

ANNOTATED RESEARCH BIBLIOGRAPHY  
FOR GEOTHERMAL RESERVOIR ENGINEERING

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Despite efforts of conscientious researchers, the current volume of published materials makes it virtually impossible to review all relevant publications in a given field. As a result it has been estimated that approximately one-tenth of the research and development funds expended in the United States has been applied to areas resulting in a duplication of efforts. This has been attributed to inadequate literature review.

An up-to-date annotated bibliography has been prepared which assisted in avoiding duplication of reservoir engineering research and served as a definitive record of the progress and current status of the subject. The bibliography included English, Italian, Russian and Japanese language publications. Individual documents have been grouped under the following major subject categories:

- o Formation Evaluation
- o Reservoir Modeling
- o Exploitation Strategies
- o Evaluation of Production Trends

The specific tasks for completing the bibliography included:

- o Literature Research
- o Thesaurus Development
- o Document Evaluation
- o Computerized Bibliography
- o Report Preparation

It is imperative that the reservoir engineer quantitatively appreciate the physical processes occurring within the geothermal system in order that an exploitation strategy can be selected with confidence. The first step in this process was to develop an appreciation of the general physical processes associated with geothermal systems and use this background to generate a conceptual model of the particular system under study. Secondly the physical properties of the rock and fluid and the structural features of the reservoir must be assessed. These inputs are required before a representative quantitative simulation can be formulated. A mathematical or experimental model must then be developed using the defined physical properties along with identified initial and boundary conditions which can then be used to assess possible production strategies. The actual reservoir response under production must then be used to continuously update and refine the model. This will allow extrapolations of performance to be made with greater confidence.

In the early 1960's the majority of geothermal reservoir engineering concepts relied primarily on experience gained in the oil and gas industries. It was not long however before workers in geothermal research realized the complexity and different nature of geothermal resources from conventional oil and gas resources. High temperature, steam flashing, chemical deposition and nonporous fractured reservoirs are examples of such differences. The recent surge in geothermal energy exploration and exploitation activities has given an impetus to increased effort and progress in geothermal reservoir engineering.

Literature research resulted in approximately 350-400 documents from retrievable sources in the subject areas listed above.

Thesaurus development has expanded on the **GRID** indexing system developed by Lawrence Berkeley Laboratory. The expansion of a thesaurus of the **GRID** data base will permit computerized information retrieval.

The document evaluation phase reviewed and retrieved items for subject relevance and compiled annotations of literature included in the bibliography. Computer tasks have entailed keypunching data for automated retrieval.

Final bibliography has been divided into a narrative review, annotations, reference list, and thesaurus.