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## Health Effects Associated with Volcanic Eruptions

### Background

On January 11, 2006, the Alaska Volcano Observatory recorded two discrete volcanic eruptions at the summit of Augustine Volcano at 4:44 AM and 5:13 AM.<sup>1</sup> On January 13, starting at 3:55 AM, a series of additional eruptions occurred.<sup>1</sup>

The purpose of this *Bulletin* is to inform healthcare providers of the principal hazards, health effects, and public health recommendations associated with volcanic eruptions.

### Volcanic Hazards

The main volcanic hazards include: ash and larger fragments that rain down from an explosion cloud; flows of hot ash, blocks, lava, and gasses that move down the slopes of a volcano; volcanic gases trapped in topographic depressions; mudslides; and tsunamis.<sup>2</sup>

### Health Effects<sup>3</sup>

#### Respiratory Problems

Respiratory symptoms resulting from the inhalation of volcanic ash depend on factors such as the concentration of total suspended particles in the air, the proportion of respirable particles (<10 µm in diameter) in the ash, frequency and duration of exposure, presence of free crystalline silica and volcanic gases or aerosols mixed with the ash, meteorological conditions, and host factors. Symptoms might include:

- nasal irritation and discharge;
- throat irritation and dry cough;
- discomfort while breathing;
- airway irritation among people with asthma or bronchitis (e.g., shortness of breath, wheezing, and coughing); and
- severe bronchitic symptoms (e.g., hacking cough, production of sputum, wheezing, or shortness of breath) among people with pre-existing chest complaints.

These short-term effects are not considered harmful for people who do not have pre-existing respiratory conditions.

#### Ocular Problems

Because volcanic ash is abrasive, people typically experience eye discomfort or irritation during and after ash fall, especially those who use contact lenses. Signs and symptoms might include:

- foreign particle sensation;
- painful, itchy, or bloodshot eyes;
- mucous discharge or tearing; and
- corneal abrasions or scratches.

Individuals with “dry eye syndrome” might also experience ailments due to the presence of ash. Chronic ocular effects have not been noted.

#### Skin Irritation

Minor skin irritations are sometimes reported following ashfall.

#### Accident Risk

1. Roof collapses: The weight of volcanic ash on roofs can lead to their collapse, especially if the ash is wet and the building is not designed to support a heavy load.
2. Accidents: Ashfall conditions limit visibility and make roads slippery, resulting in automobile accidents. Similarly, ash can make walkways slippery, resulting in falls. Shoveling heavy ash might result in back injuries.

### Recommendations

Clinicians should advise their patients to follow some basic precautions after a volcanic eruption that results in a substantial local ash deposit in the following ways.<sup>4</sup>

1. Close windows, doors, and fireplace/woodstove dampers, and minimize use of forced air heaters and air conditioners to prevent ash and gases from getting inside the home.
2. Replace or clean furnace filters frequently.
3. Use an N-95 disposable respirator (available at some hardware stores) while outdoors or while cleaning up ash that has gotten indoors; if an N-95 mask is not available, use a nuisance dust mask as an alternative.
4. Wear goggles while outdoors, or while cleaning up ash that has gotten indoors.
5. Keep your skin covered to avoid irritation from contact with ash.
6. Avoid driving.
7. Avoid drinking water that has ash in it.
8. Wet ash prior to clean-up to avoid resuspension of particulates.
9. Clear roofs of ash in excess of four inches.
10. Pay attention to warnings, and comply with instructions from local authorities (i.e., local health officials will inform the public when it is safe to go outside, drive, drink water, etc.).
11. Seek medical attention if substantial respiratory symptoms develop.

### References

1. Alaska Volcano Observatory. Available at: <http://www.avo.alaska.edu/>.
2. Buist AS, Bernstein RS. Health effects of volcanoes: an approach to evaluating the health effects of an environmental hazard. *AJPH*. 1986;76(3 Suppl):1-2.
3. Volcanic Ash: Effects & Mitigation Strategies. USGS. Available at: <http://volcanoes.usgs.gov/ash/health/index.html>.
4. Key Facts About Protecting Yourself After a Volcanic Eruption. CDC. Available at: <http://www.bt.cdc.gov/disasters/volcanoes/after.asp>.