

PROPOSAL TO CONDUCT ANALYSIS OF
SEISMIC ACTIVITY ON THE KILAUEA EAST RIFT ZONE

Submitted by:

Dr. Patricia Cooper
and
Dr. Greg Moore

Geophysics

The geophysics program has the potential to provide a number of types of information to the resource assessment and reservoir management effort. However, because of the Federal restriction on participation by the USGS in the State's geothermal program and the absence of a strong electrical geophysics group at SOEST, only two types of analyses can be undertaken in the near term: gravity and seismic studies of the rift systems associated with potential geothermal areas. Gravity surveys over the rift will enable us to better define the width of the dike complex within the rift and may give us some indications of how far away from the surface expression of the rift deep drilling could encounter a thermal anomaly. Preparation of a proposal to conduct seismic surveys on the island of Hawaii is presently underway and will be provided to the GTAC at a later date.

Seismic surveys may be able to provide structural information on the rift zones, indications of fluid flow within their hydrothermal systems, and the response of the hydrothermal system to development. The current seismic proposal will attempt to map concentrations of seismic activity within the rift to determine whether there is a correspondence between the activity and reservoir productivity or fluid flow within the rift. The work will be performed using publicly available seismic data from the existing network on Kilauea and will also obtain data from a more densely spaced array of seismic instruments that will be borrowed from the National Science Foundation. Acquisition of current seismic activity data within the rift will also provide information regarding typical pre-development baseline seismicity with which to judge the impacts of reinjection of geothermal fluids and possibly enable us to use any changes in seismic activity to track the movement of reinjectate within the rift zone. The ability to perform the latter could prove very valuable in demonstrating any potential for contamination of shallow drinking water supplies or, alternatively, in demonstrating that such is not occurring and hence, allaying fears of contamination where none exists.

A separate effort will attempt to perform seismic profiling of the rift to better define the structure of the dike complex. This work will require access to one or more deep wells on the rift that are capable of accepting a retrievable downhole geophone. Surface seismic signals will be generated using an "airgun" that will be detected by the subsurface geophone. Analysis of the signals will provide data that will support the analysis of natural seismicity and will enable us to determine whether a more sophisticated array of downhole geophones and surface sources could be used to better define the structure of the rift.

The work proposed here will be a unique application of seismic analysis to the Hawaiian geothermal system and hence, we cannot be certain that all of the information that is hoped for will be obtained. Hence, the work plan in the attached proposal has attempted to minimize costs by relying heavily on the use of equipment provided by outside institutions. As individual aspects of the work demonstrate their ability to provide useful information to the State's geothermal effort, it is anticipated that subsequent proposals could be submitted to install permanent seismic stations or to conduct more sophisticated seismic surveys of the KERZ and other potential geothermal areas on Hawaii.

Budget

A detailed budget and description of the work to be performed is attached.

Geothermal Assessment Program
 Core Archive/Sample Distribution
 Principal Investigator/P.D.

| | F.Y. ' | MONTHS | Funds Requested |
|--|--------|----------|-----------------|
| | SALARY | Cal O.L. | |
| A. Senior Personnel | | | |
| 1. Core Curator | 1600 | 12 | 19200 |
| 2. | | | 0 |
| 3. | | | 0 |
| 4. | | | 0 |
| 5. () Others (List Separately) | | | 0 |
| 6. () Total Senior Personnel (1-5) | | | 19200 |
| B. Other personnel (show number) | | | |
| 1. () Post Doc. Assoc. | | | 0 |
| 2. () Other Professionals | | | 0 |
| 3. () Graduate Students | | | 0 |
| 4. (2) Undergraduate Students | 1060 | 12 | 12720 |
| 5. () Secretarial-Clerical | | | 0 |
| 6. () Other | | | 0 |
| TOTAL SALARIES AND WAGES (A + B) | | | 31920 |
| C. Fringe Benefits | | | 4927 |
| TOTAL SALARIES WAGES AND F.B. (A+B+C) | | | 36847 |
| D. Permanent Equipment | | | 3000 |
| TOTAL PERMANENT EQUIPMENT | | | |
| E. Travel | | | |
| 1. Domestic | | | 3720 |
| 2. Foreign | | | 0 |
| G. Other Direct Costs | \$ | | |
| 1. Materials and Supplies..... | 8000 | | |
| 2. Publication Costs/Page Charges..... | 4000 | | |
| 3. Consultant Services..... | 0 | | |
| 4. Computer (ADPE) Services..... | 0 | | |
| 5. Subcontracts..... | 0 | | |
| 6. Other..... | 0 | | |
| Eng. Support Fac. | 0 | | |
| Misc | 0 | | |
| TOTAL OTHER DIRECT COSTS | 12000 | | 12000 |
| H. Total Direct Costs (A through G) | | | 52567 |
| I. Indirect Costs (Specify) | 5257 | | 5257 |
| 44% of A - G EXCEPT D, G4, AND G6 (Eng.Supp.Fac.) | | | |
| J. Total Direct and Indirect Costs (H+I) | | | 57824 |
| K. Residual Funds | | | |
| L. Amount of This Request | | | 57824 |

Geothermal Assessment Program
 Geology Program Summary Costs
 Principal Investigator/P.D.

| | F.Y. ' 1 | MONTHS | Funds |
|--|----------|----------|-----------|
| | SALARY | Cal O.L. | Requested |
| A. Senior Personnel | | | |
| 1. J. Sinton | | | 0 |
| 2. M. Sykes | 4858 | 3 | 14574 |
| 3. R. Evans | 1600 | 12 | 19200 |
| 4. | | | 0 |
| 5. () Others (List Separately) | | | 0 |
| 6. () Total Senior Personnel (1-5) | | | 33774 |
| B. Other personnel (show number) | | | |
| 1. () Post Doc. Assoc. | | | 0 |
| 2. () Other Professionals | | | 0 |
| 3. () Graduate Students | | | 0 |
| 4. (2) Undergraduate Students | 1060 | 12 | 12720 |
| 5. () Secretarial-Clerical | | | 0 |
| 6. () Other | | | 0 |
| TOTAL SALARIES AND WAGES (A + B) | | | 46494 |
| C. Fringe Benefits | | | 8571 |
| TOTAL SALARIES WAGES AND F.B. (A+B+C) | | | 55065 |
| D. Permanent Equipment | | | 0 |
| TOTAL PERMANENT EQUIPMENT | | | |
| E. Travel | | | |
| 1. Domestic | | | 570 |
| 2. Foreign | | | 0 |
| G. Other Direct Costs | \$ | | |
| 1. Supplies..... | 8000 | | |
| 2. Publications Costs..... | 4000 | | |
| 3. Sample preparation..... | 1800 | | |
| 4. Secondary Mineral Analysis..... | 7600 | | |
| 5. Whole rock chemical analysis..... | 45000 | | |
| 6. Other..... | 0 | | |
| Eng. Support Fac. | 0 | | |
| Misc | 0 | | |
| TOTAL OTHER DIRECT COSTS | 66400 | | 66400 |
| H. Total Direct Costs (A through G) | | | 122035 |
| I. Indirect Costs (Specify) | 11444 | | 11444 |
| 10% of A - G EXCEPT D, G4, AND G6 (Eng.Supp.Fac.) | | | |
| J. Total Direct and Indirect Costs (H+I) | | | 133479 |
| K. Residual Funds | | | |