

Water Catchment Systems

Volcanic emissions can cause contamination of water in catchment systems. These emissions are the greatest cause of acid rain in Hawai'i. Gases released by the volcano, particularly sulfur dioxide, combine with water in the air to form a dilute sulfuric acid that falls to the earth as acid rain. This acid rain can contaminate the water in catchment tanks because acidity increases the possibility of lead leaching into your water system. The lead comes from lead headed nails, lead flashings, lead paint, and lead solder.

Ash fall can also contaminate the water in a catchment system. The ash particles can get into the water tank either by being washed off the roof when it rains or by falling directly into the storage tank if it does not have a solid cover.

The following suggestions may help protect you and your catchment system:

- The safest action is to temporarily disconnect pipe from roof, or use filters to block or remove ash.
- Avoid drinking or cooking with your catchment water if the quality is questionable.
- Be aware that ash may affect catchment pump and filter systems.
- Keep extra water sediment filters on hand in case of very heavy ash fall.

For your information, emergency water spigots have been established throughout the island. It is strongly advised that if the quality of your catchment water is questionable, use these spigots established by the Department of Water Supply for your drinking and cooking needs.

More information about water catchment can be found at:

<http://hawaii.gov/health/environmental/water/sdwb/raincatch/raincatch.html>

<http://www.eng.warwick.ac.uk/ircsa/factsheets/HawaiiRainHarv.pdf>

<http://volcanoes.usgs.gov/ash/water/index.html>

Agriculture

The recent increased volcanic activity at Kīlauea's Halema'uma'u crater has not only caused concern for human health and safety, but also for various farm activities, including livestock, food crops and nursery industries.

Livestock: The Hawai'i Department of Agriculture (HDOA) is advising ranchers in areas downwind of the volcano to closely monitor the health of their livestock and report any observations to HDOA as soon as possible at 974-6503 (Hilo) or (808) 483-7106 (Honolulu).

Ranchers are advised to:

- Be on the lookout for eye infections and gastrointestinal and respiratory problems in livestock.
- Ensure that an adequate supply of clean water is available.
- Consult with their veterinarians.

Agricultural Crops: Ash fall can have serious detrimental effects on agricultural crops depending on ash thickness, the type and growing condition of a crop, and timing and intensity of subsequent rainfall. Although crops that are under cover do have some protection, there is little that can be done to protect field crops from ash fall. Harvested crops should be thoroughly washed prior to consumption. Overhead irrigation of greenhouse nursery stock may be helpful to wash away ash and residue, and minimize chemical damage to flowers and foliage.

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.

Contact Information:

Hawai'i County Civil Defense Agency

(808) 935-0031

<http://lavainfo.us/>

<http://co.hawaii.hi.us/cd/index.htm>

USGS Hawaiian Volcano Observatory

(808) 967-8862 – Recording of Daily Activity Summary

(808) 967-7328 – Other questions related to volcanic activity

<http://hvo.wr.usgs.gov/>

Hawai'i Volcanoes National Park

(808) 985-6000

<http://www.nps.gov/havo>

State of Hawai'i Department of Health

(808) 933-0917 – Hilo

(808) 322-1507 – Kona

<http://hawaii.gov.health/>

State of Hawai'i Department of Agriculture

(808) 974-6503 – Livestock Disease Control Veterinarian

(808) 483-7103 – State Veterinarian

<http://hawaii.gov.hdoa>

American Lung Association of Hawai'i

(808) 935-1206

<http://www.ala-hawaii.org/>



Emissions from Kīlauea Volcano



Brief summary of hazards and protective measures

April 2008

(Second revision 4/08)

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 ash fall, higher levels of sulfur dioxide and vog.

A partnership has been formed among key agencies of your Federal, State and County governments with the private sector 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.

This guide has been developed to provide you with information on:

- These hazards and their health effects
- Protective measures
- Impact on catchment systems and agriculture
- How you will be kept informed
- How to contact various agencies to obtain additional information

Sulfur Dioxide (SO₂)

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 SO₂ 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 SO₂ 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 SO₂ 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 SO₂ 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.

A color-coded condition/response table for sulfur dioxide has been developed and is included in this brochure for your reference. These color codes will be used when information is released on the current levels of SO₂ at various sites.

How will the public be informed?

A system of daily public notification and emergency advisories has been established. Scheduled advisories will be made to inform you of the sulfur dioxide condition status. The condition status color codes shown at right have been established by the emergency response agencies, and will be used to keep you informed. The condition status will be determined based on sulfur dioxide reports from field monitoring systems and weather factors.

SULFUR DIOXIDE INFORMATION	
Condition	Recommended Response
GREEN <i>Trace</i>	<u>Sensitive Groups</u> ¹ : Highly sensitive individuals may be affected at these levels <u>Everyone else</u> : Potential health effects not expected.
YELLOW <i>Light</i>	<u>Sensitive Groups</u> ¹ : Avoid outdoor activity <u>Everyone else</u> : Potential health effects not expected, however actions to reduce exposure to vog may be useful
ORANGE <i>Moderate</i>	<u>Sensitive Groups</u> ¹ : 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
RED <i>High</i>	<u>Sensitive Groups</u> ¹ : 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
PURPLE <i>Extreme</i>	<u>Sensitive Groups</u> ¹ as well as <u>everyone else</u> : 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

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

The most important thing to understand about the SO₂ information codes is that **YOUR EMERGENCY RESPONDERS WILL USE THESE CODES, ESPECIALLY RED AND PURPLE, TO INFORM YOU OF A POTENTIALLY DANGEROUS LEVEL OF SO₂.** In the event that SO₂ reaches the red or purple level information will be given to the public utilizing all means available, including radio stations and field units.

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 SO₂ in vog is greatest near the sources (Halema'uma'u and Pu'u 'O'o). SO₂ levels generally are reduced at greater distances from the source. For example, although vog haze may be heavy in West Hawai'i, the SO₂ levels are typically very low due to the distance away from the source at Kilauea. In short, you cannot judge the amount of SO₂ in the air and its danger to you by how heavy the vog is. And it is important to know that the SO₂ level can be high with only light 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

Protective Measures for your Health

To reduce the health impacts of the hazards of sulfur dioxide, ash fall and vog, the following protective actions 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 become worse 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 are helpful to reduce particulates in the air (vog and ash). These types of air cleaners do not remove 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.*