

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

May 22, 2015

Chairperson and Members  
Board of Land and Natural Resources  
State of Hawai'i  
Honolulu, Hawai'i

Land Board 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 Board Submittal outlines the status of the volcanic hazards in Kahauale'a Natural Area Reserve (NAR), island of Hawai'i and requests the Land Board approve and 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 32+ 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 April 2015 flows were still active within the Natural Area Reserve. In April 2015 a portion of Pu'u 'Ō'ō vent collapsed. Throughout this eruption, Pu'u 'Ō'ō has been emitting elevated and variable amounts of volcanic gases, the most noxious of which is sulfur dioxide (SO<sub>2</sub>). These gas emissions, along with fine particles – collectively called vog – are most dangerous in areas near the emission sources such as Pu'u 'Ō'ō and skylights in the upper lava tube system. Currently, SO<sub>2</sub> emissions from East Rift Zone vents are less than 1,000 tonnes per day. During previous episodes of activity along the East Rift Zone, however, emissions have been as high as 10,000 tonnes per day and this could happen again. Smoke from burning forest is also an issue. Large land cracks up to 6 ft wide are common throughout the area, and new cracks form as eruptions continue. 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 the 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 (HAVO); the National Park Service (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 22 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 main active lava in the east rift zone, other than the current Halema‘uma‘u activity. 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 originally initiated July 25, 2007 by extending closure for an additional two years, from July 25, 2015 through July 25, 2017. This closure is supported by the USGS-HVO and the County of Hawai‘i Civil Defense. Should conditions change during the proposed closure period, the Division will return to the Board to re-open the NAR, so that public access can again be safely restored.

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 natural area reserves 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 approved the previous closure extension at its meeting July 12, 2013, recommended the Board extend the closure until July 25, 2015. The BLNR has approved previous two year closures from July 2007-2009, 2009- July 25, 2011 through July 25, 2013, and most recently from July 2013 to July 25 2015.

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 Kamoamoia 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.

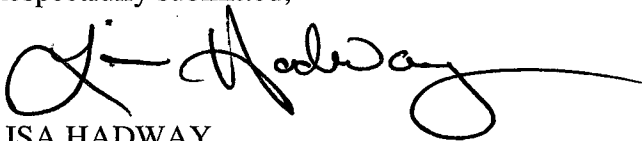
The Division requested the Commission approve and recommend that the Board extend the closure of Kahauale'a NAR for a term of two years commencing on July 25, 2015 through July 24, 2017, with the possibility of renewal should the current volcanic conditions continue. The Commission approved continued closure and recommended that the Board extend the closure for another two years at its April 27, 2015 Commission Meeting. Should the current conditions change before July 25, 2017, 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 publications 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 Office of the Attorney General 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 Board extend the closure of Kahauale‘a NAR for an additional term of two years commencing from July 25, 2015 to July 24, 2017.


Respectfully submitted,



LISA HADWAY  
Administrator  
Division of Forestry and Wildlife

Attachments: USGS-HVO letter  
MOU between USGS – HVO and the State of Hawai‘i BLNR  
Civil Defense letter

APPROVED FOR SUBMITTAL:



SUZANNE D. CASE, Chairperson  
Board of land and Natural Resources



as of April 1, 2015.

Gas Emissions: Throughout this eruption, Pu‘u ‘Ō‘ō has been emitting elevated and variable amounts of volcanic gases, the most noxious of which is sulfur dioxide (SO<sub>2</sub>). These gas emissions, along with fine particles – collectively called vog – are most dangerous in areas near the emission sources such as Pu‘u ‘Ō‘ō and skylights in the upper lava tube system. Currently, SO<sub>2</sub> emissions from East Rift Zone vents are less than 1,000 tonnes per day. During previous episodes of activity along the East Rift Zone, however, emissions have been as high as 10,000 tonnes per day and this could happen again. Smoke from burning forest is also an issue.

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 will experience high concentrations of sulfur dioxide. An SO<sub>2</sub> 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 current flow field is mostly tube-fed pāhoehoe flows at least 400-500 years old. There are large cracks in this area often extremely well-hidden by vegetation. The few that are known but not located are near the southern boundary of this area abutting the rift zone. 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.

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.

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



## **MEMORANDUM OF UNDERSTANDING**

between the

### **UNITED STATES GEOLOGICAL SURVEY – HAWAIIAN VOLCANO OBSERVATORY**

and the

### **STATE OF HAWAII BOARD OF LAND AND NATURAL RESOURCES**

This **MEMORANDUM OF UNDERSTANDING**, between the **United States Geological Survey, Hawaiian Volcano Observatory**, hereinafter referred to as "USGS-HVO", and the **State of Hawaii Department of Land and Natural Resources**, hereinafter referred to as "DLNR," (together "the Parties"), outlines an agreement for volcanic hazard monitoring on State lands on the island of Hawaii.

#### **RECITALS:**

Whereas, USGS is Congressionally mandated to issue volcano hazard warnings by the 1974 Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) (Public Law 100-707); and

Whereas, one of the missions of USGS-HVO, as part of the Volcano Hazards Program of the U.S. Geological Survey, is to enhance public safety and reduce losses from volcanic events through effective forecasts and warnings of volcanic hazards, and that to accomplish this objective, USGS-HVO conducts research on the volcanoes of Hawai'i, maintains accurate data and visual information for outreach and emergency response situations, and communicates with emergency response officials; and

Whereas, USGS-HVO works to reduce the risks of volcano-related hazards through monitoring volcanoes and earthquakes to track their behavior before, during, and after eruptions, through studying the eruption histories of Hawaii's volcanoes in order to achieve a long-term perspective that can help anticipate their future behavior and identify potentially hazardous areas, and through communicating results of their studies with the public, emergency managers, educators, and students through the media, presentations, and workshops; and

Whereas, Kīlauea has been erupting continuously since January 1983, and since July 21, 2007 has been erupting as fissure lava flows into the State lands of Kahaualea Natural Area Reserve, Wao Kele o Puna Forest Reserve, and other unencumbered State lands; and

Whereas, due to public safety concerns of unprepared visitors attempting to visit the active lava flow, the State closed Kahaualea NAR to public access, effective July 25, 2007; and

Whereas, the study and monitoring of this volcanic eruption by USGS-HVO staff, contractors, and collaborators is of high importance to public safety, both immediately and over the long-term to understand volcanic processes; and

Whereas, effective monitoring and management of the current eruption while on State land will best be achieved through coordinated action between USGS-HVO and DLNR; and

Whereas, the Parties deem a Memorandum of Understanding to be the best way to clarify the common goals and cooperative benefits of the relationship;

**NOW, THEREFORE**, in consideration of the mutual benefits of cooperative effort and the other terms and conditions of this agreement, the Parties agree as follows:

## **I. ACCESS.**

The Parties agree that USGS-HVO staff, contractors, and collaborators are expressly granted unlimited access via ground or by air to the State lands identified in Exhibit A ("Project Area") for the purpose of volcanic hazard monitoring. Ground access would be via the existing Captain's trail in Kahaualea Natural Area Reserve, through State parcel TMK 3-1-2-008-001, or through other mutually agreed-upon ground routes. All flights for any USGS passengers will adhere to USGS standards, including flight following and the wearing of appropriate personal protective equipment (PPE).

For purposes of this agreement, the term "contractors" means persons or entities under contract to USGS-HVO. For purposes of this agreement, the term "collaborators" means persons or entities under the control and supervision of the USGS-HVO Scientist in Charge (SIC), including those companies with whom USGS-HVO has USGS Research Associate Agreements (such as Volcano Video Productions and Tropical Visions Video, Inc.).

All requests for third party access (e.g., anyone other than USGS-HVO staff, contractors, or collaborators) will be handled by DLNR pursuant to existing permit requirements. It is anticipated that these third-party requests may be by film, video, or still photographers and researchers unaffiliated with USGS-HVO. DLNR agrees to circulate any applications for access or research into the Project Area to USGS-HVO for review and comment to ensure consistency with USGS-HVO sponsored monitoring and research.

## **II. COOPERATIVE RESEARCH AND MANAGEMENT.**

The Parties agree to exchange relevant information regarding the results of volcanic monitoring and research to enhance land management. In addition, USGS-HVO may provide additional guidance/assistance regarding the assessment of fire hazards, which may include developing flow direction projections and other volcano hazard tools, and may provide assistance in mapping volcanic hazards.



The Parties agree that USGS-HVO shall acquire appropriate DLNR permits for the installation of monitoring equipment for long-term hazards. The Parties agree that during a crisis situation that threatens public safety, USGS-HVO may install temporary instrumentation to address that crisis. Unless the Parties agree otherwise on a case-by-case basis, USGS-HVO will maintain any monitoring equipment installed in the project area and be responsible for its removal when no longer needed.

The Parties agree that DLNR will remain primarily responsible for normal land management functions including, but not limited to, control of public access, fire suppression, and law enforcement.

### **III. COMMUNICATION.**

Owing to the many values and benefits that arise from research and volcanic monitoring, the Parties further agree they will consult and communicate with each other regarding research, observations, and management activities within the project area. In addition, the Parties will consult with other affected agencies, including the Hawaii County Civil Defense Agency and the Office of Hawaiian Affairs.

### **IV. TERM.**

The Parties agree that this instrument is effective as of the date of the last signature. This instrument will remain in effect as long as the current lava eruption on Kīlauea remains active, unless terminated earlier by the withdrawal of either Party with 30 days notice in writing.

### **V. PRINCIPAL CONTACTS.**

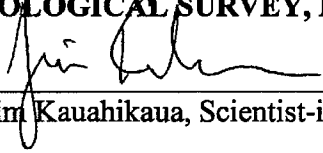
The principal contacts for administering this MOU are:

- A. *USGS-HVO:*  
Jim Kauahikaua, Scientist-in-Charge  
USGS Hawaiian Volcano Observatory  
PO Box 51  
Hawaii National Park, HI 96718
  
- B. *State of Hawaii:*  
Roger Imoto, Branch Manager  
Division of Forestry and Wildlife, Hawaii Island  
Department of Land and Natural Resources  
19 E. Kawili Street  
Hilo, HI 96720

**IN WITNESS WHEREOF**, the parties hereto have executed this Memorandum of Understanding as of the last date written below.

**U.S. GEOLOGICAL SURVEY, HAWAIIAN VOLCANO OBSERVATORY**

By

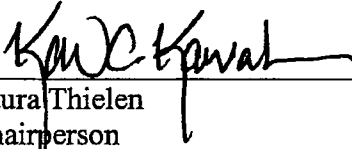
  
Jim Kauahikaua, Scientist-in-Charge

Date

May 22, 2008

**STATE OF HAWAII  
DEPARTMENT OF LAND AND NATURAL RESOURCES**

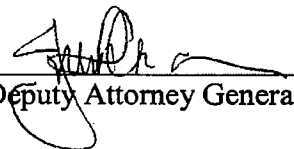
By

  
Laura Thielen  
Chairperson

Date

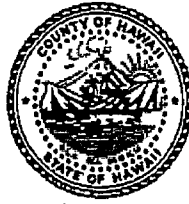
MAY 14 2008

**APPROVED AS TO FORM**

  
Deputy Attorney General

William P. Kenoi  
Mayor

Walter K.M. Lau  
Managing Director



Darryl J. Oliveira  
Civil Defense Administrator

## County of Hawaii

### CIVIL DEFENSE AGENCY

920 Ululani Street • Hilo, Hawai'i 96720-3958  
(808) 935-0031 • Fax (808) 935-6460

April 21, 2015

Betsy Gagne  
Department of Land and Natural Resources  
State of Hawaii

Dear Ms. Gagne,

I would like to provide you with this letter in support of maintaining the closure or restricted access to the Kahaualea NAR.

The Kahaualea NAR has and continues to experience the impacts of eruption activity from the Pu'u O'o vent. Most recently with the June 27<sup>th</sup> breakout and subsequent lava flows, this area and the adjoining Wao Kele o Puna Forest Reserve was inundated by lava flow activity that had also threatened nearby communities. In addition to the direct impact of lava flows, volcanic eruptions present with secondary hazards and threats to include wildland fires ignited by advancing flows, toxic gas emissions, and methane explosions associated with the igniting of sub-surface methane produced as a natural byproduct of organic decomposition. These hazards combined with the unstable and treacherous topography in the area to include very large and concealed cracks and tubes poses a significant danger to anyone attempting to access the area.

The magnificence and spectacular nature of the eruption and lava flow phenomenon is acknowledged and appreciated however, the hazards and risks associated with the eruption and unique topographical features presents with challenges and concerns with allowing access. The lava flow activity is a very alluring attraction that often overshadows the hazards that are present in the environment and may also entice individuals to enter and traverse areas without regards for the aforementioned dangers. This not only exposes these individuals to risk for injury or worse, but also places would be first responders summoned to their aid at risk to these same conditions.



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As an example of the latter concern, on September 11, 2002 a Hawaii Fire Department Rescue Specialist was critically injured when he fell over one hundred feet down a hidden crack while conducting search operations for overdue hunters in this same area.

As previously stated, the natural phenomena of volcanic eruptions and lava flows are greatly appreciated and it is acknowledged that this wonder should be shared and experienced by many however, only when it is safe to do so. Unfortunately the location of the activity is not in an area that is conducive to safe access and viewing.

Therefore, and based on the stated concerns and risks associated with the eruption activity and other environmental hazards present in the area of the Kahaualea NAR, I would like to express my support to maintain the closure and restricted access of the area. I would welcome the opportunity to discuss this matter in more depth and to address any questions you may have.

Sincerely,



Darryl J. Oliveira, Administrator  
Hawaii County Civil Defense Agency