

CONF-9710104--

A GUIDE TO THE SELECTION OF  
PERSONAL PROTECTIVE EQUIPMENT  
FOR USE IN RESPONDING TO  
A RELEASE OF CHEMICAL WARFARE AGENTS

October 1997

Prepared by

Cheri Bandy Foust  
Energy Division  
Oak Ridge National Laboratory

RECEIVED

OCT 27 1997

OSTI

Prepared for

Federal Emergency Management Agency  
Regulatory Service Coordination Unit

Prepared by the  
OAK RIDGE NATIONAL LABORATORY  
Oak Ridge, Tennessee 37831  
managed by  
LOCKHEED MARTIN ENERGY RESEARCH CORPORATION  
for the  
U.S. DEPARTMENT OF ENERGY  
under Contract No. DE-AC05-96OR22464

MASTER

  
DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED  


### **DISCLAIMER**

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, make any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

## **DISCLAIMER**

**Portions of this document may be illegible  
electronic image products. Images are  
produced from the best available original  
document.**

**How Do I Know?  
A Guide to the Selection of  
Personal Protective Equipment  
for Use in Responding to  
A Release of Chemical Warfare Agents**

**Cheri Bandy Foust, MPH, CHMM  
Research Associate  
Energy Division  
Oak Ridge National Laboratory\*  
Oak Ridge, Tennessee 37831**

**\*Managed by  
LOCKHEED MARTIN ENERGY RESEARCH CORPORATION  
for the  
U.S. DEPARTMENT OF ENERGY  
under Contract No. DE-AC05-96OR22464**

**HOW DO I KNOW?  
A GUIDE TO THE SELECTION OF  
PERSONAL PROTECTIVE EQUIPMENT  
FOR USE IN RESPONDING TO  
A RELEASE OF CHEMICAL WARFARE AGENTS**

## **Introduction**

An incident involving chemical warfare agents requires an unique hazardous materials (HAZMAT) response. As with any HAZMAT event, federal regulations prescribe that responders must be protected from exposure to the chemical agents. But unlike other HAZMAT events, special considerations govern the selection of personal protective equipment (PPE). PPE includes all clothing, respirators and detection equipment used to respond to a chemical release. PPE can differ depending on whether responders are military or civilian personnel.

Traditionally, most emergency managers and responders had little reason to become familiar with the decisions involving chemical warfare agent-related PPE. Today, however, the concern over domestic vulnerability to terrorist activities, has changed that picture. Increasingly, responders want to know how to protect themselves and others if they are faced with the need to respond to an incident involving chemical warfare agents.

## **Background**

Public Law 99-145 requires the U.S. Department of the Army to dispose of the lethal chemical agent munition stockpiles stored at eight Army installations throughout the continental United States and Johnston Atoll in the Pacific. Recognition by the U.S. Army that a potential threat to the public from continued storage was potentially as great a threat as from transportation and the final demilitarization of chemical agents gave rise to the Chemical Stockpile Emergency Preparedness Program (CSEPP). CSEPP is a civilian community emergency preparedness program complementing the Department of Defense's initiative to destroy domestic stockpiles of aged chemical warfare munitions.

The Oak Ridge National Laboratory (ORNL) has assisted the Federal Emergency Management Agency (FEMA) in developing a wide variety of training materials for CSEPP. The document described in this paper is entitled *How Do I Know? A Guide to the Selection of Personal Protective Equipment for Use in Responding to a Release of Chemical Warfare Agents*. The document complements a CSEPP video that illustrates the testing and evaluation techniques used to assess PPE for use by CSEPP participants in the event of a chemical agent accident/incident. The video also addresses federal regulatory requirements that govern the CSEPP civilian community emergency response protocols.

Only federal requirements are discussed in the document. The reader is encouraged to check their state and local regulations in addition to state Occupational Safety and Health Administration (OSHA) requirements to determine when such requirements are applicable.

Because there are no specific federal regulations regarding protective clothing, industry has adopted general industry consensus standards (i.e., procedures and protocols agreed upon and upheld by industry) for testing. In addition, several nationally recognized organizations have developed procedures and protocols for testing protective clothing. Some of these organizations include the National Fire Protection Association (NFPA), the American Society for Testing and Materials (ASTM), and the American National Standards Institute (ANSI). If an organization may potentially respond to chemical warfare agents, it would be prudent to use the Army's testing procedures.

At this time, OSHA is in the process of modifying its existing standard on respiratory protection [29 *Code of Federal Regulations (CFR)* 1910.134]. The current respiratory standard was adopted from a voluntary, industry-wide consensus standard developed in 1971. Since that time, changes in methodology, technology, and approach related to respiratory protection have occurred. Because OSHA's standard does not include those changes, organizations and agencies should continue to apply the most recent voluntary, industry-wide consensus standards regarding respiratory protection until modifications to 29 *CFR* 1910.134 are finalized.

### **Purpose**

FEMA requested that ORNL create training materials for CSEPP participants. These training materials were to provide information on a variety of topics and answer questions that a typical CSEPP participant might ask, including the following:

- How did the Army select the CSEPP recommended ensemble (i.e., protective clothing, respiratory equipment, and detection equipment)?
- How do I (i.e., CSEPP participant) know this ensemble is the right PPE for chemical warfare agents and will actually protect me?
- What are the concept of operations and work rules? Do I need to know what the CSEPP concept of operations and work rules include?

### **Target Audience**

Staff at ORNL identified the target audience for the *How Do I Know* document. One audience included numerous CSEPP participants that volunteer their time. Most of the volunteers do not wear PPE on their paid jobs. Another group included compensated participants such as firefighters, local law enforcement officers, emergency medical technicians (EMTs), nurses, doctors, etc. Many of these individuals neither wear PPE to perform their jobs nor are involved in making decisions regarding appropriate PPE, or any PPE-related issues.

ORNL determined the target audience needed basic information as well as an introduction to each topic area. ORNL concluded that a series of information sheets covering a variety of topics in one document would be of most benefit and convenience.

## **Description of the *How Do I Know* Document**

The *How Do I Know* document contains a collection of information sheets dealing with PPE-related issues that were prepared for use in CSEPP. For those unable to attend FEMA's CSEPP courses, the *How Do I Know* document also may serve as a "stand alone" guide, saving decision-makers time and money when questions arise concerning PPE. The information sheets attempt to answer questions such as:

- What is available?
- What are the pros and cons of choosing one type of PPE versus another?
- What do items cost?
- Can more information be obtained and, if so, where?

These questions are being asked because of the variety of PPE on the market today. All PPE must meet, at a minimum, federal requirements. For example, all respirators must be approved by the National Institute of Occupational Safety and Health (NIOSH). There are other pieces of PPE not identified in the *How Do I Know* document that would be appropriate for use with chemical warfare agents. The PPE discussed in the document represent PPE appropriate for CSEPP participants, based on CSEPP's concept of operations, equipment testing, work rules, and tasks to be performed.

## **Information Sheets**

Information sheets included in the *How Do I Know* document cover the following topics:

- Selection of personal protective equipment
- Selection of the appropriate level of PPE in response to a chemical warfare agent accident/incident
- CSEPP's PPE which includes:
  - battledress overgarment
  - responder coveralls
  - chemical protective gloves
  - chemical protective hood
  - chemical protective overshoes
  - chemical protective apron
  - ready bag
  - powered air-purifying respirator (PAPR)
- Respirator filters, cartridges, and canisters
- Selection of appropriate respiratory protection

- Chemical agent detection equipment for field use which includes:
  - individual chemical agent detector (ICAD)
  - chemical agent monitor (CAM)
  - M256 series chemical agent detector kit
  - real time analysis platform (RTAP)
  - fox, XM93, NBC reconnaissance system (NBCRS)
  - miniature continuous air monitoring system (MINICAMS)
  - automatic chemical agent alarm (ACAA)
- Understanding the importance of the concept of operations and work rules
- Understanding the medical requirements for workers wearing respiratory equipment
- What is a hazardous materials (HAZMAT) team?

### **Application**

Although ORNL prepared the *How Do I Know* document for CSEPP participants, any individual or organization needing basic knowledge and information can benefit from the use of these training materials (e.g., an organization starting a PPE Program, etc.). The document also provides pertinent references and addresses where more information can be found. This is especially helpful for the many individuals or organizations who do not know where to look for such references or are limited by time constraints.

This publication can also be used by HAZMAT teams who may potentially be exposed to chemical warfare agents, or by the regional terrorism response teams currently being assembled by FEMA, the Federal Bureau of Investigation (FBI), as well as other organizations. These response teams are being formed to respond to any act of terrorism, and the use of chemical warfare agents is a real possibility.

### **Future Work**

Future research will likely include a follow up document that focuses strictly on chemical warfare agent-related issues. Such a document could look more closely and provide more relevant detail useful for CSEPP as well as other individuals or organizations who may be called upon to respond to terrorist events involving those agents.

### **Conclusions**

CSEPP is a civilian community emergency preparedness program complementing the Department of Defense's initiative to destroy domestic stockpiles of aged chemical warfare munitions. FEMA, through its role in CSEPP, has developed a wide variety of training materials to address those issues important in responding to a HAZMAT incident involving chemical warfare agent accidents/incidents. The *How Do I Know* document described in this paper can



serve as a "stand alone" guide to help answer decision-makers questions concerning PPE-related issues.

Although ORNL staff prepared the *How Do I Know* document for CSEPP participants, any individuals or organizations such as HAZMAT teams or terrorism response teams, could benefit from the use of this document. Clearly the need for this information exists.