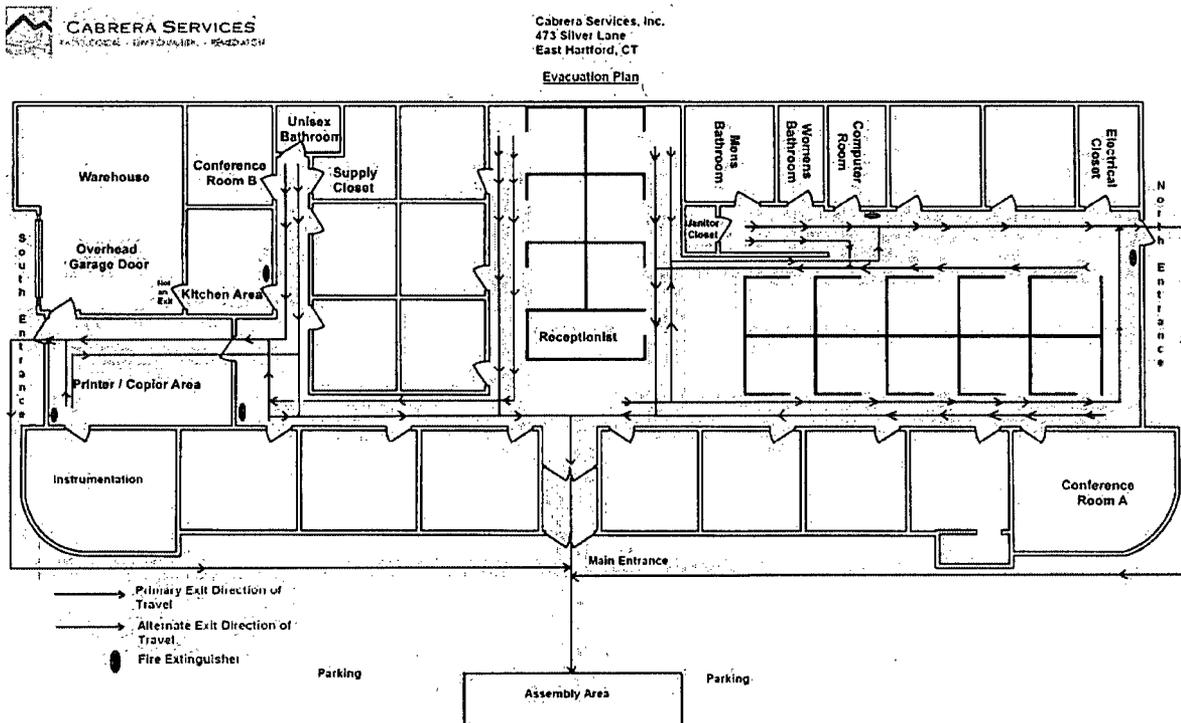
### 11.0 EVACUATION ROUTES

Evacuation route maps have been posted in each work area. The following information is marked on evacuation maps:

- 1. Emergency exits
- 2. Primary and secondary evacuation routes
- 3. Locations of fire extinguishers
- 4. Fire alarm pull stations' location
- 5. Assembly points

Personnel should know at least two evacuation routes as shown in Figure 1 below.

**Figure 1 - East Hartford Office Evacuation Routes**



## 11.1 Emergency Evacuation Procedure

### 11.1.1 General Instruction

A building evacuation is mandatory whenever a fire alarm sounds, sprinkler head releases, or verbal communication is heard, and building occupants must put the evacuation plan into effect by exiting immediately. After the building has been evacuated, occupants must wait for a safety inspection before re-entry.

### 11.1.2 Implementing an Evacuation

- a. If time permits, notify the Designated Responsible Principal/Officer or Alternate who will make the decision whether evacuation is necessary.
- b. For immediate emergencies, stay calm.
- c. Initiate evacuation alarm for you location.
- d. Communicate clearly and succinctly.

*Example:*

*We have a \_\_\_\_\_ type of emergency.*

*Evacuate to \_\_\_\_\_.*

*Take your belongings.*

*DO NOT use the elevators (if applicable).*

- e. Do not use elevators.
- f. Take personal items including jackets or other clothing needed for protection from the weather.
- g. Turn equipment off, if possible.
- h. Notify others in the area of the alarm or announcement if they did not hear it
- i. Close windows and doors, but do not lock doors as you leave. Leave room lights on.
- j. Take emergency supplies and rosters, if possible.
- k. Evacuation leaders assist persons with disabilities.
- l. Evacuation leaders check offices and restrooms.
- m. Move away from the building, report to the unit's designated evacuation point and meet with other persons from the unit or building. Report any missing or trapped people to the emergency responders.
- n. Keep exiting groups together.
- o. Exit the building via the nearest safe exit route. Walk calmly (do not run!) while exiting.
- p. Gather at the assembly area and await instructions.
- q. Assigned personnel must account for all employees.
- r. Wait at assembly area for directions.
- s. Do not re-enter the building until emergency coordinators indicates "all clear."

### 11.1.3 Evacuation of Persons with Disabilities

Be aware that employees with "hidden" disabilities (arthritis, cardiac conditions, back problems, learning disabilities, etc.) may also need individual assistance.

**A. To Assist Visually Impaired Persons**

- Announce the type of emergency
- Offer your arm for guidance
- Tell the person where you are going, alert them of obstacles that will be encountered
- When you reach safety, ask if further help is needed

**B. To Alert People with Hearing Limitations**

- Turn lights on/off to gain the person's attention, or
- Indicate directions with gestures, or
- Write a note with evacuation directions

**C. To Evacuate People Using Crutches, Canes, or Walkers**

- Evacuate these individuals as injured persons
- Assist and accompany to evacuation site if possible, or
- Use a sturdy chair (or one with wheels) to move the person, or
- Help carry individual

**D. To Evacuate Wheel Chair Users**

- Non-ambulatory persons' needs and preferences vary
- Individuals at ground floor locations may exit without help
- Others have minimal ability to move – lifting may be dangerous
- Some non-ambulatory persons have respiratory complications
- Remove them from smoke and vapors immediately
- Wheelchair users with electrical respirators get priority assistance
- Most wheelchairs are too heavy to take down stairs
- Consult with the person to determine best carry options
- Reunite the person with the chair as soon as it is safe to do so

**12.0 EMERGENCY PHONE NUMBERS**

|  |                    |                       |
|--|--------------------|-----------------------|
| East Hartford Fire Department<br>31 School Street          | Emergency<br>Other | 911<br>(860) 291-7400 |
| Emergency Medical Services (Ambulance)<br>31 School Street | Emergency          | 911                   |
| Police<br>31 School Street                                 | Emergency<br>Other | 911<br>(860) 528-4401 |
| Emergency Management<br>31 School Street                   |                    | (860) 291-7411        |
| Building Manager (If applicable)                           |                    | <hr/>                 |

**13.0 UTILITY COMPANY EMERGENCY CONTACTS**

(Specify name of the company, phone number and point of contact)

|  |  |  |                                  |
|--|--|--|----------------------------------|
| Electric Company   | Connecticut Light and Power            | Hartford calling area  | (860) 947-2000                   |
|  |  | Outside of the Hartford area   | (800) 286-2000                   |
| Report any emergency such as downed, hanging or burning wires or if you see a flash or hear a loud noise. Customer Service representatives are available 24 hours a day. |  |  |                                  |
| Water Company  | Metropolitan District Commission (MDC) |  | (860) 278-7850<br>extension 3600 |
| Gas Company  | Not applicable to 473 Silver Lane      | Although no active gas lines supply 473 Silver Lane, there may still be active gas lines in the vicinity of the building, and gas odors (i.e., methyl mercaptan odors) should still be reported. |                                  |
| Telephone Company  | AT&T                                   |  | (203) 420-3131                   |

Date \_\_\_ / \_\_\_ / \_\_\_

**14.0 EMERGENCY REPORTING PROCEDURES**

This section describes the types of emergencies to be reported by personnel. The types of emergencies listed are not all-inclusive and additional procedures must be developed as the need arises.

**14.1 Medical Emergency**

- Call medical emergency phone number (check applicable):

|                 |                          |
|-----------------|--------------------------|
| Paramedics      | <input type="checkbox"/> |
| Ambulance       | <input type="checkbox"/> |
| Fire Department | <input type="checkbox"/> |
| Other           | <input type="checkbox"/> |

Provide the following information:

- Nature of medical emergency,
- Location of the emergency (address, building, room number),
- Your name and phone number from which you are calling.

- Do not move victim unless absolutely necessary.
- Call the following personnel trained in CPR and First Aid to provide the required assistance prior to the arrival of the professional medical help:

Name: \_\_\_\_\_ Phone: (860) \_\_\_\_\_  
 Name: \_\_\_\_\_ Phone: (860) \_\_\_\_\_

If personnel trained in First Aid are not available, as a minimum, attempt to provide the following assistance:

Stop the bleeding with firm pressure on the wounds (note: avoid contact with blood or other bodily fluids).

1. Clear the air passages using the Heimlich Maneuver in case of choking.
2. In case of rendering assistance to personnel exposed to hazardous materials, consult the Material Safety Data Sheet (MSDS) and wear the appropriate personal protective equipment. Attempt first aid ONLY if trained and qualified.

## 14.2 Fire Emergency

### *When fire is discovered:*

- Activate the nearest fire alarm (if installed)
- Notify the local Fire Department by calling 911.
- If the fire alarm is not available, notify the site personnel about the fire emergency by the following means (check applicable):

Voice Communication \_\_\_\_\_ Air Horn \_\_\_\_\_ 2-Way Radio \_\_\_\_\_

Intercom \_\_\_\_\_ PA System \_\_\_\_\_ Other (specify) \_\_\_\_\_

### *Fight the fire ONLY if:*

- The Fire Department has been notified.
- The fire is small and is not spreading to other areas.
- Escaping the area is possible by backing up to the nearest exit.
- The fire extinguisher is in working condition and personnel are trained to use it.

### *Upon being notified about the fire emergency, occupants must:*

- Leave the building using the designated escape routes.
- Assemble in the designated area (specify location):
- Remain outside until the competent authority (Designated Official or designee) announces that it is safe to reenter.

### *Designated Official, Emergency Coordinator or supervisors must (underline one):*

- Disconnect utilities and equipment unless doing so jeopardizes his/her safety.
- Coordinate an orderly evacuation of personnel.
- Perform an accurate head count of personnel reported to the designated area.
- Determine a rescue method to locate missing personnel.
- Provide the Fire Department personnel with the necessary information about the facility.
- Perform assessment and coordinate weather forecast office emergency closing procedures

### *Evacuation Leaders must:*

- Ensure that all employees have evacuated the area/floor.
- Report any problems to the Emergency Coordinator at the assembly area.

### *Assistants to Physically Challenged should:*

- Assist all physically challenged employees in emergency evacuation.



## **15.0 RECEIVING A SUSPICIOUS PACKAGE**

### **15.1 Suspicious Packages**

Previous incidents of Anthrax and other terrorist/criminal-related activities concerning the U. S. Postal Service do pose a potential threat. In view of this and the potential for contracting serious illnesses, everyone is cautioned to take immediate measures to protect against suspicious mail.

### **15.2 What to look for**

- Excessive postage.
- Handwritten or poorly typed addresses.
- Incorrect titles or titles but no name.
- Misspelled words.
- Markings of "Personal" or "Confidential".
- No return address.
- Postmark does not match the return address.
- Powdery residue, oily stains, discoloration, or odor to package.
- Excessive weight.
- Lopsided or uneven.
- Protruding wires or aluminum foil.
- Excessive security material (masking tape, string, etc.).

### **15.3 Upon Discovery of a Suspicious Package**

- **REMAIN CALM**
- Put suspicious package down.
- **DO NOT** shake or empty contents.
- **DO NOT** clean up any powder or residue.
- Cover package with any type of container (trash can, newspaper, etc.) to prevent spread or leakage of contents.
- Cover up any spilled contents immediately.
- Close off the area to prevent others from entering.
- Turn off local fans or ventilation units.
- **DO NOT TOUCH YOUR FACE OR EYES OR ANYONE OR ANYTHING ELSE UNTIL YOU HAVE WASHED YOUR HANDS.**
- Wash your hands thoroughly with soap and water to avoid spreading any powder or other substance to your face.
- Leave someone in charge of the area and personally proceed to the nearest emergency medical facility.

- **SEVERE WEATHER**
- **BOMB THREAT**
- **CHEMICAL SPILL**
- **EXTENDED POWER LOSS**
- **OTHER (specify)** \_\_\_\_\_  
**(e.g., terrorist attack/hostage taking)**

## 16.0 EXTENDED POWER LOSS

In the event of extended power loss to a facility certain precautionary measures should be taken depending on the geographical location and environment of the facility:

- Unnecessary electrical equipment and appliances should be turned off in the event that power restoration would surge causing damage to electronics and effecting sensitive equipment.
- Facilities with freezing temperatures should turn off and drain the following lines in the event of a long term power loss.
  - Fire sprinkler system
  - Standpipes
  - Potable water lines
  - Toilets
- Add propylene-glycol to drains to prevent traps from freezing
- Equipment that contain fluids that may freeze due to long term exposure to freezing temperatures should be moved to heated areas, drained of liquids, or provided with auxiliary heat sources.

### Upon Restoration of heat and power:

- Electronic equipment should be brought up to ambient temperatures before energizing to prevent condensate from forming on circuitry.
- Fire and potable water piping should be checked for leaks from freeze damage after the heat has been restored to the facility and water turned back on.

**17.0 CHEMICAL SPILL**

The following are the locations of:

Spill Containment and Security Equipment: \_\_\_\_\_

Personal Protective Equipment (PPE):

MSDS: \_\_\_\_\_

*When a Large Chemical Spill has occurred:*

- Immediately notify the designated official and Emergency Coordinator.
- Contain the spill with available equipment (e.g., pads, booms, absorbent powder, etc.).
- Secure the area and alert other site personnel.
- Do not attempt to clean the spill unless trained to do so.
- Attend to injured personnel and call the medical emergency number, if required.
- Call a local spill cleanup company or the Fire Department (if arrangement has been made) to perform a large chemical (e.g., mercury) spill cleanup.

Name of Spill Cleanup Company: \_\_\_\_\_

Phone Number: \_\_\_\_\_

- Evacuate building as necessary

*When a Small Chemical Spill has occurred:*

- Notify the Emergency Coordinator and/or supervisor (select one).
- If toxic fumes are present, secure the area (with caution tapes or cones) to prevent other personnel from entering.
- Deal with the spill in accordance with the instructions described in the MSDS.
- Small spills must be handled in a safe manner, while wearing the proper PPE.
- Review the general spill cleanup procedures.

Date \_\_\_/\_\_\_/\_\_\_

**18.0 TELEPHONE BOMB THREAT CHECKLIST**

INSTRUCTIONS: BE CALM, BE COURTEOUS. LISTEN. DO NOT INTERRUPT THE CALLER.

YOUR NAME: \_\_\_\_\_ TIME: \_\_\_\_\_ DATE: \_\_\_\_\_

CALLER'S IDENTITY SEX: Male \_\_\_\_\_ Female \_\_\_\_\_ Adult \_\_\_\_\_ Juvenile \_\_\_\_\_ APPROXIMATE AGE: \_\_\_\_\_

ORIGIN OF CALL: Local \_\_\_\_\_ Long Distance \_\_\_\_\_ Telephone Booth \_\_\_\_\_

| VOICE CHARACTERISTICS                | SPEECH                              | LANGUAGE                            |
|--------------------------------------|-------------------------------------|-------------------------------------|
| <input type="checkbox"/> Loud        | <input type="checkbox"/> Fast       | <input type="checkbox"/> Excellent  |
| <input type="checkbox"/> High Pitch  | <input type="checkbox"/> Distinct   | <input type="checkbox"/> Fair       |
| <input type="checkbox"/> Raspy       | <input type="checkbox"/> Stutter    | <input type="checkbox"/> Foul       |
| <input type="checkbox"/> Intoxicated | <input type="checkbox"/> Slurred    | <input type="checkbox"/> Good       |
| <input type="checkbox"/> Soft        | <input type="checkbox"/> Slow       | <input type="checkbox"/> Poor       |
| <input type="checkbox"/> Deep        | <input type="checkbox"/> Distorted  | <input type="checkbox"/> Other      |
| <input type="checkbox"/> Pleasant    | <input type="checkbox"/> Nasal      |                                     |
| <input type="checkbox"/> Other       | <input type="checkbox"/> Other      |                                     |
| ACCENT                               | MANNER                              | BACKGROUND NOISES                   |
| <input type="checkbox"/> Local       | <input type="checkbox"/> Calm       | <input type="checkbox"/> Factory    |
| <input type="checkbox"/> Foreign     | <input type="checkbox"/> Rational   | <input type="checkbox"/> Machines   |
| <input type="checkbox"/> Race        | <input type="checkbox"/> Coherent   | <input type="checkbox"/> Music      |
| <input type="checkbox"/> Not Local   | <input type="checkbox"/> Deliberate | <input type="checkbox"/> Office     |
| <input type="checkbox"/> Region      | <input type="checkbox"/> Righteous  | <input type="checkbox"/> Machines   |
|                                      | <input type="checkbox"/> Angry      | <input type="checkbox"/> Street     |
|                                      | <input type="checkbox"/> Irrational | <input type="checkbox"/> Traffic    |
|                                      | <input type="checkbox"/> Incoherent | <input type="checkbox"/> Trains     |
|                                      | <input type="checkbox"/> Emotional  | <input type="checkbox"/> Animals    |
|                                      | <input type="checkbox"/> Laughing   | <input type="checkbox"/> Quiet      |
|                                      |                                     | <input type="checkbox"/> Voices     |
|                                      |                                     | <input type="checkbox"/> Airplanes  |
|                                      |                                     | <input type="checkbox"/> Party      |
|                                      |                                     | <input type="checkbox"/> Atmosphere |

**BOMB FACTS**

PRETEND DIFFICULTY HEARING - KEEP CALLER TALKING - IF CALLER SEEMS AGREEABLE TO FURTHER CONVERSATION, ASK QUESTIONS LIKE:

When will it go off? Certain Hour \_\_\_\_\_ ~~Time~~ Remaining \_\_\_\_\_ Where is it located? Building \_\_\_\_\_

What kind of bomb? \_\_\_\_\_ What kind of package? \_\_\_\_\_

How do you know so much about the bomb? \_\_\_\_\_

What is your name and address? \_\_\_\_\_

If building is occupied, inform caller that detonation could cause injury or death.

Activate malicious call trace: Hang up phone and do not answer another line. Choose same line and dial \*57 (if your phone system has this capability). Listen for the confirmation announcement and hang up.

Call Security/Police at \_\_\_\_\_ and relay information about call.

Did the caller appear familiar with plant or building (by his/her description of the bomb location)? Write out the message in its entirety and any other comments on a separate sheet of paper and attach to this checklist.

Notify your supervisor immediately.

## 19.0 SEVERE WEATHER AND NATURAL DISASTERS

### **Tornado:**

- When a warning is issued by sirens or other means, seek inside shelter. Consider the following:
  - Small interior rooms on the lowest floor and without windows,
  - Hallways on the lowest floor away from doors and windows, and
  - Rooms constructed with reinforced concrete, brick, or block with no windows.
- Stay away from outside walls and windows.
- Use arms to protect head and neck.
- Remain sheltered until the tornado threat is announced to be over.

### **Earthquake:**

- Stay calm and await instructions from the Emergency Coordinator or the designated official.
- Keep away from overhead fixtures, windows, filing cabinets, and electrical power.
- Assist people with disabilities in finding a safe place.
- Evacuate as instructed by the Emergency Coordinator and/or the designated official.

### **Flood:**

If indoors:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Follow the recommended primary or secondary evacuation routes.

If outdoors:

- Climb to high ground and stay there.
- Avoid walking or driving through flood water.
- If car stalls, abandon it immediately and climb to a higher ground.

### **Hurricane:**

- The nature of a hurricane provides for more warning than other natural and weather disasters. A hurricane watch is issued when a hurricane becomes a threat to a coastal area. A hurricane warning is issued when hurricane winds of 74 mph or higher, or a combination of dangerously high water and rough seas, are expected in the area within 24 hours.

Once a hurricane watch has been issued:

- Stay calm and await instructions from the Emergency Coordinator or the designated official.
- Moor any boats securely, or move to a safe place if time allows.
- Continue to monitor local TV and radio stations for instructions.
- Move early out of low-lying areas or from the coast, at the request of officials.

- If you are on high ground, away from the coast and plan to stay, secure the building, moving all loose items indoors and boarding up windows and openings.
- Collect drinking water in appropriate containers.

Once a hurricane warning has been issued:

- Be ready to evacuate as directed by the Emergency Coordinator and/or the designated official.
- Leave areas that might be affected by storm tide or stream flooding.

During a hurricane:

- Remain indoors and consider the following:
  - Small interior rooms on the lowest floor and without windows,
  - Hallways on the lowest floor away from doors and windows, and
  - Rooms constructed with reinforced concrete, brick, or block with no windows.

**Blizzard:**

If indoors:

- Stay calm and await instructions from the Emergency Coordinator or the designated official.
- Stay indoors!
- If there is no heat:
  - Close off unneeded rooms or areas.
  - Stuff towels or rags in cracks under doors.
  - Cover windows at night.
- Eat and drink. Food provides the body with energy and heat. Fluids prevent dehydration.
- Wear layers of loose-fitting, light-weight, warm clothing, if available.

If outdoors:

- Find a dry shelter. Cover all exposed parts of the body.
- If shelter is not available:
  - Prepare a lean-to, wind break, or snow cave for protection from the wind.
  - Build a fire for heat and to attract attention. Place rocks around the fire to absorb and reflect heat.
  - Do not eat snow. It will lower your body temperature. Melt it first.

If stranded in a car or truck:

- Stay in the vehicle!
- Run the motor about ten minutes each hour. Open the windows a little for fresh air to avoid carbon monoxide poisoning. Make sure the exhaust pipe is not blocked.
- Make yourself visible to rescuers.
  - Turn on the dome light at night when running the engine.
  - Tie a colored cloth to your antenna or door.
  - Raise the hood after the snow stops falling.
- Exercise to keep blood circulating and to keep warm.

### 19.1 CRITICAL OPERATIONS

During some emergency situations, it will be necessary for some specially assigned personnel to remain at the work areas to perform critical operations.

Assignments:

Work Area

Name

Job Title

Description of assignment

- Personnel involved in critical operations may remain on the site upon the permission of the site designated official or Emergency Coordinator.
- In case emergency situation will not permit any of the personnel to remain at the facility, the designated official or other assigned personnel shall notify the appropriate \_\_\_\_\_ offices to initiate backups.

The following offices should be contacted:

Name/Location: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Name/Location: \_\_\_\_\_

Telephone Number: \_\_\_\_\_

Name/Location: \_\_\_\_\_

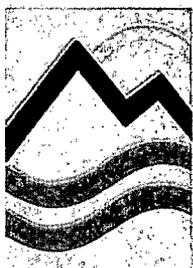
Telephone Number: \_\_\_\_\_

**20.0 TRAINING**

The following personnel have been trained to ensure a safe and orderly emergency evacuation of other employees:

Location: East Hartford, CT

| Name | Title | Responsibility | Date |
|------|-------|----------------|------|
|      |       |                |      |
|      |       |                |      |
|      |       |                |      |
|      |       |                |      |
|      |       |                |      |
|      |       |                |      |
|      |       |                |      |



# **CABRERA SERVICES**

**RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION**

## **HAND TOOLS AND PORTABLE EQUIPMENT**

### **Health and Safety Manual**

**HSM-021**

Effective Date

January 2008

Revision 0

*Prepared By:  
Cabrera Services, Inc.  
East Hartford, CT*

## HAND TOOLS AND PORTABLE EQUIPMENT

### 1. Applicability

This procedure applies to CABRERA operations involving the use of hand tools and/or power equipment, including chain saws, brush cutters, powder-actuated tools, and similar high-hazard implements.

### 2. Purpose and Scope

The purpose of this standard is to provide guidelines for the safe use and handling of hand tools and power equipment.

### 3. Implementation

Office/Facility Locations - Implementation of this program is the responsibility of the Location Manager.

Field Locations - Implementation of this program is the responsibility of the Project Manager.

### 4. Requirements

#### A. General

1. Keep hand and power tools in good repair and used only for the task for which they were designed.
2. Remove damaged or defective tools from service.
3. Keep surfaces and handles clean and free of excess oil to prevent slipping.
4. Do not carry sharp tools in pockets.
5. Clean tools and return to the tool box or storage area upon completion of a job.
6. Wrenches must have a good bite before pressure is applied.
  - a. Brace yourself by placing your body in the proper position so that in case the tool slips you will not fall.
  - b. Make sure hands and fingers have sufficient clearance in the event the tool slips.

- c. Always pull on a wrench, never push.
7. When working with tools overhead, place tools in a holding receptacle or secure when not in use.
8. Do not throw tools from place to place, from person to person, or drop from heights.
9. Use non-sparking tools in atmospheres with fire or explosive characteristics.
10. Inspect all tools prior to start-up or use to identify any defects.
11. Powered hand tools should not be capable of being locked in the on position.
12. Require that all power fastening devices be equipped with a safety interlock capable of activation only when in contact with the work surface.
13. Do not allow loose clothing, long hair, loose jewelry, rings and chains to be worn while working with power tools.
14. Do not use cheater pipes.
15. Make provisions to prevent machines from automatically restarting upon restoration of power.

#### B. Grinding Tools

1. Inspect work rests and tongue guards for grinders.
  - a. Work rest gaps should not exceed 1/8 inch (3 mm).
  - b. Tongue guards gap should not exceed ¼ inch (6 mm).
2. Do not adjust work or tool rests while the grinding wheel is moving.
3. Inspect the grinding wheel for cracks, chips or defects. Remove from service if any defects are found.
4. Wear goggles when grinding. A clear full face shield may be worn with the goggles.
5. Do not use the side of a grinding wheel unless the wheel is designed for side grinding.

6. Always stand to the side of the blade, never directly behind it.
7. Use grinding wheels only at their rated speed.
8. Grinding aluminum is prohibited.

#### C. Power Saws

1. Require that circular saws are fitted with blade guards.
2. Remove damaged, bent or cracked saw blades from service immediately.
3. Require that table saws are fitted with blade guards and a splitter to prevent the work from squeezing the blade and kicking back on the operator.
4. Require guards that cover the blade to the depth of the teeth on hand held circular saws. The guard should freely return to the fully closed position when withdrawn from the work surface.

#### D. Wood Working Machinery

1. Do not use compressed air to remove dust, chips and from wood working machinery.
2. Locate the on-off switch to prevent accidental start up. The operator must be able to shut off the machine without leaving the work station.
3. Guard planers and joiners to prevent contact with the blades.
4. Use a push stick when:
  - a. the cutting operation requires the hands of the operator to come close to the blade.
  - b. Small pieces are being machined.
5. Adjust saw blades so they only clear the top of the cut.
6. Automatic feed devices should be used whenever feasible.

#### E. Pneumatic Tools and Equipment

1. Require that pneumatic tools have:

- a. Tool retainers to prevent the tool from being ejected from the barrel during use.
  - b. Safety clip or tie wire to secure connections between tool/hose/compressor if they are of the quick connection (Chicago fittings) type.
2. Do not lay hose in walkways, on ladder or in any manner that presents a tripping hazard.
  3. Never use compressed air to blow dirt from hands, face or clothing.
  4. Compressed air exhausted through a chip guarded nozzle shall be reduced to less than 30 psi. Proper respiratory, hand, eye and ear protection must be worn.
  5. Never raise or lower a tool by the air hose.

#### F. Powder Actuated Fastener Tools

1. Use powder actuated tools that comply with the requirements of the American National Standards Institute (ANSI) standard A 10.3 - 1970.
2. Use only individuals that have been trained by a manufacturer's representative and possess the proper license to operate, repair, service and handle powder actuated tools.
3. Never use a powder actuated tool in a flammable or explosive atmosphere.
4. Require the use of goggles or a full face shield as well as safety glasses during operation of powder actuated tools.
5. Powder actuated tool must not be able to be fired unless the tool is pressed against the work surface.
6. The tool must not be able to fire if the tool is dropped when loaded.
7. Firing the tool should require two separate operations, with the firing movement being separate from the motion of bringing the tool to the firing position.

8. Never fire into soft substrate where there is potential for the fastener to penetrate and pass through, creating a flying projectile hazard.
9. Do not use powder actuated tools in reinforced concrete if there is the possibility of striking the re-bar.
10. Do not use on cast iron, glazed tile, surface hardened steel, glass block, live rock or face brick.
11. Never load and leave a powder actuated tool unattended. It should only be loaded prior to intended firing.
12. Test tools each day prior to loading by testing safety devices according to manufacturer's recommended procedure.

#### G. Chain Saws

1. Inspect the saw prior to each use and periodically during daily use.
2. Operate the chain saw with both hands at all times.
3. Never cut above chest height.
4. Require that the idle is correctly adjusted on the chain saw. The chain should not move when the saw is in the idle mode.
5. Start cutting only after a clear escape path has been made.
6. Shut the saw off when carrying through brush or on slippery surfaces. The saw may be carried no more than 50 feet (15 meters) while idling.
7. Require applicable protective gear. This may include, but is not limited to:
  - a. Loggers safety hat.
  - b. Safety glasses.
  - c. Steel-toed boots.
  - d. Protective leggings.
  - e. Hearing protection.
8. Inspect saws to require that they are fitted with an inertia break and hand guard.
9. Never operate a chain saw when fatigued.

10. Do not allow others in the area when chain saws are operated.
11. Make sure there are no nails, wire or other imbedded material that can cause flying particles.
12. Do not operate a chain saw that is damaged, improperly adjusted, or is not completely and securely assembled. Always keep the teeth sharp and the chain tight. Worn chains should immediately be replaced.
13. Keep all parts of your body away from the saw chain when engine is running.

#### H. Hand Operated Pressure Equipment

1. Pressure equipment such as grease guns, paint and garden sprayers shall be directed away from the body and other personnel in the area. The person operating any equipment such as this, which has a potential for eye injury, must wear protective goggles.
2. The noise produced when using certain types of pressure equipment may require the use of hearing protection.
3. Never allow the nozzle of a pressurized tool to come in contact with any body parts while operating. There is potential for injection of a chemical directly into the user's body, resulting in severe injury or death.

#### I. Gasoline Powered Tools

1. Never pour gasoline on hot surfaces.
2. Never fuel around open flame or while smoking.
3. Shut down the engine before fueling.
4. Provide adequate ventilation when using in enclosed spaces.
5. Use only OSHA approved safety cans to transport flammable liquids.

#### J. Inspection

Inspect all hand tools on a regular basis. Defective tools shall be immediately removed from service, tagged or destroyed to prevent further use.

## 5. Documentation Summary

Place in the Project Safety File:

- A. Site briefings regarding tool use.
- B. Records of tools removed from service.
- C. Copies of powder actuated tool licenses (as applicable).
- D. Tool inspection documentation.

## 6. Resources

- A. U.S. OSHA Standard - Hand and Portable Power Tools - 29 CFR 1910, Subpart P
- B. U.S. OSHA Standard - Construction Tools - Hand and Power - 29 CFR 1926, Subpart I
- C. ANSI A10.3 – 1970
- D. National Association of Demolition Contractors



# **CABRERA SERVICES**

**RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION**

## **FIRE PREVENTION**

### **Health and Safety Manual**

**HSM-022**

Effective Date

January 2008

Revision 0

*Prepared By:  
Cabrera Services, Inc.  
East Hartford, CT*

## FIRE PREVENTION

### 1. Applicability

This procedure applies CABRERA office and project locations.

### 2. Purpose and Scope

The purpose of this procedure is to reduce/eliminate potential fire hazards in the workplace and to provide for a rapid, effective response should a fire occur.

### 3. Implementation

Office Locations – Implementation of this procedure is the responsibility of the Location Manager.

Field Activities – Implementation of this procedure is the responsibility of the Project Manager.

### 4. Requirements

#### General

- A. Develop an Emergency Action Plan as outlined in HSM-019, "Emergency Action Plan."
- B. Maintain good housekeeping to reduce fire hazards and to provide safe routes of egress should a fire occur.
- C. Provide the appropriate number and types of fire extinguishers for the operations being performed.
- D. Inspect fire extinguishers monthly and maintain an inspection log.
- E. Conduct frequent periodic inspections to identify fire hazards such as:
  1. Unnecessary accumulation of combustibles.
  2. Unnecessary storage of flammables.
  3. Sources of ignition (e.g., faulty wiring, sparks, open flame, etc.).
- F. Remove all fire hazards promptly.

- G. Prohibit smoking and other ignition sources in flammable storage and other fire hazard areas.
- H. Post emergency numbers near telephones and evacuation maps in appropriate locations.
- I. Conduct evacuation drills.
- J. Train employees in:
  - 1. Fire hazard recognition.
  - 2. Fire hazard prevention.
  - 3. Fire extinguisher use.
  - 4. Emergency and evacuation procedures.

## 6. Documentation Summary

File the following in the Office/Project Health and Safety File:

- A. Emergency Action Plans.
- B. Fire extinguisher inspection logs.
- C. Employee training documentation.
- D. Site audits.

## 7. Resources

- A. U.S. OSHA Standard - Means of Egress - 29 CFR 1910, Subpart E
- B. U.S. OSHA Standard - Employee Emergency Plans and Fire Prevention Plans - 29 CFR 1910.38
- C. U.S. OSHA Standard - Fire Protection - 29 CFR 1910, Subpart L
- D. U.S. OSHA Technical Links - Fire Safety
- E. U.S. OSHA Construction Standard - Fire Protection and Prevention - 29 CFR 1926, Subpart F
- F. USACE EM 385-1-1 Section 9 - Fire Prevention and Protection
- G. Attachment 14-1 - Fire Extinguisher Placement Guidelines



# **CABRERA SERVICES**

**RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION**

## **ELECTRICAL SAFETY**

### **Health and Safety Manual**

**HSM-023**

Effective Date

January 2008

Revision 0

*Prepared By:  
Cabrera Services, Inc.  
East Hartford, CT*

## ELECTRICAL SAFETY

1. **Applicability** This program applies to CABRERA field operations where electricity is used, electrical systems are installed or maintained, or where live electrical circuits are accessed. For work around overhead or underground utilities, see HSM-024, "Utility Clearances".

2. **Purpose and Scope**

This procedure describes requirements for working on electrical circuits with voltage greater than 50 volts. The primary hazards related to electricity are shock; burns; arc-blast; fire and explosions. This procedure is intended to reduce worker risk to electrical hazards.

3. **Implementation**

Office Locations - Implementation of this program is the responsibility of the Location Manager.

Field Activities - Implementation of this program is the responsibility of the Project Manager.

4. **Requirements**

- A. Any work performed on live electrical systems must be done by a licensed or journeyman electrician.
- B. Follow established lockout/tagout procedures. Refer to HSM-014, "Lockout and Tagout Safety".
  1. Consider all electrical systems as hot until verified de-energized and grounded.
  2. Do not work on or in close proximity to electrical circuits unless the circuit is de-energized, grounded or guarded.

- C. Hazardous Locations

Determine if electric equipment and wiring will be installed in locations that are classified depending on:

1. The properties of flammable vapors, liquids or gases, or combustible dusts or fibers that may be present; as well as the likelihood that a flammable or combustible concentration

or quantity is present. (Refer to Appendix A for definitions of Hazardous Locations)

2. Consult resources A, B, E, and F for information on working in classified locations.

#### D. Ground Fault Circuit Interrupters and Grounding

##### 1. Ground Fault Circuit Interruptors

- a. Provide approved ground-fault circuit interrupters for all 120-volt, single phase, 15- and 20-ampere receptacle outlets on construction sites.
- b. Provide ground-fault circuit interrupters for all 120-volt, single phase, 15-and 20-ampere receptacle outlets within garages, bathrooms, kitchens and shops.

##### 2. Grounding/Earthing

Effectively ground all wiring, electrical circuits, and equipment, except portable tools & appliances protected by an UL-approved system of double insulation. Examples of equipment requiring grounding include:

- a. Portable and vehicle or trailer mounted generators.
- b. Electrically powered arc welders.
- c. Switches.
- d. Motor controller cases.
- e. Fuse boxes.
- f. Distribution cabinets.
- g. Frames.
- h. Non-current-carrying rails used for travel and motors of electrically operated cranes.
- i. Electric elevators.
- j. Metal frames of non-electric elevators to which electric conductors are attached.

#### E. Circuits

1. Require that there are no missing blanks.
2. Close doors to circuit and fuse boxes when not in use.
3. Label every circuit located on a circuit breaker/fuse box and/or motor control center (MCC).

#### F. Temporary Wiring, Electrical Tools and Extension Cords

1. Require that temporary wiring is installed and used in accordance with references. Specifically:
  - a. Guard, bury or isolate by elevation temporary wiring to prevent accidental contact by workers and equipment.
  - b. Require that vertical clearance above walkways is not less than 10 feet (3 meters) from circuits carrying 600 volts or less.
  - c. Support all exposed temporary wiring on insulators.
  - d. Protect temporary wiring from accidental damage.
  - e. Guard live parts of wiring.
  - f. Mark temporary power lines, switch boxes, receptacle boxes, metal cabinets and enclosures around equipment to indicate the maximum operating voltage.
2. Require that lighting strings are installed and used in accordance with resources A and B. Specifically:
  - a. Use nonconductive lamp sockets and connections permanently molded to the conductor insulation.
  - b. Require that lighting strings have lamp guards.
  - c. Replace all broken or defective bulbs promptly.
  - d. Protect all lights used for illumination from accidental contact or breakage.
  - e. Ground metal-case sockets.
3. Require that extension cords are installed and used in accordance with resources A and B. Specifically:
  - a. Use only 3-wire grounded type extension cords, designated for hard service or extra hard service and listed by Underwriters Laboratories, Inc.
  - b. Check cords for damage before use.
  - c. Do not exceed the rated load.
  - d. Do not use spliced cords.
  - e. Destroy and discard worn or frayed cords.
  - f. Do not fasten extension cords with staples, hang them by nails or suspend them by wire.
  - g. Do not wrap cords or cables around any conductive materials.
4. Require that portable electric tools brought onto the site are in good condition. Before use on any shift, visually inspect portable cord and plug connected equipment for external defects and evidence of possible internal damage.

- G. Report to supervision potential electrical hazards or unexpected occurrences while electrical renovation or construction occurs.
- H. Keep accurate records of all pertinent work performed on a project.
  - 1. Keep as-built designs updated.
  - 2. Share information on modifications with contractors on site.
- I. Isolation of live electrical components  
  
Isolate all live, unprotected electrical components through the use of barricades, fencing or other means to protect employees from contact.
- J. Briefing
  - 1. Brief workers on electrical hazards at the beginning of the job. Utilize Appendix B as a guide for proper PPE as applicable.
  - 2. Brief new workers entering the site.
  - 3. Brief workers when electrical conditions change or when hazards exist.
- K. Inspection  
  
Inspect the job site periodically to evaluate compliance with this procedure.

## 5. Documentation Summary

### Project Safety Files

- A. Licensed/journeyman electrician for project (as necessary).
- B. Documented communications between CABRERA, contractors, licensed/journeyman electricians, or others.

## 7. Resources

- A. U.S. OSHA Standard - General Industry Electrical Safety - 29 CFR 1910, Subpart S
- B. U.S. OSHA Standard - Construction Electrical Safety - 29 CFR 1926, Subpart K

- C. U.S. OSHA Standard - Design Safety Standards for Electrical Systems - 29 CFR 1910, Subpart S
- D. U.S. OSHA Standard - The Control of Hazardous Energy (Lockout/Tagout) - 29 CFR 1910.147
- E. American National Standards Institute. ANSI C-2.1996 National Electrical Safety Code
- F. National Fire Protection Association, National Electric Code, NFPA-70
- G. Appendix A - Hazardous Locations
- H. Appendix B - PPE, Tools and Equipment

## Appendix A

**HAZARDOUS LOCATIONS****"Class I locations."**

Class I locations are those in which flammable gases or vapors are or may be present in the air in quantities sufficient to produce explosive or ignitable mixtures. Class I locations include the following:

A. A Class I, Division 1 location is a location:

- (1) In which ignitable concentrations of flammable gases or vapors may exist under normal operating conditions; or
- (2) In which ignitable concentrations of such gases or vapors may exist frequently because of repair or maintenance operations or because of leakage; or
- (3) In which breakdown or faulty operation of equipment or processes might release ignitable concentrations of flammable gases or vapors, and might also cause simultaneous failure of electric equipment.

B. A Class I, Division 2 location is a location:

- (1) In which volatile flammable liquids or flammable gases are handled; processed, or used, but in which the hazardous liquids, vapors, or gases will normally be confined within closed containers or closed systems from which they can escape only in case of accidental rupture or breakdown of such containers or systems, or in case of abnormal operation of equipment; or
- (2) In which ignitable concentrations of gases or vapors are normally prevented by positive mechanical ventilation, and which might become hazardous through failure or abnormal operations of the ventilating equipment; or
- (3) That is adjacent to a Class I, Division 1 location, and to which ignitable concentrations of gases or vapors might occasionally be communicated unless such communication is prevented by adequate positive-pressure ventilation from a source of clean air, and effective safeguards against ventilation failure are provided.

**"Class II Locations."**

Class II locations are those that are hazardous because of the presence of combustible dust. Class II locations include the following:

A. A Class II, Division 1 location is a location:

(1) In which combustible dust is or may be in suspension in the air under normal operating conditions, in quantities sufficient to produce explosive or ignitable mixtures; or

(2) Where mechanical failure or abnormal operation of machinery or equipment might cause such explosive or ignitable mixtures to be produced, and might also provide a source of ignition through simultaneous failure of electric equipment, operation of protection devices, or from other causes, or

(3) In which combustible dusts of an electrically conductive nature may be present.

B. A Class II, Division 2 location is a location in which:

(1) Combustible dust will not normally be in suspension in the air in quantities sufficient to produce explosive or ignitable mixtures, and dust accumulations are normally insufficient to interfere with the normal operation of electrical equipment or other apparatus; or

(2) Dust may be in suspension in the air as a result of infrequent malfunctioning of handling or processing equipment, and dust accumulations resulting therefrom may be ignitable by abnormal operation or failure of electrical equipment or other apparatus.

### **"Class III Locations."**

Class III locations are those that are hazardous because of the presence of easily ignitable fibers or particulates but in which such fibers or particulates are not likely to be in suspension in the air in quantities sufficient to produce ignitable mixtures. Class III locations include the following:

A. A Class III, Division 1 location is a location in which easily ignitable fibers or materials producing combustible particulates are handled, manufactured, or used.

B. A Class III, Division 2 location is a location in which easily ignitable fibers are stored or handled, except in process of manufacture.

## Appendix B

**Personal Protective Equipment & General Equipment  
& Tools Needed During Electrical Work**

| <b>If there is a danger of:</b>   | <b>Then use the following:</b>  |
|---|---|
| <ul style="list-style-type: none"> <li>- head injury from electric shock; or</li> <li>- burns due to contact with exposed energized parts</li> </ul>  | Nonconductive head protection - Class II nonconductive hard hat   |
| Injury to the eyes or face from: <ul style="list-style-type: none"> <li>- electric arcs or flashes, or</li> <li>- flying objects resulting from electrical explosion</li> </ul>   | Protective equipment for the eyes and face - face shield and safety glasses.  |
| Shock to hands while handling energized wires   | Lineman's rubber insulated gloves rated for the voltage exposed to; leather overgloves may be needed if exposure to abrasive surfaces is possible |
| <ul style="list-style-type: none"> <li>- shock while working in areas where high voltage electrical systems or present, or</li> <li>- shock when performing electrical repairs</li> </ul>   | Non-conductive protective foot wear   |
| Exposure to electric arcing or flash from: <ul style="list-style-type: none"> <li>- opening or closing 2400 volt oil cutout switching devices;</li> <li>- removing or installing links in high voltage cable tap boxes; or</li> <li>- Removing or installing fuses in high voltage circuits.</li> </ul> | Protective coveralls made of Nomex or other suitable flash-proof material.  |
| <b>IF:</b>  | <b>THEN:</b>  |
| Energized parts are exposed.  | Use nonconductive ropes and handlines near the exposed energized part.  |
| Working near exposed energized conductors or circuit parts.   | Use insulated tools or handling equipment if the tools or handling equipment might make contact with such conducts or parts.                      |
| The insulating capability of insulated tools or handling equipment is subject to damage.  | Protect the insulating material.  |
| Removing or installing fuses when the fuse terminals are energized.   | Use fuse-handling equipment, insulated for the circuit voltage.   |
| Working near exposed energized parts that might be accidentally contacted or where dangerous electric heating or arcing might occur.  | Use protective shields, protective barriers, or insulating materials to protect from shock, burns, or other electrically related injuries.        |
| Normally enclosed live parts are exposed for maintenance or repair.   | Guard the parts to protect unqualified persons from contact with the live parts.  |



# **CABRERA SERVICES**

**RADIOLOGICAL • ENVIRONMENTAL • REMEDIATION**

## **UTILITY CLEARANCE AND ISOLATION**

### **Health and Safety Manual**

**HSM-024**

Effective Date

January 2008

Revision 0

*Prepared By:  
Cabrera Services, Inc.  
East Hartford, CT*

## UTILITY CLEARANCES AND ISOLATION

### 1. Applicability

This procedure applies to CABRERA projects where personnel may encounter subsurface or overhead utilities.

### 2. Purpose and Scope

Many field activities are conducted near aboveground and underground utilities. The primary purpose of this Standard is to establish operating requirements that will permit employees to work safely in the vicinity of electrical, natural gas, fuel, water, and other utility systems and installations. The secondary purpose is to prevent economic damage to utility systems from operations associated with project-related activities.

The term "utility clearance" includes

- A. The positive locating of utility systems in or near the work area.
- B. A signed statement by an appropriate representative attesting to the location of underground utilities and/or the positive de-energizing (including lockout) and testing of electrical utilities.

Note that in some cases, utility representatives may deem it appropriate or necessary to use insulating blankets to isolate a power line; this is an acceptable alternative to positive de-energizing (only utility representatives can make the determination).

"Contact" with overhead power lines is considered to occur when equipment is closer to power lines than permitted by the criteria in the table in Section 4.0.C.2.b below.

### 3. Implementation

Field Operations - Implementation of this procedure is the responsibility of the Project Manager.

### 4. Requirements

- A. Time for Completion

Complete utility clearances prior to the start of any work in the area of the utility that could feasibly result in contact with or damage to that utility.

#### B. Local Regulations

Research local codes and regulations regarding utility locating and isolation requirements. Utility companies and locating services are among the appropriate resources.

#### C. Overhead Power Lines

##### 1. Proximity to Power Lines

No work is to be conducted within 50 feet (15 meters) of overhead power lines without first contacting the utility company to determine the voltage of the system. No aspect of any piece of equipment is to be operated within 50 feet (15 meters) of overhead power lines without first making this determination.

##### 2. Operations adjacent to overhead power lines are **PROHIBITED** unless one of the following conditions is satisfied:

- a. Power has been shut off, positive means (such as lockout) have been taken to prevent the lines from being energized, lines have been tested to confirm the outage, and the utility company has provided a signed certification of the outage.
- b. The minimum clearance from energized overhead lines is as shown in the table below, or the equipment will be repositioned and blocked so that no part, including cables, can come within the minimum clearances shown in the table.

| <b>MINIMUM DISTANCES FROM POWERLINES</b> |                           |
|--|---------------------------|
| Powerlines Nominal System kV             | Minimum Required Distance |
| 0-50                                     | 10 feet (3 meters)        |
| 51-100                                   | 12 feet (3.6 meters)      |
| 101-200                                  | 15 feet (4.6 meters)      |
| 201-300                                  | 20 feet (6.1 meters)      |

|          |                       |
|----------|-----------------------|
| 301-500  | 25 feet (7.6 meters)  |
| 501-750  | 35 feet (10.7 meters) |
| 751-1000 | 45 feet (13.7 meters) |

c. The power line(s) has been isolated through the use of insulating blankets which have been properly placed by the utility. If insulating blankets are used, the utility will determine the minimum safe operating distance; get this determination in writing with the utility representative's signature.

3. All inquiries regarding electric utilities must be made in writing and a written confirmation of the outage/isolation must be received by the Project Manager prior to the start of work.

#### D. Underground Utilities

3. Do not begin subsurface work (e.g., trenching, excavation, drilling, etc.) until a check for underground utilities and similar obstructions has been conducted. The use of as-built drawings must be confirmed with additional geophysical or other survey.
4. Contact utility companies or the state/regional utility protection service at least two (2) working days prior to excavation activities to advise of the proposed work, and ask them to establish the location of the utility underground installations prior to the start of actual excavation.

Obtain utility clearances for subsurface work on both public and private property. Clearances are to be in writing, signed by the party conducting the clearance.

5. Protect and preserve the markings of approximate locations of facilities until the markings are no longer required for safe and proper excavations. If the markings of utility locations are destroyed or removed before excavation commences or is completed, the Project Manager must notify the utility company or utility protection service to inform them that the markings have been destroyed.

6. Do not conduct mechanical-assisted subsurface work (e.g., powered drill rig, mechanical excavator, etc.) within five (5) feet (1.5 meters) of a confirmed or suspected utility or other subsurface structure. Confirm minimum distances for mechanical-assisted subsurface work with the utility owner, as distances beyond this five foot minimum may be required.
7. Subsurface work within five feet (1.5 meters) of a confirmed or suspected utility or other subsurface structure must be done by hand (e.g., hand auger, shovel) to the point where the obstruction is visually located and exposed. Once the obstruction location is confirmed in this manner, mechanical-assisted work may commence.
8. Reference HSM\_008, "Excavation Safety" for additional information regarding subsurface operations.

#### E. Training

Conduct a site briefing for site employees regarding the hazards associated with working near the utilities and the means by which the operation will maintain a safe working environment. Detail the method used to isolate the utility and the hazards presented by breaching the isolation.

### 5. Documentation Summary

File these records in the Safety Filing System:

- A. Documents requesting utility clearance.
- B. Documents confirming utility clearance.
- C. Training/briefing documentation of each isolation.

### 6. Resources

- A. Utility Locating Services (typically under "Utility" in the Yellow Pages)
- B. NIOSH Alert - Preventing Electrocutions from Contact Between Cranes and Power Lines
- C. One Call Utility Locating List
- D. National Utility Locating Contractor's Association

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**ATTACHMENT C**  
**Emergency Contact List and Hospital Directions**

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**EMERGENCY CONTACT LIST**

| <b>Service</b>  | <b>Telephone Number</b>                       |
|---|---|
| <b>Alle-Kiski Medical Center</b><br>1301 Carlisle Street<br>Natrona Heights, PA 15065 | 724-334-2562 (information)<br>911 (emergency) |
| <b>Leechburg Police (Emergency)</b>   | (911) or 724-842-8531                         |
| <b>Leechburg Fire Department (Emergency)</b>  | (911) or 724-842-3141                         |
| <b>USACE-Pittsburgh Project Manager:</b><br>William Lenart                            | 412-3957-377                                  |
| <b>CABRERA Project Manager:</b><br>John Eberlin                                       | 314-703-6784                                  |
| <b>CABRERA Corp. Health &amp; Safety Manager:</b><br>Paul Schwartz, CIH, CSP          | 860-569-0095 (work)<br>860-463-8595 (cell)    |
| <b>CABRERA Corporate RSO:</b><br>Hank Siegrist, PE, CHP                               | 860-569-0095 (work)<br>860-416-0196 (cell)    |
| <b>CHEMTREC</b>   | 800-424-9300                                  |
| <b>Poison Control</b>   | 800-888-7655                                  |

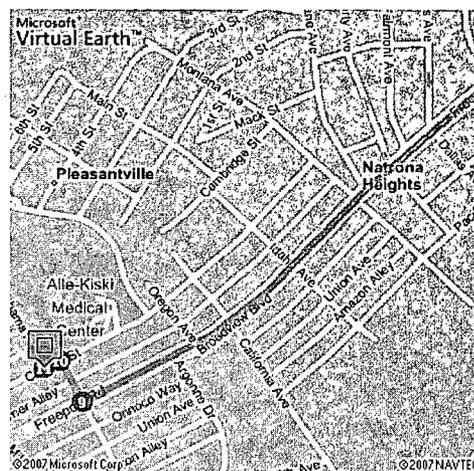
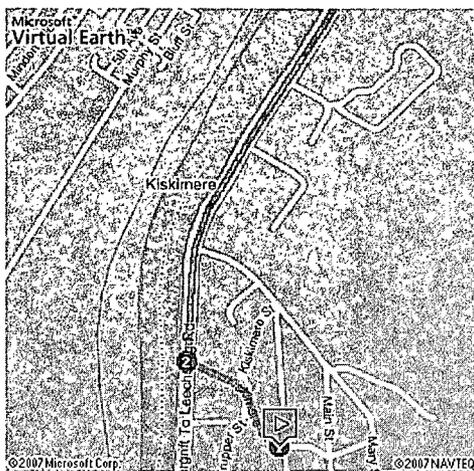
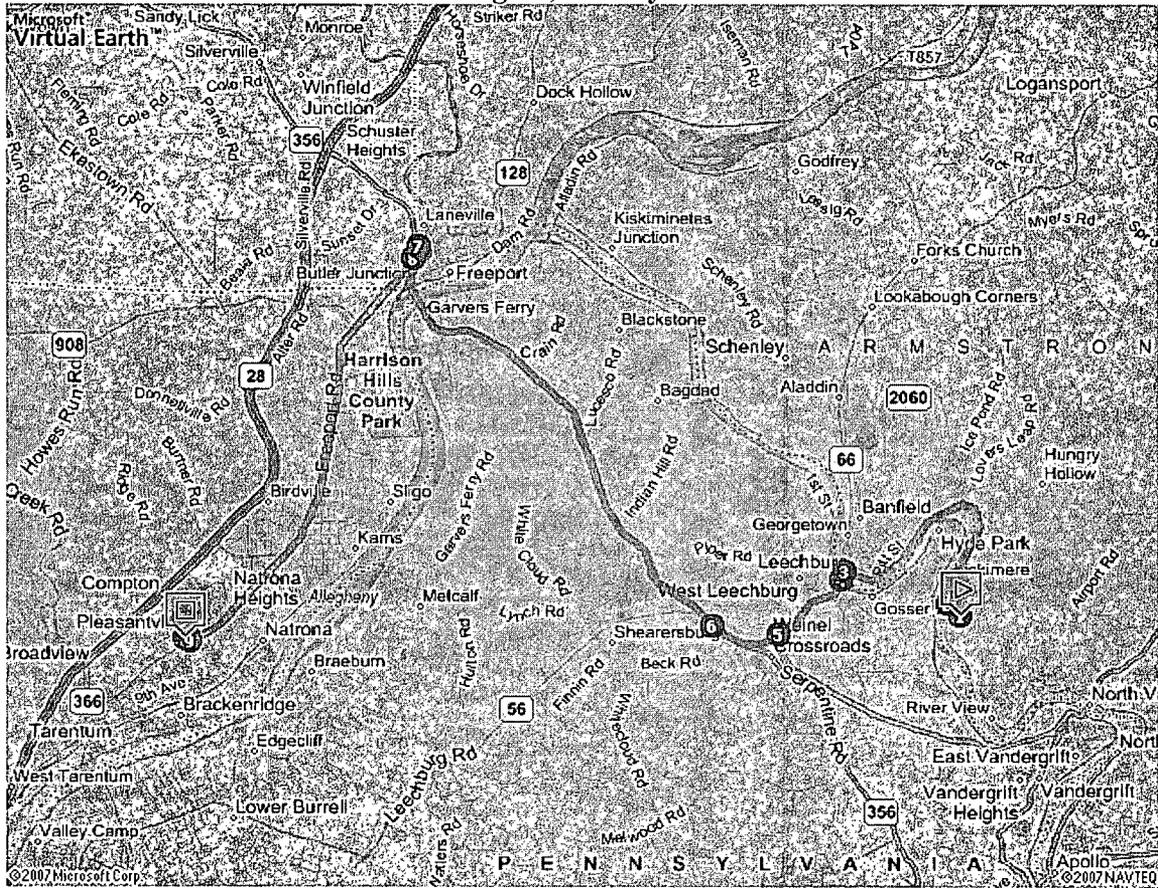
This list should be prominently posted in the CABRERA field office. This list should also be carried in a vehicle or by an individual while working in survey or sampling locations remote from the field office area.

CABRERA personnel will immediately dial 911 to request emergency services in the event of an emergency requiring outside emergency services. CABRERA personnel will contact USACE on-site personnel following the phone call to inform them that emergency service personnel and equipment will be entering the facility. Subsequent to these notifications, appropriate off-site personnel of USACE and CABRERA will be contacted and informed about the situation.

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### DIRECTIONS AND MAP

Alle-Kiski Medical Center  
1301 Carlisle Street  
Natrona Heights, Pennsylvania 15065



15.6 mi, 26 min

---

|  |        |
|--|--------|
| Depart Kiskimere St  | 0.2 mi |
| 1: Turn right onto SR-66 / North Vandergrift To Leechburg Rd | 2.8 mi |
| 2: Turn left onto 3rd St 0.1 mi                              | 0.1 mi |
| 3: Road name changes to S Leechburg Hill Rd                  | 0.9 mi |
| 4: Keep straight onto SR-56 / S Leechburg Hill Rd            | 0.8 mi |
| 5 Keep right to stay on SR-356                               | 5.7 mi |
| 6 Turn left to stay on SR-356 South                          | 0.1 mi |
| 7 Bear right onto Freeport Rd                                | 4.9 mi |
| 5 Turn right onto Alabama Ave                                | 0.1 mi |
| 5 Turn left onto Carlisle St                                 |        |
| Arrive 1301 Carlisle St                                      |        |

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**ATTACHMENT D**  
**Sevenson Drum Handling Plan**

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|-----------------|-----------------------------------|
|                 | EFFECTIVE DATE: NOVEMBER 20, 2001 |
| REVISION NO.: 1 | REVISION DATE: APRIL 11, 2003     |

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## **1.0 DRUM HANDLING**

Cleanup operations involving drums and containers must be carried out safely. This means that the handling, sampling, testing, staging, transport, decontamination, evacuation, excavation, and bulking of drums and containers must be carried out with minimal risk. All drums and drum artifacts will be transported to the Material Handling Building for processing and sorting. When new containers are used, they must meet minimum standards according to Department of Transportation (DOT), Occupational Safety and Health Act (OSHA), and the United States Environmental Protection Agency (USEPA) regulations.

### **1.1 SITE PREPARATION**

Before commencing site activities involving the handling of drummed waste, the area must be prepared to facilitate operations and eliminate obvious physical hazards. Roadways, work areas, and storage areas should be constructed to provide ease of access and a sound roadbed for heavy equipment and vehicles. Security fences or barricades should be erected. Work areas should be cleared and physical hazards should be eliminated as much as possible. Physical hazards to consider include:

- Ignition sources in flammable areas such as drum opening and bulking areas.
- Exposed and/or underground electrical wiring and low overhead wires which may be cut or entangled in equipment resulting in electrical shock, short circuits, and possible fires.
- Sharp, protruding edges such as torn metal, glass, nails, and other objects which can puncture or tear protective clothing or equipment.
- Unsecured railings, loose steps or flooring, holes, slippery surfaces, debris, and other obstacles that can cause slips, trips, and falls.
- Protruding objects which can cause slips, trips, and falls.
- Weeds and debris which obstruct visibility.

Weeds and debris can be removed, walking surfaces can be cleared and repaired, skid resistant strips can be installed on slippery surfaces, railings can be repaired or installed, stairs and ladders can be secured, electrical wiring can be repaired or relocated, and sharp

objects and protruding edges which cannot be removed can be covered or properly guarded. Staging areas can be constructed to facilitate safe and effective operations.

## **1.2 GENERAL RULES**

- Drums and containers used must meet minimum DOT regulations.
- If practical, drums and containers will be inspected to insure their integrity prior to being moved. If drums or containers are stored or stacked so that inspection is impossible, they should be moved to an accessible location for inspection prior to further handling.
- Unlabeled drums and containers will be assumed to contain hazardous substances and treated accordingly until contents are positively characterized.
- Site operations shall be organized so as to minimize the amount of drum or container movement required.
- All employees exposed to transfer operations shall be warned of potential hazards associated with contents of any drums or containers involved.
- DOT specified salvage drums or containers and suitable sorbent materials shall be available in areas where spills may occur.
- Where major spills are possible, a spill containment program shall be implemented as part of the site Health and Safety Plan (HASP). The spill containment program shall allow for the containment and isolation of the entire volume being transferred.
- Drums and containers that can not be moved without rupture or leakage will be emptied into a sound container.
- Some type of detection system (such as ground-penetrating radar) shall be used to estimate the location and depth of buried drums or containers.
- Buried drums shall be excavated carefully to prevent rupture.
- Suitable fire extinguishing equipment will be kept on hand and ready for use.

**2.0 OPENING DRUMS AND CONTAINERS**

These procedures are to be followed in areas where drums or containers are being opened:

- The buddy system is to be utilized at all times during drum opening operations.
- Level B is mandatory if the drum contents are unknown.
- If airline respirators are used, air cylinder connections must be protected from contamination and the entire system shall be protected from physical damage.
- Employees who must work near drums or containers being opened must be provided protective shielding in case of explosion.
- Employees not directly involved in the opening procedures will be kept at a safe distance.
- Controls for opening equipment, monitoring equipment, and fire suppression equipment shall be located behind the shield.
- Non-sparking tools and equipment will be used when flammable atmospheres are a reasonable possibility.
- Drums and containers shall be opened so as to safely relieve excess pressure. Either relieve the pressure from a remote location or place appropriate shielding (i.e. The shielding will be 1/4-inch (minimum) explosion-resistant Plexiglas of a size sufficient to protect at least one observer, and will be placed a safe distance (10 meters) removed from the drum being opened and the observer.) between the employee and the drums or containers.
- Employees shall not stand on or work from drums or containers.

**2.1 MATERIAL HANDLING EQUIPMENT**

Material handling equipment shall be selected, located, and operated so as to prevent ignition of vapors released during opening procedures. There are hazards associated with gas or electrically powered units.

**2.2 RADIOACTIVE WASTES**

If a drum exhibits radiation levels above background (approximately >2 mrem/hr), immediately contact the Health and Safety Officer (HSO). Do not handle any drums that

are determined to be radioactive. A special contractor will be brought in to further characterize and process the drum(s).

### **2.3 SHOCK-SENSITIVE, AIR REACTIVE, OR WATER REACTIVE WASTE**

When handling drums containing or suspected of containing shock-sensitive or reactive wastes, the following special precautions should be followed:

- All non-essential employees shall be removed from the area of transfer.
- Material handling equipment shall be fitted with explosion containment devices or protective shields to protect operators.
- An alarm system will be used to signal the beginning and end of the procedure.
- Continuous communications will be maintained between the employee in charge of the operation and the HSO during the operation.
- Pressurized drums shall not be moved until the cause of the excessive pressure is determined and appropriate measures are implemented.
- All drums and containers containing packaged laboratory wastes lab packs shall be considered shock-sensitive until proven otherwise.
- Work will proceed in clear, dry weather.

### **2.4 LAB PACKS**

Laboratory packs (i.e., drums containing individual containers of laboratory materials) can be an ignition source for fires. They may contain shock-sensitive or explosive materials. Prior to handling or transporting packs, move all non-essential personnel to a safe distance. Use a grappler unit constructed for explosive containment for handling. A qualified person must inspect, classify, and segregate the containers in the lab pack. Pack the segregated containers with sufficient cushioning and adsorption materials to prevent excessive movement. If crystalline material is noted at the opening of any container, handle it as a shock-sensitive waste.

## **3.0 SHIPPING AND TRANSPORT**

Drums and containers shall be identified and classified prior to packaging for shipment. Staging areas shall be kept to the minimum number necessary and shall be provided adequate entrance and exit routes. Bulking of wastes shall be permitted only after a thorough characterization has been completed.

### **3.1 CONTAINER HANDLING**

Waste containers of various types on a site may need to be handled during sampling, characterization, or preparation of material for disposal, in addition to other reasons.

### **3.2 VISUAL INSPECTION**

Prior to handling, visually inspect the containers for the following to determine if the containers might show whether the materials may be radioactive, explosive, corrosive, toxic, flammable, or lab-packed:

- Symbols, words, or markings.
- Signs of deterioration such as corrosion, rust, or leaks.
- Indications the container is under pressure, such as swelling or bulging.
- Drum type.
- Configuration of drumhead.
- Conditions in the immediate vicinity of the container. Crystalline material on or around the containers could indicate shock-sensitive material. In addition, there may be other material leaked or spilled from the containers onto the ground which might give a clue as to what may be in the drum.

**4.0 MONITORING**

Before any moving or opening of containers takes place, direct reading instruments should be used to detect the presence of organic vapors, combustible gases, or above-background levels of radiation.

**4.1 SUBSURFACE INVESTIGATION**

If there is any reason to suspect the presence of buried containers, some type of non-destructive ground penetrating system should be used to determine the approximate location and depth of such containers.

**4.2 PRELIMINARY CLASSIFICATION**

As a precautionary measure, any unlabeled containers should be assumed hazardous until it is learned otherwise. Using the information gathered by visual inspection, monitoring and subsurface investigations, preliminarily classify any containers thought to be radioactive, leaking/deteriorated, under pressure, explosive/shock-sensitive, lab packs, or buried.

**4.3 PLANNING**

Based on inspection and preliminary classification, decide if any hazards are present and the appropriate response activity. Determine which drums need to be moved in order to be opened and/or sampled. A preliminary handling plan should be developed dealing with the extent of any necessary container moving or handling and the most appropriate procedures based on the particular hazards revealed during preliminary inspection. The handling plan should be revised as new information comes to light during site operations.

## **5.0 OPENING CONTAINERS**

If supplied air respiratory protection is used, place a bank of air cylinders outside the work area and supply air to the operators via airlines and escape SCBAs. Keep personnel at a safe distance from the drums being opened. If possible, monitor for radiation, combustibles, and toxics during opening. Use the buddy system.

### **5.1 REMOTELY CONTROLLED OPENING DEVICES**

If possible, use remotely controlled devices for opening drums. This procedure must be explored first, prior to deciding to open drums manually.

### **5.2 BACKHOE SPIKE**

The backhoe spike is a metal (bronze) spike attached or welded to a backhoe bucket. It is efficient and advisable for large-scale operations. The drums should be in rows with adequate aisle space to allow ease of backhoe movement. Once in rows, drums can be quickly opened by punching holes in the drum tops with the spike. To prevent cross contamination, the spike should be decontaminated after each drum is opened.

### **5.3 HYDRAULIC DRUM PIERCER**

A hydraulically operated drum piercer consists of a manually operated pump which pressurizes oil through a hydraulic line. A piercing device with a spark-proof metal point is attached to the end of the line and pushed into the drum by the hydraulic pressure. The piercing device can be attached so that the hole is made in the side or top of the drum.

### **5.4 PNEUMATIC BUNG REMOVER**

Operates by means of compressed air delivered through a high-pressure airline to a pneumatic drill which is adapted to turn a bung fitting. An adjustable bracket has to be attached to the drum before the drill can be operated and must be removed before the sample can be taken.

## **5.5 MANUALLY OPERATED OPENING DEVICES**

The risks are greater when manually opening drums than when using remotely operated means. When using manual devices, the drums must be positioned to allow easy worker access to the drums.

### **5.6 BUNG WRENCH**

A bung wrench and other hand tools must be of the non-sparking kind and should be marked as such. Although a non-sparking wrench will prevent sparking between the wrench and drum, it will not prevent sparking between the bung and the threads on the drum. The bung should be turned very slowly to allow pressure to dissipate and reduce the chance of sparking. The small bung should be opened first, as a pressure release. Avoid leaning on the drum while opening.

### **5.7 DRUM DEHEADER**

A drum deheader can be used when the bung is not removable with a bung wrench. It can be used only with closed-head drums, not on open-top drums. It is used by first positioning the cutting edge just inside the top chime and then tightening the adjustment screw so the deheader is held against the side of the drum.

### **5.8 HAND PICKS, PICKAXES, AND SPIKES**

Hand picks, pickaxes, and spikes are not recommended for opening drums because the drum must be struck with too much force, creating great potential for spraying and splashing. Also, drums cannot be opened slowly enough with this method, so any over-pressure can be dangerous. In addition, there is a great hazard using this method on drums with shock-sensitive materials. Use of chisels and firearms as an opening tool is prohibited.

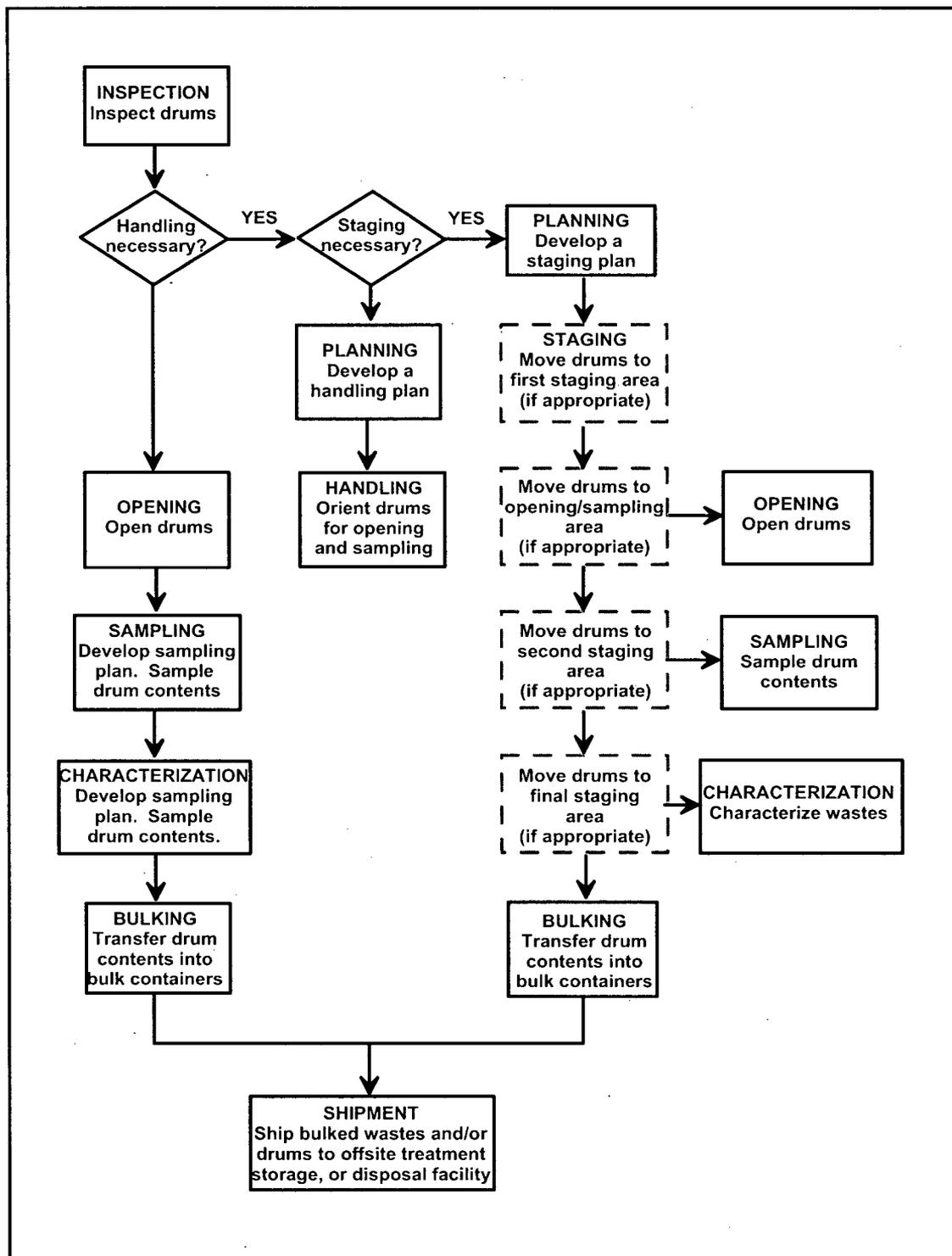


Figure 1. Flow Chart for Drum Handling (Dashed boxes indicate optional steps. Number of staging areas necessary is site specific (from OSHA website))

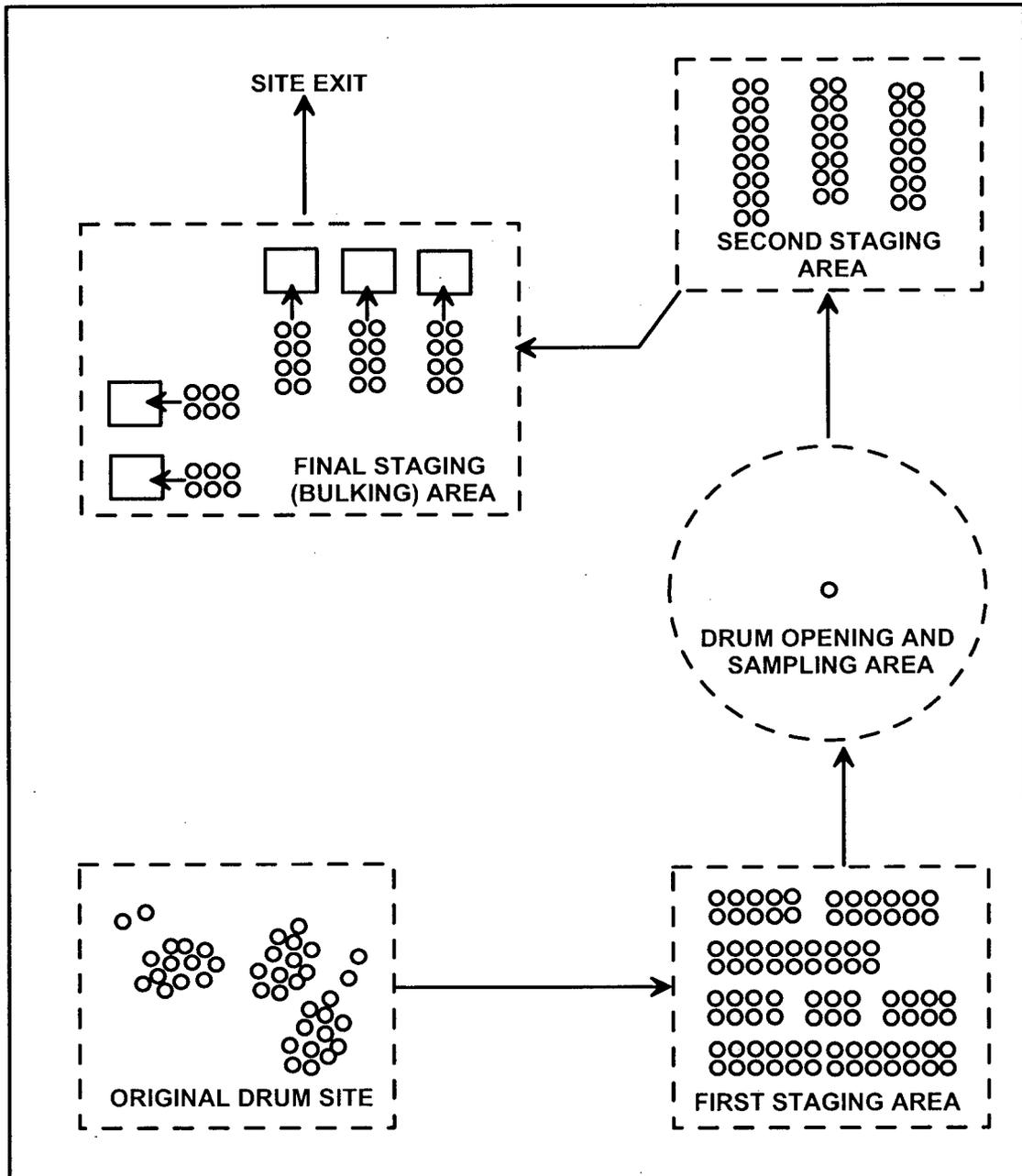


Figure 2. Possible Staging Areas at a Hazardous Waste Site (from OSHA website)