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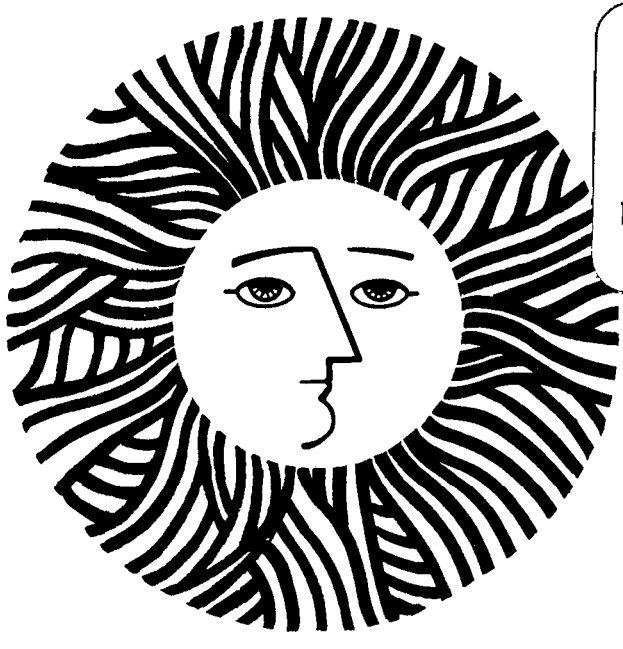
ENERGY & ENVIRONMENT DIVISION

OCTOBER MONTHLY PROGRESS REPORT CHEMICAL TRANSPORT STUDIES



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TO: Paul Weiber

FROM: Phyllis Fox

RE: October Monthly Progress Report
Chemical Transport Studies
LBID-139

Because Western coal and oil shale resources are interspersed with groundwater aquifers, in situ energy conversion may result in contamination of underground water supplies. The purpose of this program is to develop the chemical kinetic data necessary to simulate the leaching and transport of contaminants from in situ coal and oil shale conversion. Laboratory studies will be coordinated with an on-going hydraulic and chemical transport modeling effort.

During October, a detailed literature survey of in situ leaching and transport of constituents from an oil shale industry was completed. This survey revealed that no work has been initiated on the transport of chemical constituents from an in situ burn and that a number of laboratory studies on the leaching of simulated in situ spent shales have been completed. The results of these laboratory studies are not suitable for use in chemical transport modeling as the experiments were designed to characterize the leachates rather than to develop kinetic data, and did not accurately simulate field conditions. These studies used spent shales exposed to lower temperatures and for shorter time periods than would be encountered

in a field burn. High temperatures, in excess of 1000°C, and low isothermal advance rates, on the order of a couple of feet per day, may produce shales with a mineralogy that is significantly different from those produced in laboratory retorts. Additionally, much of the existing data were derived from batch experiments or from column experiments in which flow velocities and packing densities have differed significantly from field conditions.

Experiments are presently being designed to overcome some of these deficiencies. Experiments will be conducted to simulate field conditions and to provide kinetic data. Continuous-flow columns are being designed based on mass transfer theory, and they will be capable of accommodating steam, elevated-temperature water flows (initial leaching will occur in the presence of steam and/or high temperature fluids) and shale packing densities and flow velocities anticipated under field conditions. Specific experiments will be conducted to simulate the effect of a plug of tar and other condensed matter that may accumulate at the botton of an in situ retort, steam-water interactions with the confining wall of the spent retort (this interface will consist of partially retorted shale which will have different leaching properties from the main mass of shale) and leachate attenuation mechanisms, such as adsorption. Arrangements have been made to obtain spent shale from Occidental's Room 6 at the Logan Wash site, and this material will be used in some leaching experiments. Spent shales that simulate this field material will be generated in an existing laboratory retort.

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