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ELECTRIC POWER GENERATION USING
GEOTHERMAL BRINE RESOURCES
FOR A PROOF-OF-CONCEPT FACILITY

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An exploratory systems study of a geothermal proof-of-concept facility is being conducted. This study is the initial phase (Phase 0) of a project to establish the technical and economic feasibility of using hot brine resources for electric power production and other industrial applications. Phase 0 will include the conceptual design of an experimental test-bed facility and a 10-MWe power generating facility.

Bechtel Corporation is performing an exploratory systems study of a geothermal proof-of-concept facility under a National Science Foundation grant. This study is the initial phase, Phase 0, of a project to establish the technical and economic feasibility of utilizing hot brine resources, presently undeveloped in the United States, for electric power production and other industrial applications. The Phase 0 study began on July 1, 1974, and is scheduled to be completed by January 31, 1975.

The National Science Foundation's purpose in sponsoring this project is to promote the development of geothermal technology and effect its transfer to the private sector of the economy. Subsequent phases of the project, not included in the present study, will entail engineering and construction of the proof-of-concept facilities.

Phase 0 will include the conceptual design of an experimental "test-bed" facility and a 10-MWe power generating facility. A specific geothermal site will be selected and used as the basis for developing and illustrating the concepts involved in the design. An objective of the study is to determine the earliest feasible time that these facilities could be in operation. Accordingly, the site will be one at which hot brine resources have previously been identified. This will eliminate the time-consuming effort that would otherwise be needed for exploration.

The experimental facility will be designed to serve as a test bed for developing advanced geothermal processes and equipment. Offices, laboratories, and test areas that are necessary to support the test programs and evaluate the resulting data will be included. The capability will be provided to test energy conversion equipment, such as heat exchangers and multiphase turbines, with geothermal fluid under operating conditions. Provisions will

also be made for concurrently carrying out other test programs, such as methods for controlling corrosion, erosion and scaling, and nonelectric uses of geothermal energy.

The thermodynamic performance of several energy conversion processes will be evaluated and the most promising selected for use in the 10-MWe power generating facility. The process selected will depend to a large extent on the chemical and thermodynamic characteristics of the geothermal fluid at the site used to illustrate the concept, as well as other site-sensitive conditions, such as the availability of cooling water and environmental effects.

The conceptual design will include all engineering drawings and equipment lists necessary to support an order-of-magnitude capital cost estimate. The output from Phase 0 will also include a plan for carrying the project forward through the detail design, construction, and startup phases. The plan will comprise a delineation of the scope of work and a time schedule.

The Phase 0 study will be completed by preparing a final report containing a record of the study findings and data of permanent value.