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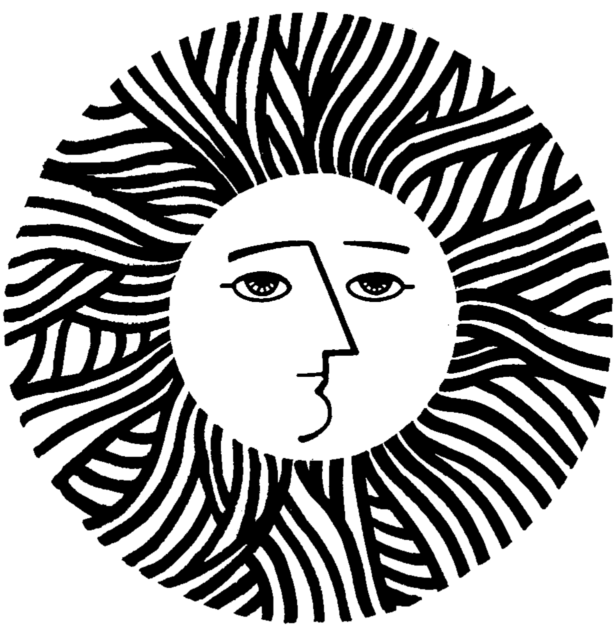

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September 23, 1981

TO: Charles Grua and Art Hartstein

FROM: Peter Persoff, Bill Hall, and Mohsen Mehran
Lawrence Berkeley Laboratory, Universtiy of California, Berkeley, CA 94720

RE: Monthly Progress Report for August
Control Technology for In-Situ Oil Shale Retorts
LBID -441

PRESENTATIONS AND PUBLICATIONS

The paper "Modeling of Static Mining Subsidence in a Non-linear Medium" by J.L. Ratigan and R.E. Goodman was presented at Conference on Implementation of Computer Procedures and Stress-Strain Laws in Geotechnical Engineering, at Virginia Polytechnic Institute, Blacksburg, VA, August 3-6, 1981.

TASK 3. BARRIER OPTIONS

Triaxial testing of simulated spent shale grouted cores.

This month we began a series of consolidated drained triaxial tests in order to determine the expected structural response of grouted retorts to overburden loads. Simulated grouted cores, consisting of spent shale grouts and -3/8" spent shale from LETC retort run S-55 were prepared by hand mixing and rodding, as called for by ASTM method C-305 (preparation of concrete specimens). Although grouted retorts are not expected to contribute significantly to enhanced resource recovery by replacing pillars to support overburden, the structural response is important to determine the confining pressure seen by grout in a retort, which influenced the permeability as shown by data presented last month.

Disposal of surface retorted spent shale.

Spent shale from two near-commercial surface retorting processes have been tested as received for cementing strength by a modification of ASTM C109 (Compressive strength of mortar cubes). The modifications were use of a coarser sand than called for (fineness modulus = 3.07), and the use of water-solid ratio of 0.8.

The high water demand of the spent shale necessitated both these modifications in order to get a mortar of proper consistency. The 28-day compressive strengths of the two spent shales were 72 and 313 psi respectively. Typical unmodified ASTM C109 28-day strength of portland cement for comparison, is about 5000 psi.

TASK 5. LEACHING OPTIONS

Leaching of organics from spent shale.

Work was completed on the development and testing of the model of TOC leaching and transport in a spent shale bed. Model variables are column length, leachate flow rate, particle diameter, pore diffusion, and porosity within the particle boundaries. Experimental data from several column runs were used to test the model. Pore diffusion coefficients in the range of 10^{-5} to 10^{-4} cm^2/sec were calculated. These coefficients are within an order of magnitude of coefficients normally reported for molecular diffusion of organic compounds in water. These results are reasonable, considering the complexity of the leaching mechanism. Work is continuing on the preparation of the final report.

TASK 6. GEOHYDROLOGIC MODIFICATION

Solute transport model development.

Several sample problems have been solved using the upstream weighting function for handling a sharp concentration front moving through the flow medium, as described last month. Results of these runs have been described in a paper "An Upstream Finite Element Method for Solution of Transient Transport Equation in Fractured Porous Media", which has been submitted to Water Resources Research.

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