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LAWRENCE BERKELEY LABORATORY
Room: 128 Bldg.: 70 Ext.: 6698

March 9, 1981

TO: Pat Fair

FROM: D. C. Girvin and A. T. Hodgson

RE: Monthly Progress Report for February
Distribution of As, Cd, Hg, Pb, Sb, and Se During Simulated In-Situ Oil Shale Retorting
LBID-370

TASK 1. ANALYTICAL METHODS FOR OIL AND WATER SAMPLES

Shale oil samples were not completely decomposed by the Parr acid bomb digestion technique. Due to the resulting sample inhomogeneity, inorganic Cd spikes added to the samples prior to digestion were not quantitatively recovered. This failure led us to attempt the digestion in beakers on a hot plate using concentrated nitric acid followed by concentrated perchloric acid. Oil samples were completely decomposed and quantitative recovery of inorganic Cd spikes was obtained.

TASK 2. ANALYTICAL METHODS FOR GAS SAMPLES

During February, three new lock-in-amplifiers for use with the Hg and Cd ZAA spectrometers were tested. Several circuit errors were discovered necessitating the return of these units to the manufacturer for repair. We also tested the Cd ZAA light source and high voltage Cd light source driver and made several modifications to these units. The Cd ZAA spectrometer was fitted with a Perkin-Elmer single-slot burner for air-acetylene flame operation. With this instrumental configuration, we were able to measure the Cd absorption of aqueous standards aspirated into the flame. Calculations based upon conservative estimates of possible Cd concentrations in the offgas from the laboratory retort indicate that it may be possible to use the air-acetylene burner for direct on-line analysis of this element. This possibility is being further investigated. The major

advantages of the burner over the graphite furnace are its simplicity and the ease with which standards can be introduced.

TASK 4. LABORATORY PARTITIONING STUDIES

We are in the process of preparing a report on the results of the Hg partitioning studies. Some additional laboratory work may be required in order to clarify the results of certain experiments.

Plans are being formulated for the next laboratory retort run. The major objective of this run will be to attempt an analysis of Cd in the offgas using the air-acetylene burner for atomization. We also plan to test various scrubber solutions for the collection of trace elements in offgas. Maximum retorting temperature will be 750°C.

PROJECTED WORK

The projected work for March is as follows:

Task 1. Analytical Methods for Oil and Water Samples

We will analyze oil samples for Cd and determine the accuracy and precision of the method.

Task 2. Analytical Methods for Gas Samples

We will continue to work on developing a method for Cd analysis in retort offgas using the air-acetylene burner for atomization.

Task 4. Laboratory Partitioning Studies

If the method development in task 2 produces encouraging results, we will attempt to conduct a laboratory retort run during March.

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