EXPLORATION OF VOLCANIC GEOTHERMAL ENERGY
RESOURCES BASED ON RHEOLOGICAL TECHNIQUES

Third Technical Status Report

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Brief Restatement of Objectives

Elementary considerations indicate that rheological methods may be useful in the detection and delineation of volcanic geothermal resources, in particular, those connected with subsurface molten or quasi-molten plutons such as may possibly be the case in the Oregon-Washington Cascades. The processes of main interest are the deformations or flows caused by (1) seasonal snow-ice load, (2) tidal strain and (3) seismic surface waves from moderate to high energy earthquakes. We propose to carry out an initial physical-analytic and field study of the general applicability of the rheidity sensing techniques in the Oregon-Washington Cascade region.

PROGRESS REPORT FOR THE PERIOD OCTOBER 1, 1978 TO DECEMBER 31, 1978

Personnel

Gunnar Bodvarsson devoted 3 months at 1/3 time, Dr. Ansel Johnson devoted 3 months at 1/6 time without pay, and Cindy Veen devoted 3 months at 1/2 time to the project during the present report period.

Progress Summary

In organizing and preparing field work at Klamath Falls, Oregon, the following was achieved:

- (1) Installation of strain and tilt meter housings at the OIT campus.
- (2) PSU group traveled to San Francisco to pick-up and assemble strain bases and get the electronics packages tuned up by Mr. Alan Jones.

- (3) Assembly of the strain systems in the lab was nearly completed.

Work on the theoretical basis of the rheological methods of exploration was continued, in particular,

- (4) A general overview of the potential of the rheological methods in geothermal and volcanic exploration is being prepared and
- (5) Numerical estimates of the responses of various structures of interest to the excitation by solid earth tidal and seasonal force fields are being worked out. Emphasis is on fracture/fault zone "breathing" phenomena and snow-ice loading of Cascade type volcanics.

Problems Encountered

- (6) Debugging of strain-meter electronics has not yet been completed.
- (7) Tiltmeters have not yet been delivered and
- (8) Instrumentation has to be installed and tested at Klamath Falls.

Plans for period January 1st to March 31st, 1979

- (9) Field tests at Klamath Falls are to be completed and equipment moved to the Newberry Caldera and Mt. Hood areas.
- (10) Work on items (4) and (5) above is to be continued and brought to a satisfactory completion.