

PLAN OF OPERATIONS

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

December 1989

## SUMMARY

This document presents a plan of operations to support the scientific observation hole (SOH) program in the Kilauea middle east rift zone. The SOH is for scientific observation purposes only. The core 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.

The plan addresses the drilling program and schedule, project area and drill site description, well bore description, planned access, source of water, major project facilities and equipment for drilling activities, other areas of potential surface disturbance, disposal procedures for drill cuttings and other waste, and monitoring plans and programs for review and approval.

## I. INTRODUCTION

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 a plan of operations as required in Decision and Order, CONDITIONS, Exploration Area, (1):

"Applicant shall submit for approval in accordance with Section 13-183-55 of Chapter 183, Rules of Leasing and Drilling of Geothermal Resources prior to conducting exploration access or drilling activities to implement this Order. The scope of planned exploration activity shall follow or be conducted in a manner consistent with the sequence described in the Final Supplemental Impact Statement (EIS), pp 14-15."

## II. BACKGROUND

The SOH 3 is for scientific observation purposes only. The core 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. The SOH, in combination with existing geothermal wells or future geothermal wells to be drilled by producers, can be instrumented to provide data relating to reservoir productivity. By injecting water into the holes, estimates can be made as to possible reservoir conditions and productivity.

Mud drilling causes negligible gaseous emissions because the drilling mud forms a cake on the hole walls, sealing the hole from fluid entry. Also, the hydrostatic head of the drilling fluids tends to prevent fluid entry into the hole. The holes will be protected from blowouts during drilling by: using blowout prevention (BOP) equipment; cementing the casing to the rock formations; having water available to cool and quench the hole; and following standard drilling safety procedures. After drilling, the hole will be capped with a wellhead valve.

### III. DRILLING PROGRAM AND SCHEDULE

The general drilling program is for a series of core holes designed not to be flow-tested or produced. A designated six holes are planned: four on the Big Island and two on Maui. Three of the Big Island holes are on agriculture land and have been permitted by the County of Hawaii Planning Commission. The fourth hole, designated SOH 3, is on conservation land. Geothermal development activities under Conservation District Use Permit (HA 12/20/85 - 1830) issued to the Estate of James Campbell has been approved. Appendix A presents the drilling program for each hole. Figure 1 shows the tentative schedule for the drilling.

### IV. PROJECT AREA AND DRILL SITE DESCRIPTION

SOH 3 drill site will be located next to the access road between True/Mid-Pacific Geothermal Venture's wellsite 1 and wellsite 2 (see Figure 2).

Due to the gradual slope of the ground area, it is anticipated the cut and fill requirements will be limited. At the drill site, the area will be cleared and graded to accommodate the drill rig and ancillary equipment.

The drill site will cover approximately a quarter of an acre which will include drill pad, water storage, mud pit, storage area, sump pit, access road, and parking for drill site personnel and visitors. The sump pit, with a maximum capacity of 60,000 gallons will be located adjacent to the drilling site. Drilling fluids and excess drilling mud as well as rainfall runoff will be directed to the sump pit. Figure 3 shows a typical layout of the drill site area.

#### V. WELL BORE DESCRIPTION

A combination of rotary and core drilling methods will provide the maximum flexibility to handle the variety of anticipated drilling conditions.

Casing and cementing programs and blow out prevention (BOP) equipment to be used will provide protection from any potential over pressured zones and allow the hole to be shut in at any stage during the drilling after the upper 100 feet of conductor casing is in place. The BOP equipment will conform to or exceed specifications in Title 13, Chapter 183-74 (See Drilling Program and Schedule for details of Drilling Plan).

Nominal total depth is projected to be 4,000 feet, with drilling capacity to 6,500 feet.

## VI. PLANNED ACCESS

SOH 3 is located on State Conservation District (TMK 1-2-10:03 por.) within the True/Mid-Pacific Geothermal Venture exploration/development area of the Kilauea middle east rift zone, Puna district of the Big Island of Hawaii (see Figure 2).

The primary route to the project site will be via State Road 130 to the Pahoa bypass road north of Pahoa, to South Road to Kaohe Homesteads to Middle Road and south along State Road easement to the boundary of the Campbell Estate property (TMK 1-1-10:1). A gate is installed at the road entrance to the Campbell Estate property at the juncture of the State road easement and True/Mid-Pacific Geothermal Venture project site. Access to SOH 3 will be over the True/Mid-Pacific Geothermal Venture road to their wellsite 1. SOH 3 drill site will be located next to the access road between True/Mid-Pacific Geothermal Venture's wellsite 1 and wellsite 2.

Access will be limited to SOH project personnel, regulatory government officials, and other visitors admitted by project management. All non-project personnel admitted to the SOH project site will be escorted by project personnel.

Final location of SOH 3 drill site will be determined after True/Mid-Pacific Geothermal Ventures clears the access road to their second site. Biological and archaeological surveys will be conducted and reports submitted to DLNR for ministerial approval. A grubbing/grading engineering design will be finalized for permit application to the County of Hawaii. A metes and

bounds description will also be included.

#### VII. SOURCE OF WATER

Primary water source for drilling and testing operations, drinking, sanitation, and for work force safety (fire fighting) measures will be transported on to the project site from an existing county water point. A 20,000 gallon storage tank will be located on the drill site. In addition, a sump pit with a total capacity of 60,000 gallons will be located adjacent to the drilling site. Drilling fluids and excess drilling mud as well as rainfall runoff will be directed to the sump pit. Every attempt will be made to recycle all water used in drilling and testing operations.

#### VIII. MAJOR PROJECT FACILITIES AND EQUIPMENT FOR DRILLING ACTIVITIES

The major project facilities and equipment for the drilling are the drilling rig and ancillary equipment including office trailer, utility vehicles, pumps, generators, compressors, drill pipe racks, water storage tanks, drilling mud, and fuel. In addition, a sump pit for drill cuttings, excess drilling mud, and rain catchment will be required.

#### IX. OTHER AREAS OF POTENTIAL SURFACE DISTURBANCE

The landscape will be altered in the area of SOH 3 due to clearing for the drill site. Approximately a quarter of an acre will be needed for core drilling operations. Metes and bounds descriptions, archaeological survey, and biological survey of the area to be cleared will be submitted to DLNR prior to conducting any clearing operations.

X. DISPOSAL PROCEDURES FOR DRILL CUTTINGS AND OTHER WASTE

Project wastes such as cuttings from the wellbore, drilling mud and fluids will be discharged into the sump pit at the drill site. Solids will be settled out and fluids will be recycled. After drilling, any existing material and/or fluid in the sump pit will be disposed in a manner acceptable to the County of Hawaii and State Department of Health.

XI. MONITORING PLANS AND PROGRAMS

The D & O prescribed management, air quality and environmental monitoring, noise monitoring, and emergency plans were submitted separately to DLNR for ministerial approval.





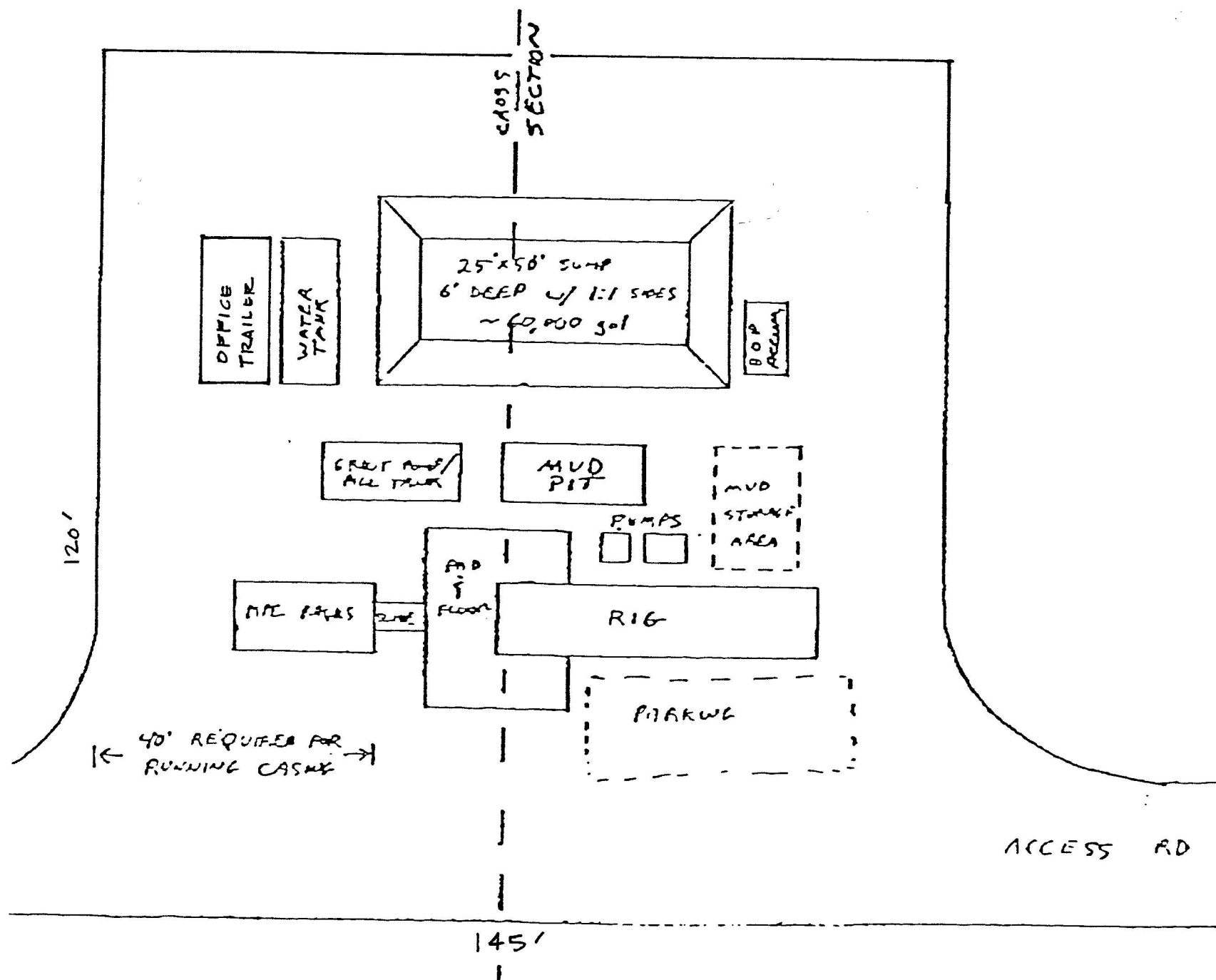


Figure 3. Typical SOH Site Layout

PLAN OF OPERATIONS - ADDENDUM

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

September 1990

## SUMMARY

This document provides an addendum to the plan of operations to support the scientific observation hole (SOH) program in the Kilauea middle east rift zone. The revised plan addresses the change in the location of the SOH 3 site with respect to the original plan submitted in December 1989 for your review and approval.

### III. DRILLING PROGRAM AND SCHEDULE

A revised drilling program for SOH 3 has been submitted to DLNR under separate cover. Figure 1 shows the revised schedule for the drilling.

### IV. PROJECT AREA AND DRILL SITE DESCRIPTION

SOH 3 is located on True/Mid-Pacific alternate drill site No. 2 (see Figure 2). Cut and fill requirements will be required depending on the slope of land. At the drill site, the area will be cleared and graded to accommodate the drill rig and ancillary equipment. An access road around the SOH 3 drill site will be necessary to accommodate delivery of equipment and supplies.

Tentative plans provide an option for directional drilling from this pad in a northerly direction. A revised drilling plan will be submitted to DLNR under separate cover.

### VI. PLANNED ACCESS

SOH 3 will be located on True/Mid-Pacific's alternate drill site No. 2, about 3,000 feet north-north-west of their present drill site No. 1. Flora, fauna, and archaeological surveys of the road from True/Mid-Pacific's drill site No. 1 and alternate drill site No. 2 have been submitted to DLNR for ministerial approval once the procedure has been established by DLNR. A grading engineering design will be finalized for permit application to the County of Hawaii. A metes and bounds description will be submitted to DLNR.

### IX. OTHER AREAS OF POTENTIAL SURFACE DISTURBANCE

Approximately a quarter of an acre plus access road around the drill site area will be needed for core drilling operations. Metes and bounds descriptions will be submitted to DLNR prior to conducting any grading operations. Biological and archaeological surveys conducted by True/Mid-Pacific Geothermal Ventures have been submitted to DLNR.

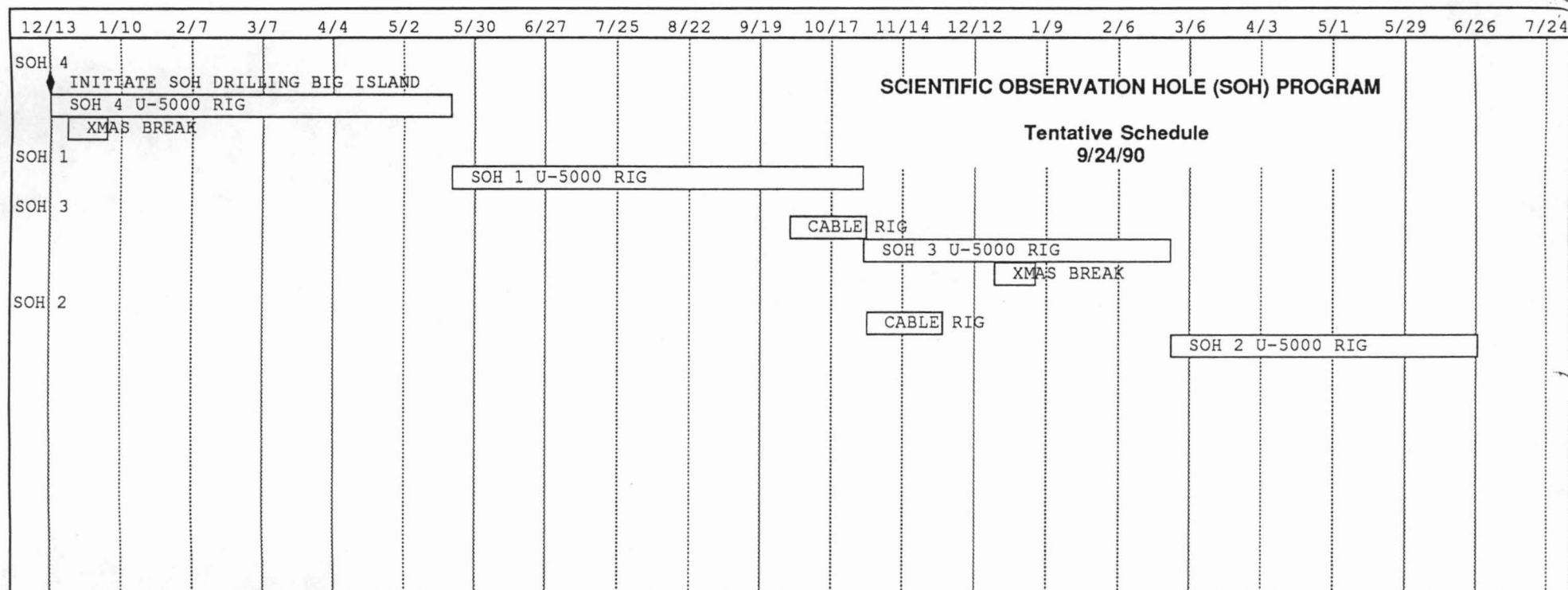
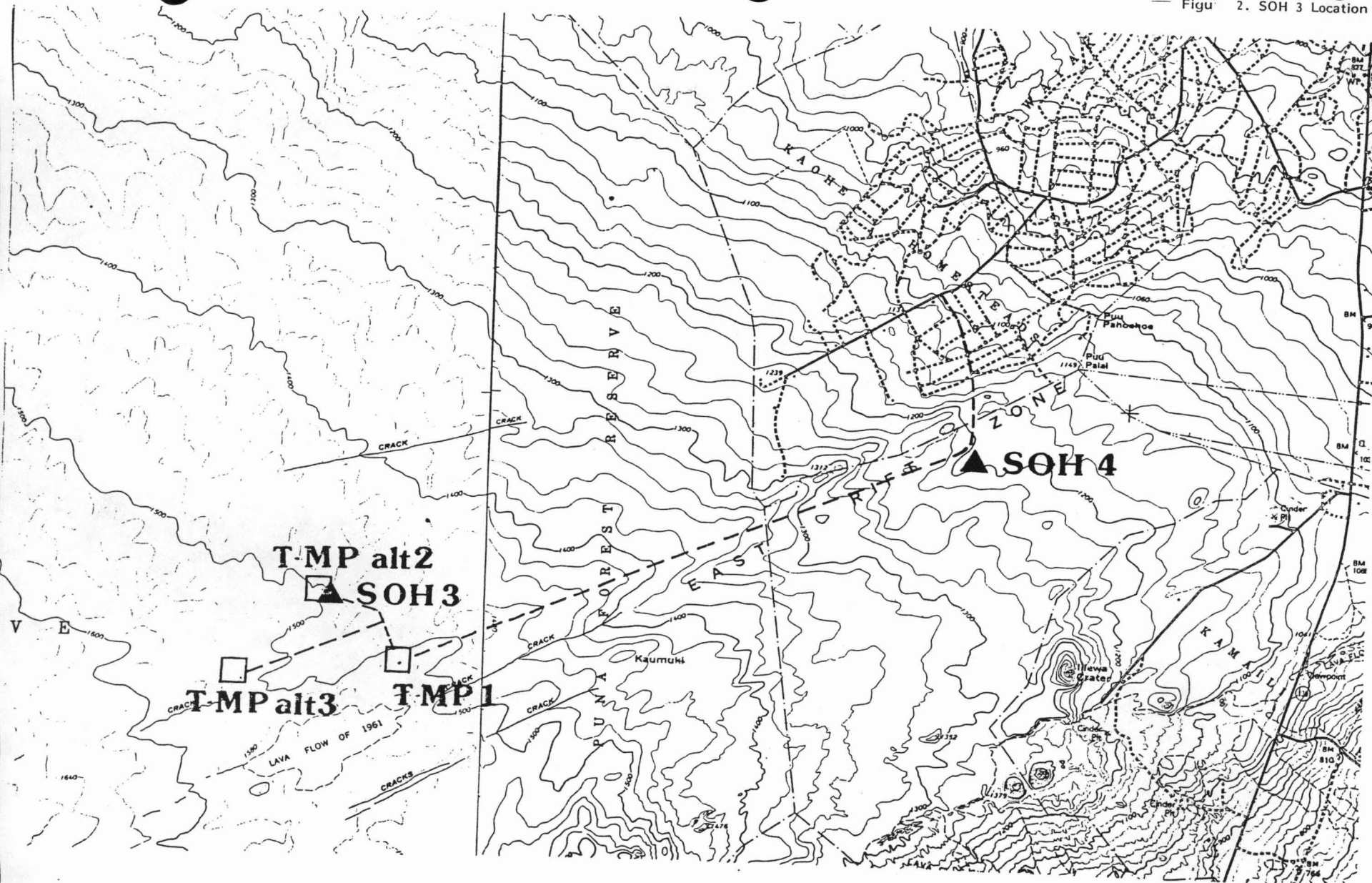


Figure 1. Tentative Schedule

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RECEIVED

# University of Hawaii at Manoa

DEC 21 10:06

Hawaii Natural Energy Institute

Holmes Hall 246 • 2540 Dole Street • Honolulu, Hawaii 96822

December 18, 1989

DEPT. OF WATER &  
LAND DEVELOPMENT

Mr. Manabu Tagomori, Deputy  
Division of Water and Land Development  
Department of Land and Natural Resources  
1151 Punchbowl Street  
Honolulu, Hawaii 96813


Re: Scientific Observation Hole (SOH) Program Activities under Conservation  
District Use Permit (HA 12/20/85-1830)

Dear Manabu:

As part of the SOH approval conditions to drill and monitor SOH 3 under  
Conservation District Use Permit (HA 12/20/85-1830), we are submitting a plan  
of operations for your review and comment.

If you have any questions, please feel free to call me at 522-5611, or  
in my absence, Arthur Seki at 948-8788. Mahalo.

Sincerely yours,

*for*   
Harry J. Olson  
Hawaiian Electric Industries/  
Spark Matsunaga Fellow in  
Geothermal Energy Research

Enclosure

cc: D. Kanuha  
A. Seki