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ATTENTION EMERGENCY RESPONDERS

Guidance on Emergency Responder Personal Protective Equipment (PPE) for Response to CBRN Terrorism Incidents

DEPARTMENT OF HEALTH AND HUMAN SERVICES
CENTERS FOR DISEASE CONTROL AND PREVENTION
NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH

NIOSH

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Purpose

This guidance document provides local, State and Federal emergency response entities with comparison information on the Occupational Safety and Health Administration/ Environmental Protection Agency (OSHA/EPA) Protection Levels A, B, and C to Department of Homeland Security (DHS) adopted Personal Protective Equipment (PPE) performance based standards for response to terrorism incidents involving Chemical, Biological, Radiological, and Nuclear (CBRN) hazards

Definitions

CBRN: An abbreviation for chemicals, biological agents, and radiological particulate hazards.

CBRN terrorism agents: Chemicals, biological agents, and radiological particulates that could be potentially released as an act of terrorism. (See Chemical Terrorism Agents, Biological Terrorism Agents, Radiological Particulate Terrorism Agents).

Chemical terrorism agents: Liquid, solid, gaseous, and vapor chemical warfare agents and industrial chemicals used to inflict lethal or incapacitating casualties as a result of a terrorist attack.

Biological terrorism agents: Liquid or particulate agents that can consist of a biologically-derived toxin or pathogen used to inflict lethal or incapacitating causalities as a result of a terrorist attack.

Radiological particulate terrorism agents: Particles that emit ionizing radiation in excess of normal background levels, used to inflict lethal or incapacitating casualties as a result of terrorist attack.

Background

Proper selection of PPE for individual responders must be based upon a careful assessment of two factors: (1) the hazards anticipated to be present, or are present at the scene and (2) the probable impact of those hazards, based upon the mission role of the individual. The emergency responder must be provided with appropriate respiratory and dermal protection from suspect or known CBRN hazards. The amount of protection required is material and hazard specific. Physical and durability properties for PPE must meet or exceed minimum requirements for operations at a CBRN terrorism incident scene. The selection of appropriate PPE is the responsibility of the Incident

Commander and/or the on-scene Safety Officer. A written personal protective equipment program must be established in accordance with the Hazardous Waste Operations and Emergency Response Standard (HAZWOPER), Title 29, Code of Federal Regulations (CFR), Part 1910.120.

Appendix B of the HAZWOPER standard defines the OSHA/EPA Protection Levels A, B, and C as follows:

- **Level A**—To be selected where the hazards are unknown or unquantifiable or when the greatest level of skin, respiratory and eye protection is required
- **Level B**—The highest level of respiratory protection is necessary but a lesser level of skin protection is needed
- **Level C**—The concentration(s) and type(s) of airborne substances is known and the criteria for using air-purifying respirators are met

However, the description of these levels do not specify minimum performance criteria of protective clothing and respirators required for specific threats, such as chemical permeation resistance and the contaminants' physical properties and characteristics. The use of these general "levels" of protection does not assure that the wearer is adequately protected from CBRN specific hazards. The HAZWOPER standard itself states that the generic descriptions of the equipment do not fully address the performance of PPE in relationship to specific needs.

Relying solely on PPE being marketed on the basis of OSHA/EPA PPE levels could result in exposure levels above acceptable limits, or an unnecessary reduction in operational effectiveness through lack of mobility, decreased dexterity, or reduced operational mission duration.

Currently, no single personal protective ensemble can protect the wearer from exposure to all hazards. It is important that the appropriate combination of respirator, protective ensemble and other equipment be selected based on a conclusive hazard assessment at the scene. This guidance document provides information on NIOSH CBRN respirator standards and NFPA protective ensembles standards that establish minimum performance requirements for PPE for use in CBRN terrorism incident response.

Personal Protective Equipment Performance Standards

NIOSH CBRN Respirator Performance Standards

The National Institute for Occupational Safety and Health (NIOSH) has developed performance appropriate standards and test procedures for all classes of respirators

that will provide respiratory protection from chemical, biological, radiological and nuclear (CBRN) agent inhalation hazards. These NIOSH CBRN respirator standards can be accessed at www.cdc.gov/niosh/npptl/standardsdev/cbrn/.

NIOSH Statement of Standard for CBRN Open-Circuit Self-Contained Breathing Apparatus (SCBA)

The purpose of this standard is to specify minimum requirements to determine the effectiveness of open-circuit, positive-pressure self-contained breathing apparatus (SCBA) used during entry into a CBRN atmospheres at or above Immediately Dangerous to Life or Health (IDLH), or entry into unknown atmospheres.

- Approval under NIOSH 42 CFR Part 84, Subpart H
- Compliance with NFPA 1981 Standard on Open-Circuit Self-Contained Breathing Apparatus for Emergency Services
- Special Tests under NIOSH 42 CFR 84.63(c)
    1. Chemical Agent Permeation and Penetration Resistance Against Distilled Sulfur Mustard (HD) and Sarin (GB)
    2. Laboratory Respirator Protection Level (LRPL)

NIOSH Statement of Standard for CBRN Full Facepiece Air-Purifying Respirator (APR)

The purpose of this standard is to specify minimum requirements to determine the effectiveness of full facepiece air-purifying respirators (APR) used during entry into CBRN atmospheres not Immediately Dangerous to Life or Health (IDLH).

NIOSH Statement of Standard for CBRN Power Air-Purifying Respirators (PAPR)

The purpose of this standard is to specify minimum requirements to determine the effectiveness of tight-fitting and loose-fitting power air-purifying respirators (PAPR) used during entry into a CBRN atmosphere not Immediately Dangerous to Life or Health (IDLH).

The National Institute for Occupational Safety and Health (NIOSH), under the authorization of the Occupational Safety and Health Act of 1970, provides a testing approval and certification program assuring commercial availability of safe respiratory protective devices. The NIOSH Certified Equipment List (CEL) is available in an internet searchable format at www.cdc.gov/niosh/npptl/topics/respirators/CEL/default.html.

National Fire Protection Association (NFPA) Protective Clothing and Equipment Performance Standards

NFPA 1991 Standard on Vapor-Protective Ensembles for Hazardous Materials Emergencies, 2005 Edition

The purpose of this standard is to establish a minimum level of protection for emergency response personnel against adverse vapor, liquid-splash, and particulate environments during hazardous materials incidents and from specific chemical and biological terrorism agents in vapor, liquid-splash, and particulate environments during CBRN terrorism incidents. The ensemble totally encapsulates the wearer and self-contained breathing apparatus (SCBA).

NFPA 1994 Standard on Protective Ensembles for First Responders to CBRN Terrorism Incidents, 2007 Edition

NFPA 1994 sets performance requirements for protective ensembles used in response to CBRN terrorism incidents. The standard defines three (3) classes of ensembles (Class 2, 3, and 4) based on the protection required for different hazard types (vapors, liquids, and particulates) and airborne contaminant levels. Selection of the appropriate ensemble class must be based on a thorough risk assessment in accordance with OSHA Regulation 29 CFR 1910.120 (HAZWOPER) and 29 CFR 1910.132 – Personal Protective Equipment Standard. All NFPA 1994 ensembles are intended to be disposable after a single exposure use. Ensembles consist of garments, gloves, and footwear tested and certified as a protective system with a manufacturer specified (make and model) CBRN respiratory protective device

Class 2 ensembles are intended for use at terrorism incidents involving vapor or liquid chemical or particulate hazards where the concentrations are at or above IDLH level requiring the use of CBRN compliant self-contained breathing apparatus (SCBA).

Class 3 ensembles are intended for use at terrorism incidents involving low levels of vapor or liquid chemical or particulate hazards where the concentrations are below IDLH, permitting the use of a CBRN compliant air-purifying respirators (APR) or power air-purifying respirator (PAPR).

Class 4 ensembles are intended for use at terrorism incidents involving biological or radiological particulate hazards where the concentrations are below IDLH levels permitting the use of CBRN compliant APR or PAPR. The ensembles are not tested for protection against chemical vapor or liquid permeability, gas-tightness, or liquid integrity.

NFPA 1951 Standard on Protective Ensembles for Technical Rescue Operations, 2007 Edition

The NFPA 1951, 2007 Edition contains performance requirements for a CBRN Technical Rescue Protective Ensemble for use during entry into CBRN atmospheres not Immediately Dangerous to Life of Health (IDLH). This CBRN protective ensemble category defines limited protection requirements for operational settings where exposure to physical, thermal, liquid, and body fluid-borne pathogen hazards and CBRN agents in vapor, liquid-splash, and particulate forms could be encountered.

NFPA 1971 Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting, 2007 Edition

The NFPA 1971, 2007 Edition includes optional protection from CBRN hazards. Only complete ensembles certified as compliant with these additional optional requirements provide this specified level of CBRN protection. The protection levels set in the NFPA 1971 CBRN option are based on the Class 2 requirements contained in NFPA 1994.

Comparison of Respirator and Ensemble Combinations to OSHA/EPA Levels

The following table provides comparison information to assist emergency responders, health and safety professionals, and others in transitioning from Levels A, B, and C to standards-based terminology. Because the OSHA/EPA levels are expressed in general terms, it is not possible to "map" the levels to specific standards. However, it is possible to look at specific standards-based ensembles and establish their level based on the standards defined above. Combinations of NIOSH-approved CBRN respirators and ensembles that are certified as compliant with NFPA CBRN protective requirment are compared to corresponding OSHA/EPA levels in the Table 1.

Table 1. Ensemble description using performance-based standards

Ensemble description using performance-based standard(s)	OSHA/EPA level
NFPA 1991 (2005 Edition) worn with NIOSH CBRN SCBA	A
NFPA 1994 (2007 Edition) Class 2 worn with NIOSH CBRN SCBA	B
NFPA 1971 (2007 Edition) with CBRN option worn with NIOSH CBRN SCBA	B
NFPA 1994 (2007 Edition) Class 3 worn with NIOSH CBRN APR/PAPR	C
NFPA 1994 (2007 Edition) Class 4 worn with NIOSH CBRN APR/PAPR	C
NFPA 1951 (2007 Edition) CBRN technical rescue ensemble worn with NIOSH CBRN APR/PAPR	C

Department of Homeland Security (DHS) Grant Guidance and InterAgency Board (IAB) Information

The DHS sponsored Responder Knowledge Base (www.rkb.us) contains the following information:

- Homeland Security Grant Program—Program Guidance and Application Kit document. A direct link to the DHS Homeland Security Grant Program is www.ojp.usdoj.gov/odp/grants_hsgp.htm
- Information on related standards, certifications, and products

Following the IAB recommendations, and in accordance with Homeland Security Presidential Directive (HSPD) 8, the Fiscal Year 2007 Grant Guidance from the DHS —Office of Grants and Training defines eligible personal protective equipment (PPE) in terms of compliance with Federal and nationally recognized standards. These standards require Federal or third-party certification and products can not claim compliance with them unless fully certified in accordance with the applicable standard. The product must be labeled to show compliance with the appropriate standard.

The mission of the IAB includes endorsement for the development of hazard-based protective clothing and equipment performance standards. This includes performance standards for respiratory protective equipment, protective ensembles, garments, boots, and gloves for protection against CBRN threats. Section 1 of the IAB's Standard Equipment List (SEL) defines the hazardous environments for chemical, biological, radiological, thermal, explosive, and ballistic threats. The IAB has also defined emergency responder mission roles in categories of law enforcement, fire department, emergency medical services, follow-on responders, and special operations. The SEL provides a table that indicates the Federal, or consensus-based performance standards with which PPE should be compliant to assure appropriate protection against chemical, biological, radiological, nuclear, and explosive hazards (www.iab.gov/).

Information on Code of Federal Regulations (CFR), Interim Guidance Documents and Related Consensus Standards

OSHA Regulation 29 CFR 1910.120—Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard

This Federal regulation applies to five distinct groups of employers and their employees. This includes any employees who are exposed, or potentially exposed to hazardous waste including emergency response operations for releases of, or substantial threat of the release of, hazardous substances regardless of the location.

OSHA Regulation 29 CFR 1910.132—Personal Protective Equipment

This standard applies to personal protective equipment for eyes, face, head, and extremities and protective clothing, respiratory devices, and protective shields and barriers. The major requirements include: permissible practices; definitions; hazard assessment and equipment selection; training; and the proper care, maintenance, useful life, and disposal; program evaluation; and record keeping.

OSHA Regulation 29 CFR 1910.134—Respiratory Protection

The major requirements of this OSHA Respiratory Protective Standard include: permissible practices; definitions; respiratory protection program; selection of respirators; medical evaluations; fit testing; use, maintenance, and care of respirators; identification of filters, cartridges, and canisters; training; program evaluation; and record keeping.

NIOSH Regulation 42 CFR Part 84—Approval of Respiratory Protective Devices

The purpose of the NIOSH regulation is:

- To establish procedures and prescribe requirements that must be met in filing applications for approval by NIOSH of respirators or changes or modifications of approved respirators
- To provide for the issuance of certificates of approval or modifications of certificates of approval for respirators that have met the applicable construction, performance, and respiratory protection requirements set forth in this part
- To specify minimum requirements and to prescribe methods to be employed by NIOSH and by the applicant in conducting inspections, examinations, and tests to determine the effectiveness of respirators used during entry into or escape from hazardous atmospheres

EPA Regulation 40 CFR Part 311—Worker Protection

The EPA promulgated a standard identical to 29 CFR 1910.120 (OSHA's HAZWOPER Standard) to protect employees of State and local governments engaged in hazardous waste operations in States that do not have an OSHA-approved State plan.

OSHA/NIOSH Interim Guidance (February 2006): Chemical – Biological – Radiological – Nuclear (CBRN), Personal Protective Equipment Selection Matrix for Emergency Responders, Nerve Agents and Blister Agents

Nerve Agent: www.osha.gov/SLTC/emergencypreparedness/cbrnmatrix/nerve.html

Blister Agent: www.osha.gov/SLTC/emergencypreparedness/cbrnmatrix/blister.html

OSHA/NIOSH Interim Guidance (August 30, 2004): Chemical – Biological – Radiological – Nuclear (CBRN), Personal Protective Equipment Selection Matrix for Emergency Responders, Radiological Dispersal Devices (RDD)

Radiological Dispersal Devices (RDD):

www.osha.gov/SLTC/emergencypreparedness/cbrnmatrix/radiological.html

NFPA 1401: Recommended Practice for Fire Service Training Reports and Records, 2006 Edition

Includes training required by regulatory and/or other agencies such as the Occupational Safety and Health Administration (OSHA).

NFPA 1500: Standard on Fire Department Occupational Safety and Health Program, 2007 Edition

The purpose of this standard is to specify the minimum requirements for an occupational safety and health program. The requirements of this standard are applicable to organizations providing rescue, fire suppression, emergency medical services, hazardous materials mitigation, special operations, and other emergency services including public, military, private, and industrial fire departments.

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