



## **Hawai'i State Department of Health Frequently Asked Questions and Answers on Vog and Volcanic Emissions from Kilauea Volcano**

The Information provided here is based on available data and research and is subject to change.

### **Island of Hawai'i:**

Volcanic activity at Halema'uma'u and Pu'u O'o craters on the Kilauea volcano have created potential health hazards for Hawaii Island residents and especially those with respiratory conditions.

Government agencies are working together to monitor volcanic emissions and provide the most reliable information to help those affected make the best decisions for themselves and their families.

Changing and unpredictable conditions such as weather, wind direction and the amount of volcanic activity make it difficult to provide specific guidance for every situation. The Department of Health (DOH) advises Hawai'i island residents to get updates and advice on vog and volcanic emissions from the County of Hawai'i Civil Defense local radio broadcasts and their website at <http://www.hawaiicounty.gov/civil-defense>

### **All Other Islands:**

Residents of all other islands are not expected to be at risk for exposure to high sulfur dioxide (SO<sub>2</sub>) levels from Kilauea volcano emissions. The distance from the Kilauea volcano is too great for SO<sub>2</sub> to travel across the ocean in high enough levels to create health risks for people on islands other than Hawai'i. All islands have seen vog in the air from time to time due to special weather conditions and increased volcanic emissions.

### **Frequently Asked Questions:**

#### **What is vog?**

Vog is a term that refers to volcanic smog. It is the haze you may see in the air that is caused by a combination of weather, wind conditions and volcanic activity. Vog becomes thicker or lighter depending upon the amount of emissions from Kilauea volcano, the direction and amount of wind, and other weather conditions.

### **Is vog harmful to my health?**

People with pre-existing respiratory conditions (such as asthma or emphysema) are more likely to experience health effects from vog which may include: headaches, breathing difficulties, increased susceptibility to respiratory ailments, watery eyes, and sore throat.

On the island of Hawai'i:

Near Kilauea volcano, sulfur dioxide (SO<sub>2</sub>) gas is a major component of vog. SO<sub>2</sub> is an irritant gas that is usually removed or filtered out by the nasal passages in your nose. During moderate physical activity that triggers mouth breathing (such as a brisk walk) SO<sub>2</sub> can get deep into the airway and can make breathing difficult for some individuals, particularly those with asthma and other respiratory conditions.

### **What can I do to protect myself or prepare for possible health effects of vog?**

- If you have asthma or other respiratory conditions, keep your medication refilled and use your daily (controller) medication as prescribed. Have your emergency or evacuation medications available. If you don't have any medications, but feel you might need them, call your physician. Stay indoors, and close the windows and doors tightly; use an air conditioner with the outside vent closed so that it is recirculating inside air only.
- Avoid physical activity (especially outdoors) such as brisk walking or exercise.
- Drink liquids to avoid dehydration.
- If you are having asthma symptoms such as trouble breathing, increased coughing or chest tightness, contact your doctor or seek medical assistance. If you live on the island of Hawai'i, you should check for county civil defense advisories and consider leaving the area. Assume that your asthma may get worse during periods of high vog and SO<sub>2</sub> emissions.
- FOR VOG and ASH ONLY: A damp cloth, or a paper, gauze surgical or non-toxic dust mask may be helpful. BUT if you find it more difficult to breathe with the mask on, don't use it. THESE MASKS ARE NOT EFFECTIVE IN REMOVING GASES SUCH AS SULFUR DIOXIDE (SO<sub>2</sub>).

### **What is sulfur dioxide (SO<sub>2</sub>)?**

Sulfur dioxide (SO<sub>2</sub>) is a colorless gas and is often described as the "smell of burning sulfur". Emissions of SO<sub>2</sub> are largely from sources that burn fossil fuels, coal, and oil such as factories, power plants, motor vehicles, and construction. Other sources may be agricultural activities, fires, and volcanic emissions. The eruption of Kilauea Volcano on the Island of Hawai'i is a major source of SO<sub>2</sub>.

**What are the health effects of sulfur dioxide (SO<sub>2</sub>) and who is most at risk?** Sulfur dioxide is an irritant gas that is usually removed by the nasal passages in your nose. Moderate activity that triggers mouth breathing (such as a brisk walk) is needed for SO<sub>2</sub> to cause health problems. SO<sub>2</sub> is a health concern on the island of Hawai'i where levels are being watched by the DOH and Civil Defense.

- People with asthma who are physically active outdoors are most likely to experience the health effects of SO<sub>2</sub>. The main effect, even with a short exposure, is a narrowing of the airways (called bronchoconstriction). This may cause wheezing, chest tightness, and shortness of breath. Symptoms increase as SO<sub>2</sub> levels and/or breathing rates increase. When exposure to SO<sub>2</sub> stops, lung function typically returns to normal within an hour.
- At very high levels, SO<sub>2</sub> may cause wheezing, chest tightness, and shortness of breath even in healthy people who do not have asthma.
- No one knows the long-term health effects of exposure to SO<sub>2</sub> from volcanic emissions such as those from Kilauea although some studies are underway.

### **How do I protect myself from harmful exposure to SO<sub>2</sub>?**

The safest way to avoid exposures to significant levels of SO<sub>2</sub> is to leave the area. This is especially important for children and those with pre-existing respiratory conditions such as asthma, bronchitis, emphysema, lung or heart disease.

If you live on the island of Hawai'i, be sure and listen to or check on volcano emissions updates from the Hawai'i County Civil Defense. These updates include helpful information on SO<sub>2</sub> (see below). For more information on current protective measures issued by civil defense related to SO<sub>2</sub> exposure go to: <http://www.hawaiicounty.gov/civil-defense>

### **What is the “color code for SO<sub>2</sub> condition status”?**

The County of Hawai'i and DOH have worked together to form a color code system to help individuals and groups make decisions on protective actions based on SO<sub>2</sub> levels on the island of Hawai'i. More information on the color codes used for the Hawaii Short Term SO<sub>2</sub> Advisory are available at <http://www.hiso2index.info/assets/FinalSO2Exposurelevels.pdf>

To find out the current SO<sub>2</sub> level color code for the island of Hawai'i log on to the DOH webpage at <http://www.hiso2index.info/>

The color code is based on data from the SO<sub>2</sub> air quality monitoring stations located on the island of Hawaii. The color code chart can be found at <http://www.hiso2index.info/assets/FinalSO2Exposurelevels.pdf>

### **How do I find out what the SO<sub>2</sub> and particulate levels are in my area?**

The DOH website provides near real-time data from stationary air monitors statewide at <http://health.hawaii.gov/cab/> Click on “Hawaii Ambient Air Quality Data”

Air quality monitoring site maps are available at [hawaii.gov/health/environmental/air/cab/cabmaps/index.html](http://hawaii.gov/health/environmental/air/cab/cabmaps/index.html)

Information on real-time particulate data on the island of Hawai'i is available at the U.S. Environmental Protection Agency website [Airnow.gov](http://Airnow.gov).

### **What is volcanic ash?**

Residents on the Island of Hawai'i may see volcanic ash fall from Kilauea volcano. Ash fall was reported in the areas of Pahala and Na'alehu in Ka'u and described by residents there as “like dust.” In general, the larger particles of ash fall closer to the source of the volcanic emission and fine particles are carried longer distances.

### **Are there health effects from volcanic ash?**

Ash may include fine particulates that can be inhaled deeply in the lungs. Short-term exposure to ash can cause eye, nose and throat irritation. It is not known what kinds of long-term health effects breathing in ash can have on people. People with asthma, emphysema and other respiratory conditions are more prone to the adverse effects of volcanic ash fall that may include:

- Runny nose
- Sore throat
- Worsening of pre-existing respiratory conditions
- Difficulty breathing
- Eye and skin irritation

## **How do I protect myself from volcanic ash in the air?**

If visible ash is present:

- Dust or filter masks will help to minimize your exposure to ash.
- Children, the elderly and those with heart and lung problems should take special care to limit their exposure to ash particles. They should keep windows and doors closed, stay indoors when possible and avoid strenuous outdoor activities, like jogging, cycling or heavy yard work.

## **If I feel ill from vog, SO<sub>2</sub> or ash what should I do?**

- Consider leaving the area.
- Go indoors and close the windows and doors tightly.
- Use your medications as prescribed by your physician.
- Contact your doctor or seek immediate medical attention, especially if you have difficulty breathing.

Different people will react to different levels of SO<sub>2</sub>. If you are having difficulty breathing, are sneezing or coughing, have eye irritation, or other symptoms it is best to leave the area.

## **How safe is it to stay indoors when trying to avoid vog and SO<sub>2</sub> from the volcano?**

Staying indoors with doors and windows closed can help you avoid vog and SO<sub>2</sub> over a short-term period (e.g. one to several hours). This provides some protection against short term “peaks” or brief exposures to higher levels of SO<sub>2</sub> and vog.

An air conditioner may provide comfort, but will not filter out SO<sub>2</sub> from the air. If air-conditioning is used indoors during elevated volcanic emissions, set the unit to the air “re-circulation” or closed vent mode or setting to prevent the unit from pulling outdoor air into the home.

Remember that staying indoors in a sealed room without air flowing has its hazards. Be extra careful to keep fuel burning appliances turned off, and watch for the effects of heat on the elderly and others.

Over longer periods, the safest way to reduce exposure to elevated levels of SO<sub>2</sub> and vog is to leave the area. Listen to or check on volcano emissions updates from the U.S. Geological Survey Hawaiian Volcano Observatory and the Hawaii County Civil Defense Agency. These updates include information on condition status color codes related to SO<sub>2</sub> and recommendations for protecting yourself.

## **Are air cleaners effective for filtering vog and SO<sub>2</sub> in my home?**

Air cleaners are effective in removing particulates in vog from the air. The particulates in vog are thought to be the cause of many breathing problems. Air cleaners designed to filter particles are usually not effective in filtering out gases such as SO<sub>2</sub>.

There are air-cleaning device manufacturers that advertise equipment that has special sorbent materials and high-efficiency filters that may be effective in removing at least some gases in a room, including SO<sub>2</sub> for some models. However, DOH is not aware of studies that show the effectiveness of these air cleaners with sorbents for removing SO<sub>2</sub>, and does not have specific recommendations on their use.

## **Should I wear a mask to protect myself from breathing in SO<sub>2</sub> or particulates?**

An “N95-type” disposable dust/particulate mask plus eye protection (goggles/safety glasses) will provide protection from ash and reduce exposures to particulates, but will not provide protection from SO<sub>2</sub> or other gases. Many people may find it difficult to breathe while wearing a dust/particulate mask and should not use one.

The safest way to eliminate exposure to significant levels of volcanic particulates, vog, or gases such as SO<sub>2</sub> is to leave the area.

### **How does the DOH monitor air quality?**

The DOH maintains stationary ambient air quality monitors that measure SO<sub>2</sub> and fine particulate levels in Hilo, Kona, Mountain View, Ocean View, Pahala and Puna E (SO<sub>2</sub> & hydrogen sulfide) on the Island of Hawai'i. Air quality monitors are also located on Kauai, Maui and Oahu. To find out more about DOH's air quality monitoring, go to <http://health.hawaii.gov/cab>

### **Why does DOH monitor for sulfur dioxide (SO<sub>2</sub>) and not sulfuric acid (H<sub>2</sub>SO<sub>4</sub>)?**

Sulfur dioxide (SO<sub>2</sub>) is a regulated criteria pollutant for which there is an ambient air quality standard. Sulfuric acid (H<sub>2</sub>SO<sub>4</sub>) is not a criteria pollutant and there are no state air quality standards for it. DOH does periodic monitoring for H<sub>2</sub>SO<sub>4</sub> from the "laze" emissions from the Kalapana area on the island of Hawai'i.

On the island of Hawai'i, lava haze or "laze" is created when heat from lava entering the sea rapidly boils and vaporizes seawater, leading to a series of chemical reactions. The boiling and reactions produce a large white cloud that contains a mixture of hydrochloric acid (HCl) and concentrated seawater. Depending on the wind, the cloud may travel a short distance, but usually disperses over the ocean.

### **I have a catchment water system; can it be affected by volcano emissions?**

Yes. In areas affected by volcanic emissions, catchment systems collect very acidic water that can leach harmful contaminants such as lead from roofing and plumbing materials. Volcanic ash can also get into the water, cause contamination, and interfere with common water treatment methods such as filtration and chlorination.

Even when there is no volcanic activity, extra care should be taken when using water from rainwater catchment systems. For health and safety reasons, homeowners should NOT use catchment water for drinking or preparing food. County water spigots should be used instead as a safer water supply.

### **Is testing available for catchment system water?**

Yes. Catchment systems may be tested for lead and copper, once each year, through a subsidized program that costs about \$25 for testing of each sample plus shipping fees. Contact AECOS, Inc. at (808) 234-7770 to find out how a sample of your catchment water may be tested. Additional information on testing for catchment water can be found on the DOH website at <http://health.hawaii.gov/sdwb/raincatchment/>.

Local private labs may also be hired at an owner's expense for testing of contaminants other than lead and copper. Local labs can be found in the yellow pages of the telephone directory under "Laboratories, Analytical." Whenever possible, labs should be certified or approved for the specific drinking water contaminants being targeted.

### **Are fruits and vegetables grown in vog affected areas safe to eat or sell?**

Yes. Remember to wash them before eating to remove dirt and ash.

### **Is it safe to visit the volcano if I have a respiratory condition?**

It is safe to visit the park as long as the air monitors there indicate that the air quality is good. Pay attention to park warnings and follow park advisories available at [www.nps.gov/havo/](http://www.nps.gov/havo/) to protect your health.

## Related Topics:

Please click on the following links to learn more about related topics:

The DOH posts a notification whenever an air pollutant exceeds a federal standard. See the web page on Notification of Exceedances of the NAAQS:

(<http://health.hawaii.gov/cab/notifcaton-of-exceedance-of-a-national-ambient-air-quality-standard/>).

Hawaii Ambient Air Quality Data: (<http://health.hawaii.gov/cab/hawaii-ambient-air-quality-data/>) Please note that the data has not been validated for quality assurance and is provided for information only.

National Park Service – Hawaii Volcanoes National Park:

(<http://www.hawaiiiso2network.com>)

National Park Service - Hawaii Volcanoes National Park – Closed Area and Advisories:

([http://www.nps.gov/havo/closed\\_areas.htm](http://www.nps.gov/havo/closed_areas.htm))

USGS Volcano Hazards Program

(<http://volcanoes.usgs.gov/hazards/gas/volgaspollution.php>)

EPA AIRNow Hawaii web page

([http://airnow.gov/index.cfm?action=airnow.local\\_state&stateid+12&tab=0](http://airnow.gov/index.cfm?action=airnow.local_state&stateid+12&tab=0))

Hawaii Short Term SO<sub>2</sub> Alert Index (<http://www.hiso@index.info/>)

Vog Measurement and Prediction Project VMAP (<http://mkwc.ifa.hawaii.edu/vmap/hysplit/>)