Evaluations of Radionucides of Uranium, Thorium, and Radium Associated with Produced Fluids, Precipitates, and Sludges from Oil, Gas, and Oilfield Brine Injection Wells in Mississippi

DE-FC26-02NT15227

Program
This project was selected in response to DOE's Oil Exploration and Production solicitation DE-PS26-01NT41048, focus area Effective Environmental Protection. The goal of the program was to reduce compliance costs and improve environmental performance by providing lower-cost technologies and/or sound scientific bases for cost-effective, risk-based regulatory decisions.

Project Goal
The goal of the project was to produce baseline, scientifically defensible information regarding the radionuclides contained in produced waters and scales associated with hydrocarbon production in Mississippi.

Performer
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Project Results
The project produced the most comprehensive data set regarding the radioactive materials produced by hydrocarbon production in Mississippi. The amounts of radioactive elements in the produced waters and scales were identified, concentrations and distributions determined, and suggestions made to industry as how to best manage these radiation concerns in an environmentally responsible manner.

Benefits
A lack of information regarding the production of radioactive materials from hydrocarbon production in Mississippi was a concern that was problematic to the industry. Legal and regulatory actions were proceeding without the necessary knowledge base from which to make responsible decisions. This project has produced a set of information from which meaningful decisions can be made by government agencies. This project also removes much of the misinformation about radioactive materials in exploration and production operations that had been circulating prior to completion of the project. The public now has a set of defensible information from which it can make reasonable decisions or express its concerns.

The project also has allowed academia and the hydrocarbon industry to work jointly to determine the best manner in which these radiation concerns can be mitigated. A set of elements of best practices was produced, in consultation with industry, for use by the industry.

Background
The presence of radionuclides resulting from hydrocarbon production has a controversial history in Mississippi. A lack of Mississippi-specific information regarding the radioactive concerns associated with production had allowed misinformation and incomplete data to be used inappropriately. The industry had little information to defend its position, a lack addressed by this project. The project produced defensible information that can be used by governmental agencies to access the need for regulations as well as by the public to judge environmental risks verses the value of hydrocarbon production.

Project Summary
The project yielded these conclusions:

- Low concentrations of radionuclides (radium 226 and 228) in all produced waters were identified, but scale production-which is dependent on other ions-is not uniformly distributed across the state.
- Production from the Mississippi Interior Salt Basin is most likely to produce radioactive scales.
- Leaching experiments suggest that small quantities of radionuclides from the scales can become bioavailable through a combination of cation exchange and microbial activity in common soils.

This project consisted of both field and laboratory activities. Brines and scales were sampled from various fields and prepared for lab determination of their radioactive content. The results of the lab analysis were data-based and used to investigate any potential correlations among brine chemistry, producing reservoir, and radionuclide content. The database also was used to examine the spatial relationships between production and radionuclide content.

All of these data were used, in consultation with industry, to construct a set of elements of best practices for those in the industry who must deal with radioactive scales.

Current Status (October 2005)
Since completion of the project, the emphasis has been to identify an economically viable means of disposing of radioactive scales. Significant interest has been identified in the environmental industry to identify such a methodology.

Publication
Swann, C.T., Ericksen, Rick, Kuszmaul, Joel, and Matthews, J.C., 2004, Evaluations of radionuclides of uranium, thorium, and radium associated with produced fluids, precipitates, and sludges from oil, gas, and oilfield brine injection wells in Mississippi: Final Technical Report, submitted to the U.S. Department of Energy, 93 p.

Project Start: April 22, 2002
Project End: December 31, 2003

Anticipated DOE Contribution: $202,962
Performer Contribution: $50,881 (20% of total)

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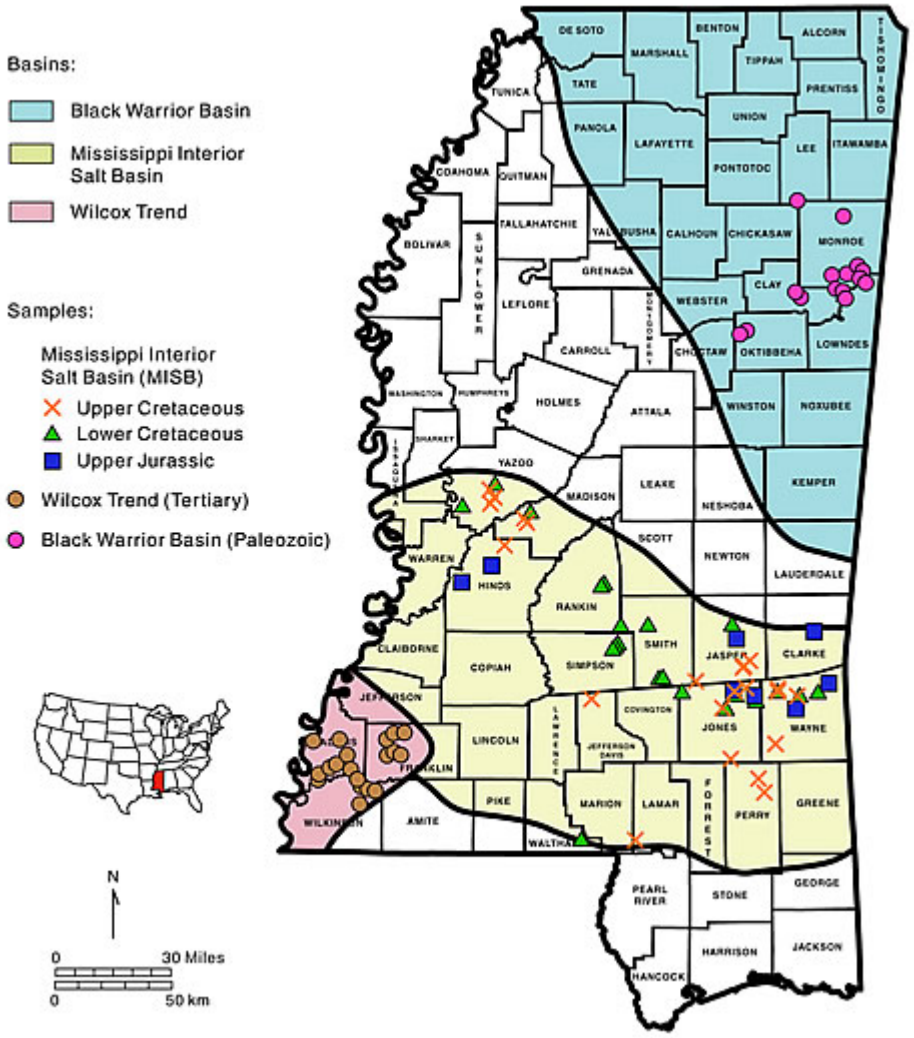
View of a typical oilfield sampling site in the Black Warrior Basin of Mississippi.



Map showing the major geologic trends, oil and gas production areas, and project sampling locations in Mississippi.