Produced-Water Management and Beneficial Use

DE-FC26-04NT15549

Program
The project was selected under the Focused Research in Federal Lands Access and Produced Water Management in Oil and Gas Exploration and Development solicitation DE-PS26-04NT15460-00 issued January 2004. Area of Interest 2, Produced Water Management, is directed toward reducing the cost of produced-water management.

Project Goal
This contract is a multi-tasked project with an overall objective of developing a portfolio of technologies to address the produced-water issues in a comprehensive manner.

Performer
Colorado School of Mines (CSM)
Golden, CO

Project Results
The project only recently got under way, and it is too soon to report results.

Benefits
The opportunity to resolve the oil and gas industry's growing problem with producing, handling, and treating produced water presents a potential double benefit to the Nation.

U.S. energy security would benefit directly from a corresponding increase in domestic oil and gas production that would ensue from a comprehensive program of tools and treatment options designed to optimize produced-water practices.

At the same time, America's fresh water supply—particularly in the arid Western states, where growth in produced water volumes is a mounting concern in coalbed natural gas (CBNG) development—will be bolstered by a thorough analysis of beneficial-use market scenarios.

Background
As U.S. energy security comes to depend more and more on oil and natural gas supplies from mature oil fields and unconventional gas sources, growing volumes of coproduced water poses both a thorny environmental challenge and a promising source of another increasingly scarce resource—fresh water.

CBNG wellhead equipped with radio monitoring system and field irrigation in background in Wyoming's Powder River Basin.

The requirements for clean, fresh water are a growing concern in the U.S. and throughout the world. As the world's population increases along with a growing economy, there is an ever-expanding demand for water for human consumption, agriculture, and in-stream and industrial uses—including energy production.

The production of oil and gas—conventional as well as unconventional, notably CBNG extraction—also yields large volumes of water of varying quality. Due to this variability, there is no single treatment or handling scenario for all produced waters. Research by industry, government, and academia has provided treatment technologies and handling methods, usually with consideration for beneficial use. However, these approaches are frequently costly and often suitable for only one area or field. In addition, there is often no incentive to change current treatment methods, due to lack of market for the treated water or for the treatment byproduct.

As there is no single best method, producers do not have solid information on which treatment technique or which disposal method to use in a given produced-water scenario. The research in the produced-water arena is not easily accessible, often the chemistry and technical terminology make it difficult to understand, and many of the proven technologies in this area are considered too expensive. Thus even though an appropriate solution may be available, it may not be utilized.

In response to this challenge, DOE's Oil and Gas Environmental Solutions Program sponsors a comprehensive, integrated plan to address the issues related to treatment, handling, and beneficial use of produced water in a printed and/or electronic "cookbook" of best-management options and the benefits of utilizing these practices (including cost comparisons) for various scenarios. This long-term DOE project would require coordination with industry partners, National Laboratories, universities, and other agencies or divisions as well as Federal and State governments working on this issue.

Project Summary
The scope of the project includes 1) CO_2 injection to minimize CBNG water, 2) electrodialysis for CBNG water treatment, 3) isotopic evaluation of CBNG produced waters to identify water sources, 4) wellbore geomechanics and evaluation to identify better drilling techniques, 5) factors affecting land application of CBNG produced waters, 6) aquifer analysis and modeling to support infiltration-pond siting criteria, 7) development of a mobile facility to evaluate produced-water treatment systems, 8) controls on the fate of CBNG produced waters relative to impacts on shallow aquifer quality, 9) water disposal by injec-

tion into formations in the Powder River Basin (PRB), and 10) regulatory analysis to support these tasks. Two of the project tasks involve technology development that has been successful in other applications, and the remaining project tasks will provide further definition of PRB hydrogeology and soil science.

Current Status (November 2005)

The project just started, and no data are available.

Revegetation of brine site using salt-resistant prairie grasses.

Project Start: April 29, 2005
Project End: April 28, 2007

Anticipated DOE Contribution: $2,134,000
Performer Contribution: $553,000 (20.5% of total)

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