

MINUTE ITEM

This Calendar Item No. 31
was approved as Minute Item
No. 31 by the State Lands
Commission by a vote of 3
to 0 at its 5:31-78
meeting.

INFORMATIVE CALENDAR ITEM

5/78
Thompson

31.

REVIEW OF PILOT SCALE DEMONSTRATION OF CAUSTIC
WATERFLOODING TECHNIQUES FOR ENHANCED OIL RECOVERY,
LONG BEACH UNIT, WILMINGTON OIL FIELD,
LOS ANGELES COUNTY

The Commission, at its September, 1976 meeting, approved a request by the City of Long Beach as Unit Operator, Long Beach Unit, to enter into a cost-sharing contract with the United States Energy Research and Development Administration (ERDA), now the Department of Energy (DOE), to conduct a pilot scale demonstration of caustic waterflooding techniques for enhanced oil recovery from Fault Block VII in the Long Beach Unit.

Under the terms of the contract, the Long Beach Unit and the Federal government agreed to share the estimated \$11.6 million cost of the demonstration on a 60/40 basis respectively, and to share similarly any increased oil production during the 5 year life of the project. As of the end of March, 18 months into the demonstration, total expenditures were \$4,708,368.

The Federal government's obligation is limited to \$4,640,000 which is 40% of the original total estimated cost of \$11,600,000. Due to the unforeseen amount of well repair work that has been necessary, it is now estimated that the pilot project will cost about \$17 million, and that the Federal support will last only through the 1979-1980 fiscal year. The economics of this project will be reviewed at each of the future decision points, when it will be decided whether to continue the pilot demonstration.

The demonstration was designed to study 2 potential enhanced recovery mechanisms that occur when caustic is added to injection water. The first was to be an evaluation of increasing the sweep efficiency of injected fluids by creating an entrapment phase in which emulsions are formed in the reservoir. This phase was to be done using water having a low concentration of sodium, potassium, calcium and magnesium. Calcium and magnesium must be removed to prevent reaction and neutralization of the caustic. In the second evaluation there was to be an increase in the sodium concentration of the injection water which would cause some of the residual oil in the swept part of the reservoir to emulsify and be carried to the producing wells, thereby increasing oil recovery.

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Laboratory tests of the entrapment phase, using new core samples from redrilled demonstration area wells, have shown no increase in oil recovery. Deletion of this phase of the pilot demonstration is being considered as it now appears to be less significant. The entrainment phase test has shown promising results. Some questions remain, however, regarding the proper concentration of caustic to be used. A test of the facilities for produced water softening have been completed and the results are being evaluated. The pilot flood demonstration will use softened fresh water. Expansion of the flood area, should the pilot scale demonstration prove successful, would depend upon further testing with produced water.

The mini-injection test has been completed satisfactorily and the results analyzed. Installation of the caustic injection plant is in progress. Studies on the need for special treating facilities for emulsions which may be encountered in the produced fluid are continuing because of the possible need for higher caustic concentrations in the injected fluids than originally planned, which might create emulsion breaking problems.

As previously reported, the need for remedial work on the wells involved in this demonstration has exceeded original estimates. The recent repair of a producing well in the pilot demonstration area has proven unsatisfactory, and an offset producing well now requires redrilling.

In addition to the need for more extensive well repair work than originally planned, the project has been delayed by equipment problems with laboratory procedures for testing core samples. Presently, there is a need for more extensive testing to establish the optimum concentration of caustic to be used. It is now anticipated that the pilot scale demonstration will continue and the caustic injection will commence about October 1st, approximately 1 year later than originally planned.

The Commission's staff will continue to analyze the progress and effectiveness of this pilot scale demonstration for enhanced oil recovery, and present semi-annual progress summaries to the Commission for its information.