PROCEEDINGS
SIXTH WORKSHOP
GEOTHERMAL RESERVOIR ENGINEERING

December 16-18, 1980

Henry J. Ramey, Jr. and Paul Kruger, Editors
William E. Brigham, Ian G. Donaldson, Roland N. Horne,
and Frank G. Miller, Co-Principal Investigators
Stanford, Geothermal Program
Workshop Report SGP-TR-50*

*Conducted under Stanford-DOE Contract No. DE-AT03-80SF11459 sponsored by the Geothermal Division of the U.S. Department of Energy.
DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.
DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.
PROPOSAL FOR RESERVOIR ENGINEERING STUDIES IN THE STATE OF ALASKA

Michael J. Economides, Christine Ehlig-Economides and Eugene Wescott
University of Alaska, Fairbanks

Alaska has a significant geothermal potential. While other sources of energy such as petroleum and coal are in abundance, there has been a definite move towards geothermal exploitation. The State has recognized the opportunity cost of petroleum as a source of materials and has expressed interest in the development of geothermal energy as a desirable and alternative resource.

More than 11 million acres \(^1\) have been identified as potential geothermal reservoirs capable of producing electric power as well as direct heating. Reservoirs of the latter type are found in the interior of the state. Considering the winter temperatures of these regions (at times dipping to \(-60^\circ F\)) direct utilization is attractive.

A comprehensive reservoir engineering proposal is presented to better assess the extent and potential of the geothermal areas in Alaska. The purpose of this paper is to acquaint the participants of the Stanford Geothermal Workshop with the enormous potential, as yet untapped, of the State of Alaska.

Introduction

Figure 1 is a map of Alaska with a number of potential geothermal sites. Of these reservoirs, Chena Hot Springs and Pilgrim Hot Springs have had considerable geological and geophysical work. \(^2,3\) At Pilgrim Springs, two small wells were drilled at 200 feet and they encountered hot water at 178°F. No deeper drilling was attempted since the available equipment was incapable for such a task. The flow rate was measured at 32,000 lb/hr. At Chena Hot Springs and at a depth of only 18 feet a temperature of 138°F was recorded.

Two other exploration projects are to begin in calendar 1981. Personnel from the Geophysical Institute and the Petroleum Engineering Program at the University of Alaska, Fairbanks will cooperate in the "Geophysical Exploration for Geothermal Energy at Manley Hot Springs" and in the "Investigation of Radiogenic Heated Aquifers in the Lower Susitna Basin".
Potential sites in Alaska are: Pilgrim Hot Springs, Kotzebue, west side of Mount Drum (Klawasi), Willow, Chena Hot Springs, Circle Hot Springs, Manley Hot Springs, Homer Hot Springs, Clear Creek Hot Springs, Central Baranof Island, Tenakee Hot Springs, Northern part of Unalaska Island, Unnak Islands, Emmons Caldera and Northeastern Atka Island. (Reference 1)

As it can be seen, the developable sites in the state span the entire area.

Many of these areas occur in sedimentary basins, containing ancient volcanic formations. Often, geothermal formations may be associated with hydrocarbon deposits. Fractures, which are characteristic of other major geothermal formations, also penetrate the Alaskan reservoirs.

**RESERVOIR ENGINEERING WORK**

The University of Alaska will purchase Amerada bombs in order to facilitate a comprehensive well testing program. Following intensive geophysical exploration it is anticipated that an aggressive drilling program will ensue. Drawdown and buildup well tests will be done in the first well. If they are encouraging then a second and third well will be drilled preferably forming a right angle with the first well. One direction should follow identified faults while the other will be perpendicular. Interference well testing will allow the estimation of the directional permeabilities and the identification of the principle axes of permeability.

Subsequent drilling will take into account the findings of the well testing. Well logging during the drilling phase will supply the final formation evaluation which along with the results of well testing will define the economic attractiveness of each project.

While reservoir engineering work in the state is still in its infancy, it is expected to grow rapidly. The comprehensive geophysical and geological work done thus far have prepared a highly favorable ground for the reservoir engineer.

**REFERENCES**


Figure 1. Alaska map with potentially developable sites.