SIXTEENTH QUARTERLY PROGRESS REPORT

4Q/97
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TITLE:

THE UTILIZATION OF THE MICROFLORA INDIGENOUS TO AND PRESENT IN OIL-BEARING FORMATIONS TO SELECTIVELY PLUG THE MORE POROUS ZONES THEREBY INCREASING OIL RECOVERY DURING WATERFLOODING

COOPERATIVE AGREEMENT NUMBER:

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Task 1.6 Acquisition of Baseline Data

Acquisition of baseline data has been completed.

Task 1.7: Analysis of Baseline Data

The analysis of baseline data has been completed.

Phase II: Implementation

This phase involves initiation of nutrient injection and the analysis of results.

Task 2.1 Design of Field Demonstration

The field demonstration is continuing. There are ten injection wells receiving nutrients and twenty producing well sin test patterns are being monitored for responses.

**Task 2.2 Drill Three Additional Wells
Completed**

Task 2.3 Reservoir Characterization

Petrophysical studies of recovered core sample from the 3 newly drilled wells are still in progress.

Task 2.5 Analysis of Results

Monthly collection of produced fluids from the test and control wells in all patterns continued with the following tasks performed,

- (1) Aliphatic profile (Gas chromatographic analysis),
- (2) API gravity and absolute viscosity under reservoir temperature,
- (3) pH of produced water,
- (4) Surface tension (ST) of produced water (water-air),
- (5) Interfacial tension (IFT) for produced oil-water system,
- (6) Microbiological population,
- (7) Inorganic analyses (nitrate, phosphate, sulfate, sulfide, chloride, potassium, and hardness).

Production data on all wells in all patterns continues to be evaluated.

Increased gas production that has been noted in some wells could be the result of microbial activity or from previously unswept areas of the reservoir. Samples of gas were collected from selected production wells and analyzed by gas chromatography using a Fisher Model No. 1200 Gas Partitioner. The results of analyses from four sets of samples are given in the accompanying tables.

Gas Analyses of samples Collected October 22, 1997.

Well No.	CO ₂ (%)	Ethane (%)	Nitrogen (%)	Methane (%)
34-7#2	0.16	10.36	1.87	78.00
34-10#1	0.16	10.92	2.24	85.20
2-5#1	0.00	11.48	1.87	83.40
2-11#1	0.00	12.60	4.49	88.80
2-5#2	0.16	8.12	3.74	93.00
2-13#1	0.00	12.60	2.62	87.00
2-13#2	0.00	15.40	1.87	79.20
3-9#1	0.16	15.12	2.99	78.60

Gas Analyses of Samples Collected November 19, 1997.

Well No.	CO ₂ (%)	Ethane (%)	Nitrogen (%)	Methane (%)
2-15#1	0.16	13.30	4.50	76.30
2-13#1	0.32	9.50	2.90	77.80
2-11#1	0.32	8.60	4.50	77.30
2-13#2	0.16	10.40	3.20	75.40
3-9#1	0.32	10.30	2.30	75.80
3-1#1	0.32	10.40	3.90	73.90
2-5#2	0.32	9.40	3.60	74.40
2-5#1	0.48	10.80	1.60	76.80

Gas Analyses of Samples Collected November 25, 1997.

Well No.	CO ₂ (%)	Ethane (%)	Nitrogen (%)	Methane (%)
2-11#3	0.30	6.12	12.30	70.08
34-2#1	1.28	7.38	7.18	70.56
34-10#1	1.12	7.56	10.26	69.60
34-15#2	0.30	7.07	2.39	78.24
34-15#1	0.30	5.76	16.07	68.64
34-16#2	0.16	6.66	5.81	76.80

Gas Analyses of Samples Collected December 8, 1997.

Well No.	CO ₂ (%)	Ethane (%)	Nitrogen (%)	Methane (%)
34-15#1	0.48	5.40	16.76	69.12
2-11#3	0.64	5.94	14.36	70.08
34-10#1	0.96	7.20	13.00	71.04
34-2#1	1.44	7.38	7.52	71.04
34-16#2	0.32	6.30	6.16	75.84
34-15#2	0.48	6.48	4.45	77.76

REFERENCES AND PUBLICATIONS

PLANS FOR NEXT QUARTER

Monitoring of the influent of the injector wells and effluent from the production wells, including the three newly drilled wells, will continue.

Analyses of cores from newly drilled wells will continue and will be expanded to include gas chromatographic analyses of residual oil for signs of microbial activity.

Analyses of gas from selected production wells will continue.