

**CO₂ HUFF-n-PUFF PROCESS
IN A LIGHT OIL
SHALLOW SHELF CARBONATE RESERVOIR**

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QUARTERLY TECHNICAL PROGRESS REPORT

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OBJECTIVES

The principal objective of the Central Vacuum Unit (CVU) 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 be used to determine if this process is technically and economically feasible 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 considered a timely effort for near-term goals.

BACKGROUND

Texaco Exploration and Production Inc's. (TEPI) mid-term plans are to implement a full-scale miscible CO₂ project in the CVU. The economic market precludes acceleration of many such capital intensive projects in many cases. This is a common finding throughout the Permian Basin SSC reservoirs. In theory, it is believed that the "immiscible" CO₂ H-n-P process might bridge these longer-term "miscible" projects with near-term results. A successful implementation would result in near-term production, or revenue, to help offset cash outlays during the initial startup of a miscible flood. The DOE partnership provides some relief to the associated R & D risks, allowing TEPI to evaluate a proven Gulf-coast sandstone technology in a waterflooded carbonate environment. Numerous sites exist for widespread replication of this technology following a successful field demonstration.

TEPI concluded all of the Tasks associated with the First Budget Period by October, 1995. The DOE approved the TEPI continuation application. Budget Period No. 2 is in progress. Initial injection of CO₂ began in November, and after a short shut-in period for the soak, the well was returned to production in late December, 1995. Monitoring the results of the first demonstration continued through mid-year. This report, as did the previous report, covers TEPI's efforts at history matching the results of the field demonstration. Costs and economics of the work are presented. The majority of effort during the fourth quarter has revolved around the selection of a new project site and refinement of the demonstration design and well selection.

SUMMARY of TECHNICAL PROGRESS

FIELD DEMONSTRATION:

Results. The CO₂ Huff-n-Puff process has not met with successful results at the Central Vacuum Unit test site. As mentioned in the previous report, there are several reasons contemplated as to the reasons behind the results. Most notable is the fact that other San Andres locations with have been operating Water-Alternating Gas injection have seen marked reductions in injectivity on the water cycle, while operators within Vacuum have not. If there is a relation, as hypothesized in the literature, then rather than conclude this demonstration with inconclusive results, TEPI plans to further investigations. The Vacuum reservoir may not be amenable to trapping of CO₂ gas in the matrix. A new demonstration site at the Sundown Slaughter Unit in Hockley County, Texas is being considered. Miscible injection operations within this field have verified the reduced injectivity with CO₂ WAG operations--suggesting an ability for gas trapping. Negotiations with the DOE for a site change has been underway during the reporting period.

Additional benefits that were not accounted for in the simplistic economic evaluation were noted in the last report. First of which, even though recoveries in the Vacuum site demonstration accounted for only the deferred production, there were reduced electrical requirements during the injection, soak and flow period. Secondly, there were reduced water handling requirements for an extended period of time. These benefits, coupled with the potential to recover additional oil suggest further investigation is warranted if the technology is applied to a reservoir amenable to gas trapping. It is TEPI's desire to negotiate the site change and begin injecting at a second wellbore during the second quarter, 1997.

REFERENCES/PUBLICATIONS

The Petroleum Recovery Research Center continues to provide updates on the project in its quarterly newsletter. In addition, the Petroleum Technology Transfer Counsel, a joint venture between the Independent Producers Association of America (IPAA) and DOE is providing complete quarterly and annual Technical Reports on an Industry Bulletin Board called GO-TECH. This is allowing a more timely dissemination of information to interested parties.