

## Personal Protective Equipment and Volcanic Ash Exposures

### Hazards

Depending on the type of volcano and nature and the force of eruption, a number of different hazards may come from the volcanic activity, including ash, gases and vapors, and physical hazards such as lava and explosions. Often, the most visible evidence of an eruption is the plume of ash released into the atmosphere. This ash can travel long distances from the site of the eruption, often causing health and safety issues as it travels and 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 and/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 lung and heart concerns (including children and the elderly), 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 cannot remove yourself from the ash, particulate respirators may be used to help reduce inhalation exposure. However, respirators must fit properly and be worn the entire time of exposure. They will not function as intended if facial hair or anything else comes between the face and the sealing surface of the respirator. Particulate respirators do not filter gases and vapors. Please see the packaging and User Instructions for more information on proper selection and use.

Various countries and regions have their own testing and certification requirements for filtering facepiece particulate respirators. The following classes all have approximately 94-95% filtration efficiency against particles per their relevant test method, and may be considered similar in the ability to filter volcanic ash:

- Australia/New Zealand - P2
- Brazil - FFP2
- China - KN95, KP95
- Europe - FFP2
- Japan - DS2, DL2
- India - BIS P2
- Korea - 1st class
- US NIOSH - N95, R95, P95

Please follow any applicable guidance from relevant health and safety authorities regarding respirator selection and use.

Most respirators are designed to fit adults, not children. People with pre-existing medical conditions should check with their physician to ensure that they are healthy enough to wear a respirator.

## IMPORTANT NOTE

Note: certified particulate respirators are different than surgical masks. Surgical masks are generally not designed to seal to the face, and they have lower particle filtration than approved respirators.

### Recommendations related to dealing with ash environments include:

- Wear long-sleeved shirts and long pants
- Use dust-rated goggles to help protect your eyes
- Be careful with contact lenses, which 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, and 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 climate control heating or air conditioning system.



## Additional Resources

For further information concerning the use of personal protective equipment in connection with 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) ([www.ivhhn.org/information](http://www.ivhhn.org/information))
- U.S. Centers for Disease Control and Prevention (CDC) ([www.cdc.gov/disasters/volcanoes/index.html](http://www.cdc.gov/disasters/volcanoes/index.html))
- U.S. Department of Homeland Security ([www.ready.gov/volcanoes](http://www.ready.gov/volcanoes))
- U.S. Geological Survey ([https://volcanoes.usgs.gov/volcanic\\_ash](https://volcanoes.usgs.gov/volcanic_ash))
- World Health Organization (WHO) ([www.who.int/hac/techguidance/ems/volcanos/en](http://www.who.int/hac/techguidance/ems/volcanos/en))
- The Pan American Health Organization Regional Office of WHO ([www.paho.org/disasters/index.php?Itemid=1171&lang=en](http://www.paho.org/disasters/index.php?Itemid=1171&lang=en))

**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](http://3M.com/workersafety)  
**In Canada**  
Technical Service: 1-800-267-4414  
Customer Service: 1-800-364-3577  
[3M.ca/Safety](http://3M.ca/Safety)

© 3M 2020. 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. February 2020

