

## Protective Measures for your Health

To reduce the health impacts of the hazards of sulfur dioxide, ash fall and vog, the following protective measures are effective to reduce exposure to all three types of emissions, unless otherwise noted. These are general recommendations from the American Lung Association of Hawai'i and supported by the Department of Health:

- Stay indoors and use an air conditioner if available.
- Reduce flow of outdoor air into homes by closing doors and windows.
- Avoid outdoor physical exertion (*especially important for the sensitive groups of children and individuals with pre-existing respiratory conditions such as asthma, emphysema, bronchitis, and chronic lung or heart disease*).
- Contact your doctor as soon as possible if any problems develop, as respiratory conditions might deteriorate rapidly in heavy sulfur dioxide or vog conditions.
- Always keep medications on hand and readily available.
- **For sulfur dioxide and vog only:** Drink plenty of liquids; warm liquids seem to work best.
- **For ash and vog only:** Most residential air cleaners/air purifiers are designed for removing dust and particulates. Good air purifiers would be helpful to reduce particulates in the air (vog and ash). These types of air cleaners are not effective in removing gases such as sulfur dioxide. Be careful what you buy.
- **For ash only:** Avoid ash fallout.
- **For ash only:** Masks, damp cloths or damp handkerchiefs to cover your mouth and nose are useful when protecting yourself from ash fallout. (These measures are not effective in removing gases such as sulfur dioxide). Mask use is for temporary relief and is not recommended for extended use. *If you find it difficult to breathe with a mask on, discontinue use.*

SULFUR DIOXIDE INFORMATION	
Condition	Recommended Response
<b>GREEN</b> (Trace)	<u>Sensitive Groups</u> <sup>1</sup> : Highly sensitive individuals may be affected at these levels <u>Everyone else</u> : Potential health effects not expected.
<b>YELLOW</b> (Light)	<u>Sensitive Groups</u> <sup>1</sup> : Avoid outdoor activity <u>Everyone else</u> : Potential health effects not expected, however actions to reduce exposure to vog may be useful
<b>ORANGE</b> (Moderate)	<u>Sensitive Groups</u> <sup>1</sup> : Avoid outdoor activity and remain indoors <u>Everyone else</u> : Potential health effects not expected, however actions to reduce exposure to vog may be useful
<b>RED</b> (High)	<u>Sensitive Groups</u> <sup>1</sup> : avoid outdoor activity and remain indoors <u>People experiencing respiratory-related health effects</u> : Consider leaving the area <u>Everyone else</u> : Avoid outdoor activity
<b>PURPLE</b> (Extreme)	<u>Sensitive Groups</u> <sup>1</sup> : Avoid outdoor activity and remain indoors <u>People experiencing respiratory-related health effects</u> : Leave the area and seek medical help <u>Everyone</u> : Leave the area if directed by Civil Defense

<sup>1</sup> Sensitive Groups = children, and individuals with pre-existing respiratory conditions such as asthma, bronchitis, emphysema, lung or heart disease.



# Emissions from Kīlauea Volcano



## Brief summary of hazards and protective measures

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Recent changes in activity at Halema'uma'u crater at the Kīlauea summit have increased the potential hazards for Hawai'i Island. These hazards include ashfall and higher levels of sulfur dioxide and vog.

Government and private agencies are working together to monitor these hazards and provide you with the best and most reliable information so you can minimize the risk to you and your family. Key contact information:

State Dept. of Health: 933-0917 Hilo  
322-1507 Kona

County Civil Defense: 935-0031

On the internet: <http://co.hawaii.hi.us/>

## Sulfur Dioxide (SO<sub>2</sub>)

Since late December, 2007, sulfur dioxide emissions from Halema'uma'u crater have been increasing. The increase was gradual but steady until March 12, when emissions increased greatly.

The major problem and the greatest danger of the emissions from the Halema'uma'u site is its close proximity to people. *It is expected that any area down wind of the vent site of Halema'uma'u can expect SO<sub>2</sub> levels to be higher than in previous years.* The areas affected and the exposure levels are so very difficult to predict as they are almost totally dependent on weather conditions, primarily wind direction and wind speed, as well as the varying SO<sub>2</sub> emission rate at Halema'uma'u Crater.

**Health effects:** Sulfur dioxide is irritating to the eyes, nose, throat and respiratory tract. Short-term exposure to elevated levels of SO<sub>2</sub> may cause inflammation and irritation, resulting in burning of the eyes, coughing, difficulty in breathing and a feeling of chest tightness. *"Sensitive groups" are children and those with pre-existing respiratory conditions such as asthma, emphysema, bronchitis, and chronic lung or heart disease.* These people are especially sensitive to SO<sub>2</sub> and may respond to very low levels in the air. Prolonged or repeated exposure to higher levels may be dangerous to children and persons with pre-existing respiratory conditions.

On the back of this brochure is a color-coded condition/response table for your reference. These color codes will be used when information is released on the current levels of SO<sub>2</sub> at various sites.

## Ash Fall

Volcanic ash is composed of fine rock particles erupted from the new vent in the Halema'uma'u crater. This volcanic ash is cooled when it falls to the ground so heat is not a hazard factor in residential areas. Size of ash from this emission at Halema'uma'u varies from grit-like to fine like talcum powder to particles so small they can be inhaled. Residents of Ka'u describe it as "like dust." Ash fall has recently been reported from the areas of Pahala, Na'alehu and South Point communities in Ka'u.

**Health effects:** The volcanic ash in the air comes in various sizes. In general, larger particles will fall out closest to the source, and the finer particles will be carried longer distances. Fine particles of ash can be inhaled into the lungs and cause chest discomfort with increased coughing.

Common short-term symptoms may include coughing and irritation. People with pre-existing respiratory conditions such as asthma, emphysema and bronchitis are more prone to the adverse effects of the ash fallout.

Common symptoms include the following:

- Runny nose and/or sore throat
- Worsening of pre-existing respiratory conditions
- Difficulty in breathing

Other potential health effects of exposure to ash may include eye and skin irritation.

## Vog

"Vog" is a very familiar term used in Hawai'i to describe the hazy conditions caused by volcanic emissions. Vog is the result of the gases being emitted into the air mixing with water vapor and very small particles, primarily sulfur compounds and sulfur dioxide. The SO<sub>2</sub> in vog is greatest

near the sources (Halema'uma'u and Pu'u 'O'o). SO<sub>2</sub> levels generally are reduced at greater distances from the source. For example, although vog haze may be heavy in West Hawai'i, the SO<sub>2</sub> levels are typically very low due to the distance away from the source at Kilauea. Consequently, impacts of small particulates are of greater concern than SO<sub>2</sub> in West Hawai'i. In communities near Kilauea, SO<sub>2</sub> emissions may be a greater concern than particulates (vog).

**Health effects:** Health effects from vog exposure vary greatly among individuals. People with pre-existing respiratory conditions such as asthma, emphysema and bronchitis are more prone to the adverse effects of the vog. Common symptoms include the following:

- Headaches
- Breathing difficulties
- Increased susceptibility to respiratory ailments
- Watery eyes
- Sore throat

## Emergency Plans

As a precautionary measure, family emergency plans should be developed so you will be prepared in the event winds carry higher levels of sulfur dioxide, ash, and/or vog into your neighborhood. A family emergency plan should include the following:

- A plan on leaving the area – this could be if evacuation is recommended, or if you are feeling health effects and make your own decision to go to a different area.
- A plan to secure your home, business, and property.
- Preparation of an evacuation kit.
- Plans for the care of your pets.

All household members should be familiar with the emergency plan.