

EMERGENCY PLAN

Scientific Observation Hole (SOH) Program

**under
Conservation District Use Permit (HA 12/20/85-1830)
Kaimu, Puna, Hawaii
TMK: 1-2-10:03**

**Hawaii Natural Energy Institute
University of Hawaii**

November 1989

EMERGENCY PHONE NUMBERS

County

Civil Defense	935-0031
	935-3311 (after hours; holidays)
Police Department	935-3311 (emergencies)
	966-9388 (Keaau Police Station)
	961-2211 (Hilo Police Station)
Fire Department	961-6022 (fire, ambulance, rescue)

State

Department of Health (Pollution Investigation and Environmental Enforcement)	548-6355 (Honolulu)
Department of Land and Natural Resources (Water and Land)	548-7533 (Honolulu)
	988-6541 (Honolulu)

Federal

Hawaii Volcanoes Observatory	967-7328
Volcano Report	967-7977 (recorded message)
Hawaii Volcanoes Nat'l Park	967-7311
National Weather Service	935-8555
Weather Report	961-5582 (recorded message)

Project Personnel

Project Sites(s)	* (Puna)
Harry Olson, Principal Investigator	522-5611 (Honolulu)
John Deymonaz, Drilling Manager	* (Big Island)
Arthur Seki, Project Manager	948-8788 (Honolulu)
Donald Thomas, Geochemist	948-6482 (Honolulu)
Hawaii Natural Energy Institute	948-8890 (Honolulu)

Emergency Responders

Robert Kochy	925-5985 (mobile phone)
Steve Avery	925-5531 (Pahoa)

Complaint Responders

Answering Service	935-2981, Code 1035 (calls to be forwarded)
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* to be provided when telephones are installed.

SUMMARY

The Department of Land and Natural Resources approved, on September 25, 1989, a request to drill a scientific observation hole (SOH 3) in the area (TMK 1-2-10:03) approved for geothermal development activities under Conservation District Use Permit (HA 12/20/85 - 1830) issued to the Estate of James Campbell. This document presents an air quality monitoring plan as required in Decision and Order, Plan of Operations, (k) Emergency Plan.

"Applicant shall submit and obtain approval from the Hawaii County Civil Defense Agency and the DLNR of a plan of action to deal with emergency situations such as volcanic activities, earthquake, fires and well bore ruptures, and blowouts which may threaten the health, safety, and welfare of the employees and other persons in the vicinity of the proposed project. The plan shall include procedures to facilitate coordination with appropriate State and County officials and the evacuation of affected individuals."

This emergency plan outlines the steps and procedures that would be implemented when certain events do occur (or appear likely to occur) that cause or could cause loss of life, serious injury, or health hazards to personnel or those affected in the project activity sites.

The SOH is for scientific observation purposes only. The hole *will not be flow-tested or produced*. The information to be gained from the SOH will provide an assessment of subsurface geological conditions, groundwater level and composition, temperature, drilling conditions, an inventory of possible mineral and geothermal resources, and an eruptive history of the island to the depth drilled.

OBJECTIVE

The emergency plan for the University of Hawaii's Scientific Observation Hole (SOH) program sets forth the procedures that are to be used during the occurrence of any emergencies or health hazards at the site of SOH 3, located in the middle Kilauea East Rift Zone in the Puna District of the Big Island (see map for the exact location of the drilling).

These emergencies shall include any events which may endanger or injure project personnel or individuals living or working near the project site. Such events include volcanic activity, earthquakes, fire, severe storms, well blowouts, and other natural phenomena or unforeseen circumstances which may cause, or result in, the failure of existing safety measures or the damage and destruction of the project facilities.

Comments, corrections, or changes to the plan may be directed to:

Harry Olson
Scientific Observation Hole Program
Hawaii Natural Energy Institute
University of Hawaii at Manoa
2540 Dole Street, Holmes Hall 246
Honolulu, Hawaii 96822

Phone: (808) 948-8890
FAX: (808) 946-4235

or

J.K.K. Look Laboratory
University of Hawaii at Manoa
811 Olomehani Street
Honolulu, Hawaii 96813

Phone: (808) 522-5611
FAX: (808) 522-5618

PROJECT MANAGEMENT AND MONITORING

Official management of the Scientific Observation Hole (SOH) program rests with the University of Hawaii, which has a project management office located at:

Hawaii Natural Energy Institute
University of Hawaii at Manoa
2540 Dole Street, Holmes Hall 246
Honolulu, Hawaii 96822
Phone: (808) 948-8890
FAX: (808) 946-4235

and

J.K.K. Look Laboratory
University of Hawaii at Manoa
811 Olomehani Street
Honolulu, Hawaii 96813
Phone: (808) 522-5611
FAX: (808) 522-5618

This office serves as the point for official management, coordination, and communications on all aspects of the SOH program. However, it should not be considered the primary point of contact in emergencies.

The SOH principal investigator is the individual charged with the program, which includes the following drill hole: SOH 3 on conservation land. He has been designated as the individual who is to be immediately contacted during emergencies.

The SOH principal investigator, along with the University of Hawaii program office, will have the knowledge and capability to marshal resources with the geothermal expertise necessary to respond to emergencies.

EMERGENCY NOTIFICATION

Any person witnessing an abnormal condition or emergency should call (collect) the first Scientific Observation Hole Program representative reachable, in the following order of priority:

Big Island Contacts

Robert Kochy, Emergency Responder (808) 925-5985 (mobile phone)

Steve Avery, Emergency Responder (808) 925-5531 (mobile phone)

John Deymonaz, Drilling Manager * (808) (business)

Harry Olson, Principal Investigator (808) 522-5611 (business)

Arthur Seki, Project Manager (808) 948-8788 (business)

Donald Thomas, Geochemist (808) 948-6482 (business)

* to be completed when telephones are installed.

EMERGENCY RESPONSE PLAN

This plan will cover responses to all emergencies and health hazards, according to the time available in which to act.

On-Site Personnel

At any given time, there may be one of three drilling rigs (one cable rig and two diamond core rigs: U-5000 and U-1500) operating at the project site. The rig will be operated by a crew composed of:

- a drilling manager who will inspect the active drilling locations on a regular basis;
- one drill foreman; and
- one to two crew members.

Additionally, brief regular visits to the wellhead site will be made by technical consultants.

All of the aforementioned personnel will be under the overall supervision of the Scientific Observation Hole program principal investigator or his designee.

Any of these individuals or member of the public will immediately notify, by mobile telephone, the SOH principal investigator or office of any unusual noise, odor, leakage, or other abnormal condition at the wellhead and wellsite.

On-Site Equipment

Equipment at the site will include:

- a single drilling rig;
- a blowout preventer, a device to prevent the escape of high-temperature fluids or gases;
- vehicles belonging to the rig personnel;
- hydrogen sulfide (H₂S) monitors with two-stage alarms and Scott air packs on drill rig;

These monitors will have two-stage visual and sound alarm systems which will be triggered if H₂S is emitted from the well. The detectors will be set at levels (warning at 5 ppm and alarm at 20 ppm) sufficient to protect rig personnel.

In addition, as part of the air quality monitoring plan, H₂S measurements (in parts per billion) will be made with Houston-Atlas analyzers, along with Qualimetrics instruments (anemometer and vane) for wind speed and direction, on a continuous 24-hour basis for the duration of the core drilling.

- cement batching equipment and cement to plug the drill hole in an emergency (should a blowout preventer fail) at the diamond core rigs only;
- mobile telephone equipment for communication between drilling sites and with emergency personnel at the diamond core rigs only;
- first aid kit;
- oxygen supply and administration equipment; and
- fire extinguishers.

Emergency Response Procedure: Case A

Should the SOH principal investigator or his designee have some advance notice of any impending natural event, e.g., volcanic eruptions, hurricanes, storms, and so forth, which may affect the drilling, he shall take any of the following actions, as deemed appropriate by the scientific and technical staff:

- alert all affected on-site personnel of the situation;
- decide on the acceleration or termination of operations and inform Hawaii County Civil Defense officials of the measures to be taken;
- secure the wellhead;
- disassemble and remove equipment, if necessary and time permitting; and
- evacuate personnel.

Should the situation pose a threat to public health and safety, the County Civil Defense Emergency Operating Center in Hilo will coordinate the efforts and expertise of appropriate government officials, project managers, and technical personnel. Civil Defense will release any information to the public on the situation. Project personnel will be available on a 24-hour basis to provide technical advice and provide updates on the emergency.

Emergency Response Procedure: Case B

Should circumstances require immediate action, such as with forest fires or medical emergencies, these procedures will be followed:

- provide medical assistance to injured persons and evacuate the injured by the most expedient means available, including:
 - a) available ambulances from Hilo (40 minutes from Hilo to Puna);
 - b) helicopters (if feasible and readily available) from nearby companies;
or
 - c) private vehicles (in which the injured would not have the medical attention of a paramedic);
- take immediate measures to secure the well to prevent hazards;
- alert Civil Defense of the situation and apprise officials of any situation which may affect public health and safety;
- secure the wellhead;
- remove equipment and secure the site, time permitting;
- evacuate all personnel.

Again, should the situation pose a threat to public health and safety, the County Civil Defense Emergency Operating Center in Hilo will coordinate all efforts and alert the public of hazardous situations which may develop. Project personnel will be available on a 24-hour basis to provide technical advice and provide updates as long as necessary.

Exposure to H₂S

Noticeable hydrogen sulfide (H₂S) emissions from core drilling with mud are extremely improbable. However, if in the unlikely event that emissions do occur, it would be for a brief period only and detection would be extremely unlikely outside the project site area. If this were to occur, Civil Defense would be notified immediately and the H₂S levels will be monitored in areas potentially affected by any release outside the drill site area. A map of the area surrounding the SOH sites is attached and will be kept updated. The 1/2-mile radius represents the worst-case scenario and residents who are potentially affected by H₂S release will be kept updated. The SOH program will follow all federal, state, and county guidelines for H₂S emissions.

Removal of Equipment

The amount of equipment at any site will be mobile and minimal. It can be disassembled and removed in an emergency, or abandoned entirely if necessary.

Transportation for Evacuation

Personnel will have personal vehicles they use to get to and from the drill sites. Those vehicles will be used to transport them from the drill site in an emergency. There will also be personal vehicles available at other SOH sites and from the various SOH managers and personnel.

PERSONNEL TRAINING

All drilling personnel will be updated on first-aid procedures; hydrogen sulfide (H₂S) alarm system and Scott air pack use; and the emergency procedures set forth in this plan.

POLICY ON THE NOTIFICATION OF SUBSTANTIAL RISK

The Toxic Substances Control Act (TSCA), Section 8(e), requires that any person who obtains information that reasonably supports a conclusion that any chemical substance or mixture presents a substantial risk to public health or the environment shall report it to the Environmental Protection Agency.

In compliance with this regulation, the University of Hawaii, hereby institutes this policy:

Employees who acquire information that reasonably suggests that a chemical substance or mixture used in project operations may present a substantial risk to health or the environment will inform the operator's program manager. This action should be taken as soon as such information is received, without waiting for a final report, conclusions, or the results of subsequent or confirming studies.

- a. The program manager will inform and consult with appropriate environmental affairs, legal, and management personnel and coordinate all reports to the EPA. Any reporting to the EPA will be done in consultation with appropriate UH officials.
- b. Copies of reports of all toxological studies and investigatory studies made regarding health or environmental concerns shall be evaluated in regard to TSCA reporting and for filing with other health and environmental information.
- c. Persons initially bringing the information to the attention of management will be informed of the decision upon filing a notice of substantial risk.
- d. Failure to comply with the provisions of this policy could lead to federal penalties under the TSCA.

Appendix A

EMERGENCY RESCUE AND

FIRST AID PROCEDURES

FOR VICTIMS OF EXCESSIVE H₂S INHALATION*

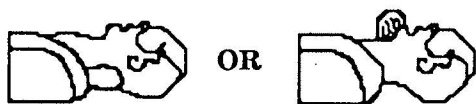
1. Speed is essential in rescuing a victim and in administering first aid.
2. The rescuer dons self-contained breathing equipment before approaching the danger area and the victim. When possible, the rescuer should have a partner on a life line.
3. The rescuer immediately moves the victim to fresh, pure air while other personnel obtain the resuscitator for use on the victim, and call for medical assistance.

(TO BE POSTED IN A POSITION CLOSE TO THE DRILLING SITE)

* These procedures represent practices recommended by the Workman's Compensation Board, Alberta, Canada, and the American Heart Association

FIRST AID PROCEDURES

AIRWAY



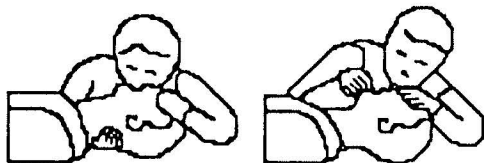
If you find a collapsed person, determine if victim is conscious by shaking the shoulder and shouting "Are you all right?" If no response, shout for help. Then open the airway. If victim is not lying flat on his back, roll victim over, moving the entire body at one time as a total unit.

To open the victim's airway, lift up the neck (or chin) gently with one hand while pushing down on the forehead with the other to tilt head back. Once the airway is open, place your ear close to the victim's mouth:

1. Look - at the chest and stomach for movement
 2. Listen - for sounds of breathing
 3. Feel - for breath on your cheek
- If none of these signs are present, victim is not breathing.

If opening the airway does not cause the victim to begin to breathe spontaneously, you must provide rescue breathing.

BREATHING



The best way to provide rescue breathing is by using the mouth-to-mouth technique. Take your hand that is on the victim's forehead and turn it so that you can pinch the victim's nose shut while keeping the heel of the hand in place to maintain head tilt. Your other hand should remain under the victim's neck (or chin), lifting up.

Immediately give four quick, full breaths in rapid succession using the mouth-to-mouth method.

CHECK PULSE



After giving the four quick breaths, locate the victim's carotid pulse to see if the heart is beating. To find the carotid artery, take your hand that is under

the victim's neck and locate the voice box. Slide the tips of your index and middlefingers into the groove beside the voice box. Feel for the pulse. Cardiac arrest can be recognized by absent breathing and an absent pulse in the carotid artery in the neck.

FOR INFANTS AND SMALL CHILDREN

Basic life support for infants and small children is similar to that for adults. A few important differences to remember are given below.

AIRWAY

Be careful when handling an infant that you do not exaggerate the backward position of the head tilt. An infant's neck is so pliable that forceful backward tilting might block breathing passages instead of opening them.

BREATHING

Don't try to pinch off the nose. Cover both the mouth and nose on an infant or small child who is not breathing. Use small breaths with less volume to inflate the lungs. Give one small breath every three seconds.

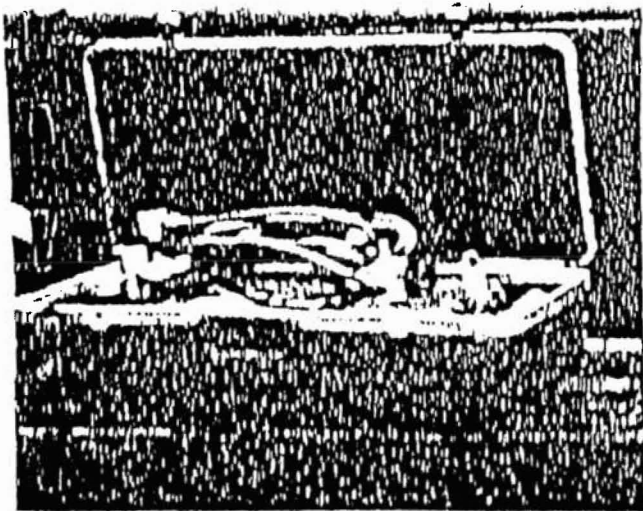
CHECK PULSE

The absence of a pulse may be more easily determined by feeling over the left nipple.

*If you **CAN** find the pulse*, continue rescue breathing until victim revives or the resuscitator is readied. (Exercise care due to possible lung congestion.) According to the American Red Cross rescue breathing instructions, you should:

- * Repeat breaths about 12 times a minute for an adult or 20 times a minute for a child
- * Establish a rhythm.
- * If victim's stomach rises, press it gently to remove air.
- * As patient revives, watch closely. Treat for shock.

*If you **CANNOT** find the pulse*, the victim needs CPR, Cardiopulmonary Resuscitation. CPR should be administered **ONLY** by a person properly trained and certified. It is too complicated to taught from printed pages alone.



A resuscitator. Photo by Murray Dosch.

The Pneolator is an instrument that performs artificial respiration with an automatic, predetermined pressure inhalation, and without suction on exhalation. This most nearly represents normal respiration and has been selected by medical authorities as the method of choice in restoring breathing.

Once the patient is breathing, the Pneolator becomes an effective oxygen inhalator by a simple adjustment. If the air passage is obstructed by mucous or foreign material, a warning is immediately given by a chattering of the cycle valve, and the Pneolator provides an aspirator for removing the obstruction. The Pneolator must be taken with a victim to the hospital.

NOTE: *The small oxygen bottles carried by most ambulances are not the type required for a Pneolator. The 21 cubic foot bottle of oxygen in the Pneolator should be checked and filled to capacity before all well testing operations. Furthermore, it is strongly recommended that an extra supply of oxygen (a commercial tank) be kept on hand as a "standby" supply.*

This large oxygen cylinder can be hooked up to the resuscitator while it is being used to increase the volume of oxygen that is available for use should there be more than one victim overcome.

Keep victim warm and quiet, but never unattended.

The person who has been overcome by H_2S gas and revived could go into shock. Because of this, take the victim to a doctor at once. Patients should be kept for medical observation until the doctor declares them fit to return to work.

A patient breathing normally may be given stimulants such as tea or coffee. (Alcohol is a depressant).

If eyes are affected by H_2S , wash them thoroughly with clear water. For slight eye irritation, cold compresses will help.

Once a victim is removed to fresh air and normal respiration restored before heart action ceases, rapid recovery may be expected.

In cases of slight or minor exposures, where the worker has not been totally unconscious and wants to return to work after a short rest period, it is recommended that duty be postponed until the following day. Reflexes may not have returned to normal, and the person could be subject to injuries from other work hazards.

CALIFORNIA DIVISION OF OIL AND GAS

