QUARTERLY TECHNICAL PROGRESS REPORT

FOR THE PERIOD ENDING

JUNE 30, 2002

For DOE Grant Entitled

"ENHANCED OIL RECOVERY WITH
DOWNHOLE VIBRATION STIMULATION
IN OSAGE COUNTY, OKLAHOMA"

Contract Number:	**DE-FG26-00BC15191**
Contractor:	**Oil & Gas Consultants International, Inc. 4111 So. Darlington Suite 700 Tulsa, Oklahoma**
Contract Date:	**July 13, 2000**
Extended Completion:	**December 31, 2002**
Government Award:	**$675,750 (Current Year)**
Principal Investigators:	**J. Ford Brett Robert V. Westermark**
Project Manager:	**Virginia Weyland National Petroleum Technology Office**
Reporting Period:	**March 31, 2002 to June 30, 2002**

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Abstract

This Technical Quarterly Report is for the reporting period March 31, 2002 to June 30, 2002. The report provides details of the work done on the project entitled “Enhanced Oil Recovery with Downhole Vibration Stimulation in Osage County Oklahoma”.

The project is divided into nine separate tasks. Several of the tasks are being worked on simultaneously, while other tasks are dependent on earlier tasks being completed.

The vibration stimulation Well 111-W-27 is located in section 8 T26N R6E of the North Burbank Unit (NBU), Osage County Oklahoma. It was drilled to 3090’ cored, logged, cased and cemented. The rig moved off August 6, 2001.

Phillips Petroleum Co. has performed several core studies on the cores recovered from the test well. Standard porosity, permeability and saturation measurements have been conducted. In addition Phillips has prepared a Core Petrology Report, detailing the lithology, stratigraphy and sedimentology for Well 111-W27, NBU. Phillips has also conducted the sonic stimulation core tests, the final sonic stimulation report has not yet been released.

Calumet Oil Company, the operator of the NBU, began collecting both production and injection wells information to establish a baseline for the project in the pilot field test area since May 2001.

The original 7-inch Downhole Vibration Tool (DHVT) has been thoroughly tested and it has been concluded that it needs to be redesigned. An engineering firm from Fayetteville AR has been retained to assist in developing a new design for the DHVT.

The project participants requested from the DOE, a no-cost extension for the project through December 31, 2002. The no-cost extension amendment to the contract was signed during this reporting period.

A technical paper SPE 75254 “Enhanced Oil Recovery with Downhole Vibration Stimulation, Osage County, Oklahoma” was presented at the 2002 SPE/DOE Thirteenth Symposium on Improved Oil Recovery, in Tulsa OK, April 17, 2002.

A one-day short course was conducted at the SPE/DOE Thirteenth Symposium on Improved Oil Recovery in Tulsa, OK, April 13-14, 2002. Dan Maloney, Phillips and Bob Westermark, OGCI, Brett Davidson and Tim Spanos, Prism Production Technologies, were the instructors. The sixteen attendees also participated in the half-day field trip to the test facility near Tulsa.

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List of Graphical Material

No graphical material is included in this report.

Introduction

The objective of this project is to demonstrate the impact of downhole vibration stimulation on oil production rates in a mature waterflood field. Oil and Gas Consultants International, Inc. (OGCI) will manage the project in close cooperation with the Osage Tribe as the tests will be conducted in Osage County, Oklahoma, the mineral estate of the Osage Tribe. Calumet Oil Company operates the field. Phillips Petroleum Company has contributed their proprietary vibration core analysis of cores recovered from the pilot test area.

To achieve the project objectives, the work was divided into nine tasks, some were concurrent, while other tasks rely on completion of previous steps. The initial task was to review of the North Burbank Unit (NBU) field operated by Calumet Oil Company, in Osage County, Oklahoma, to determine the appropriate pilot test area. Once the pilot test area was selected, Calumet Oil Company began, collecting base-line production and injection data. The team then determined where within the pilot test area to drill the vibration test well. The test well was drilled, cored, logged and 7-inch production casing run and cemented in August 2001.

After the core was recovered, Phillips Petroleum Company conducted laboratory tests utilizing their proprietary sonic core apparatus to determine fluid flow response to a range of vibration frequencies. These results, in turn, should allow final adjustments to the desired frequency generated by the downhole vibration tool.

In a parallel effort, OGCI began designing, building, and testing a 7 inch diameter version of the downhole vibration tool based on our patented whirling orbital vibrator. However, the tool did not perform satisfactorily. The results of the testing indicated that the tool needed to be redesigned. A consulting engineering firm form Fayetteville, AR, has been retained to assist in redesigning the DHVT.

Once the new design of the DHVT has been built and surface tested, the field tests in the NBU will commence. The downhole vibrator will be installed in the vibration test well. One offset well, in the area adjacent to the vibration test well, will be equipped with downhole geophones to determine strength of signal and if the producing formation has a dominant frequency response. Surface geophones will also be set out and arranged to pick up the signal generated by the downhole vibration tool. As the frequency of the downhole tool is changed, the recording of seismic signals, both on the surface and downhole, will also be conducted. The results of the data collection will be a matrix of varying vibration stimulation conditions corresponding to changes in production and injection fluid rates and seismic responses.

In addition to required DOE reports, the results of the downhole vibration stimulation have been prepared and delivered using several venues. Technical papers have been presented to the Society of Petroleum Engineers and other professional organizations. A technical short course and field trip on sonic stimulation was conducted at the SPE/DOE Thirteenth Improved Oil Recovery Symposium April 13-14, 2002, bringing together some of the world's experts in this emerging technology. Should the field test be considered a success, workshops are planned to be held in conjunction with the PTTC for operators in Osage County and surrounding areas. The final task will be to close out the project.

Executive Summary

Contract Status:

The current project budget is $1,020,500. The DOE share is $675,750 and recipient share is $334,750. The present ending budget period is May 12, 2002. The proposed ending budget period is December 31, 2002.

Financial status:

During this quarter $87,000 has been dispersed with an additional $46,500 committed for work in progress.

Schedule Status:

A project proposal for a No Cost Budget Extension to December 31, 2002 along with a change in the scope of work to be performed was submitted to DOE May 30, 2002.

The DHVT is currently being re-designed. Prototypes of the new design are being built. Based on satisfactory results with the prototype, field-testing could commence in August 2002.

Technical Progress:

Field Instrumentation and Well Testing

Calumet Oil Company continues monitoring all wells in section 8, which now has an eighteen-month the baseline for production and injection characteristics for each well in the pilot area.

Core Studies

Phillips has conducted standard core analysis of the core recovered from Well 111-W-27 NBU. This was reported in the 6th Quarterly report. Phillips has also completed the Core Petrology Report for the core which was submitted with the 7th Quarterly report as a separately bound report listed as Appendix B

Phillips has also finished the sonic core testing, but the report is being reviewed in-house prior to released to the project for further distribution.

Downhole Vibration Tool (DHVT) Redesign Process

The failure analysis of the tool's performance during the Wynona field tests, covered in the 6th Quarterly report, indicated several possible solutions to the inadequate run times. To facilitate testing the reliability of new tool configurations, a surface test site was constructed at OGCI's test facility at Knight's Pecan Farm (KPF), south of Tulsa. As reported in the 7th Quarterly report, after extensive additional testing, the original design DHVT was determined to be unsatisfactory with respect to long term durability. The tool required a redesign to overcome galling problems. The solution was to add an internal, closed loop lubricating system and a gear based rotating mechanism.

Cole Engineering, Fayetteville, AR, has been retained to assist in redesigning the DHVT. Jack Cole, the principal in this firm has designed, built and patented orbital vibrators for over twenty years. This experience was considered very desirable when approaching a redesign of the current DHVT. During this reporting period two potential designs were developed and are being prototyped to confirm functionality.

Results and Discussion

THIS SECTION OF THE QUARTERLY REPORT REVIEWS IN DETAIL, THE PROGRESS MADE DURING THE QUARTER ON EACH OF THE PROJECT'S MAJOR TASKS AND SUB-TASKS.

TASK 1: DEFINE MOST APPROPRIATE TEST AREA

THIS TASK AND ALL SUB TASKS ARE COMPLETE

TASK 2 DRILL AND CORE TEST WELL

THIS TASK AND ALL SUB TASKS ARE COMPLETE

TASK 3: DEFINE, CONDUCT & EVALUATE LAB TESTS

- *DEFINE SUITE OF LAB TESTS* *Sub task completed.*
- *REVIEW NORTH BURBANK UNIT FIELD CHARACTERISTICS* *Sub task completed.*
- *REVIEW OF LITERATURE* *Sub task completed.*
- *ANALYZE THE OFFSET CORE* *Sub task completed.*
- *ANALYZE THE PILOT TEST AREA CORE* *Sub task completed*
- *EVALUATE LAB TEST RESULTS FOR FREQUENCY AND AMPLITUDE*

Phillips has conducted the sonic core studies to determine the frequencies, which effect the fluid flow through the core. The report is being routed internally for approval and will be released to the project in the future.

- *MEET TO REVIEW LAB TEST RESULTS & BRACKET FIELD TEST FREQUENCIES/AMPLITUDES*
  Sub task completed
- *REPORT TO OSAGE TRIBAL REPRESENTATIVES ON PROJECT PROGRESS*
  Sub task completed

TASK 4: DESIGN AND CONSTRUCT DOWN HOLE VIBRATION TOOL AND SURFACE POWER SOURCE

- *SELECT MOST APPROPRIATE POWER SOURCE* *Sub task completed*
- *CONSTRUCT TOOL(S) & SOURCES* *Sub task completed.*
- *SURFACE TEST TOOLS* *Sub task completed.*
- *CONDUCT POWER SOURCE LIFE TEST* *Sub task completed.*
- *PERFORM RELIABILITY TESTS AT KNIGHT'S PECAN FARM (KPF) TEST FACILITY*

  Sub task completed
- ***REDESIGN, BUILD, AND CONDUCT RELIABILITY TESTS OF NEW DHVT DESIGN AT OGCI TEST FACILITY***

This is a new sub task for the project. It was initiated by retaining Cole Engineering to assist in redesigning the DHVT to have a closed loop lubrication system and a reliable means to generate 15,000 lbs of force at a 50 to 80 hertz frequency range. This work is on-going for this reporting period.

- *Report to Osage Tribal Representatives on project progress*

Monthly telephone conversions with Joe Hughlett, Osage Petroleum Engineer have occurred and have covered the progress of these tasks

TASK 5: INSTRUMENT TEST WELLS

- *ENGINEER SEISMIC MEASUREMENT SYSTEM* *Sub task completed*
- *SPECIFY SEISMIC MEASUREMENT SYSTEM* *Sub task completed*

- *INSTALL MEASUREMENT SYSTEMS*

Calumet has worked over the inactive wells in the pilot test area, to prepare the necessary wells to be able to accept the listening devices provided by LBNL. Equipment necessary to monitor the two injection wells for real time injection rate and injection pressure have been ordered and will be installed prior to beginning the vibration stimulation tests.

LBNL has been kept informed of the delays in conducting the field tests at NBU, they are still committed to conducting both surface and downhole geophone data acquisition while the field test in proceeding.

TASK 6: CONDUCT FIELD VIBRATION STIMULATION TESTS

The field tests have been delayed due to inadequate tool life found during the reliability testing sub tasks.

TASK 7: REPORT FIELD TEST RESULTS

WORK ON THIS TASK HAS NOT COMMENCED.

TASK 8: TECHNOLOGY TRANSFER, PUBLICIZE TEST RESULTS

- *WRITE & SUBMIT SPE PAPER ABSTRACT* *SUBTASK COMPLETED*

- *AUTHOR SPE PAPER* *SUBTASK COMPLETED*

SPE Paper 67303 “Enhanced Oil Recovery with Downhole Vibration Stimulation” was given at the Production and Operations Symposium (POS) in Oklahoma City, OK on March 27, 2001. A presentation of SPE paper 67303 updated given at the Mid Continent Section of the SPE (Tulsa) 13th December, 2001. A version of the SPE Paper 67303 was published in World Oil, a Gulf Publishing Company, a trade magazine in their October 2001 issue.

A technical paper SPE 75254 “Downhole Vibration Stimulation for Enhanced Oil Recovery Project, Osage County, Oklahoma” was presented April 17, 2002 at the SPE/DOE 13th Improved Oil Recovery Symposium.

- *ESTABLISH A SPE/DOE/IOR 2002 SYMPOSIUM VIBRATION ENHANCED PRODUCTION WORKSHOP*

A one-day short course on Sonic Production Techniques and field trip, covering seismic stimulation efforts around the world, was offered at the SPE/DOE Thirteenth Symposium on Improved Oil Recovery in Tulsa, OK, April 13-14, 2002.

- *PREPARE VIBRATION ENHANCED PRODUCTION WORKSHOP*

Discussions have transpired concerning coupling a half-day workshop on vibration stimulation in conjunction with other DOE /PTTC sponsored workshops in the mid-continent region. There are no firm plans in place at this time to conduct such workshops.

WORK ON THE SUBTASKS LISTED BELOW HAS NOT COMMENCED.

- *PUBLICIZE VIBRATION ENHANCED PRODUCTION WORKSHOP - PTTC, OIPA, BIA,*
- *CONDUCT BIA, TRIBAL COUNCIL AND OSAGE COUNTY OPERATORS VIBRATION ENHANCED PRODUCTION WORKSHOP DATE TBD*
- *CONDUCT PTTC OK CITY VIBRATION STIMULATION WORKSHOP*
- *CONDUCT PTTC /U OF KANSAS VIBRATION ENHANCED PRODUCTION WORKSHOP DATE TBD*
- *AUTHOR DOE CONFERENCE PRESENTATION DATE TBD*
- *PRESENT DOE CONFERENCE PAPER DATE TBD*
- *PRESENT DOE/BIA CONFERENCE PAPER DATE TBD*

TASK 9: FINISH AND CLOSE OUT PROJECT

WORK ON THIS TASK HAS NOT COMMENCED.

Conclusions

Project Management

A No Cost Budget Extension to December 31, 2002 was requested by OGCi and has been approved by DOE.

Technical Issues

An important aspect of the downhole stimulation project is the reliability of the DHVT to run for sufficient time without need for servicing. To date, the current tool design has not met this requirement of reliability. With the assistance of third party engineering design services, a new design for improved reliability in is progress. The current schedule calls for a DHVT version II to be built by 2nd quarter. This version will go through reliability testing prior to beginning the field stimulation tests in the NBU in the 3rd quarter

Technology Transfer Activities

A technical paper SPE 75254 for the April 2002 SPE/DOE 13th Improved Oil Recovery Symposium was presented.

A one-day SPE sponsored short course and one-day field trip was conducted April 13-14, 2002. Topics covered seismic stimulation efforts around the world and was offered at the SPE/DOE Thirteenth Symposium on Improved Oil Recovery in Tulsa, OK,

Reference

None listed in this report.