

# SEMI-ANNUAL TECHNICAL PROGRESS REPORT

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For

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*Identification, Verification and Compilation  
of  
Produced Water Management Practices for Conventional Oil and Gas  
Production Operations*

Report Submitted  
By The  
Interstate Oil and Gas Compact Commission  
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## ABSTRACT

The project is titled “Identification, Verification and Compilation of Produced Water Management Practices for Conventional Oil and Gas Production Operations.” The Interstate Oil and Gas Compact Commission (IOGCC), headquartered in Oklahoma City, Oklahoma is the principal investigator and they have partnered with ALL Consulting, Inc., headquartered in Tulsa, Oklahoma in this project. State agencies who have also partnered in the project are the Wyoming Oil and Gas Conservation Commission, the Montana Board of Oil and Gas Conservation, the Kansas Oil and Gas Conservation Division, the Oklahoma Oil and Gas Conservation Division and the Alaska Oil and Gas Conservation Commission.

The objective is to characterize produced water quality and management practices for the handling, treating and disposing of produced water from conventional oil and gas operations throughout the industry nationwide. Water produced from these operations vary 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 which best minimizes environmental impacts.

This will be accomplished by compiling 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 thereby allowing 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.

A case study will be conducted in Wyoming to validate the applicability of the GIS analysis tool for watershed evaluations under real world conditions. The results of the partnered research will be shared utilizing proven methods, such as on the IOGCC Website, preparing hardcopies of the results and distribution of documented case studies and development of reference and handbook components to accompany the interactive internet-based GIS watershed analysis tool. Additionally, there will be several technology transfer seminars and presentations. The goal is to maximize the recovery of our nations’ energy reserves.

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## **LISTS OF GRAPHICAL MATERIALS**

**None**

## INTRODUCTION

This is the second semi-annual Technical Progress Report for the Department of Energy (DOE) project titled *Identification, Verification and Compilation of Produced Water Management Practices for Conventional Oil and Gas Production Operations* submitted by the Interstate Oil and Gas Compact Commission (IOGCC) under DOE grant number DE-FC26-04NT15545. This report details progress for the months of March through August of 2005 completed by the IOGCC and ALL Consulting (ALL) team for the project. This report details the tasks completed, tasks in progress, problems encountered, problems resolved, miscellaneous project activities, and tasks to be conducted over the next quarter.

## EXECUTIVE SUMMARY

A Project Advisory Council (PAC) kickoff meeting was held on November 1, 2004 at the Department of Energy (DOE) National Environmental Technology Laboratory (NETL) offices in Tulsa, Oklahoma. Discussions during this meeting involved additional PAC members and phase I tasks, schedules and work plans.

From research conducted a summary document titled *Technical Summary of Oil & Gas Produced Water Treatment Technologies* was produced in draft form as a working document.

Research has begun on Phase I and II tasks and a project Website has been developed as part of the technology transfer and communication phase of the project. Presentations have also been provided at a Ground Water Protection Council (GWPC) meeting and at a DOE project meeting for the BLM, DOE and GWPC.

## **EXPERIMENTAL**

There have been no experimental methods used to date in this project.

# RESULTS AND DISCUSSION

*Project Status Report: March-August, 2005*

*IDENTIFICATION, VERIFICATION AND COMPILATION OF PRODUCED  
WATER MANAGEMENT PRACTICES FOR CONVENTIONAL OIL AND GAS PRODUCTION  
OPERATIONS*

This report details progress for the months of March through August 2005 completed by the ALL Consulting (ALL) team for the project. The report details, tasks completed, tasks in progress, problems encountered, problems resolved, miscellaneous project activities, and tasks to be conducted over the next quarter.

## TASKS COMPLETED

No tasks have been fully completed to-date.

## TASKS-IN-PROGRESS

The Project Advisory Council (PAC) held a meeting in May of 2005 at the Midyear Issues Summit in Anchorage, AK. IOGCC and ALL team members have also contacted various PAC members to assist in field reconnaissance.

**Task 1** involves research relevant to produced water management regulations. General research has been conducted on existing and planned changes to regulations and identifying regulatory barriers. In addition, various state and federal regulations have been reviewed and team members have also attended meetings in Wyoming and Montana relative to issues such as watershed assimilative capacity, surface discharge, and water management regulatory and planning oriented meetings (e.g., Montana Board of Environmental Review (MBER) meetings concerning water management planning and requirements for coal bed natural gas development). In addition, researchers have attended federal public meetings concerning water management activities and have also met with a variety of state and federal regulatory officials in several states. For instance, research team members have attended meetings of the Montana HB790 subcommittee relative to issues pertaining to water management and the subcommittee's view on various water management practices.

**Task 2** involves Identifying Current and Emerging Produced Water Management Practices. From the research conducted, a summary document titled TECHNICAL SUMMARY OF OIL & GAS PRODUCED WATER TREATMENT TECHNOLOGIES was produced in draft form as a working document. This document describes and summarizes various produced water treatment systems developed by oil and gas producers, research organizations, water treatment service companies, and universities. Produced water treatment technologies are a growing concern with very large investments by industry and manufacturers as well as DOE and is a critical aspect to be addressed in the project. In addition, continued work on a variety of water management practices have been researched with that work ongoing. Research staff have visited a

number of water treatment systems currently used as well as those that are under development (largely in the Powder River Basin of Montana and Wyoming). Research

team members have also began compiling a broad array of water management practices identified from field reconnaissance, interviews, and research.

**Task 3** involves performing Field Reconnaissance on various sites to get a rounded impression of produced water management practices under varying regional conditions. Approximately 40 sites have been visited in Alabama, Alaska, Kansas, Montana, North Dakota, Oklahoma, Texas, and Wyoming. Site visit summaries have been or are under preparation for each site and vary in detail. Each site visit summary includes general information about the site (State, County, Basin, etc), a description of the produced water management practice in use, any environmental impacts and/or benefits, relevant cost information, regulatory issues or concerns, and a photo log depicting what was noted at the site. The research team anticipates conducting an additional 10-30 site visits in 2005.

**Task 4** involves assessing and evaluating the data collected during the research performed in Tasks 1.0 and 2.0, and the field reconnaissance performed in Task 3.0. The data is currently being evaluated in an attempt to regionally categorize the United States in terms of which produced water management practices are applicable and appropriate in different regions/geologic and/or geographic basins of the country. The results will be compiled, along with other research findings of relevance, in a document titled *A Guide to Practical Management of Produced Water from Onshore Oil and Gas Operations in the United States*. This document is currently under development.

A project web-site was developed as part of the technology transfer and communication phase of the project and put on-line ([www.all-llc.com/iogcc/prodwtr](http://www.all-llc.com/iogcc/prodwtr)). The web site includes basic information on the project. Presently, the above referenced paper can be downloaded from the site, **and the site visit summaries will be made available on the website soon.** The site is evolving.

Also as part of the technology transfer aspects of the project, ALL staff have presented information on produced water management practices at a Ground Water Protection Council Meeting and at a meeting DOE project meeting for federal land access held by BLM, DOE and the GWPC.

### **Problems Encountered**

None Report

### **Problems Resolved**

N/A

### **Miscellaneous Project Activities**

Research team members have held several discussions with industry and regulatory officials since the start of the project. Interest by industry has exceeded expectations and the researchers are considering the addition of sites to be considering in the project at the request of industry.

In addition, the researchers have identified additional potential case studies and will be working with the PAC and industry on the appropriateness of each project.

## **CONCLUSIONS**

Thus far PAC meetings were held on November 1, 2004 at the Tulsa, Oklahoma offices of the DOE-NETL and on May 13, 2005 in conjunction with the IOGCC 2004 Mid-Year Issues Summit held in Anchorage, Alaska. General research has been conducted on existing and planned changes to regulations and identifying regulatory barriers. A Website has been constructed to allow PAC members and other key constituents to update themselves on the progress of the project.

It has been identified that produced water treatment technologies are a growing concern with very large investments by industry and manufacturers as well as DOE and is a critical aspect to be addressed in the project. A third PAC meeting is scheduled for September 16, 2005 in Jackson Hole, Wyoming, which will be held in conjunction with the IOGCC 2005 Annual Meeting. It is anticipated that we will have at least one new PAC member from the public sector participate at this meeting.

## REFERENCES

None

## **BIBLIOGRAPHY**

None

## **LISTS OF ACRONYMS AND ABBREVIATIONS**

AOGCC	Alaska Oil and Gas Conservation Commission
BLM	Bureau of Land Management
DOE	Department of Energy
GIS	Geographic Information System
IOGCC	Interstate Oil and Gas Compact Commission
MBOGC	Montana Board of Oil and Gas Conservation
NETL	National Energy Technology Laboratory
PAC	Project Advisory Committee
WOGCC	Wyoming Oil and Gas Conservation Commission

## APPENDICES

None