

PROJECT FACT SHEET

CONTRACT TITLE: CO2 Huff-n-Puff Process in Light Oil Shallow Shelf Carbonate Reservoir (Central Vacuum Unit), Vacuum Field, Lea County, New Mexico -- Class II

ID NUMBER: DE-FC22-93BC14986 B & R CODE: AC1010000 DOE PROGRAM MANAGER: NAME: Guido DeHoratiis PHONE: (202) 586-7296 DOE PROJECT MANAGER: NAME: Dan Ferguson LOCATION: NPTO PHONE: (918) 699-2047	CONTRACTOR: Texaco E&P ADDR: 500 North Loraine Midland, TX 79701 PRINCIPAL INVESTIGATOR: NAME: Scott C. Wehner PHONE: (915) 688-2954 FAX: (915) 688-2985 INTERNET ADDRESS: wehnesc@texaco.com
PROJECT SITE CITY: Slaughter Field STATE: TX CITY: Hockley Co. STATE: TX CITY: Midland STATE: TX	CONTRACT PERFORMANCE PERIOD: 02/10/1994 to 12/31/1997 PROGRAM: Field Demonstration RESEARCH AREA: Class 2

FUNDING (\$1000'S)	DOE	CONTRACTOR	TOTAL
PRIOR FISCAL YRS	1,162	1,420	2,582
FISCAL YR 1998	0	0	0
FUTURE FUNDS	0	0	0
TOTAL EST'D FUNDS	1,162	1,420	2,582

OBJECTIVE: The principal objective of the Central Vacuum Unit (CVU) and Sundown Slaughter Unit (SSU) CO2 Huff-n-Puff (H-n-P) project is to determine the feasibility and practicality of the technology in a waterflooded shallow shelf carbonate environment. The results of parametric simulation of the CO2 H-n-P process coupled with the CVU reservoir characterization components will determine if this process is technically and economic for field implementation. The technology transfer objective of the project is to disseminate the knowledge gained through an innovative plan in support of the Department of Energy's (DOE) objective of increasing domestic oil production and deferring the abandonment of shallow shelf carbonate (SSC) reservoirs. Tasks associated with this objective are carried out in what is a timely effort for near-term goals.

PROJECT DESCRIPTION:

Work to be performed: TEPI's long-term plans are to implement a full-scale miscible CO2 project in the CVU. It is believed that the 'immiscible' CO2 H-n-P process might bridge this longer-term 'miscible' project with near-term results. A successful implementation would result in near-term production, or revenue, to help offset cash outlays. The DOE partnership provides R&D aid, allowing TEPI to evaluate a proven Gulf-coast sandstone technology in a waterflooded carbonate environment.

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PROJECT DESCRIPTION (Continued)

Background: The principal objective of the Central Vacuum Unit (CVU) and Sundown Slaughter Unit (SSU) CO2 Huff-n-Puff (H-n-P) project is to determine the feasibility and practicality of the technology in a waterflooded shallow shelf carbonate environment. The results of parametric simulation of the CO2 H-n-P process coupled with the CVU reservoir characterization components will determine if this process is technically and economic for field implementation. The ultimate goal will be to develop guidelines based on commonly available data that other operators in the industry can use to investigate the applicability of the process within other fields.

PROJECT STATUS:

Current Work: All tasks in Budget Period 1 are 100% complete. CO2 injection was initiated in 11/95 at the CVU demonstration site. Site-specific simulation and field demonstration of the CO2 Huff-n-Puff process involved injection of 50 MMscf CO2 over 23 days. Production began in 01/96 under flowing conditions. Production equipment was placed in the wellbore in March, 1996. Monitoring of the production streams continues to date. Production has reached the pre-demonstration level of 68 BOPD by the tenth day of the flow period. The peak production response was approximately 180 BOPD. However, the response period has been short-lived and incremental production above that deferred during the injection and soak period has not been realized. This observation may be masked by the operational period during the long soak and flow periods. History matching of the demonstration was performed. It was concluded that no gas trapping occurred in the reservoir. The CVU site did not respond as expected so a second site at Sundown Slaughter Unit (SSU) was identified. SSU wells are completed in the San Andres Formation at a depth of 5000'. TEPI has just completed pumping approximately 33 MMCF of CO2 into the SSU test well. It was shut in on August 6, 1997 for a three week soak period. Results from this second demonstration were not much more encouraging than the CVU demonstration. The production characteristics at SSU were basically similar to CVU. However, the SSU does not look to recover all of the injectant and the water production came back rather quickly. The SSU demonstration produced more incremental oil than CVU, but not in economical quantities. The conclusions are that these demonstrations must have the ability to move produced fluids in larger volume-higher pressure. This is a limiting factor since most Permian Basin leases do not have production systems to handle the needed volumes and pressure. Additionally, there must be a disposal option for the CO2. If there is a processing option available, then a miscible flood would be the more efficient process.

Scheduled Milestones:

Soak period begin	12/95
Production period begin	01/96
EOR history matching/simulation	05/96
Project ends	12/97

Accomplishments: Budget Period No. 2 was initiated September 1, 1995, with CO2 injection beginning in 11/95 at CVU. The second site, SSU, was initiated in 06/97. TEPI et. al. solicited industry partners for a 4-Dimensional, 3-Component seismic survey. The survey was conducted in conjunction with the DOE project at no cost to either TEPI or DOE. The intention of the survey was to dynamically monitor saturation changes and frontal movement associated with the CO2 injectant. The DOE project provides for public access to data which makes this additional work possible. The findings may help refine the model/simulation following the first demonstration. Results of the seismic work are preliminary at this date--providing exciting information which will be made available to industry partners at a later date. Individuals interested in the success of this work are referred to the Geophysics Department at Colorado School of Mines. Evaluation and history matching with compositional simulation of the 1st field demonstration is complete. An interesting relationship has been hypothesized that may shed significant light on future successes of the process. This hypothesis and associated options were integrated at the second demonstration site at SSU for evaluation. The conclusion of the two demonstrations sites is to suggest that the process is not an economical alternative within waterflooded shallow shelf carbonate reservoirs.