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# POTENTIAL SOLUTIONS FOR GEOTHERMAL BRINE PRODUCTION UTILIZATION AND REINJECTION PROBLEMS

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ABSTRACT

The geothermal industry is presently confronted with a large number of technical problems related to geothermal brine production, utilization and reinjection processes. The United States Department of Energy/Division of Geothermal Energy realizes these problems and is funding large efforts to help overcome them.

The joint efforts by private industry and DOE/DGE have still not solved, in a satisfactory manner, the following most critical problems:

1. Scale and corrosion problems in subsurface and surface equipment.
2. Removal of silica and other suspended particles from the reinjected brine; these particles cause severe damage to the injection wells.
3. Proper gas handling (noncondensables) to ensure optimum power plant efficiency.
4. Mineral recovery through utilization of brine constituents.
5. Maximum reservoir heat recovery and avoidance of subsidence through reinjection of heat depleted brine and injection of aqueous fluids which are not native to the reservoir.

Many papers dealing with various aspects of these problems have been published. These papers describe attempts to attack these problems through theoretical evaluations and/or through bench scale experiments. Unfortunately, very little is published about full-scale field experiments to find solutions to these problems.

Recently, a number of private geothermal operators have commissioned us to conduct some of these large scale experiments in actual field tests. A large scale test unit was built and operated at

various sites. This unit is capable of handling up to 1,000,000 lbs/hr total flow at a maximum temperature of 515°F.

DOE/DGE joined forces with these operators by providng funds through its research program on reinjection problems. In return, all data obtained through these field experiments will be published whether or not they are directly funded by DOE/DGE.

The following tasks are included in this work:

1. Experiments to determine the practical feasibility of brine clarification by various processes including reactor-clarification and flocculation.
2. Extensive documentation of actually measured data and precise identification of problems based on these actually measured field data.
3. High temperature/high pressure test loop experiments to determine:
   a. Practical aspects of mineral recovery.
   b. Optimization of gas and liquid handling processes.
   c. Scale deposition rates.

Of particular interest are the types of instrumentation used to identify problems and to monitor the gas and liquid quality in large-scale field experiments. Theoretical evaluations using the field data to determine various chemical aspects of foreign brine injection are also given.