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1. Document Title: Consortium Focused on Improving . . . Domestic Stripper Wells

2. Type of Document: ☒ Technical Progress Report ☐ Topical Report ☐ Final Technical Report
☐ Abstract ☐ Technical Paper ☐ Journal Article ☐ Conference Presentation
☐ Other (please specify): _____

3. Date clearance needed: _____

★4. Results of review for possible inventive subject matter:
a. ☒ No Subject Invention is believed to be disclosed therein.
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ii. A disclosure of the invention was submitted on _____
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★5. Signed R. Killoren Date 5/23/02
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Name & Title R. Killoren, Assistant Vice President for Research/Director of OSP

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PENNSTATE

Establishment of an Industry-Driven Consortium Focused on Improving the Production Performance of Domestic Stripper Wells

Fifth Quarterly Technical Progress Report for the Period 10/01/2001 to 12/31/2001

By

Joel L. Morrison
The Energy Institute

May 20, 2002

Work Performed Under Grant No. DE-FG26-00NT41025

For
U.S. Department of Energy
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By
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DISCLAIMER

ABSTRACT

The Pennsylvania State University, under contract to the U.S. Department of Energy, National Energy Technology Laboratory will establish, promote, and manage a national industry-driven Stripper Well Consortium (SWC) that will be focused on improving the production performance of domestic petroleum and/or natural gas stripper wells. The consortium creates a partnership with the U.S. petroleum and natural gas industries and trade associations, state funding agencies, academia, and the National Energy Technology Laboratory.

This report serves as the fifth quarterly technical progress report for the SWC. Key activities for this reporting period include: 1) organize and host two regional informational workshops (Oklahoma City, OK and Dallas, TX), 2) author, print, and distribute a SWC newsletter, and 3) organize and host the first SWC technology transfer meeting (Hershey, PA). In addition, a literature search that focuses on the use of lasers, microwaves, and acoustics for potential stripper well applications was initiated.

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1.0 INTRODUCTION

The Pennsylvania State University, under contract to the U.S. Department of Energy (DOE), National Energy Technology Laboratory (NETL) is in the process of establishing an industry-driven stripper well consortium that will be focused on improving the production performance of domestic petroleum and/or natural gas stripper wells. Industry-driven consortia provide a cost-efficient vehicle for developing, transferring, and deploying new technologies into the private sector. The Stripper Well Consortium (SWC) will create a partnership with the U.S. petroleum and natural gas industries and trade associations, state funding agencies, academia, the National Energy Technology Laboratory, and the National Petroleum Technology Office.

Consortium technology development research will be conducted in the areas of reservoir remediation, wellbore clean up, and surface system optimization. Consortium members elected an Executive Council that will be charged with reviewing projects for funding consortium co-funding. Proposals must address improving the production performance of stripper wells and must provide significant cost share. The process of having industry develop, review, and select projects for funding will ensure that the consortium conducts research that is relevant and timely to industry. Co-funding of projects using external sources of funding will be sought to ensure that consortium funds are highly leveraged.

2.0 EXPERIMENTAL

A description of experimental methods is required by the DOE for all quarterly technical progress reports. In this program, Penn State is responsible for establishing and managing an industry-driven stripper well consortium. Technology development research awards are made on a competitive basis. Therefore, this section is not applicable to the Penn State contracted activities. Technical reports from the individual researchers will be required to contain an experimental discussion section and will be submitted to consortium members and DOE for their review.

3.0 RESULTS AND DISCUSSION

During the last reporting period, the SWC focused the following: 1) organizing and hosting two regional informational workshops, 2) preparing, publishing, and mailing a

second SWC newsletter, 3) organizing and hosting the first SWC technology transfer for its membership, and 4) membership recruitment.

3.1 REGIONAL INFORMATIONAL WORKSHOPS

The SWC hosted workshops in Oklahoma City, OK and Dallas, TX during to provide southern-based petroleum and natural gas producers an overview of the SWC and its associated projects. Presentations were made by: Advanced Resources International, Brandywine Energy and Development Company, Colorado School of Mines, Penn State University, and Texas A&M University.

The Oklahoma City workshop was held on October 24, 2001 and was co-sponsored by the Oklahoma Commission of Marginally Producing Oil and Gas Wells. The workshop was held at the Educational Center located at the Oklahoma City Zoo and drew 43 attendees. On the following day, the SWC held its second workshop in Dallas, TX on October 25, 2001 at the Harvey House Hotel and Conference Center. The workshop drew 17 attendees.

3.2 SWC NEWSLETTER

The SWC published its second newsletter in December 2001. The newsletter is available either as print or electronically on the SWC website (http://www.energy.psu.edu/swc). The newsletter focused on providing readers a brief executive summary for each of the 13 SWC projects, an announcement of the upcoming SWC technology transfer meeting, and a review of the regional informational workshops.

3.3 SWC TECHNOLOGY TRANSFER MEETING

The SWC organized and hosted its first technology transfer meeting on December 18-19, 2001. The meeting was held at Hershey, PA at the Hershey Lodge and Convention Center and focused on reviewing the 13 projects that the consortium is co-funding. Ample time was provided to permit the SWC membership to ask the various presenters detailed questions about the status of their funded research. Ms. Christine Hansen, Executive Director of the Interstate Oil and Gas Compact Commission, presented the keynote address.

The consortium also elected three Executive Council members for the 2002-2003 term. The newly elected Council members are: Mr. Peter Bastian of Quicksilver Resources, Mr. Jason Lacewell of Republic Energy, and Mr. John Papso of Cabot Oil & Gas.

3.4 MEMBERSHIP RECRUITMENT

During this reporting period, three additional members joined the Consortium. These new members include: 1) affiliate membership for Independent Oil and Gas Association of Pennsylvania (Wexford, PA), 2) full membership for TechSavants, Inc (Wheaton, IL), and 3) full membership for Furness-Newburge (Versailles, KY). This now brings the SWC membership to 52. Figure 1 provides a geographic distribution of the SWC membership.

3.5 LITERATURE SEARCH

An extensive literature search on the use of lasers, microwave, and acoustics in stripper well applications began during this reporting period. Dr. Watson, of Penn State's Department of Energy and Geo-Environmental Engineering, is supervising the day-to-day activities of the literature search. A brief overview of the literature search is presented in Appendix A.

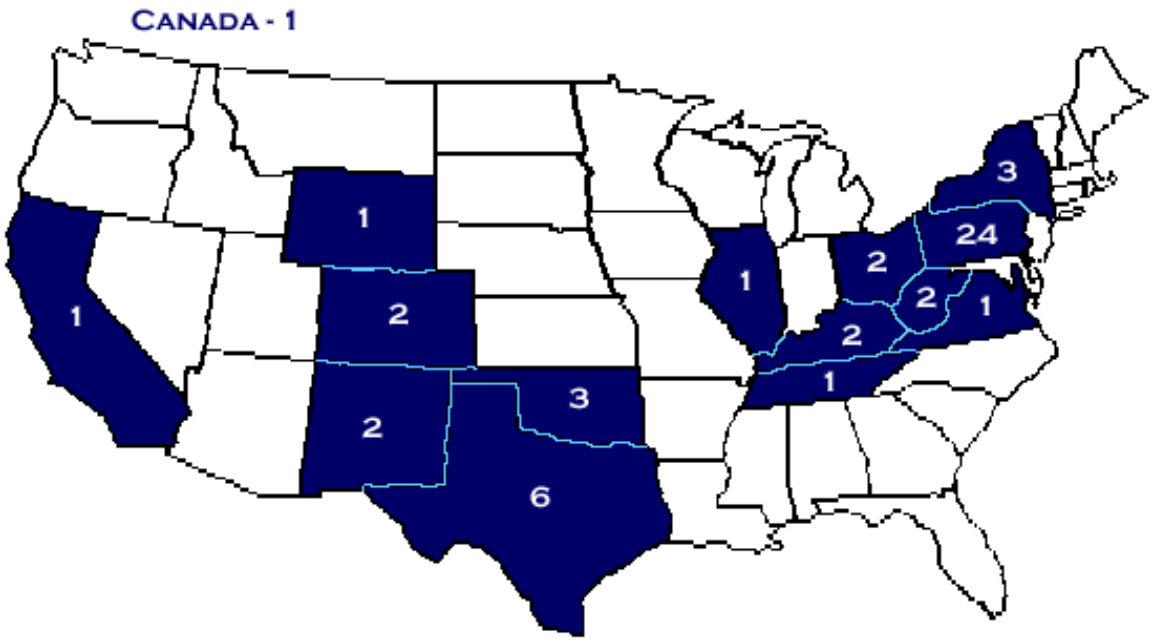

Figure 1. Geographic Distribution of the SWC Membership.

4.0 CONCLUSION

During this reporting period, The Consortium focused on having organizing and hosting one technology transfer and two informational meetings. During the first year, the Consortium focused on establishing a membership foundation which now stands at 52 and a strategy to grow the membership in 2002. The first technology transfer was held and the request for proposals for the 2002 is ready for release. The SWC is poised very well to begin its second calendar year activities.

5.0 REFERENCES

A listing of referenced materials is required by the DOE for each quarterly technical progress report. This technical progress for the SWC did not utilize any reference materials. Reference materials for the literature search are listed in Appendix A.

APPENDIX A: Application of Lasers, Microwave, and Acoustics to Stripper Wells and Other Oil/ Gas Applications

Prepared by:
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The Pennsylvania State University

Application of Lasers, Microwave, and Acoustics to Stripper Wells and Other Oil/ Gas Applications

A literature survey to investigate the potential for use of ultrasonic technology to advance oil and natural gas technology has been initiated. For the past period literature from the oil and gas industry was reviewed in order to determine the extent of the use of ultrasonics in this industry. It was recognized early on that ultrasonic technology has a potential in various areas of petroleum recovery. Campbell and Duhon [1] reported encouraging results on the increase of oil recovery in controlled laboratory experiments consequent to ultrasonic treatment. However as electronic technology progressed there seems to be a shift towards using ultrasonic probes for various applications.

Ondrik et al. [2] reported the use of a borehole flow meter for production logging of a shale gas reservoir in 1984. Use of ultrasonic devices in drilling and completed has also been reported. Clerke and Van Akkeren utilized a borehole Televiewer to improve completion of infill wells. They showed that this device generated superior logs to some conventional logs (gamma-ray, sonic laterolog, and spherically focused) [3]. Published in 1986, their reports demonstrated that ultrasonic devices can provide drilling engineers with viable information needed to improve oil recovery as a consequence of the availability of more reliable information. One year later use of an ultrasonic flow meter for kick and loss detection during drilling was reported by Orban et al. [4]. The flow meter was capable of metering changes in mud circulation as low as 50 GPM, a range considered to be sufficient for determining that a blowout will occur. Other techniques for measurement of important formation parameters were reported [5,6]. Hoyos et al. reported on a laboratory method for detection of gas nucleation during primary depletion. Also, Soucemarianadin et al. devised a new method for saturation mapping of porous media.

Use of ultrasonic technology for well logging and interference testing has been reported [7,8]. Nayhavn et al. reported laboratory and field test results of generated by an ultrasonic Doppler velocity probe designed for production logging of horizontal and deviated wells. The instrument incorporated the latest technology in data filtering and presentation. The probe was used successfully to detect laminar, turbulent and gas flow respectively. Also use of ultrasonics in surface and bottom hole experiments to determine interference of wells was reported by Laird et al. The apparatus incorporated an EOS-based model for pressure determination from data acquired by the use of surface and bottom hole sensors. Also,

newly developed temperature compensation technology was utilized. Equipped with this new tool, the investigators were able to determine that the geological mapping of the field was incorrect and suggested new schemes for improving recovery.

Direct use of ultrasonic energy to improve recovery was also reported. Campbell et al. demonstrated a significant increase in simulated oil production during water flooding of sandstone and limestone cores. Experimental work by Roberts et al. [9] showed a definite increase in permeability of contaminated cores. These Brine saturated Berea sandstone cores were contaminated with fines and mud separately. Four-fold increase in permeability was reported, a result of significant importance since drastic decreases in permeability are caused by contamination of the near-wellbore region. Another interesting set of results was reported on the use of ultrasonic treatment to remove asphaltene during oil production. Gllapudi et al. [10] reported a significant increase in permeability of sand packs subsequent to ultrasonic irradiation.

PLANNED WORK

The survey of the oil and gas technology will be completed soon. The next phase will be to survey the use of ultrasonic technology in other fields. Attention will be focused on applications that have a potential for application in the oil and gas industry. At that time, informed conclusions can be made about the potential area for research in this field.

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