

INTRODUCTION

The Arab oil embargo of 1973 focused national attention on energy problems. A national focus on development of energy sources alternative to consumption of hydrocarbons led to the initiation of research studies of reservoir engineering of geothermal systems, funded by the National Science Foundation. At that time it appeared that only two significant reservoir engineering studies of geothermal reservoirs had been completed.

Many meetings concerning development of geothermal resources were held from 1973 through the date of the first Stanford Geothermal Reservoir Engineering workshop December 15-17, 1975. These meetings were similar in that many reports dealt with the objectives of planned research projects rather than with results. The first reservoir engineering workshop held under the Stanford Geothermal Program was singular in that for the first time most participants were reporting on progress in active research programs rather than on work planned. This was true for both laboratory experimental studies and for field experiments in producing geothermal systems. The Proceedings of the December 1975 workshop (SGP-TR-12) is a remarkable document in that results of both field operations and laboratory studies were freely presented and exchanged by all participants. With this in mind the second reservoir engineering workshop was planned for December 1976. The objectives were again two-fold.

First, the workshop was designed as a forum to bring together researchers active in various physical and mathematical branches of the developing field of geothermal reservoir engineering, to give participants a current and updated view of progress being made in the field. The second purpose was to prepare this Proceedings of Summaries documenting the state of the art as of December 1976. The workshop proceedings will be distributed to all interested members of the geothermal community involved in the development and utilization of the geothermal resources in the world.

Many notable occurrences took place between the first workshop in December 1975 and this present workshop in December 1976. For one thing, the newly formed Energy Research and Development Administration (ERDA) has assumed the lead role in geothermal reservoir engineering research. The second workshop under the Stanford Geothermal Program was supported by a grant from ERDA. In addition, two significant meetings on geothermal energy were held in Rotarua, New Zealand and Taupo, New Zealand. These meetings concerned geothermal reservoir engineering, and the reinjection of cooled geothermal fluids back into a geothermal system. It was clear to attendees of both the New Zealand and the December workshop meetings that a great deal of new information had been developed between August and December 1976. Another exciting report made at the meeting was a successful completion of a new geothermal well on the big island of Hawaii which

produces a geothermal fluid that is mainly steam at a temperature in excess of 600 degrees F.

Although the total developed electrical power generating capacity due to all geothermal field developments in 1976 is on the order of 1200 megawatts, it was reported that rapid development in geothermal field expansion is taking place in many parts of the world. Approximately 400 megawatts of geothermal power were being developed in the Philippine Islands, and planning for expansion in production in Cerro Prieto, Mexico was also announced. The Geysers in the United States continued the planned expansion toward the level of more than 1000 megawatts.

The Second Workshop on Geothermal Reservoir Engineering convened at Stanford December 1976 with 93 attendees from 4 nations, and resulted in the presentation of 44 technical papers, summaries of which are included in these Proceedings. The major areas included in the program consisted of reservoir physics, well testing, field development, well stimulation, and mathematical modeling of geothermal reservoirs.

The planning for this year's workshop and the preparation of the proceedings was carried out mainly by my associate Paul Kruger and his secretary for the program, Marion Wachtel. A great deal of the work involved in conducting the workshop was also carried out by students in the Stanford Geothermal Program under Dr. Paul Atkinson, Program Manager. We would like to express our deep gratitude to the Energy Research and Development Administration whose financial support of this workshop made the program and these proceedings possible.

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