

Technical Data Bulletin

OH&ESD

#182

Personal Protective Equipment and Residential Wildland Fire Cleanup

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Background

Personal protection in the aftermath of a wildland fire is a critical consideration of the cleanup process. Selection of Personal Protective Equipment (PPE), just one consideration, depends on both anticipated hazards and the task to be performed. For example, in home cleanup situations, the severity of damage and the age of the home must be considered in determining whether a hazard may be present and PPE is needed. In combination with safe work practices, selection and use of PPE encompasses the scope of personal protection at the cleanup site.

Individuals participating in clean-up efforts may represent a diverse group that includes both professional workers, volunteers and homeowners. Their knowledge and experience in the use of respiratory protection may vary significantly. At a minimum, a basic understanding of personal protective equipment is essential to everyone prior to initial use. For professional workers falling under the scope of OSHA, specific regulatory requirements are applicable. Volunteers and homeowners, who may not be covered by OSHA-compliant programs, should, at a minimum, be aware of basic information on the use and limitations of personal protective equipment and should follow the direction of local health authorities.

Cleanup Phases

Cleanup tasks are generally categorized based on the severity of damage to the home. Tasks and associated hazards can be grouped according to required cleanup phases or activities:

Demolition Phase – Includes homes that have been totally or partially damaged by fire. Tasks include demolition of any free-standing structures and removal of all fire-related building debris (e.g., ash, brick, glass, concrete, etc.).

Cleaning and Restoration Phase – Includes homes that are in the vicinity of the wildland fire. Damage is usually due to residual effects, such as smoke and soot, rather than from the fire. Tasks may include removal of damaged building materials such as carpeting and drywall, and general cleaning of structural surfaces.

Reconstruction Phase – Includes all tasks associated with rebuilding or restoring the home to its previous condition. May include both partial and complete rebuilds involving general construction tasks, such as framing, utility installations, drywalling, painting, etc.

Potential Cleanup Hazards

Numerous hazards may be present throughout the cleanup process. Prior to beginning the work, certain considerations unrelated to the fire

damage are necessary in order to obtain an accurate assessment of all potential hazards. The age of the home may suggest the potential for lead and asbestos exposures. Homes built prior to 1980 commonly used lead-based paint coatings and asbestos-containing insulation, decorative and fireproofing building materials. Other hazardous materials, such as pesticides and propane cylinders, are also common in residential areas.

Inhalation and skin contact with mold and mold spores is also a potential hazard during cleanup and restoration phases. In water-damaged homes, mold growth can occur in a relatively short time. Building materials (e.g., carpet, drywall, wood) that have been wet for more than 48 hours are a potential food source for mold.

Using properly qualified contractors to handle and remove materials that contain asbestos, lead, large amounts of mold or other hazardous substances is necessary in order to minimize exposures and resulting adverse health effects. Other potential hazards that may be encountered throughout the cleanup include:

- Inhalation, eye and skin contact with ash, soot and demolition dusts containing hazardous materials.
- Inhalation, eye and skin contact with cleaners and disinfectants used during the cleaning and restoration phase.

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- Inhalation of various nuisance dusts, paint/adhesive vapors, etc. throughout the reconstruction.
- Operation of carbon-monoxide producing equipment (e.g., pumps, generators, pressure washers) in confined or poorly ventilated areas.
- Electrical hazards due to work around downed power lines and overhead power lines.
- Ergonomic hazards resulting from the stress/strain/injury to hands, back, shoulders, and knees.
- Engulfment hazards in open excavation, trenches, and pits.
- Heat stress and cold stress due to work outdoors.
- Fall hazards due to working at elevated heights.
- Slip, trip and fall hazards due to work around unstable structures, wet and slippery surfaces, uneven terrain and steep grades.

Types of PPE

Preventative measures to address recognized hazards include both safe work practices and proper use of PPE. Safe work practices are typically designed to change worker behaviors and lessen the probability of a hazardous occurrence. The following describes the types of PPE that are available and their application to wildland fire cleanup.

Eye, head and face protection are intended to help reduce the risk of traumatic injury due to airborne dusts and falling or flying debris. Eye and face protection may include safety glasses, goggles and face shields. Use of safety glasses with side shields should be considered minimum protection at all cleanup sites. Unvented or indirectly vented safety

goggles may be used for dusty environments or situations where splashing may occur. Many are available for use with prescription eyewear. In all cases, select only protective eyewear that has the ANSI Z87 mark on the lens or frame. Face shields must be used in conjunction with safety glasses or goggles. Some full-facepiece respirators provide eye protection.

Protective helmets (sometimes referred to as “hard hats”) are classified under ANSI Z89.1-2003, based on the specific impact and electrical performance requirements they’re designed to meet. Impact performance is classified according to Type I and Type II helmets. The Type I helmet reduces the force of impact resulting from a blow only to the top of the head. A Type II helmet reduces the force of impact resulting from a blow to the top or sides of the head. Electrical performance is classified as Class G, Class E or Class C helmets. Class G (General) helmets reduce the danger of contact exposure to low voltage (tested at 2200 volts). A Class E (Electrical) helmet reduces the danger of exposure to high voltage conductors (tested at 20,000 volts). A Class C (Conductive) helmet is not intended to protect against contact with electrical conductors. Helmet selection depends on meeting the specific cleanup site needs.

Respiratory protection may be necessary in all phases of the wildland fire cleanup. Regardless of the task performed, use only NIOSH approved respirators. In general, to help reduce exposure to ash, soot and other nuisance type particles common to the cleanup, an N95 rated particulate respirator may be appropriate. N95 is a NIOSH

classification referring to the particulate filtration efficiency of the respirator (an N95 has at least 95% filtration efficiency). In addition to reducing particulate exposures, fire or smoke related odors may require a respirator with chemical cartridges (such as a half or full facepiece respirator with organic vapor / acid gas cartridges and a particulate filter). Disposable particulate respirators, also called filtering facepiece respirators, are available with a carbon layer built-in. This type of respirator will help reduce exposure to airborne dusts as well as provide nuisance odor relief.

These types of air purifying respirators do not filter all by-products of combustion, such as carbon monoxide and they do not supply oxygen. They should not be used when carbon monoxide levels are dangerous or if oxygen is below normal levels.

It is important to note that certain tasks may require a higher level of respiratory protection. Cleanups involving homes with potential lead, asbestos or mold contamination typically require a Class 100 filter (e.g., P100) with a negative pressure half or full facepiece respirator, or a Powered Air Purifying Respirator with high efficiency (HE) filters. OSHA has specific respirator requirements for both lead and asbestos that define the selection criteria. Respirator selection for mold is contained in EPA regulations. Considering the numerous residual hazards associated with all cleanup phases, consulting with the respirator manufacturer or a health and safety professional is advisable when seeking assistance selecting the most appropriate respirator for the task.

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Workplace/Occupational Applications

Respiratory protection can be an important part of a comprehensive effort to help reduce exposure to hazardous contaminants. However, in accordance with OSHA’s Respiratory Protection Standard 29 CFR 1910.134, a full respiratory protection program may be required. Program elements must address selection, employee training, fit testing, medical evaluations, maintenance and inspection, and record keeping. Users must understand respirator capabilities, as well as limitations, and follow the user instructions in order to receive the assigned level of protection. Misuse of any respiratory protection device may result in sickness or death.

Volunteers/Homeowners

Volunteers, and homeowners, should, at a minimum, be aware of basic information on the use and limitations of respirators. The following guidelines are offered for non-occupational users of respiratory protection during clean-up:

- Volunteers should check with the organization/agency to determine if they have a respirator program. If the organization is not providing respirators, ask if respiratory protection is needed for the anticipated work. Contact the local department of health or the respirator manufacturer if assistance is needed selecting a respirator.
- Wearing a respirator adds physical stress in the form of increased breathing resistance. If you have any doubts concerning your ability to wear a respirator, contact your physician. Discuss the type of work

you will be doing, the respirator you intend to use and the anticipated contaminants.

- Follow the respirator manufacturer’s instructions for proper respirator donning and doffing procedures. A user seal check is required each time the respirator is worn. Also check instructions to determine if there are any time use limitations for the respirator.
- For tight-fitting respirators to be effective, the user must be clean-shaven in the area where the respirator contacts the face. Hair, jewelry, scarves, etc. must not come between the respirator and the skin.
- If wearing a reusable half facepiece or full facepiece respirator, follow the respirator manufacturer’s recommendations for cleaning. Daily cleaning is typically recommended.

Other conditions, including work rate, physical condition, ambient temperature and humidity, should also be considered when making the personal decision to wear a respirator.

Homeowners interested in using respiratory protection should consult the CDC’s fact sheet titled “Wildfires: Health Threat from Wildfire Smoke”, <http://www.bt.cdc.gov/disasters/wildfires/facts.asp>. Information is also available from 3M’s Occupational Safety and Environmental Health Division’s web site www.3M.com/wildfires.

Hearing protection is usually necessary when operating heavy machinery or power tools. Both ear plugs and ear muffs are available. To evaluate the effectiveness of hearing protection devices, the Noise

Reduction Rating (NRR) is used. The NRR is the theoretical reduction (in decibels) that the hearing protection device (HPD) will provide when worn correctly. In the real world, noise reduction offered by the HPD is usually about one-third to one-half of the laboratory-derived value that the NRR is based upon. Although NRR values may vary between manufacturers for the same type of HPD, there may be very little difference in noise reduction under actual use conditions. Consideration of other factors, such as overall comfort, is probably as important when selecting a HPD.

Protective clothing, gloves, and boots, or “head to toe” protection, require consideration of the types of contaminants, environmental, and work conditions to be encountered. Selection criteria may need to address both chemical and physical protection, such as the following:

- **Site conditions** – Selection based on preventing skin contact, durability and keeping dry. The demolition phase, which typically will include wet and/or dirty conditions, may have the greatest need for head to toe protection. Consideration for clothing durability, including cut, puncture, abrasion and slip resistance, may also be necessary.
- **Heat stress** – Lighter weight clothing, such as disposable poly-coated coveralls, may be necessary for work in hot environments.
- **Cold stress** – Insulated clothing may be necessary for cold weather work.
- **Worker visibility** – Need for high visibility reflective materials in high traffic or low visibility areas (i.e., safety vests).

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- **Electrical hazards** – Need for specialized clothing, rubber gloves, dielectric boots and tools to prevent electrical related injuries.
 - **Task specific protective clothing** – Need for specialized equipment based on the task performed, such as welding and cutting.
- Consideration of specific OSHA regulations and for other types of safety-related equipment, such as fall protection, lockout/tagout, and confined space, may also be necessary in order to provide complete personal protection.
- Pre-planning for personal protection is essential at a wildland fire cleanup. An understanding of the hazards involved and the types of protective equipment available will help ensure worker safety is maintained.

Resources

Additional information on topics related to personal protection at a residential wildland fire cleanup may be obtained through the list of resources below.

3M, www.mmm.com/occsafety and www.mmm.com/wildfires

Cal/OSHA, http://www.dir.ca.gov/DOSH/Fire_Announcement.html, workplace hazards from the Southern California fires, and relevant links

United States HHS, <http://www.hhs.gov/californiafires/>, information on the 2007 California Wildfires.

NIOSH, <http://www.cdc.gov/niosh/topics/firefighting/>, Certified Equipment List (respirators), hazards specific to fighting wildfires

OSHA, www.osha.gov, health and safety standards and regulations for employers (e.g., respiratory protection, noise, asbestos, lead), safety related topics (heat stress/cold stress, mold, etc.)

AIHA, <http://www.aiha.org/Content/AccessInfo/consumer/>. Consumer brochures related to common household hazards (lead, mold, noise)

CDC, <http://www.atsdr.cdc.gov/asbestos/>, general information about asbestos

CDC, <http://emergency.cdc.gov/disasters/hurricanes/returnhome.asp>, information about returning home after a disaster

EPA, <http://www.epa.gov/iaq/molds/moldguide.html>, information about mold in the home

EPA, http://www.epa.gov/mold/mold_remediation.html, information on mold remediation in schools and commercial buildings

Manufacturers— product selection and application

Safety Supplier— product overview and availability, catalogs



Occupational Health and Environmental Safety Division

3M Center, Building 235-2E-91
St. Paul, MN 55144-1000

For more information, please contact:

3M Occupational Health and Environmental Safety Division (OH&ESD)

In the U.S., contact:

Sales Assistance
1-800-896-4223

Technical Assistance
1-800-243-4630

Fax On Demand
1-800-646-1655

Web site
<http://www.3M.com/OccSafety>

For other 3M products
1-800-3M HELPS

In Canada, contact:

3M Canada Company, OH&ESD
P.O. Box 5757
London, Ontario N6A 4T1

Sales Assistance
1-800-265-1840, ext. 6137

Technical Assistance (Canada only)
1-800-267-4414

Fax On Demand
1-800-646-1655

Web site
<http://www.3M.com/CA/OccSafety>

Technical Assistance In Mexico
01-800-712-0646
5270-2255, 5270-2119 (Mexico City only)

Technical Assistance In Brazil
0800-132333

Fax On Demand O.U.S. Locations
1-651-732-6530