

State of Hawai`i
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Forestry and Wildlife
Honolulu, Hawai`i 96813

June 20, 2011

Chairperson and members
Natural Area Reserves System Commission
State of Hawai`i
Honolulu, Hawai`i

NARS Commission Members:

**SUBJECT: REQUEST TO EXTEND THE CLOSURE OF KAHUALE`A
NATURAL AREA RESERVE, ISLAND OF HAWAI`I, TO THE
PUBLIC PURSUANT TO HAR § 13-209-4.5 FOR PUBLIC SAFETY
PURPOSES**

This Commission Submittal outlines the status of the volcanic hazards in Kahauale`a Natural Area Reserve (NAR), island of Hawai`i and requests the Commission approve and recommend that the Board extend the closure of this area to the public, pursuant to HAR § 13-209-4.5.

BACKGROUND:

Kīlauea Volcano has been erupting continuously since January 1983. The Kahauale`a NAR has been inundated by lava flows several times during the 28+ year eruption of the middle east rift zone vents, namely Pu`u `Ō`ō, Kupaianaha, and the Thanksgiving Eve Breakout (TEB) vents. As recently as March 2011 flows were still active within the Natural Area Reserve that originated from the TEB vent (its official name) that commenced erupting in July, 2007. On March 5th, 2011 the floor of Pu`u `Ō`ō vent collapsed, dropping at least 370 ft. Subsequently, the Kamoamoā fissure eruption ensued for 4 days, stalling activity in the TEB vent. Large land cracks up to 6 ft wide were opened during this event, and sulfur dioxide concentrations exceeded 11,000 tons per day. Since the cessation of the Kamoamoā fissure eruption, lava has returned to the Pu`u `Ō`ō vent and is slowly filling the crater floor. As of June 1, 2011, the lava was within 130 ft of the eastern vent wall. The lava could stay within the Pu`u `Ō`ō crater, erupt to the east, as it did between 2007 and 2011, or erupt to the west, as it did with the March, 2011 Kamoamoā eruption. Another eruption to the east will directly impact the NAR.

The U.S. Geological Survey – Hawaiian Volcano Observatory (USGS-HVO) website provides updated status reports on the activity of Kīlauea. The June 8th, 2011 report provided the following activity summary:

“Past 24 hours at the middle east rift zone vents and flow field:

The tiltmeter on the north flank of Pu`u `Ō`ō Cone recorded continued slowing deflation. The GPS network around Pu`u `Ō`ō recorded long-term extension since

mid-April. Seismic tremor levels near middle east rift zone vents remained low. The most recent (preliminary) sulfur dioxide emission rate measurement was 1,100 tonnes/day on June 3, 2011, from all east rift zone sources.

A lava lake, fed continuously by sources near the west and northeast edges of the lake, remained perched in the center of the crater floor. The rim of the perched pond was elevated more than 2-3 m (6-10 ft) higher than the surrounding crater floor, which was 39 m (130 ft) below the eastern crater rim when measured on June 1. The lake level remained high with one small breach through the western lake edge. There was also minor lava activity from at least one source at the base of the southwest crater wall. The only lava currently erupting in the east rift zone is within Pu`u `Ō`ō Crater.

Before the July 21, 2007 eruption, public use of Kahauale`a was steadily increasing. A hiking trail (known as the Captain's Trail, Kahauale`a Trail, or Pu`u `Ō`ō Trail) developed over years of use is widely publicized in visitor publications such as *Hawaii Revealed* and encourages people to use the trail to illegally access Pu`u `Ō`ō, the current eruption source. The northern slope of Pu`u `Ō`ō is within the Kahauale`a NAR, with the majority of the vent within Hawai`i Volcanoes National Park (NPS). The NPS continues to restrict access to Pu`u `Ō`ō. Over the years, in response to the number of rescues and incidents at Kahauale`a, NARS staff have partnered with the Hawai`i Fire Department to increase signage and make minor trail improvements to minimize the number of hikers who become lost by going off-trail. The Hawai`i County Fire Department (HCFD) has responded to 14 separate incidents of lost parties in the Kahauale`a NAR area since May 2008, most of which occurred in 2010-2011. A number of closure signs and fenced barriers have been placed across the trail. There now seems to be an increased draw to try and view lava in Pu`u `Ō`ō vent, as it is the only active lava in the east rift zone. Prior to March 2011, lava was entering the ocean near Kalapana and viewing activity was closely monitored by the County of Hawai`i.

Due to public safety concerns relating to unprepared visitors attempting to visit an active lava flow and an active volcanic area and the heightened risk of sulfur dioxide inhalation, and after discussions with staff from USGS-HVO, the Board closed Kahauale`a NAR to public access effective July 25, 2007. Since that time, NARS staff has communicated with USGS-HVO staff on a regular basis about the status and condition of the area to confirm that the area continues to pose a safety risk to visitors. In May 2008, a Memorandum of Understanding between the Board and the USGS-HVO was entered into that allows USGS-HVO access to Kahauale`a for the purposes of volcanic hazard monitoring and provides the Board with hazard assessments and recommendations. Staff regularly attends weekly updates at the USGS-HVO headquarters in Hawai`i Volcanoes National Park. In addition, Division staff regularly monitors the signage and barricade at the Captain's Trail, and DOCARE officers patrol the area.

The Division requests the Board to continue the closure initiated July 25, 2007 and to extend it for another two years, through July 24, 2013. This closure is supported by the USGS-HVO and the County of Hawai`i Civil Defense. Should conditions change during the next years so that public access can again be safely restored, the Division will return to the Board to re-open the NAR.

During the current closure, Special Use Permit Applications to conduct research, filming, cultural practice, and other uses have been considered on a case-by-case basis with restrictive conditions, as necessary, clearly defined.

ANALYSIS:

Hawai'i Revised Statutes § 195-5 provides that the Department of Land and Natural Resources may make rules governing the use, control and protection of the areas included within the reserve system. Hawai'i Administrative Rule § 13-209-4.5 provides:

The board or its authorized representative, with the approval of the commission, may close or restrict the public use of all or any portion of a natural area reserve for up to two years, when deemed necessary by the commission for the protection of the natural, geological, or cultural resources of the area or the safety and welfare of persons or property, by the posting of appropriate signs indicating the duration, extent, and scope of closure. Closures may be renewed with the approval of the board or its authorized representative and the commission.

The proposed closure is requested for the safety and welfare of the public. The Commission approved the previous closure extension at its meeting April 6, 2009, and recommend the Board extend the closure until July 24, 2011.

The Division is seeking approval to close the entire NAR, TMK 311001002 Parcel 1 & 2 (22,521 acres), based primarily on information from USGS-HVO. The vent areas and lava channels are hazardous and conditions can change rapidly including collapse of existing features. Lava flows advancing through vegetation are hazardous and can produce fire and methane explosions that propel chunks of lava and rock several feet in the air. Fume emissions in the area can exceed 1000 tons per day of sulfur dioxide, and exceeded 11,000 tons per day during the Kamoamo eruption event. Downwind exposure to these fumes can be hazardous, and have been known to reach concentrations that can be lethal. Finally, because of previous volcanic activity in Kahauale`a in the 1980s and 1990s, the entire NAR is marked by old lava tubes and cracks, now partially covered by vegetation, making the holes and gaps difficult to see and extremely dangerous to anyone venturing off established trails. Based on the current volcanic activity and the known dangers, the Division recommends closing the entire NAR, rather than just a portion. Natural Area Reserve Special Use Permit Applications to conduct research, filming, cultural practice, and other uses, such as hunting, will continue to be considered on a case-by-case basis with restrictive conditions, as necessary, clearly defined.

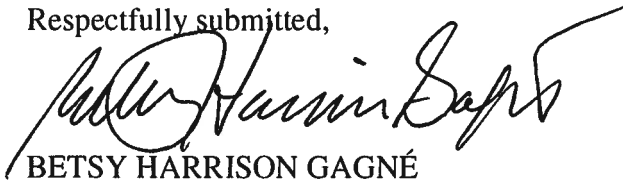
The Division requests the Commission approve and recommend that the Board to extend the closure of Kahauale`a NAR for a term of two years commencing on July 25, 2011 through July 24, 2013, with the possibility of renewal should the current volcanic conditions continue. Should the current conditions change before July 24, 2013, so that public access can be safely accommodated, the Division will return to the Board to remove the closure. The exact duration of the closure is currently uncertain, as it is entirely dependent on the volcanic activity. The Division is concerned about posting a specific date on signage, based upon a belief that visitor

publication will then re-publicize that date as a date upon which the NAR will be re-opened, building expectations and creating management problems if the closure needs to be extended. After further discussion with the Attorney General's office and the Division of Conservation and Resources Enforcement (DOCARE), the Division has installed signage indicating that the area is *Closed until further notice*, or other appropriate language indicating the duration of the closure.

RECOMMENDATION:

That the Commission approve and recommend that the Board extend the closure of the Kahauale`a NAR for an additional term of two years commencing from July 25, 2011 to July 24, 2013.

Respectfully submitted,

A handwritten signature in black ink, appearing to read "Betsy Harrison Gagné", written in a cursive style.

BETSY HARRISON GAGNÉ
Executive Secretary
NARS Commission

Attachments: USGS-HVO letter dated June 7, 2011
Hawai'i County Civil Defense letter dated May 27, 2011



United States Department of the Interior



U.S. GEOLOGICAL SURVEY
Hawaiian Volcano Observatory
Post Office Box 51
Hawaii National Park, Hawai'i 96718-0051

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FORESTRY & WILDLIFE
HAWAII DISTRICT

IN REPLY REFER TO:

To: Lisa Hadway, Department of Land and Natural Resources
From: Jim Kauahikaua, Scientist-in-Charge
Date: June 7, 2011
Subject: Current Hazard Assessment of the Kahauale'a NAR

There are several volcanic hazards present in the Kahauale'a NAR. They include volcanic gas emissions, lava flow hazards, collapse of recently constructed topographic structures, and ground cracks.

Recent Area History: The NAR has been inundated by lava flows several times during the 28+ year eruption of middle east rift zone vents, namely Pu'u 'O'o, Kupaianaha, and the TEB vents. The entire southeastern arm of the NAR has been covered multiple times by 'a'a and pahoehoe flows. As recently as March, 2011, active lava flows were proceeding downslope toward the community of Kalapana where 3 structures were destroyed in the last year.

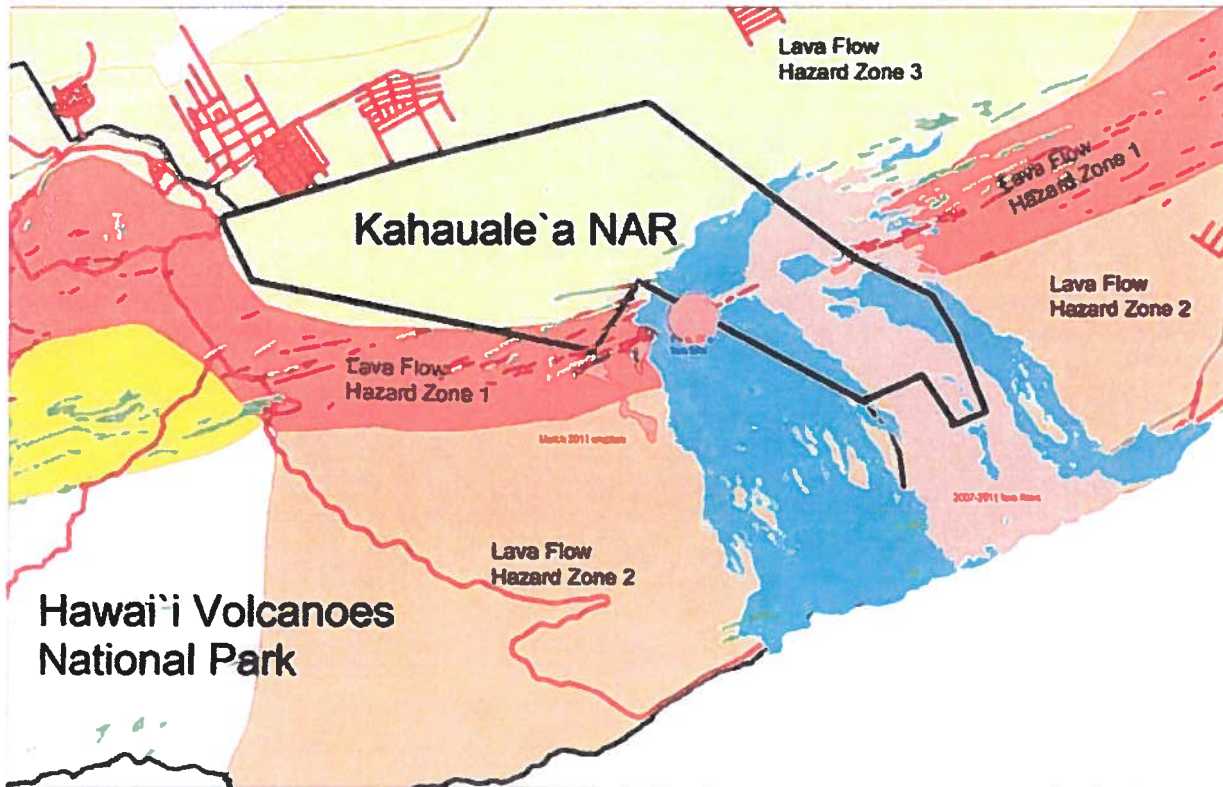


Figure 1. Lava flows from 1983-2007 in blue, 2007 to present in pink. Cracks and fissures also shown as green and red lines. Lava Flow Hazard Zones are also shown.



The only active lava currently present in the east rift zone is slowly filling Pu'u 'Ō'ō crater; its future includes lava staying within the crater, erupting to the east, as it did between mid-2007 and early 2011, or erupting to the west, as it did in early March, 2011. Another eruption to the east will directly impact the NAR. An eruption to the west will directly impact the NAR only if lava flows or gases blow to the north.

Throughout this eruption, Pu'u 'Ō'ō has been emitting elevated and variable amounts of volcanic gasses, the most noxious of which is sulfur dioxide. Vog is a state-wide problem which can be most dangerous in areas near the emission sources – Pu'u 'Ō'ō is one of those sources. The 2003-2007 average emission rate was 1,700 tonnes per day. For the month of July, 2008, this rate increased to over 7,000 tonnes per day. Gas emissions from the TEB vent (east of Pu'u 'Ō'ō) were much lower but still significant. Finally, gas emissions from the recent Kamoamoā eruption (March 5-9, 2011) were more than 10,000 tonnes per day. Currently, SO₂ emissions from all east rift zone vents are less than 1,000 tonnes per day and increasing.

During normal trade winds, these emissions immediately depart the NAR and move to the southwest through Hawai'i Volcanoes National Park. However, during kona or weak winds, these emissions can accumulate around Pu'u 'Ō'ō and/or move out into the northwestern section of the NAR. The areas in close proximity to the sources might experience high concentrations of sulfur dioxide but specific measurements have not been made. The nearest air quality site is in the adjoining Mauna Loa Estates subdivision 14 km (9 miles) to the northwest of Pu'u 'Ō'ō; maximum, 15-minute-average concentrations have reached 2 ppm in that subdivision. Sulfur Dioxide concentrations in air are likely higher with the NAR which is closer to the gas source. The State of Hawaii Department of Health regards 15-minute-average sulfur dioxide concentrations above 1 ppm as Unhealthy and above 3 ppm as Very Unhealthy.

Current Hazards: The Kahauale'a NAR consists of two hazard provinces: 1) the area north of Lava Flow Hazard Zone 1 and 2) Lava Flow Hazard Zone 1 and the flow field from ongoing eruption including the 2007-2011 TEB eruption episode.

- 1) The area north of the rift zone is mostly tube-fed pahoehoe flows at least 400-500 years old. The volcano hazard here is ground cracks and potentially high concentrations of volcanic gases, mostly sulfur dioxide, when winds blow from the south to southeast. There are large cracks in this area. The few that are known but not located are near the southern boundary of this area abutting the rift zone.
- 2) the east rift zone of Kīlauea is characterized by active vents and inactive vents, fissures, and cracks. Much of the rift zone currently lacks vegetation due to recent volcanic activity; there are deep cracks within the forest on either side of the unvegetated terrain. Dangerous concentrations of sulfur dioxide can occur in areas downwind of Pu'u 'Ō'ō and any other vents. The actively erupting area includes the area from the north boundary of the east rift zone all the way to the far southeastern boundary. The active vents of Pu'u 'Ō'ō, TEB, and the Kamoamoā fissure eruption, and numerous structures built by lava flows over the active lava tube system all pose significant potential of collapse and inundation by lava. In addition, dangerous concentrations of sulfur dioxide can occur in areas downwind of Pu'u 'Ō'ō and/or the TEB vent.

If you have any questions, please feel free to contact me.





Figure 2. An HVO geologists looks along a crack formed during the March 5-9 Kamoamoao eruption west of Pu'u 'Ō'ō. Similar and wider cracks are present within the forest to the north, within the NAR.

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CIVIL DEFENSE AGENCY

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May 27, 2011

Ms. Lisa Hadway
Natural Area Reserves System Manager Hawaii Branch
Department of Land and Natural Resources
Division of Forestry and Wildlife
19 East Kawili Street
Hilo, Hawaii 96720

Dear Ms. Hadaway,

The Hawai'i County Civil Defense Agency supports the continued closure of the Kahaualea Natural Area Reserve. We consider the area a public safety concern due to:

- 1) the on-going volcanic eruption at Pu'u O'o. Current hazards include unstable geologic conditions and volcanic gas emissions.
- 2) hazards related to hiking on the "Captain's trail" used to access Pu'u O'o through the Kahaualea Reserve. Hikers routinely get lost hiking on the trail necessitating thirteen rescue missions by the Hawai'i Fire Department since 2008. In 2002, a Firefighter was severely injured from falling into a 130+' deep crack in the ground during a rescue mission in the area.

Please feel free to contact me if you have questions regarding the matter at 808-935-0031.

Respectfully,


Quince Mento
Civil Defense Administrator

