

Identification, Verification & Compilation of Produced-Water Best Management Practices for Conventional Oil & Gas Production Operations

DE-FC26-04NT15545

Project Goal

The goal is to identify, verify, and compile in a manual current best management practices for produced water from conventional oil and gas operations and to develop a geographic information system (GIS)-based analysis tool to assist in the understanding of watershed issued permits. This will allow management costs to be kept in line with the specific projects and regions, which increases the productive life of wells and increases the ultimate recoverable reserves in the ground.

Performers

Interstate Oil & Gas Compact Commission (IOGCC), Oklahoma City, OK
ALL Consulting, Tulsa, OK

Results

Research has been performed that has led to the development of a guidebook titled A Guide to Practical Management of Produced Water from Onshore Oil and Gas Operations in the United States. This document has been published on the project and the IOGCC's website. In coordination with ongoing research, field visits have been conducted to oil and gas sites in Alabama, Alaska, Kansas, Montana, North Dakota, Oklahoma, and Wyoming. These visits were conducted in cooperation with State oil and gas agencies, and the findings of the research and site visits have been consolidated by categorizing the data by region, basin, resource, water quality and quantity, management practice, impact/benefit, and operational requirements. Furthermore, a GIS-based analysis tool is being developed to allow users to calculate the impacts of produced water for hydrologic units based on the input of proposed development scenarios. A case study will be used to demonstrate the applicability and functionality of the GIS-based analytical tool.

Benefits

This project's research will have widespread benefits for the oil and gas industry, producing States, and the Nation as a whole. Implementing research findings will lower the cost of managing water, thereby encouraging operators to keep marginal wells online and to initiate new exploration and production projects despite marginal economics.

This research also will help regulatory agencies devise new regulations and perhaps new exemptions for existing regulations to make water management easier while still maintaining environmental protection. These reinforcing benefits will have the following outcomes:

- Establishment of lower-cost management options that are robust, compatible with local conditions, and readily permittable.

- Innovative combinations of treatment, beneficial uses, and disposal that can result in lower operating costs.

- Extension of a producing well's life, which will add to the operator's ultimate reserves.

- Ability to confidently initiate once-marginal new projects, expanding in-place resources and, ultimately, oil and gas reserves to the Nation's supply.

- Arm producers with the knowledge to improve water handling strategies without compromising efficiency and effectiveness.

- Create awareness for the need to manage produced water in new ways.

If regulators can institute watershed-based and flow-based permits rather than overly conservative NPDES (National Pollutant Discharge Elimination System) requirements, environmental protection will be maintained while allowing increased discharge during periods of high surface flow.

Background

To date little had been done to characterize management practices for handling, treating, and disposing of produced water from conventional oil and gas operations throughout the industry nationwide. Water produced from these operations varies greatly in quality and quantity and is often the single largest barrier to the economic viability of wells. The lack of data, coupled with renewed emphasis on domestic oil and gas development, has prompted many experts to speculate that the number of wells drilled over the next 20 years will approach 3 million, or near the number of current wells. This level of exploration and development will undoubtedly draw the attention of the environmental community, focusing their concerns on produced-water management based on perceived potential impacts to fresh-water resources. Therefore, it is imperative that produced-water management practices be performed in a manner that best minimizes environmental impacts.

Summary

To date, the following tasks have been accomplished or are expected to be completed as the project progresses:

A guidebook titled A Guide to Practical Management of Produced Water from Onshore Oil and Gas Operations in the United States has been finalized. The guidebook includes discussion on large-scale produced-water issues facing industry, regulatory challenges that have been identified, applicability of produced-water management practices in various regions, water treatment technologies, and how Wyoming is going forward with watershed-based regulations.

The project team members met prior to the IOGCC meeting in Billings (May 2006) to discuss the draft version of A Guide to Practical Management of Produced Water from Onshore Oil and Gas Operations in the United States. At the meeting, ALL Consulting provided an overview of the draft guidebook and moderated discussion among the project team members aimed at identifying areas of the guidebook to be improved for the final version. ALL incorporated comments into a final guidebook.

A project website has been developed as part of the technology-transfer and communications phase of the project (www.all-llc.com/iogcc/prodwtr). The website includes basic information on the project as well as downloadable documents.

The findings of the field visits to sites in the seven States listed earlier, along with findings of the research performed in coordination with the field visits, are consolidated in A Guide to Practical Management of Produced Water from Onshore Oil and Gas Operations in the United States for use by the oil and gas industry and regulatory agencies to identify produced-water management practices for both emerging and existing domestic oil and gas fields.

A GIS-based analysis tool will be developed to allow users to calculate the impacts of produced water for hydrologic units based on the input of proposed development scenarios.

A case study will be performed to validate the applicability of the GIS analysis tool for watershed evaluations under real-world conditions.

The partners have embarked on an aggressive outreach and education component for this project. The report is prominently displayed on the IOGCC Web site, and efforts are underway to communicate the results of this study to government decision-makers at all levels as well as appropriate government agencies. The outreach effort will also reach educational institutions, environmental groups, oil and gas industry associations and agricultural organizations. A summary document will be prepared with a CD-ROM containing a full version of the report and a 20-minute presentation summarizing important facets of the project. IOGCC will also work with associations, trade media, and others to create interest in the benefits of this project.

Current Status (February 2007)

IOGCC requested a no-cost extension to engage in technology transfer opportunities.

Funding

The project was selected under DOE solicitation DE-PS26-04NT15460-02, Produced-Water Management, April 19, 2004.

Project Start: September 1, 2004

Project End: May 31, 2007

Anticipated DOE Contribution: \$701,305

Performer Contribution: \$175,700 (20 percent of total)

Other Government Organizations Involved: Alaska Oil and Gas Conservation Commission, Montana Board of Oil and Gas Conservation, Wyoming Oil and Gas Conservation Commission, Kansas Corporation Commission (Oil and Gas Conservation Division), Oklahoma Corporation Commission (Oil and Gas Conservation Division).

Contact Information

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Publications

ALL Consulting, Draft A Guide to Practical Management of Produced Water from Onshore Oil and Gas Operations in the United States, March 2006.



View of a reverse osmosis plant under construction in the Powder River Basin.



View of a produced-water discharge in Elk Basin field in the Big Horn Basin that is used to create habitat and provide water for livestock and wildlife.