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STUDY TITLE: Capital Investment Decision Making and Trends: Implications on Petroleum Resource Development in the U.S. Gulf of Mexico

REPORT TITLE: Fiscal System Analysis: Concessionary and Contractual Systems Used in Offshore Petroleum Arrangements

CONTRACT NUMBER: 1435-01-01-30951-18178

SPONSORING OCS REGION: Gulf of Mexico

APPLICABLE PLANNING AREA: Gulfwide

FISCAL YEAR(S) OF PROJECT FUNDING: 2002; 2003; 2004

COMPLETION DATE OF REPORT: April 2004

COST(S): FY 2002: $74,475.67; FY 2003: $25,720.85; FY 2004: $4.48; CUMMULATIVE PROJECT COST: $100,201.00

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KEY WORDS: Gulf of Mexico; contracts; economics; offshore; fiscal system analysis; modeling.

BACKGROUND: The economics of the upstream petroleum business is complex and dynamic. Each year anywhere between 25-50 countries in the world offer license rounds, 20-30 countries introduce new model contracts or fiscal regimes, and nearly all countries revise their tax laws during their annual budgetary process.

The focus of fiscal system analysis depends upon your perspective. From the host government's point of view, focus is usually maintained on the division of profit (take) between the contractor and government. From the operator's perspective, economic measures such as the present value and rate of return describing the expected profitability of the project are of primary interest.

OBJECTIVES: The manner in which the fiscal terms and parameters of the contract impact system measures are complicated and not well understood. The purpose of this report is to quantify the influence of private and market uncertainty on the computation

of the economic and system measures of a petroleum producing field governed under concessionary and contractual fiscal system arrangements.

DESCRIPTION: The economic and system measures associated with hydrocarbon production are subject to various levels of private and market uncertainty. This paper develops an analytic framework to quantify the influence of private and market uncertainty under contractual and concessionary fiscal systems.

The impact of changes in system parameters is usually presented as a series of graphs or tables that depict the present value, rate of return, or take (or whatever measure is under consideration) as a function of one or more variables under a “high” and “low” case scenario. While useful, this approach is generally piecemeal and the results are anchored to the initial conditions employed. A more general and concise approach to fiscal system sensitivity is developed.

SIGNIFICANT CONCLUSIONS: A constructive approach to fiscal system analysis was developed to isolate variable interaction and determine the manner in which private and market uncertainty impact take and the economic measures associated with a field. Functional relations were developed by computing the component measures for parameter vectors selected within a given design space. The relative impact of the parameters and the manner in which the variables are correlated was also established in a general manner. The methodology was illustrated on hypothetical oil fields and case studies for the deepwater Na Kika development and the Angolan deepwater Girassol development were considered. The impact of royalty relief on the field economics of Na Kika and the impact of fiscal design on the field economics of Girassol were examined.

STUDY RESULTS: The paper develops an analytic framework to quantify the influence of private and market uncertainty on the economic and system measures associated with a field. A “meta-modeling” approach is employed to construct regression models of the system measures in terms of various exogenous, fiscal, and user-defined parameters. In meta-modeling, a model of the system is first constructed, and then meta data is generated for variables simulated within a specified design space. Linear models are then constructed from the meta data. Meta-modeling is not a new construct, but as applied to fiscal system analysis is new, useful, and novel, being an especially good way to understand the structure and sensitivity of fiscal systems to various design parameters.

STUDY PRODUCTS: Kaiser, M.J. and A.G. Pulsipher. 2004. Fiscal system analysis: Concessionary and contractual systems used in offshore petroleum arrangements. U.S. Department of the Interior, Minerals Management Service, Gulf of Mexico OCS Region, New Orleans, LA. OCS Study MMS 2004-016. 78 pp.