

**STUDY TITLE:** Marginal Production in the Gulf of Mexico – Economic, Environmental, and Regulatory Perspective

**REPORT TITLE:** Assessment of Marginal Production in the Gulf of Mexico and Lost Production from Early Decommissioning

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**SPONSORING OCS REGION:** Gulf of Mexico

**APPLICABLE PLANNING AREA:** Western, Central, Eastern

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**CUMULATIVE PROJECT COST:** \$167,110.00

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**KEY WORDS:** Gulf of Mexico; offshore structures; marginal production; decommissioning; hurricane; economics

**BACKGROUND:** All producing properties are unique and have costs and benefits specific to each stage of its life cycle. The capital intensive expenditures associated with drilling offshore wells and installing infrastructure during the early stages of development are usually quickly recovered during the first few years of production and operations are highly profitable during this time. As fields mature and operations transition into the later half of their life cycle, decreasing revenue streams, higher operating costs, and fewer upside opportunities lead to declining profitability. Eventually, all properties are abandoned when the value of production is less than the cost of operations. Assets transition to marginal status at some point during their life cycle and may spend a considerable amount of time in this state before production is no longer economic.

**OBJECTIVES:** The purpose of this study is twofold: (1) quantify the oil and gas production that was lost from hurricane destruction in the Gulf of Mexico during 2004 and 2005, and (2) investigate the role marginal production in the Gulf has contributed to historic production and is expected to contribute to future production.

**DESCRIPTION:** Hurricanes Ivan, Katrina, and Rita passed through the Gulf of Mexico during 2004 and 2005 and resulted in the largest number of destroyed and damaged

offshore structures in the history of Gulf operations. In the final official government assessment, a total of 120 platforms were destroyed, including one deepwater floating structure. According to Minerals Management Service production data, 21 destroyed platforms have restarted production, but by December 2008, only two of these structures were still producing. Gas structures appear more successful than oil structures in redevelopment and apparently present better economics and production potential. Eleven of the 14 redevelopment plans on leases that contained destroyed infrastructure are for gas structures. We review pre- and post-hurricane production, revenue, and drilling characteristics for the collection of destroyed structures that have been redeveloped and compare against structures that have not submitted redevelopment plans.

In June 2008, there were 3,847 structures in the Outer Continental Shelf of the Gulf of Mexico associated with the production of oil and gas. About 65 percent of the inventory, or 2,514 structures, were producing in 2008, with the remaining structures either serving in an auxiliary role or no longer in production. Structures in water depth less than 1,000 ft constitute the vast majority of the oil and gas producing assets but contribute less than 30 percent of the Gulf's annual hydrocarbon production. We categorize shallow water committed assets according to their age of production and the nature of their production profile, and forecast production within each asset category. We describe the forecast methodology and illustrate each asset category with examples.

A forecast of marginal production of the current inventory of producing structures in the shallow water Gulf of Mexico is provided. We estimate the number of shallow water committed assets that are economic and marginal throughout a 60-year time horizon, and compute the expected quantity and value of the production and revenue streams. A meta evaluation procedure is adopted to simplify the results of our analysis. Model results are presented along with a description of the model framework.

**SIGNIFICANT CONCLUSIONS:** We estimate that about 35 MMBOE out of 48 MMBOE recoverable reserves from the 2004-2005 hurricane destroyed structures are accounted for in operator plans to redevelop. The discounted gross revenue estimates range from \$988 million (\$60/bbl) to \$2.32 billion (\$140/bbl).

For the inventory of producing structures circa January 2007, the cumulative hydrocarbon production from the inventory of producing assets is estimated to be 1.056 Bbbl of oil and 13.3 Tcf of gas. Marginal production is expected to contribute 4.1 percent of the total oil production and 5.4 percent of gas production from the committed assets in the Gulf.

**STUDY RESULTS:** We developed structure-specific production models from the collection of destroyed assets and estimated remaining reserves and their likely value to future production in the Gulf. We also reviewed operator development plans and described a redevelopment matrix based on remaining reserves and production rates.

We operationalized the definition of marginal production based on revenue threshold and classified and forecast economic and marginal production in the shallow water Gulf. The number of marginal structures and the amount and value of marginal production

was forecast for a 60-year time horizon. A simulation strategy was employed that combined scenario analysis and a meta framework to investigate the impact and sensitivity of input variables on model output. Count and production trajectories were presented for economic and marginal structures for oil, gas, and BOE forecasts.

**STUDY PRODUCTS:** Kaiser, M.J., Y Yu, and A.G. Pulsipher. 2010. Assessment of Marginal Production in the Gulf of Mexico and Lost Production from Early Decommissioning. U.S. Dept. of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2010-007. 199 pp.

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