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Health Effects

Is vog harmful to my health?

People with pre-existing respiratory conditions are more prone to adverse effects of vog which may include: headaches, breathing difficulties, increased susceptibility to respiratory ailments, watery eyes, and sore throat. The long-term health effects of vog are unknown.

On the island of Hawai'i:

Near Kilauea volcano, sulfur dioxide (SO₂) gas is a major component of vog. SO₂ is an irritant gas that is usually removed or filtered out by the nasal passages. During moderate physical activity that triggers mouth breathing (such as a brisk walk), SO₂ penetrates deeply into the airway and can produce difficulty breathing in 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 vent closed and air re-circulated if possible.
- 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 SO₂ 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 (SO₂). A mask is the least important of these suggestions.

What is sulfur dioxide (SO₂)?

Sulfur dioxide (SO₂) is a colorless gas and is often described as the "smell of burning sulfur". Emissions of SO₂ 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 SO₂.

What are the health effects of sulfur dioxide (SO₂) and who is most at risk?

Sulfur dioxide is an irritant gas that is usually removed by the nasal passages. Moderate activity levels that trigger mouth breathing (such as a brisk walk) are needed for SO₂ to cause health problems. SO₂ 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 SO₂. 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 SO₂ levels and/or breathing rates increase. When exposure to SO₂ stops, lung function typically returns to normal within an hour.
- At very high levels, SO₂ 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 SO₂ from volcanic emissions such as those from Kilauea.

How do I protect myself from harmful exposure to SO₂?

The safest way to avoid exposures to significant levels of SO₂ 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 condition status color codes related to SO₂ (see below). For more information on current protective measures issued by civil defense related to SO₂ exposure go to: <http://lavainfo.us/>

What is the "color code for SO₂ condition status"?

The County of Hawai'i and DOH have worked together to form a color code system to help individuals and groups take protective actions based on SO₂ levels on the island of Hawai'i. More information on the color code for SO₂ conditions status is available at co.hawaii.hi.us/cd/emissions_brochure.pdf.

To find out the current SO₂ level color code for the island of Hawai'i listen to your local radio station, or log on to the Hawai'i Civil Defense Agency (HCDA) webpage at co.hawaii.hi.us/cd/advisory.htm or lavainfo.us/. Call HCDA at 935-0031 or Department of Health at 933-0917(Hilo) or 322-1507(Kona) for more information.

The color code is based on a forecast of data and uses volcanic emission levels, weather, wind, and historical data. Although changing conditions make it difficult to predict protective measures, forecasting is intended to provide advanced warning and advice to help in prepare for an emergency.

SULFUR DIOXIDE INFORMATION

Condition	Recommended Response
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GREEN	<i>Sensitive Groups</i> ¹ : Highly
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(Trace) sensitive individuals may be affected at these levels.

Everyone else: Potential health effects not expected.

YELLOW (Light) *Sensitive Groups*¹: Avoid outdoor activity.

Everyone else: Potential health effects not expected, however actions to reduce exposure to vog may be useful.

ORANGE (Moderate) *Sensitive Groups*¹: Avoid outdoor activity and remain indoors.

Everyone else: Potential health effects not expected, however actions to reduce exposure to vog may be useful.

RED (High) *Sensitive Groups*¹: Avoid outdoor activity and remain indoors.

People experiencing respiratory-related health effects: Consider leaving the area.

Everyone else: Avoid outdoor activity

PURPLE (Extreme) *Sensitive Groups*¹: Avoid outdoor activity and remain indoors.

People experiencing respiratory-related health effects: Leave the area and seek medical help.

Everyone: Leave the area if directed by Civil Defense.

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

Real time data from DOH stationary air monitors located on the island of Hawai'i is available at the national website Airnow.gov.

The DOH website provides near real-time data from stationary air monitors statewide at

hawaii.gov/health/environmental/air/cab/index.html

Click on "Online Air Quality Data"

Air quality monitoring site maps are available at hawaii.gov/health/environmental/air/cab/cabmaps/index.html

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What is volcanic ash?

Residents on the Island of Hawai'i may see volcanic ash fall from Kilauea volcano. Ash fall was recently reported in the areas of Pahala and Na'alehu in Ka'u and described by residents there as being "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. The long-term health effects of breathing in ash are not known. People with asthma, emphysema and other respiratory conditions are more prone to the adverse effects of volcanic ash fall, which 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.
- 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, SO₂ or ash what should I do?

The American Lung Association recommends that individuals:

- 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 SO₂. 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 SO₂ from the volcano?

Staying indoors can lower your exposures to SO₂. An air conditioner will not filter out SO₂ from the air, but if air-conditioning is used during elevated volcanic emissions, set the unit to the air "re-circulation" (closed vent mode or setting) to prevent the unit from pulling outdoor air into the home.

Over longer periods, the safest way to eliminate exposures to elevated levels of SO₂ is to leave the area. Monitor volcano emissions updates from the Hawai'i County Civil Defense to learn information on condition status color codes related to SO₂ as well as recommendations for protecting yourself. For more information on protective measures issued by civil defense related to SO₂ exposure visit: <http://lavainfo.us/>

Are air cleaners effective for filtering SO₂ in my home?

Air cleaners designed to filter particles are not effective in filtering out gases such as SO₂. A few air-cleaning device manufacturers advertise equipment that has special absorbent materials and high-efficiency filters that may be effective in removing some gases in a room, including SO₂ for some models. However, DOH is not aware of studies that show the effectiveness of these air cleaners and does not have specific recommendations on their use.

Should I wear a mask to protect myself from breathing in SO₂ 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 SO₂ or other gases. Some people 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 SO₂ is to leave the area.

How does the DOH monitor air quality?

The DOH maintains stationary ambient air quality monitors that measure particulate levels in Hilo, Kona, Pahala and Mountain View stations on the Island of Hawai'i. Air quality monitors are also located on Maui and O'ahu. The DOH has monitoring stations for sulfur dioxide (SO₂) on the island of O'ahu and Hawai'i where the majority of industrial and volcanic SO₂ sources are.

Why does the DOH monitor for sulfur dioxide (SO₂) and not sulfuric acid (H₂SO₄)?

Sulfur dioxide (SO₂) is a regulated criteria pollutant for which there is an ambient air quality standard. Sulfuric acid (H₂SO₄) is not a criteria pollutant and there are no particular standards for it. DOH does periodic monitoring for H₂SO₄ 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, producing a series of chemical reactions. The reactions produce a large white plume that contains a mixture of hydrochloric acid (HCl) and concentrated seawater.

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

Yes. In areas impacted by volcanic emissions, catchment systems collect acidic water that can leach harmful contaminants such as lead from roofing and plumbing materials. Volcanic ash may also 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 relying on water catchment systems. For health and safety reasons, homeowners should NOT use rainwater catchment water for drinking or food preparation. 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://hawaii.gov/health/environmental/water/sdwb/raincatch/raincatch.html>

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 minimize exposure to dirt and residual 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/ to protect your health.