

MANAGEMENT OF FLUID INJECTION IN GEOTHERMAL WELLS TO AVOID SILICA SCALING AT LOW LEVELS OF SILICA OVERSATURATION

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ABSTRACT

In the design of geothermal installations, the possibility of scale precipitation caused by silica oversaturation has often been taken as a design constraint upon steam separation pressure. At installations where oversaturation is allowed to develop, the resulting scale formation is a nuisance and in some cases affects the performance of injection wells. A review of the thermodynamics, reaction mechanisms, and kinetics of silica deposition, compared with actual experience at various locations, shows that it is possible to predict low-level scaling with sufficient confidence for production and injection system design. With foresight it thus becomes possible to suppress or manage the silica scale. A useful suppression technology is fluid pH reduction, achieved by mixing with non-condensable gases and/or steam condensate. Results from several geothermal systems will be presented. Further improvements of predictive technique will benefit from more uniformity in data collection, designing experiments, reporting of results, and reporting measurements of scaling in actual production systems.

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