SAVE: For Appendix A, B

Los Alamos

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memorandum

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SUBJECT: QUARTERLY PROGRESS REPORT, OCTOBER-DECEMBER 1981

Fenton Hill Flow Experiments

Proposed and planned Experiment 2003, the initial pressurization of hole EE-2, which was finally conducted in early January.

Earth Stresses as Determined from the Phase I Flow Experiments

Considerable effort was directed towards a re-evaluation of the least principal earth stress in the Phase I reservoir. From this work, a new and essentially unique method of determining the minimum earth stress from injection flow testing was developed. The resulting value for S_3 was then tested against porous media elastic theory, resulting in an indicated Poisson's ratio of 0.24, a value in substantial agreement with both in-situ dynamic measurements within and above the Phase I reservoir, and with numerous laboratory measurements on core samples.

This injection flow method of earth stress determination was then applied to those pumping tests involving wellbore intervals with intersecting S_2 -- rather than S_3 -- joints. From these analyses, an S_2 value approximately 1000 psi greater than S_3 was determined at a depth of 2700 m. These derived S_2 values were then tested against the Phase I reservoir flow-through data for Run Segments 2,3,4 and 5. An agreement between these reservoir flow-through-derived S_2 values and the above injection-derived S_2 levels of better than 4 bars (<1%) was obtained.

In-Situ Moduli Appropriate to the Phase I Reservoir

At my urging, Chris Pearson has re-examined the 1977-78 seismic data to determine the shear wave velocity. Combined with Mike Fehler's P wave velocity data previously reported in JGR, a mean dynamic in-situ Young's modulus of 780 kb and a Poisson's ratio of 0.235 were determined.

Note!

An extensive literature search for applicable static in-situ modulus measurements has been conducted. The primary conclusions are that most measurements have been made in near-surface open-jointed rocks, and are not applicable to our Fenton Hill situation. However, a few recent measurements, notably by the Japanese, have shown that in the case of jointed -- but previously undisturbed -- granite, the modulus going from compression into tension stays high until the joints first open, and is then much lower during subsequent compression testing.