

Documentation for Natural Event Excluded Data
Pahala, Hawaii Air Monitoring Station
AIRS ID 15-001-2016
FIRST QUARTER 2008 Exceedances of the 24-hour SO₂ NAAQS

I. Exceedances and Natural Event Flag

Station Name:	Pahala (PA16)	
AIRS ID:	150012016	
Address:	Ka'u High/Pahala Elementary School 96-3150 Pikake Street Pahala, Hawaii 96777	
Station start date:	August 10, 2007	
Exceedances of the 24-hour SO₂ NAAQS (0.14 ppm)		
Date	24-hour SO ₂ Block Average (ppm)	Date of Initial EPA Notification (E-mail to Catherine Brown, EPA Region 9)
3/19/08	0.149	3/20/08
3/30/08	0.182	3/31/08
3/31/08	0.154	4/1/08

The exceedances are flagged using the Natural Event Qualifier "C" for Volcanic Eruptions.

II. Description of Natural Event

A. Background

The Kilauea volcano on the island of Hawaii has been erupting almost continuously since 1983 typically emitting approximately 2,000 tons of SO₂ per day (*USGS Attachment 1*).

The SO₂ is being emitted from two vents located at the Halema'uma'u and Pu'u O'o craters (*USGS Attachment 2*). Prior to December 2007, approximately 200 tons of SO₂ came from the Halema'uma'u vent and 1,800 tons came from the Pu'u O'o vent. In late December 2007, the SO₂ emission rate began to increase; and on March 13, 2008, a new gas vent at Halema'uma'u increased the amount of SO₂ from this location ten-fold, from 200 to 2,000 tons per day (*USGS Attachment 3 and Photo Attachment 4*). The total amount of SO₂ being emitted from the two vents increased from 2,000 tons to approximately 4,000 tons per day.

B. Department of Health (DOH) Monitoring of Volcanic Emissions

The volcano is the single largest emission source in the state. The greatest impact is in communities from Hilo on the eastern side of the island, to Kona on the west (*see map Attachment 5*).

Prevailing winds from the northeast usually carry the SO₂ gas to nearby downwind communities such as Pahala. As the SO₂ gas travels around the southern end of the island, it interacts with other atmospheric constituents to form

particulates that affect communities farther away from the vents, such as Kona (*USGS Attachment 1*). When the winds shift to a southerly direction, the volcanic emissions, mainly as SO₂ gas, are carried to towns northeast of the volcano, such as Mountain View and Hilo.

Table 1 describes the locations, AQS ID, pollutants monitored, and start dates of the DOH stations established to monitor volcanic emissions.

Table 1: DOH Air Monitoring Stations for Volcanic Emissions

Station Name and Address	AQS ID	Pollutants Monitored	Start Date
Hilo 1099 Waianuenu Avenue Hilo, HI	150011006	SO ₂	March 1995
Kona Konawaena High School 81-1043 Konawaena School Road Kealahou, HI	150011012	SO ₂ PM _{2.5}	April 1997 March 13, 2008
Puna E 13-763 Leilani Avenue Pahoa, HI	150012010	SO ₂	February 2005
Pahala Ka'u High/Pahala Elementary School 96-3150 Pikake Street Pahala, HI	150012016	SO ₂ PM _{2.5}	August 10, 2007 April 11, 2008
Mountain View 17-860 Volcano Road Mt. View, HI	150012017	SO ₂ PM _{2.5}	December 4, 2007 April 11, 2008

III. Causal Relationship of Event to Exceedances

The Pahala station began operation in August 2007 and therefore, historical background data prior to the current eruptive phase which began in 1983 is not available. However, to demonstrate that the SO₂ exceedances at the Pahala station are directly related to volcanic emissions, the data can be compared to the SO₂ levels measured at four Oahu stations. Additionally, the exceedances can also be associated with the increased emissions from the new Halema'uma'u vent.

Most commerce and industry are located in the City and County of Honolulu, on the island of Oahu. Three of the four Oahu SO₂ stations (KA, WB, and MG) are located near Campbell Industrial Park, which includes two refineries and several major power generating facilities. The fourth station (DH) is located in downtown Honolulu. As the only MSA in the state, the City and County of Honolulu has a 2000 census population of over 800,000.

By comparison, the Ka'u district where Pahala is located had a 2000 census population of just under 6,000. The town of Pahala has a resident population of approximately 1,400. The main industry in this rural community is agriculture. Other than the volcano, there are no major sources of SO₂ in the area.

Table 2 are the one hour SO₂, wind direction (WD), and wind speed (WS) averages recorded at the Pahala station for the days that exceeded the 24-hour SO₂ NAAQS.

**Table 2: Daily Site Summary Reports: Pahala SO₂, WD, and WS Hourly Averages¹
March 19, 2008, March 30, 2008, and March 31, 2008**

Start Hour	March 19, 2008			March 30, 2008			March 31, 2008		
	SO ₂	WD	WS	SO ₂	WD	WS	SO ₂	WD	WS
0000	0.168	253	4.0	0.435	261	2.7	0.177	287	5.2
0100	0.215	185	3.9	0.238	276	4.2	0.115	293	3.9
0200	0.331	227	2.4	0.225	280	3.1	0.154	261	3.4
0300	0.466	283	2.6	0.157	292	3.5	0.269	293	4.4
0400	0.138	214	3.0	0.170	294	4.1	0.291	221	3.6
0500	0.074	291	2.6	0.392	203	4.3	0.519	229	7.5
0600	0.164	289	3.0	0.535	283	5.8	0.320	217	4.3
0700	0.192	265	2.6	0.508	246	5.0	0.240	203	3.6
0800	0.331	165	2.0	0.349	156	3.5	0.197	215	3.2
0900	0.206	124	6.4	0.091	93	8.3	0.142	97	8.8
1000	0.019	103	12.6	0.071	96	9.9	0.072	106	10.9
1100	0.075	100	10.4	0.067	97	8.7	0.027	107	10.4
1200	0.038	98	10.2	0.022	100	8.8	0.040	103	10.7
1300	0.019	98	8.8	0.024	98	9.0	0.030	97	14.4
1400	0.008	99	8.4	0.004	99	8.1	0.020	99	9.6
1500	0.009	92	7.9	0.003	101	7.6	0.010	112	7.2
1600	0.024	93	7.6	0.015	101	8.6	0.007	104	8.4
1700	0.027	90	5.1	0.051	92	6.5	0.018	97	8.5
1800	0.047	95	3.9	0.144	173	2.8	0.028	114	6.0
1900	0.025	130	2.5	0.164	229	3.2	0.199	191	4.3
2000	0.051	138	2.9	0.160	299	3.3	0.180	222	3.5
2100	0.293	99	4.6	0.147	250	3.2	0.257	153	5.1
2200	0.468	212	3.2	0.203	308	4.4	0.152	232	3.6
2300	0.178	279	4.6	0.182	289	3.3	0.245	196	4.4
24-hr Ave	0.149	168	5.2	0.182	197	5.5	0.154	177	6.5

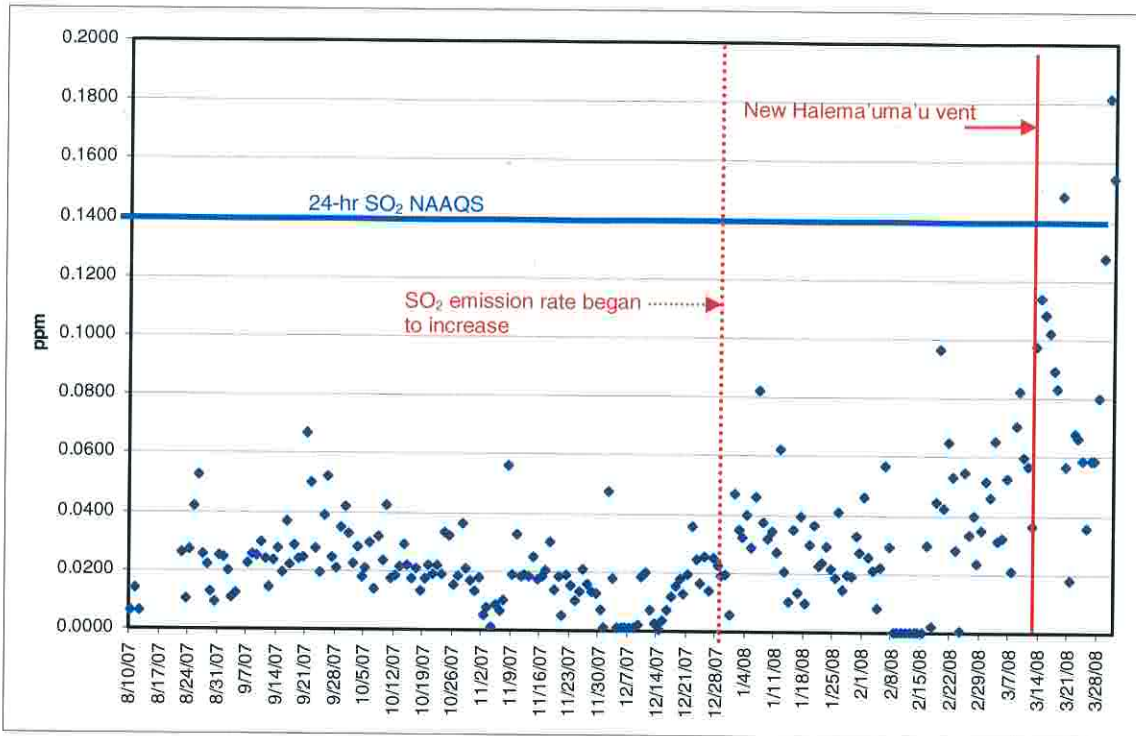
¹ SO₂ in ppm; WD in degrees; WS in mph

Although localized wind patterns at the station were predominantly from the southeasterly or southwesterly directions, the predominant wind direction at the volcano was from the northeast for all three days (*Weather Underground Attachment 6*). As described earlier, the northeast winds will carry the plume towards Pahala.

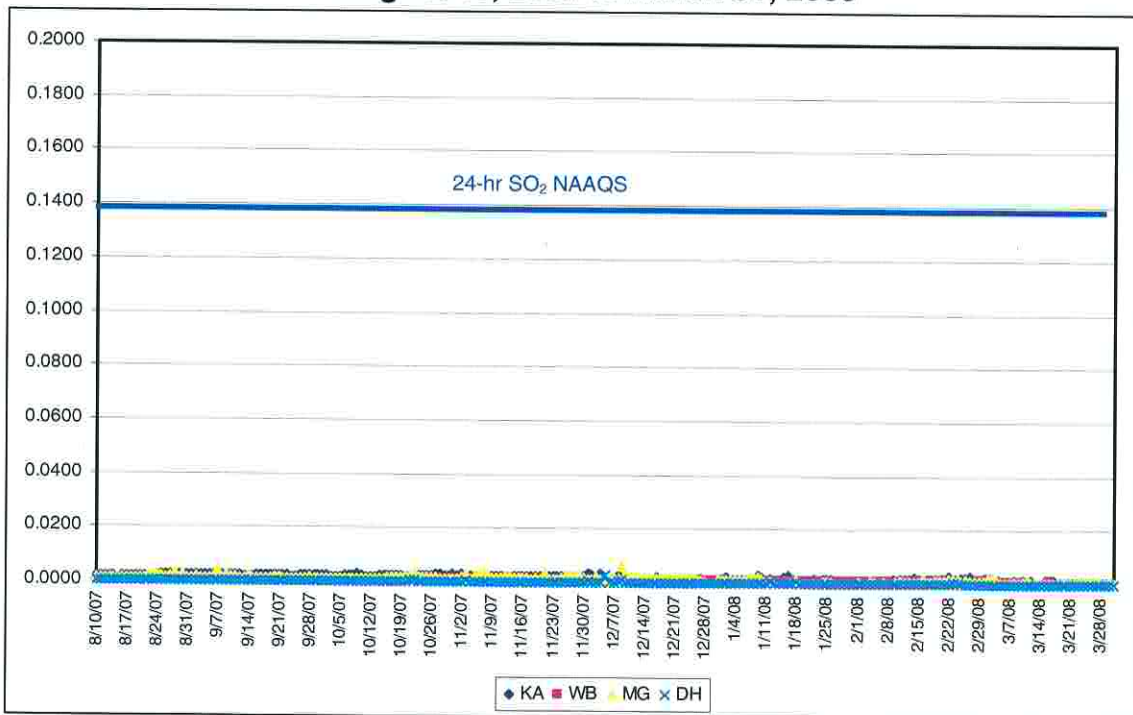
Figure 1 illustrates the 24-hour SO₂ averages at the Pahala station since it began on August 10, 2008. As expected, SO₂ levels are elevated at this location, however, the graph clearly shows that the exceedances occurred after the new Halema'uma'u vent opened on March 13, 2008.

Figure 2 shows the 24-hour SO₂ levels measured at four Oahu monitoring stations during the same period from August 10, 2007 to March 31, 2008. A comparison between graphs 1 and 2 demonstrates how the volcano, as the single largest SO₂ emitter in the state, impacts ambient air in nearby communities such as Pahala.

**Figure 1: 24-Hour SO₂ Averages at Pahala (150012016)
August 10, 2007 to March 31, 2008**



**Figure 2: 24-Hour SO₂ Averages at Oahu Monitoring Stations
KA (150030010); WB (150030011); MG (150031006); and DH (150031001)
August 10, 2007 to March 31, 2008¹**



¹The 2008 data has not been validated and is subject to change.

IV. Public Notification

Public notifications of these exceedances were provided for immediate media release. In *Attachment 7* are the DOH press releases and various news articles regarding this event:

- 1) DOH press release dated March 20, 2008 for the March 19, 2008 exceedance
- 2) DOH press release dated April 1, 2008 for the March 30 and March 31, 2008 exceedances
- 3) Honolulu Advertiser newspaper article (daily distribution statewide): "*Big Island warned of higher sulfur dioxide levels.*" March 21, 2008.
- 4) Honolulu Star Bulletin newspaper article (daily distribution statewide): "*Fire in the hole.*" March 21, 2008.
- 5) Honolulu Advertiser newspaper article: "*Officials worry about billowing volcanic gas.*" March 27, 2008.
- 6) The EPA also posted a link on AirNOW regarding the SO₂ health advisories for the volcano. This greatly assisted in getting the message out to those planning a trip to Hawaii.

V. Public Education

Due to the potential public health emergency of extremely high SO₂ levels affecting communities near the volcano, the Big Island Emergency Operations Center (EOC) was activated. The EOC consists of representatives from the Hawaii County, Civil Defense, DOH, and the Fire Department.

Included in *Attachment 8* are some of the public education materials produced since this event occurred:

- 1) The Hawaii County Civil Defense, with input from various agencies, published a brochure on "Emissions from Kilauea Volcano" that was distributed to the affected public. The brochure briefly summarizes the hazards and measures that the public can take to protect themselves from the harmful effects of increased levels of SO₂.
- 2) The Hawaii County Civil Defense posts a media update about the volcano on its web site at www.hawaii-county.com/cd/message.htm. The message is updated with health advisories as needed.
- 3) A health advisory about SO₂ was also placed on the DOH webpage: "*Precautionary Measures for Elevated Sulfur Dioxide Levels on the Big Island.*"
- 4) The American Lung Association of Hawaii also provides links to volcano and health advisory updates on their web site at www.ala-hawaii.org.

U.S. GEOLOGICAL SURVEY—REDUCING THE RISK FROM VOLCANO HAZARDS

Volcanic Air Pollution—A Hazard in Hawai‘i

Noxious sulfur dioxide gas and other pollutants emitted from Kīlauea Volcano on the Island of Hawai‘i react with oxygen and atmospheric moisture to produce volcanic smog (vog) and acid rain. Vog poses a health hazard by aggravating preexisting respiratory ailments, and acid rain damages crops and can leach lead into household water supplies. The U.S. Geological Survey’s Hawaiian Volcano Observatory is closely monitoring gas emissions from Kīlauea and working with health professionals and local officials to better understand volcanic air pollution and to enhance public awareness of this hazard.

On the morning of February 8, 2000, Harry Kim, Director of Hawai‘i County Civil Defense, asked radio stations on the Island of Hawai‘i to broadcast a special message concerning the thick, acrid haze that had covered the southeastern part of the island for several days. Listeners were told that outdoor activities in parks might be canceled in affected areas and that schools might need to keep children indoors. People were also warned to be aware of respiratory problems, as these conditions could deteriorate more rapidly in areas of heavier haze. This choking haze was not caused by a forest fire or industrial pollution but by light winds blowing gas emissions from Kīlauea Volcano into the area.

Best known for its spectacular lava fountains and flows, Kīlauea also emits about 2,000



Kīlauea Volcano on the Island of Hawai‘i emits about 2,000 tons of sulfur dioxide (SO₂) gas each day during periods of sustained eruption. Air pollution caused by SO₂ and other volcanic gases became a frequent problem on the island in mid-1986, when the volcano’s ongoing eruption, which began in 1983, changed from episodes of spectacular lava fountaining (shown here) to a nearly constant but quiet outflow of lava and gas. Inset shows U.S. Geological Survey scientists sampling volcanic gases from Kīlauea.

tons of irritating sulfur dioxide (SO₂) gas each day during periods of sustained eruption. Deep inside the volcano, where pressure is high, the SO₂ is dissolved in molten rock (magma). When the magma rises toward the surface, where pressure is lower, the gas bubbles out and escapes.

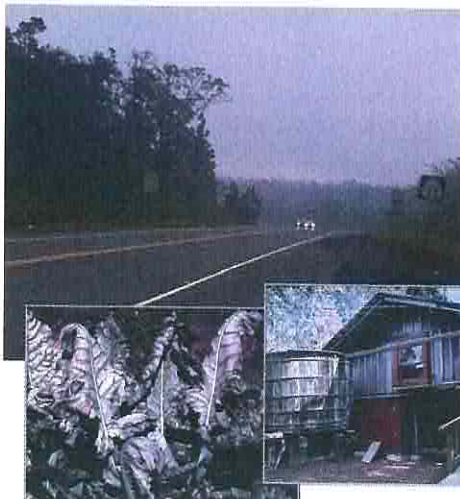
Air pollution caused by SO₂ and other gases emitted from Kīlauea became a frequent problem on the Island of Hawai‘i in 1986. Until that time, the volcano’s ongoing eruption, which began in 1983, consisted of short, spectacular episodes of lava fountaining about once every 3 weeks. Since mid-1986, the flow of magma to the surface has been more steady, producing a nearly constant but quiet outflow of lava and gas. People in areas downwind of the volcano began reporting a wide range of problems, including reduced visibility, health complaints,

and damage to crops. The word “vog,” an abbreviation for volcanic smog, was coined to identify this form of air pollution, which unfortunately has become a part of everyday life for people in Hawai‘i.

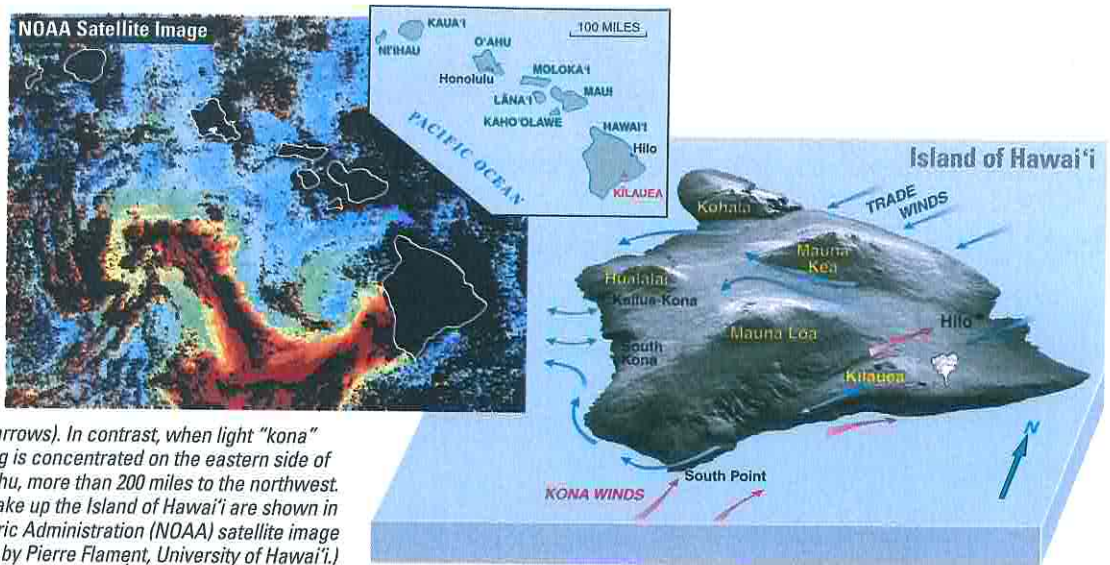
Vog is created when SO₂ and other volcanic gases combine and interact chemically in the atmosphere with oxygen, moisture, dust, and sunlight over periods of minutes to days. Vog is a visible haze consisting of gas plus a suspended mixture of tiny liquid and solid particles, called aerosol. The aerosol in vog is composed primarily of sulfuric acid and other sulfate compounds. Small amounts of several toxic metals, including selenium, mercury, arsenic, and iridium, have also been found in the volcanic air pollution coming from Kīlauea. Far away from the volcano, such as along the Kona coast on the Island of Hawai‘i’s west side, aerosol particles dominate vog, but near Kīlauea SO₂ gas is a major component of vog.

SO₂ is a poisonous gas that irritates skin and the tissues and mucous membranes of the eyes, nose, and throat. During even moderate physical activity, SO₂ penetrates deeply into the airway and can produce respiratory distress in some individuals. In the absence of strong winds, SO₂ emitted by Kīlauea can accumulate in the air and

Sulfur dioxide gas and other pollutants emitted from Kīlauea Volcano interact chemically with atmospheric moisture, oxygen, dust, and sunlight to produce volcanic smog (vog) and acid rain. Vog poses a health hazard by aggravating preexisting respiratory ailments, reduces driving visibility (top), and damages crops (lower left), and acid rain can leach lead from rainwater catchment systems (lower right) into household water supplies.



During prevailing trade-wind conditions, the nearly constant stream of volcanic smog (vog) produced by Kīlauea Volcano on the Island of Hawai'i is blown to the southwest and west (satellite image shows increasing amounts of vog aerosol particles in yellow, orange, and red, respectively); traces have been detected as far away as Johnston Island, 1,000 miles to the southwest. On the Island of Hawai'i, the trade winds (blue arrows) blow the vog from its main source on the volcano (white plume) to the southwest, where wind patterns send it up the island's Kona coast. Here, it becomes trapped by daytime (onshore) and nighttime (offshore) sea breezes (double-headed arrows). In contrast, when light "kona" winds (red arrows) blow, much of the vog is concentrated on the eastern side of the island, but some can even reach O'ahu, more than 200 miles to the northwest. (The names of the five volcanoes that make up the Island of Hawai'i are shown in yellow. National Oceanic and Atmospheric Administration (NOAA) satellite image processed by John Porter and collected by Pierre Flamant, University of Hawai'i.)



reach levels that exceed Federal health standards. Since 1986, this has occurred more than 85 times within Hawai'i Volcanoes National Park, which includes much of Kīlauea.

Because of their small size, aerosol particles such as those in vog penetrate deep into the human lung and are readily retained. Studies of air pollution in the United States and elsewhere indicate that elevated levels of acidic particles like those in vog can induce asthma attacks, especially in adolescents, and can also impede the ability of the upper respiratory tract to remove other potentially harmful particles.

Many residents and visitors on the Island of Hawai'i report physical complaints associated with vog exposure. These complaints include headaches, breathing difficulties, increased susceptibility to respiratory ailments, watery eyes, sore throat, flu-like symptoms, and a general lack of energy. In contrast to SO₂ gas concentration near Kīlauea, the amount of aerosol particles in Hawai'i's air does not routinely exceed Federal standards, but the unique combination of acidic particles, trace amounts of toxic met-



Molten lava from Kīlauea Volcano frequently flows through underground lava tubes to reach the Pacific Ocean, where it vigorously reacts with cold seawater to create large steam plumes laden with hydrochloric acid. These plumes, known as "laze", are another form of volcanic air pollution and pose a local environmental hazard along the Island of Hawai'i's southeast coast, especially to people who visit these ocean-entry sites.

als, and SO₂ gas in vog may account for the wide variety of physical symptoms reported.

Like smog, the presence of vog reduces visibility. Moisture in the air causes vog particles to enlarge, decreasing visibility still further. On the Island of Hawai'i, people often turn their headlights on during daylight hours when driving in vog, and vog sometimes limits visibility for air traffic.

The tiny sulfuric acid droplets in vog have the corrosive properties of dilute battery acid. When atmospheric moisture is abundant, these droplets combine with it and fall as acid rain, damaging plants and accelerating the rusting of metal objects, such as cars, industrial and farm equipment, and building components. However, in drier conditions, such as those that prevail on Hawai'i's Kona coast, the acid aerosols in vog may actually impede the formation of raindrops, resulting in decreased summer rainfall for crops and drinking water. Vog can also mix directly with moisture on the leaves of plants and in less than a day cause severe chemical burns. Farmers on the Island of Hawai'i have suffered losses even to crops in greenhouses, because vog can enter through the air vents.

Many homes on the Island of Hawai'i rely on rooftop rainwater-catchment systems to provide their drinking water. In 1988, the drinking water of nearly 40% of homes using such systems in the Kona Districts of the island was found to be contaminated with lead leached by acid rain from roofing and plumbing materials, such as nails, paint, solder, and metal flashings. Tests confirmed that the blood of some residents of these homes had elevated lead levels, leading to a major islandwide effort to remove lead-bearing materials from rainwater-catchment systems.

Much is still unknown about vog's composition and its effects on health. To better understand and evaluate the hazards posed by vog and other forms of volcanic air pollution, scientists from the U.S. Geological Survey's (USGS) Hawaiian Volcano Observatory (HVO) at the summit of Kīlauea closely monitor the

amount and composition of gas emissions from the volcano's ongoing eruption. In addition, HVO collects and integrates information on volcanic air pollution from other sources and advises scientific and health-care organizations studying its effects. HVO scientists are also working closely with government officials and health professionals in Hawai'i to inform residents and visitors about this hazard.

The studies of volcanic air pollution carried out at HVO by scientists with the USGS Volcano Hazards Program complement the observatory's other studies of Hawai'i's volcanoes. The work of HVO is part of the ongoing USGS effort to help protect people's lives and property from volcano hazards in all of the volcanic regions of the United States, including Hawai'i, Alaska, Wyoming, California, and the Pacific Northwest.

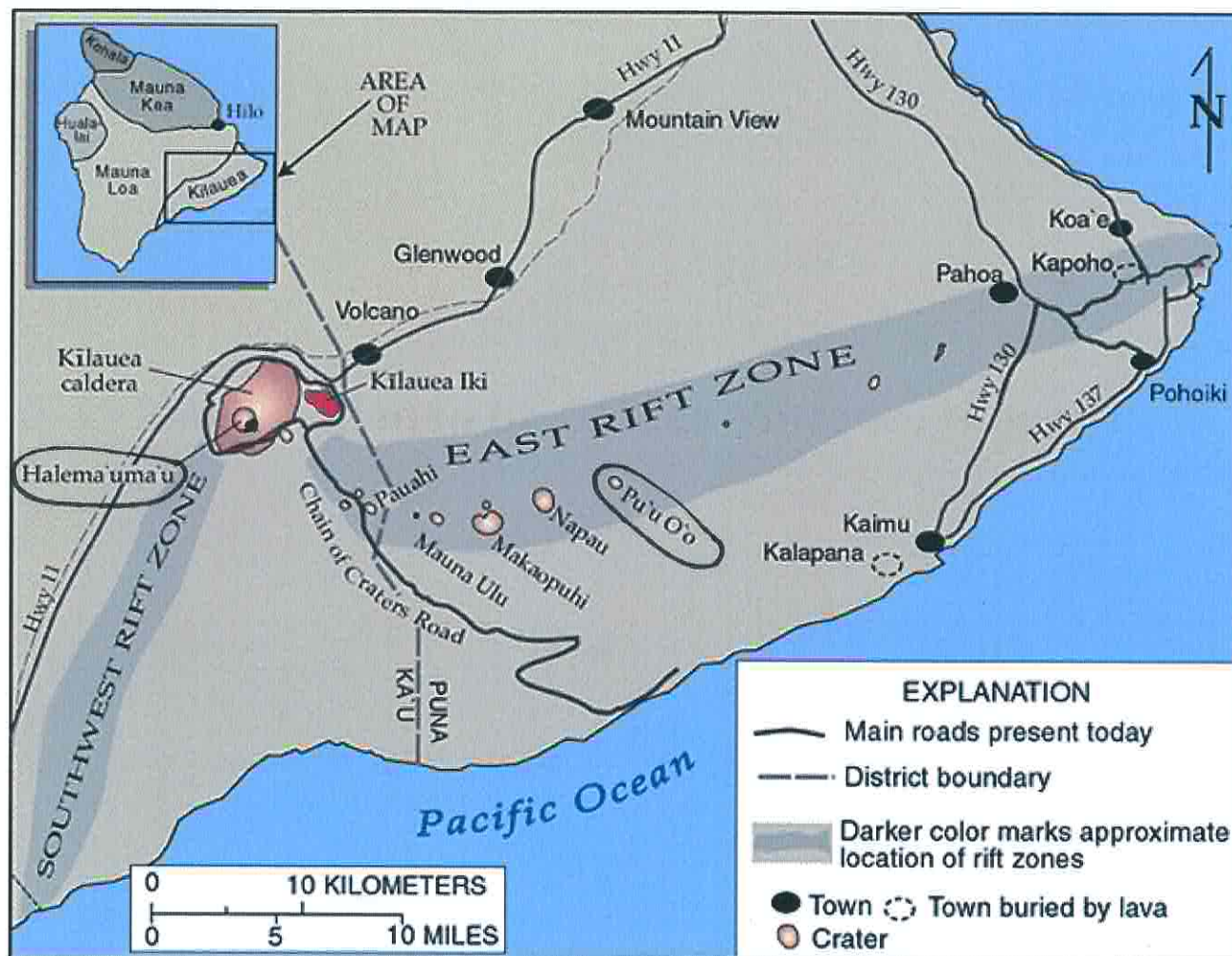
Jeff Sutton, Tamar Elias,
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Banner design by Bobbie Myers

COOPERATING ORGANIZATIONS
American Lung Association of Hawai'i
Hawai'i County Civil Defense
Hawai'i State Department of Health
National Centers for Disease Control and Prevention
National Oceanic and Atmospheric Administration
National Park Service
University of Hawai'i, Center for the Study
of Active Volcanoes
University of Hawai'i, School of Ocean and
Earth Science and Technology

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P.O. Box 51, Hawai'i National Park, HI 96718
Tel: (808) 967-7328, Fax: (808) 967-8890
<http://hvo.wr.usgs.gov/>
or
U.S. Geological Survey Volcano Hazards Program
<http://volcanoes.usgs.gov/>
See also *Living On Active Volcanoes—The Island of Hawai'i*
(USGS Fact Sheet 074-97) and *What are Volcano Hazards?*
(USGS Fact Sheet 002-97)



Simplified map of Kilauea Volcano, Hawai'i



Map by J. Johnson, 2000

Simplified map of Kilauea Volcano showing the summit caldera, southwest and east rift zones, Pu'u O'o, roads, and several communities located on the volcano's flanks.



The URL of this page is http://hvo.wr.usgs.gov/kilauea/Kilauea_map.html

Contact: hvowebmaster@usgs.gov

Updated: 5 June 2000 (SRB)



Hawaiian Volcano Observatory

Press Releases

New gas vent in Halema`uma`u crater doubles sulfur dioxide emission rates

USGS HVO News Release
March 14, 2008

Kilauea

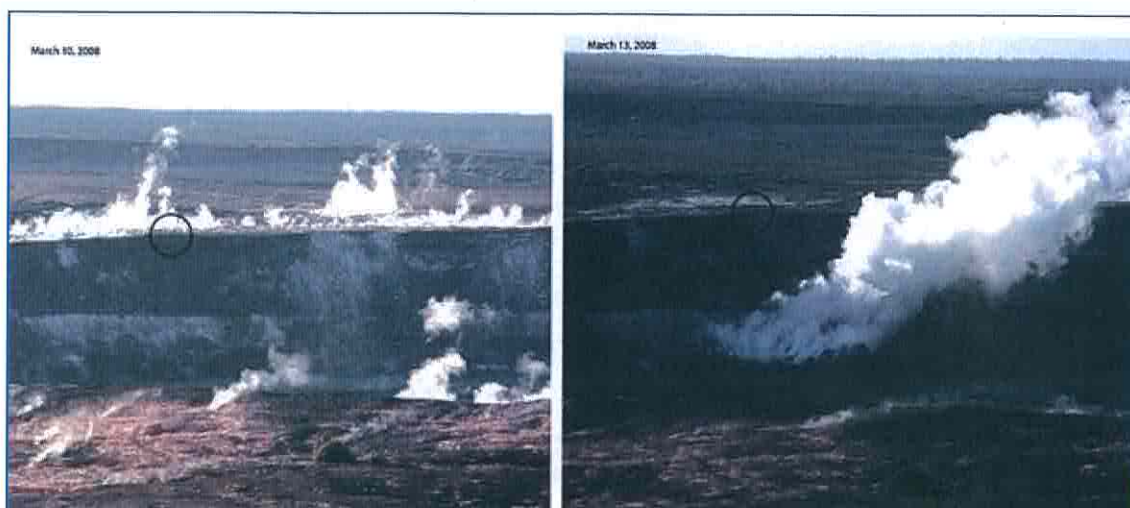
Mauna Loa

Earthquakes

Other
Volcanoes

Volcanic
Hazards

About HVO



Views of the east wall of Halema`uma`u crater on March 10 and 13, 2008, showing the emergence of a new gas vent. The Halema`uma`u crater overlook is circled. Note the large gas plume in the right frame taken on March 13, 2008.

A prominent new gas vent broke through the lower east wall of Halema`uma`u this week, doubling the already elevated level of sulfur dioxide gas being emitted from the crater.

The rate at which sulfur dioxide (SO₂) is released by Kilauea volcano has typically been 150-200 tonnes/day, but in late December 2007, the emission rate increased to nearly 300 tonnes/day. This rate continued to rise into the new year, and by mid-February 2008, it fluctuated between 600 and 1000 tonnes/day.

On March 12, the rate abruptly jumped to 1,500 tonnes/day. The following day, SO₂ emission rates reached the highest recorded at Kilauea's summit since measurements began in 1979—from 1,800 to 2,000 tonnes/day.

With increased emission rates, the concentration of noxious sulfur dioxide gas in the air, the cause of respiratory hazards, also rises. When the emission rate doubled in December 2007, sulfur dioxide concentrations exceeded 1 ppm on more than half of Crater Rim Drive between the Southwest Rift Zone pullout and the Halema`uma`u Overlook parking lot. The increased SO₂ concentration and associated incidents of

respiratory distress in visitors prompted the National Park Service to restrict access to roads and trails around Kilauea Caldera.

After the new gas vent opened this week, sulfur dioxide concentrations exceeded 40 ppm along Crater Rim Drive, significantly increasing respiratory hazards downwind of the vent.

Sulfur dioxide gas reacts with air, moisture, and sunlight to form tiny acidic particles that are readily retained in human lungs. Thus, it is listed by EPA as one of six criteria air pollutants. Factories, power plants, and other industrial sources are required to regulate their output of SO₂ to prevent possible negative effects on human health and the environment. Elevated SO₂ levels can cause breathing difficulties, especially in people with preexisting respiratory problems, irritation of the eyes, nose, and throat, and damage to plants and water. For more information on the effects of volcanic gases, check with the International Volcanic Health Hazard Network at <http://ivhhn.org/>.

Release of sulfur dioxide gas from Kilauea volcano is not new, but the current emission rates are unusual. Gas emissions have been unsettled since June 2007, the beginning of the current Father's Day eruptive activity, but the root cause of the recent increase in SO₂ emissions from Halema'uma'u crater is not yet clear.

While it is a remote possibility, a summit eruption is not expected because other harbingers of summit activity have not occurred. We continue to monitor for signs such as inflation and increased earthquake activity at Kilauea summit.

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Updated: 14 March 2008 (pnf)

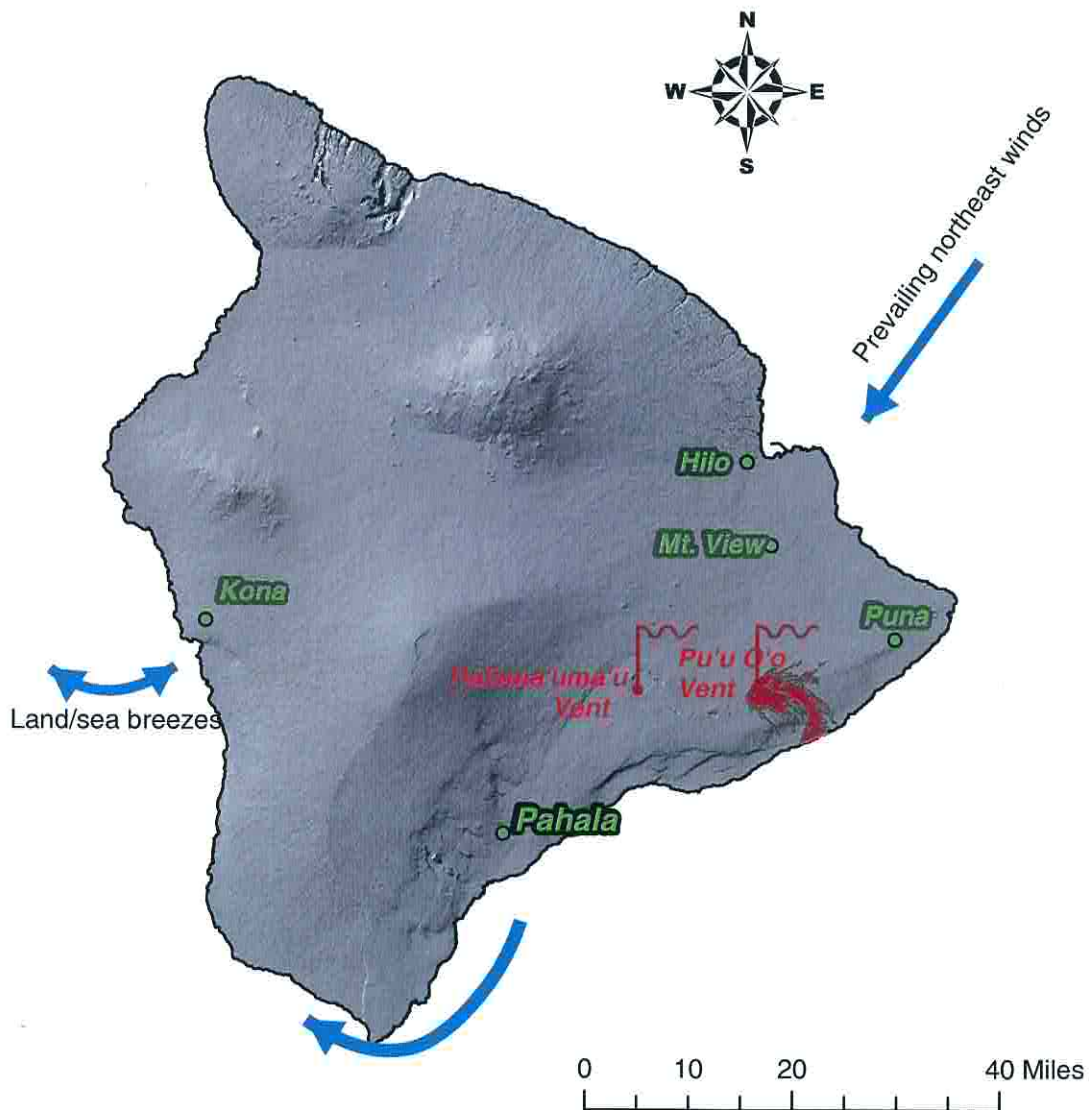
Attachment 4

Photo of Halema'uma'u Vent



Photo taken on 4/4/08 by DOH staff

Island of Hawaii Special Purpose Monitoring Stations for Volcanic Emissions



Attachment 6

- 1) Weather station history from *Weather Underground* at www.wunderground.com
Volcano Golf Country Club on March 19, 2008
Hawaii National Park on March 19, 2008
- 2) Weather station history from *Weather Underground* at www.wunderground.com
Volcano Golf Country Club on March 30, 2008
Hawaii National Park on March 30, 2008
- 3) Weather station history from *Weather Underground* at www.wunderground.com
Volcano Golf Country Club on March 31, 2008
Hawaii National Park on March 31, 2008

History for KHIHAWAI2

Volcano Golf Country Club, QTH of KH6SX, HI — [Current Conditions](#)

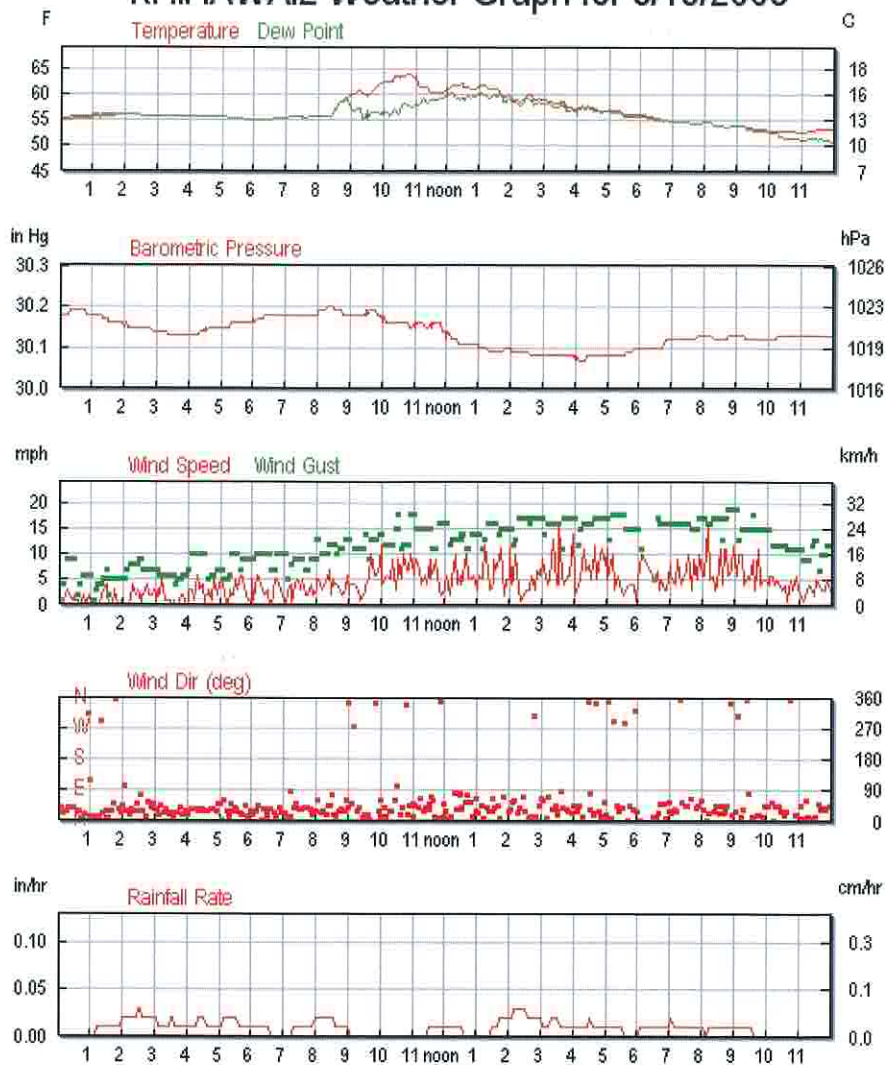
Daily Summary for March 19, 2008

	Current:	High:	Low:	Average:
Temperature:	63.7 °F / 17.6 °C	64.5 °F / 18.1 °C	53.2 °F / 11.8 °C	57.4 °F / 14.1 °C
Dew Point:	53.3 °F / 11.8 °C	61.0 °F / 16.1 °C	51.5 °F / 10.8 °C	56.5 °F / 13.6 °C
Humidity:	69%	100%	77%	97%
Wind Speed:	1.0mph / 1.6km/h /	16.0mph / 25.7km/h	-	4.4mph / 7.1km/h
Wind Gust:	4.0mph / 6.4km/h /	19.0mph / 30.6km/h	-	-
Wind:	East	-	-	NNE
Pressure:	30.13in / 1020.2hPa	30.20in / 1022.6hPa	30.07in / 1018.2hPa	-
Precipitation:	0.17in / 4.3mm			

Statistics for the rest of the month:

	High:	Low:	Average:
Temperature:	71.8 °F / 22.1 °C	39.5 °F / 4.2 °C	57.6 °F / 14.2 °C
Dew Point:	62.0 °F / 16.7 °C	38.2 °F / 3.4 °C	55.1 °F / 12.8 °C
Humidity:	100.0%	55.0%	92.0%
Wind Speed:	23.0mph / 37.0km/h from the North	-	2.6mph / 4.2km/h
Wind Gust:	23.0mph / 37.0km/h from the North	-	-
Wind:	-	-	NE
Pressure:	30.27in / 1024.9hPa	30.05in / 1017.5hPa	-
Precipitation:	3.92in / 99.6mm		

KHIHAWAI2 Weather Graph for 3/19/2008



Tabular Data for March 19, 2008

Time	Temperature	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)	Clouds
00:00	56.0 °F / 13.3 °C	55.5 °F / 13.1 °C	30.18in / 1021.9hPa	NE	1mph / 1.6km/h	7mph / 11.3km/h	98%	0.00in / 0.0mm	---
00:04	56.0 °F / 13.3 °C	55.5 °F / 13.1 °C	30.18in / 1021.9hPa	Calm		1mph / 1.6km/h	98%	0.00in / 0.0mm	---
00:05	56.0 °F / 13.3 °C	55.5 °F / 13.1 °C	30.18in / 1021.9hPa	Calm		1mph / 1.6km/h	98%	0.00in / 0.0mm	---
00:09	56.0 °F / 13.3 °C	55.5 °F / 13.1 °C	30.18in / 1021.9hPa	NNE	1mph / 1.6km/h	4mph / 6.4km/h	98%	0.00in / 0.0mm	---
00:14	56.0 °F / 13.3 °C	55.5 °F / 13.1 °C	30.18in / 1021.9hPa	NNE	3mph / 4.8km/h	9mph / 14.5km/h	98%	0.00in / 0.0mm	---
00:19	56.2 °F / 13.4 °C	55.7 °F / 13.2 °C	30.19in / 1022.2hPa	NE	2mph / 3.2km/h	9mph / 14.5km/h	98%	0.00in / 0.0mm	---
00:24	56.3 °F / 13.5 °C	55.8 °F / 13.2 °C	30.19in / 1022.2hPa	NE	1mph / 1.6km/h	9mph / 14.5km/h	98%	0.00in / 0.0mm	---

History for MPLIH1

PALI2 HI US, Hawaii National Park, HI — [Current Conditions](#)

This station is part of the [MADIS project](#). The data provider: RAWS

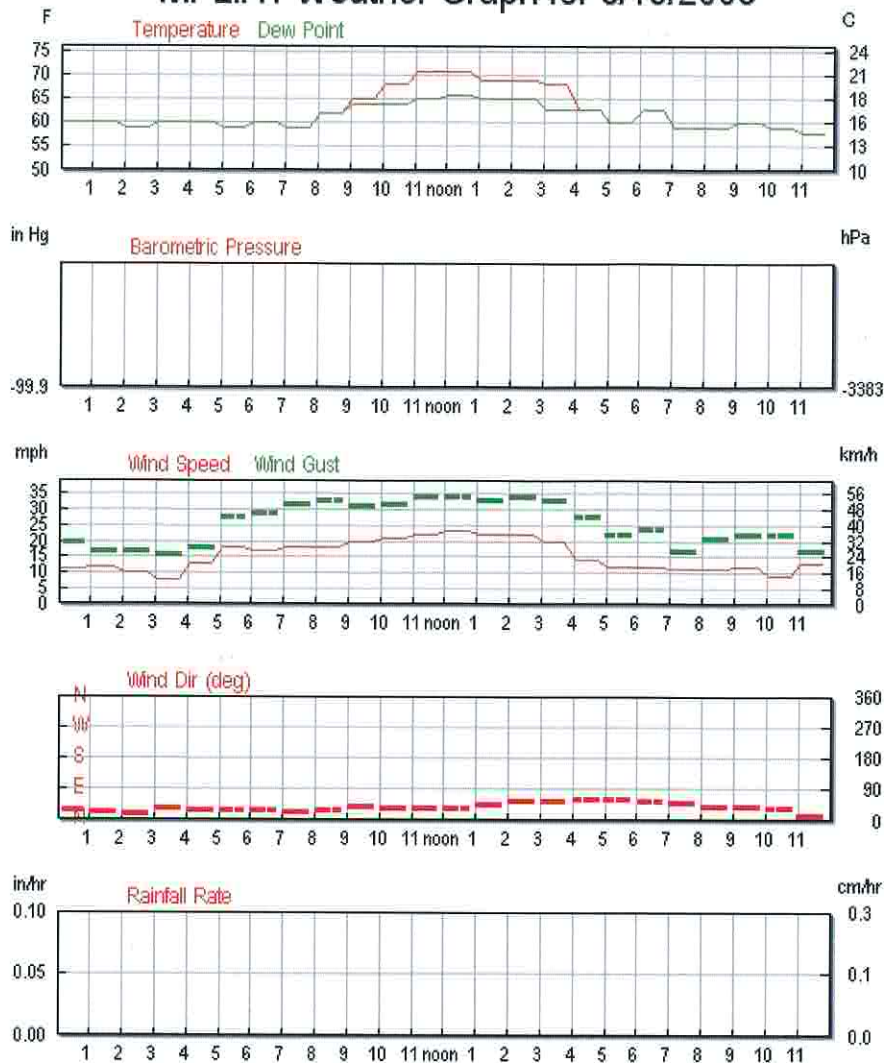
Daily Summary for March 19, 2008

	Current:	High:	Low:	Average:
Temperature:	65.0 °F / 18.3 °C	71.0 °F / 21.7 °C	58.0 °F / 14.4 °C	62.5 °F / 17.0 °C
Dew Point:	64.0 °F / 17.8 °C	66.0 °F / 18.9 °C	58.0 °F / 14.4 °C	61.3 °F / 16.3 °C
Humidity:	97%	100%	80%	96%
Wind Speed:	10.0mph / 16.1km/h /	23.0mph / 37.0km/h	-	15.4mph / 24.7km/h
Wind Gust:	17.0mph / 27.4km/h /	34.0mph / 54.7km/h	-	-
Wind:	SE	-	-	NE
Pressure:	0.00in / 0.0hPa	0.00in / 0.0hPa	40.00in / 1354.4hPa	-
Precipitation:	0.00in / 0.0mm			

Statistics for the rest of the month:

	High:	Low:	Average:
Temperature:	75.0 °F / 23.9 °C	53.0 °F / 11.7 °C	59.2 °F / 15.1 °C
Dew Point:	71.0 °F / 21.7 °C	-99.9 °F / -73.3 °C	51.7 °F / 10.9 °C
Humidity:	100.0%	53.0%	87.9%
Wind Speed:	27.0mph / 43.4km/h from the NE	-	9.6mph / 15.4km/h
Wind Gust:	40.0mph / 64.4km/h from the NE	-	-
Wind:	-	-	ENE
Pressure:	0.00in / 0.0hPa	40.00in / 1354.4hPa	-
Precipitation:	0.00in / 0.0mm		

MPLIH1 Weather Graph for 3/19/2008



Tabular Data for March 19, 2008

Time	Temperature	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)
00:02	60.0 °F / 15.6 °C	60.0 °F / 15.6 °C	-100.00in / -	NNE	11mph / 17.7km/h	20mph / 32.2km/h	100%	0.00in / 0.0mm
00:12	60.0 °F / 15.6 °C	60.0 °F / 15.6 °C	-100.00in / -	NNE	11mph / 17.7km/h	20mph / 32.2km/h	100%	0.00in / 0.0mm
00:23	60.0 °F / 15.6 °C	60.0 °F / 15.6 °C	-100.00in / -	NNE	11mph / 17.7km/h	20mph / 32.2km/h	100%	0.00in / 0.0mm
00:33	60.0 °F / 15.6 °C	60.0 °F / 15.6 °C	-100.00in / -	NNE	11mph / 17.7km/h	20mph / 32.2km/h	100%	0.00in / 0.0mm
00:43	60.0 °F / 15.6 °C	60.0 °F / 15.6 °C	-100.00in / -	NNE	11mph / 17.7km/h	20mph / 32.2km/h	100%	0.00in / 0.0mm
01:03	60.0 °F / 15.6 °C	60.0 °F / 15.6 °C	-100.00in / -	NNE	12mph / 19.3km/h	17mph / 27.4km/h	100%	0.00in / 0.0mm
01:12	60.0 °F / 15.6 °C	60.0 °F / 15.6 °C	-100.00in / -	NNE	12mph / 19.3km/h	17mph / 27.4km/h	100%	0.00in / 0.0mm
01:23	60.0 °F /	60.0 °F /	-100.00in /	NNE	12mph /	17mph /	100%	0.00in / 0.0mm

History for KHIHAWAI2

Volcano Golf Country Club, QTH of KH6SX, HI — [Current Conditions](#)

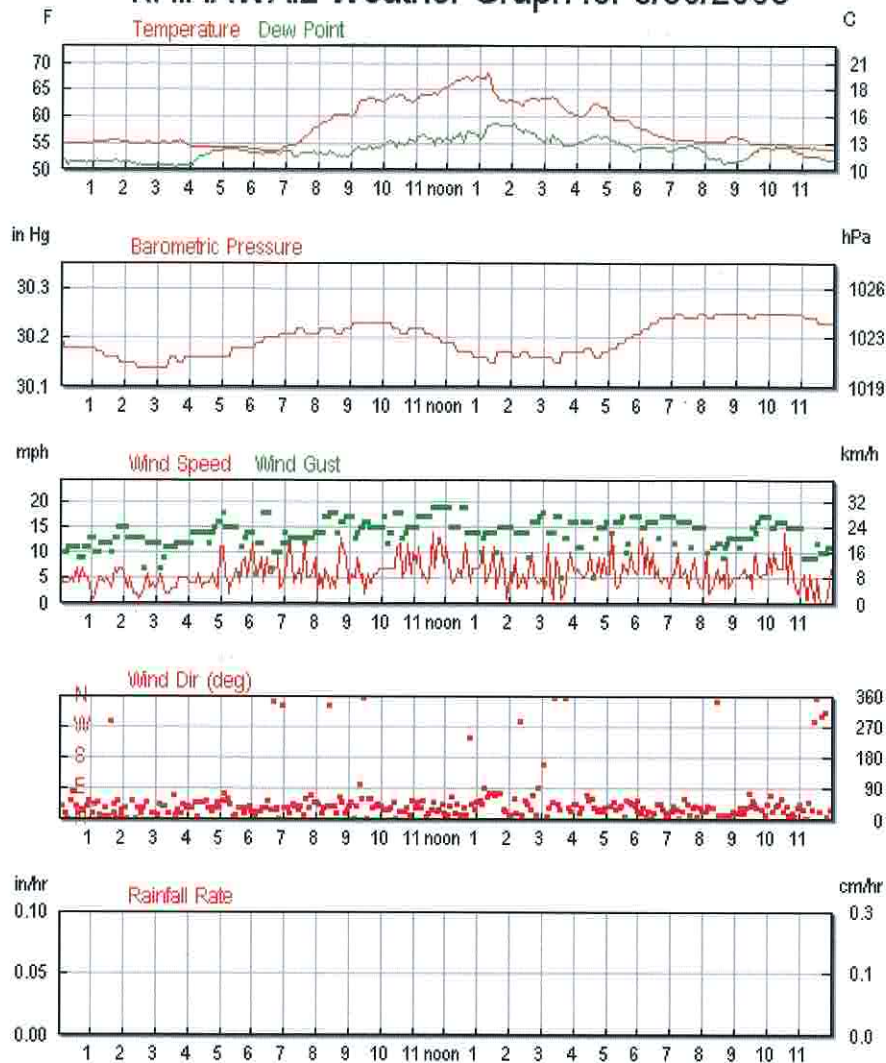
Daily Summary for March 30, 2008

	Current:	High:	Low:	Average:
Temperature:	63.7 °F / 17.6 °C	68.1 °F / 20.1 °C	53.6 °F / 12.0 °C	58.2 °F / 14.5 °C
Dew Point:	53.3 °F / 11.8 °C	58.7 °F / 14.8 °C	50.6 °F / 10.3 °C	53.8 °F / 12.1 °C
Humidity:	69%	99%	65%	86%
Wind Speed:	1.0mph / 1.6km/h /	14.0mph / 22.5km/h	-	5.9mph / 9.4km/h
Wind Gust:	4.0mph / 6.4km/h /	19.0mph / 30.6km/h	-	-
Wind:	ESE	-	-	NNE
Pressure:	30.13in / 1020.2hPa	30.25in / 1024.3hPa	30.14in / 1020.5hPa	-
Precipitation:	0.00in / 0.0mm			

Statistics for the rest of the month:

	High:	Low:	Average:
Temperature:	71.8 °F / 22.1 °C	39.5 °F / 4.2 °C	57.6 °F / 14.2 °C
Dew Point:	62.0 °F / 16.7 °C	38.2 °F / 3.4 °C	55.1 °F / 12.8 °C
Humidity:	100.0%	55.0%	92.0%
Wind Speed:	23.0mph / 37.0km/h from the North	-	2.6mph / 4.2km/h
Wind Gust:	23.0mph / 37.0km/h from the North	-	-
Wind:	-	-	NE
Pressure:	30.27in / 1024.9hPa	30.05in / 1017.5hPa	-
Precipitation:	3.92in / 99.6mm		

KHIHAWA12 Weather Graph for 3/30/2008



Tabular Data for March 30, 2008

Time	Temperature	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)	Clouds
00:01	54.8 °F / 12.7 °C	52.2 °F / 11.2 °C	30.20in / 1022.6hPa	NNE	6mph / 9.7km/h	14mph / 22.5km/h	91%	0.00in / 0.0mm	---
00:06	55.0 °F / 12.8 °C	51.8 °F / 11.0 °C	30.18in / 1021.9hPa	NE	4mph / 6.4km/h	10mph / 16.1km/h	89%	0.00in / 0.0mm	---
00:11	54.8 °F / 12.7 °C	51.0 °F / 10.6 °C	30.18in / 1021.9hPa	NNE	4mph / 6.4km/h	10mph / 16.1km/h	87%	0.00in / 0.0mm	---
00:16	54.8 °F / 12.7 °C	51.6 °F / 10.9 °C	30.18in / 1021.9hPa	North	4mph / 6.4km/h	11mph / 17.7km/h	89%	0.00in / 0.0mm	---
00:21	54.8 °F / 12.7 °C	51.6 °F / 10.9 °C	30.18in / 1021.9hPa	NE	5mph / 8.0km/h	11mph / 17.7km/h	89%	0.00in / 0.0mm	---
00:26	54.8 °F / 12.7 °C	51.6 °F / 10.9 °C	30.18in / 1021.9hPa	East	4mph / 6.4km/h	11mph / 17.7km/h	89%	0.00in / 0.0mm	---
00:31	54.8 °F / 12.7 °C	51.6 °F / 10.9 °C	30.18in / 1021.9hPa	NE	7mph / 11.3km/h	11mph / 17.7km/h	89%	0.00in / 0.0mm	---

History for MPLIH1

PALI2 HI US, Hawaii National Park, HI — Current Conditions

This station is part of the [MADIS project](#). The data provider: RAWS

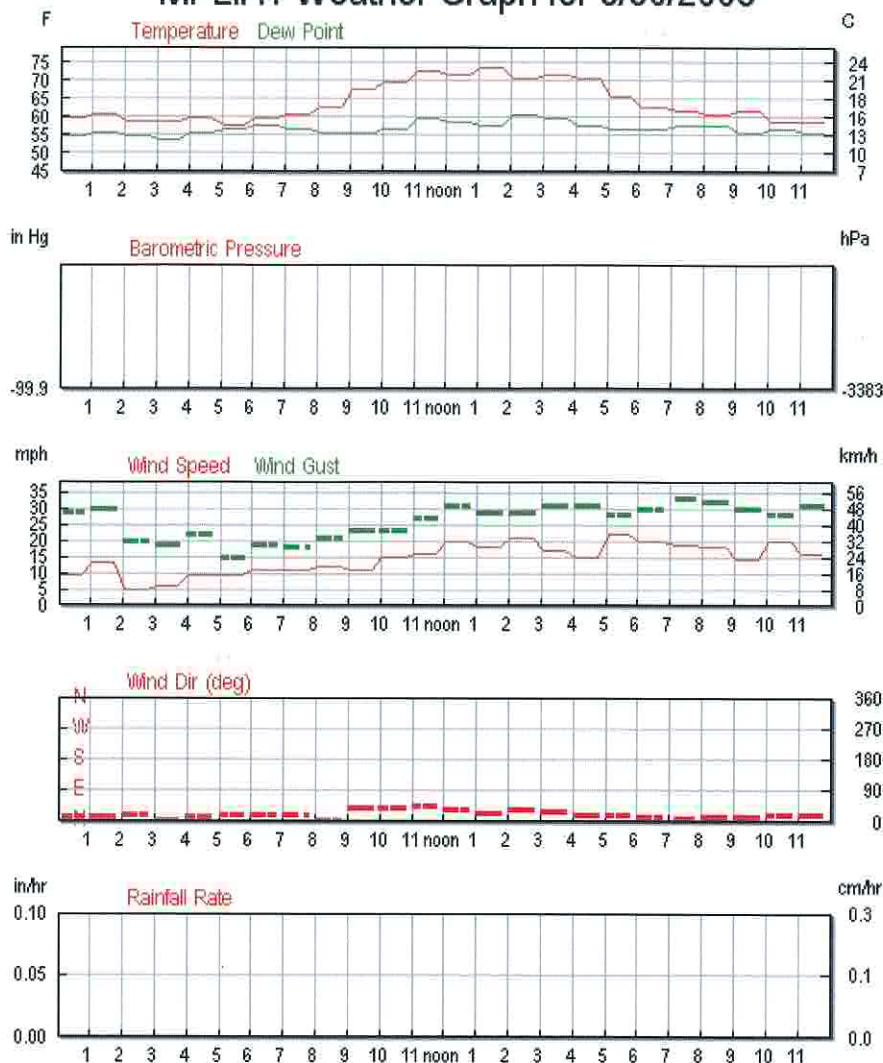
Daily Summary for March 30, 2008

	Current:	High:	Low:	Average:
Temperature:	65.0 °F / 18.3 °C	74.0 °F / 23.3 °C	58.0 °F / 14.4 °C	64.4 °F / 18.0 °C
Dew Point:	64.0 °F / 17.8 °C	61.0 °F / 16.1 °C	54.0 °F / 12.2 °C	57.2 °F / 14.0 °C
Humidity:	97%	97%	58%	78%
Wind Speed:	10.0mph / 16.1km/h /	22.0mph / 35.4km/h	-	14.4mph / 23.2km/h
Wind Gust:	17.0mph / 27.4km/h /	33.0mph / 53.1km/h	-	-
Wind:	SE	-	-	NNE
Pressure:	0.00in / 0.0hPa	0.00in / 0.0hPa	40.00in / 1354.4hPa	-
Precipitation:	0.00in / 0.0mm			

Statistics for the rest of the month:

	High:	Low:	Average:
Temperature:	75.0 °F / 23.9 °C	53.0 °F / 11.7 °C	59.2 °F / 15.1 °C
Dew Point:	71.0 °F / 21.7 °C	-99.9 °F / -73.3 °C	51.7 °F / 10.9 °C
Humidity:	100.0%	53.0%	87.9%
Wind Speed:	27.0mph / 43.4km/h from the NE	-	9.6mph / 15.4km/h
Wind Gust:	40.0mph / 64.4km/h from the NE	-	-
Wind:	-	-	ENE
Pressure:	0.00in / 0.0hPa	40.00in / 1354.4hPa	-
Precipitation:	0.00in / 0.0mm		

MPLIH1 Weather Graph for 3/30/2008



Tabular Data for March 30, 2008

Time	Temperature	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)
00:03	60.0 °F / 15.6 °C	55.0 °F / 12.8 °C	-100.00in / -	NNE	9mph / 14.5km/h	29mph / 46.7km/h	84%	0.00in / 0.0mm
00:12	60.0 °F / 15.6 °C	55.0 °F / 12.8 °C	-100.00in / -	NNE	9mph / 14.5km/h	29mph / 46.7km/h	84%	0.00in / 0.0mm
00:23	60.0 °F / 15.6 °C	55.0 °F / 12.8 °C	-100.00in / -	NNE	9mph / 14.5km/h	29mph / 46.7km/h	84%	0.00in / 0.0mm
00:34	60.0 °F / 15.6 °C	55.0 °F / 12.8 °C	-100.00in / -	NNE	9mph / 14.5km/h	29mph / 46.7km/h	84%	0.00in / 0.0mm
00:42	60.0 °F / 15.6 °C	55.0 °F / 12.8 °C	-100.00in / -	NNE	9mph / 14.5km/h	29mph / 46.7km/h	84%	0.00in / 0.0mm
01:03	61.0 °F / 16.1 °C	56.0 °F / 13.3 °C	-100.00in / -	North	13mph / 20.9km/h	30mph / 48.3km/h	85%	0.00in / 0.0mm
01:12	61.0 °F / 16.1 °C	56.0 °F / 13.3 °C	-100.00in / -	North	13mph / 20.9km/h	30mph / 48.3km/h	85%	0.00in / 0.0mm
01:23	61.0 °F /	56.0 °F /	-100.00in /	North	13mph /	30mph /	85%	0.00in / 0.0mm

History for KHIHAWAI2

Volcano Golf Country Club, QTH of KH6SX, HI — [Current Conditions](#)

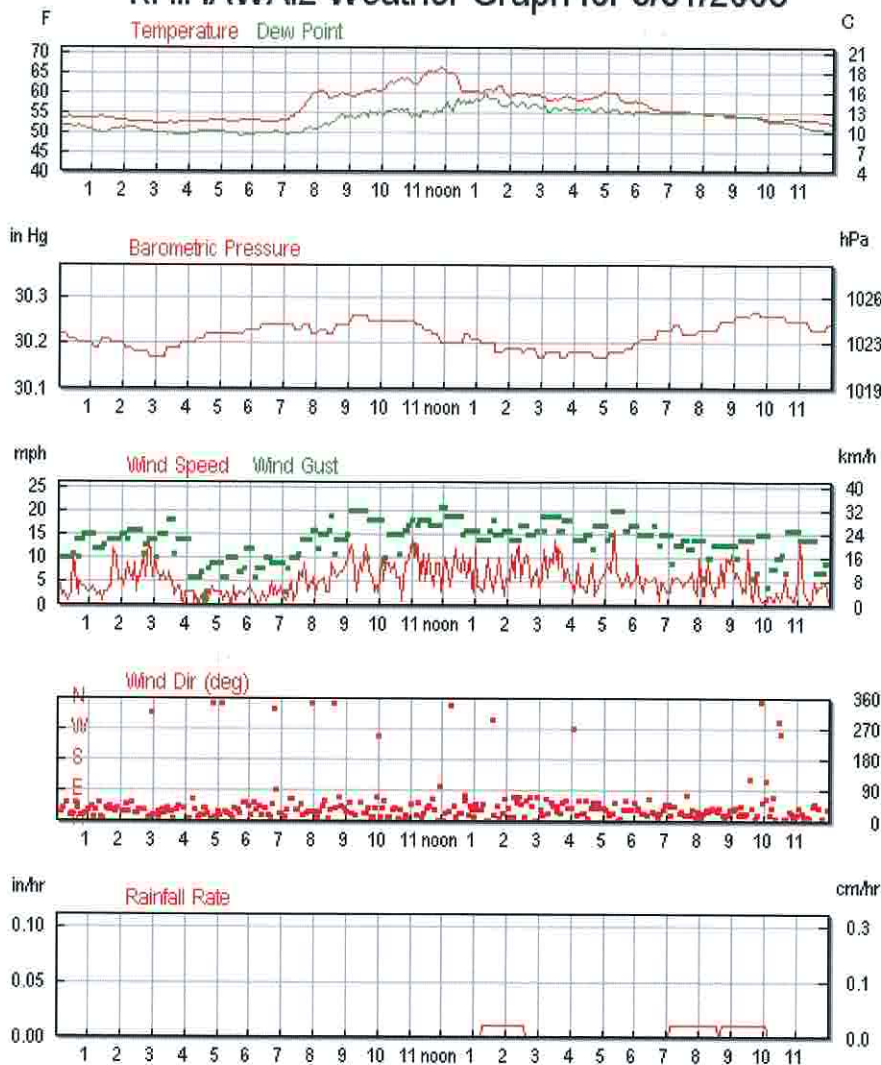
Daily Summary for March 31, 2008

	Current:	High:	Low:	Average:
Temperature:	63.7 °F / 17.6 °C	66.1 °F / 18.9 °C	52.3 °F / 11.3 °C	56.6 °F / 13.7 °C
Dew Point:	53.0 °F / 11.7 °C	59.9 °F / 15.5 °C	49.1 °F / 9.5 °C	53.0 °F / 11.7 °C
Humidity:	68%	100%	68%	88%
Wind Speed:	1.0mph / 1.6km/h /	16.0mph / 25.7km/h	-	5.3mph / 8.6km/h
Wind Gust:	4.0mph / 6.4km/h /	21.0mph / 33.8km/h	-	-
Wind:	ESE	-	-	NNE
Pressure:	30.13in / 1020.2hPa	30.27in / 1024.9hPa	30.17in / 1021.6hPa	-
Precipitation:	0.03in / 0.8mm			

Statistics for the rest of the month:

	High:	Low:	Average:
Temperature:	71.8 °F / 22.1 °C	39.5 °F / 4.2 °C	57.6 °F / 14.2 °C
Dew Point:	62.0 °F / 16.7 °C	38.2 °F / 3.4 °C	55.1 °F / 12.8 °C
Humidity:	100.0%	55.0%	92.0%
Wind Speed:	23.0mph / 37.0km/h from the North	-	2.6mph / 4.2km/h
Wind Gust:	23.0mph / 37.0km/h from the North	-	-
Wind:	-	-	NE
Pressure:	30.27in / 1024.9hPa	30.05in / 1017.5hPa	-
Precipitation:	3.92in / 99.6mm		

KHIHAWA12 Weather Graph for 3/31/2008



Tabular Data for March 31, 2008

Time	Temperature	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)	Clouds
00:03	53.6 °F / 12.0 °C	51.6 °F / 10.9 °C	30.22in / 1023.2hPa	NE	5mph / 8.0km/h	11mph / 17.7km/h	93%	0.00in / 0.0mm	---
00:08	53.6 °F / 12.0 °C	51.6 °F / 10.9 °C	30.22in / 1023.2hPa	NNE	2mph / 3.2km/h	10mph / 16.1km/h	93%	0.00in / 0.0mm	---
00:13	53.6 °F / 12.0 °C	51.6 °F / 10.9 °C	30.22in / 1023.2hPa	NE	3mph / 4.8km/h	10mph / 16.1km/h	93%	0.00in / 0.0mm	---
00:18	53.8 °F / 12.1 °C	51.8 °F / 11.0 °C	30.21in / 1022.9hPa	NE	1mph / 1.6km/h	10mph / 16.1km/h	93%	0.00in / 0.0mm	---
00:24	53.6 °F / 12.0 °C	51.3 °F / 10.7 °C	30.21in / 1022.9hPa	NNE	3mph / 4.8km/h	10mph / 16.1km/h	92%	0.00in / 0.0mm	---
00:29	53.5 °F / 11.9 °C	51.2 °F / 10.7 °C	30.21in / 1022.9hPa	NNE	11mph / 17.7km/h	11mph / 17.7km/h	92%	0.00in / 0.0mm	---
00:34	53.5 °F / 11.9 °C	51.5 °F / 10.8 °C	30.20in / 1022.6hPa	NE	4mph / 6.4km/h	14mph / 22.5km/h	93%	0.00in / 0.0mm	---

History for MPLIH1

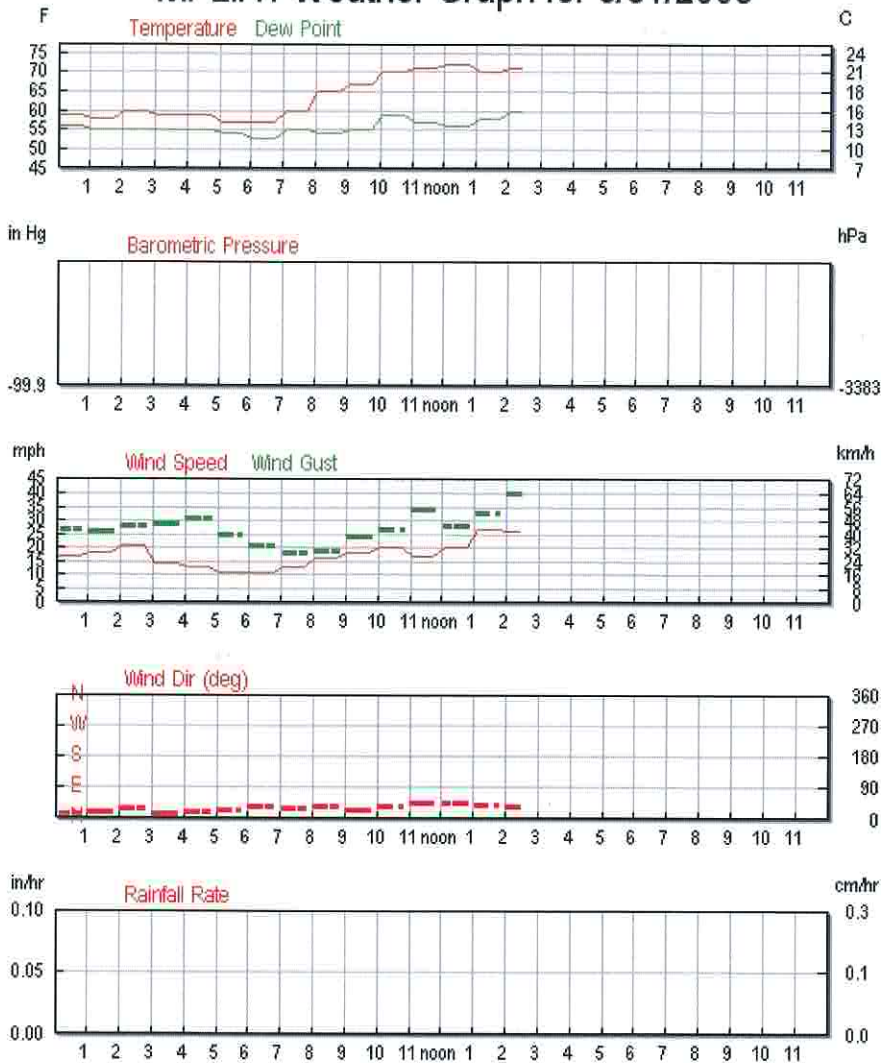
PALI2 HI US, Hawaii National Park, HI — Current Conditions

This station is part of the [MADIS project](#). The data provider: RAWS

Daily Summary for March 31, 2008

	Current:	High:	Low:	Average:
Temperature:	65.0 °F / 18.3 °C	72.0 °F / 22.2 °C	57.0 °F / 13.9 °C	63.2 °F / 17.3 °C
Dew Point:	64.0 °F / 17.8 °C	60.0 °F / 15.6 °C	53.0 °F / 11.7 °C	55.5 °F / 13.1 °C
Humidity:	97%	90%	58%	77%
Wind Speed:	10.0mph / 16.1km/h /	27.0mph / 43.4km/h	-	16.9mph / 27.3km/h
Wind Gust:	17.0mph / 27.4km/h /	40.0mph / 64.4km/h	-	-
Wind:	SE	-	-	NNE
Pressure:	0.00in / 0.0hPa	0.00in / 0.0hPa	40.00in / 1354.4hPa	-
Precipitation:	0.00in / 0.0mm			
Statistics for the rest of the month:				
	High:	Low:	Average:	
Temperature:	75.0 °F / 23.9 °C	53.0 °F / 11.7 °C	59.2 °F / 15.1 °C	
Dew Point:	71.0 °F / 21.7 °C	-99.9 °F / -73.3 °C	51.7 °F / 10.9 °C	
Humidity:	100.0%	53.0%	87.9%	
Wind Speed:	27.0mph / 43.4km/h from the NE	-	9.6mph / 15.4km/h	
Wind Gust:	40.0mph / 64.4km/h from the NE	-	-	
Wind:	-	-	ENE	
Pressure:	0.00in / 0.0hPa	40.00in / 1354.4hPa	-	
Precipitation:	0.00in / 0.0mm			

MPLIH1 Weather Graph for 3/31/2008



Tabular Data for March 31, 2008

Time	Temperature	Dew Point	Pressure	Wind	Wind Speed	Wind Gust	Humidity	Rainfall Rate (Hourly)
00:03	59.0 °F / 15.0 °C	56.0 °F / 13.3 °C	-100.00in / -	NNE	17mph / 27.4km/h	27mph / 43.4km/h	89%	0.00in / 0.0mm
00:12	59.0 °F / 15.0 °C	56.0 °F / 13.3 °C	-100.00in / -	NNE	17mph / 27.4km/h	27mph / 43.4km/h	89%	0.00in / 0.0mm
00:23	59.0 °F / 15.0 °C	56.0 °F / 13.3 °C	-100.00in / -	NNE	17mph / 27.4km/h	27mph / 43.4km/h	89%	0.00in / 0.0mm
00:35	59.0 °F / 15.0 °C	56.0 °F / 13.3 °C	-100.00in / -	NNE	17mph / 27.4km/h	27mph / 43.4km/h	89%	0.00in / 0.0mm
00:43	59.0 °F / 15.0 °C	56.0 °F / 13.3 °C	-100.00in / -	NNE	17mph / 27.4km/h	27mph / 43.4km/h	89%	0.00in / 0.0mm
01:03	58.0 °F / 14.4 °C	55.0 °F / 12.8 °C	-100.00in / -	NNE	18mph / 29.0km/h	26mph / 41.8km/h	90%	0.00in / 0.0mm
01:12	58.0 °F / 14.4 °C	55.0 °F / 12.8 °C	-100.00in / -	NNE	18mph / 29.0km/h	26mph / 41.8km/h	90%	0.00in / 0.0mm
01:23	58.0 °F /	55.0 °F /	-100.00in /	NNE	18mph /	26mph /	90%	0.00in / 0.0mm

Attachment 7

- 1) March 20, 2008 DOH Media Release: "*DOH URGES BIG ISLAND RESIDENTS TO TAKE PRECAUTIONARY MEASURES FOR ELEVATED SULFUR DIOXIDE LEVELS*"
- 2) April 1, 2008 DOH News Release: "SULFUR DIOXIDE LEVELS ELEVATED ON HAWAI'I ISLAND RESIDENTS ADVISED TO TAKE PRECAUTIONS"
- 3) Honolulu Advertiser news article dated March 21, 2008: "Big Island warned of higher sulfur dioxide levels"
- 4) Star Bulletin news article dated March 21, 2008: "Fire in the hole"
- 5) Honolulu Advertiser news article dated March 27, 2008: "Officials worry about billowing volcanic gas"
- 6) EPA AirNOW, Hawaii page link: "Hawai'i County Civil Defense Agency Continues Emergency Health Advisory due to high levels of sulfur dioxide from Kilauea Volcano Eruption"

DOH URGES BIG ISLAND RESIDENTS TO TAKE PRECAUTIONARY MEASURES FOR ELEVATED SULFUR DIOXIDE LEVELS

HONOLULU – The Hawai'i State Department of Health (DOH) is urging Hawai'i County residents to take precautionary measures due to elevated levels of sulfur dioxide (SO₂). The 24-hour SO₂ level recorded at the DOH air monitoring station located in Pahala exceeded the federal ambient air quality standard on Wednesday, March 19. The U.S. Environmental Protection Agency's standard for SO₂ averaged over 24-hours is 0.14 parts per million (ppm). The DOH Pahala air monitoring station recorded a 24-hour average of 0.149 ppm.

Communities near the Kilauea volcano are particularly affected by increased levels of SO₂ caused by the recent volcanic activity. The DOH is continuing to monitor the SO₂ levels in five Hawai'i County communities: Kona, Hilo, Mountain View, Pahala, and Pahoa.

Elevated levels of SO₂ can cause breathing problems in individuals especially those with pre-existing respiratory conditions, such as asthma, emphysema, and bronchitis. If you have respiratory conditions and live or work in an area impacted by SO₂ or vog, consider taking precautionary measures. The following are general recommendations from the American Lung Association:

- Stay indoors and use an air conditioner, if available.
- Do not smoke and avoid second-hand smoke.
- Limit physical exertion.
- Drink plenty of fluids to loosen mucus. Warm beverages seem to work best.
- If you take medications, make sure you have an adequate supply and keep them readily available in a convenient place.
- Contact your physician as soon as any respiratory problem develops.

While these recommendations are intended primarily for persons having respiratory or chronic lung disease, they are also useful for healthy persons during vog episodes.

To obtain additional information on respiratory health, contact your personal physician or the American Lung Association of Hawai'i at (808) 537-5966.

3/24/2008



DEPARTMENT OF HEALTH

News Release

LINDA LINGLE
GOVERNOR

CHIYOME LEINAALA FUKINO M.D.
DIRECTOR
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For Immediate Release: April 1, 2008

08-37

**SULFUR DIOXIDE LEVELS ELEVATED ON HAWAI'I ISLAND
RESIDENTS ADVISED TO TAKE PRECAUTIONS**

HONOLULU – The Hawai'i State Department of Health (DOH) is urging Hawai'i County residents to take precautions to protect their health from elevated levels of sulfur dioxide (SO₂). The 24 hour average for SO₂ in Pahala exceeded the federal ambient air quality standard on Sunday, March 30, and Monday, March 31, 2008. The standard for SO₂ averaged over 24 hours is 0.14 parts per million (ppm), and the DOH Pahala air monitoring station recorded a 24-hour average of 0.181 ppm on March 30 and an average of 0.154 ppm on March 31. Results in March 2008 are:

DATE	PLACE	24-HOUR AVERAGE
		0.140 ppm = standard
March 19, 2004	Pahala	0.149 ppm
March 30, 2008	Pahala	0.181 ppm
March 31, 2008	Pahala	0.154 ppm

Communities near the Kilauea volcano are particularly affected by increased levels of SO₂ caused by the recent volcanic activity. The DOH continues to monitor the SO₂ levels in five Hawai'i County communities: Kona, Hilo, Mountain View, Pahala, and Pahoa.

As required by rule, public notice will be issued each day following the exceedence of the 24-hour average standard, after results are available. All further notices and updates will be posted at www.hawaii.gov/health/environmental/air/cab/index.html and included in the County of Hawaii Civil Defense daily Kilauea Eruption Update.

Elevated levels of SO₂ can cause breathing problems in individuals especially those with pre-existing respiratory conditions, such as asthma, emphysema, and bronchitis. Anyone with respiratory conditions

(more)

who lives or works in an area impacted by SO₂ or vog should consider taking precautionary measures. The following are general recommendations from the American Lung Associations:

- Stay indoors and use an air conditioner, if available.
- Do not smoke and avoid second-hand smoke.
- Limit physical exertion.
- Drink plenty of fluids to loosen mucus. Warm beverages seem to work best.
- If you take medications, always have an adequate supply and keep them readily available in a convenient place.
- Contact your physician as soon as any respiratory problem develops.

While these recommendations are intended primarily for persons having respiratory or chronic lung disease, they are also useful for healthy persons during vog episodes. For additional information on respiratory health, contact your personal physician or the American Lung Association of Hawaii at (808) 537-5966.

###

For media questions about this news release, contact:
Lisa Young
Clean Air Branch
Phone: (808) 586-4200



Updated at 3:28 p.m., Friday, March 21, 2008

Big Island warned of higher sulfur dioxide levels

Advertiser Staff

The state Department of Health is urging Big Island residents to take precautionary measures due to elevated levels of sulfur dioxide, especially near Kilauea volcano.

On March 19, the 24-hour sulfur dioxide level recorded at the department's monitoring station in Pahala exceeded the federal ambient air quality standard.

The U.S. Environmental Protection Agency's standard for sulfur dioxide averaged over 24 hours is 0.14 parts per million. The Pahala air monitoring station recorded a 24-hour average of 0.149 ppm.

Communities near Kilauea volcano are particularly affected by increased sulfur dioxide levels due to recent volcanic activity. The department is continuing to monitor sulfur dioxide levels in five Hawai'i County communities: Kona, Hilo, Mountain View and Pahoa.

Elevated sulfur dioxide levels can cause breathing problems especially for individuals with asthma, emphysema and bronchitis.

The following are general recommendations from the American Lung Association:

- Stay indoors and use an air conditioner, if available.
- Do not smoke and avoid secondhand smoke.
- Limit physical exertion.
- Drink plenty of fluids to loosen mucus.
- If you take medications, make sure you have an adequate supply and keep them readily available in a convenient place.
- Contact your physician as soon as any respiratory problem develops.

For additional information on respiratory health, contact your physician or the American Lung Association of Hawaii at 537-5966.

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COURTESY CHARLENE MEYERS, IMAGES OF HAWAII
Photographer and national park volunteer Charlene Meyers took this 72-second time exposure Tuesday night of the glowing spot in Halemaumau Crater. Five hours later a natural explosion tore the red spot apart.

Fire in the hole

Volcano blast spews grit over 19 miles

By Rod Thompson
rthompson@starbulletin.com

HILO » Big Island photographer Charlene Meyers must have been one of the last people to see the glowing red vent inside Halemaumau Crater before the unusual feature blew itself apart early Wednesday morning.

Arriving at the Jaggar Museum viewing site at about 9:30 p.m. Tuesday, Meyers found a moment when rain showers did not obstruct the view, a nearly full moon lit the ground and sulfur dioxide steam plume, and a 72-second exposure revealed the Southern Cross hanging just to the right of the blazing, bright red spot.

About five hours later, at 2:58 a.m. Wednesday, the red spot blew up, throwing debris over a 75-acre area.

Tuesday night was the last time anyone had a chance to see it, Meyers said.

The next day, Hawaii Volcanoes National Park closed the Jaggar area for fear of a repeat explosion.

"We are still gathering details and trying to deduce the exact nature of the explosion," the Hawaiian Volcano Observatory said in its weekly "Volcano Watch" column.

One idea is the "throat-clearing hypothesis" -- that the vent system plugged up, then blasted the vent tube open, the observatory said.

A coating of fine white grit, probably from the explosion, was found on cars in Pahala, 19 miles to the southwest.

A boulder weighing 2.7 tons was among the material blown out of Halemaumau Crater.

News Alert

» Molokai Ranch shutting down operations

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- » Alexander, 'Bows hold Fresno State in check

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Sulfur dioxide gas continues to gush from the former site of the red spot.

A state air-monitoring station at Pahala recorded sulfur dioxide levels on Wednesday at nearly 0.15 parts per million, exceeding the U.S. Environmental Protection Agency's limit of 0.14 parts per million during a 24-hour period, the state Department of Health said.

People with breathing problems were urged to stay indoors, limit physical activity and drink plenty of fluids.

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Posted on: Thursday, March 27, 2008

Officials worry about billowing volcanic gas

Volcano stirring

Activity at Big Island's Kilauea is heightening as the eruption of the island's youngest volcano entered a new phase. [Read our stories](#), [see more photos](#), and [see video](#).



StoryChat: [Comment on this story](#)

By [Kevin Dayton](#)
Advertiser Big Island Bureau

HALEMA'UMA'U, Hawai'i — Scientists, civil defense and Hawai'i Volcanoes National Park officials are grappling with a new set of problems as the summit of Kilauea volcano pumps out an unprecedented amount of gas and volcanic ash.

The trade winds have helpfully pushed pollutants away from most populated areas since Kilauea nearly doubled its gas emissions earlier this month, but it is only a matter of time until the winds shift.

When that happens, higher levels of sulfur dioxide and other particles may be blown into nearby communities, which include Volcano Village and the subdivisions in Upper Puna, posing a potential health threat. People with respiratory problems such as asthma, bronchitis and emphysema would be particularly at risk.

The unexpected increase in sulfur dioxide production at the summit of the volcano has officials at the state Department of Health scrambling to develop new guidelines to determine when communities may be at risk from short-term spikes in the emissions, and how great those risks may be.

Those guidelines aren't expected to be complete until next week, but there are some signs that suggest which communities could be affected.

On March 19, the 24-hour average levels of sulfur dioxide in Pahala exceeded federal ambient air quality state guidelines in what amounted to the equivalent of a bad pollution day in an urban area. That prompted the state Department of Health to issue an advisory to warn residents, especially those who have respiratory problems.

Pahala is 20 miles southwest of Halema'uma'u, which suggests communities such as Volcano, Glenwood, Kurtistown, Mountain View and even the sprawling Puna subdivisions such as Hawaiian Acres may feel the effects of the changes at Kilauea when the winds blow from the southwest.

According to the 2000 Census, those communities have a combined population approaching 10,000, and all are within 20 miles of the new vent that opened at the crater and dramatically increased the sulfur dioxide emissions from the volcano.

Big Island Mayor Harry Kim acknowledged yesterday that scenarios are being studied that could include evacuations of the 800 workers at Hawai'i Volcanoes National Park and the surrounding area if the air quality deteriorates dramatically.

"Our responsibility is to assess what is the risk to people and to take appropriate actions," he said. "The worst-case scenario obviously would be if in areas of the park the SO2 reaches a level that we will advise evacuation of all people. Hopefully that will not be, but obviously that is a scenario based on wind conditions that could be for the areas abutting the national park."



Two geologists stand at the rim of Halema'uma'u as a cloud of ash and sulfur dioxide rushes into the air.

J.D. Griggs

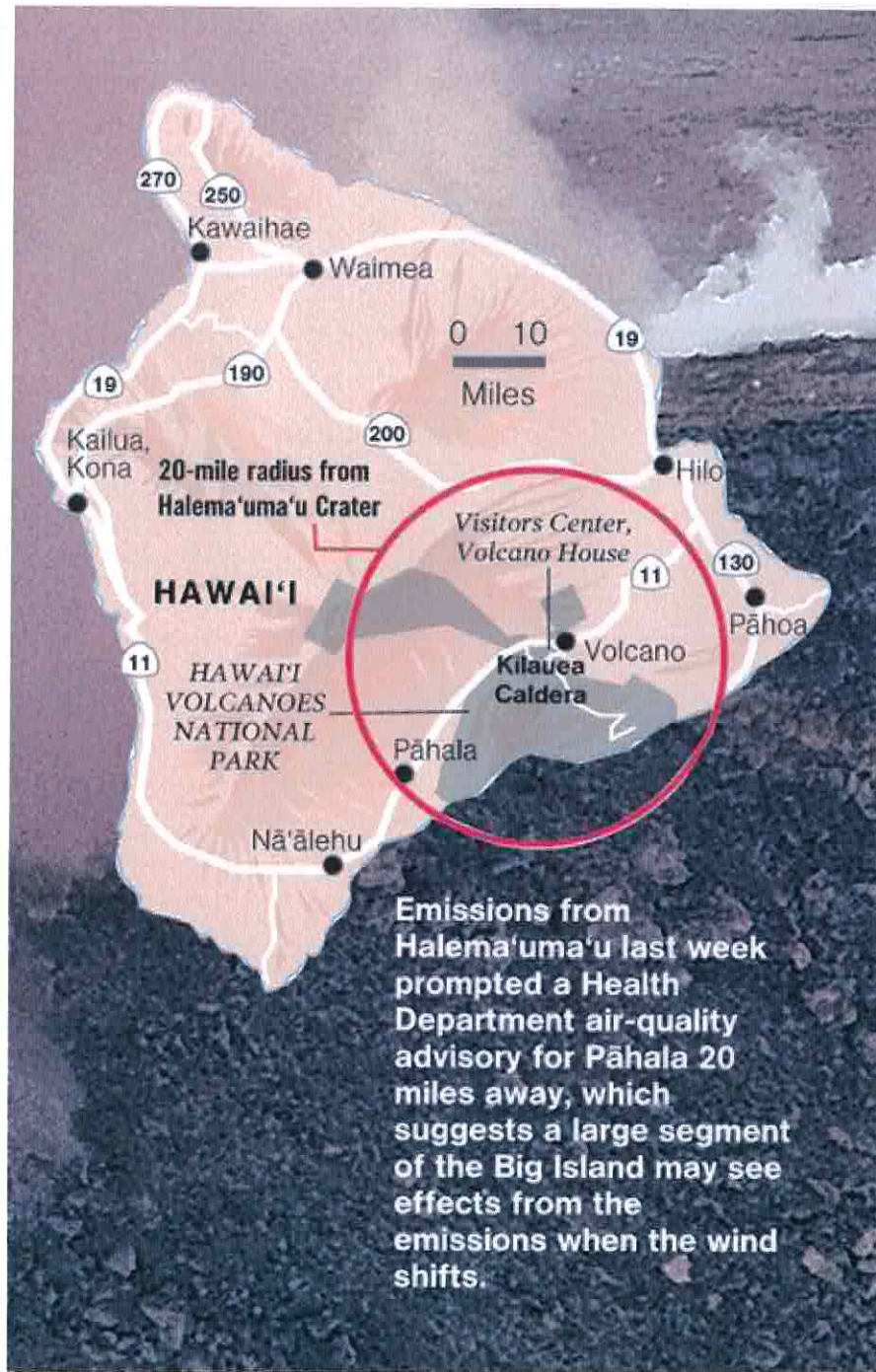


Park Ranger Michael Larson was at the overlook near Jaggar Museum yesterday, taking photographs of the new vent in Halema'uma'u crater.

KEVIN DAYTON | The Honolulu Advertiser



John Peard



Emissions from Halema'uma'u last week prompted a Health Department air-quality advisory for Pāhala 20 miles away, which suggests a large segment of the Big Island may see effects from the emissions when the wind shifts.

...

STORYCHAT

From the editor: StoryChat was designed to promote and encourage healthy comment and debate. We encourage you to respect the views of others and refrain from personal attacks or using obscenities.

By clicking on "Post Comment" you acknowledge that you have read the [Terms of Service](#) and the comment you are posting is in compliance with such terms. Be polite. Inappropriate posts may be removed by the moderator.

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Quality of Air Means Quality of Life

- Local Forecasts & Conditions
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Hawaii Air Quality Conditions & Forecasts

[Hawaii Volcanoes National Park](#) | [Honolulu](#)

Data courtesy of [Hawaii Department of Health - Environmental Health](#)

National Air Quality Summary

G 0 - 50 Good	M 51 - 100 Moderate	USG 101 - 150 Unhealthy for Sensitive Groups	U 151 - 200 Unhealthy	V 201 - 300 Very Unhealthy	H 301 - 500 Hazardous	! Action Day click on the icon in city forecast area for more details
-----------------------------------	---	--	---	--	---	---

Hawai'i County Civil Defense Agency Continues Emergency Health Advisory due to high levels of sulfur dioxide from Kilauea Volcano Eruption

Location	Current AQI	Forecast	
City	Wednesday April 23	Wednesday April 23	Thursday April 24
Hawaii Volcanoes National Park, HI	Forecast program not in place. Select city or national park for current conditions.		
Honolulu, HI	OZONE 32 G	Ozone G	Ozone G

Current Air Quality Conditions Maps

Particles (PM2.5)	Ozone
Hawaii	Hawaii

[EXIT AIRNOW](#) NOTE: Most links on this page are pointers to other hosts and locations on the Internet.

Hawaii Air Quality Resources

Hawaii Department of Health - Environmental Health (EH)
Hawaii EH - Clean Air Branch
Hawaii Department of Land and Natural Resources
American Lung Association (ALA) of Hawaii

AIRNow is a government-backed program. Through AIRNow, EPA, NOAA, NPS, news media, tribal, state, and local agencies work together to report conditions for ozone and particle pollution. State, Local and Tribal Partners.



[EPA Home](#)



[NOAA-National Weather Service](#)



[NASA Earth Science](#)



[National Park Service Air Resources](#)



[National Association of Clean Air Agencies](#)



[Environment Canada](#)

Attachment 8

- 1) Hawaii County Civil Defense brochure: "Emissions from Kilauea Volcano"
- 2) Hawaii County Civil Defense "Health Advisory Update" from their web site:
www.hawaii-county.com/cd/message.htm
- 3) "Precautionary Measures for Elevated Sulfur Dioxide Levels on the Big Island" from the DOH home page at:
http://hawaii.gov/health/environmental/air/cab/cab_precautions.html
- 4) Homepage of the American Lung Association of Hawaii at:
www.ala-hawaii.org

Water Catchment Systems

Volcanic emissions can cause contamination of water in catchment systems. These emissions are the greatest cause of acid rain in Hawaii. 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/ra/ra/ra/raincatch.html>

<http://www.eng.warwick.ac.uk/icsa/facisheets/Hawaii/RainHarv.pdf>

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

Agriculture

The recent increased volcanic activity at Kilauea'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 Hawaii 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:

Hawaii County Civil Defense Agency

(808) 935-0031

<http://havainfo.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/>

Hawaii Volcanoes National Park

(808) 985-6000

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

State of Hawaii Department of Health

(808) 933-0917 – Hilo

(808) 322-1507 – Kona

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

State of Hawaii Department of Agriculture

(808) 974-6503 – Livestock Disease Control

Veterinarian

(808) 483-7103 – State Veterinarian

<http://hawaii.gov.hdoa>

American Lung Association of Hawaii

(808) 935-1206

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



Emissions from Kilauea 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 Kilauea summit have increased the potential hazards for Hawaii 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 everyone else: 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.*

CIVIL DEFENSE AGENCY

MEDIA UPDATE

Date: March 25, 2008

Time: 4:30 p.m.

Update: # 1

Incident: Health Advisory Update

This is a civil defense message.

This is a health advisory update for Tuesday afternoon, March 25, at 4:30.

The Hawaiian Volcano Observatory, which is responsible for the monitoring of our volcanoes, has reported that sulfur dioxide emissions from Halema'uma'u at the Kilauea summit have shown a heavy increase especially over the past two weeks. This increase, combined with the output at Pu'u 'O'o, means that about twice the level of sulfur dioxide is now being emitted into the air from Kilauea. Increase in sulfur dioxide from Halema'uma'u has also been accompanied by ash emissions that has reached Pahala.

Due to this change in activity at Kilauea, your federal, state and county government agencies and the private sector are working together to monitor the sulfur dioxide emissions level and vog conditions, and other events of Kilauea to ensure public awareness and safety.

The following recommendations and precautionary measures by the Department of Health and the American Lung Association are in response to the increased level of sulfur dioxide and heavy vog conditions affecting some areas of Hawai'i Island. While these recommendations are intended primarily for persons having respiratory or chronic lung disease, they are also useful for healthy persons during heavy vog episodes.

- Stay indoors and in an air conditioned area if possible to reduce exposure.
- Do limit any outdoor and physical activities.
- Contact your doctor as soon as possible if any problem develops as respiratory problems might deteriorate much more rapidly in heavy vog conditions.
- Drink plenty of liquids, and it is recommended that warm liquids seem to work best.
- Keep medications readily available.
- *Sensitive population including asthmatics, individuals with other respiratory disease, lung disease, or heart disease are especially advised to exercise caution, and if at all possible, limit exposure to vog conditions.

The State Department of Health does fully recognize that individuals are affected differently by exposure to sulfur dioxide, and appropriate measures of care and preventive actions must be considered on an individual basis. Please know that these recommendations are general in nature.

For your additional information:

- A combined “no-burn” declaration has been issued by the State Department of Health and the Hawai‘i County Civil Defense Agency for the island of Hawai‘i effective immediately. The declaration prohibits any open burning, with or without permits, including all agricultural burning and backyard rubbish fires. Cooking fire are not affected by this prohibition.

The volcanic conditions will be closely monitored and if any changes occur that might affect your safety, you will be informed.

Thank you for listening. Have a safe day.

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Precautionary Measures for Elevated Sulfur Dioxide Levels on the Big Island

Recent activity at Kilauea volcano has been affecting nearby communities on the Big Island with increased levels of [sulfur dioxide \(SO₂\)](#). The Department of Health (DOH) is working with Hawai'i County and its efforts to continue to monitor the SO₂ levels throughout the Big Island.

Elevated levels of SO₂ can cause breathing problems in individuals especially those with preexisting respiratory conditions, such as asthma, emphysema, and bronchitis. If you have respiratory conditions and live or work in an area impacted by SO₂ or vog, consider taking precautionary measures. The following are general recommendations from the [American Lung Association](#):

- Stay indoors and use an air conditioner, if available.
- Do not smoke and avoid second-hand smoke.
- Limit physical exertion.
- Drink plenty of fluids to loosen mucus. Warm beverages seem to work best.
- If you take medications, make sure you have an adequate supply and keep them readily available in a convenient place.
- Contact your physician as soon as any respiratory problem develops.

While these recommendations are intended primarily for persons having respiratory or chronic lung disease, they are also useful for healthy persons during vog episodes. Click [here](#) for a printable one-page PDF file on precautionary measures for elevated sulfur dioxide on the Big Island.

To obtain additional information on respiratory health, contact your personal physician or the [American Lung Association of Hawai'i](#) at **(808) 537-5966**.

To obtain more information about the [Clean Air Branch](#), please call **(808) 586-4200** between 7:45 a.m. and 4:15 p.m. Monday through Friday.

Department of Health Clean Air Branch
919 Ala Moana Blvd., Suite 203
Honolulu, Hawaii 96814
Ph (808) 586-4200
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Hawaii Department of Health for SO2 levels

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Emissions from Kilauea Volcano

County of Hawaii - April 2008

Brief summary of hazards and protective measures

[Click here for brochure](#)

(.pdf file - please change printer settings to legal size paper)



Hawai'i Volcanoes National Park Service

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