

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

July 12, 2013

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 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 5<sup>th</sup>, 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 that continue to demonstrate the need for

continued closure.

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 first 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, 2015. 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; however, there is currently active lava flowing on to the Captain’s Trail on the Pu‘u ‘Ō‘ō end of the trail.

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

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 (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 through July 25, 2013, and at its June 17, 2013 meeting, the Commission approved extending the closure through July 24, 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 Kamoamoa 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, 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, 2013 through July 24, 2015, with the possibility of renewal should the current volcanic conditions continue. Should the current conditions change before July 24, 2015, 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 Board extends the closure of Kahauale‘a Natural Area Reserve for an additional term of two years commencing from July 25, 2013 to July 24, 2015.

Respectfully submitted,



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ROGER H. IMOTO, Administrator  
Division of Forestry and Wildlife

APPROVED FOR SUBMITTAL:



\_\_\_\_\_  
WILLIAM J. AILA, JR., Chairperson  
Department of Land and Natural Resources

Attachments: USGS-HVO letter  
USGS-HVO-BLNR MOU



# United States Department of the Interior



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

IN REPLY REFER TO:

To: Betsy Gagne, Department of Land and Natural Resources  
From: Jim Kauahikaua, Scientist-in-Charge  
Date: June 11, 2013  
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 30+ year eruption of middle east rift zone vents, namely Pu'u 'Ō'ō, Kupaianaha, and the TEB vents. The entire southeastern arm of the NAR has been covered multiple times by 'a'ā and pāhoehoe flows. Currently, active lava flows are proceeding downslope to the ocean through the southeastern arm of the NAR.

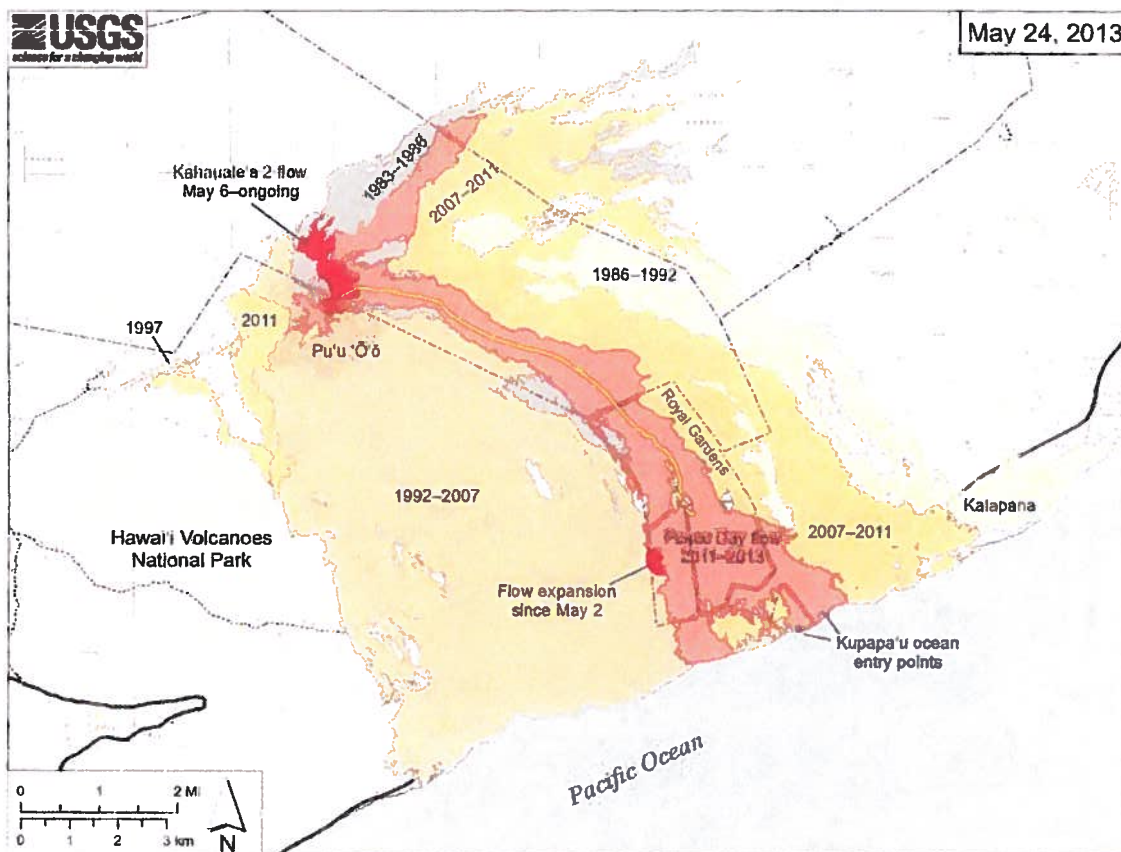


Figure 1. Lava flows from 1983-1987 in grey, 1986-1992 in yellow, 1992-2007 in light brown, 2007-2011 in light orange, and 2011 to present in pink. Red flows indicate currently active surface flows.



While always a possibility, two lava flows have issued from Pu'u 'Ō'ō vent and advanced to the north and northwest since the beginning of 2013. Over this past weekend, the second flow, called by us the Kahauale'a II flow, has advanced beyond the 1908s-era 'a'ā flows and started into the Kahauale'a NAR forest.

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 Kamoamoia eruption (March 5-9, 2011) were more than 10,000 tonnes per day. Currently, SO<sub>2</sub> emissions from all east rift zone vents are less than 1,000 tonnes per day.

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. A newly established SO<sub>2</sub> sensor on the north rim of Pu'u 'Ō'ō vent has recorded peak values of 150 ppm occasionally. 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 the current flow field and 2) the current flow field from ongoing eruption including the currently advancing Kahauale'a lava flows.

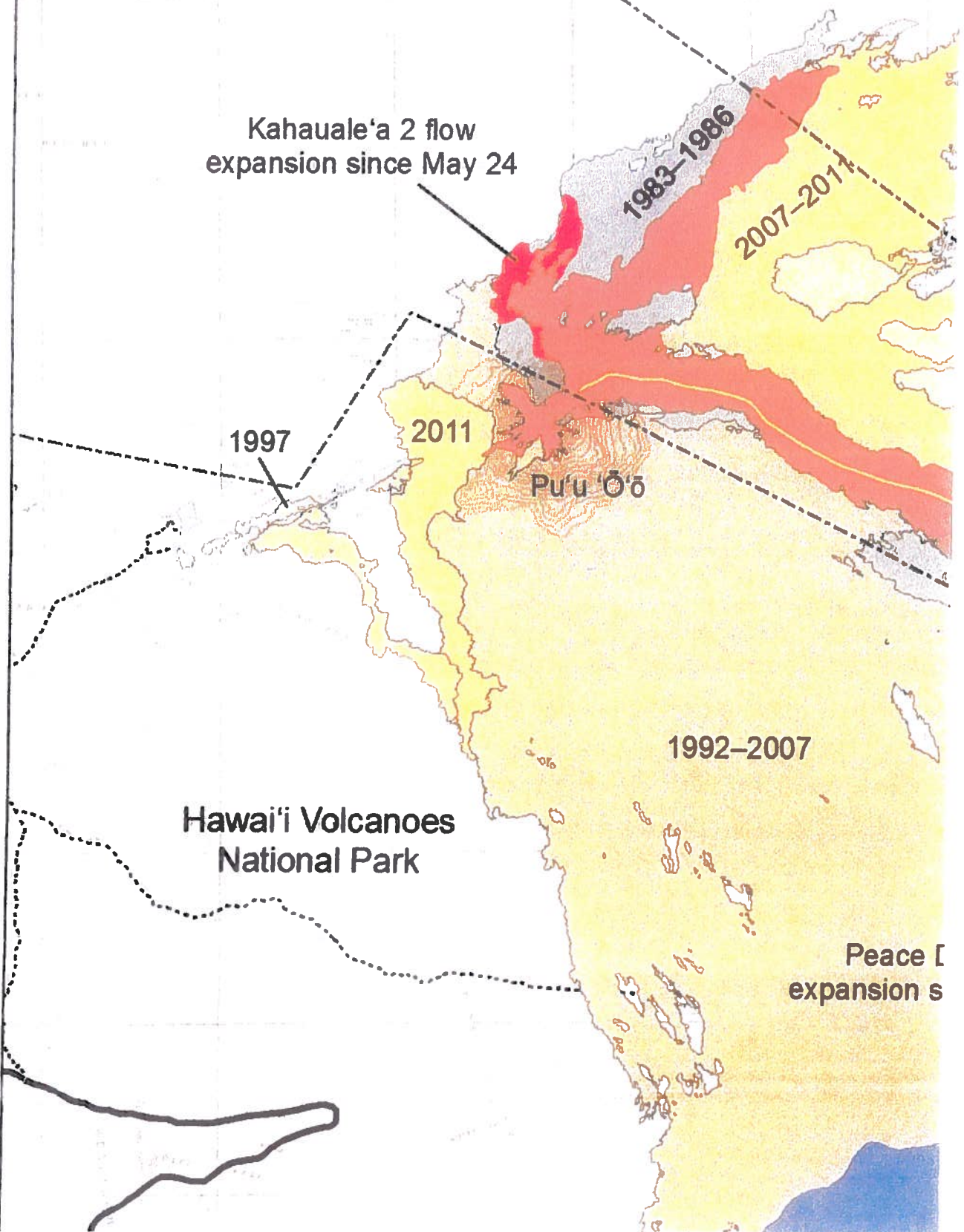
- 1) The area north of the rift zone and the current flow field is mostly tube-fed pahoehoe flows at least 400-500 years old. The volcano hazard in this area is ground cracks and potentially high concentrations of volcanic gases, mostly sulfur dioxide, when winds blow from the south to southeast. There 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 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, 2011, Kamoamo eruption west of Pu'u 'Ō'ō. Similar and wider cracks are present but covered with vegetation within the forest to the north, within the NAR.*





**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.

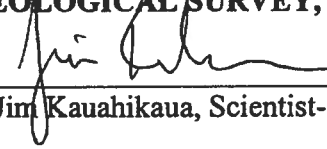
### **V. PRINCIPAL CONTACTS.**

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

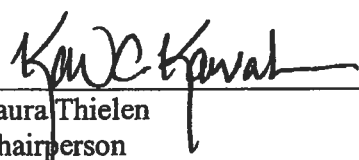
**IN WITNESS WHEREOF**, the parties hereto have executed this Memorandum of Understanding as of the last date written below.

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

By   
Jim Kauahikaua, Scientist-in-Charge

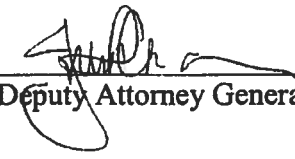
May 22, 2008  
Date

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

By   
for Laura Thielen  
Chairperson

MAY 14 2008  
Date

**APPROVED AS TO FORM**

  
Deputy Attorney General