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MONTHLY PROGRESS REPORT FOR AUGUST. STEAM STRIPPING PROJECT

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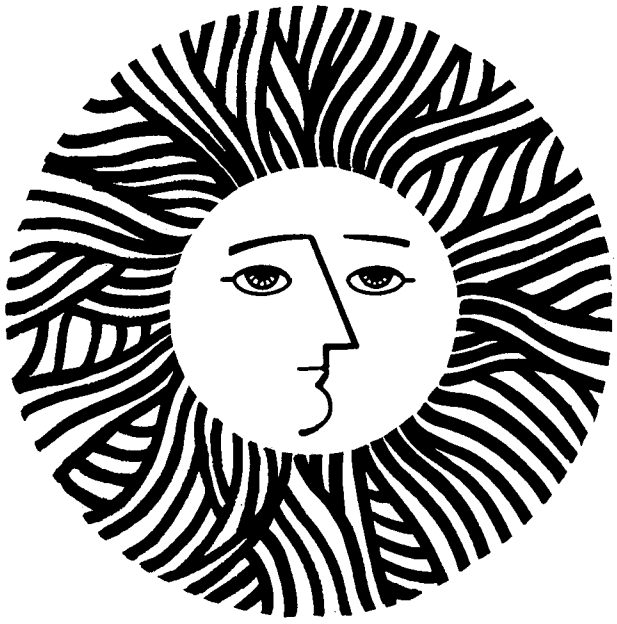

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DISCLAIMER

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September 3, 1981

TO: Charles Grua

FROM: Richard H. Sakaji, Bonnie M. Jones, and Jerome F. Thomas;
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RE: Monthly Progress Report for August
Steam Stripping Project
LBID- 442

ANALYTICAL METHODS DEVELOPMENT

Ammonia Determination

The following ammonia nitrogen values were obtained using Weatherburn's version of the phenate method: Oxy-6 gas condensate, 6759 ppm (rsd = 1.4%, n = 10); Oxy-6 retort water, 1089 ppm (rsd = 1.1%, n = 10); air stripped Oxy-6 gas condensate, 149 ppm (rsd = 1.3%, n = 9).

Samples of Oxy-6 gas condensate were spiked with 1000, 10 000, and 50 000 ppm ammonia nitrogen using a standard ammonium sulfate solution. Recoveries of ammonia nitrogen by Weatherburn's phenate method were 110%, 93%, and 100%, respectively. Our experimental results indicate that Weatherburn's version of the phenate method for ammonia determination may be applied to our wastewater samples.

Carbon Analysis

Samples of a known concentration of carbon (potassium acid phthalate) were analyzed using a Coulometrics carbon analyzer that was fitted with a Beckman ceramic combustion tube. A ceramic combustion tube, in comparison with a Coulometrics stock quartz combustion tube, is not attacked by the high salt concentration of synfuel wastewaters. The recoveries from two separate experiments were: 98 to 104% within the range of 1000 to 10,000 ppm carbon; 97 to 101% for 20 to 1000 ppm carbon; and 87% for 10 ppm carbon.

We also compared two methods of carbon determination, low-temperature UV-persulfate oxidation and IR detection (Dohrmann/Envirotech) vs. the high-temperature-combustion coulometric detection method of the Coulometrics carbon analyzer. Replicate samples of Oxy-6 retort water and gas condensate were analyzed by each method. Equivalent values for dissolved organic carbon, as well as for total carbon, were obtained by either instrument for a given

sample. This is the only form of validation that we have obtained for carbon determination of these waters.

STEAM STRIPPER DESIGN

Fabrication

The pressure vessels for steam generation, bottoms collection, and overheads capture were built and mounted on the support structure. To decrease heat loss and to minimize worker exposure to hot surfaces, some of the pressure vessels and pipework were insulated. The raw waste feed, condenser cooling water recycle, and flash evaporator recycle pumps were installed on the structural support. The installation of the steam and cooling water transfer lines was begun.

The control panel for the heaters, temperature read-out, pumps, and pressure read-out was installed and labelled. The wiring for the heater, digital temperature read-out, and other controls also was initiated.

LITERATURE REVIEW

Factors that affect the solubility of ammonia include pH, ionic strength, the presence of hydrogen sulfide, and the ratio of carbon dioxide to ammonia. For instance, in a solution of carbon dioxide and ammonia of constant normality, as the mole ratio of carbon dioxide to ammonia increases, the partial pressure of the ammonia over the water decreases. These factors must be taken into consideration in calculations used to construct equilibrium curves. We are conducting a literature review for data on ammonia solubility in solutions containing hydrogen sulfide and carbon dioxide. These data will enable us to model the equilibrium curves. From these curves, we will calculate both the number of transfer units and the height equivalent to a transfer unit that are required to achieve predetermined levels of removal.

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