

PPE for Volcanic Ash Exposures

Description

Volcanoes are found throughout the world. Typically, they form where tectonic plates come together. Examples include the volcanoes in the area, known as the Pacific Ring of Fire, which encircles the Pacific Ocean basin. They also may form where hot spots occur such as under Hawaii, Yellowstone National Park in the United States or under Iceland. Most of the world's volcanoes are considered to be extinct or dormant, with only a few actively erupting. It is possible, however, for a dormant volcano to become active and erupt with little advance warning. A volcanic eruption can range from being relatively gentle, such as Hawaii's Kilauea volcano historically, to causing widespread damage and impacts.

Hazards

Depending on the type of volcano and the force of the eruption, a number of different hazards may come from the volcano, including ash, gases and vapors and physical hazards such as lava and explosions. Ash is made from pulverized rock, minerals and glass and can vary in size from a gritty, abrasive, sometimes corrosive particle to a fine powder. Ash can range in color from light grey to black, but can also be pink.

Often, the most visible evidence of an eruption is the plume of ash released high into the atmosphere. This ash can travel long distances from the site of the eruption, often causing health and safety issues along the way as it settles back to the ground. Depending on the size of the eruption, ash can stay on the ground or in the air for months or even years after an eruption, being mobilized by wind and vehicles, unless there are active efforts to remove the ash or very heavy rainfall.

Health Effects

Exposure to volcanic ash can cause irritation to the eyes as well as the respiratory system. The gritty ash particles can scratch the cornea of the eye and could cause conjunctivitis, an inflammation that leads to redness, burning of the eyes, and photosensitivity. It is also common for ash to cause bloodshot, itchy eyes, producing tears, and for affected people to feel as though there are foreign objects stuck in the eye. For people with existing respiratory conditions such as asthma, emphysema or other chronic lung disease, exposure to ash may pose serious health risks. Ash particles can irritate the airways, causing them to contract more frequently which may make breathing more difficult in people with chronic lung conditions. Exposure to fine ash particles may also cause the lining of the airways to secrete more mucous, causing people to cough and breathe more heavily. People with asthma may experience a tightening of the chest, wheezing, and coughing. Healthy people may also experience discomfort in their airways and feel the need to cough.

Personal Protective Equipment (PPE)

The most effective way to reduce exposure, especially for people with particular susceptibilities (e.g., children and infants, older people and those with existing respiratory (lung) or cardiovascular (heart and blood vessels) disease) is to shelter somewhere that can be isolated from ash, ideally inside a building where you can stay indoors for some time, if necessary. If you are very concerned about your health, take advice from a health professional.



If you cannot remove yourself from the ash, you may make a personal decision to use respiratory protection (e.g., respirator), or may be advised to do so by governmental or humanitarian agencies. *The CDC and the International Volcanic Health Hazard Network (IVHHN) have both published guidance documents that provide information to help protect against the harmful effects from falling volcanic ash.*

Recommendations related to dealing with ash environments include:

- Wear long-sleeved shirts and long pants
- Use dust-rated goggles to protect your eyes
- Contact lenses can cause eye irritation and corneal scratches
- Dry sweeping can produce high levels of ash in the air and should be avoided. Consider lightly wetting ash before shoveling or sweeping outside. Never soak the ash with water as it will cake into a heavy, solid mass which is harder to clean up and may overload structures such as roofs. For inside surfaces, consider wiping with a damp cloth.
- Fine ash particles may make surfaces slippery so use caution to avoid slips and falls, especially when removing ash from a rooftop. Fall protection is highly recommended for licensed professionals while homeowners should only attempt ash removal with a roof rake from ground level.
- Wearing a light duty protective coverall while cleaning up ash outside can help prevent ash traveling indoors on clothing.
- Avoid driving in heavy ash. If you do have to drive, keep the car windows closed and do not operate the air conditioning system.
- Particulate respiratory protection (e.g. respirators), if worn properly, can help reduce the amount of ash you may breathe. IVHHN provides information on the effectiveness of different types of respirators and cloth materials (<http://www.ivhhn.org/ash-protection>). A government-approved particulate respirator can help reduce your exposure while you are outdoors or while you are cleaning up ash that has gotten indoors.
- Respirators approved by United States National Institute for Occupational Safety & Health (NIOSH), such as an N95 particulate filtering facepiece respirator or those meeting the requirements of the European Standards (EN), such as an FFP2 disposable respirator can help reduce exposures to particulates. Other countries have their own respirator approvals so please follow the guidance of local authorities. People with pre-existing medical conditions should check with their physician to ensure that they are healthy enough to wear a respirator.



Additional Resources

For further information concerning the use of personal protective equipment for volcanic eruptions, contact 3M. For more information on volcanoes and the hazards associated with them, contact your local emergency management office or one of the following agencies:

- International Volcanic Health Hazard Network (IVHHN) (<http://www.ivhhn.org/information>)
- Centers for Disease Control and Prevention (CDC) (<http://emergency.cdc.gov/disasters/volcanoes>)
- Federal Emergency Management Agency (FEMA) (http://www.fema.gov/media-library-data/20130726-1622-20490-0808/volcanoesfactsheet_finalrev.pdf)
- U.S. Geological Survey (https://volcanoes.usgs.gov/volcanic_ash/)
- World Health Organization (WHO) (<http://www.who.int/hac/techguidance/ems/volcanos/en/>)
- The Pan American Health Organization Regional Office of WHO (http://www.paho.org/english/dd/ped/te_volc.htm)

Personal Safety Division
3M Center, Building 235-2W-70
St. Paul, MN 55144-1000

3M PSD products are
occupational use only.

In United States of America
Technical Service: 1-800-243-4630
Customer Service: 1-800-328-1667
3M.com/workersafety
In Canada
Technical Service: 1-800-267-4414
Customer Service: 1-800-364-3577
3M.ca/Safety

© 3M 2018. All rights reserved.
3M is a trademark of 3M Company and
affiliates. Used under license in Canada.
All other trademarks are property
of their respective owners. Please
recycle. May 2018

