

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

March 31, 2017

Chair and Members
Natural Area Reserves System Commission
State of Hawai'i
Honolulu, Hawai'i

Commission Members:

**SUBJECT: REQUEST TO EXTEND THE CLOSURE OF KAHAUALE'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 recommend extending continued closure of the area to the Board, pursuant to HAR § 13-209-4.5.

BACKGROUND:

Kilauea 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 the Pu'u 'Ō'ō vent collapsed; dropping at least 370 feet. Subsequently, the Kamoamoa fissure eruption ensued for four 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 Kamoamoa 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 Kamoamoa 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 Kilauea. 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.

Item 4.b.

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 that the Commission recommend continued closure to the Board, to continue the closure initiated July 25, 2007, and to extend it for another two years, through July 24, 2019. This closure is supported by the USGS-HVO. 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 practices, and other uses have been considered on a case-by-case basis with restrictive conditions, as necessary, clearly defined, and would be continued to be reviewed on a case-by-case basis over the near closure period.

Continued closure is supported by US Geological Survey (USGS)/Hawaiian Volcano Observatory (HVO); which still has concerns due to the close proximity of Pu'u 'Ō'ō (located just within the boundary of Hawai'i Volcanoes National Park (HAVO) and Kahauale'a Natural Area Reserve; that the NAR should remain closed due to extreme hazards from fumes and shifting eruption activities. While it may appear that there is little or no activity; that can change in an instant.

For sulphur dioxide levels alone, the area is ranked well above hazard levels (hazard is considered to be 5 ppm; however levels have been measured that give it well above 150 ppm; which is way beyond hazard levels. HVO scientists and others charged with monitoring the entire area are prepared to deal with such situations with personal protective gear; but allowing the general public into such an already acknowledged area with not just potential for hazardous fumes, but shifting flows and lava tubs, is not prudent at this time.

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."

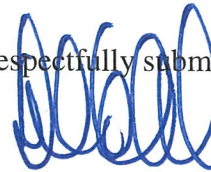
The proposed closure is requested for the safety and welfare of the public. The Natural Area Reserves System Commission (Commission) approved the previous closure extension at its meeting April 6, 2009, and recommended the Board extend the closure until July 24, 2011. At its meeting of June 20, 2011, the Commission approved extending the closure thorough July 25, 2013. At its June 17, 2013 meeting, the Commission approved extending the closure from July 25, 2013 through July 24, 2015. At its April 27, 2015 meeting, the Commission approved extending the closure from July 25, 2015 through July 24, 2017. At its March 31, 2017 meeting, the Commission is being asked to approve extending the closure from July 25, 2017 through July 24, 2019. 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 Kamoamoa eruption event. Downwind exposure to these fumes can be hazardous, and have been known to reach concentrations that can be lethal very quickly. 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, HVO and the Division recommend 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, with review of each request by HVO also. The Division requests, following recommendation by the Commission, that the Board approve extending the closure of Kahauale‘a NAR for a term of two years commencing on July 25, 2017 through July 24, 2019; with the possibility of renewal should the current volcanic conditions continue. Should the current conditions change before July 24, 2019, 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 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 recommends that the Board extend the closure of Kahauale‘a Natural Area Reserve for an additional term of two years commencing from July 25, 2017 to July 24, 2019.

Respectfully submitted,



DAVID G. SMITH, Administrator

APPROVED FOR SUBMITTAL:

Suzanne D. Case, Chairperson

Attachment: USGS-HVO letter



United States Department of the Interior

U.S. GEOLOGICAL SURVEY
Hawaiian Volcano Observatory
Post Office Box 51
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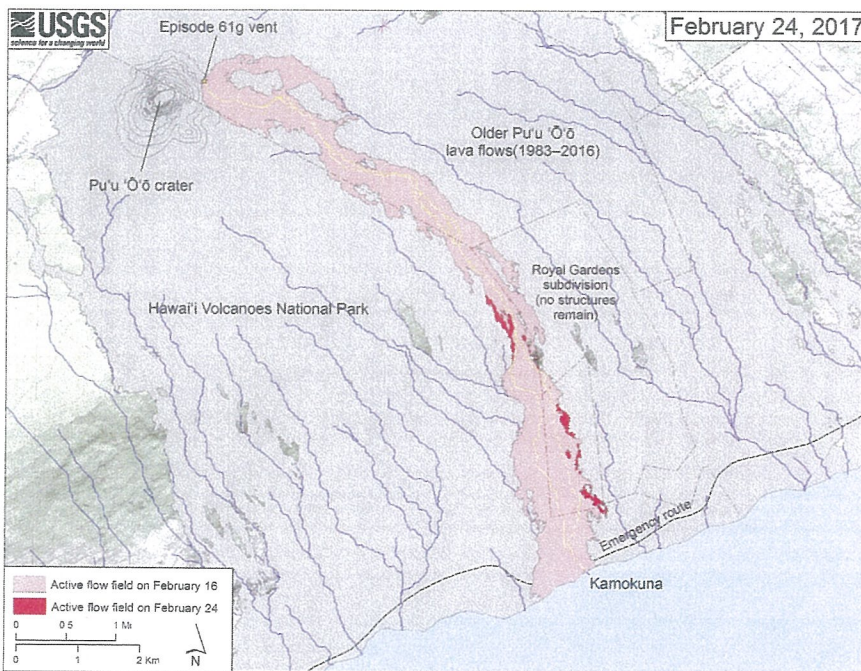


IN REPLY REFER TO:

To: Betsy Gagne, Department of Land and Natural Resources
From: Christina Neal, Scientist-in-Charge
Date: March 10, 2017
Subject: Current Hazard Assessment of the Kahauale'a NAR

Due to ongoing eruptive activity at the Pu'u 'Ō'ō vent on Kīlauea Volcano's East Rift Zone, several volcanic hazards persist in the Kahauale'a NAR. They include lava flows and volcanic gas, explosions, collapse of recently constructed topographic structures, and ground cracks.

Lava Flows: The NAR has been inundated by lava flows several times during the 34+ year eruption of the middle East Rift Zone. The entire southeastern arm of the NAR has been covered multiple times by 'a'ā and pāhoehoe flows. Currently, active lava flows from episode 61g at Pu'u 'Ō'ō are traveling via lava tube southeast through the NAR more or less parallel to the boundary with Hawai'i Volcanoes National Park. Occasionally, surface pāhoehoe lava flows are active following breakouts at the 61g vent on Pu'u 'Ō'ō's east flank and elsewhere along the tube system (Figure 1), including areas within the NAR. Until there is a significant shift in vent location, we expect this general style of activity to continue.



Lava flows from 1983-2016 in grey. Lava from episode 61g in pink. Red indicates surface flows active on February 24, 2017. The faint yellow line marks the trace of the 61g lava tube delivering lava to the Kamokuna ocean entry.



Gas Emissions: Pu'u 'Ō'ō continues to emit elevated amounts of volcanic gases, the most noxious of which is sulfur dioxide (SO₂). These gas emissions, along with fine particles – collectively called vog – are most dangerous in areas near Pu'u 'Ō'ō and skylights in the lava tube. Currently, SO₂ emissions from East Rift Zone vents are less than 500 metric tons per day. During previous episodes of activity along the East Rift Zone, however, emissions have been as high as 10,000 metric tons per day and this could happen again should the eruption style shift. Smoke from burning forest is also an issue intermittently, but less so as episode 61g lava heads across barren lava terrain.

During normal trade winds, Pu'u 'Ō'ō and skylight 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 NAR; areas in close proximity to the sources will experience high concentrations of sulfur dioxide. An SO₂ sensor on the north rim of Pu'u 'Ō'ō vent has recorded peak values of 150 ppm occasionally during kona wind conditions. The State of Hawaii Department of Health regards 15-minute-average sulfur dioxide concentrations above 1 ppm as Unhealthy and above 5 ppm as Hazardous.

Ground Cracks: The area north of the rift zone and the 1983-2016 flow field is mostly tube-fed pāhoehoe at least 400-500 years old. There are large cracks in this area often extremely well-hidden by vegetation. These are a significant hazard to anyone walking in the area.

Ground Collapse: The active vents of Pu'u 'Ō'ō and numerous structures built by lava flows over the active lava tube system all pose significant potential of collapse and inundation by lava at any time.

Explosions: Active flows running through forests can generate dangerous blasts as trapped combustible gas (including methane), formed by lava-cooked vegetation, ignites and explodes. These are sudden, unpredictable, and can hurl blocks of lava into the air posing a significant hazard to those nearby. This hazard has diminished somewhat under current conditions but could recur at any time.

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



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