



Interim Recommendations for Firefighters and Other First Responders for the Selection and Use of Protective Clothing and Respirators Against Biological Agents

from the National Institute for Occupational Safety and Health

The approach to any potentially hazardous atmosphere, including biological hazards, must be made with a plan that includes an assessment of hazard and exposure potential, respiratory protection needs, entry conditions, exit routes, and decontamination strategies. Any plan involving a biological hazard should be based on relevant infectious disease or biological safety recommendations by the Centers for Disease Control and Prevention (CDC) and other expert bodies including emergency first responders, law enforcement, and public health officials. The need for decontamination and for treatment of all first responders with antibiotics or other medications should be decided in consultation with local public health authorities.

This **INTERIM STATEMENT** is based on current understanding of the potential threats and existing recommendations issued for biological aerosols. CDC makes this judgment because:

- Biological weapons may expose people to bacteria, viruses, or toxins as fine airborne particles. Biological agents are infectious through one or more of the following mechanisms of exposure, depending upon the particular type of agent: inhalation, with infection through respiratory mucosa or lung tissues; ingestion; contact with the mucous membranes of the eyes, or nasal tissues; or penetration of the skin through open cuts (even very small cuts and abrasions of which employees might be unaware). Organic airborne particles share the same physical characteristics in air or on surfaces as inorganic particles from hazardous dusts. This has been demonstrated in military research on biological weapons and in civilian research to control the spread of infection in hospitals.
- Because biological weapons are particles, they will not penetrate the materials of properly assembled and fitted respirators or protective clothing.
- Existing recommendations for protecting workers from biological hazards require the use of half-mask or full facepiece air-purifying respirators with particulate filter efficiencies ranging from N95 (for hazards such as pulmonary tuberculosis) to P100 (for hazards such as hantavirus) as a minimum level of protection.
- Some devices used for intentional biological terrorism may have the capacity to disseminate large quantities of biological materials in aerosols.
- Emergency first responders typically use self-contained breathing apparatus (SCBA) respirators with a full facepiece operated in the most protective, positive pressure (pressure demand) mode during emergency responses. This type of SCBA provides the highest level of protection against airborne hazards when properly fitted to the user's face and properly used. National Institute for Occupational Safety and Health (NIOSH) respirator policies state that, under those conditions, SCBA reduces the user's exposure to the hazard by a factor of at least 10,000. This reduction is true whether the hazard is from airborne particles, a chemical vapor, or a gas. SCBA respirators are used when hazards and airborne concentrations are either unknown or expected to be high. Respirators providing lower levels of protection are generally allowed once conditions are understood and exposures are determined to be at lower levels.

Interim Recommendations for the selection and use of protective clothing and respirators against biological agents

When using respiratory protection, the type of respirator is selected on the basis of the hazard and its airborne concentration. For a biological agent, the air concentration of infectious particles will depend upon the method used to release the agent. Current data suggest that the self-contained breathing apparatus (SCBA) which first responders currently use for entry into potentially hazardous atmospheres will provide responders with respiratory protection against biological exposures associated with a suspected act of biological terrorism.

Protective clothing, including gloves and booties, also may be required for the response to a suspected act of biological terrorism. Protective clothing may be needed to prevent skin exposures and/or contamination of other clothing. The type of protective clothing needed will depend upon the type of agent, concentration, and route of exposure.

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Important first responder safety information

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Interim Recommendations for the selection and use of protective clothing and respirators against biological agents (continued)

- The interim recommendations for personal protective equipment, including respiratory protection and protective clothing, are based upon the anticipated level of exposure risk associated with different response situations, as follows:
- ✓ **Responders should use a NIOSH-approved, pressure-demand SCBA in conjunction with a Level A protective suit in responding to a suspected biological incident where any of the following information is unknown or the event is uncontrolled:**
 - the type(s) of airborne agent(s);
 - the dissemination method;
 - if dissemination via an aerosol-generating device is still occurring or it has stopped but there is no information on the duration of dissemination, or what the exposure concentration might be.
 - ✓ **Responders may use a Level B protective suit with an exposed or enclosed NIOSH-approved pressure-demand SCBA if the situation can be defined in which:**
 - the suspected biological aerosol is no longer being generated;
 - other conditions may present a splash hazard.
 - ✓ **Responders may use a full facepiece respirator with a P100 filter or powered air-purifying respirator (PAPR) with high efficiency particulate air (HEPA) filters when it can be determined that:**
 - an aerosol-generating device was not used to create high airborne concentration,
 - dissemination was by a letter or package that can be easily bagged.

These types of respirators reduce the user's exposure by a factor of 50 if the user has been properly fit tested.

Care should be taken when bagging letters and packages to minimize creating a puff of air that could spread pathogens. It is best to avoid large bags and to work very slowly and carefully when placing objects in bags. Disposable hooded coveralls, gloves, and foot coverings also should be used. NIOSH recommends against wearing standard firefighter turnout gear into potentially contaminated areas when responding to reports involving biological agents.

Decontamination of protective equipment and clothing is an important precaution to make sure that any particles that might have settled on the outside of protective equipment are removed before taking off gear. Decontamination sequences currently used for hazardous material emergencies should be used as appropriate for the level of protection employed. Equipment can be decontaminated using soap and water, and 0.5% hypochlorite solution (one part household bleach to 10 parts water) can be used as appropriate or if gear had any visible contamination. Note that bleach may damage some types of firefighter turnout gear (one reason why it should not be used for biological agent response actions). After taking off gear, response workers should shower using copious quantities of soap and water.

For additional information, visit the **NIOSH Web site at www.cdc.gov/niosh**
or call **NIOSH at 1-800-35-NIOSH (1-800-356-4674)**
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