Title

MONTHLY PROGRESS REPORT FOR FEBRUARY - CONTROL TECHNOLOGY FOR IN-SITU OIL SHALE RETORTS

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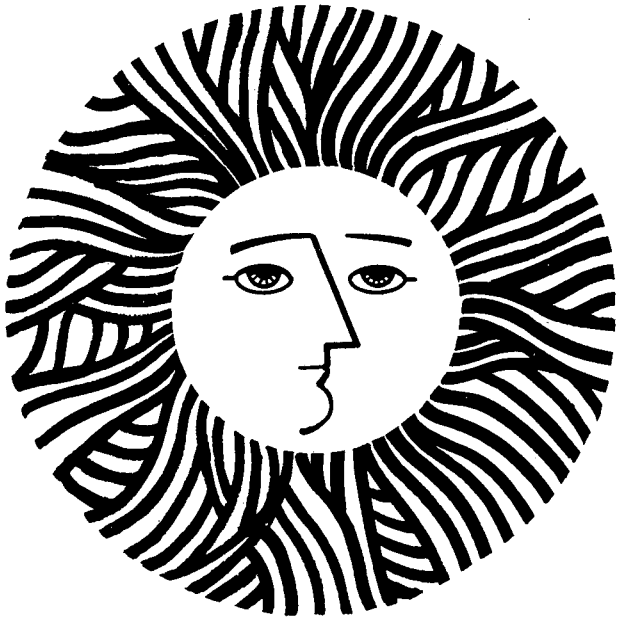

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March 9, 1981

TO: Charles Grua, Brian Harney, and Art Hartstein

FROM: Peter Persoff, Bill Hall, Mohsen Mehran, and Phyllis Fox

RE: Monthly Progress Report for February
Control Technology for In-Situ Oil Shale Retorts
LBID-371

TASK 3. BARRIER OPTIONS

Evaluation of Fly Ashes as Grout Ingredient

To determine the optimum level of gypsum addition to class C fly ash, various levels of gypsum from 3 to 10 percent were blended with two fly ashes and tested by ASTM C109 (compressive strength of mortar cubes). Results of these tests are shown in Table 1. Optimum gypsum addition is apparently 10% (or more) for both Wyodak fly ash and Comanche fly ash (from Pueblo, Colorado). Further tests are planned to explain the minimum at 6% for Comanche fly ash. Comanche fly ash develops greater strength, apparently because it contains more C_3A. Efforts will now be made to determine the availability and delivered cost of Comanche fly ash and other class C fly ashes.

Table 1. Compressive strength of fly ash-gypsum (ASTM C109).

Fly ash	Wyodak		Comanche	
test age, days	7	28	7	28
gypsum added, %				
3	320	530	990	1000
6	680	890	580	640
10	610	1030	1240	1800

TASK 5. LEACHING OPTIONS

Leaching of Organics from Spent Shale

Work continued on fitting experimental column and batch data to mathematical models of the leaching process. Most of the time was spent determining kinetic leaching coefficients. We are using two methods for this task; one based on work by Thomas (1) and the other on the method

of characteristics (2). The Thomas method is based on the assumption that sorption in fixed beds is analogous to the stoichiometry of the ion-exchange reaction. Although the equations are complex, tabular and graphical solution aids have been published (1).

The method of characteristics is a numerical means of solving the partial differential equations of the leaching and transport equation. Calculations are facilitated by converting partial differentials into ordinary differentials which are more amenable to solution than the original equations.

In general, data analysis by the Thomas method involves fitting normalized curves of column effluent TOC versus time to dimensionless breakthrough curves calculated with the Thomas equation. For the method of characteristics, finite-difference techniques are used to calculate the mass transfer coefficients.

TASK 6. GEOHYDROLOGIC MODIFICATION

Review comments have been received on the report "An Investigation of Dewatering for the Modified In-Situ Retorting Process, Piceance Creek Basin, Colorado" (LBL-11819). These comments and additional simulations are being incorporated in the final form of the report. This work will be presented at the Fourteenth Oil Shale Symposium, Golden, Colorado, in April.

Four existing computer codes were examined to select one for modeling solute transport during groundwater reinvasion of abandoned retorts. The code ROCMAS has been tentatively selected. This code, developed earlier at LBL, models simultaneous heat and fluid flow. Solute transport will be added to the code approximately analogously to heat transport.

REFERENCES

(1) Perry, R. H. and Chilton, C. E., Chemical Engineers' Handbook, 5th Edition, page 16-33, McGraw-Hill, 1973.

(2) Ibid. page 16-43.

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