

QUARTERLY TECHNICAL PROGRESS REPORT

FOR THE PERIOD ENDING

SEPTEMBER 30, 2001

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:	May 12, 2002
Government Award:	\$675,000 (Current Year)
Principal Investigators:	J. Ford Brett Robert V. Westermarck
Project Manager:	Virginia Weyland National Petroleum Technology Office
Reporting Period:	July 1, 2001 – September 30, 2001

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Abstract

This Technical Quarterly Report is for the reporting period July 1, 2001 to September 30, 2001. 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 is permitted as Well 111-W-27, section 8 T26N R6E Osage County Oklahoma. It was spud July 28, 2001 with Goober Drilling Rig No. 3. The well was drilled to 3090' cored, logged, cased and cemented. The Rig #3 moved off August 6, 2001.

Phillips Petroleum Co. has begun analyzing the cores recovered from the test well. Standard porosity, permeability and saturation measurements will be conducted. They will then begin the sonic stimulation core tests

Calumet Oil Company, the operator of the NBU, has begun to collect both production and injection wells information to establish a baseline for the project in the pilot field test area. Green Country Submersible Pump Company, a subsidiary of Calumet Oil Company, will provide both the surface equipment and downhole tools to allow the Downhole Vibration Tool to be operated by a surface rod rotating system.

The 7-inch Downhole Vibration Tool (DHVT) has been built and is ready for initial shallow testing. The shallow testing will be done in a temporarily abandoned well operated by Calumet Oil Co. in the Wynona waterflood unit. The data acquisition doghouse and rod rotating equipment have been placed on location in anticipation of the shallow test in Well # 20-12 Wynona Waterflood Unit

A notice of invention disclosure was submitted to the DOE Chicago Operations Office. DOE Case No.S-98,124 has been assigned to follow the documentation following the invention disclosure.

A paper covering the material presented to the Oklahoma Geologic Survey (OGS) / DOE Annual Workshop in Oklahoma City May 8,9 2001 has been submitted for publication to the OGS

A technical paper draft has been submitted for the ASME/ETCE conference (Feb 2002) Production Technology Symposium.

A one-day SPE sponsored short course which is planned to cover seismic stimulation efforts around the world, will be offered at the SPE/DOE Thirteenth Symposium on Improved Oil Recovery in Tulsa, OK, April 13-17, 2002. Dan Maloney, Phillips and Bob Westermarck, OGCI will be the instructors. In addition, a proposed technical paper has been submitted for this meeting.

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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 will contribute their proprietary vibration core analysis of cores recovered from the pilot test area.

To achieve the project objectives, the work has been divided into nine tasks, some are concurrent, while other tasks rely on completion of previous steps. The initial task is a review of the North Burbank Unit field operated by Calumet Oil Company, in Osage County, Oklahoma, to determine the appropriate pilot test area. Once the pilot test area is selected, Calumet Oil Company will maintain current field operations, collecting base-line production and injection data. The team will then determine where within the pilot test area to optimally locate the vibration test well. With the location determined, the test well will be drilled, cored, logged and 7-inch production casing run and cemented.

In a parallel effort, OGCI will be designing, building, and testing a new version of the downhole vibration tool based on their patented whirling orbital vibrator. With the field test tool built to run in 7-inch casing, duration testing of the downhole tool and surface power source will be conducted in a well operated by Calumet Oil Company, near Wynona, Oklahoma.

After the core is recovered, Phillips Petroleum Company will be conducting laboratory tests utilizing their proprietary sonic core apparatus to determine fluid flow response to a range of vibration frequencies. These results, in turn, will allow final adjustments to the frequency generation mechanisms of the downhole vibration tool.

One or more offset wells, 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.

The downhole vibrator will be installed in the test well. Monitoring the production and injection for the pilot test area will continue. 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 will be prepared and delivered using several venues. Technical papers will be submitted to the Society of Petroleum Engineers and other professional organizations. Workshops are planned to be held in conjunction with the PTTC for operators in Osage County and surrounding areas. A dedicated technical session on vibration stimulation will be offered at the SPE/DOE 13th Improved Oil Recovery Symposium April 13-17, 2002, bringing together the world's experts in this emerging technology. The final task will be to close out the project.

Executive Summary

Contract Status:

In August 2001, an Extended Budget Request was submitted to the DOE Contract officer Mrs. Weyland, NPTO, Tulsa office. In this request, we have asked for funding for additional tasks to be performed by Las Alamos National Laboratory (LANL) and Lawrence Berkeley National Laboratory (LBNL). The contract amendment covering the request for additional funds and extended completion date was received September 18, 2001. The executed contract amendment was sent back to DOE in November 2001.

This brings the total project budget to \$1,020,500. This is with the DOE share of \$675,750 and recipient share of \$334,750. This will extend the budget period from November 12, 2001 to May 12, 2002.

Financial status:

During this quarter \$360,020 has been dispersed with an additional \$5,780 committed for work in progress.

Schedule Status:

The vibration stimulation well has been drilled, almost 10 months behind the original schedule. Surface testing of the system to operate the downhole vibration tool will be tested in October. The vibration stimulation of the North Burbank Unit will begin after successfully completing the surface tests, anticipated to be in November 2001. The cores recovered are being tested by Phillips, with preliminary results expected in December 2001.

Technical Progress:

Vibration Stimulation Test Well Drilled

The vibration stimulation test will be conducted at the NBU field in Osage County, OK. See Fig. 1 on page 4. The pilot test area is located in Section 8 T26N R6E, please refer to Fig. 2 on the following page. The vibration stimulation test well location is 2560 ft FWL and 510 ft FSL of NW/4 of Section 8, this quarter section is known as Tract 111. The well number is Well 111-W-27. The surface of the area can be seen on the composite USGS Topographic map found in Fig. 3. The distance from the offset wells (producers, injectors and shut-in wells) to the vibration stimulation well can be seen in Fig.4.

The well was spud on July 28, 2001 with Goober Rig # 3. Total depth of 3090' was reached August 5, 2001. The well was cored, logged, cased and cemented. The drilling rig moved off August 6, 2001. Details of the drilling and coring operation can be found in Appendix A: Drilling Summary prepared by David Spencer, Operations Manager for Calumet Oil Company. Appendix B is the Geologic Report prepared by Richard Langston, Consulting Geologist for Calumet Oil Company. Please refer to Fig.5, which is the schematic of Well 111-W-27 with the DHVT installed. The cost of the well was about \$115,000 more than the original estimate due to a deeper reservoir at the NBU field. Calumet Oil Company is contributing the additional well costs.

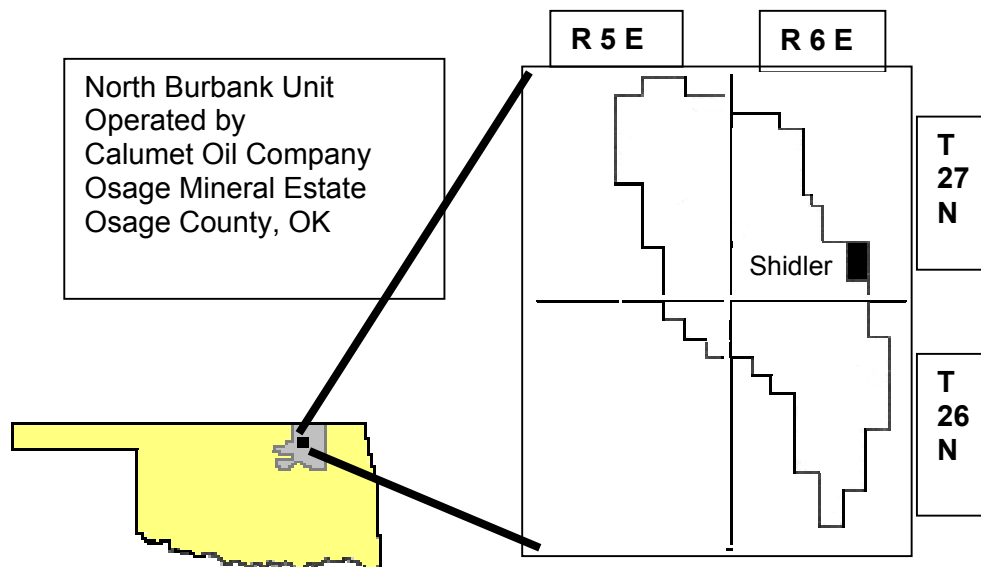


Figure 1 Location of North Burbank Unit (NBU) Field, Osage County, OK.

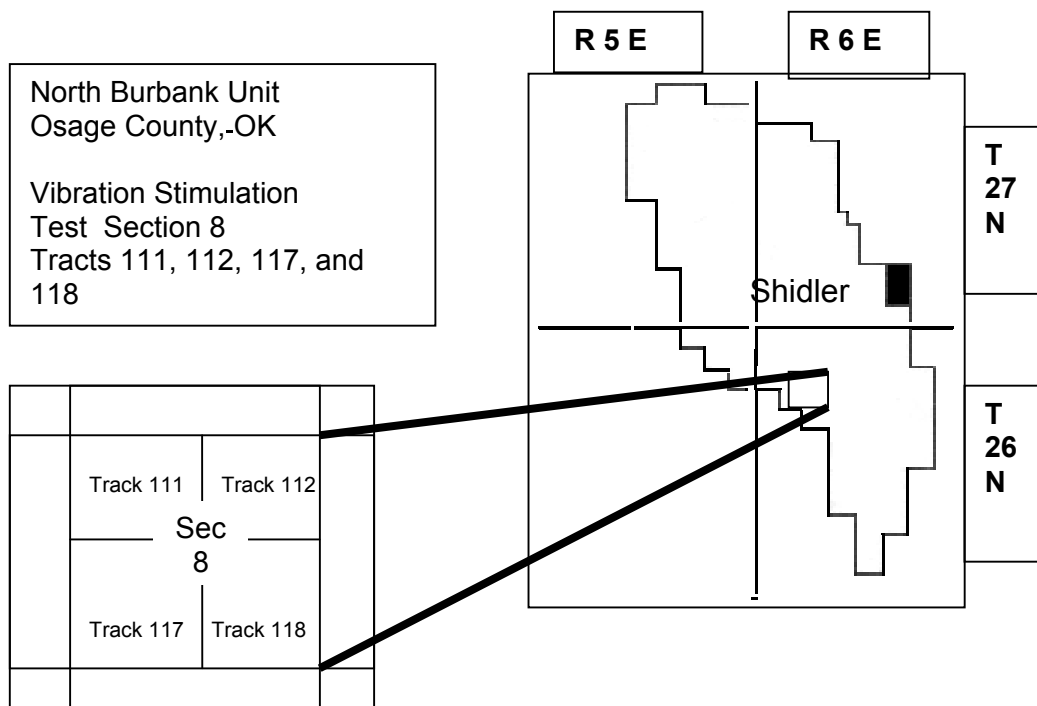


Figure 2 Section 8, Location of Vibration Stimulation Pilot Test Area in NBU Field

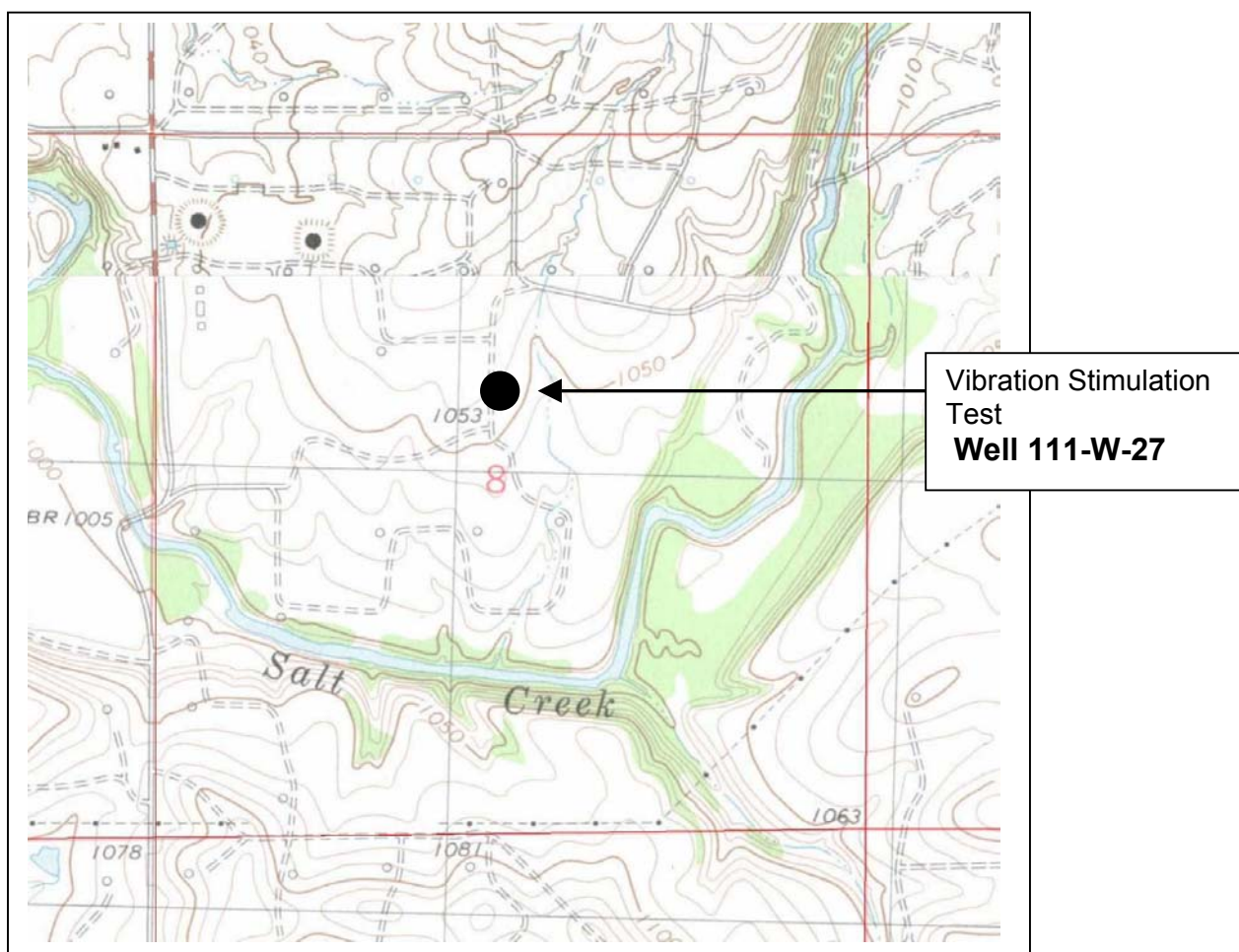


Figure 3 Section 8 T26N R 6E USGS Topographic Map, Osage County, OK.

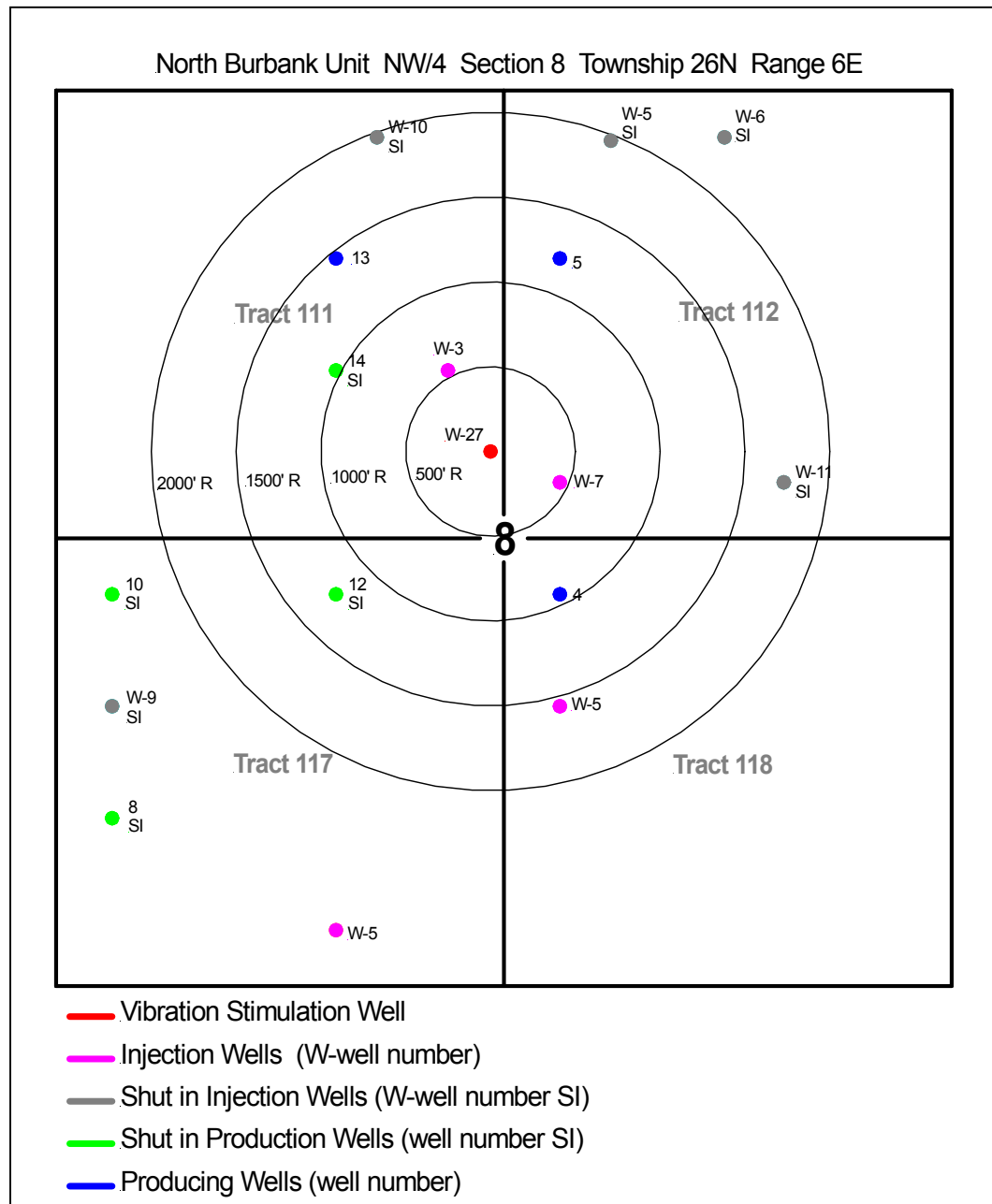


Figure 4 Current Well Locations in Section 8 T26N R6E NBU

Building the Downhole Vibration Tool

OGCI has built the 7-inch field test version of the downhole vibration tool (DHVT). In the course of improving the present tool design, a novel method of constructing the tool has been implemented. An invention disclosure was given to OGCI's patent attorneys and we plan to apply for a patent.

A notice of invention disclosure to DOE patent attorneys per the grant contract was dated June 28, 2001. DOE patent attorneys have assigned a case number to follow the documents related to the invention disclosure. It is DOE case no. S-98,198 – Entitled: Use of flexshafts in backwards whirling mass vibrator construction under contract no. DE-FG26-00BC15191.

Field Instrumentation and Well Testing

In Fig 4 above, the approximate distance from Well 111-W-27 has been drawn in 500' radii circles. Calumet Oil Company is monitoring all wells in Section 8 to establish the baseline for production and injection characteristics for each well. The plot of daily production oil and total fluid versus total water injection can be found in Appendix C.

During the vibration stimulation operation Well 111-W-27 will be equipped with the DHVT located across the Burbank formation. The DHVT will be driven by a rod-rotating unit from the surface. Please refer to Fig.5 for a schematic of the well during vibration stimulation.

The shut-in wells in section 8 will be candidates for downhole monitoring equipment installation. The first shut-in well to be used for downhole geophone installation is slated to be Well 111-14, which is approximately 1000' from the vibration stimulation well. A schematic of the geophone installation can be found in Fig. 6.

Preparing for the Power Source Tests

The purpose of the power source tests are to check the performance of the 7" DHVT, the controls on the rod rotating system and the data acquisition system. The DHVT will be rotated from the surface using a rod-rotating unit, conventionally used to power progressive cavity pumps. To be able to monitor the DHVT performance, downhole sensors have been built into the tool. These transmit data back to the surface using a multi-conductor cable strapped to the tubing. This tool data is collected with a computer in the data acquisition doghouse. Fig. 7 is a photograph of the rod rotating unit placed near the well and the doghouse, which houses the computer equipment and the controls for the rod-rotating unit.

The location for the power source tests is at the Wynona Waterflood Unit Well 12-20. Calumet Oil Company operates this Osage County waterflood unit. For a schematic of Well 12-20, please refer to Fig.8. This particular well has 7 inch casing, which is the size casing required for the 7" DHVT to be installed. The well was recompleted about 20 years ago in a formation above the waterflood and did not produce commercial quantities of oil, so it has been shut in since 1980.

NBU FIELD WELL 111-W 27

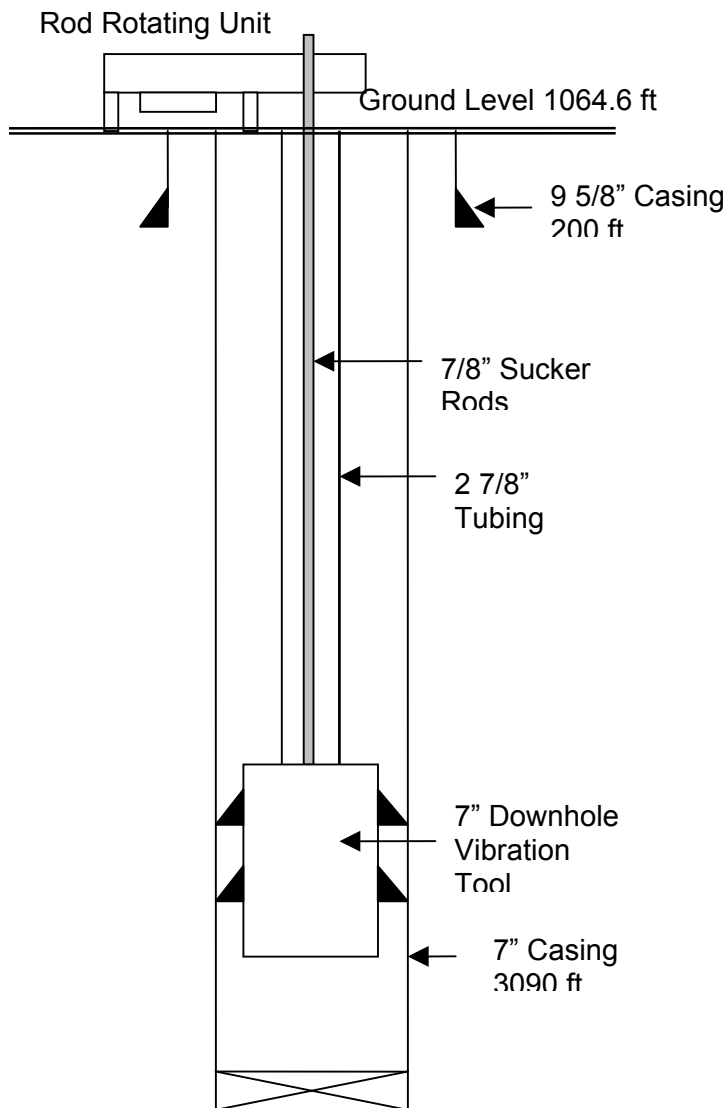
VIBRATION STIMULATION WELL

U. S. Department of Energy

Project DE-PS26-99BC15191

"Enhanced Oil Recovery with
Downhole Vibration Stimulation"

NBU Phase



Completion Date: July 2001

SURFACE CASING:

Production Casing: 7"

TD: 3090'

TOP OF BURBANK SAND:

2850 ft

Completion:

Not Completed in Burbank

Stimulation:

None

Figure 5 Schematic of Vibration Stimulation Well NBU 111-W-27

NBU FIELD WELL 111-14

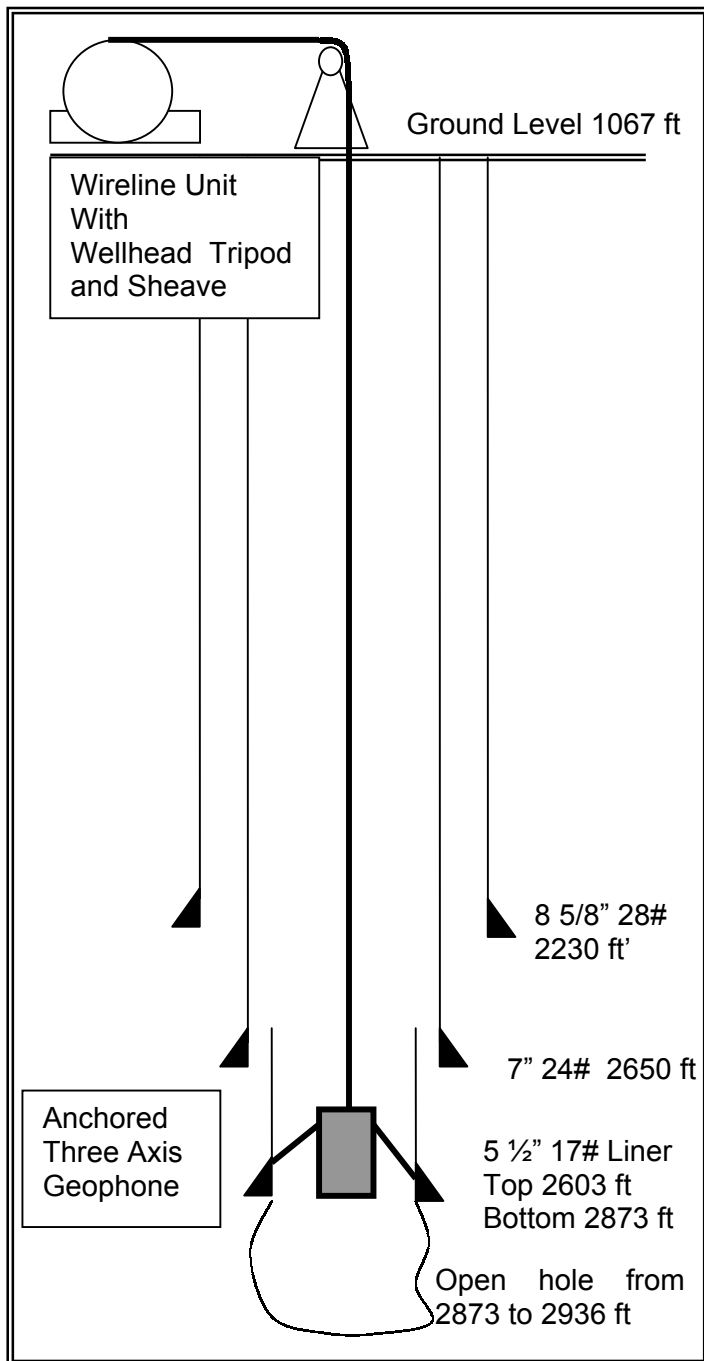
GEOPHONE INSTALLATION WELL

U. S. Department of Energy

Project DE-PS26-99BC15191

“Enhanced Oil Recovery with
Downhole Vibration Stimulation”

N B U Phase



Completion Date: September 1923

SURFACE CASING:

Production Casing: 7"

LINER

TD: 2935 ft

BURBANK SAND:

2873 to 2936 ft

Completion:

Open hole from 2873 to 2936 ft

Stimulation:

Nitroglycerine

Figure 6 Schematic of Geophone Installation NBU Well 111-14

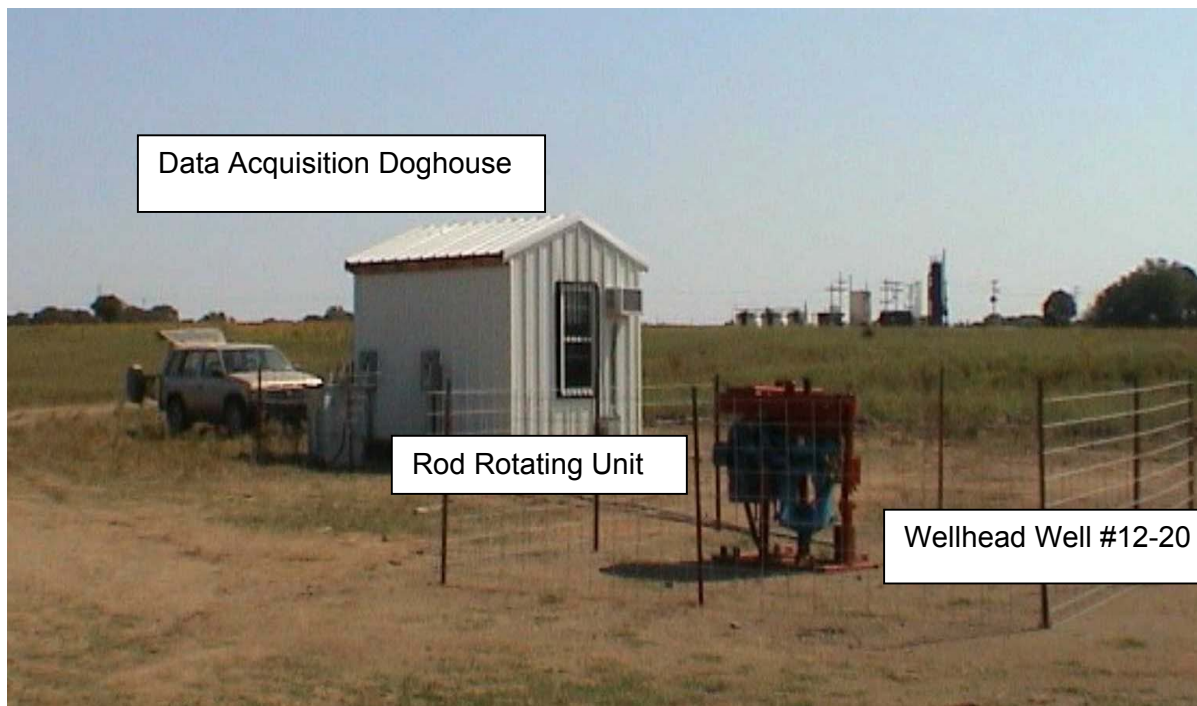


Figure 7 Data Acquisition Doghouse and Rod Rotating Unit Wynona Waterflood Unit Well 12-20

WYNONA WATERFLOOD FIELD WELL 12 - 20

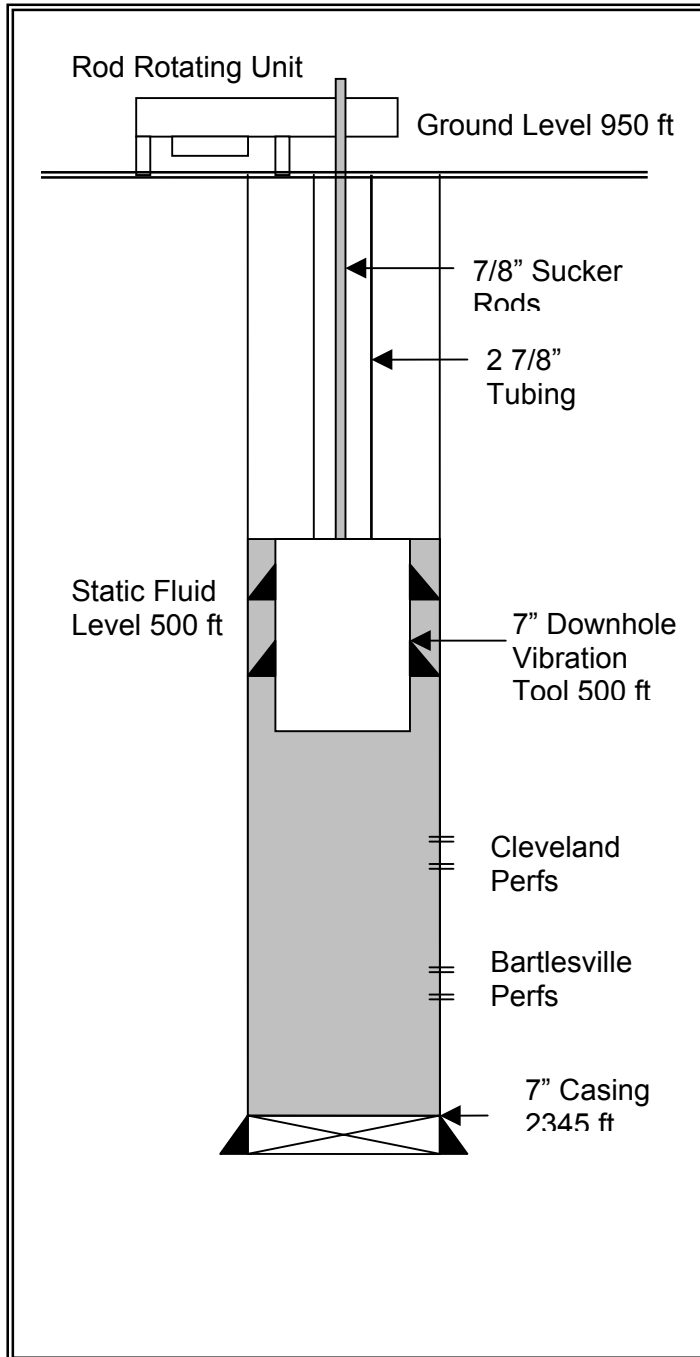
POWER SOURCE TEST WELL

U. S. Department of Energy

Project DE-PS26-99BC15191

“Enhanced Oil Recovery with
Downhole Vibration Stimulation”

NBU Phase



Re-Completion Date: 2/8/80

SURFACE CASING:

Production Casing: 7"

TD: 2351 ft

TOP OF CLEVELAND SAND:

1400 ft

TOP OF BARTLESVILLE SAND:

2050 ft

Completion:

Cleveland 1404 to 22 ft

Bartlesville 2098 to 2114 ft

Stimulation:

500 gal Acid

5000 lbs. Sand

Figure 8 Schematic of Power Source Test Wynona Waterflood Unit Well 12-20

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

- *SUBMIT AND OBTAIN DRILLING PERMIT* *Sub task completed.*
- *BID THE DRILLING RIG AND SERVICES* *Sub task completed.*
- *AWARD THE DRILLING AND SERVICE CONTRACTS* *Sub task completed.*
- *PREPARE LOCATION* *Sub task completed.*

• DRILL, CORE, AND CASE WELL

The well was spud July 28, 2001 at 11:00AM. 9 5/8" surface casing was run and cemented at 200ft. 8 3/4" hole was drilled to core point at 2850 ft. Core # 1 was cut from 2850 to 2880 ft. Core #2 was cut from 2880 to 2910 ft. Core # 3 was cut from 2910 to 2934 ft. Core recovery was 98%. Cores were taken to Phillips core laboratory for standard tests and special sonic testing.

The well was drilled to total depth of 3090 ft, which put TD into the Mississippi Lime formation. Schlumberger logged the well.

7" 23 lb/ft 8 Round Long Thread and Coupling casing was run to TD and cemented with 190 sacks of Premium Plus cement with the following additives; 5% Calseal and 3 #/sack Gilsonite.

Please refer to Appendix A, which is the morning drilling reports as provided by David Spencer, Calumet Operations Manager. The Geologic report for the well is found in Appendix B. It was prepared by Calumet's consulting Geologist, Richard Langston

- *REPORT TO OSAGE TRIBAL REPRESENTATIVES OF PROJECT PROGRESS*
A drilling and completion report was filed with the Osage Agency.

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*

While Phillips has conducted several sonic core tests on “old” Burbank cores, the plan to perform sonic core tests on fresh cores is still integral to the project. Phillips has taken the core from Well 111-W-27 to Phillip’s core laboratory in Bartlesville Oklahoma. Phillips will be conducting standard porosity, permeability and saturation tests on plugs taken throughout the length of the recovered core. Then Phillips will conduct sonic core studies to determine the frequencies which effect the fluid flow through the core.

WORK ON THESE SUBTASKS HAS NOT COMMENCED

- *EVALUATE LAB TEST RESULTS FOR FREQUENCY AND AMPLITUDE*
- *MEET TO REVIEW LAB TEST RESULTS & BRACKET FIELD TEST FREQUENCIES/AMPLITUDES*
- *REPORT TO OSAGE TRIBAL REPRESENTATIVES ON PROJECT PROGRESS*

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

- *FRONT END SOURCE ENGINEERING - SELECT MOST APPROPRIATE POWER SOURCE*

Sub task completed

- *ENGINEER SOURCES TO SPECIFICATIONS* *Sub task completed.*
- *CONSTRUCT TOOL(S) & SOURCES* *Sub task completed.*
- *SURFACE TEST TOOLS*

The surface testing of the field test tool in conjunction with the power source life testing will be done at the Wynona Waterflood Unit, just outside Wynona Oklahoma. The well, which will be used, is Wynona Waterflood Unit Well #12-20

- *CONDUCT POWER SOURCE LIFE TEST*

The surface test is being combined with the power source test, which will enable the testing of both the variable speed drive, rod rotating system along with the Downhole Vibration Tool (DHVT). The DHVT is instrumented to measure temperature and movement. This data will be brought to the surface using a cable attached to the tubing. The downhole data and surface operating data will be recorded with a data acquisition computer for later analysis.

- *REPORT TO OSAGE TRIBAL REPRESENTATIVES ON PROJECT PROGRESS*

This sub task has not yet been performed.

TASK 5: INSTRUMENT TEST WELLS

- *ENGINEER SEISMIC MEASUREMENT SYSTEM*

Ernie Majors from Lawrence Berkley National Laboratory (LBNL), has been consulted to assist the project in setting up the vibration detection tools and testing protocol. Pending satisfactory financial arrangements, LBNL equipment and personnel will be used to obtain and evaluate the downhole monitoring data.

- *SPECIFY SEISMIC MEASUREMENT SYSTEM*

LBNL will deploy geophones in nearby inactive wells during the vibration tests to determine the strength of the vibrations that are causing the stimulation to occur. Measured will be the band width and amplitude in all three directions of motion in the boreholes at various elevations in the borehole. LBNL will use a three component geophones on a wire line provided by OGC. A series of tests will be performed during the performance period to test source strength, radiation pattern, effect of heterogeneity and variability of the source. The results will be correlated with the lab tests that LANL will be performing on the core from the test hole.

- *INSTALL SEISMIC MEASUREMENT SYSTEM*

OGC will arrange for the necessary downhole telemetry equipment, coordinate the operation of the DHVT with the listening efforts, and support the LBNL personnel in their field test activities. OGC will also make arrangements for the inactive wells to be worked over, supervise those operations and prepare the necessary wellbore conditions to be able to accept the listening devices provided by LBNL.

TASK 6: CONDUCT FIELD VIBRATION STIMULATION TESTS

Calumet field personnel have been collecting both injection and production well information to be able to establish a solid baseline for the wells in Section 8. Injection information is now being gathered daily rather than on the previous bi-weekly schedule. Plans have been made to further isolate the pilot test area wells at tank battery 118, to allow for unambiguous well test information.

Please refer to Appendix C for a plots of the production rates and injection pressures and rates by well for the pilot test area section 8.

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*

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.

Additional technical presentations made covering work done on this project.

- A technical paper abstract has been submitted for the ASME/ETCE conference (Feb 2002) Production Technology Symposium.
- A proposed technical paper for the April 2002 SPE/DOE 13th Improved Oil Recovery Symposium has been submitted.
- A presentation of SPE paper 67303 updated has been scheduled with the Mid Continent Section of the SPE (Tulsa) for early December, 2001.
- A version of the SPE Paper 67303 has been submitted to World Oil, a Gulf Publishing Company, a trade magazine for their October 2001 issue.

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

A one-day SPE sponsored short course which is planned to cover seismic stimulation efforts around the world, will be offered at the SPE/DOE Thirteenth Symposium on Improved Oil Recovery in Tulsa, OK, April 13-17, 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

On August 23, 2001 a request for an extended budget to include work from Lawrence Berkeley and Los Alamos National Labs was submitted. On September 18, 2001 amendment A002 was signed by Keith Miles accepting the extended budget request. This brings the total project budget to \$1,020,500. This is with the DOE share of \$675,750 and recipient share of \$334,750. This will extend the budget period from November 12, 2001 to May 12, 2002.

Technical Issues

A pilot test area was selected in Section 8 T26N R6E. The vibration stimulation test well location was determined to be 2560 ft FWL and 510 ft FSL of NW/4 of Section 8, T26N, R6E. The well has been drilled, cored, logged cased and cemented.

The 7-inch Downhole Vibration Tool (DHVT) has been built. It has been modified to use rod-rotating equipment.

Phillips has begun the sonic testing of the recovered cores.

Technology Transfer Activities

A technical paper abstract has been accepted for the ASME/ETCE conference (Feb 2002) Production Technology Symposium.

A one-day SPE sponsored short course which is planned to cover seismic stimulation efforts around the world, will be offered at the SPE/DOE Thirteenth Symposium on Improved Oil Recovery in Tulsa, OK, April 13-17, 2002.

A proposed technical paper for the April 2002 SPE/DOE 13th Improved Oil Recovery Symposium has been submitted.

A presentation of SPE paper 67303 updated has been scheduled with the Mid Continent Section of the SPE (Tulsa) for early December, 2001.

A version of the SPE Paper 67303 has been submitted to World Oil, a Gulf Publishing Company, a trade magazine for their October 2001 issue.

Reference

1. Westermarck, R.V. et al.: "Enhanced Oil Recovery with Downhole Vibration Stimulation" SPE 67303 presented in Oklahoma City, OK, March 24-27, 2001

Appendix A

Well 111-W-27
Daily Drilling Reports

Prepared by
David Spencer
Calumet Oil Company
Operation Manager

DRILLING REPORT

CALUMET OIL COMPANY

NBU #111-W27
NW/4 Sec 8-T26N-R06E
Osage County, Oklahoma

7/29/01

Current Depth: 210 ft. Current Activity: Running 9 5/8" Casing. Summary: MIRU Goober Drilling Company Rig #3. Spud at 11:00 A.M. drilling 7 1/4" pilot hole to 210'. TOOH w/ 7 1/4" bit and begin drilling 12 1/4" hole to 210 ft. Reached current depth at 6:00 A.M.

7/30/01

Current Depth: 1200 ft. Current Activity: Drilling 8 3/4" hole in lime and shale. Summary: RIH w/9 5/8" csg to 200 ft and cmted to surface. Cmtng completed by 11:00 A.M. WOC 8 hrs. Pick up Bit #1 8 3/4" and start drilling at 7:00 P.M. Slope test 1/2° @ 900'.

7/31/01

Current Depth: 2020 ft. Current Activity: Drilling in Lime and Shale. Summary: Drilled to 1593 ft w/Bit #1. Slope test 3/4° @ 1593'. POOH w/ Bit #1 and RIH w/Bit #2 8 3/4" Lime bit.

8/01/01

Current Depth: 2640 ft. Current Activity: Drilling in Pink Lime. Summary: Drilled and service rig. SD 4 hours to service mud pump. Slope test 3/4° @ 2320'.

8/02/01

Current Depth: 2850 ft. Current Activity: TIH to circ for core. Summary: Drilled 8 3/4" hole to 2850' w/Bit #2. Started circ for core and lost circ. Build mud and add LCM. TOOH w/ Bit & DP. Start in hole w/30 ft core barrel & DP. Slope test 3/4° @ 2850'.

8/03/01

Current Depth: 2910 ft. Current Activity: TOOH w/Core #2. Summary: Finish GIH w/core barrel & DP. Core #1 2850' to 2880'. TOOH w/Core #1. TIH w/ core barrel & DP cut core #2 from 2880' to 2910'. Start OOH w/Core #2.

8/04/01

Current Depth: 2984 ft. Current Activity: Drilling in Miss Lime. Summary: Finish OOH w/Core #2. GIH w/core barrel & DP. Core #3 2910' to 2934'. TOOH w/Core #3. GIH w/bit #2 and ream core section from 2850 to 2924'. Begin Drilling.

8/05/01

Current Depth: TD @ 3090 ft. Current Activity: TIH to LDDP. Summary: Drilled to TD of 3090' in Miss Lime. Circ for Logs. TOOH w/DP & bit #2. WO Loggers. TIH w/DP circ 30

min. TOOH w/DP. MIRU Schlumberger Logging and log. RDMO Schlumberger. TIH w/DP. Slope test 3/4° @ 3090'.

8/06/01

Current Activity: RDMO Goober Drilling Rig 3. Summary: Finish in hole w/DP. TOOH and LDDP. Remove circ head from under rig to run 7" csg. RIH w/7" 23 #/ft LTC csg to 3088'. Circ for 45 min. MIRU Halliburton. Cemented 7" in place with 190 sks Premium Plus cement w/5% Calseal & 3 #/sk Gilsonite. Plug down @ 5:45 PM. Nipple up head to set csg in neutral weight on slips. RDMO Goober Drilling.

Appendix B

Geological Report

CALUMET OIL COMPANY

NORTH BURBANK UNIT #111-W27

**SECTION 8-26N-6E
OSAGE COUNTY, OKLAHOMA**

Richard S. Langston
CPG #3981
Tulsa, Oklahoma

RICHARD S. LANGSTON

CERTIFIED PETROLEUM GEOLOGIST

4710 WEST 89TH STREET

PHONE 918-446-6789

TULSA, OKLAHOMA 74132-3426

CELL 918-284-3456

TWINS87@IONET.NET

FAX 918-446-6788

GEOLOGICAL REPORT

NORTH BURBANK UNIT NO. 111-W27

**E/2-E/2-SE-NW 510' FSL 2560' FWL
SECTION 8-26N-6E
OSAGE COUNTY, OKLAHOMA**

OPERATOR: Calumet Oil Corporation

SPUD: July 28, 2001

LOGGED: August 5, 2001

TOTAL DEPTH: 3090' Driller
3095' Logger

CONTRACTOR: Goobers Drilling Company
Stillwater, Oklahoma

HOLE SIZE: 9.625" Casing Set to 248'
8.75" From 248' to TD (3095')

HOLE DEVIATION:

860.....1/2	2850.....1
1764.....1 1/4	3095.....3/4
2534.....1	

ELECTRIC LOGGING: Schlumberger
Duncan, Oklahoma

SURVEYS: Array Induction SFL/GR (Platform Express)
Compensated Neutron Log / Litho-Density w/
Gamma ray
MicroLog

ELEVATIONS: Ground Level: 1054.6
Drill Floor: 1062.6
Kelly Bushing: 1064.6
All measurements relative to Kelly Bushing.

FORMATION TOPS:

Checkerboard	2410 (-1345)
Big Lime	2522 (-1457)
Oswego	2638 (-1573)
Pink Lime	2805 (-1740)
Burbank	2840 (-1775)
Base Burbank	2914 (-1849)
Mississippian	2938 (-1873)
TD	3095

Classification of Shows:

Fluorescence:	Faint, Dull, Bright, Very Bright
Odors:	Slight, Fair, Good, Strong
Cuts:	Poor, Fair, Good, Excellent
Porosity:	Tight, Fair, Good, Very Good

DETAILED DESCRIPTION OF MAJOR ZONES:

BURBANK

2840' TO 2914'

The Burbank Sandstone was cored, using a 30' core barrel at the following intervals. The core was measured then double wrapped in plastic wrap and foil, boxed and taken to Phillips Petroleum core facilities in Bartlesville. The core was not washed at the wellsite. Phillips personnel did boxing of the core.

Core #1 2850 to 2880; recovered 29.4 feet

Core #2 2880 to 2910; recovered 29.6 feet

Core #3 2910 to 2933; cored 23 feet, recovered approximately 20 feet

CONCLUSIONS:

The North Burbank Unit #111-W27 was drilled in conjunction with OGCI and the Department of Energy as an "enhanced recovery" well in the historical Burbank Field in Osage County, Oklahoma. The Burbank Sandstone was cored and taken to the core facilities at Phillips Petroleum in Bartlesville, Oklahoma.

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The Burbank deposit starts at 2840' and the base is 2914', for 74' of deposit. Most of the 74' is a "shaly " sandstone and sometimes a "sandy" shale. The best development of sand is two lobes at the base, separated by 6' of shale.

The log calculations take into account this "shaliness" by using cut-offs from the gamma ray log. Although these calculations are interesting it should be noted that this reservoir was found and has produced since the 1920's. Saltwater saturations and BVW calculations indicate productive zones, however, in all probability, water will be produced along with hydrocarbons.

The well was subsequently deepen to the Mississippi Lime and TD'd at a total depth of 3095'.

Richard S. Langston
CPG #3981
Tulsa, Oklahoma

Appendix C

Vibration Stimulation Pilot Test Area

Production and Injection Plots

For

Section 8 26N-6E

Osage County, Oklahoma

Data Provided by Calumet Oil Company

Data Plotted by Bob Westermarck

**North Burbank Unit Section 8
Vibration Stimulation Pilot Test Area
Combined Production and Injection Well Daily Rates**

