

Coalbed Natural Gas Produced-Water Treatment Using Gas Hydrate Formation at the Wellhead

DE-FC26-05NT15551/FEAB112 partner contract with Oak Ridge National Lab

Goal

The overall goals are to develop a technically feasible, environmentally benign and cost-effective process for coalbed natural gas (CBNG) produced-water treatment at the wellhead and to transfer this gas hydrate technology to the energy industry expeditiously.

Performers

BC Technologies, Ltd, LLC, Laramie, WY
Oak Ridge National Laboratory (ORNL), Oak Ridge, TN

Results

The project team and the Integrated Petroleum Environmental Consortium plan to develop and demonstrate a unique and synergistic process for wellhead produced-water treatment to bring brines to a level where beneficial use is possible. The literature survey involved locating and reviewing applicable NEPA (National Environmental Policy Act) documents, such as Environmental Assessments and Environmental Impact Statements, that were completed by producers with CBNG leases in the Greater Green River Basin (GGRB). An extensive listing is provided in a report, which will be used by the project team and provided to DOE/NETL. The NEPA documents are available electronically on the Wyoming Bureau of Land Management website (<http://www.wy.blm.gov>" [external site]).

A review of the Wyoming Oil and Gas Conservation Commission (WOGCC) databases was completed to acquire well data on permitted CBNG wells in the GGRB. In October-November 2005, data from the website (<http://wogcc.state.wy.us/>) were downloaded and entered into an Access database developed by BCT personnel. This database was checked and updated in December 2005, April 2006, and November 2006. Tracking the well data in this fashion has provided considerable useful data on the level of permitting activity, operators, well locations, well depths, producing formations, production activity, and to a limited extent, water quality data for currently producing CBNG wells in the basin. This database will be updated periodically until it is used to identify a suitable producing CBNG well in the GGRB for the field demonstration.

A draft report on CBNG development in the GGRB was submitted to DOE. The report provides results of the literature review, review of production databases, and interviews with producers. Statistics were developed by conducting a search of the CBNG units identified by the WOGCC on its website, and creating a custom Access database to retain the information. The resources used to develop the database are publicly available on the Internet. A telephone survey of producers in the area was conducted to gather additional information about each project area and to request water quality and gas content information. While willing to discuss general field plans, producers were unwilling to release information about water quality or gas content, explaining that this is extremely confidential at this time due to the competitive stage of industry development. Water quality data supplied in the report was acquired exclusively from information reported to the State of Wyoming. Some water quality data are available on the WOGCC website, and it is summarized in the draft report.

Benefits

A new, lower-cost treatment for CBNG produced water will reduce environmental compliance and disposal costs, and provide water for beneficial use in arid regions of the United States.

Background

U.S. oil production includes an average 10 barrels of water for each barrel of oil produced. Handling and disposal of this water is the single greatest environmental impediment to domestic oil production. Especially large volumes of produced water are generated in the Western States in association with oil and gas activities. High levels of total dissolved solids (TDS) make much of this water unsuitable for use, and it is economically infeasible to treat the

water. However, a significant portion of the produced water, particularly water from CBNG development, has sufficiently low TDS levels to be used "as is" or to make treatment a feasible option.

There is tremendous need to turn wastewater from oil and gas operations into a useful product. Developing beneficial uses for produced water could reduce the costs of hydrocarbon development in the Western United States, thus increasing the Nation's economically recoverable oil and gas resources. In addition, the produced water can be used to offset problems created by near-record drought conditions in recent years, develop wildlife habitat, and provide water for agriculture, industry, and other uses.

Summary

The project tasks are as follows:

Phase 1

- Develop feasibility concept definition and proof of concept.
- Perform background work, such as operator surveys, database searches, and literature review.
- Conduct lab experiments using synthetic brines and gases.
- Undertake lab testing of field brines and gases following the synthetic work.

Phase 2

- Proceed with prototype development and testing.
- Implement bench-scale, and, if successful, scale-up to larger prototype units.
- Determine economic feasibility prior to proceeding to Phase 3.

Phase 3

- Proceed with field demonstration and commercialization.
- Implement field trial and technology transfer to other operators.

Current Status (July 2007)

Progressing as planned. A DOE briefing is expected in August 2007.

Funding

This project is funded under DOE Oil and Gas Program solicitation DE-PS26-05NT15600.

Project Start: October 1, 2005

Project End: June 30, 2008

Anticipated DOE Contribution: \$414,444

Performer Contribution: \$270,409 (30 percent of total)

Other Government Organizations Involved: Oak Ridge National Laboratory

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Prototype injector