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MATERIALS USED IN DRILLING GEOTHERMAL WELLS IN THE GEYSERS

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ABSTRACT

Drilling deep geothermal wells in the Geysers is usually done with air as a drilling fluid. Corrosion rates are very high unless the proper corrosion inhibitors are added to the air stream. Because of the high temperature encountered and the presence of H<sub>2</sub>, special inhibitors had to be developed and are currently being used. This paper will describe the corrosion problems encountered in drilling the Geysers and the measures taken to reduce the corrosion rates. Corrosion rates with and without inhibitors are compared and the cost and effectiveness of the inhibitors are discussed.

GEYSERS DRILLING MUD PROGRAM

Spud mud to 500'+	17 1/2" Open to 26" for 20" casing
to 2500'+	17 1/2" hole for 13 3/8" casing
to 5000'+	12 1/4" hole for 9 5/8" liner

Lightly treated lignite/bentonite drilling fluid: bentonite; lignite; caustic. Loss circulation zones treated with cottonseed hulls and/or cement as required. Corrosion problems can be severe, so film forming amines and oxygen scavengers are used to minimize drill pipe losses. Described as follows:

Inhibitor 202 is a formulated, persistent film type, water and oil dispersible corrosion inhibitor designed to protect the drill

string during drilling operations. It functions effectively in air stiff foam, mud misting, aerated mud or conventional mud drilling fluids. It may be painted or sprayed on the drill pipe or it may be used as a slug treatment. 55 gallon drum, density of 7.7 lb/gal.

OS-1 liquid is a liquid oxygen scavenger of the ammonium bisulfite type. It is used by diluting one part in ten parts water. The diluted solution is added at the pump suction at 1-1/2" to 2-1/2 gallons per hour. 55 gallon drum-density 11.16 lb/gal.

SI 1000 is an organic phosphate type scale inhibitor for tubular goods. It may be added to fresh water or brine systems to prevent deposition of alkaline earth metal scale. 55 gallon drum-density of 9.37 lb/gal.