

Honolulu, Hawaii

October 6, 2008

RE: HOUSE SPECIAL COMMITTEE ON  
VOG EFFECTS

Honorable Calvin K.Y. Say  
Speaker, House of Representatives  
Twenty-Fourth State Legislature  
Regular Session of 2008  
State of Hawaii

Mr. Speaker:

Your Special Committee on Vog Effects begs leave to report as follows:

#### GENERAL OVERVIEW

On March 12, 2008, when a new gas vent broke through the lower east wall of Halema'uma'u crater, the rate of gas emissions increased significantly to 1,500 tons per day. The following day, sulfur dioxide (SO<sub>2</sub>) emission rates reached the highest recorded at Kilauea's summit since measurements were first taken in 1979, from 1,800 to 2,000 tons per day. While the Big Island has borne the brunt of these increased vog emissions, the entire state experienced an increase in the intensity of haze when southerly winds prevailed.

#### ESTABLISHMENT OF THE SPECIAL COMMITTEE ON VOG EFFECTS

In response to the recent increase in emissions from Kilauea's newest vent at Halema'uma'u crater, your House Special Committee on Vog Effects (Committee) was created to bring together experts in the fields of volcanology, health, public safety, agriculture, tourism, education, and economics to examine the effects of vog on the people of the State of Hawaii. The following members were appointed to serve on the Committee:

**Robert N. Herkes, Chair**

*(District 5 - Puna, Ka'u, South Kona, North Kona)*

**Jerry L. Chang, Member**

*(District 2 - South Hilo, Waiakea Kai, Kaumana, Keaukaha)*



**Cindy Evans, Member**

*(District 7 - North Kona, South Kohala)*

**Josh Green, M.D., Member**

*(District 6 - North Kona, Keauhou, Kailua-Kona, Honokohau)*

**Faye P. Hanohano, Member**

*(District 4 - Puna, Pahoia, Hawaiian Acres, Kalapana)*

**Dwight Y. Takamine, Member**

*(District 1 - North Kohala, South Kohala, Hamakua, North Hilo, South Hilo)*

**Clift Tsuji, Member**

*(District 3 - South Hilo, Panaewa, Puna, Keaau, Kurtistown)*

**Lynn Finnegan, Member**

*(District 32 - Lower Pearlridge, Aiea, Halawa, Hickam, Pearl Harbor, Moanalua Gardens)*

## OBJECTIVE OF MEETINGS

Your Committee held a series of three fact-finding meetings at the State Capitol on June 20, July 10, and July 30, 2008, focusing on health and public safety, agriculture, and economic impacts and tourism, respectively. Although many challenges and issues have arisen as a result of vog, your Committee chose to frame the discussion around our constituents' most pressing concerns.

A final meeting was held on September 22, 2008, to follow-up on progress made since the previous meetings, such as the development of the Interagency Task Force and the Hawaii Volcano Helpline.

## TOPICS OF DISCUSSION

### HEALTH & PUBLIC SAFETY

#### Background

Concerns regarding the health effects of vog have heightened, especially for the elderly, young children, and individuals with respiratory ailments who are more prone to the adverse effects of vog. These effects include headaches, breathing difficulties, increased susceptibility to respiratory infection, watery eyes, and sore throat. Water quality in catchment systems has also been called into question due to the increased likelihood of acid rain raising the acidity of drinking water and the possibility that



heavy metals such as lead from painted roofs and copper from plumbing could leach into the water runoff being fed into water tanks. The long-term health effects of vog are still unknown.

The increased levels of dangerous gases have triggered actions to ensure public safety. In April 2008, SO<sub>2</sub> levels exceeded federal standards on four occasions in Kona and prompted the closure of Hawaii Volcanoes National Park on two occasions to visitors and non-essential park personnel. The residential developments of Mauna Loa Estates, Ohia Estates, Volcano Village, Keauhou Ranch, and Volcano Golf Course were warned of possible evacuations and Hawaiian Ocean View Estates residents were issued a voluntary evacuation notice at one point to avoid exposure to high levels of SO<sub>2</sub>.

#### **Fact-finding Meeting held on June 20, 2008**

##### *Invited Participants*

Organizations invited to attend this fact-finding meeting included:

- (1) U.S. Geological Survey, Hawaiian Volcano Observatory (USGS);
- (2) Department of Health (DOH);
- (3) Hawaii Health Systems Corporation (HHSC);
- (4) Department of Education (DOE);
- (5) Department of Labor and Industrial Relations;
- (6) Department of Land and Natural Resources;
- (7) Department of Defense (DOD);
- (8) University of Hawaii (UH) at Manoa;
- (9) University of Hawaii at Hilo (UH-Hilo);
- (10) County of Hawaii;
- (11) Hawaii Medical Service Association (HMSA);
- (12) Kaiser Permanente Hawaii (Kaiser); and
- (13) American Lung Association.

##### *Summary of Discussion*

USGS updated the Committee on the activity taking place at Kilauea volcano, including the history of the activity, composition of emissions, and expected duration of the activity. USGS stated that while it's possible that the activity could cease immediately, it is much more likely to continue for an extended



period of time. Accompanying the USGS representative was an expert from the UH Center for the Study of Active Volcanoes (CSVA), who provided a more detailed explanation of the composition of volcanic emissions. CSVA noted that SO<sub>2</sub> levels change as vog moves away from the vents, depending on distance and weather conditions. SO<sub>2</sub> is a highly reactive gas, which in a relatively short period of time will change to sulfuric acid. By the time the vog reaches Pahala, much of the SO<sub>2</sub> will have converted to sulfuric acid and by the time it reaches Kona, most of the SO<sub>2</sub> will be gone. Conditions are very volatile due to the rapid change of SO<sub>2</sub> levels.

There are concerns about the threat of acid rain and its effects on water catchment systems, especially when the rain falls on roofs with lead-based paint and enters the catchment systems with lead leached from the paint. Acid rain has also been known to cause leaching of copper from plumbing into the water. While DOH does not recommend drinking from water catchment systems, it is doubtful that residents will abide by the recommendation as they have few practical alternatives. Your Committee stressed that DOH should provide the public with instructions on what residents should do to determine if their water supply is safe. The use of swimming pool test kits that measure pH levels as well as lead and copper tests, both of which can be found in local hardware stores, was suggested by your Committee.

The Administrative Director of Ka'u Hospital in Pahala cited anecdotal reports that point to increased occurrences of respiratory ailments during times of high vog concentrations. However, the increase may also be attributed to the regular cold and flu season so officials are unsure of the extent of vog's health effects. To better track the number and types of cases seen during high vog days, the Administrative Director suggested that there be a more coordinated effort to conduct data collection, including a computer records system for the hospital, rather than the pen and paper recording system currently being used. It was noted that Ka'u Hospital has only one room with air conditioning to which patients can be taken when air quality is poor, and there should be a concerted effort to provide more rooms with filtered air systems to ensure the health of patients. Your Committee suggested that similar measures be taken for DOE schools to ensure the health and safety of students, as stories were conveyed of children being sent home sickened by vog. Your Committee also expressed concerns for the psychological impact of vog on students.



To further efforts to gather information on vog's health effects, your Committee suggested that DOH partner with health insurers such as HMSA and Kaiser to review health data records that coincide with periods of poor air quality due to vog. HMSA and Kaiser representatives stated their willingness to participate in such an endeavor.

DOH urged people to be more aware of their own health conditions and not wait for someone to tell them when to seek medical attention or take action to remove themselves from an area with poor air quality because vog affects everyone differently. People with health conditions who live in some of the frequently affected areas may have to consider installing air filtration systems, wearing a respirator, or even relocating permanently.

DOD provided an overview of the assistance being provided to the County of Hawaii to ensure public safety. Between March 23 and April 28, 2008, the Hawaii National Guard's 93<sup>rd</sup> Civil Support Team, designated "Task Force Kilauea," worked on hazard and risk assessment measures with the County of Hawaii, mainly through the Hawaii County Fire Department (HCFD), to address the volcanic emissions as follows:

#### I. Hazard Assessment

- (1) Identifying the threat (SO<sub>2</sub> and particulates);
- (2) Quantifying the threat; and
- (3) Developing and implementing response measures, which included providing:
  - (A) HAZMAT training and equipping over 400 HFD firefighters with portable 25 x SO<sub>2</sub> monitors at 21 stations;
  - (B) Upon alert, response teams conducting surveys at affected areas to determine levels and locations of SO<sub>2</sub>;
  - (C) Civil Defense with Air Quality Color Code Guidance; and
  - (D) Maintenance of a Monitor Network interfaced and interoperable.

#### II. Risk Assessment

- (1) Protecting, informing, and educating the public;
- (2) Identifying gaps in current resources; and
- (3) Providing comprehensive solutions to a complex set of threats, including:



- (A) Producing action levels for SO<sub>2</sub> and particulate;
- (B) Evaluating particulate composition and size distribution;
- (C) Defining and differentiating between vog, ash, SO<sub>2</sub>, and particulate;
- (D) Assessing and recommending a long-term monitoring network;
- (E) Determining the effects of particulate and ash on catchment water systems;
- (F) Producing informational products for risk communication to the public; and
- (G) Identifying gaps and resources necessary to complete risk assessment via Request for Assistance.

Task Force Kilauea has turned over the reins of this public safety project to the County of Hawaii, but your Committee was assured that the Hawaii National Guard's 93<sup>rd</sup> Civil Support Team would never be sent on out-of-state duty so they could be relied on to provide assistance and support in case of future crises.

DOD also reported that air conditioners and air purifiers have been provided to five Big Island school campuses, including Pahoia High and Intermediate Schools, Pahoia Elementary School, Keonepoko Elementary School, Keaau Elementary and Intermediate Schools, and Mountain View Elementary School. These safe rooms were designed to be used for students and staff with medically-certified respiratory problems who could be affected when exposed to high levels of vog. All of these school campuses also provide facilities for public emergency shelter. Recently, DOE directed \$50,000 toward addressing vog related issues at Ka'u High School.

## AGRICULTURE

### **Background**

Vog has been implicated in the destruction of or damage to crops, particularly for farmers of protea, chrysanthemums, and other plants, creating financial hardship for farmers and causing numerous job losses in areas such as Ocean View and Pahala. Some farmers can no longer afford to pay their workers because of the losses they've had to deal with. Negative effects on livestock have also been reported as animals have been observed with tearing eyes on days when vog levels are high.



**Fact-finding Meeting held on July 10, 2008***Invited Participants*

Organizations invited to attend this fact-finding meeting included:

- (1) U.S. Department of Agriculture;
- (2) National Weather Service;
- (3) Hawaii Department of Agriculture (DOA);
- (4) UH College of Tropical Agriculture and Human Resources (CTAHR);
- (5) UH-Hilo College of Agricultural Forestry and Natural Resource Management;
- (6) County of Hawaii Department of Research and Development;
- (7) Hawaii Farm Bureau Federation;
- (8) Big Island Farm Bureau;
- (9) Hawaii Agriculture Research Center;
- (10) Kona Pacific Farmers Cooperative;
- (11) Big Island Protea Growers Association;
- (12) Hawaii Florist and Shippers Association; and
- (13) Other individual farms.

*Summary of Discussion*

Various local farmers provided testimony about the impacts of vog on their agricultural operations. SO<sub>2</sub> is the primary culprit with respect to damage to agricultural products, including cut flowers. The recent activity has created visible plumes of vog that descend upon the crops. Flowers and other plants have been visibly damaged by high SO<sub>2</sub> levels that may persist for several hours at a time, with incidents occurring every few weeks. Irises, roses, and protea have been especially hard hit. Tender, leafy plants appear to be the most susceptible to vog, while tropical plants with waxy coatings appear to be protected from vog's effects. Vog is particularly troublesome in higher elevations, between 2,000-3,000 feet. Eucalyptus trees in higher elevations have also been severely defoliated.

Even if plants survive a vog event, they may no longer be marketable due to damage. Some farmers have taken the initiative to begin developing strategies to combat the effects of SO<sub>2</sub>. Some of the initial observations are noted below:



- (1) Anti-desiccants have shown good results against SO<sub>2</sub>, but additional research and field studies are needed to develop appropriate procedures for application;
- (2) Spraying water on plants to wash off volcanic ash and sulfuric acid seems to work. However, water is extremely expensive in the remote areas impacted by vog. Also troubling is that frequent use of water increases the likelihood of fungal growth on plants such as protea that thrive in drier climates; and
- (3) Greenhouses offer some protection, and airtight structures seem to offer the highest level of protection from SO<sub>2</sub>.

Flower farmers have been substantially impacted by vog, and coffee and macadamia nut farmers have endured relatively minor damage, with some reporting leaf burns. Bee farmers have also reported decreased bee activity which could negatively impact pollination and honey production. Additional information is needed, including information regarding the impacts on immature plants and results from the next harvest, to determine the actual effects of vog on these crops. Although data collection regarding vog and its effects on agriculture is ongoing, the existing knowledge base is incomplete.

Government agencies continued the discussion. They agreed that SO<sub>2</sub> is the primary volcanic substance causing crop damage. Specifically, SO<sub>2</sub> damages stomates found on the leaves of plants. Flowers incur damage from dew, as SO<sub>2</sub> in water turns into sulfuric acid. However, it is important to distinguish between damage caused by vog and damage caused by other problems such as plant diseases. One farmer reported damage that was believed to have been caused by vog, but CTAHR determined it was actually caused by fungus.

Southern areas of the Big Island, downwind of the emissions coming from the Halema'uma'u vent, have experienced the most damage from the volcanic emissions. A July survey of a small group of protea farmers indicated that 93 percent of farm acreage has been damaged by vog. Damage to protea farms has resulted in loss of market share and delays in expansion plans - protea is poised for rapid export expansion. As a result of its ability to grow on marginal agricultural lands, protea offers the state a productive way to make use of such lands. The floricultural





industry in general represents one of the fastest-growing diversified agricultural commodities in Hawaii.

For ranchers and others raising livestock, vog also damages agricultural infrastructure, including pasture fencing and gates. CTAHR officials noted that ranchers leasing lands from the State are required to maintain the fencing, but the extensive and rapid damage will create financial hardships. Also of concern is the presence of the chemical element fluorine in the emissions. Fluorine concentrations in foliage consumed by livestock should be monitored on a regular basis. When there is heavy ash fall on the Big Island, fluorine toxicity may occur if livestock feed on contaminated grazing areas.

The government entities made several suggestions to counteract the effects of vog:

- (1) Acid rain can be neutralized by adding sodium bicarbonate. However, this creates a potential salinity problem. Using potassium bicarbonate instead may help to neutralize acidity without the salinity problem;
- (2) Paraffin waxes may be used to protect stomata from SO<sub>2</sub> in vog; and
- (3) Additional research on vog-resistant cultivars is needed.

A roundtable discussion ensued involving all parties present. Questions arose as to what actions could be taken by government entities to assist the farmers, and the following points were made:

- (1) DOA has made a request for federal disaster designation as a result of vog;
- (2) The recently passed federal farm bill contains the Supplemental Disaster Assistance Program, which may provide emergency assistance to farmers affected by vog. Federal regulations are pending adoption;
- (3) DOA is working to restructure existing loans to help farmers;



- (4) Available emergency loans may not be appropriate for farmers affected by vog since the duration and scope of the vog emergency are difficult to quantify; and
- (5) Direct grants are not available according to DOA, but farmers that form non-profit cooperatives, such as the Hawaii Farm Bureau Federation, may become eligible for other forms of aid provided by the U.S. Department of Agriculture - Rural Development.

## ECONOMIC IMPACTS

### Background

Headlines such as "Kilauea's toxic gas kills crops, sickens islanders," were seen nationally as the increased vog emissions continued. An image of Hawaii covered in a haze that could create adverse health effects for visitors may have deterred a number of people from visiting the islands. Loss of productivity when employees call in sick because of respiratory conditions or the other effects of vog also takes a financial toll on Hawaii's economy.

### Fact-finding Meeting held on July 30, 2008

#### *Invited Participants*

Organizations invited to attend this fact-finding meeting included:

- (1) Department of Business, Economic Development, and Tourism (DBEDT);
- (2) Hawaii Tourism Authority;
- (3) Hawaii Hotel & Lodging Association;
- (4) Hawaii Visitors and Convention Bureau;
- (5) Hawaii Association of Realtors;
- (6) Hawaii Island Board of Realtors;
- (7) The Chamber of Commerce of Hawaii;
- (8) Hawaii Island Chamber of Commerce;
- (9) Kona-Kohala Chamber of Commerce;
- (10) Ka'u Chamber of Commerce;
- (11) Hawaii Leeward Planning Conference;
- (12) Hawaii Island Economic Development Board; and
- (13) Japanese Chamber of Commerce and Industry of Hawaii.



*Summary of Discussion*

The attendees at this meeting came to a general consensus that it is extremely difficult to determine the direct effect of vog on Hawaii's economy. While the Big Island has experienced a significant economic downfall during 2008, there have been multiple factors that could account for this. The Hawaii Tourism Authority reported that in June 2008, visitor arrivals were down by 12.7 percent and visitor spending was down by 5.2 percent. However, these decreases may be attributed to other occurrences such as the shutdown of Aloha and ATA airlines, loss of cruise ships, increased fuel prices, and the mortgage crisis. Also, Big Island hotels were already reporting lower occupancy numbers in 2007, prior to the recent vog increase. The recent slump in the housing market has had a devastating impact across the country. They noted vog effects on the real estate market included interference with view planes, which have caused prospective buyers to reconsider and buy elsewhere in the state.

While the negative headlines that show up in national news may be affecting people's decisions to travel to Hawaii, the publicity of an active volcano has attracted many people to the island. Kilauea has been the largest attraction for the Big Island and the increased activity could be viewed as beneficial for the tourism industry. Increased numbers of visitors to Volcanoes National Park have been recorded since the March 12, 2008, rise in volcanic activity at Kilauea.

Important events held on the Big Island, such as the Iron Man Triathlon, could be affected but it was reported that only a small portion of the race went through areas heavily affected by vog. While attendance for the Iron Man race seems to be up, fewer athletes will be bringing family members along due to the high airfares.

One area that has seen a recent economic boost is the health and wellness industry. More people are buying over-the-counter remedies for symptoms attributed to vog, such as sore throat and watery eyes. Health clubs are seeing an increase in membership sales as people choose to exercise indoors due to the poor outdoor air quality.

Of great concern to your Committee was the apparent lack of action being taken by the Hawaii County Council to assist residents heavily impacted by vog, such as the farmers who have lost 100 percent of their crop and will not be able to recover for



four to five years. Your Committee suggested property tax relief to help these farmers survive this difficult period.

### RECOMMENDATIONS

With vog we are presented with an even greater challenge because it does not lend itself to the more conventional response and recovery phases of a disaster. The vog disaster is ongoing and will likely continue for an undetermined period of time -- months, years, or even decades. This challenge requires extraordinary expertise and resources to address the needs of the public.

Based on the presentations and information received at the fact-finding meetings, your Committee has prepared a list of recommendations.

First and foremost, your Committee would like to emphasize that the most important vog response effort may be the establishment of a central point of contact at which the public can gain access to information regarding various vog-related concerns without having to navigate through a disjointed web of phone calls. Your Committee believes an effective central point of contact would greatly relieve the community's frustration with their situation.

Below are further recommendations for each of the following departments to consider:

#### DEPARTMENT OF HEALTH

- (1) Work with health insurance providers to collect data gathered as reimbursement claims to see if there is a notable increase in specific ailments during days with heavy vog. (HMSA and Kaiser representatives voiced their willingness to work with DOH on such a study);
- (2) Develop a more coordinated and efficient system for collecting health data. Currently different organizations/individuals are collecting different pieces of information relating to vog and the health impacts of vog;



- (3) Work with DOE to examine the psychological impact of vog on school children and develop counseling strategies;
- (4) Work with health insurance companies to look into providing coverage for purchases of air filters or other air filtration devices for qualified individuals affected by vog;
- (5) Retrofit hospitals with air filtration devices and ensure a sealed environment to lessen the impact of vog on patients;
- (6) Work with CTAHR to gather and provide the public with information regarding water safety for catchment systems:
  - (A) Find effective and affordable methods to test water pH to ensure the safety of catchment system drinking water, such as testing kits made for swimming pools. (pH is a measure of how acidic or basic a substance is.) Provide information on safe pH ranges;
  - (B) Identify similar methods to test for lead, copper, and other harmful agents that could enter a water catchment system;
  - (C) Publicize resources available to the public to have their water tested for lead, copper, and other harmful agents such as DOH's annual water testing program;
  - (D) Create a clear and easy-to-use checklist to assist residents with catchment systems in determining what actions can be taken when dealing with water with high acidity or pollutants such as lead, copper, or ashfall matter; and
  - (E) Coordinate water testing methods with those of the CTAHR Cooperative Extension Services, which routinely goes out into the communities;
- (7) Collect relevant health data and transmit to UH-Hilo Center for the Study of Active Volcanoes for archiving; and



- (8) Disseminate information to the public. Consider working with HMSA or other health care providers to include information in current health-related mailings about the effects of vog and what actions may be recommended on days with heavy vog concentrations.

#### DEPARTMENT OF DEFENSE

- (1) Work with the DOE to install air conditioning and air filtration devices in schools;
- (2) Establish shelters outfitted with air filters for evacuated residents;
- (3) Work with DOE on providing SO<sub>2</sub> monitors for the schools to allow them to get immediate notification of high levels of gas that would require action to be taken;
- (4) Work with DOE to establish protocols on proper actions to take when high levels of SO<sub>2</sub> have been detected in the schools;
- (5) Investigate the possible use of services from approximately 40 civilian environmental scientists contracted by the U.S. Army and stationed at the Pohakuloa Training Area, as an investigative team to determine recommended actions in dealing with vog; and
- (6) Collect relevant civil defense data and transmit to the UH-Hilo Center for the Study of Active Volcanoes for archiving.

#### DEPARTMENT OF EDUCATION

- (1) Develop safe practices for school children affected by vog;
- (2) Work with the charter school system to determine what practices they have adopted that can be effectively used in the public schools to ensure the safety of the children;
- (3) Work with DOD to install air conditioning and air filtration devices in schools;



- (4) Work with DOD to provide SO<sub>2</sub> monitors for the schools to allow them to receive immediate notification of high levels of gas that would require action;
- (5) Work with DOD to establish protocols on proper actions to take when high levels of SO<sub>2</sub> have been detected in the schools; and
- (6) Collect relevant data and findings and transmit to the UH-Hilo Center for the Study of Active Volcanoes for archiving.

#### COUNTY OF HAWAII

- (1) Provide real property tax relief for farmers who have been negatively impacted by vog;
- (2) Work with DBEDT, the Hawaii Tourism Authority, and private entities to collect data on economic impacts;
- (3) Identify, map, and provide information to the public on alternate evacuation routes such as back roads, whether located on government or private property; and
- (4) Establish plans to assist residents in the event that permanent relocation becomes necessary.

#### DEPARTMENT OF AGRICULTURE (DOA)

- (1) Provide SO<sub>2</sub> monitors to farmers in the southern part of Hawaii who are hardest hit by vog, and train farmers in the use of monitors as necessary;
- (2) Establish a local early warning system to inform farmers of a sudden increase in vog concentrations;
- (3) Work with CTAHR to establish monitoring and sampling systems for fluorine concentrations in foliage in areas affected by vog;
- (4) Work with CTAHR and farmers to conduct comprehensive research, including controlled experiments and field trials, to determine the best methods for employing vog



treatments such as water, anti-desiccants, and paraffin waxes;

- (5) Work with CTAHR to conduct other research to focus on finding specific varieties of crops more resistant to the effects of vog;
- (6) Establish financial assistance programs, either grants or low-interest loans, for those affected by vog;
- (7) Establish assistance programs to assist ranchers in repairing ranch and pasture infrastructure damaged by vog, through either grants or low-interest loans;
- (8) Restructure or adapt rules of existing loan programs to address the specific problems posed by vog;
- (9) When available, help farmers in applying for and receiving assistance under the new federal Supplemental Disaster Assistance Program;
- (10) Assist interested farmers to form agricultural non-profit cooperatives that may be eligible for additional federal assistance from the U.S. Department of Agriculture Rural Development;
- (11) If it appears that vog will persist indefinitely, begin to search for alternative areas for farmers that may need to relocate their operations; and
- (12) Collect relevant agricultural data and findings and transmit to the UH-Hilo Center for the Study of Active Volcanoes for archiving.

**UNIVERSITY OF HAWAII - COLLEGE OF TROPICAL AGRICULTURE AND HUMAN RESOURCES**

- (1) Work with DOA to establish monitoring and sampling systems for fluorine concentrations in foliage in areas affected by vog;
- (2) Work with DOA and farmers to conduct comprehensive research, including controlled experiments and field trials, to determine the best methods for employing vog





treatments such as water, anti-desiccants, and paraffin waxes; and

- (3) Work with DOA to conduct other research to focus on finding specific varieties of crops more resistant to the effects of vog.

**DEPARTMENT OF BUSINESS, ECONOMIC DEVELOPMENT, AND TOURISM (DBEDT)**

- (1) Work with the Hawaii Tourism Authority, County of Hawaii, and private entities to collect data on economic impacts;
- (2) Provide information and training to hotel employees who receive questions from prospective guests about vog and its possible effects so they can provide accurate answers; and
- (3) Transmit collected data to the UH-Hilo Center for the Study of Active Volcanoes for archiving.

**RECENT DEVELOPMENTS**

**U.S. DEPARTMENT OF AGRICULTURE (USDA)**

The secretary of the USDA approved a Secretarial Disaster Designation for production and physical losses resulting from volcanic emissions on the Big Island.

This designation allows Big Island farmers to apply for low-interest emergency loans to cover losses caused by the vog. Eligible producers may borrow up to 100 percent of actual production or physical losses, not to exceed a total of \$500,000.

**U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)**

After the conclusion of the first three fact-finding meetings, your Committee received information that the EPA had released a report on vog, produced by the Region IX On Scene Coordinator on July 18, 2008. The EPA had sent a team to Hawaii in April 2008 to test and analyze the air. The EPA's report focused on air monitoring, evaluation of monitoring equipment, and



modeling of impacts. Although not part of the official record received formally by your Committee, your Committee elected to include the following EPA findings and recommendations in this report:

- (1) The response to increased emissions from the Kilauea volcano on Hawaii that began in March 2008 was a multi-agency effort by HCFD, DOH, National Parks Service (NPS), USGS, Hawaii National Guard's 93<sup>rd</sup> Civil Support Team (CST) and EPA;
- (2) If another incident occurs that requires a multi-agency response, the EPA recommends that Hawaii County establish a National Incident Management System and Incident Command System structure that includes HCFD, NPS, and DOH as incident commanders in a unified command, to streamline operations and avoid duplication of effort. The USGS, CST, EPA and other agencies can participate in the operations or planning sections;
- (3) An environmental unit in the Planning section can accommodate technical specialists who provide expertise in meteorology, sampling, monitoring, modeling, and data management;
- (4) By coordinating their overall response planning to volcano emissions, Hawaii County and the NPS could leverage their resources in areas such as evacuation planning, communication to the public, and media relations;
- (5) For definitive data collection and analysis, as could be required for health studies, National Ambient Air Quality Standards-compliant monitoring equipment should be installed. Real-time monitoring equipment has applicability in developing a systematic approach to identifying those communities most likely to benefit from permanent station placement;
- (6) Real-time monitoring equipment is appropriate for short-term or hazard assessment. For SO<sub>2</sub>, AreaRAEs detection systems are appropriate. For particulates, Environmentally-sealed Beta Attenuation Monitors are a good choice because of their greater sensitivity compared to other real-time monitoring systems;



- (7) If using real-time monitoring systems, EPA recommends setting alarms based on time weighted averages, to better predict when contaminant concentrations are present in a sustained condition; and
- (8) With current plume modeling limitations (lack of source term information, high meteorological variability and lack of calibration data), EPA does not recommend using plume modeling in a predictive manner at this time.

### CONCLUSION

While this concludes the work of your Special Committee on Vog Effects, the intent is to continue to monitor the progress of the agencies in implementing effective measures to deal with vog effects throughout the remainder of the interim and into the next session.

The records and information received will continue to be made available at the Legislative Reference Bureau library.

Finally, your Committee wishes to acknowledge the contributions made by the various experts, agency representatives, and stakeholders, to our work. We also thank the participants for their time and effort, particularly those who had to travel to Oahu from the neighbor islands to testify.

Respectfully submitted on  
behalf of the members of the  
Special Committee on Vog  
Effects,



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ROBERT N. HERKES, Chair



