

**ADVANCED TECHNOLOGIES FOR  
STRIPPER GAS WELL ENHANCEMENT**

**QUARTERLY REPORT**

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## **ABSTRACT**

As part of Task 1 in Advanced Technologies for Stripper Gas Well Enhancement, Schlumberger – Holditch Reservoir Technologies (H-RT) has joined with two Appalachian Basin producers, Great Lakes Energy Partners, LLC, and Belden & Blake Corporation to develop methodologies for identification and enhancement of stripper wells with economic upside potential. These industry partners have provided us with data for more than 700 wells in northwestern Pennsylvania.

Phase 1 goals of this project are to develop and validate methodologies that can quickly and cost-effectively identify wells with enhancement potential. We have continued to enhance and streamline our software, and we are testing the final stages of our new Microsoft<sup>™</sup> Access/Excel based software. We are continuing to process the information and are identifying potential candidate wells that can be used in Phase 2 to validate the new methodologies. In addition, preparation of the final technical report is underway. During this quarter, we have presented our project and discussed the software to numerous Petroleum Technology Transfer Council (PTTC) workshops located in various regions of the United States.

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## **INTRODUCTION**

During this report period, we have continued to work with our two industry partners, Great Lakes Energy Partners, LLC (Great Lakes), and Belden & Blake Corporation (B&B). As mentioned in our last update, Great Lakes has supplied data for approximately 205 wells located in Warren, Venango, and Crawford counties, Pennsylvania, and B&B provided information for ± 501 wells situated in Venango and Warren counties, Pennsylvania. We are using this data to test and improve our Microsoft™ Access/Excel software, and recognize underperformers.

## **EXPERIMENTAL**

We are utilizing our software tools to conduct a quick, first-pass search for wells possessing enhancement potential. To begin the process, we generate a single Production Indicator (PI) capable of representing the entire production life of a well. The software has the ability to calculate two PI's (x-year cumulative versus Date of First Production (DOFP), and normalized rate versus DOFP). The first indicator is obtained by determining the cumulative gas production over a user-specified input period (e.g. 3 yr, 5 yr, 8 yr, etc.) versus a well's DOFP, and the second PI is determined by calculating the normalized (i.e. the average monthly production rate for the desired year) gas production rate for the chosen year of production.

We are able to compare the PI's of a target well relative to the average of its offsets within a user-defined radius (e.g. 5000 ft), and identify target wells that are underperforming.

The software compares the PI of a target well to the average indicator of its offsets. A user chooses a percentage (e.g.  $\geq 50\%$ ) that a target well's PI must be below the wells within its domain in order to be recognized as a low-performer. The entire well list is processed and qualifying target wells that meet the chosen criteria are recognized. This provides a rapid, efficient, and automated method to identify wells that are underperformers and that may have potential for production enhancement.

Our first pass is now complete and we have identified a list of wells with enhancement potential. During the final quarter of 2001, we met with B&B and Great Lakes to review completion, geologic, and production data in more detail. We are now further refining our list to establish a good basis for a Phase II field demonstration.

## **RESULTS AND DISCUSSION**

The well data has been downloaded into Microsoft ACCESS™ databases and has been quality-checked for internal errors or omissions. Gary Covatch is beta testing the SWARM software before its final release. Our Access database is linked to an Microsoft Excel file specifically designed to aid in recognizing wells with possible production enhancement potential.

A user-friendly interface has been included as this is of paramount importance in making the program relatively easy and inexpensive to use by the operators. Enhanced features such as generating a location maps and rate-time plots have been added.

## **CONCLUSION**

We have received data for more than 700 wells and are in the final stages of identifying wells with possible production enhancement potential. The software is now in its beta testing stage and when completed it will provide an easy and fast way to identify wells that may have upside potential.

Initial preparation of the Final Technical Report is underway with an anticipated completion date for review in early 2002.

From our experience in the Appalachian Basin, we are confident that a good sample of stripper wells with enhancement potential has been found in this data set. We are also confident that the methodologies developed to date can quickly and economically select stripper wells with economic upside potential. By accomplishing this, we will provide producers throughout the U.S. a means of increasing existing gas production and increase the U.S. natural gas reserve base.