Title
MONTHLY PROGRESS FOR MAY. DISTRIBUTION OF As, Cd, Hg, Pb, Sb, AND Se DURING SIMULATED IN-SITU OIL SHALE RETORTING

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June 9, 1981

TO:  Pat Fair
FROM:  Al Hodgson
RE:  Monthly Progress for May
Distribution of As, Cd, Hg, Pb, Sb, and Se During Simulated
In-Situ Oil Shale Retorting
LBID-406

TASK 1. ANALYTICAL METHODS FOR OIL AND WATER SAMPLES

Analyses of Cd in all products from retort runs LBL-04 through
LBL-08 have been completed. Oil samples were digested with nitric and
perchloric acids and were analyzed by graphite furnace atomic absorption
spectroscopy (AAS). Concentrations of Cd in the oils from the five
retort runs are approximately 100 µg/g. Precision of analysis as measured
by the coefficient of variation is typically 40%. This level of precision
is adequate since less than 1.5% of the Cd originally in the shale
partitioned to the oil. Water samples were analyzed directly by graphite
furnace AAS. Concentrations of Cd in the waters from the five retort runs
ranged between 0.2 and 11.5 µg/ml. The coefficient of variation for Cd
concentrations of 10 µg/ml in retort water is less than 5%.

TASK 2. ANALYTICAL METHODS FOR GAS SAMPLES

The new gas flow rate meter, which is based upon the measurement of
pressure drop over a length of capillary tubing, was successfully tested
during May. The meter was calibrated over a range of zero to 2000 scc/min
for both pure N₂ and a 50:50 mixture of N₂ and CO₂. Calibrations for both
gas compositions were identical. The temperature of the heated capillary
tubing was maintained at 300°C by joule heating. Flow rate was regulated
downstream of the tubing with a micro-metering valve.

TASK 4. LABORATORY PARTITIONING STUDIES

The draft of the report on the results of the Hg partitioning studies
is nearing completion; the text is being edited and figures are being pre-
pared.
A Cd mass balance has been calculated for experiment LBL-08. Only 6% of the Cd originally in the raw shale partitioned to the oil, water, and spent shale. The remainder was either in the gas phase or was lost to the retorting components.

PROJECTED WORK

The second retort experiment for Cd will be conducted in June. The starting material for the experiment will be spent shale from LBL-06 which has been retorted to 500°C in N₂. Use of low temperature retorted shale will reduce the time required for the experiment and for cleanup and should not interfere with the objective of evaluating the AAS apparatus used for determination of Cd in retort offgas. An attempt will be made to collect Cd in bubblers containing a variety of solutions as an independent check on the AAS apparatus.
This report was done with support from the Department of Energy. Any conclusions or opinions expressed in this report represent solely those of the author(s) and not necessarily those of The Regents of the University of California, the Lawrence Berkeley Laboratory or the Department of Energy.

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