

Report Title

Basin Analysis and Petroleum System Characterization and Modeling, Interior Salt Basins,
Central and Eastern Gulf of Mexico

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Abstract

The principal research effort for Year 2 of Phase 2 (Concept Demonstration) of the project is Mesozoic (Bossier) petroleum system characterization and modeling and refined resource assessment. The necessary software applications have been acquired to accomplish this work. No major problems have been encountered to date, and the project is on schedule.

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Basin Analysis and Petroleum System Characterization and Modeling, Interior Salt Basins, Central and Eastern Gulf of Mexico

Fourth Quarter Report for Year 1, Phase 2
April 1, 2007—June 30, 2007

Introduction

The University of Alabama and Louisiana State University have undertaken a cooperative 5-year, fundamental research project involving sedimentary basin analysis and petroleum system characterization and modeling of the North Louisiana Salt Basin and Mississippi Interior Salt Basin. According to the USGS, the hydrocarbon volume of these basins ranks them in the top 8% of the most petroliferous basins of the world.

Executive Summary

The principal research effort for Year 2 of Phase 2 (Concept Demonstration) of the project is Mesozoic (Bossier) petroleum system characterization and modeling and refined resource assessment. The necessary software applications are being acquired to accomplish this work. No major problems have been encountered to date, and the project is on schedule.

Project Objectives

The principal objectives of the project are to develop through basin analysis and modeling the concept that petroleum systems acting in a basin can be identified through basin modeling and to demonstrate that the information and analysis resulting from characterizing and modeling of these petroleum systems in the North Louisiana Salt Basin and the Mississippi Interior Salt Basin can be used in providing a more reliable and advanced approach for targeting stratigraphic traps and specific reservoir facies within a geologic system and in providing a refined assessment of undiscovered and underdeveloped reservoirs and associated oil and gas resources.

Experimental

Work Accomplished

Other Mesozoic Petroleum Systems—Work to characterize and model the Smackover petroleum system in the North Louisiana Salt Basin has been completed. Petromod software applications have been acquired by the UA to accomplish the hydrocarbon migration pathway flow modeling for the Smackover and other Mesozoic (Bossier) petroleum systems. The migration modeling has been completed by Peng Li, Ph. D. graduate student. The Bossier Shale has been identified as a potential Mesozoic source rock. Bennett Bearden, geophysicist, and Victor Ramirez, M. S. graduate student, have completed their study of the seismic data for the basin and are in the process of building a

characterization model for the Bossier Shale, a potential Mesozoic source rock. Additional core rock samples are being acquired by Don Goddard, LSU for source rock characterization of the Bossier Shale.

Technology Transfer— A technology transfer workshop reporting the results from Phase 1 of this project was conducted in Shreveport, Louisiana on March 27, 2007.

Work Planned (Phase 2)

Other Mesozoic Petroleum Systems—Work on characterizing and modeling the Bossier Shale will continue using seismic sections integrated with well log data because of the limited well log data available for this unit in the basin (Table 1). Bennett Bearden, geophysicist, and Victor Ramirez, graduate student are working on this integration. Don Goddard continues to evaluate cores for potential geochemical analysis of the Bossier shale samples for source rock characterization.

Refined Resource Assessment—The results of the undiscovered and underdeveloped reservoir assessment, based on basin analysis, will be refined based on the results of the petroleum system characterization and modeling.

**Table 1
Milestone Chart—Year 5**

	M	J	J	A	S	O	N	D	J	F	M	A
Mesozoic Petroleum System												
Refined Resource Assessment												
Work Planned												
Work Accomplished	xxx											

Results and Discussion

The analysis of the source rock potential of the Bossier has required the study of seismic data from the North Louisiana Salt Basin. To accomplish this, Bennett Bearden, geophysicist at the University of Alabama, has been added to the project research team. The project team has studied seismic data from the basin and is in the process of building a characterization model for this potential source rock. Roger Barnaby has left LSU, and Marty Horn has been added to the project by LSU.

Conclusions

The project work is on schedule.

References

Evans, R., 1987, Pathways of migration of oil and gas in the south Mississippi Salt Basin: GCAGS Transactions, v. 37, p. 75-86.

Mancini, E.A., Parcell, W.C., and Puckett, T.M., 1999, Modeling of the burial and thermal histories of strata in the Mississippi interior salt basin: GCAGS Transactions., v. 49, p. 332-341.

Mancini, E.A., Parcell, W.C., Puckett, T.M., and Llinas, J.C., 2001, Topical Report 4, Basin and petroleum migration modeling of the Mississippi Interior Salt Basin, DOE Report, 46 p.

Mancini, Ernest A., and Puckett, T.M., 2002, Transgressive-regressive cycles: application to petroleum exploration for hydrocarbons associated with Cretaceous shelf carbonates and coastal and fluvial-deltaic siliciclastics, northeastern Gulf of Mexico, Sequence Stratigraphic Models for Exploration and Production: Proceedings of the 22nd Annual Research Conference, Gulf Coast Section, SEPM Foundation, p. 173-199.

Mancini, E.A., Parcell, W.C., Puckett, T.M., Llinas, J.C., Kopaska-Merkel D.C. and Townsend, R.N., 2002, Basin analysis of the Mississippi Interior Salt Basin and petroleum system modeling of the Jurassic Smackover Formation, eastern Gulf Coastal Plain, DOE Report, DE-FG22-96BC14946, 487 p.

Mancini, E.A., Aharon, P., Goddard, D.A., and Barnaby, R., 2006, Basin analysis and petroleum system characterization and modeling, Interior Salt Basins, Central and Eastern Gulf of Mexico, DOE Report, DE-FC26-03NT15395, 422 p.

Nunn, J.A., 1984, Subsidence histories for the Jurassic sediments of the northern Gulf Coast: thermal-mechanical model: Third Annual Research Conf., Gulf Coast Section, SEPM Foundation, p. 309-322.

Puckett, T.M., B.L. Bearden, E.A. Mancini, and B.J. Panetta, 2000, Topical Report 3, Petroleum plays and underdeveloped reservoirs in the Mississippi Interior Salt Basin, U.S. DOE Report, 105 p.

Waples, D. W., 1994, Modeling of sedimentary basins and petroleum systems, Petroleum System - from source to trap: AAPG Memoir 60, p. 307-322.

Zimmerman, R.K., 1998, Chronology of oil generation in Louisiana's fractured Austin Chalk deep horizontal drilling trend: GCAGS Transactions, v. 48, p. 517-525.

Zimmerman, R.K., 1998, Estimating Louisiana's probable initial in-place oil reserves: Basin Research Institute Bulletin, LSU, p. 7-29.

Zimmerman, R.K., 1999, Potential oil generation capacity of the North Louisiana hydrocarbon system: GCAGS Transactions, v. 49, p. 532-540.

Zimmerman, R.K., and Sassen, R., 1993, Hydrocarbon transfer pathways from Smackover source rocks to younger reservoir traps in the Monroe Gas Field, northeast Louisiana: GCAGS Transactions, v. 43, p. 473-480.

Zimmerman, R.K., and Shi, Y., 1996, Simulation and modeling of the hydrocarbon generation migration-mixing processes in Louisiana sedimentary basins: GCAGS Transactions, v. 46, p. 485.