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SUMMARY - MAGMA ENERGY R&D STRATEGIES AND APPLICATIONS

George P. Tennyson, Jr. - Chairperson

In this session, this vast resource of thermal energy was described by Dr. James C. Dunn (SNLA) as an estimated 500,000 quads in U.S. crustal magma bodies with temperatures in excess of 600 degrees Celsius and at depths of less than 10 km. The aim is to develop technology which can experimentally extract energy from a silicic magma body to demonstrate the feasibility of utilizing this resource. Energy extraction from molten rock has been demonstrated in Hawaii at the Kilauea Iki lava lake. The program is showing significant progress in Geophysics and Site Selection, Energy Extraction Processes, and Geochemistry/Materials. The next major step is to drill and evaluate a deep exploratory well at the Long Valley caldera in California. Extensive analyses by the program and from previous work indicate that active magma may be expected.

John T. Finger (SNLA) then summarized the proposed four-phase drilling plan. The four phases will be approximately one year apart, and are expected to result in a large diameter well to a total depth of about 20,000 feet. The well design (by Livesay, Inc.) was described in considerable detail, together with predictions of the expected drilling problems. The well design and schedule includes accommodation of not only a substantial time for both program and outside experiments, but also the restrictions imposed by regulatory agencies including noise, disposal of wastes, and consideration of wildlife migratory patterns. Last, but hardly least, was a relation of the well and its drilling to the benefits to be accrued to the magma energy technology.

The deep borehole measurements which can, and will be taken at the Long Valley well present a unique opportunity to test and validate geophysical techniques for locating magma, analyzing the geophysical parameters of the site and testing the theory that magma is still present at drillable depths within the central portion of the caldera. Assuming the drilling indicates that there is magma present, the geothermal community will have the unusual opportunity to examine the coupling between magmatic and hydrothermal regimes in a major volcanic system. Seismic, electrical and electromagnetic surveys will be undertaken together with in situ stress measurements. All these coordinated measurements will be utilized in the scientific characterization of the magma and hydrothermal systems at Long Valley and the coupling between the magmatic source region and the more shallow hydrothermal system in the caldera fill.

While the pace of the program has been constrained by the available funding, such pacing is providing an opportunity to plan and coordinate the scientific experiments. The program can then be implemented in such a manner as to provide maximum benefits to the technology and to the nation.