



# STANDARD OPERATING PROCEDURE

		S.O.P. No. A-1	PAGE 1 OF 4
APPROVAL		EFFECTIVE DATE	REVISION No. 0
Denise L. Daggett, MS, CIH		6/24/02	
TITLE <b>ACCIDENT INVESTIGATION</b>			

## 1.0 INTRODUCTION

Accident investigation is a useful tool for discovering the cause(s) of an accident and preventing future accidents. A thorough investigation of the contributing circumstances that might have caused an accident (including both injury accidents and noninjury accidents [incidents]) is crucial. The real or potential extent of injury or property damage dictates the thoroughness of the investigation. Causative factors are then evaluated to determine appropriate corrective action. Detailed corrective action information is provided in the *Injury and Illness Prevention Program, Volume I*, of this manual.

Accident investigation is not to be confused with injury or illness reporting (discussed in *SOP A-3, Injury or Illness Reporting*).

## 2.0 SCOPE

This procedure applies to accidents that occur in both office operations or on field jobsites. This procedure pertains to accidents involving AMEC Earth & Environmental, Inc. (AEE) personnel; personnel subcontracted to AEE; and visitors, including clients who may work on or visit AEE jobsites.

AEE reserves the right to investigate and document any accident involving a subcontractor.

## 3.0 RESPONSIBILITIES

### 3.1 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR

The Corporate Safety, Health, and Environment Director (Corporate SHE Director) manages an accident investigation, either parallel to or in conjunction with the Unit Manager (UM), Project Manager (PM)/Field Manager (GM)/Supervisor, as the circumstances warrant. In instances of a severe injury or fatality, or a potentially catastrophic near miss, the Corporate SHE Director will investigate independently and report to the Executive Vice President of Operations. The Corporate SHE Director serves in an advisory capacity for all accident investigations. The Corporate SHE Director also periodically analyzes the accident investigation data to identify underlying causes and general patterns.

### 3.2 UNIT MANAGER

The UM is responsible for initiation and oversight of accident investigations. Depending on the nature and breadth of the investigation, the UM may lead with the accident investigation.

### 3.3 PROJECT MANAGER/FIELD MANAGER/SUPERVISOR

The PM/FM/Supervisor is responsible for conducting accident investigations relating to projects or activities under his/her supervision. The PM/FM/Supervisor is also responsible for ensuring that corrective actions

(identified through the accident investigation) are implemented within the targeted time frame and that the appropriate injury/illness or incident reports are made.

### **3.4 SAFETY, HEALTH, AND ENVIRONMENT COORDINATOR/SITE HEALTH AND SAFETY COORDINATOR**

The Safety, Health, and Environment Coordinator (SHE Coordinator)/Site Health and Safety Coordinator (SHSC) assists the PM/Supervisor during accident investigations and verifies the PM/Supervisor's findings.

### **3.5 EMPLOYEES AND SUBCONTRACTORS**

Employees and subcontractor employees are responsible for cooperating with accident investigators during an investigation and for being truthful and answering questions to the best of their recollection. Employees and subcontractor employees shall also comply with corrective action recommendations within the targeted time frame.

### **4.0 GOALS OF ACCIDENT INVESTIGATION**

The PM/FM/Supervisor should make a personal investigation of all accidents because:

- An investigation is the best way to determine the true cause of an accident.
- The PM/FM/Supervisor should know what the employee was doing, the proper way to do it, and what the employee probably did or did not do to cause the accident.
- The PM/FM/Supervisor is best qualified to evaluate the information gathered and determine the cause of the accident.
- The PM/FM/Supervisor has the authority to investigate the accident and initiate corrective action.

### **5.0 SERIOUS INCIDENTS**

In the event of a serious incident, an accident investigation must be documented and investigated by the PM/FM/Supervisor, and/or UM. A serious incident is defined as:

- A serious injury (hospitalization, loss of body part or any other injury that is life-threatening in nature) or death.
- An occurrence that requires reporting to a regulatory agency, e.g., OSHA or EPA.
- An occurrence that could lead to an enforcement action.
- Issuance of an enforcement action, e.g., citation and/or fine.
- An injury to a member of the public or a visitor.

Documentation of the serious incident is addressed in SOP A-3, Injury and Illness Reporting. Completion of the First Alert Report form (see SOP A-3) and submission to the AMEC Americas SHE Director, AMEC

Americas Director of Communications, the AEE Corporate SHE Director, and Executive Vice President of operations constitutes the first step of documentation. Investigation procedures and tools are addressed in this SOP.

## **6.0 INVESTIGATIVE PROCEDURES**

The PM/FM/Supervisor shall conduct an investigation of all incidents, injuries, and work-related illnesses; talk with the victim and/or coworkers who witnessed the accident or conditions; and review the medical findings report, if available. Each investigation shall be conducted as soon after the accident/incident as possible. Delays of even a few hours can allow for the destruction/alteration of evidence (whether intentional or unintentional).

Fairness and impartiality are essential during the investigation. The purpose of the investigation is to obtain information and prevent a recurrence of the incident/accident, not to place blame.

### **6.1 REPORTING**

The PM/FM/Supervisor shall report verbally and in writing any injury, illness, or incident on the appropriate forms and to the appropriate parties as defined in SOP A-3.

### **6.2 INVESTIGATING**

The investigation phase of the accident investigation procedure is initiated in response to reports of an accident (either injury or noninjury). Important information that should be obtained through the investigation includes:

- project
- location of accident
- employee(s) involved
- narrative description of the accident
- equipment associated with the accident
- task being performed when accident happened
- time factors (e.g., time of day, hours into shift, type of shift)
- preventive measures
- characteristics of injury or property damage

#### **6.2.1 Interviewing**

After reviewing the Supervisor's Report of Injury or Illness, First Aid Incident Report, and/or Incident Report, (see SOP A-3), or after verbal report of an accident, the PM/FM/Supervisor and SHE Coordinator/SHSC shall interview individually witnesses to the accident. It is recommended to prepare a set of questions and ask each witness to answer the same questions. The details of the interview shall be recorded on the Accident Investigation Interview Report (Attachment 1). The completed form shall be forwarded to the UM and Corporate SHE Director.

## 6.2.2 Identifying Causal Factors and Corrective Actions

The PM/FM/Supervisor may identify contributing factors to the accident using the National Safety Council's *Guide for Identifying Causal Factors and Corrective Actions* (Attachment 2). Completed guides shall be forwarded to the appropriate UM, SHE Coordinator/SHSC, and Corporate SHE Director.

Possible corrective actions are suggested on the guide, but keep in mind that these are not the only possible corrective actions that may be implemented. The recommended (and mandatory) corrective action(s) will be determined by the PM/FM/Supervisor, with the assistance of the SHE Coordinator/SHSC and Corporate SHE Director (when necessary), and stated in the appropriate column of the guide.

Corrective actions will be selected based upon effectiveness, cost versus benefit, feasibility, reliability, acceptance, effect on productivity, time required to implement, and any other factor deemed significant. Corrective actions can be monitored for implementation and completion using the Corrective Action Program Schedule (Attachment 3).

## 6.3 ANALYSIS

The Corporate SHE Director periodically analyzes the accident investigation data for the purpose of identifying underlying causes or general patterns. The analysis will also identify inadequate policies, procedures, or management systems that are not always readily evident when reviewing each individual accident.

## 6.4 DOCUMENTATION

Accident investigations may be documented using interviews and photographs, and by sequestering faulty tools and equipment that were involved, as well as by completing the appropriate forms (see Section 6.0, Record Keeping).

## 7.0 RECORD KEEPING

An Accident Investigation Interview Report (Attachment 1), *Guide for Identifying Causal Factors and Corrective Actions* (Attachment 2), and Corrective Action Program Schedule (Attachment 3) will be completed for work-related incident, injury, or illness that occurs.

## 8.0 REFERENCES

Fed-OSHA. 2000. 29 CFR 1904, *Recording and Reporting Occupational Injuries and Illnesses*.

Cal-OSHA. 2000. 8 CCR 3203, *Injury and Illness Prevention Program*.

National Safety Council. 1997. *Accident Prevention Manual for Business and Industry: Administration and Programs*. 10th ed.

## 9.0 ATTACHMENTS

1. Accident Investigation Interview Report
  2. *Guide for Identifying Causal Factors and Corrective Actions*
  3. Corrective Action Program Schedule
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**ATTACHMENT 1**

**ACCIDENT INVESTIGATION INTERVIEW REPORT**

Accident Investigation Interview Report



Name of Interviewer: \_\_\_\_\_ Name of Interviewee: \_\_\_\_\_

Department of Interviewer: \_\_\_\_\_ Department of Interviewee: \_\_\_\_\_

Project: \_\_\_\_\_ Time shift began: \_\_\_\_\_ a.m/p.m.

Project activity during this shift: \_\_\_\_\_

Accident date: \_\_\_\_\_ Time of accident: \_\_\_\_\_ a.m/p.m.

Date accident was reported: \_\_\_\_\_

Any injuries involved? Yes  No

Location of accident (include address, city, county, zip code): \_\_\_\_\_

Name of witnesses: \_\_\_\_\_

What was/were employee(s) doing when accident occurred? Be specific (e.g., walking, lifting, operating machinery, etc.)?

Please describe fully the events that resulted in the accident. Tell what happened and how it happened (do not describe the nature of the injury or property damage).

What machine, tool, or object was most closely connected to the accident? (e.g, machine employee struck against or which struck him, vehicle employee was driving)?

Nature of injury or property damage.

Additional Information or drawings can be included on the reverse side of this form.

Forward completed form to the appropriate Unit Manager and Corporate SHE Director.

**ATTACHMENT 2**

**GUIDE FOR IDENTIFYING CAUSAL FACTORS AND  
CORRECTIVE ACTIONS**

## Guide for Identifying Causal Factors and Corrective Actions

Project/Department: \_\_\_\_\_ Investigators: \_\_\_\_\_

Accident Date/Time: \_\_\_\_\_ Date/Time of Investigation: \_\_\_\_\_

### PART 1 - EQUIPMENT

Answer questions by placing an x in the appropriate box or circle (Y=Yes, N=No)

Y  N 1.0 WAS A HAZARDOUS CONDITION(S) A CONTRIBUTING FACTOR?

	CAUSAL FACTORS	COMMENTS	POSSIBLE CORRECTIVE ACTIONS	RECOMMENDED CORRECTIVE ACTIONS	TARGET COMPLETION DATE
<input type="radio"/> Y <input type="checkbox"/> N	1.1 Did any defect(s) in equipment/tool(s)/material contribute to hazardous condition(s)?		Review procedure for inspecting, reporting, maintaining, repairing, replacing, or recalling defective equipment/tool(s)/material used.		
<input type="checkbox"/> Y <input type="radio"/> N	1.2 Was the hazardous condition(s) recognized?  If yes, answer A and B. If no, proceed to 1.3		Perform job hazard analysis. Improve employee ability to recognize existing or potential hazardous conditions. Provide test equipment, as required, to detect hazard. Review any change or modification of equipment/tool(s)/material.		
<input type="checkbox"/> Y <input type="radio"/> N	A. Was the hazardous condition(s) reported?		Train employees in reporting procedures. Stress individual acceptance of responsibility.		
<input type="checkbox"/> Y <input type="radio"/> N	B. Was employee(s) informed of the hazardous condition(s) and the job procedures for dealing with it as an interim measure?		Review job procedures for hazard avoidance. Review supervisory responsibility. Improve supervisor-employee communications. Take action to remove or minimize hazard.		
<input type="checkbox"/> Y <input type="radio"/> N	1.3 Was there an equipment inspection procedure(s) to detect the hazardous condition(s)?		Develop and adopt procedures (for example, an inspection system) to detect hazardous conditions. Conduct test.		
<input type="checkbox"/> Y <input type="radio"/> N	1.4 Did the existing equipment inspection procedure(s) detect the hazardous condition(s)?		Review procedures. Change frequency or comprehensiveness. Provide test equipment as required. Improve employee ability to detect defects and hazardous conditions. Change job procedures as required.		
<input type="checkbox"/> Y <input type="radio"/> N	1.5 Was the correct equipment/tool(s)/material used?		Specify correct equipment/tool(s)/material in job procedures.		
<input type="checkbox"/> Y <input type="radio"/> N	1.6 Was the correct equipment/tool(s)/material readily available?		Provide correct equipment/tool(s)/material. Review purchasing specifications and procedures. Anticipate future requirements.		
<input type="checkbox"/> Y <input type="radio"/> N	1.7 Did employee(s) know where to obtain equipment/tool(s)/material required for the job?		Review procedures for storage, access, delivery, or distribution. Review job procedures for obtaining equipment/tool(s)/material.		
<input type="radio"/> Y <input type="checkbox"/> N	1.8 Was substitute equipment/tool(s)/material used in place of correct one?		Provide correct equipment/tool(s)/material. Warn against use of substitutes in job procedures and in job instruction.		
<input type="radio"/> Y <input type="checkbox"/> N	1.9 Did the design of the equipment/tool(s) create operator stress or encourage operator error?		Review human factors engineering principles. Alter equipment/tool(s) to make it more compatible with human capability and limitations. Review purchasing procedures and specifications. Check out new equipment and job procedures involving new equipment before putting into service. Encourage employees to report potential hazardous conditions created by equipment design.		
<input type="radio"/> Y <input type="checkbox"/> N	1.10 Did the general design or quality of the equipment/tool(s) contribute to a hazardous condition?		Review criteria in codes, standards, specifications, and regulations. Establish new criteria as required.		
<input type="radio"/>	1.11 List other causal factors in "Comments" column.				

**PART 2 - ENVIRONMENTAL**

<input type="radio"/> Y <input type="checkbox"/> N	2.0 WAS THE LOCATION/POSITION OF EQUIPMENT/MATERIALS/EMPLOYEE(S) A CONTRIBUTING FACTOR ?	CAUSAL FACTORS	COMMENTS	POSSIBLE CORRECTIVE ACTIONS	RECOMMENDED CORRECTIVE ACTIONS	TARGET COMPLETION DATE
<input type="radio"/> Y <input type="checkbox"/> N	2.1	Did the location/position of equipment/material/employee(s) contribute to a hazardous condition?		Perform job hazard analysis. Review job procedures. Change the location, position, or layout of the equipment. Change position of employee(s). Provide guardrails, barricades, barriers, warning lights, signs, or signals.		
<input type="checkbox"/> Y <input type="radio"/> N	2.2	Was the hazardous condition(s) recognized?	If yes, answer A and B. If no, proceed to 2.3	Perform job hazard analysis. Improve employee ability to recognize existing or potential hazardous conditions. Provide test equipment, as required, to detect hazard. Review any change or modification of equipment/tool(s)/material.		
<input type="checkbox"/> Y <input type="radio"/> N	A	Was the hazardous condition(s) reported?		Train employees in reporting procedures. Stress individual acceptance of responsibility.		
<input type="checkbox"/> Y <input type="radio"/> N	B	Was employee(s) informed of the job procedure for dealing with the hazardous condition as an interim action?		Review job procedures for hazard avoidance. Review supervisory responsibility. Improve supervisor-employee communications. Take action to remove or minimize hazard.		
<input type="checkbox"/> Y <input type="radio"/> N	2.3	Was employee(s) supposed to be in the vicinity of the equipment/material?		Review job procedures and instruction. Provide guardrails, barricades, barriers, warning lights, signs, or signals.		
<input type="checkbox"/> Y <input type="radio"/> N	2.4	Was the hazardous condition created by the location/position of equipment/material visible to employee(s)?		Change lighting or layout to increase visibility of equipment. Provide guardrails, barricades, barriers, warning lights, signs, or signals, floor stripes, etc.		
<input type="checkbox"/> Y <input type="radio"/> N	2.5	Was there sufficient workspace?		Review workspace requirements and modify as required.		
<input type="radio"/> Y <input type="checkbox"/> N	2.6	Were environmental conditions a contributing factor (for example, illumination, noise levels, air contaminant, temperature extremes, ventilation, vibration, radiation)?		Monitor, or periodically check environmental conditions as required. Check results against acceptable levels. Initiate action for those found unacceptable.		
<input type="radio"/> Y	2.7	List other causal factors in "Comment" column.				

**PART 3 - PEOPLE**

<input type="radio"/> Y <input type="checkbox"/> N	3.0 WAS THE JOB PROCEDURE(S) USED A CONTRIBUTING FACTOR?	CAUSAL FACTORS	COMMENTS	POSSIBLE CORRECTIVE ACTIONS	RECOMMENDED CORRECTIVE ACTIONS	TARGET COMPLETION DATE
<input type="checkbox"/> Y <input type="radio"/> N	3.1	Was there a written or known procedure (rules) for this job ?		Perform job hazard analysis and develop safe job procedures.		
<input type="checkbox"/> Y <input type="radio"/> N		If yes, answer A, B, and C. If no, proceed to 3.2.				
<input type="checkbox"/> Y <input type="radio"/> N	A	Did job procedures anticipate the factors that contributed to the accident?		Perform job hazard analysis and change job procedures.		
<input type="checkbox"/> Y <input type="radio"/> N	B	Did employee(s) know the job procedure?		Improve job instruction. Train employees in correct job procedures.		
<input type="radio"/> Y <input type="checkbox"/> N	C	Did employee(s) deviate from the known job procedure?		Determine why. Encourage all employees to report problems with an established procedure to supervision. Review job procedure and modify if necessary. Counsel or discipline employee. Provide closer supervision.		
<input type="checkbox"/> Y <input type="radio"/> N	3.2	Was employee(s) mentally and physically capable of performing the job?		Review employee requirements for the job. Improve employee selection. Remove or transfer employees who are temporarily, either mentally or physically, incapable of performing the job.		
<input type="radio"/> Y <input type="checkbox"/> N	3.3	Were any tasks in the job procedure too difficult to perform (for example, excessive concentration or physical demands)?		Change job design and procedures.		
<input type="radio"/> Y <input type="checkbox"/> N	3.4	Is the job structured to encourage or require deviation from job procedures (for example, incentive, piecework, work pace)?		Change job design and procedures.		
<input type="radio"/> Y	3.5	List other causal factors in "Comments" column.				
<input type="radio"/> Y <input type="checkbox"/> N	3.6	WAS LACK OF PERSONAL PROTECTIVE EQUIPMENT OR EMERGENCY EQUIPMENT A CONTRIBUTING FACTOR IN THE INJURY?				

### PART 3 - PEOPLE (Continued)

Answer questions by placing an x in the appropriate box or circle (Y=Yes, N=No)

	CAUSAL FACTORS	COMMENTS	POSSIBLE CORRECTIVE ACTIONS	RECOMMENDED CORRECTIVE ACTIONS	TARGET COMPLETION DATE
<b>NOTE: THE FOLLOWING CAUSAL FACTORS RELATE TO THE INJURY.</b>					
<input type="checkbox"/> Y <input type="checkbox"/> N	3.7 Was appropriate personal protective equipment (PPE) specified for the task or job?  If yes, answer A, B, and C. If no, proceed to 3.8.		Review methods to specify PPE requirements.		
<input type="checkbox"/> Y <input type="checkbox"/> N	A. Was appropriate PPE available?		Provide appropriate PPE. Review purchasing and distribution procedures.		
<input type="checkbox"/> Y <input type="checkbox"/> N	B. Did employee(s) know that wearing specified PPE was required?		Review job procedures. Improve job instruction.		
<input type="checkbox"/> Y <input type="checkbox"/> N	C. Did employee(s) know how to use and maintain the PPE?		Improve job instruction.		
<input type="checkbox"/> Y <input type="checkbox"/> N	3.8 Was the PPE used properly when the injury occurred?		Determine why and take appropriate action. Implement procedures to monitor and enforce use of PPE.		
<input type="checkbox"/> Y <input type="checkbox"/> N	3.9 Was the PPE adequate?		Review PPE requirements. Check standards, specification, and certification of the PPE.		
<input type="checkbox"/> Y <input type="checkbox"/> N	3.10 Was emergency equipment specified for this job (for example, emergency showers, eyewash fountains)?  If yes, answer the following. If no, proceed to Part 4.		Provide emergency equipment as required.		
<input type="checkbox"/> Y <input type="checkbox"/> N	A. Was emergency equipment readily available?		Install emergency equipment at appropriate locations		
<input type="checkbox"/> Y <input type="checkbox"/> N	B. Was emergency equipment properly used?		Incorporate use of emergency equipment in job procedures.		
<input type="checkbox"/> Y <input type="checkbox"/> N	C. Did emergency equipment function properly?		Establish inspection/monitoring system for emergency equipment. Provide for immediate repair of defects.		
<input type="checkbox"/> Y <input type="checkbox"/> N	3.11 List other causal factors in "Comment" column.				

### PART 4 - MANAGEMENT

	CAUSAL FACTORS	COMMENTS	POSSIBLE CORRECTIVE ACTIONS	RECOMMENDED CORRECTIVE ACTIONS	TARGET COMPLETION DATE
<input type="checkbox"/> Y <input type="checkbox"/> N	4.0 WAS A MANAGEMENT SYSTEM DEFECT A CONTRIBUTING FACTOR?				
<input type="checkbox"/> Y <input type="checkbox"/> N	4.1 Was there a failure by supervision to detect, anticipate, or report a hazardous condition?		Improve supervisor capability in hazard recognition and reporting procedures.		
<input type="checkbox"/> Y <input type="checkbox"/> N	4.2 Was there a failure by supervision to detect or correct deviations from job procedure?		Review job hazard analysis and job procedures. Increase supervisor monitoring. Correct deviations.		
<input type="checkbox"/> Y <input type="checkbox"/> N	4.3 Was there a supervisor/employee review of hazards and job procedures for tasks performed infrequently? (Not applicable to all accidents.)		Establish a procedure that requires a review of hazards and job procedures (preventive actions) for tasks performed infrequently.		
<input type="checkbox"/> Y <input type="checkbox"/> N	4.4 Was supervisor responsibility and accountability defined and understood?		Define and communicate supervisor responsibility and accountability. Test for understandability and acceptance.		
<input type="checkbox"/> Y <input type="checkbox"/> N	4.5 Was supervisor adequately trained to fulfill assigned responsibility in accident prevention?		Train supervisors in accident prevention fundamentals.		
<input type="checkbox"/> Y <input type="checkbox"/> N	4.6 Was there a failure to initiate corrective action for a known hazardous condition that contributed to this accident?		Review management safety policy and level of risk acceptance. Establish priorities based on potential severity and probability of recurrence. Review procedure and responsibility to initiate and carry out corrective actions. Monitor progress.		
<input type="checkbox"/> Y <input type="checkbox"/> N	4.7 List other causal factors in "Comments" column.				
<input checked="" type="checkbox"/> X	ITEM IS A CAUSAL FACTOR				
<input type="checkbox"/> X	ITEM IS NOT A CAUSAL FACTOR				

**ATTACHMENT 3**  
**CORRECTIVE ACTION PROGRAM SCHEDULE**



# Corrective Action Program Schedule

Location \_\_\_\_\_ Attention \_\_\_\_\_ Date \_\_\_\_\_

Item No.	Description of Item	Assigned To	Date Assigned	Completion Target	Date Completed	Status

# STANDARD OPERATING PROCEDURE

		S.O.P. No. A-2	PAGE 1 OF 6
APPROVAL Denise L. Daggett, MS, CIH <i>Denise L. Daggett, CIH</i>	EFFECTIVE DATE 05/24/02	REVISION No. 0	
TITLE <b>HOUSEKEEPING</b>			

## 1.0 INTRODUCTION

The term "housekeeping" should not be mistaken merely for push-broom efforts. It includes the orderly arrangement of equipment, supplies, tools, and storage facilities. Good housekeeping is a practical method of increasing efficiency of operation, reducing accidents, and improving morale.

## 2.0 RESPONSIBILITIES

### 2.1 SUPERVISORS

- Supervisors should, on a regular basis, observe the conditions in the offices and areas they are responsible for to ensure conformance with good housekeeping practices.

### 2.2 SAFETY, HEALTH, AND ENVIRONMENT COORDINATOR OR SITE HEALTH AND SAFETY COORDINATOR

The Safety, Health, and Environment Coordinator (SHE Coordinator) or Site Health and Safety Coordinator (SHSC) will inspect work areas periodically and bring housekeeping concerns to the attention of the applicable employee or supervisor. If the corrective action to address a housekeeping concern is time-consuming, complex, or will incur costs, the Unit Manager or Project Manager will be notified.

### 2.3 EMPLOYEES

- Maintaining orderliness and cleanliness is the direct responsibility of every employee.

## 3.0 HOUSEKEEPING GUIDELINES

- Housekeeping refers to the neatness and general order under which operations are conducted. This applies to all areas of AMEC Earth & Environmental, Inc. (AEE), including offices, laboratories, and operating areas.
- Housekeeping covers the way materials, articles, and supplies are handled, stored, and placed in the areas where they are to be used. Clean aisles, organized stacks of materials, tools in their place, and proper waste disposal are good indications that personnel in the area understand the importance of housekeeping.
- Housekeeping standards are designed to promote safe working conditions, reduce material and equipment inventories, and increase personnel efficiency. Cluttered areas, with equipment and supplies precariously stacked, tools and parts randomly distributed on work surfaces, and spilled liquids on floors and counter surfaces, create safety hazards.

## 4.0 GENERAL HOUSEKEEPING PROCEDURES

### 4.1 CLEANUPS

During periods of accelerated schedules, work and storage areas may become cluttered with accumulated equipment, parts, and materials. Periodic cleanups are required in all areas to prevent an overwhelming task later on.

### 4.2 PACKAGING AND SHIPPING MATERIALS

AEE is continually receiving shipments of materials in cardboard, plastic, and wooden containers packed with paper excelsior, sponge rubber, or plastic. These packing materials are often stored by individuals for future use. The resulting conglomeration of excessive flammable materials constitutes a fire hazard. All but the barest minimum of packing containers and materials should be discarded or recycled as soon as the shipment is unpacked.

### 4.3 STORAGE

Equipment or materials that are no longer needed or will not be needed for some time must be stored in a general storage area.

### 4.4 HOUSEKEEPING INSPECTION

Some conditions should be brought to the attention of the immediate supervisor so that proper housekeeping measures can reduce or eliminate the problem. Examples of these conditions include the following:

- dirt, trash, and discarded items on the floor
  - excessive materials, cluttered and uncontrolled storage on shelves and filing cabinets
  - unclean equipment, excessive accumulation of dust, chips, or scrap
  - misplaced personal items: clothing, food on top of benches, tables, or machines
  - improper storage, such as in corners, on the floor, behind equipment, etc.
  - protruding nails, rough and jagged corners, materials protruding from stock racks or shelves
  - water, oil, and grease that present a slipping hazard on walkways and floors
  - improper storage of flammable liquids
  - oily waste materials not in proper containers
  - fire extinguishers and emergency exits blocked or obstructed
  - tripping and slipping hazards
-

**5.0 HOUSEKEEPING FOR OFFICE AREAS**

- Drawers of file cabinets and desks shall be kept closed at all times when not in use to prevent bumping them accidentally.
- The top drawers of tall filing cabinets should never be overloaded compared to the bottom drawers. When top drawers are opened, the bottom drawer should also be opened to act as a counterbalance to prevent the cabinet from falling over on the workers.
- Brace round objects to prevent rolling off a counter or along the floor.
- Bookcase shelves shall be filled with heavier materials placed on the center and lower shelves to avoid a top-heavy condition. Materials on the shelves should be arranged to avoid having sharp or heavy objects projecting from the shelf edge. Lighter objects should be placed on the top shelves.
- Flammable liquids, such as photocopier cleaner, must be used sparingly in a well-ventilated area. When using solvents, personnel should take care to avoid breathing the vapors.
- Food items, partially consumed and in opened packages, must not be kept in desks for sanitation reasons and because they attract mice and insects.
- If smoking is permitted at an AEE location, ash trays must be provided and emptied frequently after making sure the contents are extinguished and cold.
- Fire in a wastebasket, if it occurs, can be smothered by pushing another wastebasket down into the burning material or utilizing an appropriate fire extinguisher. If in doubt as to your ability to put out a fire, evacuate the area and contact the Fire Department by dialing 911.
- Loose papers, drawings, and data associated with a task shall be filed, stored, or otherwise disposed of as soon as possible upon completion of the work.
- Maintain clear access to walkways, exits, emergency equipment, and utility disconnects.
- Any hazardous material or waste will be disposed of in a safe and proper manner. Do not dispose of any hazardous substances down the sink or toilet. If in doubt, consult your SHE Coordinator.

**6.0 HOUSEKEEPING FOR MATERIALS/SOILS LABORATORIES**

- Spills and leaks shall be cleaned up carefully as soon as observed.
- Floors must be kept clean and dry to prevent slippage or contamination of footwear. Aisles should not be used for storage. Never store packages in the path of an opening and closing door.
- Benches and work tables shall be kept clear of extraneous material.

- All containers shall be labeled clearly. Unlabeled materials shall be discarded.
- Idle equipment and apparatus that has not been used for 6 months or more shall be placed in storage.
- Supplies must not be stockpiled in excess.
- Reagents, bottles, and larger containers of materials must always be returned to their proper locations as soon as time permits.
- Broken glassware shall be placed in containers designated for this purpose and never mixed in with waste paper.
- Beakers and other laboratory equipment shall never be used for food or drink.
- Lunches, snacks, and beverages must be consumed outside of lab work areas.
- Waste chemicals shall be discarded properly to prevent toxic, corrosive, or explosive combinations with other discarded materials.
- Acids shall be stored separately from bases. Flammables shall NOT be stored with acids or bases.
- Emergency equipment must be checked frequently to ensure that the access path is clear, and that it is serviced and in order.
- Cleanup campaigns, in addition to daily care, should be scheduled at regular intervals.

## 7.0 HOUSEKEEPING FOR FIELD OPERATIONS

- Fire extinguishers, fire hoses, eye washes, and first aid kits shall be kept in designated locations when not in use, and access to them should never be obstructed. When a fire extinguisher is used, however little, its use must be reported to the SHSC, who will arrange for the extinguisher to be replaced while it is refilling.
- Maintain clear access to walkways, exit routes, roadways, emergency equipment, and utility disconnects.
- Storage areas shall be set up and maintained in a manner that facilitates good housekeeping. Haphazard storage of equipment and materials can result in a poor and incomplete assessment of supplies on hand and unnecessary reordering.
- Drivers of vehicles should know the whereabouts of equipment stationed outside the vehicle to prevent bumping or running over it.
- Brooms, shovels, mops, brushes, and dust pans must be returned to an appropriately designated storage area when not in use.

- Brace round objects to prevent rolling off or a trip/fall hazard.
- Cigars, cigarettes, and pipes are not allowed in work areas. Smoking is permitted only in designated areas. Ashes must be disposed of only in appropriate containers and never thrown on the floor.
- Flammable solvents used in work areas must be stored in safety cans.
- Electrical cords must be checked frequently for breaks or cracks in the insulation. Cords should always be kept coiled or restricted to the length needed to prevent damage to them and obstruction hazards to personnel.
- Cracked or split wood handles on tools will be replaced, not taped.
- Waste oil, solvents, and other fluids will be disposed of in a safe and proper manner. Do not dispose of hazardous materials or waste into sewers or surface drainage systems. If in doubt, contact your SHSC.
- Keep all accumulated trash, oily rags, and combustible materials in covered metal containers clearly labeled for the storage of waste materials.

**8.0 REFERENCES**

Fed-OSHA. 29 CFR 1910.38, *Fire Prevention Plan*.

Fed-OSHA. 29 CFR 1910.106, *Flammable and Combustible Liquids*.

# STANDARD OPERATING PROCEDURE

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S.O.P. No. A-2

PAGE 6 OF 6

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# STANDARD OPERATING PROCEDURE

S.O.P. No. A-9

PAGE 1 OF 4

APPROVAL

EFFECTIVE DATE

REVISION No. 0

Denise L. Daggett, MS, CIH *Denise L. Daggett, CIH*

05/24/02

TITLE

**GUIDANCE FOR CONDUCTING TAILGATE SAFETY MEETING**

## 1.0 INTRODUCTION

Employees, subcontractors, and visitors who perform work activities away from the office environment must recognize and understand hazards to health and safety associated with site activities. Formal classroom instruction provides the foundation for site workers to understand programs and procedures of work. However, regular site-specific training is necessary to familiarize the site staff with the site-specific Health and Safety Plan (HSP), pertinent standard operating procedures (SOPs), and site-specific hazards.

## 2.0 PURPOSE

The purpose of this procedure is to ensure that field project tailgate safety meetings are comprehensive and appropriate to the hazards present on-site. This procedure will also ensure that tailgate safety meetings are documented appropriately.

## 3.0 SCOPE

This procedure applies to all AMEC Earth & Environmental, Inc. (AEE) personnel, personnel subcontracted to AEE, and visitors of AEE who may participate in tailgate safety meetings on AEE jobsites. This procedure applies to all hazardous as well as nonhazardous field projects, regardless of their duration or location. This includes, but is not limited to, the following:

- environmental site assessments (including Phase I and II, environmental impact report/environmental impact statement [EIR/EIS], etc.)
- biological site evaluations
- sample collection (soil, groundwater, plants, terrestrial animals, marine specimens, etc.)
- air quality investigations
- geotechnical evaluations
- remediation and construction
- Site Investigations (SIs) and Remedial Investigations/Feasibility Studies (RI/FSs)
- Remediation projects

## 4.0 RESPONSIBILITIES

### 4.1 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR

The Corporate Safety, Health, and Environment Director (Corporate SHE Director) is responsible for ensuring that the frequency of tailgate safety meetings stated in the site-specific HSP is in accordance with the AEE policy stated in Volume II of the Corporate SHE Manual, Comprehensive Field Project Health and Safety Program.

**4.2 PROJECT MANAGER/FIELD MANAGER**

It is the responsibility of the Project Manager (PM)/Field Manager (FM) to ensure that regular tailgate safety meetings are conducted (by the PM, FM, Site Health and Safety Coordinator [SHSC]), or a rotation of field team members and subcontractor team members).

**4.3 SITE HEALTH AND SAFETY COORDINATOR**

The SHSC provides the necessary information to the person conducting the tailgate safety meeting, so that new hazards or site conditions and observations will be addressed in the next tailgate safety meeting.

**4.4 SITE STAFF**

It is the responsibility of the site staff to attend the tailgate safety meetings and participate in the instruction and discussion. Site staff shall be directed by the SHSC to request clarification on any unclear or confusing issues discussed in the tailgate safety meetings.

**5.0 PROCEDURE**

This section details the items that shall be discussed during a tailgate safety meeting. These items are intended to serve as general guidelines and are not considered comprehensive. Other items or issues that arise during the course of the project should be addressed as appropriate.

**5.1 INITIAL KICKOFF MEETING**

The initial kickoff meeting shall be the most comprehensive of the tailgate safety meetings, except when special circumstances warrant a more extensive subsequent tailgate safety meeting. The initial kickoff session will be attended by all site personnel, including subcontractors and visitors, prior to the commencement of work and will include the following as applicable:

- scope of work summarizing all phases of project field work
- health effects and hazards of the chemical, physical, biological, and energy agents identified or suspected to be on-site
- responsibilities of site personnel
- personnel protection, including
  - administrative and engineering controls that will be employed on-site
  - use, care, and fitting of personal protective equipment (PPE)
  - necessity for personnel protection, its effectiveness and limitations
- decontamination procedures (if applicable)
- prohibitions in work areas
- site layout and control
- standard safe work practices and use of the buddy system
- emergency procedures, including
  - emergency contacts
  - instructions for implementing the emergency plan
  - location of emergency equipment

The person conducting the initial kickoff meeting will document it on an Tailgate Safety Meeting Report form (Attachment 1).

## **5.2 REGULAR TAILGATE SAFETY MEETINGS**

Tailgate safety meetings subsequent to the initial kickoff meeting shall be conducted regularly, in accordance with the Comprehensive Field Project Health and Safety Program, Volume II of this manual. Tailgate safety meetings for hazardous waste field projects are conducted daily; whereas, tailgate safety meetings for nonhazardous waste field projects may be held less frequently, in accordance with the frequency stipulated in the HSP. Each regular tailgate safety meeting will be attended by all site personnel and site visitors who will work on the field project during the time frame to which the tailgate safety meeting applies.

Tailgate safety meetings conducted subsequent to the initial kickoff safety meeting will address any of the issues discussed at the initial meeting that warrant reemphasis. Additional topics that should be covered in the tailgate safety meetings may include as applicable:

- scheduled work and associated hazards for the applicable time frame
- near-miss incidents, accidents, and injuries that have occurred on-site since the time of the last tailgate safety meeting
- health effects and hazards of the chemical, physical, biological, and energy agents identified or suspected to be on-site in the specific areas of the site during the applicable time frame
- observations of unsafe work practices or conditions that have developed since the time of the previous tailgate safety meeting
- changes in site personnel that have occurred since the time of the previous tailgate safety meeting
- administrative and engineering controls that will be utilized during the applicable time frame
- required PPE for the identified hazards during the applicable time frame
- prohibitions in the specific areas of the site where work will occur during the applicable time frame
- changes in emergency procedures, evacuation routes, or safe refuge areas that have developed since the time of the previous tailgate safety meeting

Tailgate safety meetings will be documented on an Tailgate Safety Meeting Report form (Attachment 1).

## **5.3 UNSCHEDULED TAILGATE SAFETY MEETINGS**

Situations or events that warrant the conduct of an unscheduled tailgate safety meeting include:

- injuries, illnesses, or incidents
- mobilization to a portion of the project site that presents hazards different from those presented by the previous work area
- establishment of a new safe refuge area
- change in site personnel
- initiation of site activities or scope of work not addressed in the previous tailgate safety meeting

Unscheduled tailgate safety meetings will also be documented on the AMEC Tailgate Safety Meeting Report form (Attachment 1).

**5.4 SITE VISITOR/SUBCONTRACTOR HEALTH AND SAFETY ORIENTATION**

A health and safety orientation will be administered by the FM, SHSC, or designee to site visitors or subcontractors new to the site since the time of the previous tailgate safety meeting. Health and safety information will be documented on a completed Site Visitor Health and Safety Orientation form (Attachment 2) or a completed Subcontractor Health and Safety Orientation form (Attachment 3), as applicable. Visitors and subcontractors receiving the orientation shall read the applicable Orientation forms and will address any questions to the FM, SHSC, or designee for response before entry to the site, and will sign the acknowledgment portion of the form indicating that they understand and agree to abide by the site policies and procedures.

**6.0 RECORDS**

The following forms will be completed and maintained in the health and safety files for the project:

- AMEC Tailgate Safety Meeting Report
- Site Visitor Health and Safety Orientation Form
- Subcontractor Health and Safety Orientation Form

**7.0 REFERENCES**

Cal-OSHA. 8 CCR 3203, *Injury and Illness Prevention Program*.

**8.0 ATTACHMENTS**

1. AMEC Tailgate Safety Meeting Report
2. Site Visitor Health and Safety Orientation Form
3. Subcontractor Health and Safety Orientation Form

**ATTACHMENT 1**

**AMEC TAILGATE SAFETY MEETING REPORT**

AMEC Earth & Environmental, Inc.  
Tailgate Safety Meeting Report



Check One:

- Initial Kickoff Safety Meeting     Regular/Daily Tailgate Safety Meeting     Unscheduled Tailgate Safety Meeting

Date: \_\_\_\_\_ Site: \_\_\_\_\_

Field Manager: \_\_\_\_\_ (print)    Site Health and Safety Coordinator: \_\_\_\_\_ (print)

**Order of Business**

Topics Discussed (check all that apply):

- |  |  |
|--|--|
| <input type="checkbox"/> Site History/Site Layout  | <input type="checkbox"/> Engineering Controls  |
| <input type="checkbox"/> Scope of Work   | <input type="checkbox"/> PPE Required/PPE Used   |
| <input type="checkbox"/> Personnel Responsibilities  | <input type="checkbox"/> Define PPE Levels, Donning, Doffing Procedures  |
| <input type="checkbox"/> Medical Surveillance Requirements   | <input type="checkbox"/> Physical Hazards and Controls (e.g., overhead utility lines)  |
| <input type="checkbox"/> Training Requirements   | <input type="checkbox"/> Decontamination Procedures for Personnel and Equipment  |
| <input type="checkbox"/> Safe Work Practices   | <input type="checkbox"/> General Emergency Procedures (e.g., locations of air horns and what 1 or 2 blasts indicate)                 |
| <input type="checkbox"/> Logs, Reports, Recordkeeping  | <input type="checkbox"/> Site/Regional Emergency Procedures (e.g., earthquake response, typhoon response, etc.)                      |
| <input type="checkbox"/> Sanitation and Illumination   | <input type="checkbox"/> Medical Emergency Response Procedures (e.g., exposure control precautions, location of first aid kit, etc.) |
| <input type="checkbox"/> Air Surveillance Type and Frequency   | <input type="checkbox"/> Hazardous Materials Spill Procedures  |
| <input type="checkbox"/> Monitoring Instruments and Personal Monitoring  | <input type="checkbox"/> Applicable SOPs (e.g., Hearing Conservation Program, Safe Driving, etc.)                                    |
| <input type="checkbox"/> Action Levels   | <input type="checkbox"/> Injury/Illness Reporting Procedures   |
| <input type="checkbox"/> Accident Reporting Procedures   | <input type="checkbox"/> Route to Hospital and Medical Care Provider Visit Guidelines  |
| <input type="checkbox"/> Site Control (visitor access, buddy system, work zones, security, communications)   | <input type="checkbox"/> Hazard Analysis of Work Tasks (chemical, physical, biological and energy health hazards and effects)        |
| <input type="checkbox"/> Discussion of previous "near misses" including work crew suggestions to correct work practices to avoid similar occurrences |  |

Safety suggestions by site workers: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Action taken on previous suggestions: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Injuries/accidents/personnel changes since previous meeting: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_



**ATTACHMENT 2**

**SITE VISITOR HEALTH AND SAFETY  
ORIENTATION FORM**



**SITE VISITOR HEALTH AND SAFETY  
ORIENTATION FORM**

SITE \_\_\_\_\_ DATE \_\_\_\_\_

SITE HEALTH AND SAFETY COORDINATOR \_\_\_\_\_

SITE DESCRIPTION \_\_\_\_\_

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POSSIBLE SITE CONTAMINANTS AND HAZARDS \_\_\_\_\_

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The information summarized below is important for you to read and fully understand. This information has been extracted from the site-specific Health and Safety Plan, and has been compiled to help ensure your health and safety on-site. If you have any questions regarding the information presented below, please ask your escort for clarification.

**HEALTH, SAFETY, AND SECURITY INFORMATION**

1. You must sign in and out of the Visitor Log Book maintained at the site. This assists in identifying all the visitors at the site in the event of an emergency.
2. If your business takes you beyond the designated VISITOR AREAS, you must be escorted. If you are observed unescorted in an unauthorized area, you will be asked to leave immediately.
3. Areas marked with yellow-and-black tape stating "CAUTION - DO NOT ENTER" demarcate where the Exclusion (contaminated) areas begin. You are not allowed to enter these areas.
4. Access to the contaminated area is strictly forbidden to all visitors unless they have approval of the client and can produce adequate written proof of acceptable training and medical certification prior to arrival on-site.
5. Hard hats and visitor safety glasses must be worn at all times on-site. Your escort will provide you with this safety equipment.

6. Please read and follow all safety signs on-site. The signs are there to alert you to possible physical and chemical hazards.
7. Eating and smoking is not allowed on-site. You may eat or smoke in designated clean areas or in your vehicle.
8. Please be cautious around heavy or moving equipment and vehicles.
9. Report any accident or injury to your escort.
10. No one under the age of 18 is permitted on-site without prior approval of the client.
11. No domestic animals are permitted on-site.
12. Please do not disrupt site activities or contribute to any unnecessary delays.

**EMERGENCY NOTIFICATION**

1. In the event of a site emergency, please walk immediately to the designated meeting area for the site. You will receive further instructions at this location. Please stay in this meeting area until the all-clear signal is given from the Site Health and Safety Coordinator or off-site emergency support personnel.
2. Please cooperate fully with those in authority in the event of an emergency.

**ACKNOWLEDGEMENT OF INFORMATION**

I have read and understand the above information provided by AEE, have had an opportunity to direct questions of a health and safety nature, and have received adequate answers or explanations from my escort or other site staff member. My signature also indicates that my employer assumes the risk of any injury or property damage that may occur to me or by me.

<b>Visitor Signature</b>	<b>Print Name</b>	<b>Affiliation</b>	<b>Date</b>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

**ATTACHMENT 3**

**SUBCONTRACTOR HEALTH AND SAFETY  
ORIENTATION FORM**



**SUBCONTRACTOR HEALTH AND SAFETY  
ORIENTATION FORM**

SITE \_\_\_\_\_ DATE \_\_\_\_\_

SITE HEALTH AND SAFETY COORDINATOR \_\_\_\_\_

SITE DESCRIPTION \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

POSSIBLE SITE CONTAMINANTS AND HAZARDS \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

The information summarized below is important for you to read and fully understand. This information has been extracted from the site-specific Health and Safety Plan, and has been compiled to help ensure your health and safety on-site. If you have any questions regarding the information presented below, please ask your escort for clarification.

**HEALTH, SAFETY, AND SECURITY INFORMATION**

1. All subcontracting personnel must acknowledge their presence on-site by checking in with the Site Health and Safety Coordinator. This assists in identifying all the personnel at the site in the event of an emergency.
2. All subcontracting personnel will be restricted to their "contracted" area(s). Do not enter any of the contaminated areas (marked with yellow-and-black caution tape) unless you have been authorized by site management and are wearing the proper protective equipment.
3. Hard hats, safety glasses, and safety boots are **REQUIRED** to be worn while you are working on-site.
4. Please read and heed all safety signs on-site. These signs are there to alert you to possible physical and chemical hazards.
5. Eating and smoking is not allowed on-site. You may eat or smoke in designated clean areas or in your vehicle.
6. Shirts are required at all times; long-sleeved shirts are preferred.

7. Before beginning any HOT WORK (welding, burning, and grinding) you must notify the Site Health and Safety Coordinator. The work area must be checked for flammables and combustibles, and a proper fire extinguisher must be close by before beginning the hot work.
8. Observe the proper lockout/tagout procedure before working on electrical and/or rotating equipment.
9. Normal subcontractor shift hours coincide with the regular AEE work schedule.
10. Report any accident or injury (even if minor to you) to the Site Health and Safety Coordinator.
11. No one under the age of 18 is permitted on-site without prior approval of the client.
12. No domestic animals are permitted on-site.
13. Complete cooperation with the Health and Safety Plan must be maintained. Any violation may result in expulsion from the site.
14. In the event of an on-site emergency, please walk immediately to the designated meeting area for the site. You will receive further instructions from this location. Please stay in the meeting area until the all-clear signal is given from the Site Health and Safety Coordinator or off-site emergency support personnel.
15. Please cooperate fully with those in authority in the event of an emergency.

**ACKNOWLEDGEMENT OF INFORMATION**

I have read and understand the above information provided by AEE and have had an opportunity to direct questions of a health and safety nature, and have received adequate answer or explanations from my escort or other site staff member.

<b>Subcontractor Signature</b>	<b>Print Name</b>	<b>Affiliation</b>	<b>Date</b>
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____



# STANDARD OPERATING PROCEDURE

S.O.P. No. ER-1

PAGE 1 OF 4

APPROVAL

Denise L. Daggett, MS, CIH

*Denise L. Daggett, CIH*

EFFECTIVE DATE

05/24/02

REVISION No.

0

TITLE

## BLOODBORNE PATHOGEN EXPOSURE CONTROL PLAN FOR FIELD OPERATIONS

### 1.0 PURPOSE

The purpose of this procedure is to provide AMEC Earth & Environmental, Inc. (AEE) personnel with the guidelines for action should personnel become exposed to bloodborne pathogens. All trained field personnel who administer first aid and/or cardiopulmonary resuscitation (CPR) to injuries involving blood or certain other body fluids have the potential of being exposed to bloodborne pathogens.

### 2.0 SCOPE

This procedure applies to AEE field personnel, personnel subcontracted to AEE, and visitors (including clients) of AEE who may work on or visit AEE jobsites.

### 3.0 DEFINITIONS

**Bloodborne Pathogens** - a disease-bearing microorganism that is transmitted via blood products from one person to another.

**Universal Precautions** - preventive measures that should be followed in all situations involving exposure to blood products, which assume that all human blood and certain human body fluids are infected with Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and other bloodborne pathogens.

### 4.0 EXPOSURE RESPONSIBILITIES

Once an incident occurs, emergency actions must be followed for the safety of all responding personnel. It is the responsibility of the Project Manager (PM), Field Manager (FM), and Site Health and Safety Coordinator (SHSC) to ensure that this procedure is followed by all personnel.

All field personnel are responsible for implementing this procedure if responding to an incident involving first aid and blood or body fluid products. It is AEE policy to assume that all blood and other bodily fluids are infected with bloodborne pathogens; therefore, universal precautions must be employed.

#### 4.1 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR

It is the responsibility of the Corporate SHE Director to ensure that this procedure complies with Occupational Safety and Health Administration (OSHA) and applicable state guidelines, to review all injury/illness and First Aid Incident Reports, and to forward these documents to Human Resources. The regional SHE Manager is also responsible for informing the client of an incident requiring medical attention, in accordance with contractual agreements.

## 4.2 FIELD MANAGER

The FM is responsible for ensuring that all on-site personnel are familiar with this procedure and coordinating with the SHSC to ensure that all precautions are followed to prevent exposure to bloodborne pathogens.

In the event of a blood-bearing injury, the FM also ensures that all required reports are completed and submitted in a timely manner to the PM and Corporate SHE Director.

## 4.3 PROJECT MANAGER

The PM is responsible for incorporating the requirements of this procedure into project plans, budgets, and activities, including appropriate first aid equipment. The PM is responsible for informing the Corporate SHE Director and client (as stipulated in the contract) of an incident requiring medical attention.

## 4.4 SITE HEALTH AND SAFETY COORDINATOR

The SHSC is responsible for implementing and enforcing this procedure during project operations and activities. The SHSC will serve as a first responder in all first aid incidents and will coordinate with the FM to ensure that all precautions to prevent exposure to bloodborne pathogens are taken. When an incident occurs, the SHSC will immediately stop all work, follow universal precautions, and then attend to the injured party.

## 4.5 SUBCONTRACTORS

All personnel subcontracted to AEE and working on a project are subject to the requirements of this procedure along with those specified by the subcontracting company.

## 5.0 PROCEDURE

This procedure details the steps required to coordinate and manage emergency action procedures in the event of a bloodborne pathogen incident. Both the SHSC and the FM must work together to ensure the safety of personnel.

### 5.1 EXPOSURE DETERMINATION

AEE has not identified any existing job classifications or tasks where an occupational exposure would result from the performance of an employee's primary job duties. This exposure determination, however, would need to be modified in the event that an employee performs work on a site that contains biohazardous or medical waste.

Some employees have been identified as having collateral duties that could potentially involve an occupational exposure. These personnel include all employees performing work on field project sites. Tasks and procedures that, when performed, could involve an occupational exposure include:

- first aid response to a bleeding injury
  - performing CPR or rescue breathing on an injured victim
-

- recipient to CPR, rescue breathing, or first aid
- performing cleanup at the site after treatment for a blood-bearing injury

## **5.2 EXPOSURE CONTROL**

To control possible infection, responders to a bloodborne pathogen incident must follow the Center for Disease Control Universal Precautions. While rendering first aid where exposure to blood may occur, AEE employees must use designated personal protective equipment (PPE). This includes, at a minimum, latex or blue nitrile gloves. Protective gloves will be included in the field first aid kit in a bloodborne pathogen exposure control kit. Other items in the bloodborne pathogen exposure control kit that will help control the "spill" include absorbent beads, a plastic scooper, a biohazard (red) bag for waste, and towelettes for disinfecting surfaces and cleaning hands. For disinfecting larger surfaces, bottled bleach is recommended. In the event of a serious blood-bearing injury, safety glasses, Tyvek® coveralls, boot covers, protective outer gloves, and a one-way CPR mask will be available as PPE or in the first aid kit should the need arise. The one-way CPR mask is used for placement on an injured victim who requires rescue breathing or CPR to prevent direct contact between the rescuer and recipient.

## **5.3 HEPATITIS B VIRUS VACCINATION**

First aid providers to job site injuries need not receive a pre-exposure HBV vaccine; however, all first aid providers assisting in any situation involving an exposure incident, must be offered the full Hepatitis B immunization series no later than 24 hours after an incident. Medical facilities that provide the immunization series are listed in the site-specific Health and Safety Plans (HSPs). Employees may refuse the HBV vaccination for any reason (religious, personal, or otherwise) by contacting the Corporate SHE Director or SHSC. Employees who refuse a recommended vaccine will be required to sign the Hepatitis B Virus (HBV) Vaccination Declination (Attachment 1) indicating refusal of the vaccination. The employee may elect to receive the vaccine in the future at no expense to him/her.

## **5.4 EXPOSURE INCIDENT EVALUATION AND DOCUMENTATION**

All first aid incidents involving exposure to blood or other body fluids must be reported to the Corporate SHE Director before the end of the work shift in which the incident occurs. A First Aid Incident Report (Attachment 2) describing the circumstances of the accident and response must be completed and submitted along with the Supervisor's Report of Injury or Illness form (Attachment 3). Each project will maintain an Accident/First Aid Incident Log (Attachment 4) documenting the potential exposure and precautions taken. In the event of an exposure, AEE shall arrange for a post-exposure evaluation. Employee monitoring for HIV or HBV antibodies and medical counseling in cases of positive tests for HIV or HBV will be provided through the local Medical Care Provider. A copy of the Healthcare Professional's Written Opinion (Attachment 5) will be provided to the employee within 15 days of completion of the evaluation.

## **5.5 WASTE DISPOSAL**

Should biohazardous waste be generated as a result of a field-related injury, the "blood-bearing" waste and area will be cleaned to the extent possible with items in the bloodborne pathogen exposure control kit. Arrangements for the pickup and final disposal of the waste will be made by calling the designated

biohazardous waste disposal contractor whose name, contact person, and phone number appear in the site-specific HSP.

The SHSC for each AEE project location shall determine applicable state disposal guidelines or quantity exemptions. In California, for example, the California Medical Waste Act has established a distinction between waste requiring disposal and waste that can be thrown in any garbage receptacle. Solid medical waste includes items such as bandages and gauze that are not saturated or caked with blood. Solid medical waste can be thrown in the garbage receptacle provided that the receptacle is in a locked, secure area. If a secure garbage area is not available, a 55-gallon drum may be used. Biohazardous waste includes needles and saturated bandages and gauze that, if wrung out, would drip blood. Biohazardous waste must be placed in a biohazardous (red) bag and disposed of by permit through a permitted waste hauler.

## 6.0 TRAINING

In accordance with OSHA requirements, all personnel will receive training in the control of bloodborne pathogens. Any first aid responders will have current certifications in approved first aid and CPR. Training frequencies are annually for bloodborne pathogens. Refer to Volume IV, Training Program, of this manual for a description of the training.

## 7.0 REPORTS

Where applicable, the following documents shall be retained as records:

- Hepatitis B Virus (HBV) Vaccination Declination
- First Aid Incident Report
- Supervisor's Report of Injury or Illness
- Accident/First Aid Incident Summary Log
- Healthcare Professional's Written Opinion

## 8.0 REFERENCES

Fed-OSHA. 2000. 29 CFR 1910.1030, *Bloodborne Pathogens*.

Cal-OSHA. 2000. 8 CCR 5193, *Bloodborne Pathogens*.

AMEC Corporate Health and Safety Manual, Volume V, Exposure Control Plan

## 9.0 ATTACHMENTS

1. Hepatitis B Virus (HBV) Vaccination Declination
2. First Aid Incident Report
3. Supervisor's Report of Injury or Illness
4. Accident/First Aid Incident Summary Log
5. Healthcare Professional's Written Opinion

**ATTACHMENT 1**

**HEPATITIS B VIRUS (HBV) VACCINATION DECLINATION**



## HEPATITIS B (HBV) VACCINATION DECLINATION

In accordance with 29 CFR 1910.1030, I understand that because of my occupational exposure to blood or other potentially infectious materials I may be at risk of acquiring hepatitis B virus (HBV) infection. I have been given the opportunity to be vaccinated with the hepatitis B vaccine, at no charge to myself. However, I decline hepatitis B vaccination at this time. I understand that by declining this vaccine, I continue to be at risk of acquiring hepatitis B, a serious disease. If in the future I continue to have occupational exposure to blood or other potentially infectious materials and I want to be vaccinated with hepatitis B vaccine, I can receive the vaccination series at no charge to me.

---

Signature

---

Date

---

Printed Name

**ATTACHMENT 2**  
**FIRST AID INCIDENT REPORT**

# First Aid Incident Report



Date of Report: \_\_\_\_\_ Report Completed by: \_\_\_\_\_

Date of Injury/Incident: \_\_\_\_\_

Description of the Injury/Incident: (time, location, event, description of injuries) \_\_\_\_\_

Name of Injured Person: \_\_\_\_\_ Employer: \_\_\_\_\_

Name of First Aid Provider(s): \_\_\_\_\_

Social Security Number: \_\_\_\_\_

Bloodborne Pathogen Exposure Incident Evaluation: \_\_\_\_\_

1. Was the First Aid Responder exposed to blood or other potentially infectious materials? \_\_\_\_\_

- Exposure Occurred (see question 2)
- No Exposure

2. Exposure occurred by contact with the following (check all that apply):

- Eye
- Broken Skin (cuts, abrasions)
- Mouth
- Needlestick
- Other Mucous Membrane
- Human Bite

Exposure Control Precautions Taken (check all that apply):

- None (contact SHE Coordinator or Corporate SHE Director)
- Immediate Personal Hygiene
- Glove
- Previous HBV Immunization
- Face Mask
- Recommended for HBV Immunization
- One-way CPR Valve
- Other \_\_\_\_\_
- Eye Protection

*Please attach this completed form with the Supervisor's Report of Injury or Illness, and the Accident/First Aid Incident Summary Log, and forward to Human Resources, your SHE Coordinator, and the Corporate SHE Director.*

**ATTACHMENT 3**

**SUPERVISOR'S REPORT OF INJURY OR ILLNESS**

# Supervisor's Report of Injury or Illness



**Note:** To prevent accidents, it is necessary to know how and why they occur. Please complete both sides of this report. State facts as accurately as possible. Accurate reporting of all facts will help in the preparation of the "Employer's Report." Submit your complete report within 24 hours to Human Resources, your SHE Coordinator, and the Corporate SHE Director.

Name of injured employee		Department in which regularly employed	
Injury date	Time of injury <input type="checkbox"/> AM <input type="checkbox"/> PM	Date and time employer was notified of injury	
Did accident occur on employer's premises? <input type="checkbox"/> YES <input type="checkbox"/> NO	Where? (specify dept., job site, etc.)	Name of witness	
What was employee doing when injured? (walking, lifting, operating machines, etc.) Be specific.			
Please describe fully the events that resulted in injury or occupational disease. Tell what happened and how it happened. (Do not describe nature of injury)			
What machine, tool, substance, or object was most closely connected with the injury? (e.g., machine the employee struck against or was struck by; the chemical in use; the object the employee was lifting, pulling, etc.)			
Nature of injury and part of body affected.			
<b>Causes of Accident: Check All That Apply</b>			
<b>Unsafe Building or Working Conditions</b> <input type="checkbox"/> Layout of Operations <input type="checkbox"/> Layout of Machinery <input type="checkbox"/> Unsafe Processes <input type="checkbox"/> Improper Ventilation <input type="checkbox"/> Improper Sanitation/Hygiene <input type="checkbox"/> Improper Light <input type="checkbox"/> Excessive Noise <input type="checkbox"/> Floors or Platforms <input type="checkbox"/> Miscellaneous  <b>Housekeeping</b> <input type="checkbox"/> Improperly Piled or Stored Material <input type="checkbox"/> Congestion	<b>Physical Hazards or Equipment</b> <input type="checkbox"/> Ineffectively Guarded <input type="checkbox"/> Unguarded <input type="checkbox"/> Guard Removed <input type="checkbox"/> Defective Tools <input type="checkbox"/> Defective Machines <input type="checkbox"/> Defective Materials  <b>Discipline</b> <input type="checkbox"/> Not Following Safety Rules <input type="checkbox"/> Horseplay  <b>Apparel or Personal Protective Equipment</b> <input type="checkbox"/> Protective Equipment Not Used <input type="checkbox"/> Unsuitable Protective Equipment <input type="checkbox"/> Unsuitable Clothing or Footwear	<b>Instructions and Training</b> <input type="checkbox"/> None <input type="checkbox"/> Incomplete <input type="checkbox"/> Erroneous <input type="checkbox"/> Not Following Instructions <input type="checkbox"/> Operating Without Authority <input type="checkbox"/> Working at Unsafe Speed <input type="checkbox"/> Inexperience <input type="checkbox"/> Untrained in Procedure <input type="checkbox"/> Incorrect Use of Tool or Equipment <input type="checkbox"/> Improper Judgement <input type="checkbox"/> Improper Lifting <input type="checkbox"/> Lifting Excessive Weight	
What can be done to prevent such an accident from happening again?			
Approximate date condition will be corrected?			



**ATTACHMENT 4**

**ACCIDENT/FIRST AID INCIDENT SUMMARY LOG**

Period Covered: \_\_\_\_\_  
 Location: \_\_\_\_\_



**ACCIDENT / FIRST AID INCIDENT SUMMARY LOG**

Date/Time	Employee Name	AEE Location/ Project	General <sup>1</sup> Description	First Aid <sup>2</sup> Provided?	Medical Attention?	Comments	Universal Precautions Taken?
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							

<sup>1</sup> Attach completed Supervisor's Report of Injury or Illness

<sup>2</sup> Attach completed First Aid Incident Report

**ATTACHMENT 5**

**HEALTHCARE PROFESSIONAL'S WRITTEN OPINION**



## HEALTHCARE PROFESSIONAL'S WRITTEN OPINION

Employee Name: \_\_\_\_\_ Social Security Number: \_\_\_\_\_

Post exposure evaluation date: \_\_\_\_\_

Individual has been informed of evaluation results:  Yes  No

Hepatitis B vaccination indicated?  Yes  No

If yes, has the individual begun the HBV vaccine series?  Yes  No

If the exposed individual employee should not receive the HBV vaccine please indicate why:

Has previously received the complete hepatitis B vaccination series

Antibody testing has revealed that the employee is immune

Vaccine is contraindicated for medical reasons

Exposed individual has received counseling regarding any medical conditions resulting from exposure to blood or other potentially infectious materials which require further evaluation or treatment?

Yes  No

Healthcare Professional Name: \_\_\_\_\_  
*Print Name*

\_\_\_\_\_  
*Date*

\_\_\_\_\_  
*Signature*

\_\_\_\_\_  
*Address*

\_\_\_\_\_

**Note of healthcare Professional:** Please forward form to AMEC Earth & Environmental, Inc., Corporate Safety, Health and Environment Director, 5510 Morehouse Drive, San Diego, CA 92121.

# STANDARD OPERATING PROCEDURE



S.O.P. No. ER-2

PAGE 1 OF 18

APPROVAL

Denise L. Daggett, MS, CIH

EFFECTIVE DATE

6/24/02

REVISION No. 0

TITLE

**EMERGENCY ACTION PLAN FOR FIELD OPERATIONS**

## 1.0 PURPOSE

The purpose of this Emergency Action Plan (EAP) is to inform personnel of the requirements and methods for addressing the hazards associated with various potential disasters, and to provide guidance on the activities and responsibilities of AMEC Earth & Environmental, Inc. (AEE) personnel during such disasters. Although it is impractical to give specific instructions for all situations, the information below describes standard practices to safeguard personnel and equipment. Additional measures for specific cases may be implemented as needed by Field Managers (FMs), Site Health and Safety Coordinators (SHSCs), and the Corporate Safety, Health, and Environment Director (Corporate SHE Director).

## 2.0 SCOPE

This EAP applies to AMEC Earth & Environmental, Inc. (AEE) personnel, personnel subcontracted to AEE, and visitors (including clients) who may work on or visit AEE jobsites.

## 3.0 DEFINITIONS

**CD** – Civil Defense

**Civil Disturbances** – A civil disturbance may be in the form of labor strikes, riots, demonstrations, or other activist activities.

**Earthquakes** – An earthquake is a trembling or shaking of the earth often caused by the shifting of plates along fault zones. Earthquakes occur without warning.

**Flooding** – Flooding is the accumulation of water on land; it is often due to heavy rains and poor drainage.

**Hazardous Materials** – Hazardous materials are those substances that may represent one of the following hazard classes: FLAMMABILITY (gasoline, cleaning solvents, etc.); EXPLOSIVENESS (fireworks, TNT); RADIOACTIVE (medical isotopes, radium, etc.); COMPRESSED GAS (oxygen, nitrogen, etc.); HIGHLY REACTIVE (chlorine, phosphorus, etc.); SEVERE HEALTH HAZARD (poisons); CORROSIVES (batteries, acids, etc.).

**Hurricanes** – The effects of powerful cyclones that form over tropical waters that can include damaging surf and storm surge along coastlines, destructive sustained winds of 74 miles per hour (MPH) or higher, water spouts, heavy rain, and flooding. Same type of disturbance as a typhoon, but name is dependent on region affected by the storm.

### **Hurricane Conditions:**

Hurricane Watch means there is a threat of hurricane or tropical storm conditions within 36 hours. When a watch is issued, begin preparing (see Attachment 1, Typhoon/Hurricane Preparation

Checklist). Listen for National Weather Service (NWS) bulletins and Civil Defense (CD) messages on local radio and TV stations.

Hurricane Warning means a hurricane or tropical storm is expected within 24 hours. When a warning is issued, begin actions to protect life and property. Stay tuned to local radio and television stations for weather updates and CD messages on possible school closures, employee excusal (supervisors must inform their employees of excusal), and shelter opening schedules. Anticipate possible siren soundings and evacuation advisories/orders.

**Inclement Weather** – Inclement weather is characterized by conditions that may be hazardous to human health. Examples include severe storms, thunder and lightning, winds in excess of 40 MPH, high seas, flooding, hurricanes, and typhoons.

**NWS** – National Weather Service.

**Tornadoes** – Tornadoes are extremely powerful weather phenomena that can cause extensive damage to structures and people. A tornado watch is issued when conditions are right for a tornado. A tornado warning is an alert given by the NWS confirming a tornado sighting and location.

**Tropical Disturbances:**

- Tropical Depression: Maximum surface winds of up to 39 MPH
- Tropical Storm: Maximum surface winds of 40-74 MPH
- Typhoon/Hurricanes: Maximum surface winds of 75-149 MPH
- Super Typhoon or Great Hurricane: Maximum surface winds of 150 MPH or greater

**Tsunamis** – Tsunamis are a series of destructive ocean waves affecting all shorelines. They often are generated by earthquakes and seismic disturbances offshore.

**Typhoons** – Typhoons are violent storms equivalent to hurricanes that affect western Pacific tropical waters. Their effects can include damaging surf and storm surge along coastlines, destructive sustained winds of 75 MPH or higher, water spouts, and heavy rain and flooding.

**Universal Precautions** – These are preventive measures that should be followed in all situations involving exposure to blood products: all human blood and certain human body fluids are treated as if they are infected by Human Immunodeficiency Virus (HIV), Hepatitis B Virus (HBV), and other bloodborne pathogens (see SOP ER-1, *Bloodborne Pathogen Exposure Control Plan for Field Operations*).

**4.0 RESPONSIBILITIES**

It is the responsibility of the Project Manager (PM), FM/Emergency Coordinator (EC), Corporate SHE Director, and SHSC to ensure that this EAP is followed by all field personnel. In addition, all field personnel are responsible for implementing this EAP during all phases of field operations.

**4.1 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR**

It is the responsibility of the Corporate Safety, Health, and Environment Director (Corporate SHE Director) to ensure that this EAP complies with federal and state Occupational Safety and Health Administration (OSHA), and local agency guidelines. The Corporate SHE Director will notify Human Resources of site evacuations and keep them apprised of the disaster status, as information becomes available.

**4.2 UNIT MANAGER**

The Unit Manager (UM) is responsible for investigating accidents that arise during projects originating or reporting to his/her office.

**4.3 FIELD MANAGER/EMERGENCY COORDINATOR**

It is the responsibility of the FM to ensure that all personnel are aware of the EAP procedures and have a plan of action, as specified in this standard operating procedure (SOP), that lists all precautions and preparations that must be made in the event of a disaster. The FM enforces this procedure.

The FM shall notify all personnel and visitors when a natural disaster occurs. The FM is responsible for overseeing all emergency activities and shall ensure that all personnel evacuate the site according to this procedure.

The FM is responsible for carrying out the duties of the EC. The EC's responsibilities include the following:

- upon receiving a report of an emergency situation, notifying the proper authorities, including the fire department, police department, paramedics, utility company, etc.
- ensuring the overall safety of all the employees at the designated AEE field project location
- understanding the emergency procedures and invoking emergency response measures if necessary
- having the authority to relocate or release employees to their homes or living quarters in the event that emergency conditions at the site are such that employees could be injured or become ill
- interfacing with off-site emergency response support upon their arrival at the site
- authorizing employees to reenter the site after an emergency requiring evacuation
- directing the evacuation of site personnel when evacuation is deemed necessary
- ensuring that the appropriate investigations are conducted and that the appropriate records/reports are generated after an emergency has been resolved
- having a battery-powered radio at his or her disposal to tune in weather and news information in the event of an impending or actual emergency

#### 4.4 PROJECT MANAGER

The PM is responsible for incorporating the requirements of this procedure into project plans, budgets, and activities, including appropriate emergency response and first aid equipment. He/she is also responsible for notifying the client's technical representative of a potential site evacuation.

#### 4.5 SITE HEALTH AND SAFETY COORDINATOR

The SHSC is responsible for implementing and enforcing this procedure. The SHSC will coordinate with the FM to ensure that all emergency measures are being followed.

SHSC responsibilities include the following:

- ensuring maintenance of all emergency equipment, including but not limited to fire extinguishers, emergency lighting, first aid kits, and spill response equipment
- assisting in evacuation during emergencies; acting to smoothly and quickly move employees from potentially dangerous areas to safer ones during an emergency

Once a disaster has been identified, the SHSC will take the following actions:

- assist in evacuating all personnel according to this procedure;
- notify the Corporate SHE Director of the situation; and
- complete an Incident Report (Attachment 2) documenting the project shut-down and evacuation.

#### 5.0 PROCEDURES

These procedures detail the steps required to coordinate and manage emergency action procedures in the event of a field emergency. Both the field crew and the FM must work together to ensure personnel safety.

#### 5.1 MEDICAL EMERGENCIES

##### Medical Emergencies Classification

Injuries are classified into three categories:

1. MINOR - those that can be handled by basic first aid procedures and do not require immediate additional medical treatment or transportation.
2. SERIOUS/NON-LIFE-THREATENING - those that require immediate medical attention beyond the first aid that can be provided at a clinic or doctor's office. These injuries do not require ambulance transportation.
3. SERIOUS/LIFE-THREATENING - these injuries require immediate transportation by ambulance to a medical facility. This includes, but is not limited to, all individuals with chest pains, breathing difficulties, severe bone breaks, back injuries, or severe cuts with uncontrollable bleeding; unconscious persons; severe head injuries; and any other injury or illness that may

cause the individual to lose consciousness or experience cardiac arrest while in transit to a medical facility. Individuals with serious/life-threatening injuries should not be transported in private vehicles because of the lack of communications equipment.

4. **FIRST ALERT** - ensures that incidents are reported quickly to relevant personnel when an accident occurs which results in serious injury/death; an incident requires reporting to a regulatory body, i.e., OSHA; an incident occurs which is considered possible to lead to enforcement action; an enforcement notice is issued; or an incident occurs which results in injury to a member of the public/visitor.

### **5.1.1 Minor Injuries**

1. Immediately report all injuries to the FM and SHSC.
2. Take appropriate first aid measures.
3. The PM/FM shall complete and submit a Supervisor's Report of Injury or Illness form and a First Aid Incident Report form (Attachments 3 and 4) to the Corporate SHE Director, UM, and Human Resources before the end of the work shift in which the incident occurred.
4. Complete the Accident/First Aid Incident Summary Log (Attachment 5).

### **5.1.2 SERIOUS/NON-LIFE-Threatening Injuries/Illness**

1. Take immediate and appropriate first aid measures. First aid responders must be careful and avoid direct contact with blood. Exam gloves and a cardiopulmonary resuscitation (CPR) disposable, one-way-valve, rescue breather device should be provided in the first aid kit and used as appropriate.
2. Notify the FM and SHSC as soon as possible.
3. Ensure that the employee has transportation to the appropriate medical facility.
4. The PM/FM will contact the Corporate SHE Director, UM, and Human Resources to report the injury and for record-keeping purposes. The PM/FM shall complete and submit the Supervisor's Report of Injury or Illness form and the First Aid Incident Report, respectively, to the Corporate SHE Director, UM, and Human Resources before the end of the work shift in which the incident occurred.
5. The SHSC shall complete the Accident/First Aid Incident Summary Log.

### **5.1.3 Serious/Life-Threatening Injuries/Illness**

1. Ensure that someone notifies the fire department/paramedics (9-1-1) immediately.
2. Provide immediate first aid and/or CPR measures as required. First aid responders must be careful and avoid direct contact with blood. Exam gloves and a CPR disposable, one-way-valve, rescue breather device should be provided in the first aid kit and used as appropriate.

3. Notify the FM and SHSC as soon as possible.
4. Have another employee meet the incoming ambulance at the entrance to the site to direct them to the injured individual, if possible.
5. DO NOT MOVE the injured individual unless his/her life is in danger at that location.
6. Upon arrival of the ambulance, a staff member should be prepared to provide any needed information on the injured individual. Employees will not, however, interfere with medical treatment provided by the ambulance team.
7. The PM/FM will contact the Corporate SHE Director, UM, and Human Resources to report the injury and for record-keeping purposes. The FM or PM shall complete and submit the Supervisor's Report of Injury or Illness form and the First Aid Incident Report, to the Corporate SHE Director, UM, and Human Resources before the end of the work shift in which the incident occurred.
8. In the event of a work-related injury or illness that results in hospitalization of three or more employees within 30 days of a work-related incident, the nearest area office of the federal or state OSHA (refer to the Emergency Contact List in the HSP) must be notified within 8 hours. OSHA reserves the right to investigate these cases. Some AEE project locations are also under the jurisdiction of additional state OSHA requirements. The preparer of the HSP will determine whether state OSHA regulations apply and will follow any requirements accordingly. The Corporate SHE Director must be notified as soon as possible if an injury of this magnitude arises.
9. The SHSC shall complete the Accident/First Aid Incident Summary Log.

#### **5.1.4 Deaths**

1. In the event that an individual appears to have died because of injury or illness, those procedures outlined in Section 5.1.3 will be followed. The only exception to this would be when an individual is "obviously dead." Examples of this would be decapitation, rigor mortis, etc. In these cases, first aid and/or CPR would be inappropriate. Bear in mind that deaths become a law enforcement jurisdiction and that covering, tampering with, or moving of deceased individuals by unauthorized persons could constitute a violation of the law.
2. The EC or PM/FM will contact the police department.
3. If an individual is discovered who is "obviously dead," ALL persons will be cleared from the area but not allowed to leave until released by a law enforcement officer. The area surrounding the deceased individual shall not be altered in any manner. The area should be "roped off" by the SHSC.
4. The EC or PM/FM will interact directly with the police department, unless otherwise specified.

5. In the event of a work-related death, the nearest area office of federal or state OSHA (see Emergency Contact List in the HSP) must be notified within 8 hours. Federal or state OSHA will investigate all work-related deaths.

The caller should be prepared to give the following information:

- a. time and date of accident
  - b. employer's name, address, and telephone number
  - c. name and job title of the person reporting the accident
  - d. address of accident site or event
  - e. name of person to contact at the accident site (if applicable)
  - f. name and address of injured employee(s)
  - g. nature of the illness
  - h. location where injured employee(s) was (were) moved to
  - i. description of the accident
  - j. identification of any law enforcement agencies present at the site of the accident
6. Contact the Corporate SHE Director, UM, and Human Resources to report the death and for record-keeping purposes. Complete applicable forms, which may include the Supervisor's Report of Injury or Illness and First Aid Incident Report form.

#### **5.1.5 Serious Incidents – First Alert**

AEE uses a First Alert system to ensure that serious incidents are reported quickly to relevant personnel. The First Alert form (see Attachment 6) should be completed when:

- An accident occurs which results in serious injury/death;
- An incident that requires reporting to a regulatory body, i.e., OSHA, arises;
- An incident occurs which is considered possible to lead to enforcement action;
- An enforcement action is issued;
- An incident occurs which results in injury to a member of the public/visitor.

The First Alert Report form should be completed immediately and faxed or emailed to relevant personnel as soon as possible. In the case of a fatality, notification must be made within 24 hours of occurrence. Distribution must always include the AMEC Americas SHE Director, the AMEC Americas Director Communications, AEE Corporate SHE Director and the Executive Vice President, Communications.

**NOTE: The FIRST ALERT system is not meant to take the place of a formal investigation and formal report preparation. It is used as a quick means of informing appropriate individuals.**

Please refer to SOP A-3, Injury or Illness Reporting, Section 6.1.2.2 Procedure, for guidance in completion of the First Alert Report form (Attachment 6).

## 5.2 FIRE EMERGENCIES

Fires can emanate from a variety of sources and can spread rapidly. Quick and effective action is necessary to prevent loss of life and reduce property damage. Refer to SOP ER-3, *Fire Prevention for Field Work*, for more detailed procedures.

After resolution of the immediate fire-related emergency, the SHSC or FM will notify the Corporate SHE Director, UM, and Human Resources. Even if no injuries or occupationally related illnesses occur, the PM/FM must complete an Incident Report form and submit it to the SHSC, Corporate SHE Director and UM.

## 5.3 EARTHQUAKES

The following procedures are designed to provide site workers with guidelines to follow in the event of an earthquake. These procedures should be reviewed and updated, as necessary, by the SHSC and/or EC.

### 5.3.1 During an Earthquake

1. If inside a building or secured field trailer, take cover under a heavy desk, table, bench, doorway, hall, or against inside walls. Stay away from glass. Do not use candles, matches, or other open flames either during or after the tremor because of possible gas leaks.
2. If outside, move away from the structure or field trailer and utility wires. The greatest danger from falling debris is just outside doorways and close to outer walls. Once in the open, stay there until the shaking stops.
3. Stay calm! Direct site workers to take appropriate actions in an orderly manner.

### 5.3.2 After the Earthquake

1. Gather at a prearranged assembly area (i.e., the safe refuge area) for a head count.
2. Be prepared for additional earthquake shocks ("aftershocks"). Although most of these are smaller than the main shock, some may be large enough to cause additional damage. If it can be done safely, secure field instruments and equipment by placing in a field trailer on the floor under any available heavy desks, tables, or doorways. Gather field documents together and

- place in storage boxes or filing cabinets under available desks, tables, or doorways. If no field trailer is available, place equipment and documents inside the vehicles.
3. If it can be done safely, turn off any equipment that is operating on-site. Disconnect any gas or water valves.
  4. Check for injuries. Do not attempt to move seriously injured persons unless they are in immediate danger of further injury.
  5. The SHSC shall listen to the radio for the latest emergency bulletins and instructions from local authorities.
  6. The SHSC should check utilities. If the odor of gas is detected, shut off the main gas valve and, if possible, open windows and exterior doors. Evacuate the facility and report the leakage to the fire department (dial 9-1-1). Do NOT reenter any buildings until a utility official says it is safe to do so. If electrical wiring is shorting out, shut off the current at the main box.
  7. Check all buildings on-site for structural damage and evacuate the site if significant damage is detected.
  8. The SHSC shall arrange for immediate cleanup of spilled hazardous materials (see Section 5.10) such as gasoline, oil, cleaning solvents, etc. in accordance with AEE policy, environmental regulations, and approved methods.
  9. Ensure that no one eats or drinks from open containers near shattered glass.
  10. The SHSC will contact the fire department or police department only if a life-threatening emergency exists.

After resolution of the immediate emergency, the SHSC or EC will notify the Corporate SHE Director, UM, and Human Resources. Even if no injuries or occupationally related illnesses occur, the PM/FM must complete an Incident Report form and submit it to the SHSC, UM, and Corporate SHE Director.

#### **5.4 EXPLOSIONS**

Explosions can be caused by a number of things such as electrical malfunctions, pressure buildup in equipment, ignition of flammable vapors, bombs, etc. Explosions are commonly accompanied by fire. Emergency response for fire is addressed in SOP ER-3, *Fire Prevention for Field Work*. Be aware of equipment and/or other locations where explosions are possible (e.g., paint rooms, liquefied petroleum gas [LPG] storage tanks, etc.). Employees will immediately report the discovery of potential explosive situations to the SHSC.

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**5.4.1 Emergency Procedures**

In the event of an emergency, employees shall implement the following procedures:

1. Telephone 9-1-1 and provide all details. In most cases, the operator will ask the nature of the emergency. Stay calm and be precise (e.g., "an explosion at the north gate of the ABC site"). Let the operator ask the questions and give calm, precise, and short answers.
2. Evacuate the affected area.
3. Establish a security area around the affected area until police or fire personnel arrive.
4. Check gas and electrical systems for damage when possible.
5. Have damaged or potentially damaged utilities shut off at main controls.
6. Conduct a head count of all employees.
7. Be aware of the possibility of secondary explosions and stay away from the damaged area until officials from the fire and/or police departments advise that it is safe to reenter.

After resolution of the immediate emergency, the PM/FM or SHSC will notify the Corporate SHE Director, UM, and Human Resources. Even if no injuries or occupationally related illnesses occur, the PM/FM must complete an Incident Report form and submit it to the SHSC, Corporate SHE Director, and UM.

**5.5 TYPHOONS/HURRICANES**

If a typhoon/hurricane is expected within 12 hours all personnel must evacuate the site. Personnel working in an area away from home or visiting from another office shall remain at their hotel or other appropriate shelter until the warning is canceled.

**Emergency Procedures**

1. Upon notification of a typhoon/hurricane warning, the SHSC will turn on a radio and await instruction from the NWS.
2. When instructions are received, the SHSC will notify personnel of the course of action. In most cases, action will entail sending personnel home or to the hotel where they are staying. Personnel should be notified of the anticipated date of return for project work.
3. The FM, with the assistance of the SHSC, shall copy all field notes, memos, records, etc. Bring or mail them along with all monitoring equipment to the nearest AEE office.
4. The SHSC will clean out all decontamination (decon) stations, including equipment and personnel decon areas. Remove all decon equipment from the site and store it in a field vehicle; cover all PPE and decon wash drums with the lids and tighten them securely.

5. If there is a refrigerator on-site, the FM will remove all perishable items from it, and unplug electrical items, turn off all power, and leave the site.
6. Personnel should be cautioned as follows:
  - a. REMAIN CALM - do not panic. If driving, drive slowly and safely.
  - b. Go directly home (or to the hotel where you are staying), if advised to, and take steps to protect private property.

If personnel are staying in a hotel, the SHSC should also fill drinking-water containers and pack coolers with enough ice and nonperishable food supplies for 5 days. *Do not wait until the last minute to prepare the survival kit because supplies may not be available.* Although most hotels have emergency electrical generators and limited backup water supplies, prepare as if the hotel may have no electricity or water for 2 to 3 days. If the hotel or other accommodation is rendered unsuitable/unsafe by the disaster, all personnel shall report to the nearest *American or International Red Cross Shelter*.

Refer to the Typhoon/Hurricane Field Preparation Checklist for preparatory action and items to collect and/or purchase prior to the hurricane or typhoon.

When the "all clear" is sounded, the FM and other personnel may visit the site to assess damage. The FM will relay this damage assessment to the PM by phone or FAX. If the site appears to be in good condition, then work on the project may resume as early as the next regular work day.

After resolution of the immediate weather-related emergency, the PM/FM or SHSC will notify the Corporate SHE Director, UM, and Human Resources. Even if no injuries or occupationally related illnesses occur, the PM/FM must complete an Incident Report form and submit it to the SHSC, Corporate SHE Director and UM.

#### **5.5.1 Subcontracted Personnel (Drillers, Soil Gas Surveyors, etc.)**

During a hurricane watch, subcontracted personnel may continue to work on the project. Once a warning is declared, however, hurricane preparations must be started. The FM shall direct subcontracted personnel to take the following actions during a hurricane warning:

- Gather all equipment, and store as seen fit.
- Secure all drums located on-site and any empty drums staged elsewhere. The drums must be secured with heavy-duty rope.
- Secure all items located in the staging area or storage container. All cement and/or sand bags either should be removed or covered with plastic to avoid spills and leaks.
- Secure all heavy equipment.
- Secure and cover with plastic all items located on drill rigs, including Tyvek™, sand bags, and cement. Well pumps, augers, drill bits, steam cleaners, etc. should all be tied down.

- Pack all personal health and safety gear, e.g., boots, hard hats, and safety glasses.
- Fill the gas tanks of all vehicles. Gasoline may be in short supply for 2 to 3 days after a hurricane.

### 5.5.2 Emergency Demobilization (for Nonresident Staff)

Under the direction of the FM and with approval of the PM, the field crew and subcontractors may return home after a major storm. Personnel will be demobilized if necessary to ensure the health and safety of site personnel, if water and power services are curtailed, or if the site is severely damaged and it will take a long time to repair equipment and/or replace materials.

### 5.6 SEVERE STORMS, FLOODS, AND TSUNAMIS

Some AEE project sites are located in parts of the country where severe storms, tsunamis, and extensive flooding can occur. The FM and SHSC must evaluate each situation as it arises and determine whether it is safer to keep employees at the project site than to let them go home through severely flooded streets.

#### Emergency Procedures

1. Upon notification of a severe storm watch or tsunami alert, the FM and SHSC will turn on a radio and await instruction from the NWS.
2. When instructions are received, the FM and SHSC will notify employees of action to be taken.
3. If inside a building at the time of the emergency, remember the following:
  - a. DO NOT PANIC. Remain calm and listen for instructions.
  - b. Stay where you are. Most floors above the second floor will be safe.
  - c. Do not use elevators.
  - d. Do not use telephones.
  - e. DO NOT attempt to leave the building unless advised to do so.
  - f. If the building is less than three floors high, stay indoors, preferably on the second floor (if it exists), and be ready to exit to the building roof, if necessary.
4. If outside a building at the time of the emergency, move to high ground or into a building and take the stairs to the third floor or higher.

After resolution of the immediate weather-related emergency, the PM/FM or SHSC will notify the Corporate SHE Director, UM, and Human Resources. Even if no injuries or occupationally related illnesses occur, the PM/FM must complete an Incident Report form and submit it to the SHSC, Corporate SHE Director, and UM.

### 5.7 TORNADOES

In the event the National Weather Alert Station issues a tornado warning for the vicinity of any AEE project sites, an alarm will be sounded or an announcement will be made to alert employees.

**Emergency Procedures**

Employees will be directed to take the following action if a tornado approaches:

1. If outside, take cover inside a stable structure or lie down in a low-lying area. If inside, move away from the perimeter of any buildings and exterior glass. If inside a field trailer or other temporary facility, leave (if this can be done safely) and seek cover in a nearby building.
2. Close the doors and windows of the sheltering building. Leave one window open to permit equalization of the pressure inside and out.
3. Go to the center corridor of the building. In most buildings, this corridor will be the stairwells.
4. Sit down and protect yourself by putting your head as close to your lap as possible or kneel, protecting your head.
5. Do not go to the first floor lobby or outside of the building.
6. If caught indoors in an exterior office, seek protection under a desk.

After resolution of the immediate weather-related emergency, the PM/FM or SHSC will notify the Corporate SHE Director, UM, and Human Resources. Even if no injuries or occupationally related illnesses occur, the PM/FM must complete an Incident Report form and submit it to the SHSC, Corporate SHE Director, and UM.

**5.8 TYPHOONS****5.8.1 Typhoon Conditions**

Typhoon Condition 4 is usually considered a normal condition for areas known to experience typhoons. During this condition, no typhoons have developed over the Pacific Ocean that may be a threat to a specified location.

Typhoon Condition 3 indicates that a typhoon has been identified that may pass over or near the specified location within 48 hours. Condition 3 calls for preparation measures. Listen for NWS bulletins and CD messages on local radio and television stations.

Typhoon Condition 2 indicates that a typhoon is expected to pass over the specified location within 24 hours. When a warning is issued, begin actions to protect life and property, including stocking water and food items, securing loose items, and boarding windows. Stay tuned to local radio and television stations for weather updates and CD messages on possible school closures, employee dismissal (SHSC must inform site employees of dismissal), and shelter opening schedules. Anticipate evacuation advisories/orders.

Typhoon Condition 1 indicates that a typhoon is expected to pass over or near the specified location within 12 hours. At this time, public roads typically are closed to traffic except for emergency vehicles. Schools, offices, and stores are closed during Condition 1.

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**Emergency Procedures**

1. Upon notification of a Typhoon Condition 3 or lower, the FM and SHSC will refer to typhoon condition instructions provided above and will begin to monitor news and weather reports from a radio, television, or newspaper and await instruction from the NWS.
2. When instructions are received, the SHSC will notify personnel of the course of action. In most cases action will entail sending personnel home or to the hotel where they are staying.
3. Personnel should be cautioned as follows:
  - a. REMAIN CALM - do not panic. If driving, drive slowly and safely.
  - b. Go directly home (or to the hotel where you are staying), if advised to, and take steps to protect private property.

Refer to the Typhoon/Hurricane Field Preparation Checklist for preparatory action and items to collect and/or purchase prior to a hurricane or typhoon.

After resolution of the immediate weather-related emergency, the PM/FM or SHSC will notify the Corporate SHE Director, UM, and Human Resources. Even if no injuries or occupationally related illnesses occur, the PM/FM must complete an Incident Report form and submit it to the SHSC, Corporate SHE Director and UM.

**5.8.2 Subcontracted Personnel (Drillers, Soil Gas Surveyors, etc.)**

During a typhoon watch, subcontracted personnel may continue to work on the project. Once a warning is declared, however, typhoon preparations must be started. The FM shall direct subcontracted personnel to take the following actions during a typhoon warning:

- Gather all equipment, and store as seen fit.
- Secure all drums located on-site and any empty drums staged elsewhere. The drums must be secured with heavy-duty rope.
- Secure all items located in the staging area or storage container. All cement and/or sand bags either should be removed or covered with plastic to avoid spills and leaks.
- Secure all heavy equipment.
- Secure and cover with plastic all items located on drill rigs, including Tyvek™, sand bags, and cement. Well pumps, augers, drill bits, steam cleaners, etc. should all be tied down.
- Pack all personal health and safety gear, e.g., boots, hard hats, and safety glasses.
- Fill the gas tanks of all vehicles. Gasoline may be in short supply for 2 to 3 days after a typhoon.

**5.9 CIVIL DISTURBANCES****Emergency Procedures**

1. The SHSC will ensure that all persons on duty are inside a building, if possible, and that the police department has been notified of the situation (see Emergency Contact List in the HSP). If the situation is violent, dial 9-1-1.
2. If situation warrants, site staff may be directed to evacuate the site and meet elsewhere for resolution.
3. If evacuation is not possible and no secure building is available, all persons on duty shall enter the site vehicles and lock the doors as quickly as possible.
4. If the disturbance is taking place outside a project site building structure, staff will be responsible for ensuring that all exterior doors are closed and locked as quickly as possible.
5. The SHSC will immediately establish internal security within the facility.
6. Supervisors will ensure that their personnel are moved away from exterior doors and windows.
7. If the situation permits and it is necessary to do so, off-duty personnel will be recalled.
8. Return to normal activities only when advised by police personnel that it is safe to do so.

After resolution of the immediate security-related emergency, the PM/FM or SHSC will notify the Corporate SHE Director, UM, and Human Resources. Even if no injuries or occupation-related illnesses occur, the PM/FM must complete an Incident Report form and submit it to the SHSC, Corporate SHE Director and UM.

**5.10 HAZARDOUS MATERIAL SPILLS OR RELEASES**

Certain contracts require a Spill Prevention Control and Countermeasure (SPCC) Plan. The Emergency Response section of the site-specific HSP, when governed by an SPCC, would indicate the SPCC procedures to follow in the event of a hazardous materials spill. When a contract requires an SPCC, the guidelines discussed below shall not be followed. Instead, specific guidelines discussed in the site-specific HSP shall be followed.

All hazardous materials stored or used at AEE field sites will have an appropriate label displayed indicating the substance used and any safety precautions and appropriate emergency actions to be taken in the event of an accident.

As appropriate, Material Safety Data Sheets (MSDSs) are located in an accessible file at the site of use in all areas where chemicals are used, stored, or disposed.

## Emergency Procedures

1. Immediately clear the area where hazardous materials are spilled and erect an Exclusion Zone (EZ). Procedures for fire emergencies will be implemented in notifying the fire department and evacuating the facility.
2. Ensure that all persons are moved upwind of the spill.
3. If possible, contain the spilled material with the use of sorbent or diking material such as cat litter, sand, or other suitable, approved containment material (only if the material is not toxic).
4. DO NOT wash hazardous materials into storm or sewer lines. For work on hazardous waste sites, every effort will be made to minimize or eliminate the possibility of spilling/releasing contaminated materials into the clean area. AEE procedures dictate that contaminated materials remain in the EZ. Further spread of contamination will be reduced by containment of contaminated fluids and the use of plastic "drops" and berms whenever feasible.
5. If the spill is significant enough to pose a threat to the public, notify local response teams. On-site spill control equipment will include plastic (visqueen) sheeting and absorbent materials such as vermiculite, spill booms, pillows, and pads. Depending upon the quantity of the spill, certain regulatory authorities may also need to be notified. Small spills should only be cleaned by qualified persons and disposed of appropriately. Large spills of toxic materials require special training and equipment possessed by commercial cleanup companies.

After resolution of the immediate chemical-related emergency, the PM/FM or SHSC will notify the Corporate SHE Director, UM, and Human Resources. Even if no injuries or occupationally related illnesses occur, the PM/FM must complete an Incident Report form and submit it to the SHSC, Corporate SHE Director and UM.

## 6.0 RECORDS

Where applicable, the following documents shall be retained as records in accordance with this SOP:

- Incident Report (Attachment 2)
- Supervisor's Report of Injury or Illness (Attachment 3)
- First Aid Incident Report (Attachment 4)
- Accident/First Aid Incident Summary Log (Attachment 5)

## 7.0 REFERENCES

GTE Hawaiian Telephone Book, Oahu White Pages. March 1994-95. *Civil Defense Warnings and Procedures.*

State of Hawaii Civil Defense. 2000. *Emergency Checklist.*

AEE. Corporate Health and Safety Manual, Volume V, Emergency Preparedness Program.

**8.0 ATTACHMENTS**

1. Typhoon/Hurricane Field Preparation Checklist
2. Incident Report
3. Supervisor's Report of Injury or Illness
4. First Aid Incident Report
5. Accident/First Aid Summary Log
6. First Alert Report

# STANDARD OPERATING PROCEDURE

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S.O.P. No. ER-2

PAGE 18 OF 18

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**ATTACHMENT 1**

**TYPHOON/HURRICANE FIELD PREPARATION CHECKLIST**



## TYPHOON/HURRICANE FIELD PREPARATION CHECKLIST

### Preparation

- Make copies of all notes, memos, records, etc. and send via FedEx to appropriate Project Manager.
- Clean out all decon stations and store equipment in a secure place.
- Pack an ice chest with ice for food and drinks; fill water jugs with drinking water.
- Remove all perishable items from the refrigerator (if applicable).
- Turn off all power, and leave the site.
- Gather all important documents (field notes, visitors log, etc.) and instruments for storage in airtight/watertight coolers or storage bins at home or in the hotel.
- Secure all PPE and decon wash drums with lids and tighten.
- Notify all personnel of the anticipated date of return for project work (usually the next day).
- Fill gas tanks of all vehicles.

### Survival Kit

- Portable, battery-operated radio
- Flashlight(s), candles and matches (store in watertight baggies or containers)
- Extra batteries for flashlight and radio
- Containers of drinking water (3 to 4 gallons per person per day)
- Nonperishable food (for 5 days), such as breads, crackers, cheese, cured meats, canned foods, and fruit
- Nonelectric can opener
- First aid kit (bandages, splint, pain reliever)
- Cups, paper plates, and plastic utensils
- Change of clothes
- Playing cards, books, board games
- Special medications/diets
- Sleeping bags, blankets, air mattresses (if going to a shelter)
- Personal hygiene/sanitary supplies
- Toilet articles, Baby Wipes/Wet Ones™

### Leaving the Site

- Shut off electricity.
- Ensure all personnel are off the site.
- Secure field office/site: lock windows and doors and bolt chain-link fences.
- Take survival kit and important documents and instruments.

### Returning to the Site

#### **EXERCISE CAUTION!**

Check for the following:

- Structural damage
- Electrical short circuits
- Gas leaks from vehicles and gas lines that may be in the area
- Broken water lines
- Contaminated areas where drums may have tipped over and leaked

**ATTACHMENT 2**  
**INCIDENT REPORT**

# Incident Report



*(Please Print Clearly)*

Report Number: \_\_\_\_\_ Report Date: \_\_\_\_\_ Incident Date: \_\_\_\_\_

Project Title and Location: \_\_\_\_\_

Project Number: \_\_\_\_\_

Location of Incident: \_\_\_\_\_

Names of All Personnel Involved: \_\_\_\_\_

Describe the incident as it occurred (use additional sheets, if necessary).

Names of Witnesses	Relationship to the Incident	Where They Can Be Reached

## Project Implications

What is the cost impact to the project (e.g., lost days, man-hours, equipment)?

What is the schedule impact to the project?

Does the incident impact the scope of the project in other ways? If so, how?

**ATTACHMENT 3**

**SUPERVISOR'S REPORT OF INJURY OR ILLNESS**

# Supervisor's Report of Injury or Illness



**Note:** To prevent accidents, it is necessary to know how and why they occur. Please complete both sides of this report. State facts as accurately as possible. Accurate reporting of all facts will help in the preparation of the "Employer's Report." Submit your complete report within 24 hours to Human Resources, your SHE Coordinator, and the Corporate SHE Director.

Name of injured employee		Department in which regularly employed	
Injury date	Time of injury <input type="checkbox"/> AM <input type="checkbox"/> PM	Date and time employer was notified of injury	
Did accident occur on employer's premises? <input type="checkbox"/> YES <input type="checkbox"/> NO	Where? (specify dept., job site, etc.)		Name of witness
What was employee doing when injured? (walking, lifting, operating machines, etc.) Be specific.			
Please describe fully the events that resulted in injury or occupational disease. Tell what happened and how it happened. (Do not describe nature of injury)			
What machine, tool, substance, or object was most closely connected with the injury? (e.g., machine the employee struck against or was struck by; the chemical in use; the object the employee was lifting, pulling, etc.)			
Nature of injury and part of body affected.			
<b>Causes of Accident: Check All That Apply</b>			
<b>Unsafe Building or Working Conditions</b> <input type="checkbox"/> Layout of Operations <input type="checkbox"/> Layout of Machinery <input type="checkbox"/> Unsafe Processes <input type="checkbox"/> Improper Ventilation <input type="checkbox"/> Improper Sanitation/Hygiene <input type="checkbox"/> Improper Light <input type="checkbox"/> Excessive Noise <input type="checkbox"/> Floors or Platforms <input type="checkbox"/> Miscellaneous  <b>Housekeeping</b> <input type="checkbox"/> Improperly Piled or Stored Material <input type="checkbox"/> Congestion	<b>Physical Hazards or Equipment</b> <input type="checkbox"/> Ineffectively Guarded <input type="checkbox"/> Unguarded <input type="checkbox"/> Guard Removed <input type="checkbox"/> Defective Tools <input type="checkbox"/> Defective Machines <input type="checkbox"/> Defective Materials  <b>Discipline</b> <input type="checkbox"/> Not Following Safety Rules <input type="checkbox"/> Horseplay  <b>Apparel or Personal Protective Equipment</b> <input type="checkbox"/> Protective Equipment Not Used <input type="checkbox"/> Unsuitable Protective Equipment <input type="checkbox"/> Unsuitable Clothing or Footwear	<b>Instructions and Training</b> <input type="checkbox"/> None <input type="checkbox"/> Incomplete <input type="checkbox"/> Erroneous <input type="checkbox"/> Not Following Instructions <input type="checkbox"/> Operating Without Authority <input type="checkbox"/> Working at Unsafe Speed <input type="checkbox"/> Inexperience <input type="checkbox"/> Untrained in Procedure <input type="checkbox"/> Incorrect Use of Tool or Equipment <input type="checkbox"/> Improper Judgement <input type="checkbox"/> Improper Lifting <input type="checkbox"/> Lifting Excessive Weight	
What can be done to prevent such an accident from happening again?			
Approximate date condition will be corrected?			



**ATTACHMENT 4**  
**FIRST AID INCIDENT REPORT**

## First Aid Incident Report



Date of Report: \_\_\_\_\_ Report Completed by: \_\_\_\_\_

Date of Injury/Incident: \_\_\_\_\_

Description of the Injury/Incident: (time, location, event, description of injuries) \_\_\_\_\_

Name of Injured Person: \_\_\_\_\_ Employer: \_\_\_\_\_

Name of First Aid Provider(s): \_\_\_\_\_

Social Security Number: \_\_\_\_\_

Bloodborne Pathogen Exposure Incident Evaluation: \_\_\_\_\_

1. Was the First Aid Responder exposed to blood or other potentially infectious materials? \_\_\_\_\_

Exposure Occurred (see question 2)

No Exposure

2. Exposure occurred by contact with the following (check all that apply):

Eye

Broken Skin (cuts, abrasions)

Mouth

Needlestick

Other Mucous Membrane

Human Bite

Exposure Control Precautions Taken (check all that apply):

None (contact SHE Coordinator or Corporate SHE Director)

Immediate Personal Hygiene

Glove

Previous HBV Immunization

Face Mask

Recommended for HBV Immunization

One-way CPR Valve

Other \_\_\_\_\_

Eye Protection

*Please attach this completed form with the Supervisor's Report of Injury or Illness, and the Accident/First Aid Incident Summary Log, and forward to Human Resources, your SHE Coordinator, and the Corporate SHE Director.*

**ATTACHMENT 5**  
**ACCIDENT/FIRST AID INCIDENT**  
**SUMMARY LOG**

Period Covered: \_\_\_\_\_  
 Location: \_\_\_\_\_



**ACCIDENT / FIRST AID INCIDENT SUMMARY LOG**

Date/Time	Employee Name	AEE Location/ Project	General <sup>1</sup> Description	First Aid <sup>2</sup> Provided?	Medical Attention?	Comments	Universal Precautions Taken?
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							

<sup>1</sup> Attach completed Supervisor's Report of Injury or Illness

<sup>2</sup> Attach completed First Aid Incident Report

**ATTACHMENT 6**  
**FIRST ALERT REPORT**



AMEC Americas

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### FIRST ALERT REPORT FORM

**Company/Division:**

Fatality		Serious Injury	
Dangerous Occurrence (near miss)		Legislated Reportable Environmental Incident	
Enforcement Notice i.e. citation/charges/prosecution			
Other (Please specify):			

Date:	
Time of Accident/Incident:	
Site Address:	
Name of Injured Party:	
Occupation of Injured:	
Male/Female:	Age
Address of any Injured:	

<b>1. Brief details of accident/incident (how it happened):</b>
<b>2. Nature of injury/damage/loss:</b>
<b>3. Details of plant and owner/hirer (if relevant):</b>
<b>4. Action taken as a result of the injury/damage/loss:</b>
<b>5. Proposed action to prevent recurrence:</b>



**AMEC Americas**

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<b>DISTRIBUTION</b>	
Divisional contacts: 1. Corporate SHE Director 2. President 3. Executive Vice President, Operations, East and/or West, as applicable 4. Unit Manager	Randy Plener AMEC Americas SHE Director (416) 644-3644 (fax)

Form prepared by (Print name): \_\_\_\_\_

Signed: \_\_\_\_\_

Date: \_\_\_\_\_

**Definitions**

*Serious Injury:* An injury that requires hospitalization, loss of a body part or any other injury that is life threatening in nature.

*Dangerous Occurrence (Near Miss):* An incident that has the potential to result in extreme loss either to persons or property i.e. rupture of a gas line on the project site or materials falling from a building under construction onto a pedestrian walkway.

*Legislated Reportable Environmental Incident:* An environmental incident that must be reported to government authorities i.e. major spill of a hazardous chemical etc.

*Enforcement Notice:* Any enforcement notice issued by a regulatory body i.e. citation, charges laid, prosecution notice etc.



# STANDARD OPERATING PROCEDURE

S.O.P. No. H-4

PAGE 1 OF 10

APPROVAL

Denise L. Daggett, MS, CIH

EFFECTIVE DATE

6/28/02

REVISION No.

0

TITLE

## ERGONOMIC PROGRAM

### 1.0 PURPOSE

Ergonomics is the science concerning the interaction between people, the living and work environments, and equipment to maximize safety and job performance while minimizing fatigue.

Repetitive motion injuries (RMIs) are maladies of nerves, muscles, tendons, and bones that are caused or aggravated by repetitive movement. RMIs may affect the hand, neck, arms, or back, developing gradually over time as a result of repeated exertions or awkward postures.

The purpose of this procedure is to:

- address workplace and task factors through the identification and selection of workplace tools, equipment, and machines to control the incidence of injury
- eliminate or control RMIs through the implementation of prevention and control measures, including ergonomic worksite evaluations
- provide employees with an understanding of good ergonomic principles and equip them with the knowledge necessary to reduce the likelihood of RMIs while maximizing their own comfort
- establish appropriate medical management procedures upon an employee's report of a symptom

### 2.0 SCOPE

This procedure is applicable to all AMEC Earth & Environmental, Inc. (AEE) employees. The goal is to reduce potential worker exposure to work factors that may cause or aggravate RMIs.

### 3.0 DEFINITIONS

**Administrative Controls** - Any procedure that significantly limits daily exposure by control or manipulation of the work schedule or manner in which work is performed. Administrative controls include but are not limited to job rotation, use of rest breaks or alternative tasks, job enlargement to increase task variability, redesign of work methods, and adjustment of work pace to reduce the number of repetitions.

**Back** - The trunk of the body from below the neck (cervical spine) to the tailbone (sacrum). The back includes the upper and lower back. The neck is considered to be part of the upper extremities for purposes of this section.

**Engineering Controls** - Physical changes to work stations, equipment, materials, production facilities, or any other relevant aspect of the work environment that reduce or prevent exposure to workplace risk factors. Engineering controls include, but are not limited to:

- devices such as adjustable work stations, tables, chairs, lifting and moving equipment, and tools
- physical modifications to work stations, equipment, tools, production processes, or any other aspect of the work environment

**Fixed Posture** - Prolonged muscle contraction without movement, such as maintaining an unsupported posture or prolonged gripping of a tool.

**Job** - The performance of a series of tasks in order to reach a goal or defined end product, including a job assignment to complete specific tasks.

**Lower Extremity** - The hip, thigh, knee, leg, ankle, and/or foot.

**Personal Protective Equipment (PPE)** - Devices such as, but not limited to, corrective lenses for work with video display units, gloves, or padding, worn on or attached to the body, which are used for the purpose of controlling workplace risk factors. For purposes of this standard operating procedure (SOP), devices worn on or attached to the wrist or back are not considered personal protective equipment.

**Restrictions** - Any limitation placed on the manner in which an employee performs a job or work tasks during the recovery period. Restrictions refer collectively to any of the following: alternative duty assignment, alternative work, light duty, job modifications, job restrictions, and modified duty.

**RMI Risk Factors** - The more factors involved and the greater the exposure to each, the increased risk of developing an RMI. They include:

- **Awkward Postures:** A fixed or awkward work posture; such as continuous standing, bending over constantly, or twisting of the lower back.
- **Direct Pressure:** Constant stress against any vulnerable part of the body; especially the palm of the hands, forearms, or thighs. Direct pressure can be caused by a tool handle, leaning against a table edge, or pressing the wrists against a keyboard.
- **Force:** The use of excessive exertion to complete a task. Tasks may include gripping, pushing, or pulling.
- **Lighting:** The quantity and quality of light in the work area can either enhance or obscure the details of the work task.
- **Repetition:** Performance of the same motion or motion pattern every few seconds.
- **Temperature Extremes:** Exposure to excessive heat or cold.
- **Vibration:** Working with vibrating tools and equipment can cause discomfort and injury. Hand-arm vibration may be caused by contact with powered tools or equipment. Whole-body vibration may be caused by sitting in a truck or operating heavy equipment such as a jackhammer.

**RMI Symptom** - Any of the following, when persisting or recurring: pain from movement, pressure, or exposure to cold or vibration, except when the pain is due to an acute injury (e.g., burn, abrasion, splinter, slip and fall); change in skin color (e.g., skin turns blue, or abnormally white or red) on exposure to cold or vibration; numbness or tingling in an arm, leg, or digit, especially in fingertips at night; decreased range of joint motion; decreased grip strength; or swelling of a joint or part of an arm, leg, or digit.

**Task** - A subunit of a job or the group of activities that must be performed to accomplish the work objective or the job.

**Upper Extremity** - The hand, wrist, elbow, arm, shoulder, and/or neck.

**Vibration** - The oscillatory motion of a physical body. Localized (segmental) vibration, such as hand-arm vibration, is produced by contact with powered tools or equipment or contact with vibrating structures. Whole body vibration exposure occurs while standing or seated in vibrating environments or objects, such as trucks, heavy machines, or while using heavy equipment such as jackhammers.

**Video Display Terminal (VDT)** - Any device or set of devices not designed for handheld use, which involves use of a keyboard and a cathode ray tube or other electronic devices for entry or display of data such as words, numbers, and symbols.

**VDT Operator** - An employee who routinely works at a VDT for a cumulative total of 4 or more hours, inclusive of breaks, during any 12-hour period.

**Work-Related RMI** - Refers collectively to all of the following:

- There is an established relationship between the RMI and an employee performing a job process or work activity.
- An RMI has occurred to an employee and is predominately caused (i.e., 50% or more) by a repetitive job, process, or operation.
- There is an objective identification and diagnosis by a licensed physician of an RMI that is considered a musculoskeletal injury.

**Work Methods** - The physical methods used to perform the tasks of a job, such as reaching, gripping, use of tools and equipment, or discarding objects.

**Workplace** - An establishment, job site, or project, at one geographical location.

## 4.0 RESPONSIBILITIES

### 4.1 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR

The Corporate Safety, Health, and Environment Director (Corporate SHE Director), or designee, performs an initial records review to identify existing RMI problems. The Corporate SHE Director supervises the Safety, Health, and Environment Coordinators (SHE Coordinators) and Site Health and Safety Coordinator (SHSC) in the implementation of this SOP. The Corporate SHE Director selects qualified evaluators.

**4.2 SAFETY, HEALTH, AND ENVIRONMENT COORDINATOR/SITE HEALTH AND SAFETY COORDINATOR**

The SHE Coordinator (office) and SHSC (field) are responsible for implementation of this procedure, under the supervision of the Corporate SHE Director. Specific responsibilities include:

- arranging for, or performing (when qualified), ergonomic worksite/task evaluations and any necessary updates of ergonomic worksite evaluations
- maintaining documentation regarding ergonomic worksite/task evaluations
- submitting to the Medical Care Provider the completed Employer's Request for Medical Evaluation and RMI Symptom Report form prior to or at the time of referral of employees with RMI symptoms
- serving as the contact with the Medical Care Provider
- maintaining documentation of RMI symptoms reported by employees and any medical management that was implemented
- administering or arranging for general and job-specific training to employees and maintaining documentation of such training

**4.3 SUPERVISORS**

It is the responsibility of all supervisors to ensure that employees working for them have had an opportunity to read this procedure and ask questions and to notify the SHE Coordinator/SHSC of any employees (new employees, employees newly assigned to a job task that is known to cause or is suspected of causing RMIs, or employees in a job assignment where a significant work-related RMI risk factor exists) who will require general and job-specific training. Supervisors must also notify the SHE Coordinator/SHSC of any identified RMI risks in their area of supervision or on a field project and of any RMI symptoms reported by employees or experienced by supervisors.

**4.4 MEDICAL CARE PROVIDER**

Local Medical Care Providers are responsible for performing the initial medical evaluation of employees who report RMIs. A licensed physician will provide diagnosis, treatment, and recommendations in accordance with AEE policy and applicable federal or state regulations.

**4.5 ALL EMPLOYEES**

It is the responsibility of all employees to report:

- any potential RMI risks identified by the employee in the employee's work station or job tasks so that the SHE Coordinator/SHSC can implement adequate controls
- any RMI symptoms as they arise in order to receive effective medical management in a timely fashion

Any employee who reports RMI symptoms will:

- participate in a work station evaluation
- complete applicable paperwork to document the conditions and any symptoms

Employees will adhere to recommended control measures and safe and healthy work practices as discussed in Section 7 of this SOP and described in Attachment 4.

## **5.0 PRELIMINARY RMI RISK INFORMATION**

### **5.1 RMI RISK INDICATORS**

Certain conditions may indicate the need to review the workplace, identify jobs that need further evaluation, and set priorities for improvements. These include:

- plans for new or redesigned processes or equipment
- trends in accidents and injuries
- incidents of RMI
- absenteeism
- high turnover rate
- complaints about musculoskeletal pain
- employee-generated changes in the workplace (e.g., tool modification)
- employee complaints about procedures, methods, etc.
- high overtime and increased work rate
- poor work quality
- manual material handling and repetitive motion tasks

When gathering preliminary RMI risk information, the presence of these conditions shall be noted.

### **5.2 INITIAL RECORDS REVIEW**

The Corporate SHE Director, or designee, shall perform an initial records review to identify existing RMI problems. The goal of the initial records review is to identify jobs that produce ergonomics-related losses. Data gathered from submitted Supervisor's Reports of Injury or Illness, Occupational Safety and Health Administration (OSHA) 200 and 300 Logs, and Workers' Compensation documents provide the direction for the worksite evaluation program. In addition, any job, process, or operation where an RMI has occurred to more than one employee, doing identical work activity, must be evaluated.

## **6.0 ERGONOMIC WORKSITE EVALUATION**

### **6.1 IDENTIFYING RMI RISK FACTORS**

When an initial records review indicates an ergonomic-related loss or an employee reports an RMI symptom or condition, an assessment to identify RMI risk factors is to be completed. The Task Evaluator Checklist (Attachment 1) or/and the Computer/VDT Comfort Checklist (Attachment 2), as applicable to the job or specific tasks, may be used to perform the assessment. If no RMI risk factors are identified as a

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result of the assessment, other factors should be considered and further evaluation performed by the SHE Coordinator/SHSC, a Physical Therapist, or by the Medical Care Provider.

The SHE Coordinator/SHSC or designee will identify high risk, repetitive, or other specific risk factors that are present by asking questions of the worksite's employee(s) and observing work activities and equipment used by the employee, in addition to observing the general worksite environment. The SHE Coordinator/SHSC or designee may complete the assessment checklist(s) with worksite-specific structures and activities in mind.

### **6.1.1 Upon Notification of RMI Symptoms**

When any employee makes a notification of RMI symptoms, the SHE Coordinator/SHSC or designee will focus the job evaluation on the worksite of the employee who reported the symptoms. In some cases, a worksite may be nonfixed (mobile), such as field investigations, and ergonomic worksite/task evaluations will be limited to an evaluation of tool and machinery use and tasks involving manual lifting, cutting, packaging, sampling, decontaminating, and loading, as deemed appropriate by the SHSC or designee. The checklists are intended to serve as a guideline for conducting the ergonomic worksite/task evaluation, and may be expanded upon depending on worksite conditions.

## **6.2 APPROACHES FOR CONTROLLING WORKPLACE RISK FACTOR EXPOSURES**

Once a job is found to possibly contribute to an ergonomic-related condition, it should be evaluated and control measures implemented with the aid of the RMI Solution Guide (Attachment 3).

## **7.0 CONTROL MEASURES AND STANDARD SAFE WORK PRACTICES**

There may be more than one possible solution and various means of implementation should be considered (e.g., availability, cost, and appropriateness for job).

Controls for problem jobs at mobile worksites shall be implemented by the SHSC consistently whenever the problem task is performed.

When controls are required but are inadequate, the job shall be controlled to reduce employee exposure to the lowest feasible level. For jobs where exposure has been reduced to the lowest feasible level, but the job remains a problem, the job will continue to be monitored for developments in control technology. When feasible, new control technologies shall be implemented as they become available.

When equipment is procured, AEE shall, whenever possible, use designers, suppliers, and manufacturers that provide assistance in identifying and applying ergonomic design principles to prevent new problem job conditions from being created.

### **7.1 IMPLEMENTATION OF CONTROL MEASURES AND SAFE WORK PRACTICES**

AEE employees are responsible for implementing recommended VDT Workstation Features/Safe and Healthy Work Practices (Attachment 4) and Steps for Safe Manual Lifting (Attachment 5) on a customary and habitual basis in order to prevent RMIs. Should the implementation of these recommendations be insufficient, AEE will make efforts to provide suitable feasible engineering controls, administrative controls,

or PPE for employees who report RMI risks or symptoms. PPE will not be used as a substitute for these controls unless it provides protection at least as effective as the engineering and administrative controls.

The SHE Coordinator/SHSC or designee will implement control measures in a timely manner, based on the severity of the risk that is identified.

Except under special circumstances, workstation equipment that is appropriate for each employee's task and for the employee is considered a suitable control measure for VDT operators, provided that the VDT operators receive proper training in the use of the workstation equipment and adhere to recommended practices.

When a measure (e.g., new technology) becomes known that is substantially certain to cause a greater reduction in such injuries and it would not impose additional unreasonable costs, it shall be evaluated for implementation.

### **7.1.1 AEE VDT Workstation Features**

The goal of workstation design at AEE is to minimize physical stress and fatigue to employees. With the performance of any task, no matter how light, some degree of work strain may arise. The resulting work strain is unacceptable if it becomes excessive or diminishes the employee's work tolerance. Workstations should be designed to prevent excessive work strain.

Application of the ergonomic principles shown in the VDT Workstation Features figure (Attachment 4), can largely eliminate RMI symptoms, such as back or neck pain, eye strain, and headaches.

## **8.0 RMI SYMPTOM REPORTING PROCEDURE**

AEE encourages employees to report, orally or in writing, RMI symptoms or potential RMI risks to the SHE Coordinator/SHSC. The affected employee, SHE Coordinator/SHSC, or designee shall document the report on an RMI Symptom Report (Attachment 6). Any employee who identifies a potential RMI risk in his/her work station or related to the task he/she performs, or recognizes an RMI symptom, can be assured that the report may be given without fear of reprisal or discrimination.

All written evaluation reports will be maintained by the SHE Coordinator for a minimum of 1 year from the date the report was filed.

## **9.0 MEDICAL MANAGEMENT**

### **9.1 APPLICABILITY OF MEDICAL MANAGEMENT**

In the case of mild symptoms of recent origin, the SHE Coordinator/SHSC or designee will attempt to make adjustments to the employee's work activities to determine whether symptoms will resolve. In some cases, as warranted, a physical therapist or a representative from the workers' compensation carrier may be brought in to provide ergonomic-related improvements.

Once a situation warrants medical management, AEE will make available, at no cost to the employee, effective medical management. Medical management will provide for early detection, evaluation, and treatment of work-related RMIs and RMI symptoms. The SHE Coordinator/SHSC or designee will sign the

Employer's Request for Medical Evaluation form (Attachment 6) and give it to the employee prior to the scheduled appointment.

## 9.2 MEDICAL EVALUATION ARRANGEMENTS

A licensed physician at the local Medical Care Provider will conduct the evaluation. At the time of the appointment, any completed ergonomic worksite evaluation documentation applicable to the employee should be submitted to the Medical Care Provider. The employee will complete the RMI Symptom Report form and review the answers with the Medical Care Providers.

The SHE Coordinator/SHSC or designee shall be the contact person to communicate with local Medical Care Provider. The employee's supervisor or Human Resources and the SHE Coordinator/SHSC will coordinate the appropriate placement of the affected employee in the workplace during the recovery period in accordance with the recommendations of the Medical Care Provider.

## 10.0 TRAINING

Training in good ergonomic principles as they apply to the job and tasks shall be provided to supervisors and employees prior to assignment or transfer to a job that has been identified to have potential ergonomic risk factors. In addition, training shall be provided when new processes, procedures, or equipment are introduced to the workplace and represent a new ergonomic hazard. The SHE Coordinator/SHSC or designee shall provide (or arrange for) this training.

The training will cover the following topics:

1. an overview of AEE's program and applicable state or federal Ergonomics Standards
2. an overview of repetitive motion injuries and potential exposures
3. symptoms and health effects and/or injuries caused by RMIs
4. procedures for reporting of symptoms and/or injuries, the importance of early reporting, and AEE's medical management procedures
5. good ergonomic principles to minimize RMIs and how to put them into practice
  - maintenance of neutral postures
  - safe lifting technique
  - adjustment of chair, workstation layout, and accessory placement, e.g., copy holders
  - lighting and glare
  - noise control
  - periodic breaks and change in tasks

Training and training materials shall be provided in a manner that the employee is able to understand. This includes appropriate content, consideration of employees' educational levels, literacy, and language skills.

The program shall be evaluated for effectiveness and revised if necessary. All training will be provided during work hours at no cost to the employee.

Training sessions will include question and answer periods.

## 11.0 RECORDKEEPING

An ergonomic-related injury will be recorded as an **illness** for OSHA recordkeeping purposes. The Corporate SHE department shall update the 300 Log upon notification of diagnosis of an RMI by the Medical Care Provider.

### 11.1 ERGONOMIC WORKSTATION/WORKSITE EVALUATION RECORDKEEPING

Completed copies of the Task Evaluator Checklist; Computer/VDT Comfort Checklist; and RMI Solution Guide, and their updates are maintained by the SHE Coordinator/SHSC or designee.

The SHE Coordinator/SHSC shall maintain the workstation/worksite evaluation records for 1 year after the evaluation is completed in accordance with 8 CCR 3203, Injury and Illness Prevention Program.

The ergonomic workstation/worksite evaluation recordkeeping shall include at least the following:

- identification of the person conducting the evaluation
- the potential unsafe condition and/or work practice identified (appropriate Attachments may be used for this purpose)
- the action taken to correct the identified potential unsafe condition and/or work practice

### 11.2 TRAINING RECORDKEEPING

The SHE Coordinator/SHSC will document and maintain a current copy of the training materials and programs used, and the most recent methods and results of evaluations of the effectiveness of the training, for 3 years. The records will include the training date(s), type(s) of training, and training providers.

### 11.3 MEDICAL MANAGEMENT RECORDKEEPING

The local Medical Care Provider shall establish and maintain an accurate and confidential record for each employee provided with medical management in accordance with 29 CFR 1910.20. Employee medical records shall be maintained for at least the duration of the employee's employment plus 30 years.

## 12.0 REFERENCES

California Occupational Safety and Health Administration. 8 CCR 3203, *Injury Illness Prevention Program*.

Federal Occupational Safety and Health Administration, Department of Labor. 29 CFR 1910, *Occupational Safety and Health Standards*.

General Industry Safety Orders, 8 CCR 5110, *California Ergonomics Regulation*. July 3, 1997.

Kroemer, K., et al. 1994. *Ergonomics: How to Design for Ease and Efficiency*. Prentice Hall: New Jersey.

Magyar, Stephen V., *Homemade Ergonomics, An Effective Worksite Evaluation Program*, Professional Safety, March 1997, p.16-20.

National Safety Council. 1992. *Accident Prevention Manual for Business and Industry: Engineering and Technology*, 10th ed.

### **13.0 ATTACHMENTS**

1. Task Evaluator Checklist
  2. Computer/VDT Comfort Checklist
  3. RMI Solution Guide
  4. VDT Workstation Features/Safe and Healthy Work Practices
  5. Steps for Safe Manual Lifting
  6. Employer's Request for Medical Evaluation/RMI Symptom Report
-

**ATTACHMENT 1**

**TASK EVALUATOR CHECKLIST**



**ATTACHMENT 2**

**COMPUTER/VDT COMFORT CHECKLIST**

## COMPUTER/VDT COMFORT CHECKLIST

Complete this checklist to further analyze a job that involves a computer/video display terminal. Columns that are marked "NO" indicate an area that may need an ergonomic improvement. Use the appropriate Solutions Guide to assist in minimizing or eliminating a potential RMI risk factor.

Evaluation for: \_\_\_\_\_ Date: \_\_\_\_\_  
Employee's Name/Job Title/Department

Evaluated by: \_\_\_\_\_  
Evaluator's Name/Job Title/Department

Comments  
Note N/A if not applicable.

### CHAIR:

- |   |                              |                             |
|---|------------------------------|-----------------------------|
| Support for low back                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Adjustable seat angle                             | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Rounded edges on seat                             | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Arm rest  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Leg clearance (h=24", w=20" minimum)              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Is chair stable (5 legs and casters)              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Knees even with hips, or a little lower than hips | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Is seat easily adjusted                           | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Do feet reach the floor                           | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Backrest placed at waistline to support low back  | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Adjustable seat back (90-105 degrees)             | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Is a footrest available                           | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

### KEYBOARD:

- |                                      |                              |                             |
|--------------------------------------|------------------------------|-----------------------------|
| Position of Keyboard (h=23" - 28")   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Elbows bent at 90 degrees            | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Wrists straight, or slightly bent-up | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

### MOUSE:

- |                                      |                              |                             |
|--------------------------------------|------------------------------|-----------------------------|
| Elbows bent at 90 degrees            | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Wrists straight, or slightly bent-up | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Shoulders relaxed                    | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

### SCREEN:

- |  |                              |                             |
|--|------------------------------|-----------------------------|
| About 16" - 22" away (roughly arm's length)          | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Terminal screen top even or slightly below eye level | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Screen is free of glare                              | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

### WORK:

- |  |                              |                             |
|--|------------------------------|-----------------------------|
| Document and screen at similar heights   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Use of document holder   | <input type="checkbox"/> Yes | <input type="checkbox"/> No |
| Sitting directly in front of the document holder, keyboard, and display terminal | <input type="checkbox"/> Yes | <input type="checkbox"/> No |

REFERENCE: ANSI/HFS 100-1988

**ATTACHMENT 3**  
**RMI SOLUTION GUIDE**

**RMI SOLUTION GUIDE**  
**General Worksite**

Select the appropriate solution(s) for the job or specific task that presents a potential RMI risk factor.

Solution for: \_\_\_\_\_ Date: \_\_\_\_\_  
Employee's Name/Job Title/Department

Evaluated by: \_\_\_\_\_  
Evaluator's Name/Job Title/Department

**Hand**

- Power tool
- Different tool to maintain comfortable wrist position
- Dampen vibration
- Layout changes
- Tilted work surface
- Work methods
- Improved tool grip (best between 1" and 2" in diameter)
- Grip wrap / paddle handle
- Better gloves (look at protection and fit)
- Eliminate task

**Arm**

- Change layout (e.g., place materials in front of employee)
- Tilted work surface
- Improved heights
- Arm supports
- Eliminate task

**Back**

- Add another lifter
- Reduce weight lifted
- Raise load off the floor
- Lower load to shoulder
- Add handles or casters to item
- Change layout (e.g., eliminate pulling and minimize pushing)
- Use a material handling device (e.g., cart)
- Automate job

**Other**

- Add foot rest
- Anti-fatigue mats
- Cushioned insoles
- Adjustable chair
- Lumbar support
- Arm rests
- Adjustable work height
- Reaches within 15" of employee's seated workplace
- Pad edges
- Redesign job
- Task lighting
- Replace lights
- Maintenance needed
- Increase lighting
- Ventilation checked
- Improved work methods
- Modify job
- Shorten exposure
- Add variety

**RMI SOLUTION GUIDE**  
**Computer/VDT Workstation**

Select the appropriate solution(s) for the job or specific task that presents a potential RMI risk factor.

Solution for: \_\_\_\_\_ Date: \_\_\_\_\_  
Employee's Name/Job Title/Department

Evaluated by: \_\_\_\_\_  
Evaluator's Name/Job Title/Department

**Workstation Arrangement**

- Adjustable document holder
- Frequently used items moved for an easy reach
- Phone headset
- Keyboard extension
- Footrest

**Chair**

- Lumbar support
- Adjustable chair
- Adjust clearance between chair and desk (3"-6" of leg room)

**Keyboard**

- Raise or lower keyboard (wrists should be straight and keyboard at elbow level)
- Wrist rest
- Forearm support (if moderate to heavy mouse use)
- Soft friction mouse pad
- New keyboard

**Monitor**

- Glare screen
- Adjust monitor's display settings (brightness and contrast)
- Task lamp position adjusted to remove glare on monitor
- Raise or lower computer monitor (top of text is at or below eye level)
- Move monitor forward or backward (16"-22" away)

**Work Environment**

- Increase or decrease lighting
- Add a task light
- Window blinds
- Printer enclosure (to reduce noise level)

**Work Habits**

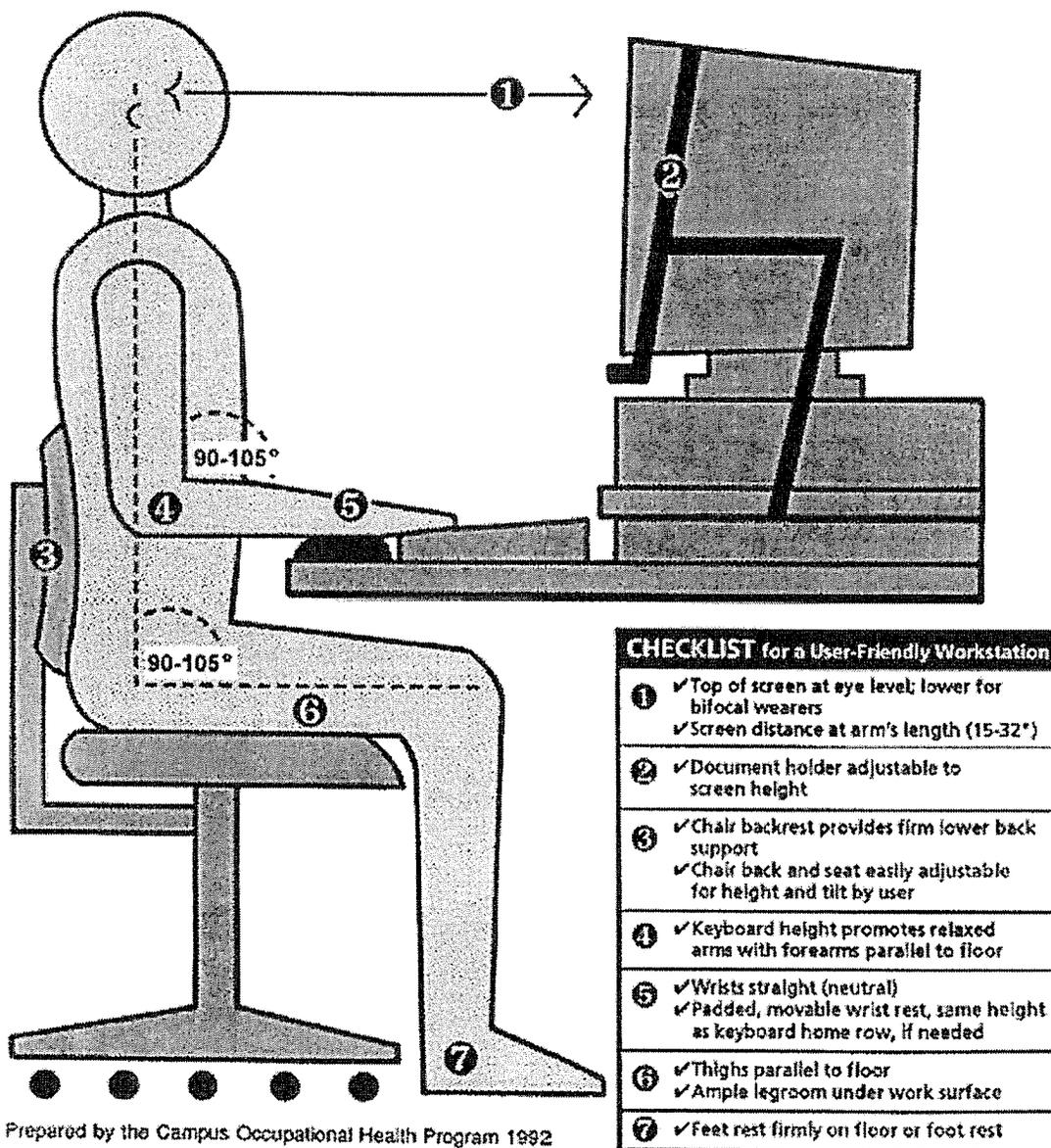
- Increase number of microbreaks (30-second breaks at workstation)
- Vary tasks more frequently
- Additional ergonomic training

**ATTACHMENT 4**

**VDT WORKSTATION FEATURES/  
SAFE AND HEALTHY WORK PRACTICES**

## VDT Workstation Features

Video display terminals (VDTs) have been a subject of concern as their use in business and industry has increased. Back, neck, and wrist pains; eye strain; and headaches can occur when using the VDT more than 4 hours a day. The application of ergonomic principles, as described below, can largely eliminate these symptoms.

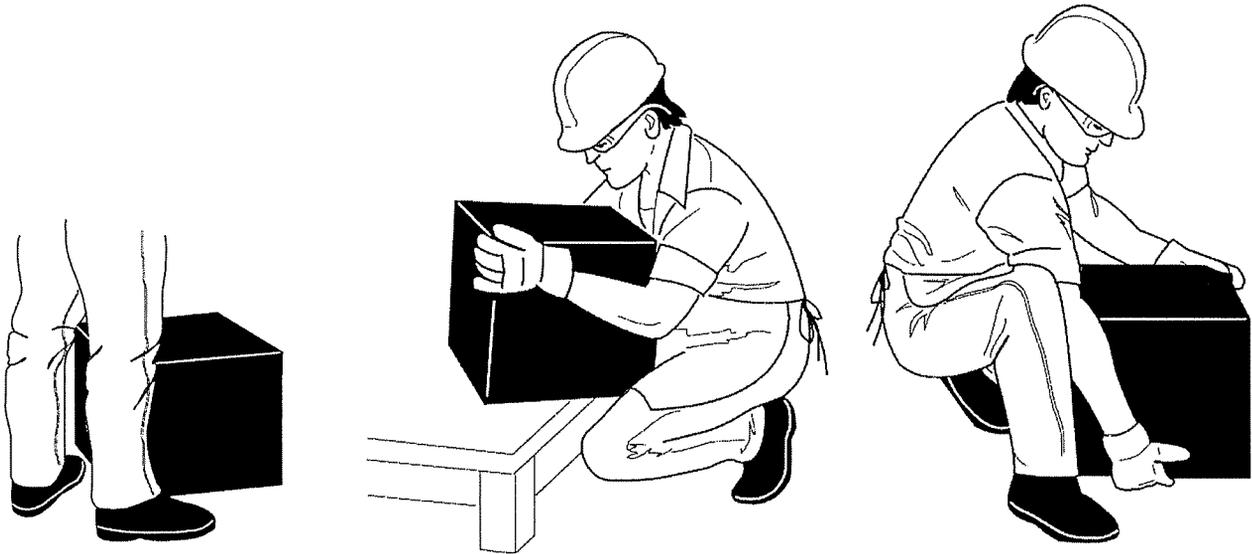


## SAFE ERGONOMIC WORK PRACTICES

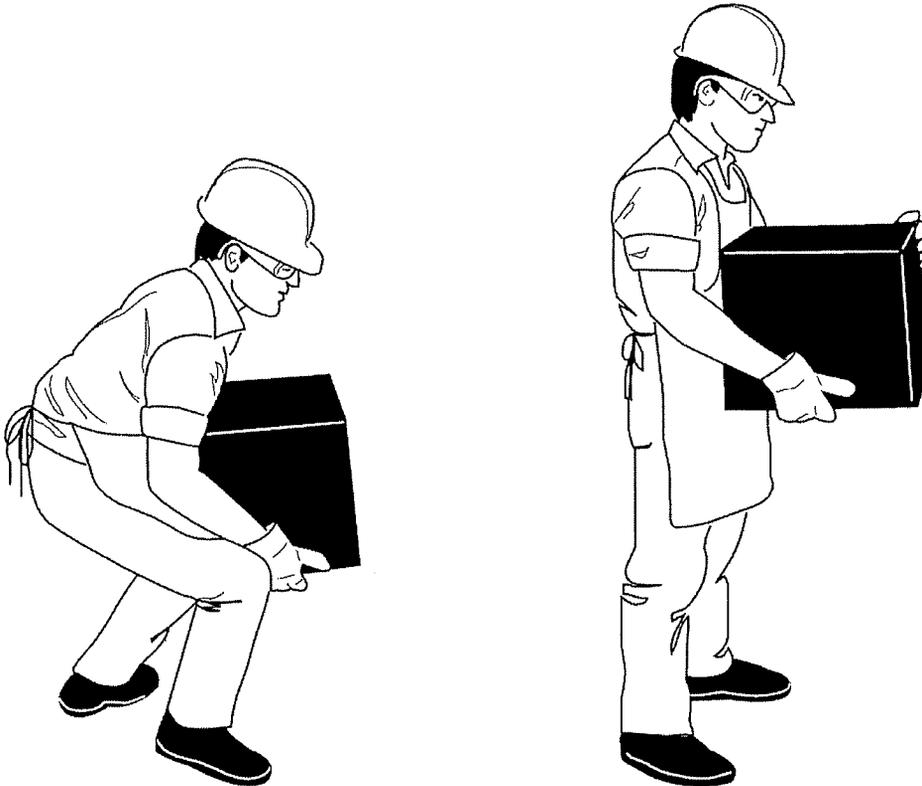
- Repetitive, monotonous, and continuous tasks, when possible, should be mingled with varying tasks of different lengths to allow the employee to shift from one task to another.
- The “recovery value” of many short rest pauses is larger than that of a few long breaks.
- Change body posture occasionally by stretching and moving when performing continuous tasks.
- Do not twist the back or bend sideways.
- Do not lift or lower with arms extended.
- To prevent back strain when manually lifting an object, keep knees bent, back straight, and head up, provided it helps to get the load closer to your body. Lifting stress is also reduced by bringing the load as close to the center of the body as possible.
- Always test an object to obtain a rough estimate of its weight prior to actually lifting.
- Avoid storing items above shoulder height or on the floor if frequent access to the items is required.
- Use vibration absorbing tool handles when possible.
- The height of the work surface should provide adequate clearance under the work surface to accommodate the legs in a comfortable position.
- To reduce wrist trauma, maintain a straight wrist. Do not allow tendons to bend or become subject to stress.

**ATTACHMENT 5**

**STEPS FOR SAFE MANUAL LIFTING**



1. Stand close to the load with your feet spread apart about shoulder width, with one foot slightly in front of the other for balance.
2. Squat down bending at the knees (not your waist). Tuck your shin while keeping your back as vertical as possible.
3. Get a firm grasp of the object before beginning the lift.



4. Begin slowly lifting with your LEGS by straightening them. Never twist your body during this step.
5. Once the lift is complete, keep the object as close to the body as possible. As the load's center of gravity moves away from the body, there is a dramatic increase in stress to the lumbar region of the back.

**ATTACHMENT 6**

**EMPLOYER'S REQUEST FOR MEDICAL EVALUATION/  
RMI SYMPTOM REPORT**



## EMPLOYER'S REQUEST FOR MEDICAL EVALUATION

Employee Name: \_\_\_\_\_

Social Security Number: \_\_\_\_\_

The above employee has reported potential Repetitive Motion Injury (RMI) symptoms (see RMI Symptom Report on the back of this form). AMEC Earth & Environmental, Inc. (AEE) requests a medical evaluation to be performed by a license physician.

Please provide AEE with a copy of the assessment results, and where necessary, work restrictions and follow-up. Omit all findings and diagnoses that are unrelated to occupational exposures, or that AEE need not be aware of to protect the employee from work-related aggravation of a medical condition. All worksite evaluation documentation applicable to this employee has been included with this request form.

Requested by: \_\_\_\_\_

Date: \_\_\_\_\_



# STANDARD OPERATING PROCEDURE

S.O.P. No. H-5

PAGE 1 OF 8

APPROVAL

Denise L. Daggett, MS, CIH

EFFECTIVE DATE

05/24/02

REVISION No.

0

TITLE

## SAMPLING EQUIPMENT, HEAVY EQUIPMENT, AND VEHICLE DECONTAMINATION

### 1.0 PURPOSE

The purpose of this procedure is to provide standard decontamination methods for use during project activities at sites potentially contaminated with hazardous materials/wastes. The removal of waste-laden materials and surface contamination from sampling equipment, heavy equipment, and vehicles is necessary because, once complete, it permits unrestricted use of the equipment by AMEC Earth & Environmental, Inc. (AEE) and subcontractors, full movement of the equipment in the clean areas of the site, and for relocation off-site. An additional benefit is that once decontamination is complete, only the need for basic safety equipment remains (e.g., safety-toe boots, hard hat, and safety glasses).

There are chemical and physical hazards associated with decontamination activities. The purpose of this standard operating procedure (SOP) is to ensure personnel safety during the decontamination process. Personnel decontamination is addressed in SOP H-6, *Personnel Decontamination*.

### 2.0 SCOPE

This procedure applies to all AEE employees and subcontractors where applicable during decontamination of sampling equipment, heavy equipment, and vehicles, as delineated in site-specific Health and Safety Plans (HSPs).

### 3.0 DEFINITIONS

**Deconnable Surfaces** - Deconnable surfaces are nonporous surfaces incapable of absorbing contaminants. Deconnable surfaces include metal, glass, and high density plastics or polymers.

**Decontamination** - Decontamination is defined as the process of physically removing contaminants or changing their chemical nature to innocuous substances.

**Exclusion/Hot Zone** - The Exclusion or Hot Zone (EZ) is defined as the area where contamination is the greatest. It encompasses a 30-foot radius around intrusive activities with access restricted to field sampling crews and necessary equipment operators.

**Transition Zone** - The Transition Zone (TZ) is defined as the area between the EZ and Contamination Reduction Zone (CRZ). It should be established upwind of the EZ and serve as the support area for sample quality assurance/quality control (QA/QC) and packing. Any coolers that are in this zone should be protected from contamination using polyethylene sheeting and decontaminated prior to leaving the site.

**Contamination Reduction Zone** - The CRZ is defined as the area between the TZ and the Clean or Support Zone (SZ). Consisting of two separate decontamination lines, this is the area where both equipment and personnel are decontaminated in order to prevent the spread of contamination. The CRZ

should be marked as narrow corridors through which personnel and equipment pass from work zones to the SZ.

**Clean/Support Zone** - The SZ is defined as the area of no contamination. It is upwind and away from the EZ and serves as the location where vehicles, emergency equipment, telephones, break areas, and all non-essential personnel remain.

#### **4.0 RESPONSIBILITIES**

##### **4.1 PROJECT MANAGER**

The Project Manager (PM) is responsible for identifying instances of noncompliance with this procedure and ensuring that future field activities are in compliance with this procedure.

##### **4.2 FIELD MANAGER**

The Field Manager (FM) will ensure that this procedure is implemented correctly. The FM will also ensure that decontamination effectiveness is evaluated, as necessary.

##### **4.3 SITE HEALTH AND SAFETY COORDINATOR**

The Site Health and Safety Coordinator (SHSC) is responsible for ensuring that decontamination occurs according to this procedure.

##### **4.4 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR**

The Corporate Safety, Health, and Environment Director (Corporate SHE Director) is responsible for ensuring that this procedure reflects the current scientific practices in the area of equipment and vehicle decontamination.

#### **5.0 PROCEDURES**

Before any work begins on a hazardous waste site, decontamination of equipment should be addressed in the HSP. The decontamination section of the HSP should:

- determine the number and layout of decontamination stations
- determine the decontamination equipment and solutions needed
- determine appropriate decontamination methods
- establish procedures to prevent contamination of clean areas
- establish methods and procedures to minimize worker contact with contaminants during equipment or vehicle decontamination

The decon plan should be revised whenever site conditions change or site hazards are reassessed based on new information.

The following subsections describe standards for decontamination.

### **5.1 EQUIPMENT AND VEHICLE DECONTAMINATION AREA**

An appropriate location for sampling equipment, heavy equipment, and vehicle decontamination at a site shall be selected based on the ability to control access to the area, control residual material removed from equipment, store clean equipment, and gain entry and exit for vehicles. The decontamination area shall be located at an adequate distance away and upwind from potential contaminant sources to avoid contamination of clean areas and personnel (usually in the CRZ), and separate from the personnel decontamination area. Once equipment and vehicles are clean, they shall be moved to a clean area or stay at a sufficient distance from the potential contamination sources and the decontamination area to ensure that they remain clean. Work zones are shown in Attachment 1.

### **5.2 CLEANING SOLUTIONS, EQUIPMENT, AND TECHNIQUES**

The preferred method of sampling equipment decontamination involves the use of long-handled, soft-bristled brushes, galvanized wash tubs or equivalent with secondary containment, pump-activated sprayer, buckets with plastic liners and drums with liners, visqueen, a mild detergent solution, and an appropriate solvent (usually isopropyl alcohol) in a spray bottle. Lumber and/or coolers/crates/boxes are preferred for elevating sampling equipment decon buckets. Detergents are preferred over other cleaning solutions because the detergent alone does not pose a handling or disposal problem (see Attachment 2). The more commonly used solutions are Penetone 155, in cases where polychlorinated biphenyls (PCBs) are of concern, and Liquinox or Alconox for general decontamination purposes. Material Safety Data Sheets (MSDSs) for decon solutions must be appended to the site-specific HSP.

Equipment and vehicle decontamination is accomplished using a variety of equipment, techniques, and solutions. A list of the necessary decontamination supplies for equipment and vehicles is as follows:

- personal protective equipment (PPE) (see below)
- high-pressure water sprayer: for washing and rinsing heavy equipment and vehicles (or equivalent decon fluid delivery device), or pressurized pump spray canister for final rinse of sampling equipment
- hazard tape (black and yellow) for marking heavy equipment and vehicles before release
- appropriate decon solution (water, dilute acids or bases, detergent-based surfactants, organic solvents)
- appropriate rinse solution (usually water)
- curtains, enclosures, or spray booth to contain splashes and blow back from high-pressured sprayers for heavy equipment and vehicle decontamination: visqueen plastic sheets or rolls, lumber
- containment to hold contaminants and solutions: assorted booms, lumber, duct tape (for temporary containment)

- assorted rags, long-handled brushes, shovels, hand tools, buckets (for exterior and cab decon, and submersion of sampling equipment)
- storage tanks or drums for appropriate treatment systems to provide temporary storage and/or treatment of contaminated wash and rinse solutions
- drains or pumps for collection of contaminated wash and rinse solutions
- containers for storage and disposal of contaminated wash and rinse solutions, damaged or heavily contaminated parts, and porous, nondeconnable materials to be discarded

Attachment 3 shows the preferred setup for the sampling equipment decontamination area and the heavy equipment decon area.

### **5.3 PERSONAL PROTECTIVE EQUIPMENT**

Generally, Level Modified D or C PPE will be required for those personnel performing decontamination. The level of PPE for decon is stated in the HSP and is typically equivalent to or slightly less than the PPE required by personnel who enter the EZ. The SHSC will require upgrading or permit downgrading when evidence allows the determination of airborne or surface contamination. This upgrade or downgrade will be determined by the SHSC through visual inspection and/or air monitoring for the contaminant of concern. The SHSC will inform the decon staff when it is acceptable to downgrade the PPE.

The HSP will identify the proper canister or filter for use with Level C respiratory protection based upon the contaminants known or suspected to occur at the site.

### **5.4 SAMPLING EQUIPMENT DECONTAMINATION PROCEDURE**

1. Assemble the appropriate decon equipment and PPE for use during your shift.
2. Prepare the appropriate decon wash and rinse solution(s) for use. This may consist of diluting an acid, base, surfactant, or detergent to a suitable concentration. Be sure to refer to the applicable MSDS, if available before commencing.
3. Carefully remove AS MUCH contaminated material AS POSSIBLE manually using shovels, rods, trowels, brushes, etc., from the exterior and interior of the equipment to be deconned, allowing the material to fall onto a visqueen-coated surface or into an empty bucket.
4. Immerse the equipment in the first decon bucket containing the decon solution. The fluids must be contained by secondary buckets containing the decon buckets (temporary or permanent). Tenting may have to be utilized in order to prevent the blowing of contaminant-laden droplets into a clean area.
5. Immerse the entire piece of sampling equipment in the appropriate rinse solution in the second bucket.
6. Spray the piece of equipment with the solvent, as necessary.

7. Place the equipment in the third bucket for the final rinse.
8. Follow with a spray of deionized water from a pressurized sprayer.
9. Dispose of all nondeconnable materials in a suitable manner. This may consist of placing the materials in appropriate containers or moving the materials to a designated portion of the waste feed pile for eventual treatment and/or incineration.

**NOTE:** In some instances it may be necessary to use an additional wash/soap solution bucket before equipment is sent through the decon line.

### 5.5 CONTROLS FOR CHEMICAL AND PHYSICAL HAZARDS

The following standard practices will help to control the physical and chemical hazards of the decon procedure:

- elevate sample buckets to prevent back strain due to bending and stooping
- perform decontamination with steady motions that utilize the natural angle of the body's wrists, fingers, hands, arms, neck, and back
- use hand-powered pump spray devices rather than triggered spray bottles
- transport drums on a drum dolly to the location of the decon wastewater (buckets or bermed pad) rather than carry buckets to the drum storage area for disposal of wastewater, or place lids on the buckets and move the buckets by an appropriate method
- rotate personnel on job tasks to minimize the effects of heat exposure and ergonomic trauma
- wear appropriate PPE (as specified in the HSP), such as gloves, Tyvek®, and safety glasses to protect from chemical exposure during decon
- stand upwind of the spray stream of solvent to avoid inhalation and skin contact
- stand upwind of the decon line or the equipment being deconned to avoid being splashed by liquid spray that may contain contaminated materials

### 5.6 HEAVY EQUIPMENT OR VEHICLE DECONTAMINATION PROCEDURE

1. Assemble the appropriate decon equipment and PPE for use during your shift.
2. Prepare the appropriate decon wash and rinse solution(s) for use. Decon solutions may include water, dilute acids or bases, surfactants, or detergents. Be sure to refer to the applicable MSDS, if available before commencing.

3. Drive the vehicle onto or place the heavy equipment on the decontamination pad.
4. Carefully remove AS MUCH contaminated material AS POSSIBLE manually using shovels, rods, trowels, brushes, etc., from the exterior and interior of the equipment to be deconned, including the cabs of vehicles.
5. Using a high-pressure sprayer or other equivalent liquid delivery device, carefully wet down the vehicle or heavy equipment with the appropriate decon solution. Care should be taken to remove as much visible contamination as possible utilizing the minimal amount of liquids. The fluids must be contained by berms (temporary or permanent). Plastic sheeting may have to be erected in order to prevent the blowing of contaminant-laden droplets into a clean area. The decon washings must drain into a collection device (grate with sump or holding tank).
6. If deconned a vehicle, pull the vehicle slightly forward and decon the part of the tire that was in contact with the ground that had not been previously deconned. Wash the contaminated material away from the deconned vehicle so as not to recontaminate.
7. Rinse the entire vehicle or piece of heavy equipment with the appropriate rinse solution, as necessary.
8. Mark the deconned vehicle or heavy equipment with Hazard Tape (black and yellow stripe) or use a Decon Inspection Ticket (Attachment 4). This will signify to the SHSC which equipment needs to be released.
9. Contact the SHSC for release. The SHSC may release by visual inspection (in event of low health hazard) or by wipe testing (in event of moderate to high health hazard). The SHSC will remove the Hazard Tape or sign off on the Decon Inspection Ticket (Attachment 4) when the vehicle or equipment is released.
10. Dispose of all non-deconnable materials in a suitable manner. This may consist of placing the materials in appropriate containers or moving the materials to a designated portion of the waste feed pile for eventual treatment and/or incineration.

### **5.7 EFFICIENCY TESTING**

The SHSC will evaluate all decontamination activities for completeness. This may consist of visual inspections, decon solution analysis (e.g., for pH), or surface wipe testing if the contaminant can be detected in this manner. With a standard wipe test, a standard-size template (usually 10 centimeter X 10 centimeter) is used to delineate the area to be wipe tested. The wiping media generally consists of glass wool (or equivalent) and a suitable solvent. At the completion of the test, the sampling media is placed carefully into a glass vial, sealed, marked, and submitted for analysis. The SHSC will receive the wipe test analytical data from the analytical laboratory.

### **5.8 RELEASE CRITERIA**

All wipe test results will be reviewed by the SHSC for comparison to a recognized standard. This standard may be derived from regulatory dictates (i.e., USEPA and PCBs), agency recommendations (i.e., Dept. of

Health Services and total hydrocarbons), or from good industrial practices (i.e., pH between 6 and 8, visually clean).

At the time of release, the SHSC will remove the Hazard Tape or Decon Inspection Ticket (Attachment 4) signifying that the released vehicle or equipment is fully decontaminated and available for uncontrolled movement and usage.

## **6.0 REFERENCES**

NIOSH/OSHA/USCG/USEPA. 1985. Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities. October.

## **7.0 ATTACHMENTS**

1. Work Zones
2. Suggested Decontamination Solutions
3. Sampling and Heavy Equipment Decontamination Setup
4. Decon Inspection Ticket



# STANDARD OPERATING PROCEDURE

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S.O.P. No. H-5

PAGE 8 OF 8

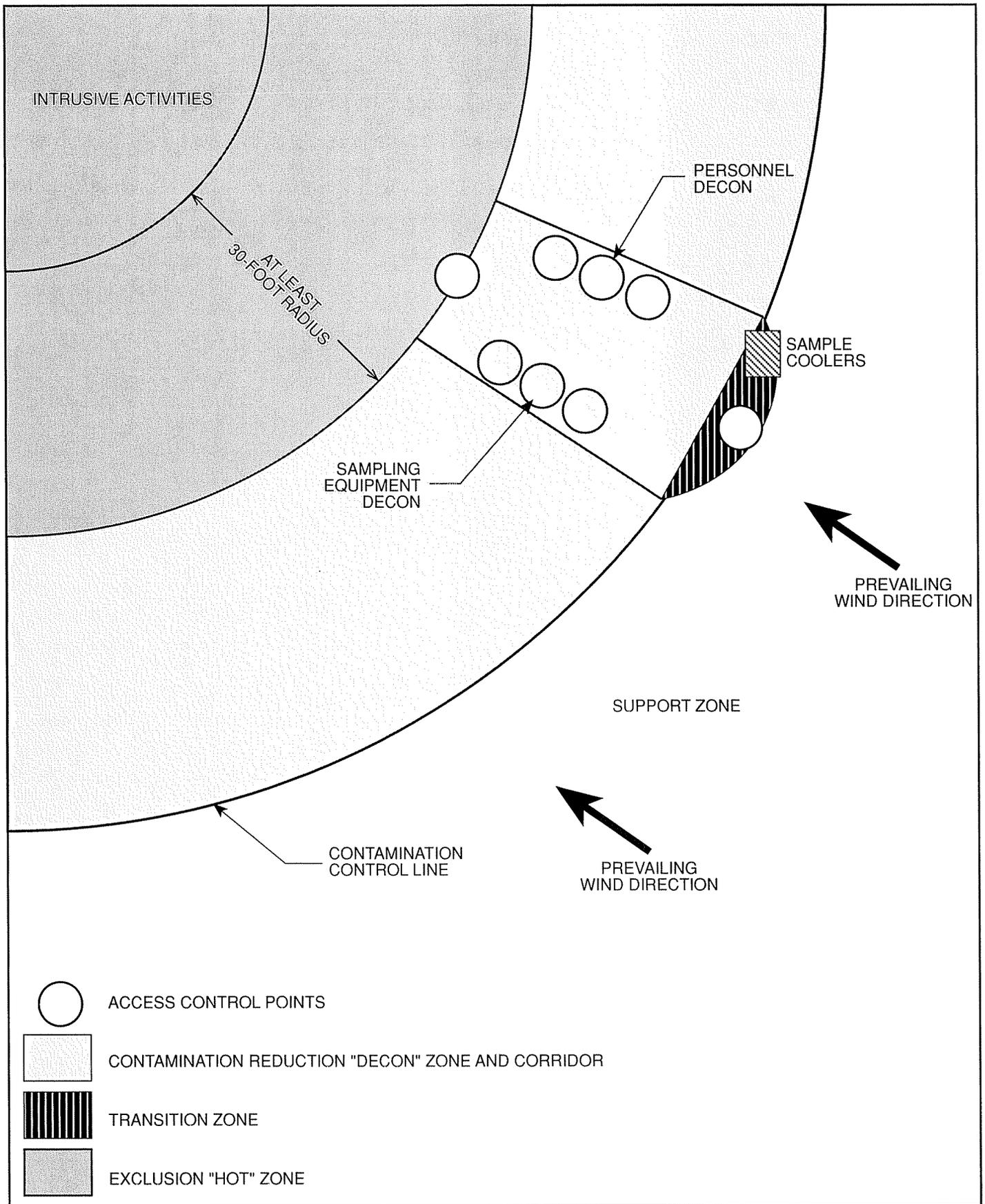
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**ATTACHMENT 1**

**WORK ZONES**



**ATTACHMENT 2**

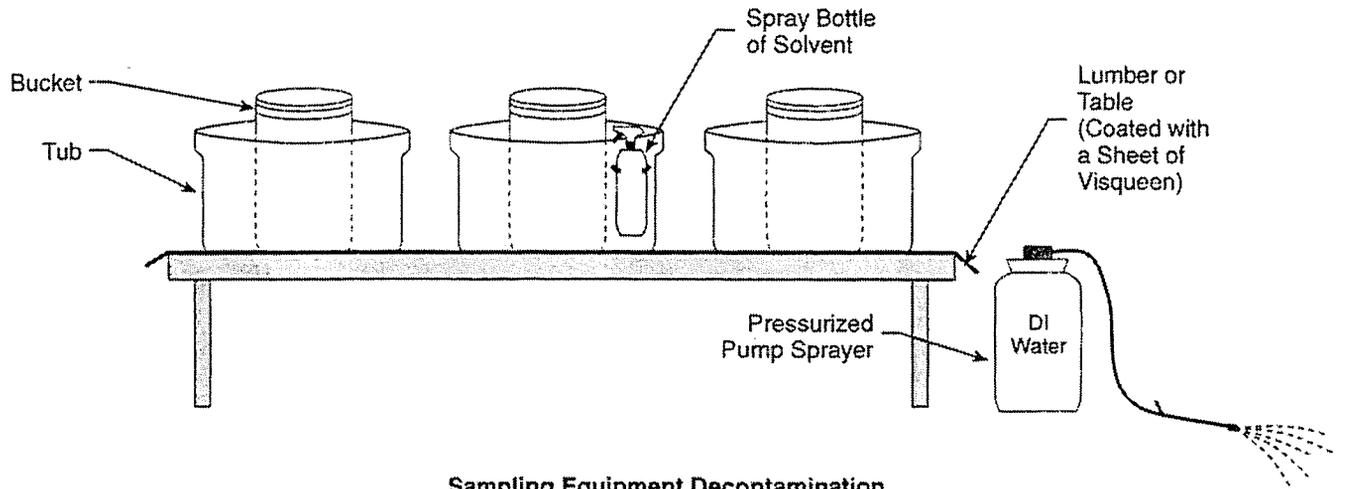
**SUGGESTED DECONTAMINATION SOLUTIONS**

## SUGGESTED DECONTAMINATION SOLUTIONS

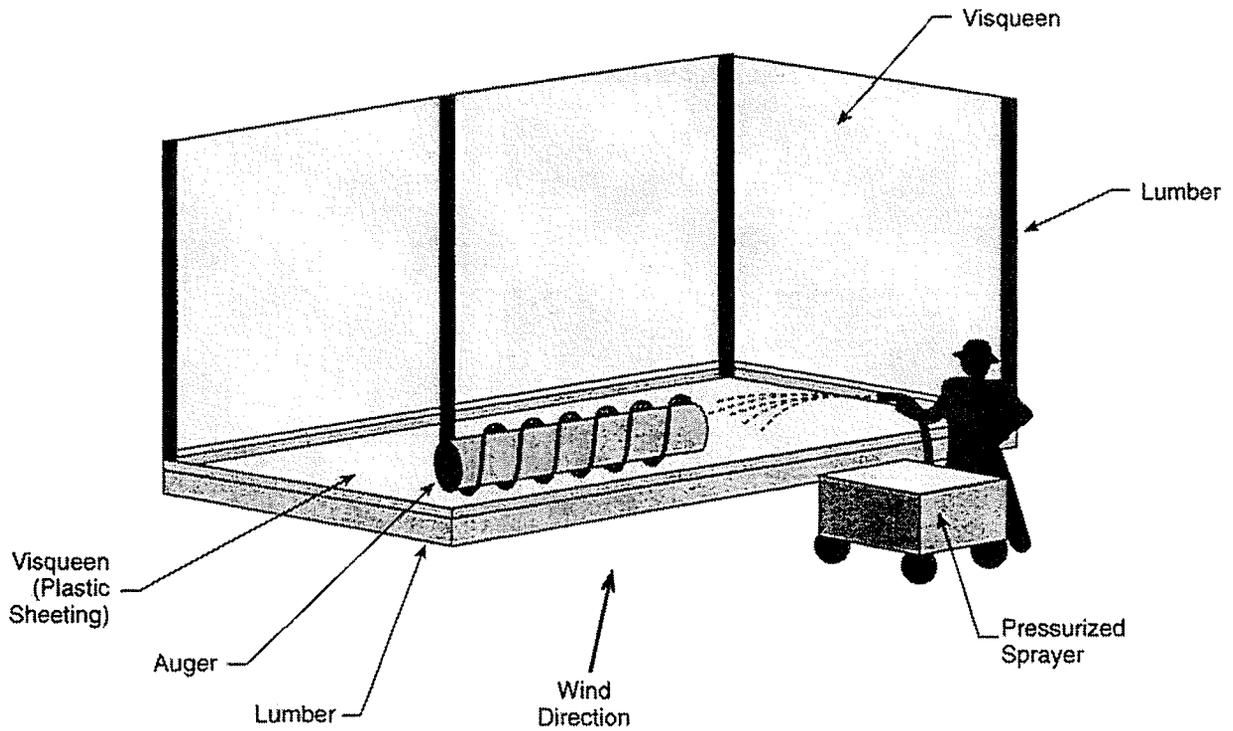
Decon Solution	Mixing	Uses/Remarks
A. An aqueous solution containing a low-sudsing detergent. Ex: Alconox, Penetone 155, Liquinox.	Follow the mixing instructions written on the particular product label.	Generally has the widest range of use. Best choice on sites where contaminants exist.
B. An aqueous solution containing 5% sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) washing soda.	To ten gallons of water, add four pounds of sodium carbonate.	Decon solution of choice for base labile compounds such as the organophosphate pesticides. Effective in neutralizing inorganic acids. Since sodium carbonate is a water softening agent, this characteristic is an aid in physical removal of contaminants.
C. An aqueous solution containing 5% sodium bicarbonate ( $\text{NaHCO}_3$ ) baking soda.	To ten gallons of water, add four pounds of sodium bicarbonate.	Sodium bicarbonate can be used to neutralize either base or acid contaminants. Good decon for base labile compounds.
D. An aqueous solution containing 2% trisodium phosphate ( $\text{Na}_3\text{PO}_4$ ) TSP.	To ten gallons of water, add two pounds of trisodium phosphate.	See uses/remarks for Decon Solution B above.
E. An aqueous solution containing 10% calcium hypochlorite ( $\text{CaCl}_2\text{O}_3$ ).	To ten gallons of water, add eight pounds of calcium hypochlorite.	Cyanide salts.
F. Ethylenediamine-tetra-acetic acid (EDTA).	Commercial product, follow product label.	EDTA is a chelating agent and is the decon solution of choice for heavy metal contaminants.
G. An aqueous solution containing 3-5% citric, tartaric, oxalic acids, or their respective sodium salts.	To ten gallons of water, add four pounds of citric, tartaric, or oxalic acid.	These compounds are chelating agents and are a decon solution of choice for heavy metal contaminants.

**ATTACHMENT 3**

**SAMPLING AND HEAVY EQUIPMENT  
DECONTAMINATION SETUP**



Sampling Equipment Decontamination



Heavy Equipment Decontamination

**ATTACHMENT 4**

**DECON INSPECTION TICKET**

# **NOTICE**

## **Decon Inspection Ticket**

Equipment Description: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Date Deconned: \_\_\_\_\_

By: \_\_\_\_\_

Date Released: \_\_\_\_\_

By: \_\_\_\_\_



# STANDARD OPERATING PROCEDURE

S.O.P. No. H-6

PAGE 1 OF 8

APPROVAL

Denise L. Daggett, MS, CIH

EFFECTIVE DATE

05/24/02

REVISION No.

0

TITLE

**PERSONNEL DECONTAMINATION**

## 1.0 PURPOSE

The purpose of this procedure is to provide standard personnel decontamination methods for use during site activities at sites potentially contaminated with hazardous materials/wastes. In general, decontamination protects workers from hazardous substances that may contaminate and eventually permeate protective clothing, respiratory equipment, tools, vehicles, and other equipment used onsite; protects all site personnel by minimizing the transfer of harmful materials into clean areas; helps prevent mixing of incompatible chemicals; and protects the community by preventing uncontrolled transportation of contaminants from the site. If garments that have come in contact with contaminants are not removed carefully and/or decontaminated, an unexpected exposure may result.

## 2.0 SCOPE

This procedure applies to AMEC Earth & Environmental, Inc. (AEE) employees and subcontractors where applicable during decontamination of field personnel contacting possible contaminants, as described in site-specific Health and Safety Plans (HSPs). Levels of protection discussed in this standard operating procedure (SOP) are defined in SOP H-12, *Personal Protective Equipment*. Sampling equipment, heavy equipment, and vehicle decontamination are discussed in SOP H-5, *Sampling Equipment, Heavy Equipment, and Vehicle Decontamination*.

## 3.0 DEFINITIONS

**Decontamination** - Decontamination is defined as the process of physically removing contaminants or changing their chemical nature to innocuous substances.

**Hot/Exclusion Zone** - The Hot or Exclusion Zone (EZ) is defined as the area where contamination is the greatest. It encompasses a 30-foot radius around intrusive activities with access restricted to field sampling crews and necessary equipment operators.

**Transition Zone** - The Transition Zone (TZ) is defined as the area between the Support Zone and Contamination Reduction Zone (CRZ). It should be established upwind of the EZ and serve as the support area for sample quality assurance/quality control (QA/QC) and packing. Any coolers that are in this zone should be protected from contamination using polyethylene sheeting and decontaminated prior to leaving the site.

**Contamination Reduction Zone** - The CRZ is defined as the area between the TZ and the Clean or Support Zone (SZ). Consisting of two separate decontamination lines, this is the area where both equipment and personnel are "decontaminated" in order to prevent the spread of contamination. The CRZ should be marked as narrow corridors through which personnel and equipment pass from work zones to the SZ.

**Clean/Support Zone** - The SZ is defined as the area of no contamination. It is upwind and away from the EZ and serves as the location where vehicles, emergency equipment, telephones, break areas, and all nonessential personnel remain.

#### **4.0 RESPONSIBILITIES**

##### **4.1 PROJECT MANAGER**

The Project Manager (PM) is responsible for identifying instances of noncompliance with this procedure and ensuring that future field activities are in compliance with this procedure.

##### **4.2 FIELD MANAGER/EMERGENCY COORDINATOR**

The Field Manager/Emergency Coordinator (FM/EC) will ensure that this procedure is implemented correctly. The FM will also ensure that decontamination effectiveness is evaluated, as necessary. In some cases, the FM/EC may also be the PM. When this occurs, all responsibilities identified above apply.

##### **4.3 SITE HEALTH AND SAFETY COORDINATOR**

The Site Health and Safety Coordinator (SHSC) is responsible for ensuring that all personnel are decontaminated according to this procedure.

##### **4.4 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR**

The Corporate Safety, Health, and Environment Director (Corporate SHE Director) is responsible for ensuring that this procedure reflects the current scientific practices in the area of personnel decontamination.

#### **5.0 PROCEDURES**

The extensiveness of decontamination depends on a number of factors, the most important being the type of contaminants involved. The more harmful the contaminant, the more extensive and thorough decontamination must be. Before any work begins on a hazardous waste site, a decontamination portion of the HSP must be developed and set up. The decontamination section of the HSP should:

- determine the number and layout of decontamination stations
- determine the decontamination equipment and solutions needed
- determine appropriate decontamination methods
- establish procedures to prevent contamination of clean areas
- establish methods and procedures to minimize worker contact with contaminants during removal of personal protective clothing and equipment (PPE)
- establish methods for disposing of clothing and equipment that are not completely decontaminated

The decon plan should be revised whenever the type of PPE changes, the site conditions change, or the site hazards are reassessed based on new information.

The following subsections describe standards for decontamination. The techniques to be used based on the level of protection, frequency of decontamination, and cleaning solutions are among the standards addressed.

### **5.1 PERSONNEL DECONTAMINATION AREA**

An appropriate location for the personnel decontamination area at a site shall be selected based on the ability to control access to the area, control residual material removed from clothing, and store clean PPE and other garments. The decontamination area shall be located at an adequate distance away and upwind from potential contaminant sources to avoid contamination of clean areas and personnel (usually in the CRZ), and separate from the equipment decontamination area. Once personnel are clean, they shall stay at a sufficient distance from the potential contamination sources and the decontamination area to ensure that they remain clean. Work zones are shown in Attachment 1.

### **5.2 CLEANING SOLUTIONS, EQUIPMENT, AND TECHNIQUES**

Personnel decontamination can be accomplished using a variety of equipment, techniques, and solutions. The preferred method of personnel decontamination involves the use of long-handled, soft-bristled brushes, galvanized wash tubs or equivalent, pump-activated sprayer, garbage cans with plastic liners and drums with liners, visqueen, paper towels, duct tape, and a mild detergent solution. Detergents are preferred over other cleaning solutions because the detergent alone does not pose a handling or disposal problem (see Attachment 2 for suggested detergents). The more commonly used solutions are Penetone 155, in cases where polychlorinated biphenyls (PCBs) are of concern, and Liquinox, Alconox, or Simple Green for general decontamination purposes. Material Safety Data Sheets (MSDSs) for decontamination solutions used on-site shall be appended to the HSPs.

### **5.3 LEVEL A AND B DECONTAMINATION**

Please refer to SOP H-12, *Personal Protective Equipment*, or Section 3.3 of the HSP for the definitions of Levels of PPE. The intermediate and final stage personnel decontamination procedures for Levels A and B include the following:

1. segregated equipment drop just outside the hotline on plastic sheets (for instruments and equipment requiring special decontamination as outlined in the Quality Assurance Plan, work plan, or field sampling plan)
2. outer boot and glove wash with long-handled, soft-bristled brushes and decontamination/detergent solution
3. outer boot and glove rinse with water
4. outer boot removal
5. outer glove removal

6. protective suit wash with long-handled, soft-bristled brushes in decontamination/detergent solution, as applicable to the contaminant(s)
7. protective suit rinse with water, as applicable to the contaminant(s)
8. (Optional.) Tank change: the self-contained breathing apparatus (SCBA) tank is exchanged for a full one; worker receives new outer gloves and boots, which are sealed with new tape, and returns to the EZ
9. removal of safety boots in designated receptacles, as applicable
10. removal and storage of SCBA backpack on a table; facepiece must remain on
11. removal and storage, on racks or plastic sheeting, of protective suit and hardhat with the assistance of a helper
12. inner glove wash with decontamination/detergent solution
13. inner glove rinse with water
14. removal and storage of facepiece in a lined container for subsequent decontamination; the fingers should not touch the face
15. removal and disposal of inner gloves in designated receptacles
16. complete body shower if severe conditions at the site exist; otherwise, hand and face wash
17. personnel redress and enter the SZ

#### 5.4 LEVEL C DECONTAMINATION (SEE ATTACHMENT 3)

The intermediate and final stage personnel decontamination procedures consist of the following for Level C:

1. segregated equipment drop just outside the hotline on plastic sheets (for instruments and equipment requiring special decontamination as outlined in the quality assurance portion of the project documents)
2. outer boot and glove wash with long-handled, soft-bristled brushes and decontamination/detergent solution
3. outer boot and glove rinse with water
4. removal of duct tape using pull tabs
5. (Optional.) Sample management: removal of outer glove and storage for later use; enter TZ for sample management, return to EZ wearing new or cleaned outer gloves

6. removal or disposal of outer boots in designated receptacles
7. removal and disposal (if not cleaned to "like new" condition) of outer gloves in designated receptacles
8. removal and disposal of coverall in designated receptacles
9. inner glove wash
10. inner glove rinse
11. removal of respirator
12. removal and disposal of inner gloves in designated receptacles
13. enter the SZ
14. general field wash for personal hygiene

#### **5.5 LEVEL MODIFIED D DECONTAMINATION (SEE ATTACHMENT 4)**

The intermediate and final stage personnel decontamination procedures consist of the following for Level Modified D:

1. segregated equipment drop just outside the hotline on plastic sheets (for instruments and equipment requiring special decontamination as outlined in the Quality Assurance Plan, work plan, or field sampling plan)
2. outer boot and glove wash with long-handled, soft-bristled brushes and decontamination/detergent solution
3. outer boot and glove rinse with water
4. removal of duct tape using pull tabs (if applicable)
5. (Optional.) Sample management: removal of outer glove and storage for later use; enter TZ for sample management, return to EZ wearing new or cleaned outer gloves
6. removal or disposal of outer boots in designated receptacles
7. removal and disposal (if not cleaned to "like new" condition) of outer gloves in designated receptacles
8. removal and disposal of coverall in designated receptacles
9. inner glove wash

10. inner glove rinse
11. removal and disposal of inner gloves in designated receptacles
12. enter the SZ
13. general field wash for personal hygiene

## 5.6 LEVEL D DECONTAMINATION

Typically, Level D does not require decontamination of protective gear. However, if chemically protective gloves are used in the course of Level D work, the gloves must be rinsed, carefully removed, and disposed of properly.

## 5.7 METHODS FOR DETERMINING THE EFFECTIVENESS OF DECONTAMINATION

Decontamination methods vary in their effectiveness for removing different substances. The effectiveness of any decontamination method should be assessed at the beginning of a program and periodically throughout the lifetime of the program by the SHSC or site individual responsible for QA/QC. If evidence indicates that decontamination has been ineffective, then the decontamination program must be revised. The following methods may be useful in assessing the effectiveness of decontamination. Visual observation is the most common method.

### 5.7.1 Visual Observation

When there is no reliable test to immediately determine the effectiveness of decontamination, visual observation will be used. Physical alterations such as discoloration, stains, corrosive effects, visible dirt, or changes in clothing fabric may indicate that contaminants have not been removed. If through visual observation decontamination has been determined to be ineffective, the decontamination steps must be repeated. Not all contaminants leave visible traces and many contaminants can permeate clothing and not be easily seen.

### 5.7.2 Wipe Sampling

Wipe testing provides after-the-fact information on the effectiveness of decontamination. This technique can be used on clothing, equipment, and the skin of personnel. In this procedure, a dry or wet cloth, glass fiber paper, or swab is wiped over the surface of the potentially contaminated object or person and then analyzed in a laboratory. In the case of reusable clothing, both the inner and outer surfaces should be tested.

### 5.7.3 Rinsate Analysis

Another way to test the effectiveness of decontamination procedures is to analyze for contaminants in a final rinsate container. Elevated levels of contaminants indicate that additional cleaning and rinsing are needed.

**5.8 DISPOSAL**

All equipment, spent solutions, and wash/rinse waters must be decontaminated and/or disposed of properly. Non-deconnable decon equipment, PPE, and other contaminated materials should be collected, placed in containers, and labeled until final disposition is determined. Spent solutions and wash/rinse waters must be collected and stored in properly labeled Department of Transportation (DOT)-approved containers. Labels should clearly indicate container contents, source, location, activity, and generator.

**5.9 EMERGENCY DECONTAMINATION**

In the event of a non-life-threatening injury in the EZ requiring first aid, the injured party should be evacuated to the decontamination line and decontaminated as much as possible or practical. Contaminated clothing should be carefully removed or cut away from the victim.

If a serious injury is sustained, life-saving care shall be administered immediately without regard to decontamination. Outside garments should be removed if it does not cause delays, interfere with treatment, or aggravate the problem. If the outer garments cannot be safely removed, the individual should be wrapped in a blanket or plastic prior to transport to a medical facility. No attempt should be made to wash or rinse the individual at the site, unless they are contaminated with an extremely toxic or corrosive material that could cause severe injury or loss of life to themselves or assisting personnel.

The EC will notify the responding emergency medical personnel of the nature of the contaminants and the extent of decontamination, if any, which was accomplished. The HSP and the SHSC should accompany the victim to the hospital to provide additional information to the emergency room staff, as applicable.

**6.0 REFERENCES**

NIOSH/OSHA/USCG/USEPA. 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*. October.

EPA. *1988 Standard Operating Safety Guides*. July.

**7.0 ATTACHMENTS**

1. Work Zones
2. Suggested Decontamination Solutions
3. Level C Decon
4. Level Modified D Decon



# STANDARD OPERATING PROCEDURE

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S.O.P. No. H-6

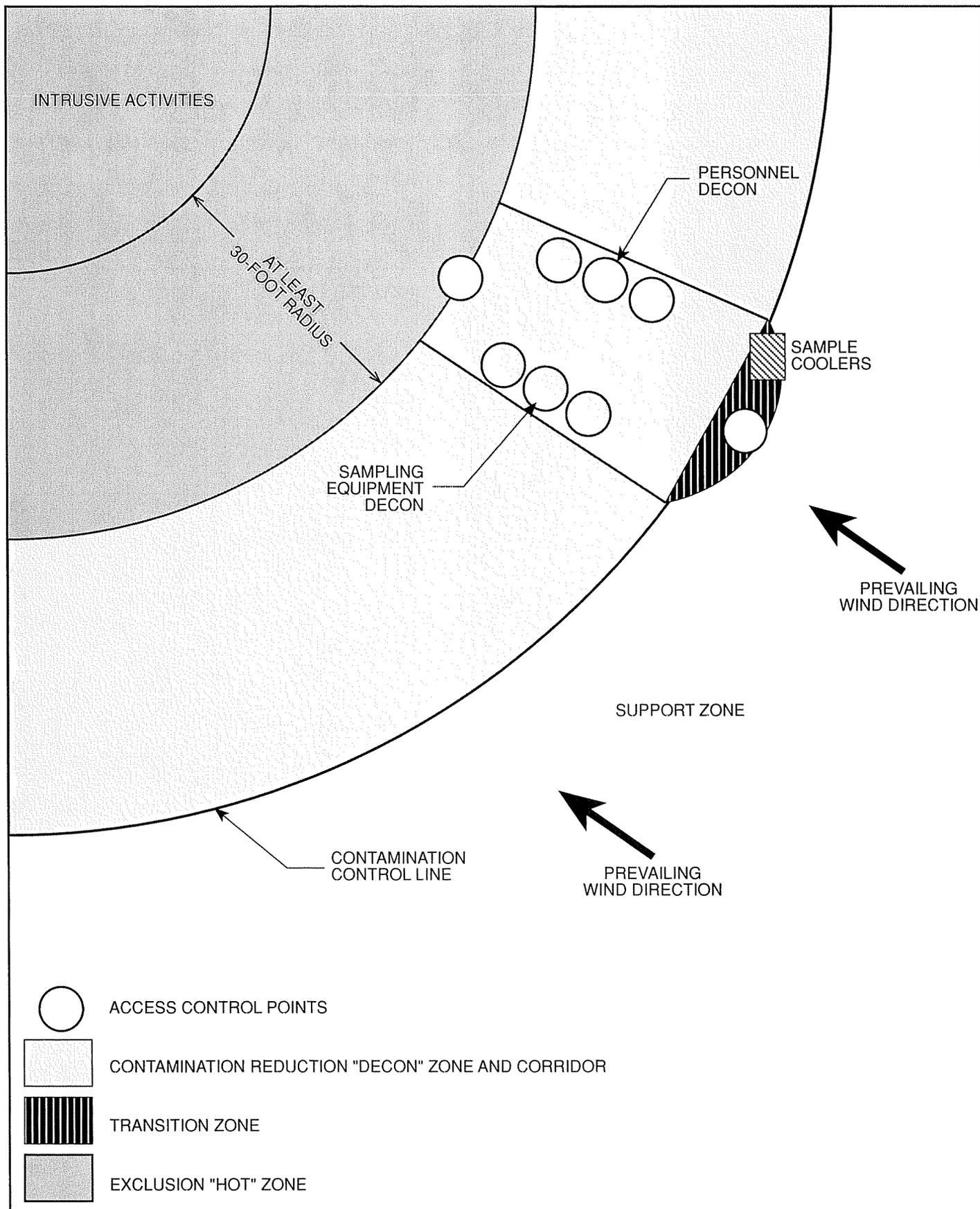
PAGE 8 OF 8

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**ATTACHMENT 1**  
**WORK ZONES**



**ATTACHMENT 2**

**SUGGESTED DECONTAMINATION SOLUTIONS**

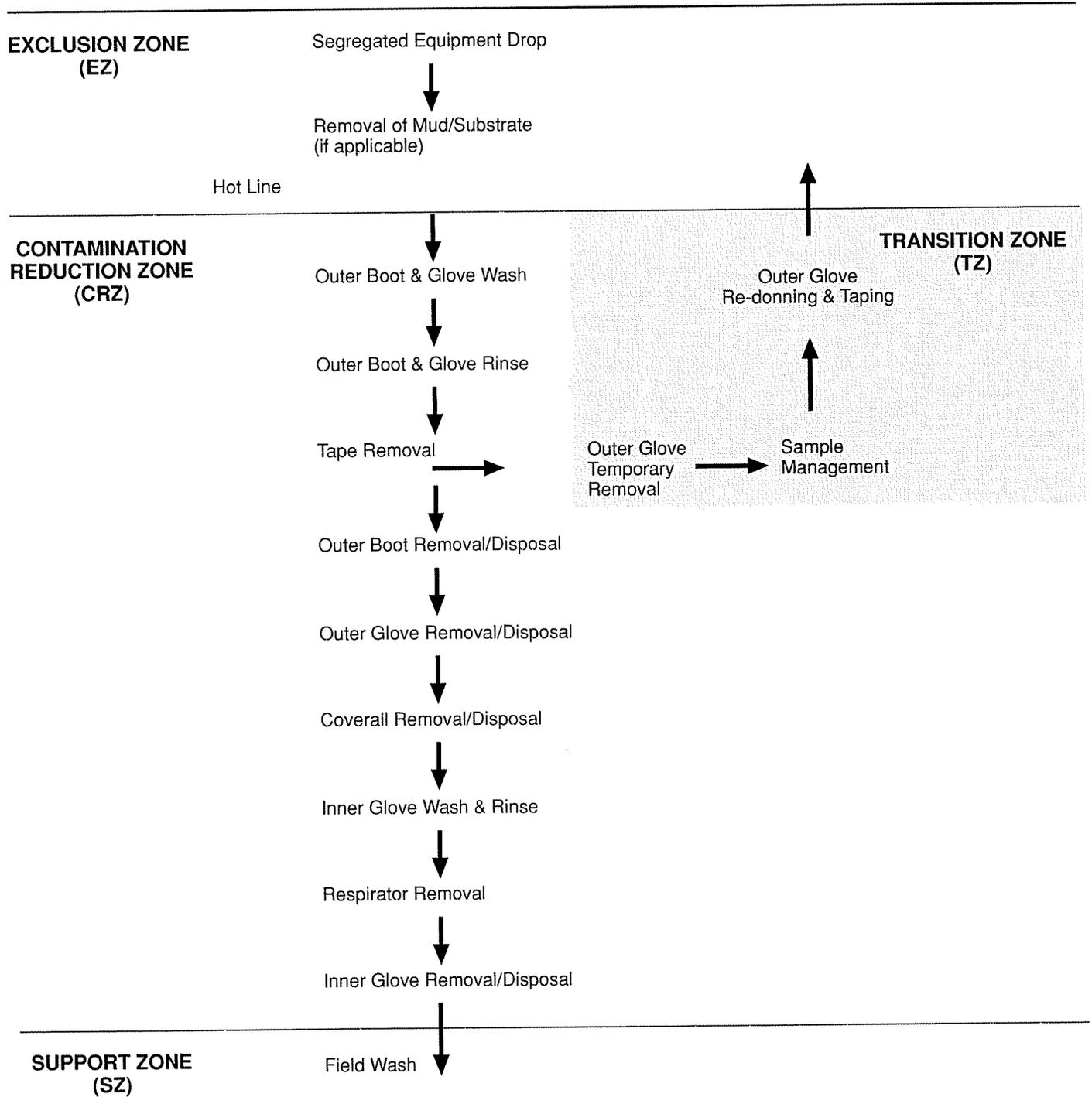
## SUGGESTED DECONTAMINATION SOLUTIONS

Decon Solution	Mixing	Uses/Remarks
A. An aqueous solution containing a low-sudsing detergent (e.g., Alconox, Penetone 155, Liquinox, Simple Green).	Follow the mixing instructions written on the particular product label.	Generally has the widest range of use. Best choice on sites where contaminants exist.
B. An aqueous solution containing 5% sodium carbonate ( $\text{Na}_2\text{CO}_3$ ) washing soda.	To 10 gallons of water, add 4 pounds of sodium carbonate.	Decon solution of choice for base labile compounds such as the organophosphate pesticides. Effective in neutralizing inorganic acids. Since sodium carbonate is a water softening agent, this characteristic is an aid in physical removal of contaminants.
C. An aqueous solution containing 5% sodium bicarbonate ( $\text{NaHCO}_3$ ) baking soda.	To 10 gallons of water, add 4 pounds of sodium bicarbonate.	Sodium bicarbonate can be used to neutralize either base or acid contaminants. Good decon for base labile compounds.
D. An aqueous solution containing 2% trisodium phosphate ( $\text{Na}_3\text{PO}_4$ ) TSP.	To 10 gallons of water, add 2 pounds of trisodium phosphate.	See uses/remarks for Decon Solution B above.
E. An aqueous solution containing 10% calcium hypochlorite ( $\text{CaCl}_2\text{O}_3$ ).	To 10 gallons of water, add 8 pounds of calcium hypochlorite.	Cyanide salts.
F. Ethylenediamine-tetra-acetic acid (EDTA).	Commercial product, follow product label.	EDTA is a chelating agent and is the decon solution of choice for heavy metal contaminants.
G. An aqueous solution containing 3-5% citric, tartaric, oxalic acids, or their respective sodium salts.	To 10 gallons of water, add 4 pounds of citric, tartaric, or oxalic acid.	These compounds are chelating agents and are a decon solution of choice for heavy metal contaminants.

**ATTACHMENT 3**

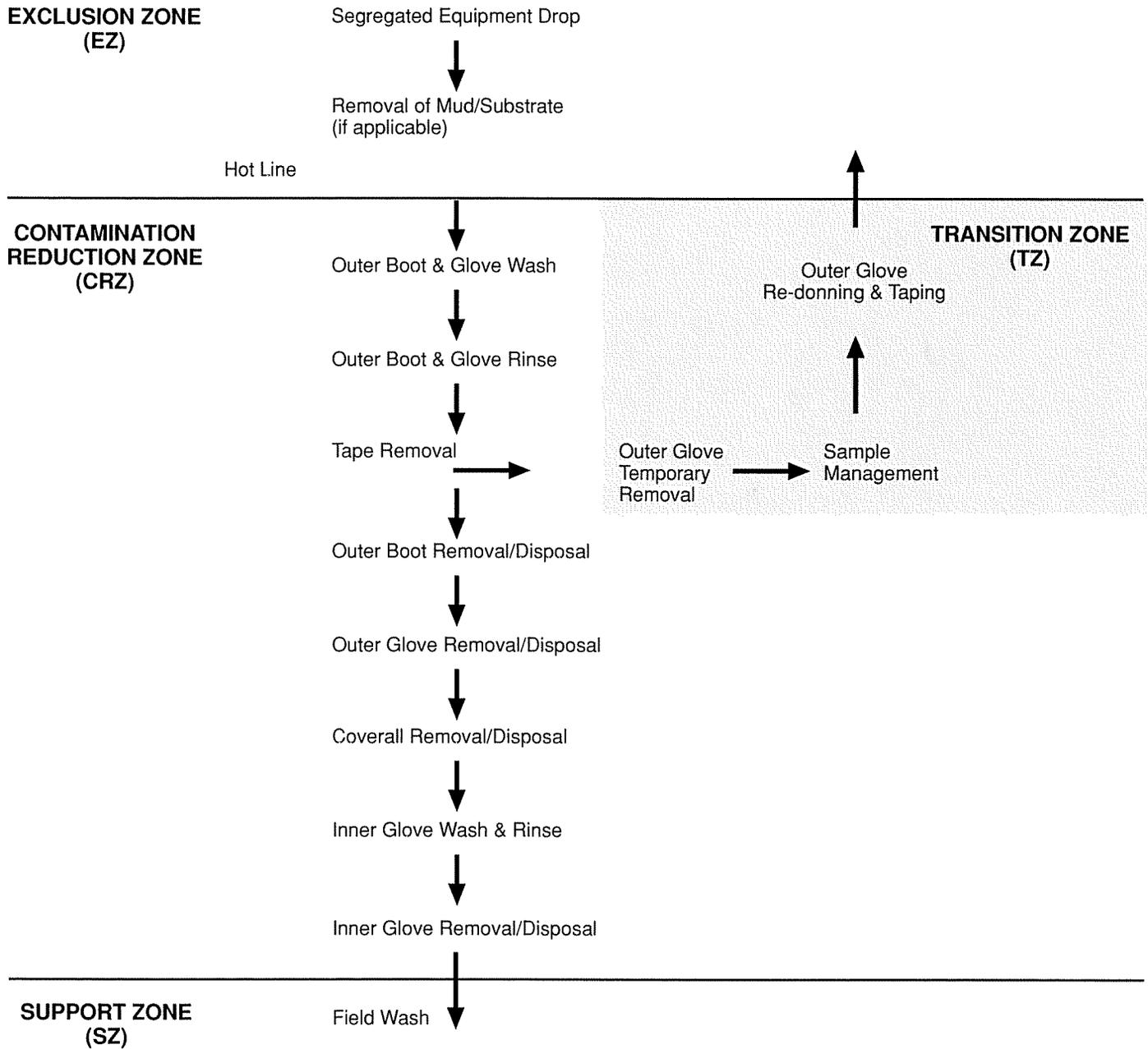
**LEVEL C DECON**

### Level C Decon Flow Chart



**ATTACHMENT 4**  
**LEVEL MODIFIED D DECON**

### Level Modified D Decon Flow Chart





# STANDARD OPERATING PROCEDURE

S.O.P. No. H-9 PAGE 1 OF 14

**APPROVAL**

Denise L. Daggett, MS, CIH

**EFFECTIVE DATE**

05/24/02

**REVISION No.** 0

**TITLE**

**HEAT STRESS CONTROL**

## 1.0 PURPOSE

The purpose of this procedure is to provide information on the causes, detection, prevention, and treatment of heat stress.

## 2.0 SCOPE

This procedure should be utilized by AMEC Earth & Environmental, Inc. (AEE) on-site personnel and subcontractors working on AEE field projects.

## 3.0 RESPONSIBILITIES

### 3.1 SITE HEALTH AND SAFETY COORDINATOR/PROJECT MANAGER/FIELD MANAGER

The Site Health and Safety Coordinator (SHSC) and Project Manager (PM) and/or Field Manager (FM) are responsible for implementing these procedures. Specific duties/responsibilities include:

- having knowledge about the signs and symptoms of heat stress
- ensuring appropriate time is allowed for acclimatization
- ensuring that employees practice appropriate heat stress prevention techniques
- completion of Heat Stress Monitoring form (Attachment 1) when conditions necessitate its use

### 3.2 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR

The Corporate Safety, Health, and Environment Director (Corporate SHE Director) is responsible for auditing or evaluating on-site activities to ensure that these procedures are implemented.

## 4.0 PROCEDURES

### 4.1 INTRODUCTION

Heat is a physical stress on the human body. Exposure to excessive heat can develop into a serious health condition known as heat stress. If the proper measures are not taken to prevent or treat heat stress, the condition can become debilitating and perhaps fatal.

The two most likely sources of heat stress that could be encountered by AEE field personnel are (1) external heat produced by high air temperatures and humidity, and (2) heat generated from the human body that cannot dissipate. Protective garments can greatly hinder the body's mechanism of evaporative cooling, causing the body temperature to rise.

## 4.2 HOW THE BODY HANDLES HEAT

Under moderate conditions of work and environmental heat, the brain regulates the body's temperature by monitoring the temperature of the blood. When the blood temperature rises above 98.6 degrees Fahrenheit (°F), the body initiates heat control mechanisms. The two major mechanisms of thermoregulation are increased blood flow and sweating.

### 4.2.1 Increased Blood Flow

As the heart begins to pump more blood towards the skin, excess body heat is lost to the air through convection, radiation, evaporation, and conduction depending on air temperature, humidity, and air movement.

#### Convection

Convection is the transfer of heat by movement of the thin layer of insulating air next to the skin. Air movement causes a cooling action. The absence of wind will cause a more intense heat effect.

#### Radiation

Radiation is the transfer of heat to cooler objects in the surrounding environment. The heat is transferred through space between objects that are not in direct contact with each other. For example, the heat from a broiler will warm objects in its surrounding area. In the same way, the body's heat will transfer to a cooler environment or will warm in the presence of a hotter environment.

#### Evaporation

Evaporation is the absorption of moisture into the air. Evaporation of moisture from the skin cools the body. The rate of this evaporative cooling is significantly increased by convection or air movement across wet skin and/or wet clothing. The amount of evaporation is also increased by low humidity. When humidity is high, evaporation is hindered and the heat hazard increases.

#### Conduction

Conduction is the transfer of heat between objects that are in contact with each other. For example, touching a piece of metal that is hotter than skin temperature will conduct heat toward the body.

### 4.2.2 Sweating

When heat loss by increased blood flow is not enough to keep the body core temperature normal, the brain signals the sweat glands in the skin to begin producing sweat (mixture of water and salts). The sweat evaporates on the skin and cools the skin surface. Sweating does nothing to cool the body unless the sweat can evaporate from the skin. When humidity is high, evaporation of perspiration slows down or stops. As the heart labors to pump more and more blood to the surface and the sweat glands continue to pour liquids onto the skin surface, the production of internal body heat continues. If this condition is not dealt with at this stage, heat stress disorders can arise rapidly.

As more blood flows to the skin, less blood remains to supply the active muscles. Strength declines and fatigue may come sooner than it would otherwise. Behavioral changes can arise in the forms of reduced accuracy, comprehension, and retention. In addition to these physiological changes, certain safety problems commonly arise in hot environments:

- sweaty palms resulting in impaired functional ability
- dizziness
- fogging of safety eyewear
- possible burns from accidental contact with hot surfaces

### 4.3 MONITORING THE HOT WORK ENVIRONMENT

There are two commonly recognized methods to measure the working conditions for heat hazard. One method employs measuring the actual environment for important physical parameters. The other monitoring technique, often used in tandem with environmental monitoring, is personal monitoring.

#### 4.3.1 Environmental Monitoring

Evaluating the work environment to determine the degree of heat stress involves measuring and recording four different physical factors:

- air temperature
- humidity
- radiant temperature
- air speed

Many different ways have been devised to evaluate the above-mentioned parameters. The method recognized by the American Conference of Governmental Industrial Hygienists (ACGIH) is commonly known as Wet Bulb Globe Temperature (WBGT). WBGT values are calculated based on the following equations:

(1) Outdoors with solar load  

$$WBGT = 0.7 (WB) + 0.2 (GT) + 0.1 (DB)$$

(2) Indoors or Outdoors with no solar load  

$$WBGT = 0.7 (WB) + 0.3 (GT)$$

WBGT = Wet Bulb Globe Temperature Index  
 WB = Natural Wet-Bulb Temperature  
 DB = Dry-Bulb Temperature  
 GT = Globe Temperature

**NOTE:** Temperatures can be recorded in either °F or °C (degrees Centigrade), but must be used consistently throughout the equation.

These measurements are made using specialized heat stress measuring equipment that measures each of the temperature parameters of the equation above. Instruments that measure the various temperature

parameters, as well as calculate the WBGT for the user, are also available. To obtain the equipment, contact a manufacturer (e.g., Metrosonics, Inc.) or a local instrument rental company. The monitoring should be made by an industrial hygienist or an appropriately trained SHSC who is familiar with the instruments and work being performed. Measurements are recorded on the Heat Stress Monitoring Form (Attachment 1).

The recommended ACGIH Screening Criteria for Heat Stress Exposure are presented in Attachment 2.

**4.3.2 Personal Monitoring**

Individuals vary in their susceptibility to heat stress. Factors that may predispose an individual to heat stress include:

- lack of physical fitness
- lack of acclimatization
- age
- dehydration
- obesity
- alcohol and drug use
- infection
- sunburn
- diarrhea
- chronic disease

When workers must wear semipermeable or impermeable encapsulating personal protective garments the ACGIH recommended Threshold Limit Values (TLVs) cannot be used. For these situations, employees should be monitored when the temperature in the work area is above 70°F (21°C). When impermeable clothing will be worn, exposure limits will be established by applying adjustment factors to the values in Attachment 2. Adjustment factors are as follows:

**WBGT Correction Factor\* (°C)**

Summer work uniform <sup>1</sup>	0
Coveralls	2
Kleenguard coveralls	4
Standard Tyvek	6
Tyvek, PE	7
Encapsulating suit	11

\* Subtract correction factor (°C) from the WBGT in Attachment 2.

<sup>1</sup> Summer work uniform is cotton long pants and cotton tee shirt.

To monitor an employee for heat stress, one can measure any of the following parameters:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.

If the heart rate exceeds 110 beats per minute (bpm) at 1 minute into the rest period, shorten the next work cycle by one-third and keep the rest period the same duration.

If the heart rate still exceeds 110 bpm at 1 minute into the next rest period, shorten the following work cycle by one-third.

If the heart rate exceeds 120 bpm at 1 minute into the rest period, the worker is under a significant strain and risk and the worker should be removed from the shift until his/her heart rate returns to normal.

- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the start and end of the work period. To obtain accurate results, workers shall not eat or drink for 15 minutes prior to oral temperature monitoring. There shall be no talking or mouth breathing when the thermometer is measuring the temperature.

If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period duration.

If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

Do *not* permit a worker to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C).

- Body water loss, if possible. Measure weight on a scale accurate to  $\pm 0.25$  pound (lb) at the beginning and end of each workday to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar work clothing. If the change in body weight divided by the body weight, when multiplied by 100, exceeds 1.5 then there is likely dehydration. *The body water loss should not exceed 1.5 percent total body weight in a workday.*
- Behavior. Other indications of heat stress may be recognized from worker behaviors that include:
  - adjusting clothing
  - slowing down
  - increased number of mini-breaks
  - irritability
  - low morale
  - absenteeism
  - increased number of errors
  - shortcuts in maintenance

The SHSC should monitor personnel for these changes in worker behavior.

#### 4.4 HEAT ILLNESSES

Table 1 provides a description of the common heat stress illnesses, symptoms, underlying causes, and treatment.

#### 4.5 PREVENTING HEAT STRESS

Heat stress can be prevented by taking personal protective measures, such as allowing for acclimatization, ensuring fluid replacement, satisfying the body's salt requirements, modifying work practices, and other control measures.

##### 4.5.1 Acclimatization

The human body has a dramatic adaptation mechanism for working in the heat called acclimatization. Any unprepared employee when exposed for the first time to a hot work environment will develop signs of significant strain such as elevated body temperature, pounding heart, high pulse rate, and sweating. But the body will, over a series of days spent working in the heat, make a series of adjustments. These adjustments, which include the decreasing of body temperature and pulse rate, will occur after the individual has worked in the heat for a week for at least 2 hours per day.

After acclimatization has taken place, work in the heat can be performed with a major reduction in strain. This allows the employee to work more effectively under conditions that may have been intolerable before acclimatization.

An important point to emphasize – acclimatization will not take place if workers do not drink enough water to replace body fluids lost to sweating. Also, acclimatization is gradually lost if work in heat stops. Some degree of acclimatization is lost over a weekend and a large degree would be lost over a full week. It is significant to remember that when employees are first exposed to the heat, or when they are returning from time off such as vacation, the workload should be reduced until acclimatization can occur.

##### 4.5.2 Fluid Replacement

Employees must be encouraged to drink enough fluid to replace the fluid that is lost through sweating. Employees should be told to drink often throughout the day. Fluid replacement should occur at 20-minute intervals and coincide with cool-down breaks. Workers should begin the day with 16 ounces (2 cups) of water or electrolyte replacement fluids and then about 8 ounces (1 cup) every break. Cool water (about 10 to 15°C) is the ideal replacement fluid. Employees who are sweating heavily must be encouraged to drink large amounts of water every 20 to 30 minutes whether they are thirsty or not. Thirst is a poor indicator under these conditions because by the time thirst is felt, heat stress already exists. Intermediate decon (as defined in the Decontamination Procedures section of the hazardous waste site-specific Health and Safety Plan [HSP]) may be performed for short heat stress mitigation breaks on hazardous waste sites.

**Table 1  
Heat Stress Illnesses**

<b>Heat Illness</b>	<b>Description</b>	<b>Symptoms</b>	<b>Possible Underlying Causes</b>	<b>Treatment</b>
Heat Cramps	Spasms in voluntary muscles due to reduction in the concentration of sodium chloride with continued loss of salt in sweat and copious intake of water without appropriate salt replacement. Other electrolytes, such as magnesium, calcium, and potassium may also be involved.	Painful spasms of muscles used during work. May occur during or after work hours.	Drinking large quantities of water without replacing salt loss  Excessive perspiration during hot work	Administer lightly salted water by mouth unless on medical restriction. Consult physician.  Adequate salt intake with meals. Those on salt-restricted diets should consult their physician for guidance.  Do not follow fad or restrictive diets while working in heat conditions except under physician's advice.
Heat Syncope	Pooling of blood in dilated vessels of skin and lower parts of body	Fainting while standing erect and immobile in the heat	Lack of acclimatization	Remove to cooler area  Recovery should be prompt and complete  Consult physician
Dehydration	Excessive loss of body water	No early symptoms  Fatigue/weakness  Dry mouth  Loss of work capacity  Increased response time	Excessive fluid loss due to sweating  Excessive fluid loss due to illness (such as vomiting or diarrhea)  Excessive fluid loss due to alcohol consumption	Remove to cool area  Fluid replacement
Heat Rash (Prickly Heat)	Keratinous layers of skin absorb water, swell, and mechanically obstruct the sweat ducts	Profuse, tiny, raised, red vesicles (blister-like), usually in areas where clothing is restrictive  Prickling sensation during heat exposure, particularly as sweating increases	Occurs on skin that is persistently wetted by unevaporated sweat  Plugging of sweat gland ducts with retention of sweat and inflammatory reaction	Clean, cotton garments against the skin  Mild drying lotions  Skin cleanliness to prevent infection

**Table 1 (Continued)  
Heat Stress Illnesses**

<b>Heat Illness</b>	<b>Description</b>	<b>Symptoms</b>	<b>Possible Underlying Causes</b>	<b>Treatment</b>
Heat Exhaustion	Low arterial blood pressure caused partly from inadequate cardiac output and partly from widespread vasodilation	<p>Skin clammy and moist, profuse sweating, coloring pale or muddy</p> <p>Extreme fatigue, weakness, blurred vision, dizziness, nausea, headache or light-headedness</p> <p>Insecure gait, may faint while standing</p> <p>Exhibits rapid pulse and low blood pressure</p> <p>Oral temperature normal or low, rectal temperature may be elevated to 99°F to 101°F</p>	<p>Lack of acclimatization/fitness</p> <p>Continuous exertion in heat</p> <p>Failure to replace water/salt lost in sweat, or from gastrointestinal maladies (dehydration)</p> <p>Distribution of blood to the periphery</p>	<p>Remove to cooler area</p> <p>Administer fluids by mouth (if victim is conscious) or give intravenous infusions of normal saline (should be done under care of a physician, especially for those on medically restricted diets)</p>
Heat Stroke	Failure of the thermoregulating system	<p>Chills; hot, dry skin; red, mottled or bluish</p> <p>High, rising deep body (core) temperature: 104°F and over</p> <p>Mental confusion, restlessness, irritability, belligerence, loss of consciousness, convulsions or coma as temperature rises</p>	<p>Continuous exertion in heat by unacclimatized employees</p> <p>Lack of acclimatization</p> <p>Obesity</p> <p>Recent alcohol consumption</p> <p>Dehydration</p> <p>Individual workers' susceptibility</p> <p>Chronic cardiovascular disease</p>	<p>Call emergency medical services for assistance. Inform ambulance on telephone that heat illness emergency exists.</p> <p>Danger - Fatal if treatment is delayed. Cool body while awaiting ambulance.</p> <p>Immediate cooling of victim by immersion in chilled water</p> <p>Wrapping victim in wet sheet while fanning with cool, dry air</p> <p>Sponging with cool liquid and fanning</p> <p>Treat shock, if necessary</p>

### 4.5.3 Salt Requirements

Sweat contains water, salt, and other electrolytes. The body needs a certain amount of salts to function properly, but using salt tablets is not recommended. Salt tablets cause stomach irritation that may result in nausea and vomiting.

Presently, it is recommended that drinking water for employees not be salted, because the normal diet should provide adequate salt intake. However, if heat cramps are observed, slightly salted water (0.1% or 1 teaspoon of salt/15 quarts water) or an electrolyte replacement fluid (e.g., Gatorade™) should be provided. Caution should be taken by individuals with high blood pressure or on a sodium-restricted diet.

### 4.5.4 Work Practices

Preventive work practices can be used as either an alternative or complementary approach to engineering controls for preventing heat stress. Preventive practices may include:

- limiting or modifying the duration of exposure time
- building the heat tolerance of the worker by heat acclimatization and physical conditioning
- establishing a work-rest regimen that provides adequate rest periods for cool down
- training workers in safety and health procedures for work in hot environments

The following are ways to control the daily length of time and temperature to which a worker is exposed in heat stress conditions:

- schedule hot jobs for cooler parts of the day
- schedule routine maintenance, repair work, and field projects in hot areas for the cooler seasons of the year
- alter the work-rest regimen to permit more rest time (the initial work period for an acclimatized worker should not exceed 1 to 1.5 hours, followed by a cool down of at least 15 minutes)
- provide cool, shaded areas for rest and recovery during the work shift
- add extra personnel to reduce exposure time for each member of the work crew
- permit freedom to interrupt work when a worker feels extreme heat discomfort

The heat tolerance of workers can be enhanced in the following ways:

- establish an appropriate heat-acclimatization program
  - instruct employees to gradually increase the thermostat in sleeping quarters for off-duty hours so that daily adjustment to the temperature at the project site is made easier
-

- encourage workers to achieve and maintain physical fitness
- ensure that an adequate supply of water is taken (roughly 8 ounces every 20 minutes)
- maintain the electrolyte balance in the body fluids

A work-rest regimen that provides adequate periods for cool down should be established. Work-rest periods will be adjusted based on the condition of the heat-exposed worker. When impermeable protective garments are worn, they will be removed during the cool-down period to allow for adequate recovery. Breaks shall be taken in a shaded, cool rest area (77°F or lower is best).

### 4.5.5 Training

Workers will be trained in accordance with Volume IV, Training Program, of this manual in health and safety procedures for work in hot environments. Such workers will be familiar with the preventive measures outlined in Volume II, Comprehensive Field Project Health and Safety Program, of this manual and in the site-specific HSP (when applicable), as well as early recognition of the signs and symptoms of heat illnesses and initiation of first aid and corrective procedures. Training topics will include:

- signs and symptoms of heat-induced illnesses
- causes and recognition of heat illnesses
- work practices to minimize heat illnesses
- proper care and use of heat protective clothing and equipment
- effects of nonoccupational factors (such as drugs, alcohol, and obesity) on tolerance to occupational heat stress
- buddy system designed to recognize the early signs and symptoms of heat illnesses

### 4.5.6 Additional Control Measures

#### Engineering Controls

Engineering controls are measures that may be used to reduce the stress of a hot environment. They include, but are not limited to:

- use of increased general ventilation or spot cooling to reduce temperatures in the work location
- use of local exhaust ventilation at points of high heat production to remove large quantities of generated and/or latent heat from the work area
- use of large fans to increase the air velocity over the workers and thereby increase the evaporative heat loss (Caution: if air temperature is greater than 95°F, the use of fans will

increase the heat stress. Cool the air instead being careful to avoid causing drafts that will disturb any existing exhaust ventilation controls)

- Application of radiant heat shielding may be helpful by such methods as:
  - insulating heat-producing equipment
  - covering exposed body parts with clothing
  - using reflective screens (made up of material such as polished aluminum, tin, or zinc) placed between the worker and the radiant heat source to reflect the heat back to the source
  - wearing reflective aprons or reflective clothing (especially useful when the workers face the heat source)
- elimination of steam leaks, by hooding or covering of steaming tanks, hot water drains, etc., to reduce the water vapor pressure at the work site
- isolation, relocation, redesign, or substitution of equipment and/or processes to reduce the thermal stress at the work site
- a wider use of work-saving devices (such as power tools, hoists, cranes, or other lifting aids) to reduce the metabolic workload
- as feasible, provisions for field "showers" or hose-down areas to cool the body down

#### Administrative Controls

Administrative work practice controls are most easily implemented and include any and all work practices or rules that may reduce the total heat stress burden. Included are:

- acclimatization to the heat
- work-rest schedule designed to reduce peaks of heat stress
- enforcing scheduled rest breaks
- if possible, providing air-conditioned rest areas to give rapid recovery (this practice decreases the cumulative effects of heat exposure)
- enforcing a schedule of frequent water ingestion breaks and provision of abundant, cool drinking water or electrolyte replacement fluids
- scheduling the hottest work for the coolest parts of the day
- where possible, moving work indoors or to air-conditioned or cooler areas

- assigning extra workers to highly demanding tasks to reduce the individuals' metabolic loads
- allowing employees to pace themselves and take frequent rest breaks
- rotating duties for hot jobs
- enforcing the buddy system
- educating workers on the basic principles of preventing heat stress illnesses and on emergency response to heat illness
- cooling sleeping quarters to allow skin to dry between heat exposures

## Personal Protective Equipment

Personal protective equipment (PPE) includes a wide range of items such as ordinary work clothing, liquid cooling systems, ice-cooled body suits, and reflective clothing for radiant heat. The correct clothing depends upon the specific heat stress situation. The HSP will identify appropriate garments for heat stress management.

Where air temperature is higher than the skin temperature or there is radiant heat (e.g., from a furnace or the sun), then clothing will protect the body. The advantage of wearing clothing, however, is negated if the clothes interfere too much with the evaporation of sweat, which is a vital cooling function.

Clothes made of thin cotton fabric help evaporate sweat by picking it up and bringing it to the surface. Nonbinding clothes are also good for sweat evaporation. In contrast, tightly fitting clothes made of synthetic fabrics interfere with evaporation.

## **4.6 CONTROL MEASURES FOR HEAT STRESS**

A summary of heat stress control measures includes the following:

- Medical supervision of workers including preplacement physicals that evaluate fitness, weight, cardiovascular system and other conditions that may make an individual susceptible to heat illnesses. Medical evaluation during and after heat illnesses and medical release for returning to work should also be included.
- Employee training and education on heat stress, heat-induced illnesses and their symptoms, water and salt replacement, clothing, work practices, and emergency first aid procedures.
- Acclimatization of employees for work in the heat.
- Work-rest regimens with air-conditioned rest areas and enforced rest breaks.
- Provision of cool, plentiful water supplies or electrolyte replacement fluids and scheduled rehydration breaks. Employees should be encouraged to weigh themselves daily to avoid dehydration.

- Environmental monitoring using one of the heat stress indices to determine the heat load and adjust work-rest regiments accordingly.
- Forecast of episodes of extreme heat or heat spells whereupon a number of preventive practices would be initiated.
- Reduction of heat stress by the proper use of engineering controls, administrative controls, or PPE.

## 5.0 RECORDS

Ambient temperature records and heat stress mitigation methods shall be recorded on the Heat Stress Monitoring Form (Attachment 1) by the SHSC or designee.

## 6.0 REFERENCES

National Safety Council. 1985. *Pocket Guide to Heat Stress*.

American Conference of Governmental Industrial Hygienists. *Threshold Limit Values and Biological Exposure Indices for 2001*.

National Safety Council. 1988. *Fundamentals of Industrial Hygiene*. 3rd Edition.

Patty, F.A. 1991. *Patty's Industrial Hygiene and Toxicology, General Principles*. Edited by George D. Clayton and Florence E. Clayton. Vol. I, Part A. 4th Edition. New York: Wiley and Sons, Inc.

## 7.0 ATTACHMENTS

1. Heat Stress Monitoring Form
  2. Screening Criteria for Heat Stress Exposure
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# STANDARD OPERATING PROCEDURE

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S.O.P. No. H-9

PAGE 14 OF 14

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**ATTACHMENT 1**

**HEAT STRESS MONITORING FORM**



**ATTACHMENT 2**

**SCREENING CRITERIA FOR  
HEAT STRESS EXPOSURE**

**SCREENING CRITERIA FOR HEAT STRESS EXPOSURE**  
(Values are given in °C and °F WBGT)

Work Demands	Acclimatized					Unacclimatized				
	Light	Moderate	Heavy	Very Heavy		Light	Moderate	Heavy	Very Heavy	
100% Work	29.5 (85.1)	27.5 (81.5)	26 (78.8)			27.5 (81.5)	25 (77)	22.5 (72.5)		
75% Work 25% Rest	30.5 (86.9)	28.5 (83.3)	27.5 (81.5)			29 (84.2)	26.5 (79.7)	24.5 (76.1)		
50% Work 50% Rest	31.5 (88.7)	29.5 (85.1)	28.5 (83.3)	27.5 (81.5)		30 (86)	28 (82.4)	26.5 (79.7)	25 (77)	
25% Work 75% Rest	32.5 (90.5)	31 (87.8)	30 (86)	29.5 (85.1)		31 (87.8)	29 (84.2)	28 (82.4)	26.5 (79.7)	

Notes:

- WBGT values are expressed in °C and °F and represent thresholds near the upper limit of the metabolic rate category.
- If work and rest environments are different, hourly time-weighted averages (TWAs) should be calculated and used. TWAs for work rates should also be used when the work demands vary within the hour.
- Values in the table are applied by reference to the "Work-Rest Regimen" section of the Documentation\* and assume 8-hour workdays in a 5-day workweek with conventional breaks, as discussed in the Documentation. When workdays are extended, consult the "Application of the TLV" section of the Documentation.
- Because of the physiological strain associated with Very Heavy work among less fit workers regardless of WBGT, criteria values are not provided for continuous work and for up to 25% rest in an hour. The screening criteria are not recommended, and a detailed analysis and/or physiological monitoring should be used.

\*Documentation = Documentation of the Threshold Limit Values and Biological Exposure Indices, latest edition.



# STANDARD OPERATING PROCEDURE

S.O.P. No. H-12

PAGE 1 OF 14

APPROVAL

Denise L. Daggett, MS, CIH

EFFECTIVE DATE

05/24/02

REVISION No.

0

TITLE

**PERSONAL PROTECTIVE EQUIPMENT**

## 1.0 PURPOSE

The purpose of this procedure is to inform AMEC Earth & Environmental, Inc. (AEE) personnel of the requirements of and methods for the selection, use, and maintenance of personal protective equipment (PPE). The objectives include:

- ensuring compliance with federal Occupational Health and Safety Administration (OSHA) regulations in 29 CFR and applicable state regulations
- minimizing the risk of human injury and illness caused by exposure to chemical, physical, biological, and energy hazards that may be encountered at a project site
- reducing potential corporate liability incurred by employees using inadequate or improper PPE

See also AEE standard operating procedures (SOPs) H-13, *Respiratory Protection Program*; A-7, *Personal Protective Equipment Issuance*; H-7, *Facial Hair Policy*; H-10, *Hearing Conservation Program*; H-3, *Cold Stress Control*; H-9, *Heat Stress Control*; and S-7, *Fall Protection and Prevention*.

## 2.0 SCOPE

This procedure applies to AEE personnel and subcontractors who may work on or visit AEE jobsites and applies to all projects and activities that may require the use of PPE.

## 3.0 DEFINITIONS

**ACGIH** - American Conference of Governmental Industrial Hygienists.

**Action Level** - Specifications taken based on instrument readings. Specific actions may include upgrading/downgrading levels of protective equipment, stopping work, or evacuating a site.

**Field Activities** - Activities performed by any employee of AEE (e.g., environmental scientists, engineers, marine scientists, geologists and geotechnical technicians, biologists, etc.) at a field site. Field activities generally include, but are not limited to, such tasks as soil boring and sampling, well installation and sampling, underground storage tank (UST) removal, wastewater sampling, building and facility sampling and decommissioning, soil excavation, and construction and operations of soil and groundwater treatment systems. Other field activities may include site visual inspections for lead-based paint, asbestos, polychlorinated biphenyls (PCBs), and/or other contaminants; air monitoring; and on-site analyses of soil, groundwater, and air samples.

**Field Work** - Work performed as part of field activities and at a site away from the main office. Field work is generally performed outdoors but may take place within site buildings and facilities.

**Immediately Dangerous to Life or Health (IDLH)** - Conditions that pose an immediate threat to life or health (toxic, explosive, etc.) or conditions that pose an immediate threat of severe exposure to contaminants such as radioactive materials, which are likely to have an adverse cumulative or delayed effect on health. Also, the maximum concentration from which, in the event of respiratory failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing or irreversible health effects.

**Injurious Nonionizing Radiation** - Ultraviolet, infrared, and visible light.

**Occupational Safety and Health Administration (OSHA)** - A division of the U.S. Department of Labor.

**Permissible Exposure Limit (PEL)** - PELs are set forth in OSHA Standards 29 CFR 1910 and 29 CFR 1926. As part of the regulations, PELs represent the legal maximum airborne concentrations for personal exposure. The PEL list is not updated annually, as is the Threshold Limit Value (TLV; see below) list compiled by ACGIH; therefore, the most current ACGIH TLV list is used rather than the OSHA PEL listing to determine respiratory protection, unless the PEL value (federal, or state where applicable) is more conservative.

**Personal Protective Equipment (PPE)** - In this SOP, PPE shall refer to protective equipment, protective clothing, and respiratory protection.

**Subcontractor** - Any other firm contracted to perform services for AEE. Subcontractors generally involved in field projects include, but are not limited to, heavy equipment operation, drilling and well installation firms, geotechnical consultants, analytical firms, and outside health and safety professionals.

**Threshold Limit Value (TLV)** - The TLV is recommended by the ACGIH and is derived from consensus review. It is reported as a time-weighted average (TWA) airborne concentration for a particular substance. It represents a level that most workers can be exposed to for an 8-hour day (40-hour week) without suffering adverse health effects. The TLV assumes that each 8-hour exposure will be followed by a 16-hour recovery period and that after 5 days, there will be a 48-hour recovery period. The TLV lists are published by ACGIH yearly. Each specific TLV is reviewed at least once every 3 years to incorporate new scientific information.

## **4.0 RESPONSIBILITIES**

The Project Manager (PM); Corporate Safety, Health, and Environment Director (Corporate SHE Director); Field Manager (FM); Site Health and Safety Coordinator (SHSC); and Safety, Health, and Environment Coordinator (SHE Coordinator) are responsible for ensuring compliance of this procedure by all field personnel.

### **4.1 PROJECT MANAGER**

The PM is responsible for incorporating the requirements of this procedure into project plans, budgets, and activities.

**4.2 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR**

It is the responsibility of the Corporate SHE Director or local technically knowledgeable designee to ensure that this procedure complies with federal and state OSHA guidelines.

**4.3 PROJECT MANAGER**

The Project Manager (PM) will ensure that the subcontractor receive the PPE requirements as outlined in the site-specific health and safety plan (HSP). Further, the PM will convey that the provision of PPE is the responsibility of the subcontractor for their employees.

**4.4 FIELD MANAGER**

The FM must ensure that all personnel are aware of the PPE requirements as identified in the site-specific HSP. In addition, he/she must have a plan of action that lists requirements in the event of a PPE upgrade.

Should a PPE upgrade be necessary, the FM must notify all personnel and visitors and evacuate the work area of the site. The FM oversees all upgrade activities.

**4.5 SITE HEALTH AND SAFETY COORDINATOR**

The SHSC is responsible for implementing and enforcing this procedure as directed by the HSP during project operations and activities. The SHSC also determines the appropriateness of assigned PPE levels based on site conditions and the results of air monitoring. The SHSC also provides training in the proper use of PPE; ensures that an adequate supply of PPE is available and used by employees; and arranges for proper maintenance, decontamination, storage, and issuance of all required PPE.

**4.6 SHE COORDINATOR**

The SHE Coordinator is responsible for implementing and enforcing this procedure as it pertains to work activities that occur in the office or laboratory. The SHE Coordinator shall evaluate work tasks, select PPE, issue PPE, and provide training.

**4.7 ALL EMPLOYEES**

All employees of AEE performing activities that require the use of PPE must comply with this procedure.

**4.8 SUBCONTRACTORS**

All personnel subcontracted to AEE and working on a field project are subject to the requirements of this procedure along with internal procedures set forth by the subcontracting company. Provision of PPE shall be the responsibility of the subcontractor for their employers.

**5.0 PROCEDURE**

Appropriate PPE shall be supplied and properly used for all AEE operations where hazardous substances or other hazardous conditions (environmental or operational) may be encountered. Subcontractor personnel shall provide their own PPE and shall maintain adequate supplies on-site for specified levels of

protection, including the potential upgrades listed in the site-specific HSP. The PM and/or SHSC shall review subcontractor equipment and ensure that it meets the requirements as specified in the HSP.

The choice of PPE for each project will be based on the specific hazards identified. Hazards will be identified in office or facility situations using a Hazard Assessment and PPE Selection form (Attachment 1). Field hazards will be identified during preliminary hazard evaluations and site characterizations, as described in Volume II, Comprehensive Field Project Health and Safety Program, of this manual. Appropriate PPE will be specified in the field project site-specific HSP. The procedures and guidelines for the proper selection and use of PPE follow.

## 5.1 HEAT STRESS AND PPE

Heat stress arises when the combination of ambient air temperature, relative humidity, solar load, and wind speed hinder the human body's ability to thermoregulate. Heat stress is also a major hazard for workers wearing chemical-protective clothing, particularly in warm and humid environments. Protective materials that shield the body from chemical exposure also prevent heat and moisture generated by the body from dissipating. PPE can therefore rapidly create a hazardous condition because the body can no longer thermoregulate properly. Work tasks, climatic conditions, and the level of PPE must be taken into consideration as best as possible to manage heat stress. Please refer to SOP H-9, *Heat Stress Control*, for additional information about heat stress management.

## 5.2 PROVISIONS FOR PPE

As stipulated in OSHA regulations for PPE (29 CFR, Section 1910.132-1910.137), AEE shall provide employees with protective clothing (e.g., chemical protective pants, hooded jackets and coveralls, gloves, hard hats, hearing protection, respirators, electrical protective equipment, heat/cold stress prevention gear, safety glasses, fall protection, flotation devices, boots) to protect their health and welfare from hazards capable of causing injury or impairment in the function of any part of the body through absorption, inhalation, or physical contact. The provisions for safety-toe footwear and prescription safety eyewear are addressed in SOP A-7, *Personal Protective Equipment Issuance (Safety-toe Boots/Shoes and Glasses)*. The Corporate SHE Director, SHSC, and SHE Coordinator will ensure that the PPE is applicable and suitable for the working environment and the specific hazards known or suspected to exist.

## 5.3 SELECTION OF PPE

Selection of appropriate PPE will be based upon the physical, chemical, biological, and energy hazards present in the work area or on-site after engineering and administrative controls have been considered.

### 5.3.1 Office Work Environment

For office or facility situations, once the hazard assessment portion of the Hazard Assessment and PPE Selection form (Attachment 1) is complete, the appropriate kind and type of PPE can be selected based upon information provided on the Material Safety Data Sheet (MSDS) instructions, or consultation with the Corporate SHE Director or local designee.

### 5.3.2 Field Work Environment

PPE selection for site work is documented in the site-specific HSP (see Volume II, Comprehensive Field Project Health and Safety Program, of this manual for an example) or on a Hazard Assessment and PPE Selection form (Attachment 1).

Levels of protection (A, B, C, D, and Modified D) that comply with 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*, are selected based upon:

- type of chemical substance in the ambient atmosphere, its measured concentration, and its toxicity
- potential for exposure to splashes of liquids, substances in the air, or other direct contact with material while working
- knowledge of the expected chemicals of concern and their properties, such as toxicity, route of exposure, and so forth

Items such as electrical protective equipment, fall protection equipment, hearing protection, heat and cold stress protection, life jackets, and eye protection are considered types of PPE but are not classified as a particular level of protection.

### 5.4 LEVELS OF PROTECTION FOR HAZARDOUS WASTE SITE WORK

The U.S. Environmental Protection Agency (USEPA) Office of Emergency and Remedial Response specifies four ensembles of protective clothing and equipment for uncontrolled hazardous waste site work (Levels A, B, C, and D). AEE utilizes a fifth level of protection, Modified Level D (Mod. D).

No single combination of protective equipment and clothing can protect against all hazards; therefore, PPE should be used in conjunction with other methods of protection (after administrative and engineering control options have been considered), and its effectiveness should be evaluated periodically.

The levels of protection indicate the degree of protection recommended for generalized categories of hazardous environments and are as follows:

Level A Protection should be worn when the highest level of respiratory, skin, and eye protection is needed. Level A is generally used where extremely hazardous substances are known to be present in high atmospheric concentrations and where Level B splash gear does not offer adequate protection against any dermally active substances present or where materials and concentrations are unknown. This level is also used where the absence of conditions requiring Level A have not yet been determined. See Attachment 2 for an example of Level A protection. Level A protection includes:

- positive pressure, full-facepiece self-contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA, approved by the National Institute for Occupational Safety and Health (NIOSH)
- totally encapsulating chemical-protective suit, taped to boots and gloves
- coveralls\*

- long underwear\*
- gloves, outer, chemical-resistant
- gloves, inner, chemical-resistant
- safety-toe boots, chemical-resistant
- hard hat (under suit)\*
- disposable protective suit, gloves, and boots (depending on suit construction, may be worn over totally encapsulating suit)

\* Optional, as applicable

Level B Protection should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection. Level B is generally used in those situations where the type and atmospheric concentration of substances have been identified and require a high level of respiratory protection. Examples of these types of atmospheres include IDLH concentrations of a specific substance that does not pose a severe skin hazard, or conditions where the criteria for use of air purifying respirators have not been met. This level of protection is normally the minimum used for initial emergency response or initial site reconnaissance, unless the respiratory hazards allow for a lesser level of respiratory protection than an SCBA. See Attachment 3 for an example of Level B protection. Level B protection includes:

- positive pressure, full-facepiece SCBA, or positive pressure supplied air respirator with escape SCBA (NIOSH-approved)
- hooded chemical-resistant clothing (overalls and long-sleeved jacket, coveralls, one- or two-piece chemical-splash suit, disposable chemical-resistant overalls) taped to boots and gloves
- coveralls\*
- gloves, outer, chemical-resistant
- gloves, inner, chemical-resistant
- safety-toe boots, outer, chemical-resistant
- boot covers, outer, chemical-resistant (disposable)\*
- hard hat\*
- face shield\*

\* Optional, as applicable

Level C Protection is composed of skin protection and an air-purifying respirator. Level C provides adequate protection when the type of airborne substance is known, the concentrations have been measured, the criteria for using air-purifying respirators are met, and the dermal route of exposure is not acutely hazardous. Use of this level of protection requires continuing measurement of air contaminants to ensure that IDLH concentrations do not arise or exist and that the concentrations of the contaminants present do not exceed the service limits of the respirators. See Attachment 4 for types of Level C respiratory protection. Level C protection includes:

- full-face or half-face air-purifying respirator (NIOSH-approved) fitted with appropriate cartridges or filters
- hooded chemical-resistant clothing (overalls and long-sleeved jacket, coveralls, one- or two-piece chemical-splash suit, or disposable chemical-resistant overalls) taped to boots and gloves
- coveralls\*
- gloves, outer, chemical-resistant
- gloves, inner, chemical-resistant
- safety-toe boots, outer, chemical-resistant\*
- boot covers, outer, chemical-resistant (disposable)\*
- safety glasses or chemical splash goggles (with half-mask)\*
- hard hat\*
- escape mask\*
- face shield\*

\* Optional, as applicable

Various types of air-purifying cartridges are available for use with air-purifying respirators. Each cartridge will protect against exposure to a specific class of air contaminants. The concentration limitation for each type of cartridge is stated on each cartridge box. The cartridges currently available protect against the following:

- acid gases
- hydrocyanic acid gases
- chlorine gases
- organic gases
- ammonia gases
- organic vapors and acid gases
- hydrocyanic acid gas and chloropicrin vapor
- acid gases, organic vapors, and ammonia gases

In addition, there are specific filters to protect against the following:

- radioactive materials, except tritium and noble gases
- particulates (dusts, fumes, mists, fogs, or smokes) in combination with any of the above gases or vapors

The Corporate SHE Director and SHSC shall select the proper cartridge for use with Level C respiratory protection based upon the contaminants known or suspected to occur at the site. SOP H-13, *Respiratory Protection Program*, of this manual provides guidelines on respiratory protection selection.

Modified Level D Protection is an AEE-specific level of PPE to be worn on sites with dermal skin hazards but no respiratory hazards. Modified Level D provides adequate protection when the type of airborne substance is known, its concentrations are measured, no protection is required, and the dermal route of exposure is not acutely hazardous. Use of this level of protection requires continuing measurement of air contaminants to ensure that IDLH concentrations do not arise or exist. See Attachment 5 for an example of Modified Level D protection. Modified Level D protection includes:

- work shirt and full-length cotton pants or coveralls
- chemical-resistant clothing (overalls and long-sleeved jacket, coveralls, one- or two-piece chemical-splash suit, disposable chemical-resistant overalls) taped to boots and gloves
- gloves, outer, chemical-resistant
- gloves, inner, chemical-resistant
- safety-toe boots/shoes, chemical-resistant (disposable) boot covers or safety-toe rubber boots
- safety glasses or chemical splash goggles
- hard hat\*
- escape mask\*
- face shield\*

\* Optional, as applicable

Level D Protection is primarily a work uniform affording minimal protection and is used for nuisance contamination only. This level is used when there is no indication of hazardous atmospheres and the work function precludes contact with any hazardous level of chemicals. Level D protection includes:

- work shirt and full-length cotton pants or coveralls
- gloves\*
- safety-toe boots/shoes
- boots, outer, chemical-resistant (disposable)\*
- safety glasses or chemical splash goggles
- hard hat\*
- escape mask\*
- face shield\*

\* Optional, as applicable

## 5.5 USE OF PPE FOR ALL FIELD PROJECTS AND WORK TASKS

For both nonhazardous and hazardous waste field projects and for office or facility work tasks, the SHE Coordinator or SHSC shall ensure that all PPE is used for the specific site conditions and activities for which it was intended and shall enforce procedures for the use of PPE, as specified in the site-specific HSP or Hazardous Assessment and PPE Selection form (Attachment 1). In addition, the SHE Coordinator or SHSC shall ensure that the following requirements for using PPE are met.

### 5.5.1 General Requirements

- No person will be allowed to enter a contaminated area or controlled work zone without the proper PPE, as specified in the site-specific HSP or Hazard Assessment and PPE Selection form.
- PPE requirements for work in contaminated areas may be downgraded or upgraded only upon approval of the SHSC and/or regional SHE Manager, or by Action Levels set in the site-specific HSP. Decisions to upgrade or downgrade must be based on environmental monitoring or other conditions that indicate greater or lesser exposure hazards than those originally anticipated.
- Adequate training in proper PPE use will be given to all AEE personnel. The training shall include a summary of correct PPE use procedures; capabilities and limitations of PPE; donning, doffing, cleaning, and fitting PPE; emergency escape procedures; the nature of respiratory and other hazards; and what will happen if PPE is not used properly. Personnel required to wear PPE will also be allowed to wear the equipment in an uncontaminated area to become familiar with it. They should be informed of the chemical cartridge change schedule, warnings that indicate respirator cartridges are saturated, or warnings that garments are inoperative. This information is also covered in the Hazardous Waste Operations and Emergency Response (HAZWOPER) course, which must be completed before an employee can be assigned to a hazardous waste site.
- All PPE must be checked by the wearer daily before each use and while cleaning it. The user should ensure that it is not cracked, torn, or distorted; has no pinholes; and is in proper working condition.
- Reusable PPE shall be capable of being cleaned easily and disinfected. PPE shall be kept clean and in good condition. PPE shall not be interchanged by employees until properly cleaned.

### 5.5.2 Head Protection

Hard hats must be worn by employees working in areas where there is danger of head injury from impact, from falling or flying objects, or from electrical shocks or burns. Helmets for protecting against falling and flying objects shall meet the specifications contained in the American National Standards Institute (ANSI) Z89.1-1986, American National Standard for Personnel Protection - Protective Headwear for Industrial Workers - Requirements. Helmets for protecting against high-voltage electrical shock and burns shall meet the specifications contained in ANSI Z89.2-1971. Where there is a risk of injury from hair entanglements in moving parts of machinery, combustibles, or toxic contaminants, employees shall confine their hair to eliminate the hazard.

### 5.5.3 Hearing Protection

Hearing protection (i.e., earplugs or muffs), shall be provided and used in identified hazardous noise areas and when using equipment that produces hazardous noise. Ear plugs inserted in the ear shall be fitted, worn, and used in accordance with SOP H-10, *Hearing Conservation Program*.

### 5.5.4 Eye and Face Protection

Eye or face protection shall be provided for and used by employees working in locations where there is a risk of receiving eye injuries, such as punctures, abrasions, contusions, or burns as a result of contact with flying particles, hazardous substances, projections, or injurious nonionizing radiation that are inherent in the work or environment. Safety glasses shall be suitable for the exposure and meet the specifications contained in ANSI Z87.1-1989. Where there is the potential for exposure to injurious light rays, the shade of lens to use in each instance shall be selected in accordance with applicable state or federal standards. Side shield protection shall be used whenever the hazard of flying objects is angular as well as frontal. See also SOP A-7, *Personal Protective Equipment Issuance (Safety-toe Boots/Shoes and Glasses)*, Section 2.2, Safety Glasses (Plano [non-prescription] and Prescription).

### 5.5.5 Respiratory Protection

- All SCBAs and respirators for emergency uses will be inspected monthly by the SHSC. Records will be maintained for all inspections of emergency-use respirators.
- All personnel required to wear respirators shall receive a physical evaluation in accordance with Volume III, Medical Surveillance Program, of this manual to ensure that they have no preexisting physical or psychological conditions that may preclude them from wearing a respirator (required under regulations outlined in 29 CFR 1910.134, *Respiratory Protection*).
- All workers using respirators must have their respirators qualitatively fit-tested at least once a year. Asbestos, arsenic, cadmium, formaldehyde, benzene, and lead workers must have unique respirator fit-tests in compliance with the standard for the chemical they are exposed to. Fit-testing ensures a proper face-to-facepiece seal [29 CFR 1910.134, 29 CFR 1926.103, *Respiratory Protection*]. The respirator head straps must be comfortable and the user should be able to perform normal and deep-breathing, side-to-side and up-and-down head movements and talking without loosening the seal. The seal will be tested by quantitative methods such as with a PortaCount. The individual will not be allowed to use the respirator until a proper seal has been obtained. The SHE Coordinator or SHSC shall maintain written fit-test records for all on-site personnel. See also SOP H-13, *Respiratory Protection Program*.
- An individual may not wear a respirator if he/she has a condition that prevents a good seal. Facial hair must not be present between the sealing surface of the respirator and the user's face (see SOP H-7, *Facial Hair Policy*). Corrective lenses that have temple bars or straps that pass between the sealing surface and the user's face may not be worn. Corrective lenses inserted inside full-facepiece respirators may be used. Contact lenses may not be used in contaminated atmospheres except with full face protection. Full dentures can be worn with respirators, but partial lower dentures may have to be removed if they interfere with a proper chin seal. It is AEE policy that all personnel working on hazardous waste/substance sites be prepared to immediately upgrade respiratory protection.

### 5.5.6 Body Protection

Body protection is required for employees whose work exposes parts of their body, not otherwise protected as required by other portions of this SOP, to hazardous or flying substances, or objects.

- Clothing appropriate for the work being done shall be worn. Loose sleeves, tails, ties, lapels, cuffs, or other loose clothing that can be entangled in moving machinery shall not be worn.
- The SHSC shall monitor the length of time employees wear protective clothing to prevent heat stress, fatigue, and chemical permeation of the clothing. He/she shall ensure that all procedures for PPE removal, decontamination, and donning are followed during rest breaks. Protective clothing shall be worn according to manufacturer's specifications. For example, Tyvek® coveralls shall not be tied down around the waist because the dangling, tied sleeves could get caught in rotating machinery. Instead, if only pants are desired (and have been approved by the HSP), Tyvek® pants shall be purchased specifically for that purpose. Protective clothing will be changed on a regular basis as determined by the SHSC. The duration that the clothing will be worn will be based on permeation data for the clothing material, the contaminant concentration ranges found during environmental monitoring, and working conditions (temperature, humidity, work schedules, etc.) at the site. At a minimum, protective clothing will be disposed of upon removal. To reenter a contaminated area an employee will have to put on new protective clothing.
- On-site AEE and subcontractor personnel wearing protective clothing shall inspect it while working to ensure that it is not torn, degraded, or covered with residue. If these conditions are noted, the person shall notify the SHSC and institute proper decontamination procedures, in order to change into new protective clothing. Rips and tears should be mended at once, or the worksuit shall be immediately replaced.
- Use of protective sleeves and gloves (see below) is necessary to protect against thermal hazards posed by hot surfaces and/or hot liquids (e.g., capping compounds).
- Protective clothing saturated or impregnated with flammable liquids, corrosive substances, irritants, or oxidizing agents shall be removed and properly disposed of or shall not be worn until properly cleaned.

### 5.5.7 Hand Protection

Hand protection shall be required for employees whose work involves unusual or excessive exposure of hands to cuts, burns, harmful physical or chemical agents, or radioactive materials that are encountered and capable of causing injury or impairments. Gloves shall be selected by referring to MSDSs, HSPs, or consultation with a health and safety professional.

Wrist watches, rings, or other jewelry shall not be worn while working with or around machinery with moving parts in which such objects may be caught, or around electrically energized equipment.

### 5.5.8 Foot Protection

Appropriate foot protection that meets the requirements and specifications in ANSI Z41-1991 is required for employees who are exposed to foot injuries from electrical hazards; hot, corrosive, poisonous substances; falling objects; or crushing or penetrating actions that may cause injuries, or who are required to work in abnormally wet locations. Refer to SOP A-7, *Personal Protective Equipment Issuance (Safety-toe Boots/Shoes and Glasses)*, for the policies regarding authorization and approval for safety-toe boots.

### 5.6 PPE DONNING/DOFFING PROCEDURE

PPE donning and doffing is particularly important when working with highly hazardous substances. Failure to follow donning and doffing procedures may result in the PPE being ineffective against contaminants. These procedures may be altered by the SHSC or SHE Coordinator if improvements can be made to the procedure and the changes are warranted in the field. Refer to SOP H-6, *Personnel Decontamination*, for personnel decontamination guidelines.

### 5.7 PPE MAINTENANCE AND CARE

Reuse of chemical protective clothing will be permitted only if the article is nonporous, the garment has been thoroughly decontaminated, and the possibility of chemicals diffusing through the inside surface is small. Chemical-resistant boots, "splash" suits, and certain special-use gloves are examples of items that may be reused based on their condition after use. AEE personnel will also frequently use items that can be disposed of after a single use or at the end of the workday. These items include gloves, coveralls, shoe covers, and respirator cartridges/filters. Used PPE will be kept on-site for disposal in PPE drums labeled as hazardous waste. In the case of respirators, disinfecting detergents and rinses and/or wipes should be used to decontaminate and hygienically clean the facepieces after each use. After cleaning, the employee must let the respirator air dry in a clean place. After drying, the respirator shall be placed in a resealable plastic bag or clean, sealable storage container or cabinet. All respirators should be stored to protect them from dust, sunlight, heat, extreme cold, excessive moisture, and damaging chemicals.

Respirators will be checked periodically by the SHSC and inspected before each use by the wearer. A respirator maintenance program will be established to repair and/or replace respirator component parts. Replacement parts for respiratory protective devices must be obtained from the manufacturer of the equipment. Substitution of parts from a different brand or type of respirator will not be allowed. SCBA repairs must be performed by the equipment manufacturer.

In the process of donning, each site worker and his/her buddy will examine protective clothing prior to use for imperfect seams, nonuniform coatings, tears, malfunctioning closures, pinholes, cracks, or other signs of deterioration. Any defective equipment should be returned by the SHSC for replacement after notifying procurement. The SHSC will ensure that protective equipment is periodically inspected throughout the workday, and any defective PPE repaired or replaced as needed.

The SHSC shall also ensure that all used protective clothing is disposed of properly and all new protective clothing is stored in an uncontaminated, well-ventilated area. This area must be away from sunlight, direct heat, and moisture. Clothing made of different types of materials will be separated and labeled to prevent use of the wrong material by mistake.

The SHSC will perform on-site maintenance of PPE, such as repair of hard hats or respirators that are discovered to have minor, reversible defects.

Fully encapsulated suits will be repaired by the manufacturer. Maintenance records for encapsulated suit repairs will be kept by the SHSC or SHE Coordinator.

## 6.0 RECORDS

Where applicable, the following documents shall be retained as records:

- Hazard Assessment and PPE Selection form
- records listing the dates and repairs made to a respirator will be maintained for each respirator by the individual user or office SHE Coordinator (see SOP H-13, *Respiratory Protection Program*)
- all field notes, logs, records, and permits pertaining to the selection, use, maintenance, and disposal of PPE

## 7.0 REFERENCES

American National Standards Institute. Z89.1-1986 and Z89.2-1971, *American National Standard for Personnel Protection-Protective Headwear for Industrial Workers - Requirements*.

Cal-OSHA. 2001. 8 CCR Article 10, *Personal Safety Devices and Safeguards*.

Fed-OSHA. 2000. 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*.

Fed-OSHA. 2000. 29 CFR 1910.134 and 29 CFR 1926.103, *Respiratory Protection*.

Fed-OSHA. 2000. 20 CFR 1926.101, *Hearing Protection*.

Fed-OSHA. 2000. 29 CFR 1910.95, *Occupational Noise Exposure*.

National Institute for Occupational Safety and Health (NIOSH). *Personal Protective Equipment for Hazardous Materials Incidents: A Selection Guide*. U.S. Department of Health and Human Services, Morgantown, West Virginia.

NIOSH/OSHA/USCG/EPA. 1985. *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*.

Schwoppe, A.D., Costas, P.P., Jackson, J.O., and Weitzman, D.J. 1985. *Guidelines for the Selection of Chemical-protective Clothing*, 2<sup>nd</sup> ed. Cincinnati: ACGIH, 1985.

U.S. Environmental Protection Agency. *Standard Operating Safety Guides*. Washington, D.C.

**8.0 ATTACHMENTS**

1. Hazard Assessment and PPE Selection Form
  2. Example of Level A Protection
  3. Example of Level B Protection
  4. Types of Air-purifying Respirators for Level C Protection
  5. Example of Level Modified D Protection
-

**ATTACHMENT 1**  
**HAZARD ASSESSMENT AND PPE SELECTION FORM**

# Hazard Assessment and PPE Selection



**Task:** \_\_\_\_\_

**Department:** \_\_\_\_\_

## HAZARDS IDENTIFIED: Seriousness of Injury?

Impact (Explain): _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>	Falling Objects: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>
Penetration: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>	Sharp Objects: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>
Compression: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>	Rolling or Pinching Objects: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>
Chemical: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>	Electrical Hazards: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>
Heat, Hot Surfaces: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>	Ergonomic/Lifting: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>
Harmful Dust: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>	Other: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>
Light Radiation: _____	None <input type="checkbox"/> Lo <input type="checkbox"/> Med <input type="checkbox"/> Hi <input type="checkbox"/>		

Can the task be modified to reduce/eliminate the hazard? Yes \_\_\_ No \_\_\_ If yes, how? \_\_\_\_\_

## MSDS PPE RECOMMENDATIONS:

<input type="checkbox"/> Gloves, Type: _____	<input type="checkbox"/> Coveralls, Type: _____
<input type="checkbox"/> Safety-toe Boots	<input type="checkbox"/> Apron
<input type="checkbox"/> Boot Covers	<input type="checkbox"/> Safety Glasses, Goggles, or Faceshield Type: _____
<input type="checkbox"/> Hard Hats	<input type="checkbox"/> Respirator Type: _____
<input type="checkbox"/> Other _____	

## PPE REQUIRED FOR THE TASK:

<input type="checkbox"/> Gloves, Type: _____	<input type="checkbox"/> Coveralls, Type: _____
<input type="checkbox"/> Safety-toe Boots	<input type="checkbox"/> Apron
<input type="checkbox"/> Boot Covers	<input type="checkbox"/> Safety Glasses, Goggles, or Faceshield Type: _____
<input type="checkbox"/> Hard Hats	<input type="checkbox"/> Respirator Type: _____
<input type="checkbox"/> Other _____	

**Training Required for Task:** \_\_\_\_\_

**POST THIS FORM IN THE WORK AREA WHERE THE TASK IS ROUTINELY PERFORMED.**

**ATTACHMENT 2**  
**EXAMPLE OF LEVEL A PROTECTION**



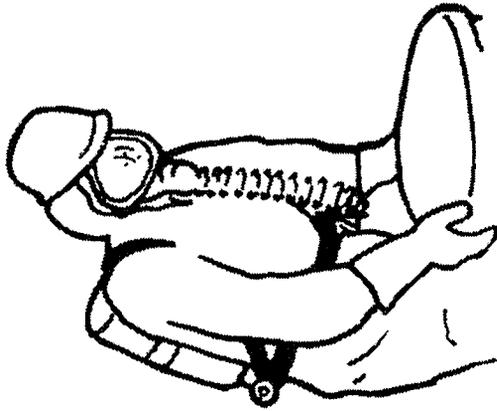
Fully-encapsulating suit

Source: NIOSH/OSHA/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, 1985

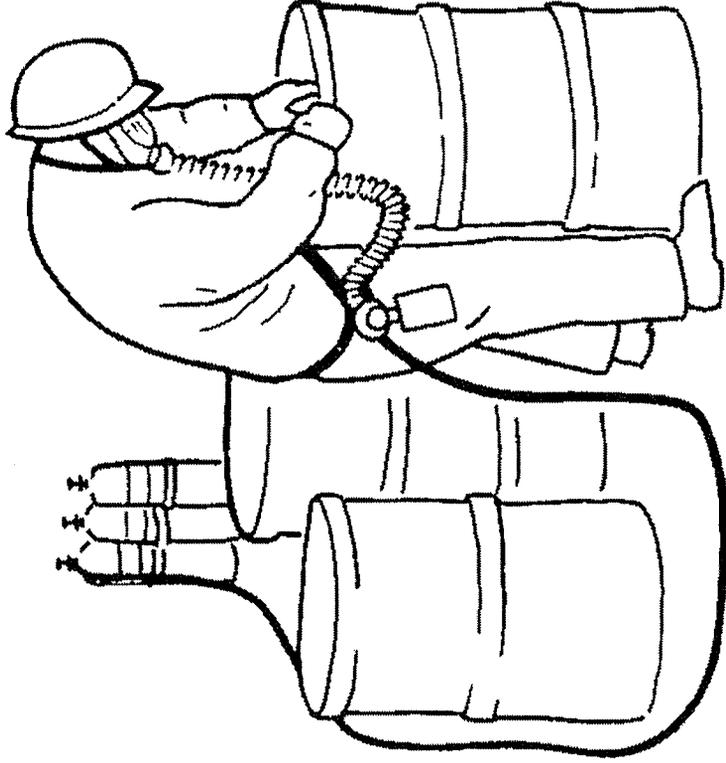


Example of Level A Protection

**ATTACHMENT 3**  
**EXAMPLE OF LEVEL B PROTECTION**



Self-contained  
breathing apparatus  
(SCBA),  
full facepiece



Supplied-air respirator, full facepiece

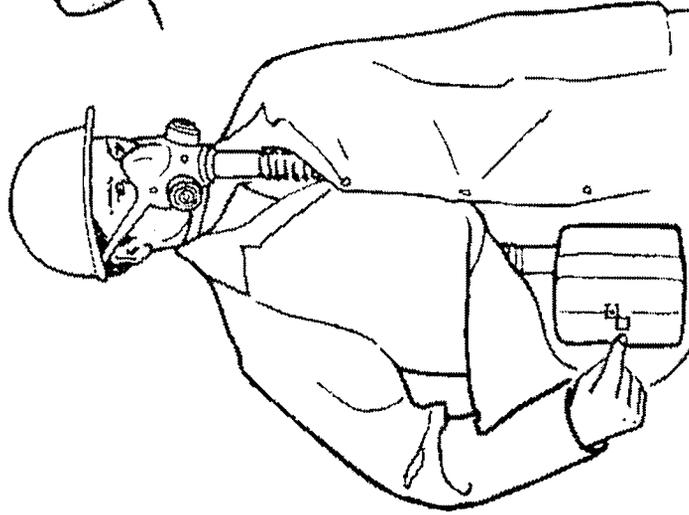
Source: NIOSH/OSHA/USCG/EPA, Occupational Safety and Health, Guidance Manual for Hazardous Waste Site Activities, 1985



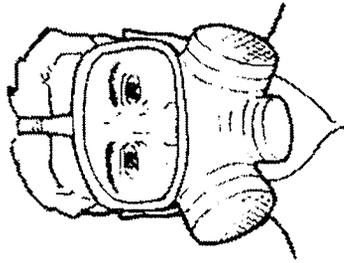
Example of Level B Protection

**ATTACHMENT 4**

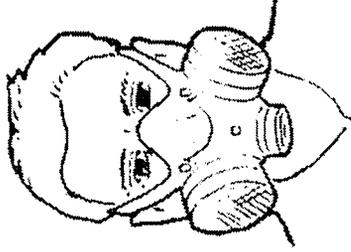
**TYPES OF AIR-PURIFYING RESPIRATORS  
FOR LEVEL C PROTECTION**



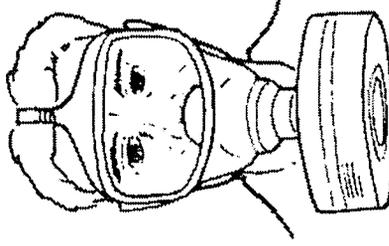
Powered air-purifying respirator, half-mask



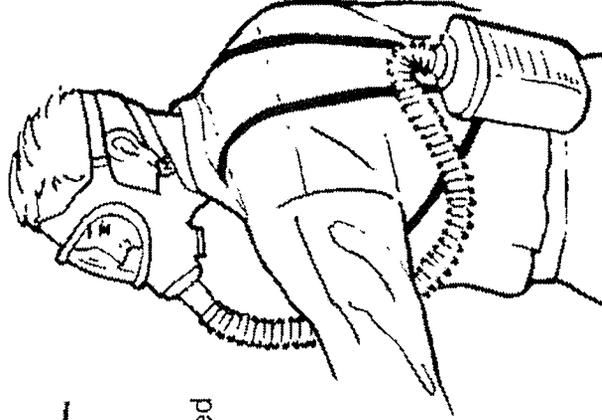
Full-facepiece, dual cartridge



Half-mask, facepiece-mounted cartridge



Full-facepiece, chin-mounted canister



Full-facepiece, harness-mounted canister

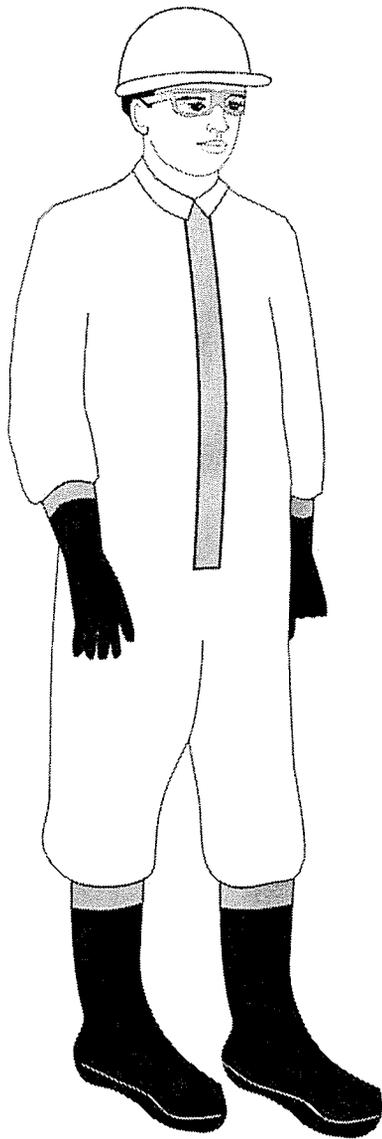
Source: NIOSH/OSHA/USCG/EPA, *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities*, 1985



### Types of Air-purifying Respirators for Level C Protection

**ATTACHMENT 5**

**EXAMPLE OF LEVEL MODIFIED D PROTECTION**



Example of Level Modified D Protection



# STANDARD OPERATING PROCEDURE

S.O.P. No. H-13

PAGE 1 OF 16

APPROVAL

Denise L. Daggett, MS, CIH

EFFECTIVE DATE

05/24/02

REVISION No.

0

TITLE

## RESPIRATORY PROTECTION PROGRAM

### 1.0 BACKGROUND

The primary objective of this Respiratory Protection Program is to limit the inhalation of harmful dusts, fumes, mists, vapors, or gases. Normally, control of toxic airborne contaminants shall be accomplished through proper engineering design of the process, containment, and ventilation equipment. However, some work tasks such as remote site work do not lend themselves well to engineering controls, and respiratory protection equipment must be relied upon.

This procedure establishes responsibilities for the respiratory protection program management, stipulates the method for employees to obtain approval to wear respiratory protective equipment, and specifies available respiratory equipment.

The effective use of respirators requires a planned program extending to all AMEC Earth & Environmental, Inc. (AEE) operations and includes supervision by trained and experienced personnel. This procedure provides for AEE's compliance with the legal requirements of the federal (and state, where applicable) Occupational Safety and Health Standard (OSHA), 29 CFR 1910.134, Final Rule 1998.

### 2.0 SCOPE

This procedure applies to all AEE personnel who are required to wear respirators on AEE jobsites or in AMEC facilities. This procedure does not apply where respiratory equipment is used for protection against airborne radioactivity.

### 3.0 RESPONSIBILITIES

#### 3.1 CORPORATE SAFETY, HEALTH AND ENVIRONMENT DIRECTOR

The Corporate Safety, Health, and Environment Director (Corporate SHE Director) is assigned primary responsibility of developing the Respiratory Protection Program and for ensuring that the program is in compliance with federal and state regulations. The Corporate SHE Director is available to train the Safety, Health, and Environment Coordinators (SHE Coordinators) in all aspects of respirator selection, use, and issuance.

#### 3.2 WORKCARE, INC.

The WorkCare, Inc. is a medical surveillance program management company that specializes in occupational medicine and has been approved by the Corporate SHE Director to provide medical services. WorkCare is owned and managed by physicians board certified in occupational medicine.

WorkCare arranges for AEE employees nationwide to participate in medical evaluations performed using a medical questionnaire or an initial medical examination that obtains the same information as the medical questionnaire.

**3.3 SAFETY, HEALTH, AND ENVIRONMENT COORDINATOR**

The SHE Coordinator for each AEE office is responsible for ensuring that proper respirators are used for specific conditions; the equipment is clean, in good repair, and in operating condition; and the user is medically qualified and has received required instruction and training. In addition, the SHE Coordinator is capable of fit testing and issuing appropriate respiratory protection.

The SHE Coordinator shall conduct evaluations of the workplace to ensure that the written respiratory protection program is being properly implemented. In addition, the SHE Coordinator shall consult employees required to wear respirators to assess the employee's views on program effectiveness. Factors to be assessed include respirator fit, appropriate respirator selected for the hazards, and proper respirator use and maintenance. Any problems identified during the assessment shall be corrected.

Assistance and advice in the training, use, and handling of respiratory equipment may be obtained from the Corporate SHE Director.

**3.4 FIELD MANAGER OR SITE HEALTH AND SAFETY COORDINATOR**

The Field Manager (FM) or Site Health and Safety Coordinator (SHSC) is responsible for:

- ensuring that work tasks are evaluated and appropriate respiratory protection is used and/or issued
- ensuring the issuance of respiratory protection for field projects
- maintenance of field project respiratory protective equipment
- ensuring adequate inventory of appropriate cartridges/filters for respiratory protective equipment
- verifying adequate decontamination of respiratory protective equipment
- ensuring that personnel are adhering to standard operating procedure (SOP) H-7, *Facial Hair Policy*, contained in this volume of the SHE manual

Additionally, this person may be qualified to perform the issuance of respiratory protective equipment for field project team members.

**3.5 AFFECTED EMPLOYEE**

The affected employee is responsible for participating in medical evaluation prior to issuance and training at the time of issuance of the respiratory protection one-on-one or in classroom sessions. Affected employees are also responsible for the proper use, storage, and maintenance of respiratory protective equipment issued for their personal use. The equipment shall be stored in a convenient and sanitary manner. Respiratory equipment can be maintained in a clean, sanitary condition with treated towellettes, which may be obtained from the SHSC, SHE Coordinator, or in the equipment storage room or area. The employee shall not loan, transfer, or exchange a respiratory protection device with another person. The employee shall guard against damage to the respiratory protective equipment, routinely inspect and fit-check the respirator before each use, and report any apparent defect or malfunction to their SHSC or SHE Coordinator.

Defective equipment must be turned in to the SHSC or SHE Coordinator for repair or replacement. Respiratory equipment no longer in use shall be returned to the SHSC or SHE Coordinator.

**4.0 PROCEDURE FOR ISSUANCE AND USE OF RESPIRATORY PROTECTION**

Selection and issuance of the proper respirator for the protection required shall be made in accordance with OSHA regulation: 29 CFR 1910.134, *Respiratory Protection*, sections (c) through (d) inclusive, and American National Standards Institute (ANSI) Practices for Respiratory Protection (Z88.2-1969). The table below describes each step necessary for the issuance of appropriate respiratory protection, including responsible person and applicable attachment(s).

Step #	Procedure	Responsible Staff Person	Key Elements to Address	Applicable SOP Attachment(s)	SOP Section #
1	At the time of hire or assignment to activities requiring the possible use of respiratory protection, the SHE Coordinator shall be notified.	Employee's Supervisor			
2	The employee shall receive and complete the WorkCare Medical History Questionnaire and/or receive a medical examination through WorkCare before using respiratory protection equipment.	SHE Coordinator arranges with WorkCare and notifies employee.	The medical questionnaire and medical examination shall be administered confidentially during the employee's normal working hours or at a time and place convenient to the employee.	<ul style="list-style-type: none"> <li>WorkCare Medical History Questionnaire (A-1)</li> </ul>	4.1
3	Pertinent health and physical conditions that may affect the employee's ability to wear respiratory protection shall be determined by WorkCare.		WorkCare shall determine if there are any health or physical conditions that would disqualify an employee from using a respirator.		4.1 4.2 4.3
4	Prior to the issuance of respiratory protection equipment, WorkCare shall complete a Health Status Medical Report for the AEE employee's file.	SHE Coordinator receives the report from WorkCare and provides a copy to the applicable employee.		<ul style="list-style-type: none"> <li>Health Status Medical Report (A-2)</li> </ul>	4.1
5	The appropriate type of respiratory protection shall be selected based on potential hazards in the work environment. For field projects, selection shall be documented in the project site-specific Health and Safety Plan (HSP). Volume II, Comprehensive Field Project Health and Safety Program (Attachment C),	SHE Coordinator or SHSC. The Corporate SHE Director should be consulted if there is concern over the proper type of respiratory protection to use.		<ul style="list-style-type: none"> <li>Hazard Assessment and PPE Selection form (A-6)</li> </ul>	6.0

Step #	Procedure	Responsible Staff Person	Key Elements to Address	Applicable SOP Attachment(s)	SOP Section #
	<p>of the Corporate Safety, Health, and Environment Manual (Corporate SHE Manual) provides an example of an HSP template. For office, laboratory, or site situations, selection shall be documented on the Hazard Assessment and PPE Selection form (Attachment 7).  <i>Volume I, Injury and Illness Prevention Program</i>, of the Corporate SHE Manual discusses completion of this form in detail.</p>				
6	<p>The appropriate equipment shall be issued to the employee and the proper fit test provided. In addition, at the time of issuance and annually thereafter, affected employees shall receive instruction and training on respiratory protection.</p>	<p>SHE Coordinator, Corporate SHE Director, SHSC, or other qualified person as assigned.</p>	<p>Respiratory equipment shall be issued on an individual basis and shall not be exchanged or loaned among users. Any equipment returned or turned in after use shall be cleaned, sanitized, and inspected before reissue.</p> <p>The employee shall demonstrate knowledge of the elements of the Respiratory Protection Program, capabilities and limitations of the respirator, maintenance and storage procedures, actions to take if the respirator malfunctions, and proper fitting of the respirator. The user will be instructed on how to perform the negative and positive user seal-checks every time the respirator is donned. Every respirator wearer shall wear</p>	<ul style="list-style-type: none"> <li>• Respirator Issuance and Training Record (A-3)</li> <li>• Relative Advantages and Disadvantages of Respiratory Protective Equipment (A-5)</li> <li>• Hazard Assessment and PPE Selection Form (A-6)</li> <li>• Available Equipment (A-7)</li> <li>• 42 CFR 84 Filter Classification Table and Selection Chart (A-8)</li> </ul>	<p>5.0 6.0 7.0 8.0 9.0 10.0 12.0</p>

Step #	Procedure	Responsible Staff Person	Key Elements to Address	Applicable SOP Attachment(s)	SOP Section #
7	<p>On a day-to-day basis, the respirator shall be maintained and stored properly. Any damaged or malfunctioning equipment shall be brought to the attention of the SHE Coordinator or SHSC.</p>	<p>The employee who is assigned respiratory protection equipment.</p>	<p>the respirator in normal air, and during a fit test protocol to qualitatively or quantitatively test for equipment fit.</p> <p>In addition, instruction shall be given on the time use limitations for the different filters and cartridges. The Corporate SHE Director has final decision-making authority on the selection of any PPE for site work.</p> <p>Employees receiving a respirator shall be instructed on proper storage of equipment to protect their respirator from dust, sunlight, extremes in temperature, excessive moisture, damaging chemicals (including detergent residue), and workplace contaminants.</p>	9.0	9.0
8	<p>Inspect issued respirators on an annual basis. Provide an annual fit test to all wearers.</p>	<p>SHE Coordinator or other qualified person as assigned.</p>	<p>Any equipment that shows wear or deterioration shall be replaced or repaired.</p>	<ul style="list-style-type: none"> <li>• Respirator Maintenance and Annual Fit Test Checklist (A-13)</li> </ul>	9.0

## 4.1 MEDICAL EVALUATION

Personnel to whom resistance-creating respiratory protective devices are to be issued shall be evaluated initially to determine the employee's ability to use a respirator. The initial medical evaluation shall be performed by a local medical care provider arranged through WorkCare using the WorkCare Medical History Questionnaire (Attachment 1) or by providing a medical evaluation that obtains the same information as the medical questionnaire. An employee who gives a positive response to key questions on the WorkCare Medical History Questionnaire or whose evaluation demonstrates the need, shall receive a medical examination provided by the local medical care provider. This exam shall include any medical tests, consultations, or diagnostic procedures that WorkCare deems necessary.

A medical evaluation may be required if an employee reports medical signs or symptoms that are related to the ability to use a respirator or if a change occurs in workplace conditions that may result in a substantial increase in physiological burden.

Attachment 2 is the Health Status Medical Report, which is completed by WorkCare indicating whether the employee is medically qualified to perform tasks as a hazardous waste operations worker, including use of respiratory protection. Please refer to Volume III of the Corporate Health and Safety Manual, Medical Surveillance Program, for additional information. The completed form is sent to the SHE Coordinator where it is maintained on file. A copy of the completed applicable form(s) shall be given to the employee. This form serves as the employee's copy of WorkCare's written recommendation.

Annually, each worker who has been issued and uses a resistance-creating respirator shall be reevaluated by WorkCare. The details of the medical exam are addressed in the Corporate SHE Manual, Volume III, Medical Surveillance Program.

## 4.2 DISQUALIFYING CONDITIONS

WorkCare may consider the following conditions as disqualifying an employee for respiratory equipment use:

- Facial deformities and facial hair. Facial deformities or the presence of excessive facial hair/sideburns or other conditions that interfere with proper sealing of the tight-fitting respirator or valve function may disqualify the potential user. According to SOP H-7, *Facial Hair Policy*, contained in this volume, staff involved in the handling of or potential exposure to hazardous materials must not have facial hair that would interfere with a proper facial seal. An obstructed seal renders the respiratory protection ineffective and can cause exposure to harmful airborne contaminants to the wearer. Such a situation can jeopardize the health and safety of the wearer and coworkers.
- History of restrictive or obstructive lung diseases. Pulmonary conditions verified by chest X-ray, clinical findings, or spirometry shall disqualify an employee for respirator use.
- History of cardiovascular disease, hypertension-symptomatic coronary artery disease, arrhythmias, or recent history of myocardial infarction shall disqualify the employee for respiratory use.
- Perforated eardrums. Individuals with perforated tympanic eardrums cannot wear respirators in hazardous exposure areas where inhalation or absorption of toxic materials or vapors through

the perforation may occur. Existence of perforation by itself shall not immediately disqualify the employee for respirator use, but the examining MCP shall consider both the environment and possible control measures before reaching a final decision.

- Claustrophobia or other psychological factors may preclude the ability to wear a respirator.

#### 4.3 OPTOMETRIC CONCERNS

Individuals with prescription eyeglasses who are required to wear respirators with tight-fitting full-facepieces shall ensure that they are worn in a manner that does not interfere with the facepiece seal. A spectacle mount kit may need to be purchased from the respirator manufacturer or supplier. The employee's prescription would be ground and mounted into the kit by an optometrist. Refer to SOP A-7, *Personal Protective Equipment Issuance* in this volume. Visual acuity and visual field requirements may need to be evaluated depending upon the nature of the work to be performed. The affected employee shall discuss the need for visual evaluations in connection with respiratory protection, with the local medical care provider or WorkCare as necessary.

Individuals with contact lenses must make sure that the wearing of these lenses does not interfere with the use of the respirator (e.g., removing the facepiece because of eye irritation).

#### 5.0 INSTRUCTION AND TRAINING

At the time of issuance, and annually thereafter, all affected employees shall be instructed and trained in accordance with the Training Program, Volume IV, Corporate SHE Manual, by the SHE Coordinator, SHSC, or Corporate SHE Director. The employee shall sign the AMEC Respirator Issuance and Training Record (Attachment 3) during initial issuance, or the Respirator Maintenance and Annual Fit Test Checklist (Attachment 13) annually, indicating that they received the required equipment, instruction, and a fit test. Respiratory protection training is covered in depth as part of the HAZWOPER course (29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response*) for workers assigned to hazardous waste sites.

#### 6.0 SELECTION OF RESPIRATORS

Upon successful completion of the medical evaluation, contact the SHE Coordinator, SHSC, or Corporate SHE Director for issuance of a respirator.

The respiratory hazard(s) in the workplace and user factors must be identified, and the respirator selected based on these factors. The site-specific Health and Safety Plan, if available, shall be consulted when selecting respiratory equipment for hazardous waste site work. For non-hazardous waste work a Hazard Assessment form, Attachment 6, shall be completed. Refer to table in Section 4.0 for Hazard Assessment procedure.

There shall be a sufficient number of models and sizes so that the respirator issued is acceptable to the user.

#### 6.1 AIR OR OXYGEN SOURCE

Respiratory protection is of primary importance as the lungs present a significant route of entry of airborne hazardous substances into the body, and the effective surface area of the lungs is large. Respiratory protective devices (respirators) consist of a facepiece that is connected to an air or oxygen source or worn

in the ambient environment. The three major categories of respirators differ with respect to whether the respirator supplies the respirator user with breathing air from a source independent of the ambient atmosphere:

1. Self-contained breathing apparatus (SCBAs) provide a breathing air source designed to be carried by the user.
2. Airline respirators (ALRs) provide a breathing air source located some distance away and connected to the user by a hose, sometimes called an umbilical cord.
3. Air-purifying respirators (APRs) enable the user to inhale "purified" ambient air due to a cartridge or filter removing specific air contaminants from the inhaled ambient air.

## 6.1.1 Supplied Air Respirators

Because they both supply air to the user, ALRs and SCBAs are sometimes categorized together as supplied-air respirators. When atmosphere-supplying respiratory protective devices must be used, only certified Type 1-Grade D breathing air (or better) shall be acceptable. Cylinders used to supply breathing air to respirators shall have a certificate of analysis from the supplier certifying that the breathing air meets the requirements for Type 1-Grade D breathing air. Grade D breathing air meets the following criteria:

Oxygen	19.5 - 23.5 percent
Hydrocarbons	≤5 milligrams per cubic meter
Carbon Monoxide	≤10 ppm
Carbon Dioxide	≤1000 ppm
Odor	None

Special quick disconnects designed exclusively for breathable air shall be the only kind of fittings allowed. Attachment 4 shows an example of an airline respirator and of an SCBA. Attachment 5 lists the relative advantages and disadvantages of commonly used respiratory protective equipment.

Provisions must be made by the SHSC for visual surveillance of, and communication with, workers wearing atmosphere-supplying respiratory protection equipment.

## 6.1.2 Air-Purifying Respirators

An APR removes specific air contaminants by passing ambient air through the air-purifying element (i.e., filter, cartridge, or canister). The APR must be used in a work atmosphere with an adequate oxygen concentration, 19.5 to 21.5 percent oxygen by volume. This type of respirator does not provide oxygen to the wearer.

## 6.2 AIR FLOW

Respirators are further differentiated by the type of air flow supplied to the facepiece:

1. Negative-pressure respirators draw air into the facepiece via the negative pressure created by wearer inhalation. APRs function on the basis of negative pressure. The disadvantage of negative-pressure respirators is if a leak develops in the system (e.g., an ill-fitting mask/facepiece), the wearer draws contaminated air into the facepiece during inhalation.

2. Positive-pressure respirators (also referred to as pressure-demand respirators) maintain a slight positive pressure in the facepiece during both inhalation and exhalation. A pressure regulator and an exhalation valve on the mask maintain the mask's positive pressure at all times. If a leak develops, the regulator sends a continuous flow of clean air into the facepiece, preventing penetration of contaminated ambient air. Positive-pressure respirators are required for U.S. Environmental Protection Agency (USEPA) Levels of Protection, Level A and Level B. Refer to SOP H-12, *Personal Protective Equipment*.
3. Continuous-flow respirators send a continuous stream of air into the facepiece at all times. Continuous air flow prevents infiltration by ambient air, but exhausts the air supply much more rapidly than positive-pressure respirators.

### 6.3 FACEPIECES

Different types of facepieces are available for these various types of respirators:

1. Full facepieces cover the face from the hairline to below the chin. They are recommended for use on uncontrolled sites because they provide eye as well as respiratory protection. An example of a full-facepiece respirator is shown in Attachment 9.
2. Half masks cover the face from below the chin to the bridge of the nose. They can be used when the airborne contaminants have been identified and are judged unlikely to irritate the eyes. An example of a half-mask respirator is shown in Attachment 9.

### 6.4 APPROVED EQUIPMENT

#### 6.4.1 Respirators and Cartridges

Federal regulations require the use of approved respirators. Approval numbers are clearly marked on all approved respiratory equipment. Brands of respirators are tested and certified by National Institute of Occupational Safety and Health (NIOSH) under 30 CFR 11. Only cartridges that are labeled and color coded with the NIOSH and Mine Safety and Health Administration (MSHA) approval label shall be used. Labels shall not be removed or defaced.

#### 6.4.2 Filters and Nuisance Filtering Facepieces

The filter series -N, -R, and -P shall be certified by NIOSH and the Department of Health and Human Services (DHHS) under 42 CFR 84. A high-efficiency particulate air (HEPA) filter certified by NIOSH under 30 CFR 11 may be used when required for the use of HEPA-filtered respirators. The N100, R100, and P100 are all equivalent to the HEPA filter. Only filters that are labeled with the NIOSH approval label shall be used. Labels shall not be removed or defaced.

The nuisance filtering facepiece is 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. The nuisance filtering facepiece shall be certified and labeled by NIOSH under 42 CFR 84.

## 7.0 FIT TEST AND USER SEAL-CHECK PROCEDURES FOR AIR-PURIFYING RESPIRATORS

The APR wearer must be qualitatively fit tested (QLFT) or quantitatively fit tested (QNFT) with the same make, model, style, and size of respirator that shall be used. Most AEE employees are issued and wear APRs. QLFT is a subjective pass/fail fit test to assess the adequacy of respirator fit and relies on the individual's response to the test agent. QNFT is an objective assessment of the adequacy of respirator fit made by numerically measuring the amount of leakage into the respirator with the use of a PortaCount®. Fit testing shall be done prior to initial use of the respirator, whenever a different respirator facepiece (size, style, model, or make) is used, and at least annually thereafter. Supplied-air respirators must be quantitatively fit tested. Contact the Corporate SHE Director for guidance.

To ensure proper protection, the facepiece seal shall be checked by the wearer each time he/she puts on the respirator by using the negative and positive pressure user seal-checks (see Sections 8.1 and 8.2, respectively). Qualitative fit testing procedures for isoamyl acetate and irritant smoke, respectively, are described in Attachments 10 and 11. Quantitative fit testing procedures using the PortaCount® are described in Attachment 12. It is AEE policy to provide QNFTs through experienced vendors whenever possible. If the SHE Coordinator obtains the equipment and is trained properly, he/she may perform QLFTs. This training is documented on the Respirator Issuance and Training Record (Attachment 3). Documentation is also entered into the recordkeeping database by the SHE Coordinator submitting the Data Entry Form to the Corporate SHE Director.

### 7.1 NEGATIVE PRESSURE USER SEAL-CHECK

The SHE Coordinator shall instruct the wearer that the negative pressure user seal-check must be performed each time the wearer dons the respirator.

1. With cartridges or filters in place, instruct the wearer to cover the porous area of the cartridge or filter with his or her hand. If an effective seal cannot be created, the HSC or wearer shall cover the face of the cartridges or filters with a surface to complete the seal, such as two pieces of paper.
2. Instruct the wearer to inhale and hold breath for 10 seconds, attempting to achieve a negative pressure in the facepiece. The facepiece should contract into the face.
3. Inability to achieve or maintain a negative seal may be indicative of poor respirator fit or malfunction. If this occurs, recheck integrity of the respirator for better seal.
4. Repeat steps 1 and 2.
5. Do not use respirator if unable to achieve a negative pressure.
6. This is not considered a QLFT, but rather a quick check of respirator integrity and seal.

### 7.2 POSITIVE PRESSURE USER SEAL-CHECK

The SHE Coordinator shall instruct the wearer that the positive pressure user seal-check must be performed each time the wearer dons the respirator.

1. Instruct the wearer to cover the exhalation valve and seal the exhalation port with his or her hand.
2. Instruct the wearer to exhale slightly. The facepiece should bulge away from the face.
3. Inability to maintain a slight positive pressure without indications of leakage may be indicative of poor respirator fit or malfunction. If this occurs, recheck integrity of the respirator for better seal.
4. Repeat steps 1 and 2.
5. This is not considered a QLFT, but rather a quick check of respirator integrity and seal.

### **7.3 QUALITATIVE FIT TEST (QLFT)**

#### **7.3.1 Isoamyl Acetate (Banana Oil)**

After successful completion of the negative and positive user seal-checks, the SHE Coordinator or SHSC may perform a QLFT using the isoamyl acetate procedure in a separate area away from the room used for odor threshold screening and respirator selection (see Attachment 10).

#### **7.3.2 Irritant Smoke**

After successful completion of the negative and positive user seal-checks, the SHE Coordinator or SHSC may perform a QLFT (see Attachment 11) using irritant smoke.

### **7.4 QUANTITATIVE FIT TEST (QNFT)**

#### **7.4.1 PortaCount®**

The PortaCount® (ambient aerosol condensation nuclei counter [CNC]) quantitative fit testing protocol quantitatively fit tests respirators with the use of a probe. The probed respirator is only used for QNFTs. A probed respirator has a special sampling device, installed on the respirator, that allows the probe to sample the air from inside the mask. A probed respirator is required for each make, style, model, and size that the employer uses and can be obtained from the respirator manufacturer or distributor. The CNC instrument manufacturer, TSI Inc., also provides probe attachments (TSI sampling adapters) that permit fit testing in an employee's own respirator. The PortaCount® provides a quantitative estimate, called the fit factor, of the fit of a particular respirator to a specific individual. The fit factor is calculated by estimating the ratio of the concentration of a contaminant in ambient air to its concentration inside the respirator when worn. A minimum fit factor pass level of at least 100 is necessary for a half-mask respirator and a minimum fit factor pass level of at least 500 is required for a full facepiece negative pressure respirator. The entire screening and testing procedure shall be explained to the test subject prior to the conduct of the QNFT (see Attachment 12).

#### **7.4.2 Medical Care Provider Fit Test Services**

In certain areas of the country, a local medical care provider may be able to provide QLFT and/or QNFT services that meet the criteria established in this SOP. To determine if these services are available, the SHE Coordinator should contact the local medical provider directly.

## 8.0 INSPECTION AND MAINTENANCE

### 8.1 POLICIES

On a day-to-day basis, it is the responsibility of the wearer to inspect, clean, and properly store his/her respiratory equipment. The FM, SHE Coordinator, or SHSC is required to see that the equipment in use is clean, functioning properly, and that the employee has a suitable place to store respiratory protective equipment. Treated towellettes are provided to aid in maintaining equipment in sanitary condition. Wearers are instructed to bring their respirator to the SHE Coordinator or SHSC at any time when the equipment is not functioning properly, is damaged, or is missing parts. Once per year, coinciding with the initial dates of issuance or during a HAZWOPER Refresher Training Course, affected employees shall be notified to bring their respiratory equipment to the SHE Coordinator for inspection, repair, and cleaning. The SHE Coordinator shall dismantle all equipment in good condition for inspection and cleaning with the sanitizer. Damaged equipment shall be repaired or replaced. Once maintenance is complete, the cleaned/repaired respiratory equipment shall be reissued to the user. The Respirator Maintenance and Annual Fit Test Checklist (Attachment 13) shall be completed by the SHE Coordinator and shall be retained as a record of respirator inspection and maintenance.

SCBAs shall be inspected monthly by the SHE Coordinator or SHSC for damage and insufficient breathing air. A tag shall be affixed to each self-contained unit and shall be initialed by the SHE Coordinator or SHSC at the time of monthly inspection.

ALRs must have couplings that are incompatible with outlets for nonrespirable worksite air or other gas systems.

### 8.2 CHANGE SCHEDULE FOR CARTRIDGES AND CANISTERS

Each cartridge and canister has a period of time established where it provides adequate protection to the wearer. All cartridges and canisters shall be changed before the end of the service life based on a predetermined change schedule. The predetermined change schedule shall be based upon the manufacturer's research data, as available.

If no such data are available for a specific filter, the Rule of Thumb for estimating organic vapor cartridge service life shall be followed.

The Rule of Thumb is:

- If the chemical's boiling point is  $>70^{\circ}\text{C}$  ( $>158^{\circ}\text{F}$ ) and the concentration is less than 200 parts per million (ppm), a service life of 8 hours at a normal work rate can be expected.
- Service life is inversely proportional to work rate, meaning the more strenuously an employee is working, the more often the cartridges shall be changed.
- Reducing concentration by a factor of 10 will increase service life by a factor of 5, meaning if the concentration of an organic vapor is less than 20 ppm, the service life for a normal work rate would increase from 8 hours to 40 hours assuming proper storage.
- Humidity above 85 percent will reduce service life by 50 percent.

**8.3 TIME USE LIMITATION OF FILTERS AND THE NUISANCE LEVEL FILTERING FACEPIECE**

All filters and nuisance level filtering facepieces shall be replaced whenever they are damaged, soiled, or causing noticeably increased breathing resistance. Additional limitations, specific to the filter series, may also apply.

- If oil aerosols are present in the atmosphere, the R-series filter must be changed after 8 hours of use.
- If the atmosphere contains **exclusively** oil aerosols, the P-series filter must be changed after 40 hours of use or 30 days, whichever is first.
- If the atmosphere contains no oil aerosols or a mixture of oil and non-oil aerosols, the time use limitation reverts to disposal of the filter when it becomes damaged, soiled, or difficult to breathe through.

The filter manufacturer's established service time recommendations printed in their instructions shall be reviewed by the SHE Coordinator. Filter efficiency reduction can vary significantly from model to model.

**8.4 RESPIRATOR CLEANING PROCEDURES**

The procedures for cleaning, decontaminating, and disinfecting respirators, in a manner that prevents damage to the respirator and does not harm the user, are provided below. As an alternative, the respirator manufacturer's cleaning recommendations may be followed.

1. Remove filters, cartridges, or canisters. Disassemble facepieces by removing speaking diaphragms, demand and pressure-demand valve assemblies, hoses, or any components recommended by the manufacturer. Discard or repair any defective parts.
2. Wash components in warm (43°C [110°F] maximum) water with a mild detergent or with a cleaner recommended by the manufacturer. A stiff bristle (not wire) brush may be used to facilitate the removal of dirt.
3. Rinse components thoroughly in clean, warm (43°C [110°F] maximum), preferably running water. Drain.
4. If the cleaner used does not contain a disinfecting agent, respirator components should be immersed for 2 minutes in one of the following:
  - a. Hypochlorite solution (50 ppm of chlorine) made by adding approximately 1 milliliter of laundry bleach to 1 liter of water at 43°C (110°F)
  - b. Aqueous solution of iodine (50 ppm iodine) made by adding approximately 0.8 milliliters of tincture of iodine (6 to 8 grams ammonium and/or potassium iodide/100 cubic centimeters of 45 percent alcohol) to one liter of water at 43°C (110°F)
  - c. Other commercially available cleaners of equivalent disinfectant quality when used as directed, if their use is recommended or approved by the respirator manufacturer

5. Rinse components thoroughly in clean, warm (43°C [110°F] maximum), preferably running water. Drain. The importance of thorough rinsing cannot be overemphasized. Detergents or disinfectants that dry on facepieces may result in dermatitis. In addition, some disinfectants may cause deterioration of rubber or corrosion of metal parts if not completely removed.
6. Components should be hand-dried with a clean lint-free cloth or air-dried. (Caution: The lens of a full facepiece can be easily scratched. Do not use paper towels or any soiled cloth as fine grit in the cloth may damage the lens.)
7. Reassemble facepiece, replacing filters, cartridges, and canisters where necessary.
8. Test the respirator to ensure that all components work properly. (Perform a positive or negative user seal check.)

## 8.5 MAINTENANCE GUIDELINES

The following are inspection guidelines to follow when maintaining a half- or full-face APR:

- Examine the facepiece for:
  - excessive dirt
  - cracks, tears, holes, or distortion
  - inflexibility (stretch and massage to restore flexibility)
  - cracked or broken element holders, badly worn threads, or missing gaskets
- Examine headstrap for:
  - breaks
  - loss of elasticity
  - broken buckles and attachments
- Examine valves for:
  - foreign materials, detergent residue, dust particles, or human hair under the valve seat
  - discoloration, cracks, tears, or distortions of the valve materials
  - improper insertion of the valve body in the facepiece
  - cracks, chips, or breaks in the valve body, particularly the sealing surfaces
  - missing or defective valve cover
- Examine air-purifying elements for:
  - incorrect cartridge or filter for the hazard with which the wearer is working
  - incorrect installation of cartridge or filter
  - expired shelf or working life of the element

## 9.0 VOLUNTARY USE OF NUISANCE LEVEL PARTICULATE FILTERING FACEPIECES AND ORGANIC VAPOR MASKS

The voluntary use of filtering facepieces (dust masks/nuisance level organic vapor) by employees are permitted if they are used against only those contaminants below the permissible exposure limit (PEL) for which it was designed. A medical examination is not required. It is the employee's responsibility to read the instructions and/or information on the respirator packaging. In addition, the employee shall receive Attachment 14, Information for Employees Using Respirators When Not Required Under the Standard.

**10.0 RECORDKEEPING****10.1 MEDICAL EVALUATION**

To ensure confidentiality of medical evaluations, records shall be maintained by WorkCare. The SHE Coordinator or Corporate SHE Director shall readily assist an employee with obtaining any record in accordance with 29 CFR 1910.1020, Access to Employee Exposure and Medical Records. The SHE Coordinator maintains the completed Health Status Medical Report.

**10.2 FIT TESTING**

All records of the qualitative and quantitative fit tests administered to an employee shall include:

1. The name or identification of the employee tested
2. The type of fit test performed
3. The specific make, model, style, and size of respirator tested
4. The date of the test
5. The pass/fail results for qualitative fit tests or the fit factor for quantitative fit tests

The Respirator Issuance and Training Record or Respirator Maintenance and Annual Fit Test Checklist, as applicable, shall be completed.

**10.3 TRAINING**

Records of respiratory protection training shall be maintained by the SHE Coordinator and submitted to the Corporate SHE Director in accordance with the requirements described in the Corporate SHE Manual, Volume IV, Training Program.

**11.0 REFERENCES**

Cal-OSHA. Title 8, Section 5144, *Respiratory Protection*.

Fed-OSHA. 29 CFR 1910.134, *Respiratory Protection* (January 8, 1998).

Fed-OSHA. 42 CFR 84, *Respirator Certification* (July 10, 1995).

3M Transition Assistance Program, Occupational Health and Environmental Safety Division.

Mine Safety Appliances Company. Product Literature.

## 12.0 ATTACHMENTS

1. WorkCare Medical History Questionnaire
2. Health Status Medical Report
3. Respirator Issuance and Training Record
4. Atmosphere Supplying Respiratory Protection Equipment (Airline Respirator and SCBA)
5. Relative Advantages and Disadvantages of Respiratory Protective Equipment
6. Hazard Assessment and PPE Selection Form
7. Available Equipment
8. 42 CFR 84 Filter Classification Table and Selection Chart
9. Types of Face Masks
10. Isoamyl Acetate (Banana Oil) Fit Test Procedures
11. Irritant Smoke Fit Test Procedures
12. PortaCount<sup>®</sup> Operation and Fit Test Procedures
13. Respirator Maintenance and Annual Fit Test Checklist
14. Information for Employees Using Respirators When Not Required Under the Standard

**ATTACHMENT 1**

**WORKCARE MEDICAL  
HISTORY QUESTIONNAIRE**

## Medical History Questionnaire

- Baseline                       Annual/Biennial  
 Exit                                 Other \_\_\_\_\_

Company Name: \_\_\_\_\_

Office: \_\_\_\_\_

Date: \_\_\_\_\_



# WORKCARE™

## Medical History Questionnaire

The exam will be at: *Please see Appointment Protocol.*

- Please have your Supervisor or Health & Safety Professional complete the Job Profile on the inside flap of this page if you do not know the responses.
- See your Health & Safety Professional for directions to the clinic. Please bring the completed exam packet and your Authorization.
- Do not eat for 8 hours prior to exam.  
(Water and unsweetened juice or black decaffeinated coffee are allowed)  
(Dry toast if you have an afternoon appointment)
- Avoid all alcohol consumption for 24 hours prior to the exam.
- Avoid loud noise exposure for 14 to 16 hours before the exam.
- If you wear contact lenses, please do not insert them on the day of the exam. Bring a pair of glasses.
- If you use hearing aids, please bring them to the clinic.
- If you have questions, do not read or understand please contact (800) 455-6155.
- The cost of this exam will be borne by your employer. It is important to be on time for your appointment. If you cannot attend your appointment, call (800) 455-6155 to cancel, or your employer may be charged.

**Please answer all the questions in this booklet.**

Occupational Medicine • Environmental Health • Toxicology

# 1-(800) 455-6155

# I INSTRUCTIONS

Your supervisor must allow you to answer this questionnaire during normal working hours, or at a time and place that is convenient to you. To maintain your confidentiality, your employer or supervisors must not look at or review your answers, and your employer must tell you how to deliver or send this questionnaire to the healthcare professional who will review it.

Yes    No

Has your employer told you how to contact the healthcare professional who will review this questionnaire?       

This questionnaire is used to gather information about your health and physical condition, both now and in the past. This information will be used to determine if you can safely perform the duties of your job. This exam is not intended to substitute for care provided by a personal physician. Results of the exam will be sent to your home address. The results of the examination are kept confidential.

I.    1.    Print the following information:

Last Name: _____		First Name: _____	
Home mailing address: _____			
(city)		(state)	(zip)
Social Security Number: _____		Date of Birth: _____	Age: _____
Sex	Position	Site Location	Date Employed
[ ] Male [ ] Female			
Home Phone ( )	Work Phone ( )	Emergency Contact/Phone # ( )	
What is the phone number at which you can be reached by the healthcare professional who reviews this questionnaire (include area code:) ( ) _____			
What is the best time to reach you? From: _____ AM/PM To: _____ AM/PM			
E-mail: _____			

2.    **Read and sign this Consent for Release of Medical Records:**

I hereby authorize **WORKCARE** to release in confidence to \_\_\_\_\_ (company) and/or its subsidiaries medical information, including but not limited to the results of medical evaluations, physical examinations or medical testing, as it specifically pertains to my medical qualification to perform the stated Job Duty consistent with the requirements of OSHA, MSHA.

I further authorize the examining physician and/or clinic to release to **WORKCARE™** any medical information related to my medical or physical condition. You have a right to receive a copy of this authorization.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

## Job Profile

### II THIS SECTION IS TO BE COMPLETED

If you have questions about the job, these need to be discussed with the employer.

**JOB DUTY / TITLE**    What is the main job duty (present or proposed) for this individual?  
(Example: Driller, Water Treatment, Ground Water Sampling, Engineer, Environmental Scientist, Lab Tech, Heavy Equipment Operator, Maintenance Worker, etc.)

\_\_\_\_\_

\_\_\_\_\_

**WORK SCHEDULE**    \_\_\_\_\_ % Field    \_\_\_\_\_ % Office    \_\_\_\_\_ % Travel

**PHYSICAL REQUIREMENTS**

Yes  No

Are there any specific physical demands of the job that are important? (example: lifting, carrying)  
If yes, please specify:

**PROTECTIVE EQUIPMENT**

Yes  No

Is clearance for the use of respiratory protective equipment needed?

Escape only (no rescue)  Emergency rescue only

Yes  No

Is there specific safety equipment (beyond hard hat, gloves, boots, and appropriate clothing) that are used in the safe performance on the job? If yes please specify:

**1. THIS EMPLOYEE USES THE FOLLOWING TYPES OF RESPIRATORY PROTECTIVE EQUIPMENT:**

✓		DURATION	FREQUENCY	TEMPERATURE EXTREMES	HUMIDITY
	HALF FACE PIECE AIR PURIFYING RESPIRATOR				
	FULL FACE PIECE AIR PURIFYING RESPIRATOR				
	POWERED AIR PURIFYING REPIRATOR				
	SELF-CONTAINED BREATHING APPARATUS				
	AIR LINE RESPIRATOR				

Yes  No

2. Is it possible that this individual will be required to wear Level A protection at any time? [SCBA, fully encapsulated suit, chemical resistant gloves & boots.]

3. Is it possible that this individual will be required to wear Level B protection at any time? [SCBA, chemical resistant clothing, chemical resistant gloves & boots.]

4. List potential chemical exposures

5. Will you be working under hot conditions (temperatures exceeding 77°F)?  Yes  No  
 Will you be working under humid conditions?    
 Will you be working at high altitudes?    
 Describe the work you'll be doing while you're using your respirator(s): \_\_\_\_\_

6. Describe any special or hazardous conditions you might encounter when you're using your respirator(s) (For example, confined spaces, life-threatening gases): \_\_\_\_\_

7. During the period you are using the respirator(s), is your work effort:  
 a. Light (less than 200 kcal per hour) Yes  No  How long \_\_\_\_\_ hrs per shift  
 b. Moderate ( 200 to 359 kcal per hour) Yes  No  How long \_\_\_\_\_ hrs per shift  
 Examples: sitting while mailing or filing; driving a truck or transferring a moderate load (about 35 lbs) at trunk level; walking on a level surface about 2 mph  
 c. Heavy (above 350 kcal per hour) Yes  No  How long \_\_\_\_\_ hrs per shift  
 Examples: lifting a heavy load (about 50 lbs.) from the floor to your waist; working on a loading dock; shoveling; standing while bricklaying; climbing stairs with a heavy load (about 50 lbs.)

8. Describe any special responsibilities you'll have while using your respirator(s) that may affect the safety and well-being of other (e.g. rescue, security): \_\_\_\_\_

9. Are there any substances which you can not work with? List: \_\_\_\_\_

# REVIEW OF SYSTEMS

ANSWER YES IF YOU CURRENTLY HAVE THE SYMPTOM OR HAVE HAD SIGNIFICANTLY IN THE PAST

		YES	NO	DATE
1.	A. Fever			
	B. Chills			
	C. Weight Loss			
	D. Loss of energy/fatigue			
2.	A. Poor Vision			
	B. Color Blindness			
	C. Double vision			
	D. Injury to eye			
	E. Cataract			
	F. Glaucoma			
	G. Do you wear glasses or contacts?			
3.	A. Ear Infection			
	B. Mastoid surgery			
	C. Loss of hearing			
	D. Sore throat			
	E. Frequent hoarseness			
	F. Dental problems			
4.	A. Allergies			
	B. Sinus trouble			
	C. Hay fever			
5.	A. Tuberculosis			
	B. Asthma & breathing difficulties			
	C. Lung collapse			
	D. Pneumonia			
	E. Shortness of breath			
	F. Persistent or severe colds			
	G. Persistent or severe coughs			
	H. Chest surgery			
	I. Wheezing			
	J. Emphysema			
	K. Bronchitis			
6.	A. High blood pressure			
	B. Heart murmur			
	C. Enlarged heart			
	D. Heart disease/failure			
	E. Rheumatic fever			
	F. Heart palpitations			
	G. Irregular heart beat			
	H. Heart attack			
	I. Chest pain			
7.	A. Varicose veins			
	B. Stroke			
	C. Leg ulcers			
	D. Swelling of ankles			
	E. Leg pain on walking			
8.	A. Anemia			
	B. Leukemia			
	C. Sickle Cell Disease			
	D. Other blood disease			
9.	A. Diabetes			
	B. Thyroid problems			
	C. Cancer or tumors			
	D. Heart related illness			
10.	A. Rash/dermatitis			
	B. Bruise easily			
	C. Psoriasis			
	D. Wart/mole change			
	E. Eczema/Acne			

		YES	NO	DATE
11.	A. Headaches			
	B. Head injury			
	C. Neck injury			
12.	A. Birth defect			
	B. Frequent backaches			
	C. Back surgery			
	D. Disc disease			
	E. Back injury or strain			
	F. Back x-rays			
	G. Chiropractic treatments			
	H. Arthritis/Rheumatism			
	I. Knee problems			
	J. Swollen joints			
	K. Amputation			
	L. Broken Bones			
	Type:			
	M. Dislocations			
N. Carpal Tunnel Syndrome				
O. Repetitive Strain Extremities				
13.	A. Ulcers			
	B. Colitis			
	C. Diarrhea (frequent)			
	D. Stomach problems			
	E. Vomiting			
	F. Bloody bowel movements			
	G. Hepatitis/Abnormal liver enzymes			
	H. Cirrhosis			
	I. Yellow Jaundice			
	J. Gallbladder trouble			
14.	A. Epilepsy/seizures			
	B. Fainting spells			
	C. Loss of consciousness			
	D. Dizziness or vertigo			
	E. Frequent exhaustion			
	F. Trouble with nerves			
	G. Frequent worry/depression			
15.	A. Kidney trouble/stones			
	B. Bladder trouble			
	C. Kidney/bladder surgery			
	D. Blood in urine			
	E. Difficulty urinating			
16.	A. Venereal disease			
	B. Infertility/difficulty conceiving			
	C. Children with birth defects			
17.	A. Irregular period/painful menstruation			
	B. Hysterectomy			
	C. Are you pregnant?			
	D. Have you difficulty becoming pregnant?			
	E. Date of last menstrual period			
	F. Date of past pelvic/pap smear			
	G. Date of last mammogram			
	H. Breast lumps			
	I. Breast discharge			
	J. Repeated miscarriages			
18.	A. Inability to have an erection			
	B. Discharge or bleeding from the penis			
	C. Abnormal testicular self examination			
	D. Prostate problems			

Describe fully any "Yes" responses by number: \_\_\_\_\_

Are you currently unable to perform any type of activity? Yes  No  List: \_\_\_\_\_

**IV****SOCIAL HISTORY**

- YES NO
1. Do you now or in the past month smoke cigarettes?
2. Have you ever smoked cigarettes in the past?
3. If you now smoke or smoked in the past, how many years total have you smoked? (Write in number) \_\_\_\_\_
4. If you now smoke or have smoked in the past, how many packs per day do/did you smoke on the average? (Choose the closest number)
- Less than one-half(1/2)  One (1)  One and one-half(1 1/2)
- Two (2)  Two and one-half (2 1/2)  Three (3)
- More than three
5. Do you use any one of the following tobacco products?
- Pipe Tobacco  Cigars  Snuff  Smokeless Tobacco
6. Do you regularly drink alcoholic beverages?
7. If yes, how many drinks, beers or glasses of wine do you drink daily?
- Less than 1  1-2  3-4
- 5-6  7-8  More than 8
8. Do you have strenuous exercise for at least 45 min.?
- Daily  3 times a week  1 time a week
- Rarely  Never
9. Do you feel frustrated, stressed or uptight?
- Daily  3 times a week  1 time a week
- Rarely  Never
10. Do you eat greasy or fatty foods?
- Daily  3 times a week  1 time a week
- Rarely  Never
11. Do you use street drugs?  Yes  No

**V****PAST MEDICAL HISTORY***For Annual or Exit Exam - Indicate Change Since Last Exam*

1. Are you currently being treated for illness or injury?  Yes  No
2. Have you been treated for persistent illness or injury?  Yes  No
3. Describe fully any "Yes" responses. \_\_\_\_\_
- 
4. Please list HOSPITAL ADMISSIONS:  If none, check here
- | YEAR    | REASON FOR HOSPITALIZATION |
|---------|----------------------------|
| 19_____ | _____                      |
| 19_____ | _____                      |
| 19_____ | _____                      |
5. Please list allergies to any medication, food, clothing, bee stings or other substances: \_\_\_\_\_
6. How many days of work did you miss in the last 12 months due to your health? \_\_\_\_\_ YES NO
7. Have you ever pursued a compensation claim or received disability payment for occupational injury or disease?
- YES NO
8. Have you ever been turned down for life insurance?
9. Have you had injuries from an auto accident?

**VI****CURRENT MEDICINES**

When was the last year you received a tetanus immunization booster? \_\_\_\_\_ mo. / \_\_\_\_\_ day / \_\_\_\_\_ yr.

Do you currently have prescriptions for drugs  Yes  No Please specify: \_\_\_\_\_

Have you ever been addicted to or consistently used drugs?  Yes  No Please specify: \_\_\_\_\_

**Do you take any of the following medications on a daily basis.**

Heart Medicine	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Aspirin	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Thyroid medicine	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Blood pressure medicine	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Oral medicine for Diabetes	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Diuretic (Water pill)	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Insulin for diabetes	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Medicine for seizures	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Nerve or sleeping pills	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Allergy/Asthma medications	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Blood thinner	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Other: _____		

**VII****FAMILY HISTORY**

Father:  Living  List Diseases \_\_\_\_\_ If dead, cause of death \_\_\_\_\_

Mother:  Living  List Diseases \_\_\_\_\_ If dead, cause of death \_\_\_\_\_

Brothers:  Living  List Diseases \_\_\_\_\_ If dead, cause of death \_\_\_\_\_

Sisters:  Living  List Diseases \_\_\_\_\_ If dead, cause of death \_\_\_\_\_

Has any member of the family had any of the following:

Cancer	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Diabetes	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Nervousness	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Insanity	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Tuberculosis	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Rheumatism	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Kidney Disease	<input type="checkbox"/> Yes	<input type="checkbox"/> No	Heart Disease	<input type="checkbox"/> Yes	<input type="checkbox"/> No			

# FOR INITIAL EXAMS ONLY

THIS PAGE IS TO BE COMPLETED ONLY AS INITIAL OR PRE-JOB EXAMS

## VIII PAST JOB HISTORY

LIST ALL JOBS EVER HELD STARTING WITH YOUR FIRST - INCLUDE PART TIME AND VOLUNTEER WORK

NAME OF EMPLOYER	FROM MO/YR	TO MO/YR	# HRS WORKED PER WEEK/SHIFT	DESCRIPTION OF WORK	POTENTIAL HAZARDS (DUST, FUMES, CHEMICALS, HEAT, NOISE, PHYSICAL AGENTS, METALS, RADIATION)

## IX TOXIC EXPOSURE HISTORY

At work or at home have you ever been exposed to hazardous solvents, hazardous airborne chemicals (e.g. gases, fumes, dust) or have you come into skin contact with hazardous chemicals?

List \_\_\_\_\_

**Have you worked with any of the materials, or under any of the conditions, listed below:**

	YES	NO		YES	NO
Asbestos	<input type="checkbox"/>	<input type="checkbox"/>	Have you ever worked around <b>vibration</b> or with <b>vibrating tools</b> ?	<input type="checkbox"/>	<input type="checkbox"/>
Silica (e.g. sandblasting)	<input type="checkbox"/>	<input type="checkbox"/>			
Coal (e.g. mining)	<input type="checkbox"/>	<input type="checkbox"/>	Have you ever worked in a doctor's office, clinic or hospital where you might have had exposure to <b>biohazardous materials</b> ?	<input type="checkbox"/>	<input type="checkbox"/>
Grinding	<input type="checkbox"/>	<input type="checkbox"/>			
Welding	<input type="checkbox"/>	<input type="checkbox"/>	Have you ever performed a <b>site assesment</b> on any of the above industry groups or materials? List: _____	<input type="checkbox"/>	<input type="checkbox"/>
Aerosols	<input type="checkbox"/>	<input type="checkbox"/>			
Asphalt, pitch or tar	<input type="checkbox"/>	<input type="checkbox"/>	Any other hazardous exposures If "yes," describe these exposures: _____	<input type="checkbox"/>	<input type="checkbox"/>
Beryllium	<input type="checkbox"/>	<input type="checkbox"/>			
Cadmium	<input type="checkbox"/>	<input type="checkbox"/>	Have you ever lived near large industrial plants or areas of air pollution?	<input type="checkbox"/>	<input type="checkbox"/>
Cotton Dust	<input type="checkbox"/>	<input type="checkbox"/>			
Pesticides	<input type="checkbox"/>	<input type="checkbox"/>	Have you ever received hazardous duty or environmental pay?	<input type="checkbox"/>	<input type="checkbox"/>
Fuel Specify:	<input type="checkbox"/>	<input type="checkbox"/>			
Oils	<input type="checkbox"/>	<input type="checkbox"/>	Have you ever been in the military service?	<input type="checkbox"/>	<input type="checkbox"/>
Lead	<input type="checkbox"/>	<input type="checkbox"/>			
Nickel/Chrome	<input type="checkbox"/>	<input type="checkbox"/>	If "yes" were you exposed to biological or chemical agents (either in training or combat?)	<input type="checkbox"/>	<input type="checkbox"/>
Paint	<input type="checkbox"/>	<input type="checkbox"/>			
Microwave/Radio Frequency	<input type="checkbox"/>	<input type="checkbox"/>	Have you ever worked on a HAZMAT team?	<input type="checkbox"/>	<input type="checkbox"/>
Nuclear Radiation/X-Ray	<input type="checkbox"/>	<input type="checkbox"/>			
Fiberglass	<input type="checkbox"/>	<input type="checkbox"/>	List any second jobs or side businesses you have: _____ _____		
Plastics	<input type="checkbox"/>	<input type="checkbox"/>			
Solvents	<input type="checkbox"/>	<input type="checkbox"/>	List your current and previous hobbies: _____ _____		
Compressed Gases	<input type="checkbox"/>	<input type="checkbox"/>			
Aluminum	<input type="checkbox"/>	<input type="checkbox"/>			
Iron	<input type="checkbox"/>	<input type="checkbox"/>			
Tin	<input type="checkbox"/>	<input type="checkbox"/>			
Dusty Environments	<input type="checkbox"/>	<input type="checkbox"/>			
Have you ever worked around excessive <b>noise</b> ? Where? _____	<input type="checkbox"/>	<input type="checkbox"/>			
Have you ever worked in an excessively <b>hot or cold environment</b> ? Where? _____	<input type="checkbox"/>	<input type="checkbox"/>			

# RESPIRATOR USERS ONLY

THE FOLLOWING 2 PAGES ONLY NEED TO BE COMPLETED BY THOSE ASSIGNED TO USE REPIRATORS.  
IF UNCERTAIN ABOUT RESPIRATOR USE, PLEASE COMPLETE

## RESPIRATOR USE

- |   | YES                      | NO                       |
|---|--------------------------|--------------------------|
| 1. Have you <u>ever</u> worn a respirator in the past?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. What type of respirator <u>did you wear</u> ?<br>(mark all that apply)<br>If no go to question 4 |                          |                          |
| <input type="checkbox"/> Disposable particulate filter mask<br>(non-cartridge dust mask)            |                          |                          |
| <input type="checkbox"/> Half face cartridge respirator   |                          |                          |
| <input type="checkbox"/> Full face cartridge respirator   |                          |                          |
| <input type="checkbox"/> Powered air purifying respirator   |                          |                          |
| <input type="checkbox"/> Supplied air (airline) respirator  |                          |                          |
| <input type="checkbox"/> Self contained breathing apparatus (SCBA)                                  |                          |                          |
| <input type="checkbox"/> Escape only respirator   |                          |                          |
| 3. If you've <u>ever</u> used a respirator, have you <u>ever</u> had any of the following problems? |                          |                          |
| Eye irritation  | <input type="checkbox"/> | <input type="checkbox"/> |
| Skin allergies or rashes  | <input type="checkbox"/> | <input type="checkbox"/> |
| Anxiety   | <input type="checkbox"/> | <input type="checkbox"/> |
| General weakness or fatigue   | <input type="checkbox"/> | <input type="checkbox"/> |
| Any other problem or difficulty that interfered with your use of a respirator                       | <input type="checkbox"/> | <input type="checkbox"/> |
| _____   |                          |                          |
| _____   |                          |                          |

## HEART, LUNGS, AND OTHER BODY SYSTEMS (CONT.)

- |  | YES                      | NO                       |
|--|--------------------------|--------------------------|
| 4. Have you <u>ever</u> had an abnormal EKG (Electrocardiogram)<br>Explain:<br>_____   | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Have you <u>ever</u> had any of the following cardiovascular or heart problems?   |                          |                          |
| Heart attack   | <input type="checkbox"/> | <input type="checkbox"/> |
| Stroke   | <input type="checkbox"/> | <input type="checkbox"/> |
| Angina (chest pain)  | <input type="checkbox"/> | <input type="checkbox"/> |
| Heart failure  | <input type="checkbox"/> | <input type="checkbox"/> |
| High blood pressure  | <input type="checkbox"/> | <input type="checkbox"/> |
| Swelling in your legs or feet (not caused by standing or walking)  | <input type="checkbox"/> | <input type="checkbox"/> |
| Heart arrhythmia   | <input type="checkbox"/> | <input type="checkbox"/> |
| Any other heart problem that you have been told about  | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Have you <u>ever</u> had surgery of the arteries, coronary bypass or angioplasty (to correct blocked artery or aneurysm)?(mark only 1 answer) |                          |                          |
| Yes, within the past year  | <input type="checkbox"/> | <input type="checkbox"/> |
| Yes, more than 1 year ago  | <input type="checkbox"/> | <input type="checkbox"/> |
| No   | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Have you ever had any of the following pulmonary or lung problems?  |                          |                          |
| Asbestosis   | <input type="checkbox"/> | <input type="checkbox"/> |

## HEART, LUNGS, AND OTHER BODY SYSTEMS (CONT.)

- |  | YES                      | NO                       |
|--|--------------------------|--------------------------|
| Asthma   | <input type="checkbox"/> | <input type="checkbox"/> |
| Chronic bronchitis   | <input type="checkbox"/> | <input type="checkbox"/> |
| Emphysema  | <input type="checkbox"/> | <input type="checkbox"/> |
| Pneumonia  | <input type="checkbox"/> | <input type="checkbox"/> |
| Tuberculosis   | <input type="checkbox"/> | <input type="checkbox"/> |
| Silicosis  | <input type="checkbox"/> | <input type="checkbox"/> |
| Lung cancer  | <input type="checkbox"/> | <input type="checkbox"/> |
| Broken ribs  | <input type="checkbox"/> | <input type="checkbox"/> |
| Pneumothorax (collapsed lung)  | <input type="checkbox"/> | <input type="checkbox"/> |
| Any chest injuries or surgeries  | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Have you <u>ever</u> had seizures (fits)?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Have you <u>ever</u> been told you had diabetes (sugar disease)?                                  | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Have you <u>ever</u> had allergic reactions that interfere with your breathing?                  | <input type="checkbox"/> | <input type="checkbox"/> |
| 11. Have you <u>ever</u> experienced claustrophobia (fear of closed-in places)?                      | <input type="checkbox"/> | <input type="checkbox"/> |
| 12. Have you <u>ever</u> had trouble smelling odors?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 13. Have you <u>ever</u> had any of the following pulmonary, cardiovascular, lung or heart symptoms? |                          |                          |
| Shortness of breath  | <input type="checkbox"/> | <input type="checkbox"/> |
| Shortness of breath when walking fast on level ground or walking up a slight hill or incline         | <input type="checkbox"/> | <input type="checkbox"/> |
| Shortness of breath when walking with other people at an ordinary pace on level ground               | <input type="checkbox"/> | <input type="checkbox"/> |
| Have to stop for breath when walking at your own pace on level ground                                | <input type="checkbox"/> | <input type="checkbox"/> |
| Shortness of breath when washing or dressing yourself  | <input type="checkbox"/> | <input type="checkbox"/> |
| Shortness of breath that interferes with your job  | <input type="checkbox"/> | <input type="checkbox"/> |
| 14. Do you <u>currently</u> take medication for any of the following problems?                       |                          |                          |
| Breathing  | <input type="checkbox"/> | <input type="checkbox"/> |
| Heart trouble  | <input type="checkbox"/> | <input type="checkbox"/> |
| Blood pressure   | <input type="checkbox"/> | <input type="checkbox"/> |
| Seizure (fits)   | <input type="checkbox"/> | <input type="checkbox"/> |
| 15. Have you within the <u>past</u> had any of the the following symptoms of lung illness?           |                          |                          |
| Coughing that produces phlegm (thick sputum)   | <input type="checkbox"/> | <input type="checkbox"/> |

**HEART, LUNGS, AND OTHER  
BODY SYSTEMS (CONT.)**

- |  | YES                      | NO                       |
|--|--------------------------|--------------------------|
| Coughing that occurs mostly when you are lying down                                | <input type="checkbox"/> | <input type="checkbox"/> |
| Coughing up blood in the last month  | <input type="checkbox"/> | <input type="checkbox"/> |
| Wheezing   | <input type="checkbox"/> | <input type="checkbox"/> |
| Wheezing that interferes with your job   | <input type="checkbox"/> | <input type="checkbox"/> |
| Chest pain when you breath deeply  | <input type="checkbox"/> | <input type="checkbox"/> |
| Coughing that wakes you early in the morning                                       | <input type="checkbox"/> | <input type="checkbox"/> |
| Any other symtoms that you think may be related to lung problems                   | <input type="checkbox"/> | <input type="checkbox"/> |
| 16. Have you ever had any of the following cardiovascular or heart symtoms?        |                          |                          |
| Frequent pain or tightness in your chest   | <input type="checkbox"/> | <input type="checkbox"/> |
| Pain or tightness in your chest during physical activity                           | <input type="checkbox"/> | <input type="checkbox"/> |
| Pain or tightness in your chest that interferes with your job                      | <input type="checkbox"/> | <input type="checkbox"/> |
| In the past two years, have you noticed your heart skipping or missing a beat?     | <input type="checkbox"/> | <input type="checkbox"/> |
| Heartburn or indigestion that is not related to eating                             | <input type="checkbox"/> | <input type="checkbox"/> |
| Any other symtoms that you think might be related to heart or circulation problems | <input type="checkbox"/> | <input type="checkbox"/> |

**FULL FACE OR SCBA  
REPIRATOR USER ONLY**

The following questions must be answered by every employee who has been selected to use either a full-face piece respirator or Air Supply Respirator (Self-Contained Breathing Apparatus [SCBA] or air line).

- |  | YES                      | NO                       |
|--|--------------------------|--------------------------|
| 17. Have you <u>ever</u> lost vision in either eye (temporarily or permanently)? | <input type="checkbox"/> | <input type="checkbox"/> |
| 18. Do you <u>currently</u> have any of the following vision problems?           |                          |                          |
| Wear contact lenses  | <input type="checkbox"/> | <input type="checkbox"/> |
| Wear glasses   | <input type="checkbox"/> | <input type="checkbox"/> |
| Color blind  | <input type="checkbox"/> | <input type="checkbox"/> |
| Any other eye or vision problem  | <input type="checkbox"/> | <input type="checkbox"/> |

**FULL FACE OR SCBA  
REPIRATOR USER ONLY (CONT.)**

- |  | YES                      | NO                       |
|--|--------------------------|--------------------------|
| 19. Have you <u>ever</u> had an injury to your ears, including a broken ear drum?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 20. Do you <u>currently</u> have any of the following hearing problems?            |                          |                          |
| Difficulty hearing   | <input type="checkbox"/> | <input type="checkbox"/> |
| Wear a hearing aid   | <input type="checkbox"/> | <input type="checkbox"/> |
| Any other hearing or ear problem   | <input type="checkbox"/> | <input type="checkbox"/> |
| Explain: _____   |                          |                          |
| _____  |                          |                          |
| _____  |                          |                          |
| _____  |                          |                          |
| 21. Have you <u>ever</u> had a back injury?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 22. Do you <u>currently</u> have any of the following muscle or skeletal problems? |                          |                          |
| Weakness in any of your arms, hands, legs or feet                                  | <input type="checkbox"/> | <input type="checkbox"/> |
| Back pain  | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty fully moving your arms and legs   | <input type="checkbox"/> | <input type="checkbox"/> |
| Pain or stiffness when you lean forward or backward at the waist                   | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty fully moving your head up and down                                      | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty fully moving your head side to side                                     | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty bending at your knees   | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty squatting to the ground   | <input type="checkbox"/> | <input type="checkbox"/> |
| Difficulty climbing a flight of stairs or a ladder carrying more than 25 lbs.      | <input type="checkbox"/> | <input type="checkbox"/> |
| Any other muscle or skeletal problems that might interfere with using a respirator | <input type="checkbox"/> | <input type="checkbox"/> |
| Explain: _____   |                          |                          |
| _____  |                          |                          |
| _____  |                          |                          |
| _____  |                          |                          |

**FOR YEARLY/EXIT EXAMINATIONS ONLY**

1. a. Approximately how many days of hazardous field work have you performed since your last examination? \_\_\_\_\_  
 b. Approximately how many days in Level C (using an air-purifying respirator)? \_\_\_\_\_  
 c. Approximately how many days in Level B (self-contained breathing apparatus or air line)? \_\_\_\_\_
2. Approximately how many different hazardous material sites have you worked on since your last examination? \_\_\_\_\_
3. What were the chemical or other hazards of concern to which you have potential exposure since your last examination? (e.g. gasoline, arsenic, trichlorethylene, radiation, asbestos) \_\_\_\_\_

Chemicals of Concern	Approximate # of Days	Exposure Frequency			Exposure Duration		
		Daily	Weekly	Monthly	<1 Hr.	1-8 Hr.	>8 Hrs.

4. **Since your last exam**, have you had difficulty doing your job, because of:
- |   |            |           |                   |
|---|------------|-----------|-------------------|
| a. Sensitivity to chemicals, dust, sunlight, etc.? (circle one) | <b>Yes</b> | <b>No</b> | <b>Don't Know</b> |
| b. Inability to perform certain motions? (circle one)           | <b>Yes</b> | <b>No</b> | <b>Don't Know</b> |
| c. Inability to assume certain positions? (circle one)          | <b>Yes</b> | <b>No</b> | <b>Don't Know</b> |
| d. Heat Stress? (circle one)                                    | <b>Yes</b> | <b>No</b> | <b>Don't Know</b> |
| e. Other medical reasons? (circle one)                          | <b>Yes</b> | <b>No</b> | <b>Don't Know</b> |
5. Have you experienced any health symptoms that may be related to exposures to hazardous materials since you last examination? If so, please describe:  
 \_\_\_\_\_  
 \_\_\_\_\_

6. **Since your last examination**, have you had any type of illness that resulted in more than 3 consecutive days lost time from work? Yes  No  List: \_\_\_\_\_

7. Do you feel that you have and/or had exposure to ticks?  No  Yes When \_\_\_\_\_  
 If "Yes", how would you quantify your potential exposure?  
 Very significant  Significant  Insignificant  None  Unknown  
 Have you ever had any symptoms or signs (e.g. rash) which you attribute to tick bites?  No  Yes  
 If "Yes", please describe:  
 \_\_\_\_\_  
 \_\_\_\_\_

8. a. How would you rate the effectiveness of the health and safety procedures used for work?  
 Check One  Poor  Fair  Good  Excellent

b. Comments: \_\_\_\_\_

- |   |  |
|---|--|
| <p>9. Have you ever had an illness, condition or symptom which:</p> <p>Occurred only during work? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Occurred only after work, in evening? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Occurred when you begin work after a weekend or holiday? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>Disappeared during vacations or weekends? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> | <p>10. Have you ever developed illness or symptoms which you think were related to you work? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>11. Have you ever worked with a substance which made your nose, chest, or sinuses congested? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> <p>12. Have you ever worked with substances that irritated your skin or caused a rash? <input type="checkbox"/> YES <input type="checkbox"/> NO</p> |
|---|--|

13. Would you like to talk to the healthcare professional who will review this questionnaire about your answers to this questionnaire?  YES  NO

**STOP!: PHYSICIANS COMPLETE THE REMAINING SECTIONS.**

# PHYSICAL EXAMINATION AND SUPPORTING STUDIES

(Please initial on Authorization Form when completed)

**HEIGHT**

\_\_\_\_\_ inches

**WEIGHT**

\_\_\_\_\_ lbs.

**TEMP.**

\_\_\_\_\_ °F

**BLOOD PRESSURE**

\_\_\_\_\_ / \_\_\_\_\_

**PULSE** (Resting)

\_\_\_\_\_ /min.

For D.O.T. only:

Pulse immediately after 2/min. exercise: \_\_\_\_\_

**VISION**

Visual acuity (if applicant wears glasses, test and record both with and without glasses.)

**NEAR**

Left

Right

Both

Corrected

20/ \_\_\_\_\_

20/ \_\_\_\_\_

20/ \_\_\_\_\_

Uncorrected

20/ \_\_\_\_\_

20/ \_\_\_\_\_

20/ \_\_\_\_\_

**FAR**

Left

Right

Both

Corrected

20/ \_\_\_\_\_

20/ \_\_\_\_\_

20/ \_\_\_\_\_

Uncorrected

20/ \_\_\_\_\_

20/ \_\_\_\_\_

20/ \_\_\_\_\_

**COLOR VISION**

Normal

Abnormal

Can recognize Red & Green

**PERIPHERAL VISION**

Normal

Abnormal

**URINALYSIS**

Specified Gravity \_\_\_\_\_ Albumin \_\_\_\_\_ Female: LMP \_\_\_\_\_

Sugar \_\_\_\_\_ Blood \_\_\_\_\_

**AUDIOGRAM** (If marked YES on Exam Checklist):

	500	1000	2000	3000	4000	6000	8000
Right	_____	_____	_____	_____	_____	_____	_____
Left	_____	_____	_____	_____	_____	_____	_____

Note: Testing documentation must be forwarded to WorkCare

**SPIROMETRY** (If marked YES on Exam Checklist):

FVC \_\_\_\_\_ Observed Vol.      FEV<sub>1</sub> \_\_\_\_\_ Observed Vol.      FEV<sub>1</sub> \_\_\_\_\_ %  
 FVC \_\_\_\_\_ Predicted % \_\_\_\_\_      FEV<sub>1</sub> \_\_\_\_\_ Predicted % \_\_\_\_\_      FVC

Note: Testing documentation must be forwarded to WorkCare

**EKG** (If marked YES on Exam Checklist):

Normal       Abnormal

Note: All EKG strips must be forwarded to WorkCare

**CHEST X-RAY** (If marked YES on Exam Checklist):

Normal       Abnormal

Comments: \_\_\_\_\_

## SPECIMEN COLLECTION PER EXAM CHECKLIST

All laboratory specimens must be shipped by the day of the exam! If this is a Friday exam, mark Airbill for Saturday delivery. Exam data should be included for shipment in the box with the laboratory specimens.

## MEDICAL EXAMINATION

CHECK LIST	NORMAL	ABNORMAL	DETAILED DESCRIPTION OF ABNORMAL FINDINGS
HANDS/SKIN HAIR SKIN COLOR/TEXTURE NAILS	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
HEAD/EYES/EARS/NOSE/THROAT/MOUTH CONFIGURATION LIDS/CONJ/SCLERA PUPILS/FUNDI/EOM PINNA/CANALS/TM NASAL SEPTUM/MUCOSA TEETH/GUMS/TONGUE/PALATE	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
NERVOUS SYSTEM CENTRAL MOTOR SENSORY CEREBELLAR REFLEXES	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
NECK/NODES BRUIT ROM MUSCLE STRENGTH THYROID CERVICAL NODES INGUINAL/AXILLARY NODES	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
CHEST/LUNGS SHAPES/SYMMETRY DIAPHRAGMATIC EXCURSION PERCUSSION AUSCULTATION	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
CARDIOVASCULAR CAROTIDS NECK VEINS/PULSES HEART SOUNDS (MURMURS) HEART SIZE	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
GASTRO/INTESTINAL LIVER SPLEEN MASSES TENDERNESS SCARS HERNIA	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
MUSCULOSKELETAL/EXTREMITIES SPINAL ALIGNMENT EXTREMITIES (EDEMA, VARICOSITIES) JOINTS ROM	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>	
COMMENTS:			
EXAMINING PHYSICIAN (PRINT)	PHYSICIAN SIGNATURE		DATE

**SUMMARY OF FINDINGS AND COMMENTS RELEVANT TO ABNORMAL CONDITIONS**

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Signature of Licensed Examining Physician: \_\_\_\_\_

Printed Name: \_\_\_\_\_

Phone: ( \_\_\_\_\_ ) \_\_\_\_\_

**INSTRUCTION FOR PHYSICIAN/CLINICIAN**

1. The results of the required testing should be recorded on page 10.
2. Please be sure to note EKG and chest x-ray readings on NORMAL or ABNORMAL on page 10 if **required for this exam.**
3. Please review any YES answers ONLY for questions on pages 4, 5, 7, 8 and 9 of this booklet.  
You are not required to review the other history questions.
4. Your physical examination findings should be recorded on page 11.
5. The booklet and any specimens must be shipped to our laboratory **THE DAY OF THE EXAM.**

**QUESTIONS? CALL *WORKCARE* 1-800-455-6155**



**WORKCARE™**

Transforming Occupational Health

**1-(800) 455-6155**

**ATTACHMENT 2**  
**HEALTH STATUS MEDICAL REPORT**

# HEALTH STATUS MEDICAL REPORT

Employer Copy

TYPE OF EXAMINATION: Baseline Examination

EMPLOYEE:	SAMPLE, EMPLOYEE	COMPANY:	AMEC Earth & Environmental, Inc
SSN:	000-00-0000	POSITION:	Project Manager
DATE OF EXAM:	04/01/2002	LOCATION:	AMEC-San Diego
EXPIRATION DATE:	04/01/2003	SITE:	

The following recommendations are based on a review of one or all of the following: a base history questionnaire, supporting diagnostic tests, physical examination, and the essential functions of the position applied for or occupied by the individual named above.

	<u>Yes</u>	<u>No</u>	<u>Undecided</u>
Has the employee any detected medical conditions that would increase his/her risk of material health impairment from occupational exposure in accordance with 29 CFR §1910.120?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Does the employee have any limitations in the use of respirators in accordance with 29 CFR §1910.134?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>

## STATUS

- QUALIFIED** The examination indicates no significant medical condition. Employee can be assigned any work consistent with skills and training.
- QUALIFIED - WITH LIMITATIONS** The examination indicates that a medical condition currently exists that limits work assignments on the following basis:
- NOT QUALIFIED**
- DEFERRED** The examination indicated that additional information is necessary. The employee has been given the following instructions.

## COMMENTS:

I have reviewed the medical data of the above named employee, and informed the employee of the results of the medical examination and any medical conditions that require follow-up examination or treatment.

Name of Physician: Peter P. Greaney, MD / Peter H. Wald, MD Date: 04/03/02

Signature: \_\_\_\_\_

**ATTACHMENT 3**

**RESPIRATOR ISSUANCE AND TRAINING RECORD**

Respirator Issuance and Training Record



Date: \_\_\_\_\_

EMPLOYEE NAME: \_\_\_\_\_

EMPLOYEE TITLE: \_\_\_\_\_

MEDICAL QUESTIONNAIRE COMPLETE: Yes  No  Date: \_\_\_\_\_

None  Beard  Glasses  Dentures

Other - Explain \_\_\_\_\_

RESPIRATOR (specific make, model, style, and size): \_\_\_\_\_

CARTRIDGES/  
FILTERS:

- Organic Vapor
- Organic Vapors / Acid Gas
- Acid Gas
- Ammonia
- N100
- R100
- P100
- HEPA
- Combination (\_\_\_\_\_)
- Optional Prefilters

FITTING:

- Satisfactory Positive Pressure Fit-Check
- Satisfactory Negative Pressure Fit-Check
- Satisfactory QLFT (Isoamyl Acetate)
- Satisfactory QLFT (Irritant Smoke)
- Satisfactory QNFT (Portacount, attach results)

MAINTENANCE:

- Individual Daily Cleaning
- Disposal
- Storage

TRAINING:

- At Time of Issuance
- Annual Classroom Training \_\_\_\_\_

EMPLOYEE SIGNATURE : \_\_\_\_\_ DATE: \_\_\_\_\_

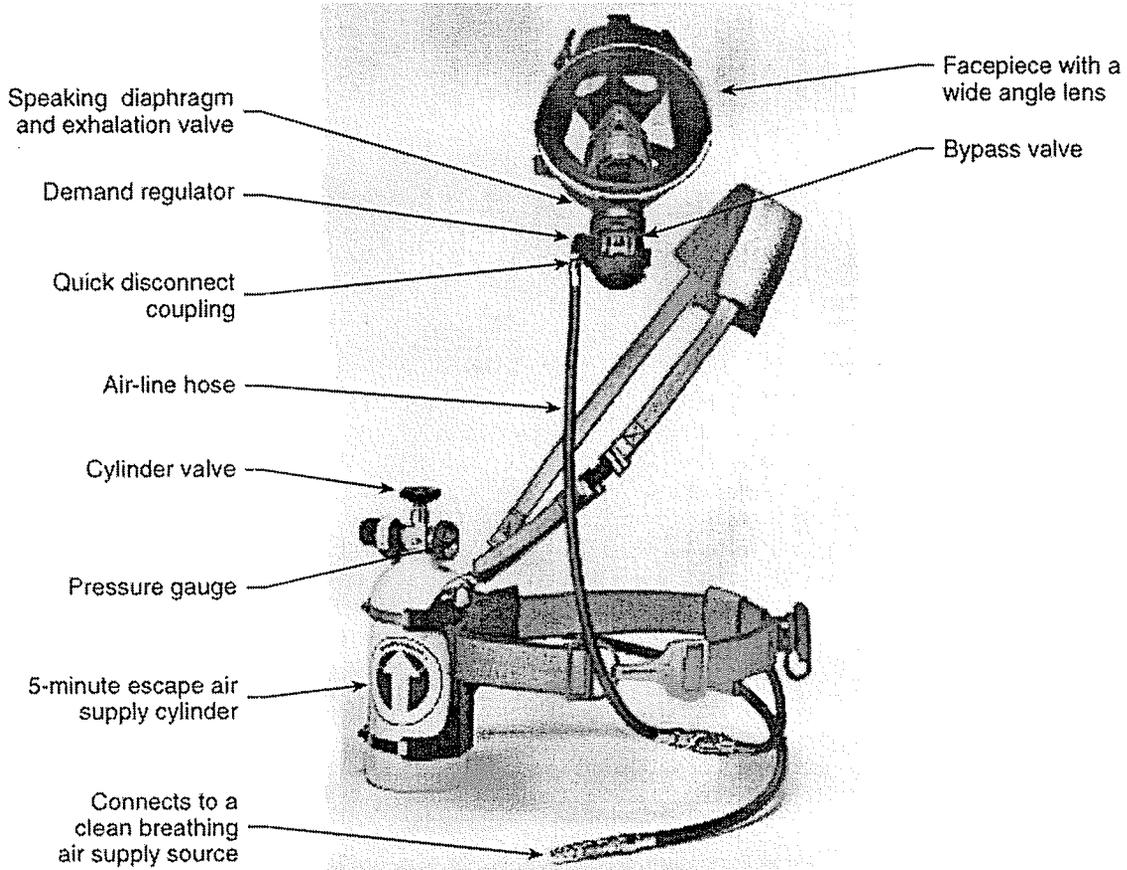
ISSUER SIGNATURE : \_\_\_\_\_ DATE: \_\_\_\_\_

## **ATTACHMENT 4**

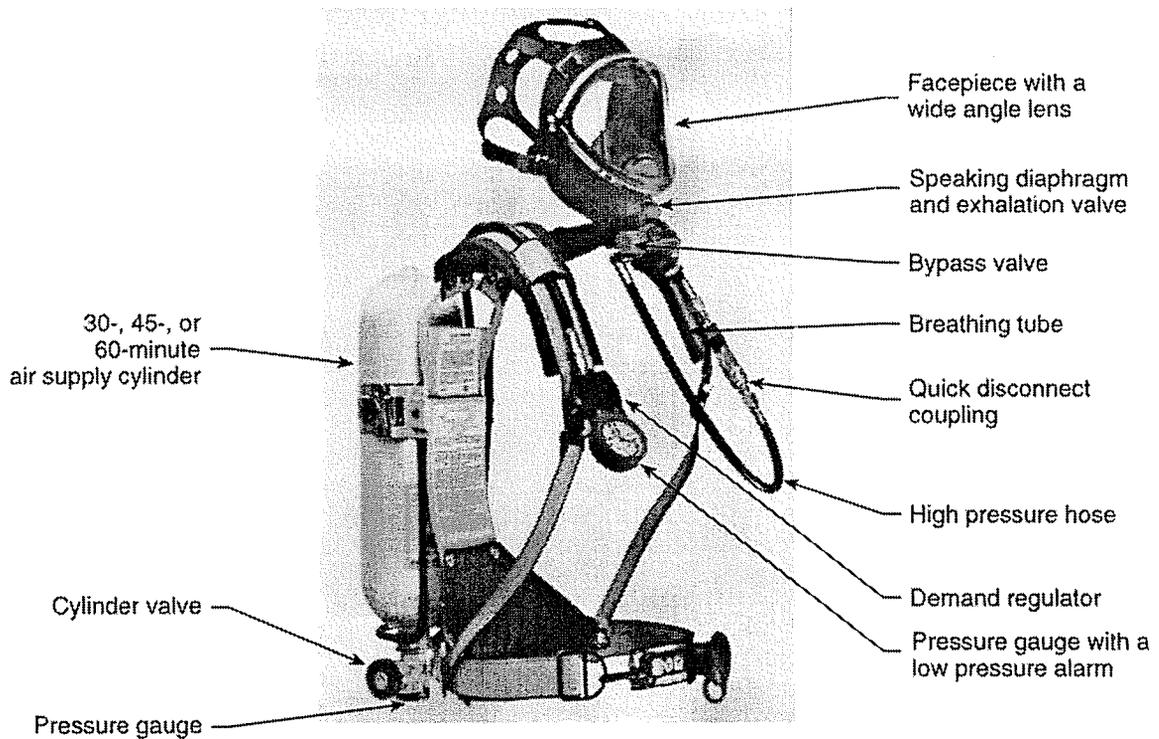
### **ATMOSPHERE SUPPLYING RESPIRATORY PROTECTION EQUIPMENT**

- **AIRLINE RESPIRATOR**
- **SCBA**

### Airline Respirator with Escape Cylinder\*



### Self-Contained Breathing Apparatus\*



**ATTACHMENT 5**

**RELATIVE ADVANTAGES AND DISADVANTAGES OF  
RESPIRATORY PROTECTIVE EQUIPMENT**

**RELATIVE ADVANTAGES AND DISADVANTAGES OF  
RESPIRATORY PROTECTIVE EQUIPMENT**

TYPE OF RESPIRATOR	ADVANTAGES	DISADVANTAGES
SELF-CONTAINED BREATHING APPARATUS (SCBA)	<ul style="list-style-type: none"> <li>• Operated in positive-pressure mode, provides the highest available level of protection against most airborne contaminants.</li> <li>• Enhanced mobility.</li> </ul>	<ul style="list-style-type: none"> <li>• Bulky, heavy (up to 35 pounds).</li> <li>• Finite air supply limits work duration.</li> <li>• Less suitable for strenuous work or work in confined spaces.</li> </ul>
AIR-LINE RESPIRATOR (ALR)	<ul style="list-style-type: none"> <li>• Enables longer work periods than a SCBA.</li> <li>• Less bulky and heavy than a SCBA. ALR equipment weighs less than 5 pounds (or around 15 pounds if escape protection is included).</li> <li>• Protects against most airborne contaminants.</li> </ul>	<ul style="list-style-type: none"> <li>• Not approved for use in atmospheres immediately dangerous to life or health unless equipped with an emergency egress unit such as a bailout bottle. Should be supplemented with a device such as an escape-only SCBA, that can provide immediate emergency respiratory protection in case of air line failure.</li> <li>• Impaired mobility. NIOSH limits the length of the supply air hose to 300 ft; auxiliary piping may extend this distance provided no decrease in air pressure occurs within the auxiliary piping.</li> <li>• Air supply hose is vulnerable to damage, chemical contamination, and degradation. Decontamination of hoses may be difficult.</li> <li>• Worker must retrace steps to leave work area.</li> <li>• Requires supervision/monitoring of the air supply line.</li> </ul>

AIR-PURIFYING  
RESPIRATOR (APR)

- Enhanced mobility.
  - Lighter in weight than a SCBA. Generally weighs 2 pounds or less.
  - Less expensive than a SCBA or ALR.
  - Cannot be used in IDLH or oxygen-deficient (less than 19.5 percent oxygen) atmospheres.
  - Limited duration of protection. May be hard to gauge safe operating time under field conditions.
  - Only protects against specific chemicals and up to specific concentrations.
  - Use requires continuous monitoring of contaminant and O<sub>2</sub> levels.
  - Shall only be used against organic vapors with adequate warning properties (taste, odor, irritation, etc.)
-

**ATTACHMENT 6**

**HAZARD ASSESSMENT AND PPE SELECTION FORM**

# Hazard Assessment and PPE Selection



Task: \_\_\_\_\_

Department: \_\_\_\_\_

## HAZARDS IDENTIFIED: Seriousness of Injury?

Impact (Explain): \_\_\_\_\_  
None  Lo  Med  Hi

Penetration: \_\_\_\_\_  
None  Lo  Med  Hi

Compression: \_\_\_\_\_  
None  Lo  Med  Hi

Chemical: \_\_\_\_\_  
None  Lo  Med  Hi

Heat, Hot Surfaces: \_\_\_\_\_  
None  Lo  Med  Hi

Harmful Dust: \_\_\_\_\_  
None  Lo  Med  Hi

Light Radiation: \_\_\_\_\_  
None  Lo  Med  Hi

Falling Objects: \_\_\_\_\_  
None  Lo  Med  Hi

Sharp Objects: \_\_\_\_\_  
None  Lo  Med  Hi

Rolling or Pinching Objects: \_\_\_\_\_  
None  Lo  Med  Hi

Electrical Hazards: \_\_\_\_\_  
None  Lo  Med  Hi

Ergonomic/Lifting: \_\_\_\_\_  
None  Lo  Med  Hi

Other: \_\_\_\_\_  
None  Lo  Med  Hi

Can the task be modified to reduce/eliminate the hazard? Yes \_\_\_ No \_\_\_ If yes, how? \_\_\_\_\_

## MSDS PPE RECOMMENDATIONS:

Gloves, Type: \_\_\_\_\_

Safety-toe Boots

Boot Covers

Hard Hats

Other \_\_\_\_\_

Coveralls, Type: \_\_\_\_\_

Apron

Safety Glasses, Goggles, or Faceshield  
Type: \_\_\_\_\_

Respirator  
Type: \_\_\_\_\_

## PPE REQUIRED FOR THE TASK:

Gloves, Type: \_\_\_\_\_

Safety-toe Boots

Boot Covers

Hard Hats

Other \_\_\_\_\_

Coveralls, Type: \_\_\_\_\_

Apron

Safety Glasses, Goggles, or Faceshield  
Type: \_\_\_\_\_

Respirator  
Type: \_\_\_\_\_

Training Required for Task: \_\_\_\_\_

POST THIS FORM IN THE WORK AREA WHERE THE TASK IS ROUTINELY PERFORMED.

**ATTACHMENT 7**  
**AVAILABLE EQUIPMENT**

## AVAILABLE EQUIPMENT

Equipment	Suggested Brands	Uses
<b>Air-purifying Respirators (APRs)</b>		
<b>Disposable Particulate Respirators</b>		
N-Series	3M, Moldex, or equivalent	Approved for protection against nuisance dusts in a non-oil aerosol environment.
R-Series	3M, Moldex, or equivalent	Approved for protection against nuisance-level acid gases. The 95 efficiency level is not to be used in environments where concentrations exceed OSHA PEL. May be used for nuisance dusts in a non-oil or oil aerosol environment.
P-Series	3M, Moldex, or equivalent	Approved for protection against nuisance-levels of organic vapors and acid gases. The 95 efficiency level is not to be used in environments where concentrations exceed OSHA PEL. May be used for nuisance dusts in a non-oil or oil aerosol environment.
Silicone half-face dual cartridge	Willson, MSA, 3M, or equivalent	Suitable for use with chemical cartridges and particulate filters.
<b>Chemical Cartridges for APRs</b>		
Organic vapor BLACK	Willson, MSA, 3M, or equivalent	Approved for protection against not more than 1000 ppm organic vapors.
Acid gas WHITE	Willson, MSA, 3M, or equivalent	Approved for protection against not more than 10 ppm chlorine, 50 ppm hydrogen chloride, or 50 ppm sulfur dioxide.
Organic vapor/acid gases YELLOW	Willson, MSA, 3M, or equivalent	Approved for protection against not more than 1000 ppm organic vapors, 10 ppm chlorine, 50 ppm hydrogen chloride, or 50 ppm sulfur dioxide.
Ammonia/methylamine GREEN	Willson, MSA, 3M, or equivalent	Approved for protection against not more than 300 ppm ammonia and 100 ppm methylamine.

## AVAILABLE EQUIPMENT (Continued)

Equipment	Suggested Brands	Uses
Filters for APRs		
N-Series filter	Willson, MSA, 3M, or equivalent	Approved for protection against only non-oil containing solid and water based aerosols. If a vapor hazard exists, use an organic vapor cartridge with an N-series filter.
R-Series filter	Willson, MSA, 3M, or equivalent	Approved for protection against oil based aerosols such as lubricants, cutting fluids, and glycols. This filter is also approved for use against non-oil containing solid and water-based aerosols. If used with oil-containing aerosols, the filter should be used for only one 8-hour shift.
P-Series filter	Willson, MSA, 3M, or equivalent	Approved for protection against oil based aerosols. This filter is also approved for use against non-oil containing solid and water-based aerosols. If used with oil-containing aerosols, follow manufacturer's recommendations for time-use limitations.
N100 R100 P100 filters (HEPA)	Willson, MSA, 3M, or equivalent	Approved for protection against asbestos, lead, and very toxic contaminants such as cadmium. The P100 filter will be color coded magenta. All 100 efficiency level filters are equivalent to the HEPA filter.
All filter series categories	Willson, MSA, 3M, or equivalent	Approved for protection against tuberculosis (TB).
Atmosphere Supplying Respirators		
Self-contained breathing apparatus	Scott Air-Pak Survivair Mark II	Emergency response situations or in hazardous waste handling situations requiring Level A or B respiratory protection.
Escape packs	Lifeair 5	Emergency egress only.

**ATTACHMENT 8**

**42 CFR 84 FILTER CLASSIFICATION TABLE  
AND SELECTION CHART**

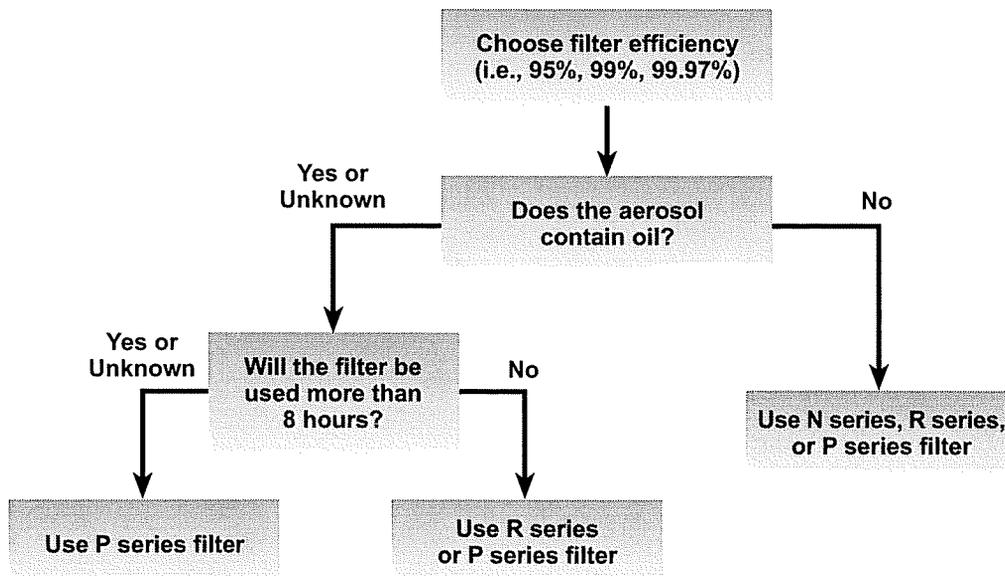
## 42 CFR 84 Filter Classification Table and Selection Chart

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FILTER CLASSIFICATION TABLE \*

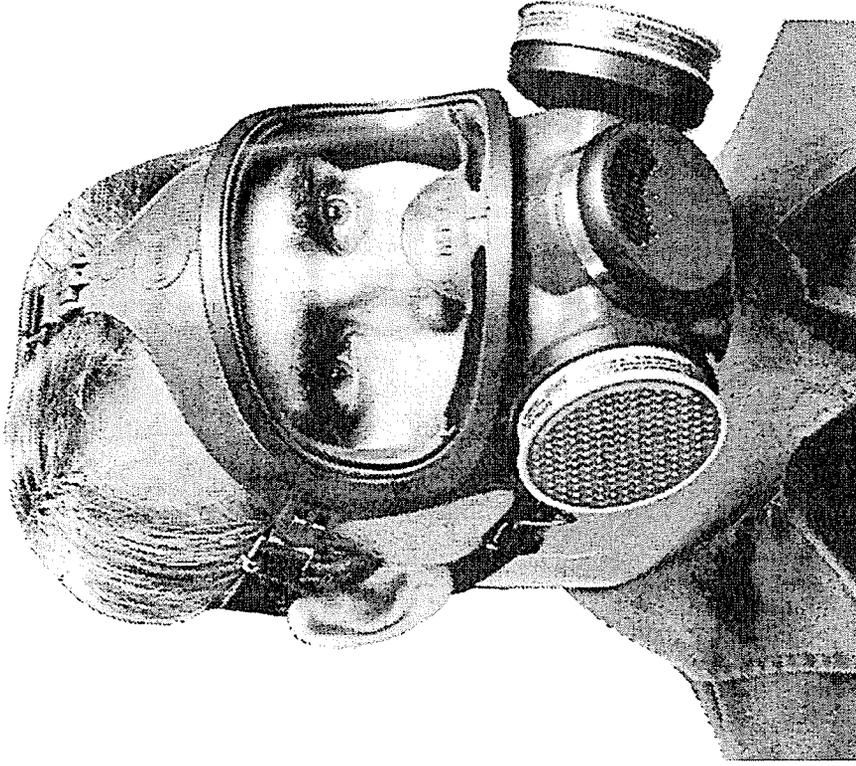
Minimum Efficiency	Non-oil Aerosols	Includes Oil Aerosols	Includes Oil Aerosols
95%	N95	R95	P95
99%	N99	R99	P99
99.97%	N100	R100	P100

SELECTION CHART \*



\* Conibear, Shirley A., What NIOSH's New Respirator Certification Regulation Means For You. "Occupational Health and Safety", P. 28-35, Nov. 1996.

**ATTACHMENT 9**  
**TYPES OF FACE MASKS**



**A. Full-Face, Dual Cartridge Air-Purifying Respirator**  
(Photo compliments of Mine Safety Appliances Company)



**B. Half-Face, Dual Cartridge Air-Purifying Respirator**  
(Photo compliments of Mine Safety Appliances Company)

Types of Face Masks



**ATTACHMENT 10**

**ISOAMYL ACETATE (BANANA OIL)**  
**FIT TEST PROCEDURES**

## ISOAMYL ACETATE (BANANA OIL)

Special Note: Isoamyl acetate is an organic vapor. To fit test particulate respirators, the respirator must be fitted with an organic vapor air-purifying cartridge (either black for organic vapor or yellow for organic vapor/acid gas). Before a fit test can be performed, an odor threshold screening must be done to determine if the individual tested can detect the odor of isoamyl acetate at low levels.

### Odor Threshold Screening

The SHE Coordinator or HHSC shall prepare the isoamyl acetate stock solution and conduct the odor threshold screening for each wearer of respiratory protection equipment.

1. Three 1 liter glass jars with metal lids are required.
2. Odor-free water (e.g., distilled or spring water) at approximately 25°C (77°F) shall be used for the solutions.
3. The isoamyl acetate (IAA) (also known as isopentyl acetate) stock solution is prepared by adding 1 ml of pure IAA to 800 ml of odor-free water in a 1 liter jar, closing the lid and shaking for 30 seconds. A new solution shall be prepared at least weekly.
4. The screening test shall be conducted in a room separate from the room used for actual fit testing. The two rooms shall be well-ventilated to prevent the odor of IAA from becoming evident in the general room air where testing takes place.
5. The odor test solution is prepared in a second jar by placing 0.4 ml of the stock solution into 500 ml of odor-free water using a clean dropper or pipette. The solution shall be shaken for 30 seconds and allowed to stand for two to three minutes so that the IAA concentration above the liquid may reach equilibrium. This solution shall be used for only one day.
6. A test blank shall be prepared in a third jar by adding 500 cc of odor-free water.
7. The odor test and test blank jar lids shall be labeled (e.g., 1 and 2) for jar identification. Labels shall be placed on the lids so that they can be peeled off periodically and switched to maintain the integrity of the test.
8. The following instruction shall be typed on a card and placed on the table in front of the two test jars (i.e., 1 and 2): "The purpose of this test is to determine if you can smell banana oil at a low concentration. The two bottles in front of you contain water. One of these bottles also contains a small amount of banana oil. Be sure the covers are on tight, then shake each bottle for two seconds. Unscrew the lid of each bottle, one at a time, and sniff at the mouth of the bottle. Indicate to the SHE Coordinator or HSHC which bottle contains banana oil."
9. The mixtures used in the IAA odor detection test shall be prepared in an area separate from where the test is performed, in order to prevent olfactory fatigue.

## ISOAMYL ACETATE (BANANA OIL) (Continued)

10. If the wearer is unable to correctly identify the jar containing the odor test solution, the IAA qualitative fit test shall not be performed.
11. If the wearer correctly identifies the jar containing the odor test solution, the SHE Coordinator or HSHC may proceed to the isoamyl acetate fit test of the wearer.

### Isoamyl Acetate Fit Test Procedure

1. The fit test chamber shall be constructed by the SHE Coordinator or SHSC. It shall be a clear 55-gallon drum liner suspended inverted over a 2-foot diameter frame so that the top of the chamber is about 6 inches above the wearer's head. If no drum liner is available, a similar chamber shall be constructed using plastic sheeting. The inside top center of the chamber shall have a small hook attached.
2. After selecting, donning, and properly adjusting a respirator, the wearer shall go to the fit testing room. This room shall be separate from the room used for odor threshold screening and respirator selection, and shall be well-ventilated, as by an exhaust fan or lab hood, to prevent general room contamination.
3. Upon entering the test chamber, the SHE Coordinator or SHSC shall give the wearer a 6-inch by 5-inch piece of paper towel, or other porous, absorbent, single-ply material, folded in half and wetted with 0.75 ml of pure IAA. The wearer shall hang the wet towel on the hook at the top of the chamber. An IAA test swab or ampule may be substituted for the IAA wetted paper towel provided it has been demonstrated that the alternative IAA source will generate an IAA test atmosphere with a concentration equivalent to that generated by the paper towel method.
4. Allow two minutes for the IAA test concentration to stabilize before starting the fit test exercises. The SHE Coordinator or SHSC shall explain the fit test, the importance of the wearer's cooperation, and the purpose for the test exercises.
5. A copy of the test exercises and any prepared text from which the subject is to read shall be taped to the inside of the test chamber. Test exercises shall be done in a standing position. The SHE Coordinator or SHSC shall instruct the wearer to slowly turn their head from side to side (the wearer shall inhale at each side), chin up (inhale in the up position), and chin down. While leaning his/her head, the wearer shall speak by counting backwards from 100 or reading some text. The wearer shall bend at the waist or jog in place, without talking. Each exercise shall be performed for 1 minute.
6. If at any time during the test, the wearer detects the banana-like odor of IAA, the test is failed. The wearer shall quickly exit from the test chamber and leave the test area to avoid olfactory fatigue.
7. If the test is failed, the wearer shall return to the selection room and remove the respirator. The odor sensitivity test shall be repeated, another respirator selected, and the wearer shall return to the test area to repeat the fit test procedure described

## ISOAMYL ACETATE (BANANA OIL) (Continued)

in Procedures 1 through 6 above. The process continues until a respirator that fits well has been found. Should the odor sensitivity test be failed, the wearer shall wait at least 5 minutes before retesting. Odor sensitivity will usually have returned by this time.

8. If the wearer passes the test, the efficiency of the test procedure shall be demonstrated by having the wearer break the respirator face seal and take a breath before exiting the chamber.
9. When the wearer leaves the chamber, the saturated towel shall be removed and returned to the SHE Coordinator or SHSC so that there is no significant IAA concentration buildup in the chamber during subsequent tests. The used towels shall be kept in a self-sealing plastic bag to keep the test area from being contaminated.

**ATTACHMENT 11**  
**IRRITANT SMOKE FIT TEST PROCEDURES**

## **IRRITANT SMOKE (STANNIC CHLORIDE)**

Special Note: This fit test uses a person's response to the irritating chemicals released in the "smoke" produced by a stannic chloride ventilation smoke tube to detect leakage into the respirator. The respirator must be fitted with P100 series or high efficiency particulate air (HEPA) filter(s) (both are color coded pink or purple).

Before a fit test can be performed, a sensitivity screening check must be done to determine if the individual tested can detect a weak concentration of the irritant smoke.

### **Sensitivity Screening Check**

The smoke can be irritating to the eyes, lungs, and nasal passages. The SHE Coordinator or SHSC shall take precautions to minimize the wearer's exposure to irritant smoke. Sensitivity varies, and certain individuals may respond to a greater degree to irritant smoke. Care shall be taken when performing the sensitivity screening checks that determine whether the wearer can detect irritant smoke to use only the minimum amount of smoke necessary to elicit a response from the wearer.

1. The fit test shall be performed in an area with adequate ventilation to prevent exposure of the SHE Coordinator or SHSC conducting the fit test or the build-up of irritant smoke in the general atmosphere.
2. The SHE Coordinator or SHSC shall break both ends of a ventilation smoke tube containing stannic chloride, and attach one end of the smoke tube to a low flow air pump set to deliver 200 milliliters per minute, or an aspirator squeeze bulb. The SHE Coordinator or SHSC shall cover the other end of the smoke tube with a short piece of tubing to prevent potential injury from the jagged end of the smoke tube.
3. The SHE Coordinator or SHSC shall advise the wearer that the smoke can be irritating to the eyes, lungs, and nasal passages and instruct him/her to keep the eyes closed while the test is performed.
4. The wearer shall be allowed to smell a weak concentration of the irritant smoke before the respirator is donned to become familiar with its irritating properties and to determine if he/she can detect the irritating properties of the smoke. The SHE Coordinator or SHSC shall carefully direct a small amount of the irritant smoke in the wearer's direction to determine that he/she can detect it.

### **Irritant Smoke Fit Test Procedure**

1. The person being fit tested shall don the respirator without assistance, and perform the required user seal check(s).
2. The wearer shall be instructed to keep his/her eyes closed.
3. The SHE Coordinator or SHSC shall direct the stream of irritant smoke from the smoke tube toward the faceseal area of the wearer, using the low flow pump or the squeeze bulb. The SHE Coordinator or SHSC shall begin at least 12 inches from

## IRRITANT SMOKE (STANNIC CHLORIDE) (Continued)

the facepiece and move the smoke stream around the whole perimeter of the mask. Two additional passes around the perimeter of the mask shall be made, moving to within six inches of the respirator.

4. If the wearer has not had an involuntary response and/or detected the irritant smoke, proceed with the test exercises.
5. The test exercises shall be performed in a standing position while the respirator seal is being continually challenged by the smoke, directed around the perimeter of the respirator at a distance of six inches. The SHE Coordinator or SHSC shall instruct the wearer to slowly turn their head from side to side (the wearer shall inhale at each side), chin up (inhale in the up position), and chin down. While leaning his/her head, the wearer shall speak by counting backwards from 100 or reading some text. The wearer shall bend at the waist or jog in place, without talking. Each exercise shall be performed for 1 minute.
6. If the wearer reports detecting the irritant smoke at any time, the test is failed. The wearer must repeat the entire sensitivity check and fit test procedure.
7. Each wearer passing the irritant smoke test without evidence of a response (involuntary cough, irritation) shall be given a second sensitivity screening check, with the smoke from the same smoke tube used during the fit test, once the respirator has been removed, to determine whether he/she still reacts to the smoke. Failure to evoke a response shall void the fit test.
8. If a response is produced during this second sensitivity check, then the fit test is passed.

**ATTACHMENT 12**

**PORTACOUNT<sup>®</sup> OPERATION AND  
FIT TEST PROCEDURES**

## PORTACOUNT® OPERATION AND FIT TEST PROCEDURES

Special Note: This fit test method objectively verifies the wearer's ability to obtain a good face to facepiece seal by sampling and measuring particulate contaminant concentration outside the facepiece and inside the facepiece. A numerical value, known as a "fit factor" (FF), is then generated by comparing the concentration outside to the concentration inside. For an accurate test result, the wearer must be clean shaven and shall not have smoked for at least 30 minutes before the fit test.

### PortaCount® Operation

1. Turn on the printer.
2. Insert alcohol cartridge and turn to locked position.
3. Turn on the PortaCount® by pressing the ON/OFF key on the instrument. The LCD display will count down from 60 seconds while the instrument warms up.
4. To ensure there is sufficient ambient particles and there are no leaks in the instrument or the sampling tube, perform the following checks:
  - a. Set the PortaCount® to the Count Mode by pressing the COUNT key. Allow to count for 5-10 seconds. If particle count is 1000 particles/cc or above, there are sufficient particles and you may proceed to b. If less than 1000 particles/cc, refer to troubleshooting section of manual.
  - b. Attach the supplied P100-series filter to the clear (sample) hose on the twin tube assembly (be sure filter is inserted securely to prevent leakage from this connection).
  - c. Watch the display and printout. The particulate concentration detected should go to zero within 30 seconds. If not, there is a leak that must be found and eliminated before performing fit testing (refer to the trouble shooting section of your service manual).
5. To verify proper operation of the PortaCount® and to ensure switching valve is functioning properly, perform the following check:
  - a. Set the PortaCount® to the Fit Test Mode by pressing the FIT TEST KEY.
  - b. Change the number of exercises to 2 by pressing and holding down the NUMBER OF EXERCISES Key until 2 is displayed on the LCD.
  - c. Press the START TEST key and wait for the completion of the test.
  - d. The instrument should display an extremely high fit factor of at least 100,000. If the fit factor is below this number, refer to service manual.

## PORTACOUNT<sup>®</sup> OPERATION AND FIT TEST PROCEDURES (Continued)

6. To verify proper operation of the PortaCount<sup>®</sup> and to ensure the instrument is calculating accurate fit factors, perform the following checks:
  - a. Remove the P100-series filter from the sample hose.
  - b. Press the START TEST key and wait for the completion of the test.
  - c. The Fit Factor should be between 0.9 and 1.1. (If the Fit Factor does not fall in this range, refer to the service manual.)

### PortaCount<sup>®</sup> Fit Test Procedures

1. Be sure the proper hose adapter is attached to the sample port on the wearer's respirator before it is donned.
2. The wearer shall don the appropriate respirator and adjust the straps without assistance from the technician (or SHE Coordinator/SHSC).
3. The wearer shall wear the respirator for five (5) minutes prior to the start of the fit test. Use this time to explain the test and how to properly perform the exercises. Also note the comfort of the mask on the wearer.
4. Attach the free end of the twin-tube, marked sample, to the hose adapter.
5. Press count mode on the PortaCount<sup>®</sup> and watch the particle count from the mask line. Note: The number displayed on the screen will represent direct leakage into the facepiece. This number should be used to assess the quality of fit before proceeding with the fit test.
6. Change the number of exercises to 7 by pressing and holding down the Number of Exercises key until 7 is displayed on the LCD.
7. Start the START TEST key.
8. Instruct the wearer to perform, in a standing position, each of the following exercises below for eighty (80) seconds each in sync with the operation and signal (beep) of the PortaCount<sup>®</sup> instrument:
  1. Normal Breathing (NB)
  2. Deep Breathing (DB)
  3. Side-to-side head motion (SS)
  4. Up and down head motion (UD)
  5. Talking (T)
  6. Running in Place (RP)\*
  7. Normal Breathing (NB)

\* Other exercises may be substituted here if desired.

## **PORTACOUNT<sup>®</sup> OPERATION AND FIT TEST PROCEDURES (Continued)**

9. Once the wearer has completed all the exercises in sequence the PortaCount<sup>®</sup> will beep three times and the OVERALL FIT FACTOR (FF) will be calculated and printed.
10. Disconnect the sample line from the respirator and instruct the wearer to remove the respirator.
11. Advance the printer tape and detach the fit test record.
12. Record the wearer's name, the date, and test exercise abbreviation next to the corresponding fit factor on the printout tape and attach it to a completed copy of a Respirator Issuance and Training Record (Attachment 4).

Note: In Fit Test Mode, if the PortaCount<sup>®</sup> is left running for 10 minutes without starting a test, the instrument automatically switches off to conserve battery life.

**ATTACHMENT 13**

**RESPIRATOR MAINTENANCE  
AND ANNUAL FIT TEST CHECKLIST**

# Respirator Maintenance and Annual Fit Test Checklist



Date: \_\_\_\_\_

RESPIRATOR USER: \_\_\_\_\_

RESPIRATOR TYPE (specific make, model, style, and size): \_\_\_\_\_

\_\_\_\_\_

## MAINTENANCE RECORD

Facepiece	
Headstraps	
Facial Seal	
Intake Valves	
Exhale Valves	
Cleanliness	
Filters/Cartridges	
Overall Condition	
Fit Test <input type="checkbox"/> QLFT <input type="checkbox"/> QNFT	

Issued to: \_\_\_\_\_  
*(signature)* *(date)*

Issued by: \_\_\_\_\_  
*(signature)* *(date)*

COMMENTS: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**ATTACHMENT 14**

**INFORMATION FOR EMPLOYEES USING RESPIRATORS  
WHEN NOT REQUIRED UNDER THE STANDARD**

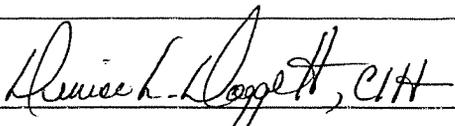
## **INFORMATION FOR EMPLOYEES USING RESPIRATORS WHEN NOT REQUIRED UNDER THE STANDARD**

Respirators are an effective method of protection against designated hazards when properly selected and worn. 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 a respirator is provided for your voluntary use, or if you provide your own respirator, you need to take certain precautions to be sure that the respirator itself does not present a hazard.

You 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 tell you what the respirator is designed for and how much it will protect you.
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 your respirator so that you do not mistakenly use someone else's respirator.

# STANDARD OPERATING PROCEDURE

		S.O.P. No. I-1	PAGE 1 OF 8
APPROVAL		EFFECTIVE DATE	REVISION No. 0
Denise L. Daggett, MS, CIH		06/28/02	
<b>TITLE</b> <b>FIELD INSTRUMENTATION: MIE INC. MINIRAM</b> <b>MODEL PDM 3 CALIBRATION AND OPERATION</b>			

## 1.0 PURPOSE

This procedure is intended to provide general operational guidelines for the MIE, Inc. MINIRAM Personal Monitor, Model PDM-3, airborne particulate monitor. This instrument utilizes scattered electromagnetic radiation in the near infrared. The light from a light-emitting source is scattered by airborne particles (both liquid and solid). A filter aids to screen out any light whose wavelength differs from that of the pulsed source. The MINIRAM requires no pump for its operation, and the scattering sensing parameters have been designed for preferential response to the particle size range of 0.1 to 10 micrometers ( $\mu\text{m}$ ), which corresponds with current gravimetric methods for sampling respirable size fractions. Attachment 1 provides a diagram of the MINIRAM.

## 2.0 SCOPE

This document applies to AMEC Earth & Environmental, Inc. (AEE) personnel involved in the operation, calibration, and maintenance of the MINIRAM PDM-3.

## 3.0 DEFINITIONS

**Open Sensing Chamber** – Air surrounding the MINIRAM passes freely through the open aerosol sensing chamber as a result of air transport caused by convection, circulation, ventilation, and personnel movement.

**Batteries** – The MINIRAM is powered by a set of internal rechargeable nickel-cadmium (Ni-Cad) batteries, which can provide continuous monitoring for more than 8.5 hours.

**Liquid Crystal Display** – The Liquid Crystal Display (LCD) indicates the aerosol concentration and is updated every 10 seconds. The LCD displays the reading in the units of milligrams per cubic meter ( $\text{mg}/\text{m}^3$ ).

**MEAS Switch** – The MEAS switch activates the monitoring cycle of the MINIRAM.

**Display Range** – The MINIRAM normally operates in its lower display range, .00 to  $9.99 \text{ mg}/\text{m}^3$ . If a 10-second concentration exceeds  $9.99 \text{ mg}/\text{m}^3$ , the display switches to the .0 to  $99.9 \text{ mg}/\text{m}^3$  range and remains in that range as long as the 10-second measured concentration exceeds  $9.99 \text{ mg}/\text{m}^3$ .

**MEAS and TIME** – This function only operates when the battery charger is plugged in and is supplying power to the instrument. When TIME is pressed and held down and MEAS is then pressed simultaneously, the MINIRAM will operate as in the measurement mode and the display will read CGO for "Continuous Go." The MINIRAM will then operate for an indefinite number of 8.3-hour runs, restarting automatically after each 8.3-hour run, until the OFF key is pressed or until the batteries are exhausted.

Concentration averages and timing information for the last seven 8.3-hour runs will remain in storage at any given time.

**OFF Switch** – When this key is pressed the MINIRAM will discontinue whatever mode is underway.

**OVR Indicator** – A display area in the upper right corner of the LCD. During measurement mode it indicates a detection circuit overload. When playing back stored information, it indicates the shift or run number being displayed.

**TIME Switch** – Prompts the LCD to display the time, in minutes, since the start of the last measurement run.

**TWA Switch** – The Time-Weighted Average (TWA) switch will prompt the LCD to indicate the TWA, or the average concentration in  $\text{mg}/\text{m}^3$ , up to the instant that the switch is pressed.

**SA Switch** – The Shift-Average (SA) switch will prompt the LCD to display the aerosol concentration, up to that moment, averaged over an 8-hour shift.

**PBK Switch** – When the instrument is in the OFF mode the stored information can be played back by pressing PBK for more than 1 second. First, the identification number is displayed with the ID indicator bar on. Next, the shift or run number (7 through 1, starting with the last run) is shown, with the OVR indicator bar on as identification. Then the sampling time, in minutes, for that run is shown followed by the off-time between the last and next run, in tens of minutes, and then the average in  $\text{mg}/\text{m}^3$ . This sequence is repeated seven times (one for each shift or run). An average reading of 9.99 indicates that a significant overload occurred during that run. The PBK function takes a total of 70 seconds.

**ZERO Switch** – The ZERO function determines the background level of reflection of the small amount of light from the infrared sensing chamber. The background level is referred to as the zero value, and is subtracted from the aerosol concentration readings during the measurement mode. The zero value will increase somewhat as the chamber inner walls and windows become contaminated with dust. Pressing ZERO during the measurement period provides momentary display of the stored zero concentration readings. To update the zero value the MINIRAM must be in its off condition and in a “clean air” environment or inside an airtight bag or the Z-bag provided by the instrument manufacturer.

**ID#** – Pressing ID# during a measurement period provides momentary display of the identification number stored within the MINIRAM memory.

**Sunshield** – The sunshield accessory serves to protect the MINIRAM sensing elements from excessive ambient light fluctuations. It should be used whenever the MINIRAM is to be operated outdoors or under fluctuating bright light. The sunshield also prevents loose clothing or other objects from touching or entering the open sensing chamber. The use of this accessory causes an insignificant alteration of the air exchange rate between the outside and inside of the sensing chamber.

**Time-Weighted Average Exposure (TWA)** – The TWA exposure is the actual airborne concentration averaged over a specified period of time (e.g., 8 hours or 15 minutes).

---

## 4.0 RESPONSIBILITIES

### 4.1 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR

The Corporate Safety, Health, and Environment Director (Corporate SHE Director) is responsible for approving instrument procedures for issue.

### 4.2 SAFETY, HEALTH, AND ENVIRONMENT COORDINATOR

The Safety, Health, and Environment Coordinator (SHE Coordinator) arranges for the training of personnel in the use of the instruments covered by this procedure.

### 4.3 SITE HEALTH AND SAFETY COORDINATOR

The Site Health and Safety Coordinator (SHSC) is responsible for the field implementation of this procedure.

## 5.0 PROCEDURE

### 5.1 OPERATING

When using the MINIRAM for monitoring it should be positioned vertically with the display panel facing upwards by clipping the MINIRAM to the belt, shoulder strap, hard hat, or other convenient location. The sensing chamber portion should not be used as a carrying handle, particularly not while operating the MINIRAM, because this may affect the measurements. The vertical monitoring position minimizes potential particle deposition within the sensing chamber. If it is not practical to operate the MINIRAM in the vertical position, it can also be operated in the following positions:

- horizontal, resting on the belt clip
- handheld (while ensuring that hand and fingers are away from the openings of the sensing chamber)
- using a MINIRAM table stand, if available
- wall-mounted using a belt clip, or the four battery pack attachment screws on the back of the MINIRAM

#### 5.1.1 Measurement Mode

If the MINIRAM shows a blank display, press **OFF** and wait until the display reads "OFF" before activating measurement mode.

When the MINIRAM reads "OFF," press **MEAS** to initiate the measurement cycle. The first readout displayed is "GO." This will be followed by the last concentration reading or ".00". Roughly 36 seconds after activating the measurement cycle the first new 10-second averaged concentration reading will be displayed. Readings are displayed in mg/m<sup>3</sup>. Record readings on a Site Air Surveillance Record (Attachment 2).

The MINIRAM will run in the measurement mode for 500 minutes (8 hours and 20 minutes). Once the **MEAS** mode has been entered this sequence can only be interrupted by pressing **OFF**. Other functions can be operated during the measurement mode only for the duration of the time that the other function key is pressed, without affecting the measurement cycle.

If **TIME** is pressed during the measurement mode the display will show the elapsed time, in minutes, to three significant figures, from the start of the last measurement run. The MINIRAM will automatically return to concentration display after the TIME key is released.

The **TWA** switch, if pressed during the measurement mode, will indicate on the display the average concentration in  $\text{mg}/\text{m}^3$  up to that instant, from the start of the last run. The value of the TWA is updated every 10 seconds. After releasing the TWA key the MINIRAM display returns to the 10-second concentration display.

The **SA** Switch, if pressed during the measurement mode, will provide a display of the aerosol concentration, up to that moment, averaged over an 8-hour shift period.

### 5.1.2 Off Mode

When the **OFF** switch is pressed the MINIRAM will discontinue the measurement mode. The LCD will read "OFF" for 48 hours (unless another key is pressed during that period), after which the display will be blanked. When the **OFF** switch is pressed during a measurement cycle the MINIRAM will store the concentration average and elapsed monitoring time up to the time of that OFF command for approximately 6 months.

#### 5.1.2.1 Playing Back Stored Information

When the instrument is in the **OFF** mode the stored information can be played back by pressing **PBK** for more than 1 second. First, the identification number is displayed with the ID indicator bar on. Next, the shift or run number (7 through 1, starting with the last run) is shown, with the OVR indicator bar on as identification. The sampling time, in minutes, for that run is shown followed by the off-time between the last and next run, in tens of minutes, and then the average in  $\text{mg}/\text{m}^3$ . This sequence is repeated seven times (one for each shift or run number). An average reading of 9.99 indicates that a significant overload occurred during that run. The PBK function takes a total of 70 seconds.

## 5.2 ZEROING

To zero the MINIRAM it must be in the **OFF** condition. Perform the zeroing either in a clean air environment or using the Z-bag or a plastic ziploc bag.

To use the Z-bag for zeroing the MINIRAM in the field:

1. Remove the rubber bulb/filter assembly from the Z-bag. Place Z-bag on a flat surface with red flow fitting facing up. Flatten bag. Remove small plastic cap from flow fitting on bag.
2. Insert ribbed elbow connector attached to filter cartridge into red flow fitting of plastic bag until connector is flush with bottom of red flow fitting.

3. MINIRAM should be in its OFF condition. If display is blanked or if MINIRAM is in the **MEAS** mode, press **OFF**.
4. Open the Z-bag and place MINIRAM inside, approximately at its center.
5. Key **ZERO** through the open end of the Z-bag. Immediately zip the Z-bag closed and begin to pump the hand bulb.
6. The Z-bag should inflate as hand pumping continues, up to a height of about 5 inches. Continue pumping gently to maintain bag interior pressure, until the MINIRAM displays OFF again.
7. Unzip the Z-bag and remove the MINIRAM. MINIRAM is now ready for monitoring.
8. Place rubber bulb/filter assembly inside Z-bag, and plug small plastic cap into flow fitting to close it. Zip until closed while flattening Z-bag to store it to ensure cleanliness of the bag interior.
9. Document zeroing on the Instrument Calibration Log (Attachment 3).

To use a clean air environment or a plastic ziploc bag for zeroing the MINIRAM in the field:

1. MINIRAM should be in its OFF condition. If display is blanked or if MINIRAM is in the **MEAS** mode, press **OFF**.
2. Once the MINIRAM has been placed in the clean air environment or bag, press zero. When the display indicates "OFF" again, the MINIRAM zeroing is complete.
3. Document zeroing on Instrument Calibration Log (Attachment 3).

### 5.3 MAINTENANCE

A zero level reading of greater than 3 mg/m<sup>3</sup> indicates excessive chamber contamination. To clean a soiled sensing chamber, remove the chamber by gently pushing it away from the display/control panel end, using both thumbs, and sliding it out of its channel. Avoid touching the sensing lenses with your fingers. The two lenses can be wiped using lens tissue. The sensing chamber should be kept clean by washing with soap and water and rinsing thoroughly to remove any residues from the glass windows and interior of the chamber. Do not use solvents of any kind or rub the interior surfaces of the chamber if they have the manufactured coating. Allow the sensing chamber to dry completely and reinsert by sliding the sensor back onto the control panel.

# STANDARD OPERATING PROCEDURE

## 5.4 TROUBLESHOOTING

There are two trouble bar indicators on the MINIRAM display, identified as OVR and BAT.

### Indications

OVR - detection circuit overloaded

BAT - battery voltage insufficient

### Possible Causes

Object inserted into sensing chamber  
Sudden exposure to sunlight

Inadequate charging time

Other problems that may arise and their solutions are as follows:

<b>Problem</b>	<b>Solution</b>
No response when OFF key is pressed	Recharge battery pack. If still no response, check the measure output of battery charger. The volt meter should read about 24.5 Va.c. If charger is sufficient, remove battery pack and slightly separate 2 gray connectors. Attach voltmeter + lead to red wire and - lead to black wire. Voltmeter should read about 8.5 Vd.c. while plugged into the charger. If battery pack is adequate, check the fuse on the circuit board. The fuse is located 3/8 inch behind the analog output jack and is designated F1 on the circuit board. Leaving the - lead of the voltmeter connected to the battery pack use the + lead to check voltage on both sides of fuse. Voltage should be 24.5 Vac. If not, fuse must be replaced by factory.
Unit constantly displays .0.3 <sup>-</sup>	Electronic component failure. Send unit back to MIE or rental company for repair and recalibration.
Improper display segments appear	Contaminated circuit or display board. Remove battery pack and clean affected areas with small brush. Do not use cleaning fluids or solvents on circuit boards if brushing does not correct problem. Send unit to MIE or rental company for repair.
Pressing <b>TWA, ID, TIME</b> keys during <b>MEAS</b> mode causes unit to shut off	Keypad failure. Send to MIE or rental company for repair. Or display board contamination (see above for cleaning of board).

## 5.5 BATTERY CHARGING

When the battery pack for the MINIRAM is discharged it should be recharged for a minimum of 14 hours. There is no danger of overcharging if the charger is left connected for an indefinite time. The batteries should occasionally be discharged completely and then recharged.

## 6.0 RECORDS

### 6.1 PROCEDURE

Monitoring results shall be recorded on the Site Air Surveillance Record (Attachment 2).

**6.2 CALIBRATION**

Instrument Calibration Logs (Attachment 3) will be maintained in the health and safety portion of the project files and/or on a log with the instrument.

**7.0 REFERENCES**

MIE, Inc. Model PDM-3 Operations Manual.

**8.0 ATTACHMENTS**

1. Diagram of the MINIRAM
  2. Site Air Surveillance Record
  3. Instrument Calibration Log
-

# STANDARD OPERATING PROCEDURE

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S.O.P. No. I-1

PAGE 8 OF 8

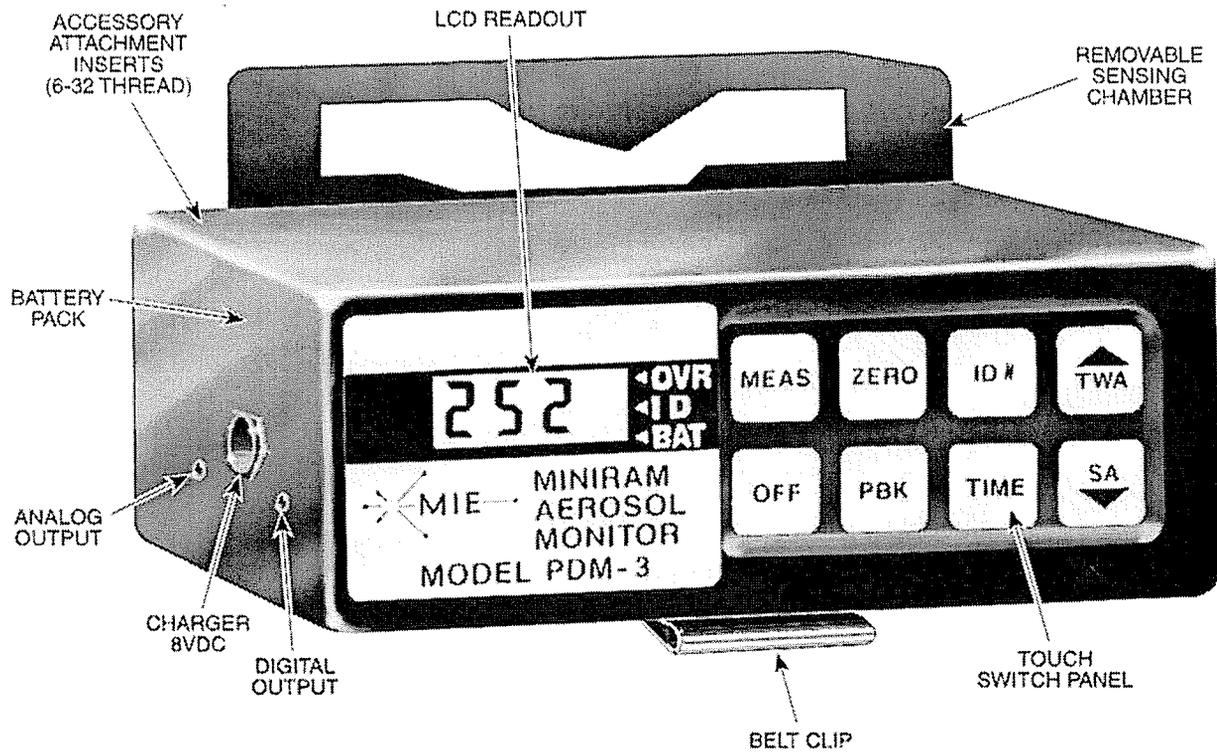
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**ATTACHMENT 1**

**DIAGRAM OF THE MINIRAM**



SOURCE: MIE, Inc., "Model PDM-3 Operations Manual"



Main View of MINIRAM

**ATTACHMENT 2**

**SITE AIR SURVEILLANCE RECORD**



**ATTACHMENT 3**

**INSTRUMENT CALIBRATION LOG**





# STANDARD OPERATING PROCEDURE

S.O.P. No. S-11

PAGE 1 OF 8

**APPROVAL**

Denise L. Daggett, MS, CIH

**EFFECTIVE DATE**

05/24/02

**REVISION No.**

0

**TITLE**

**SIGNS, SIGNALS, AND BARRICADES**

## 1.0 PURPOSE

The purpose of this procedure is to establish the safety requirements for the design, application, and use of signs, tags, flagging, barricades, and barriers.

## 2.0 SCOPE

This procedure applies to AMEC Earth & Environmental, Inc. (AEE) employees and subcontractors who design, procure, apply, or use signs, tags, flagging, barricades, or barrier devices in construction areas, or on sidewalks, pathways, streets, and roadways through and adjacent to project areas managed by AEE.

This procedure also applies to all AEE personnel, personnel subcontracted to AEE, and visitors (including clients) of AEE who may work on or visit AEE jobsites.

## 3.0 DEFINITIONS

**Barricades** – Fixed or portable devices, having one to three diagonally marked horizontal rails supported by a stable base, used to control vehicular and pedestrian traffic by closing, restricting, or delineating all or a portion of an established travel route.

**Barriers** – Fixed or portable devices (e.g., traffic cones) designed to prevent vehicles from physically entering an area.

**Flagging** – High visibility tape, chain, rope, and/or bunting used to warn personnel of a hazardous location or operation.

**Guardrails** – Protective structure (having top and intermediate rails) and support posts, used to prevent pedestrians from physically entering an area.

**Signals** – Moving signs provided by workers (e.g., flagmen) or by devices (e.g., flashing lights) to warn of possible existing hazards.

**Signs** – A piece of metal, plastic, wood, or paper marked with words and/or symbols and/or is color-coded, which is located to convey a message to personnel observing the sign.

**Tags** – A strong strip of paper, plastic, fabric, metal, or leather designed for attachment to an object and marked as a visual warning of an existing or immediate hazardous condition or operation.

**4.0 RESPONSIBILITIES****4.1 FIELD MANAGER**

The Field Manager (FM), or subcontractor supervisor is responsible for:

- implementing the requirements of this procedure
- ensuring that each employee under his/her supervision understands his/her responsibilities and complies with the requirements of this procedure
- ensuring that hazards and hazardous operations that cannot be eliminated from the work place are identified, marked, and guarded by an appropriate barrier, barricade, flagging, guardrails, signs, and/or tags
- ensuring that barriers, barricades, flagging, guardrails, signs, and tags conform to the requirements of this procedure

**4.2 SITE HEALTH AND SAFETY COORDINATOR**

The Site Health and Safety Coordinator (SHSC), or designee is responsible for conducting periodic surveillance to ensure compliance with all requirements of this procedure.

**4.3 CORPORATE SAFETY, HEALTH, AND ENVIRONMENT DIRECTOR**

The Corporate Safety, Health, and Environment Director (Corporate SHE Director) can audit regarding the content of this standard operating procedure (SOP) to ensure compliance at a field site. The Corporate SHE Director authorizes any deviation or modification of this SOP during field operations.

**4.4 EMPLOYEES**

Each AEE and subcontractor employee is responsible for:

- complying with this procedure
- informing supervisors of all hazards and hazardous operations that cannot be eliminated from the workplace
- ensuring that personnel in the work place observe the instructions, directions, and intent of the barriers, barricades, flagging, guardrails, signs, and tags

**5.0 PROCEDURES****5.1 ADMINISTRATIVE CONTROLS**

The SHSC shall evaluate the scope of work to identify, insofar as possible, any safety sign and barricade concerns that may be involved in the work to be performed. The SHSC shall also review the site-specific Health and Safety Plan (HSP) as it pertains to signs, signals, and barricade requirements.

Upon evaluation of the work to be performed, the SHSC will identify the necessary means to minimize danger to employees.

All required safety signs and barricades shall be erected prior to the initiation of project activities or as necessitated as the work progresses.

The SHSC and site staff will inspect the work areas to determine the effectiveness of the barricades, barriers, and signages. Any deficiencies will be addressed with prompt corrective action. Follow-up surveys shall be conducted by the FM to evaluate job safety and the effectiveness of the safety sign or barricade. Any deficiencies and corrective actions will be addressed in the daily tailgate safety meeting.

The SHSC and/or FM shall perform periodic surveillance of the jobs to ensure compliance with the requirements set forth by this procedure and the HSP.

## 5.2 BARRICADES

Barricades shall be constructed by a person knowledgeable in the requirements of barricades and capable of constructing barricades to standard specifications.

Barricades shall be used on or around work areas when it is necessary to prevent the inadvertent intrusion of vehicular and/or pedestrian traffic. Spills and other emergency situations may necessitate the use of barricades.

Barricades shall be placed at least 2 feet away from the edge of a spill or other emergency situation. Guardrail systems, fences, or barricades shall be placed at least 2 feet from excavations that are 6 feet or more in depth when the excavation cannot readily be seen because of plant growth or other visual barriers.

Barricade rails shall be:

- constructed of either 8-, 10-, or 12-inch (nominal) lumber, plastic, or metal
- at least 24 inches long
- mounted horizontally at least 36 inches above the ground
- marked with alternate orange and white 45-degree diagonal stripes

Barricade rails shall be supported by a stable base. The rail will be sturdy enough to resist lateral force applied to the support 30 inches above the floor, platform, runway, ramp, or ground.

## 5.3 BARRIERS

Barriers shall be constructed by a person knowledgeable in the requirements of barriers and capable of constructing barriers to standard specifications.

Barriers shall be used to guard excavations across or adjacent to streets or roadways.

Barriers shall be placed at least 2 feet away from the edge of excavations adjacent to roadways, as applicable.

Barriers shall be:

- constructed of solid material, such as concrete highway bumpers, to protect personnel from the inadvertent intrusion of vehicular traffic
- a minimum of 36 inches in height
- painted, marked, and/or illuminated to enhance their visibility

Barriers shall be used on or around work areas when it is necessary to protect personnel from the inadvertent intrusion of vehicular traffic.

## 5.4 FLAGGING

Flagging shall be designed by a person knowledgeable in the requirements of flagging and capable of designing flagging to meet standard specifications.

Flagging shall not be used as a substitute for barricades or barriers. However, when there is no imminent danger to personnel, the short-term (less than 24 hours) use of flagging to identify new, unplanned hazards is permissible while appropriate barricades or barriers are being created. In some instances, flagging is suitable for excavations, providing the excavation is in a limited access area and the excavation is clearly visible.

The flagging shall be positioned such that its lowest point (including sag) is no less than 34 inches and its highest point is no more than 39 inches as measured from the ground.

Tape and chain used as flagging shall have a minimum width of  $\frac{3}{4}$ -inch; rope and bunting used as flagging shall have a minimum rope diameter of  $\frac{1}{4}$ -inch. Additional signs may be attached to the flagging when appropriate.

Flagging shall be placed at least 6 feet laterally away from the hazard being identified.

## 5.5 GUARDRAILS

Guardrails shall be used at every open-sided floor or platform 6 feet or more above adjacent floor or ground level.

Guardrails shall be constructed:

- of wood, tubular pipe, or other solid material suitable for use as a guardrail
  - with a 2-inch by 4-inch wood or 1½-inch-diameter pipe top rail located approximately 42 inches (+/- 3 inches) above the floor, platform, runway, ramp, or ground
  - with a 1-inch by 6-inch wood or 1½-inch-diameter pipe intermediate rail located approximately halfway between the top rail and the floor, platform, runway, ramp, or ground
-

- a 1-inch by 4-inch toeboard located not more than ¼ inch above the floor, platform, runway, ramp, or ground when required

Guardrails shall be supported by 2-inch by 4-inch wood or 1½-inch-diameter pipe posts, or other solid material, spaced not to exceed 8 feet. The anchoring of posts and framing of members for railings of all types shall be of such construction that the completed structure is capable of withstanding a 200-pound force applied in a lateral or downward direction within 2 inches of the top edge. When applied in a downward direction, the top edge shall not deflect to a height less than 39 inches.

The ends of the rails shall not overhang the terminal posts except where such overhang does not constitute a projection hazard.

**5.6 SAFETY SIGNS**

**5.6.1 General**

Safety signs will be posted on-site to alert site personnel, visitors, or pass-through traffic (vehicular or pedestrian) of hazards. Examples of safety signs and color coding specifications are provided in Attachment 1. All signs shall be furnished with rounded or blunt corners and shall be free from sharp edges, burrs, splinters, or other sharp projections. The ends or heads of bolts or other fastening devices shall be located in such a way that they do not constitute a hazard. Nylon cable ties (Zip-ties) are an appropriate fastener. All signs shall be conspicuously posted in a location readily visible to personnel preparing to enter an area requiring the sign.

**5.6.2 Danger Signs**

Danger signs shall be used where an immediate hazard exists. There shall be no variation in the design of danger signs. Danger signs shall be designed as follows:

- Danger signs shall have red as the predominant color: red upper panel, black outline letters and borders, and a white lower panel for additional black-letter wording.

**NOTE:** Employees shall be instructed that danger signs indicate immediate danger and that special precautions are necessary.

**EXAMPLES:**      **DANGER - Asbestos Regulated Area**  
                          **DANGER - High Voltage**  
                          **DANGER - Do Not Operate**

**5.6.3 Caution Signs**

Caution signs shall be used to warn against potential hazards or to caution against unsafe operations. Caution signs shall be designed as follows:

- Caution signs shall have yellow as the predominant color: black upper panel and borders, yellow-letter "CAUTION" (on the black panel), and a yellow lower panel for additional black-letter wording.

**NOTE:** Employees shall be instructed that caution signs indicate a possible hazard against which proper precautions should be taken.

**EXAMPLES:**      **CAUTION - Hard Hat Area**  
                         **CAUTION - Slippery When Wet**  
                         **CAUTION - Men Working Overhead**

## 5.6.4 Instructional (or Notice) Signs

Instructional (or Notice) signs shall be used to convey general instructions and suggestions. Instructional (Notice) signs shall be designed as follows:

- Instruction signs shall have green or blue as the predominant color: green or blue upper panel, white letters, and a white lower panel for additional black-letter wording.

## 5.6.5 Traffic Signs (Vehicular and/or Pedestrian)

Directional signs shall be used to convey directional information. Directional signs shall be designed as follows:

- Directional signs shall have white as the predominant color: black upper panel, white directional symbol, and a white lower panel for additional black-letter wording.

Exit signs shall be used to identify emergency fire exits. Exit signs shall be designed as follows:

- Exit signs shall be lettered in legible red letters, not less than 6 inches high, on a white field and the principal stroke of the letters shall be at least 3/4 inch in width.

## 5.6.6 Biological Hazard Signs

Biological hazard signs shall be used to identify the actual or potential presence of a biohazard and/or identify equipment, containers, rooms, materials, and/or experimental animals that contain or are contaminated with a viable hazardous agent. Biological hazard signs shall be designed as follows:

- Biological hazard signs shall have fluorescent orange or orange/red as the predominant color, with a contrasting color or black letters and/or symbols.

**NOTE:** The term "biological hazard" and "biohazard" shall include only those infectious agents presenting an actual or potential risk to human well-being.

## 5.6.7 Radiation Hazard Signs

Radiation hazard signs shall be used to identify radiation hazards. There shall be no variation in the design of safety signs posted to warn of radiation hazards. Radiation hazard signs shall be designed as follows:

- Radiation hazard signs shall have magenta or purple on yellow background.

### 5.6.8 Street Signs

Street signs shall be posted to advise motorists of construction activity and/or hazards on or adjacent to the roadway. The design of street signs shall conform to the requirements of ANSI D6.1 - (latest revision), "Manual on Uniform Traffic Control Devices for Streets and Highways." Street signs shall be the standard diamond shape, shall have a black message and border, and shall have an orange background. The message on street signs shall have a minimum letter size of 5 inches. Street signs shall be supported by a stable base not easily blown over by the wind or traffic.

Additional requirements for traffic control/street signs are as follows:

- Construction area and construction area ahead signs shall be used to advise vehicle operators of construction activities adjacent to the roadway.
- Road work and road work ahead signs shall be used to advise vehicle operators of construction activities on the roadway.
- Detour and detour ahead signs shall be used to advise vehicle operators of a road detour.
- Road closed and road closed ahead signs shall be used to advise vehicle operators of a road closure.
- Flagman and flagman ahead signs shall be used to advise vehicle operators when a flagman is used to control/direct traffic through a construction area on or adjacent to the roadway. Flagman shall wear a red or orange warning vest. Vests worn at night shall be of a reflectorized material.

## 5.7 SAFETY TAGS

### 5.7.1 General Guidelines

Safety tags shall be used as a temporary means of warning employees of an existing hazard, such as defective tools, equipment, etc. Safety tags shall not be used in place of or as a substitute for safety signs. Safety tags shall contain a signal word and a major message. The signal word shall be either "Danger," "Caution," "Biological Hazard," "BIOHAZARD," or the biological hazard symbol. The major message shall indicate the specific hazardous condition or the instruction to be communicated to the employee. The signal word shall be readable at a minimum distance of 5 feet (1.52 meters) or greater as warranted by the hazard. The tag's major message shall be presented in either pictographs, written text, or both. The signal word and the major message shall be understandable to all employees who may be exposed to the identified hazard. Tags shall be affixed as close as safely possible to their respective hazards by a positive means such as string, wire, or adhesive that prevents their loss or unintentional removal.

### 5.7.2 Specific Guidelines

Danger tags shall be used in major hazard situations where an immediate hazard presents a threat of death or serious injury to employees.

Warning tags may be used to represent a hazard level between "Caution" and "Danger."

Caution tags shall be used in minor hazard situations where a non-immediate or potential hazard or unsafe practice presents a lesser threat of employee injury.

Biological hazard tags shall be used to identify the actual or potential presence of a biological hazard and to identify equipment, containers, rooms, experimental animals, or combinations thereof, that contain or are contaminated with hazardous biological agents.

Other tags may be used in addition to those required by this procedure or in other situations where this procedure does not require tags, provided that they do not detract from the impact or visibility of the major message on any required tag.

## 6.0 TRAINING

All employees shall be informed as to the meaning of the various tags used throughout the workplace and what special precautions are necessary. Additional training information is provided in Volume IV, Training Program, of this manual.

## 7.0 REFERENCES

Fed-OSHA. 2000. 29 CFR 1910.23, *Guarding Floor and Wall Openings and Holes.*

Fed-OSHA. 2000. 29 CFR 1910.144, *Safety Color Code for Marking Physical Hazards.*

Fed-OSHA. 2000. 29 CFR 1910.145, *Specifications for Accident Prevention Signs and Tags.*

Fed-OSHA. 2000. 29 CFR 1926.200, *Accident Prevention Signs and Tags.*

Fed-OSHA. 2000. 29 CFR 1926.202, *Barricades.*

Fed-OSHA. 2000. 29 CFR 1926.500, *Guardrails, Handrails, and Covers.*

Fed-OSHA. 2000. 29 CFR 1926.501, *Duty to Have Fall Protection.*

Fed-OSHA. 2000. 29 CFR 1926.502, *Fall Protection System Criteria and Practices.*

U.S. Army Corps of Engineers. 1998. *Safety and Health Requirements Manual, EM-385-1-1.*

## 8.0 ATTACHMENTS

1. Accident Prevention Signs and Color Coding

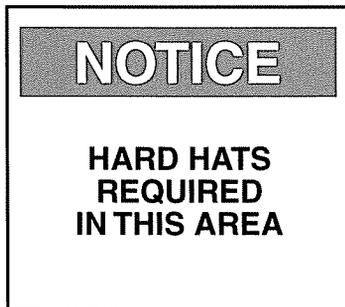
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**ATTACHMENT 1**

**ACCIDENT PREVENTION SIGNS AND COLOR CODING**

# SIGNS

GENERAL INSTRUCTIONS AND SAFETY MEASURES ARE STATED



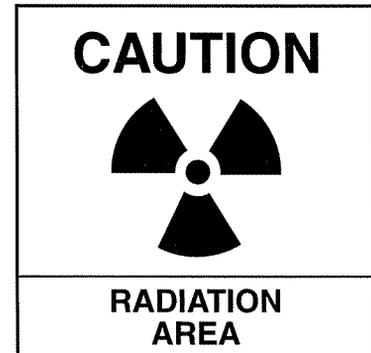
- White letters on blue or green panel
- Black letters on white background

INDICATES POSSIBLE HAZARD TAKE PRECAUTIONS



- Yellow letters on black panel
- Black letters on yellow background

INDICATES IONIZING RADIATION HAZARD



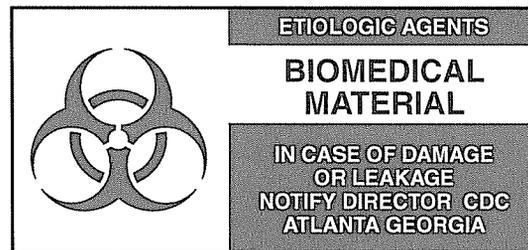
- Black logo and letters on yellow background
- Black letters on white background

INDICATES IMMEDIATE DANGER SPECIAL PRECAUTIONS ARE NECESSARY



- White letters in red oval trimmed in white on black panel
- Black letters on white background

INDICATES BIOHAZARD



- Logo color, in fire red on white background
- Letters in panels are white on fire red background
- Biomedical Material in fire red letters

## SAFETY COLOR CODING

**RED** = Identifies fire protection equipment; signifies danger on portable containers (such as safety cans) and as lights on barricades and at temporary obstructions; and signifies "STOP" on emergency stop bars or switches for machinery and equipment.

**YELLOW** = Designates caution and marks physical hazards (such as striking against, stumbling, falling, tripping, and "caught in between"). Yellow also is the color used on flammable liquid storage cabinets, as a band on safety cans, on various materials handling equipment, and in radiation hazard areas.

**BLUE OR GREEN** = Designates the location of first aid and safety equipment (not including fire protection equipment).

**BLACK & WHITE** = (solo, or in combination as stripes or checks) - Used for housekeeping or for traffic markings, or to provide contrast colors on other signs or objects.

**ORANGE** = Highlights dangerous parts of machinery or energized equipment. Also indicates "WARNING," which is a hazard between that of caution and danger.