

World Petroleum Resources Project

Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of Puerto Rico and the Puerto Rico–U.S. Virgin Islands Exclusive Economic Zone, 2013

Using a geology-based assessment methodology, the U.S. Geological Survey estimated means of 19 million barrels of undiscovered, technically recoverable oil and 244 billion cubic feet of undiscovered natural gas in the Puerto Rico–U.S. Virgin Islands Exclusive Economic Zone.

Introduction

The U.S. Geological Survey (USGS) assessed the potential for undiscovered conventional oil and natural gas resources of Puerto Rico and the Puerto Rico–U.S. Virgin Islands Exclusive Economic Zone (EEZ; EEZ–Scan Scientific Staff, 1987) (fig. 1). The assessment was based on the postulated presence and viability of petroleum-system elements including petroleum source rocks (quality, source-rock maturation, generation, and migration), reservoir rocks (depositional environments, sequence stratigraphy, and petrophysical properties), traps (type and formation), and timing considerations. Using this geologic framework, the USGS defined three hypothetical petroleum systems and five assessment units (AUs) (table 1). This study assessed the potential for technically

recoverable resources in new field discoveries; economic resources were not evaluated.

Five hypothetical AUs were geologically defined to encompass those areas of the EEZ that were further evaluated for potential oil and gas resources (fig. 1): North Coast Basin AU, San Juan Basin AU, South Coast Basin AU, North Mona Basin AU, and the Muertos Deformed Belt AU. The five AUs combine to form about 13 percent of the total area of evaluation. Most of the evaluation area, including Atlantic oceanic crust, Caribbean oceanic crust, Puerto Rico Trench area, and shelf areas have no petroleum potential and were not considered further. In addition, there is no potential for oil and gas resources within the onshore area of Puerto Rico or the U.S. Virgin Islands.



Figure 1. Map showing the extent of the Puerto Rico–U.S. Virgin Islands Exclusive Economic Zone (red line) and the five geologic assessment units (AUs) defined for this study (yellow polygons).

Table 1. Puerto Rico–U.S. Virgin Islands Exclusive Economic Zone assessment results.

[MMBO, million barrels of oil; BCFG, billion cubic feet of gas; MMBNGL, million barrels of natural gas liquids. Results shown are fully risked estimates. For gas accumulations, all liquids are included as NGL (natural gas liquids). Undiscovered gas resources are the sum of nonassociated gas (gas in gas accumulations) and associated gas (gas in oil accumulations). F95 represents a 95-percent chance of at least the amount tabulated; other fractiles are defined similarly. Fractiles are additive under the assumption of perfect positive correlation. TPS, Total Petroleum System; AU, Assessment Unit. Gray shading indicates not applicable]

Total Petroleum Systems (TPS) and Assessment Units (AU)	AU Proba- bility	Field Type	Total Undiscovered Resources											
			Oil (MMBO)				Gas (BCFG)				NGL (MMBNGL)			
			F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Paleogene TPS														
North Coast Basin AU (61170201)	0.04	Oil	Not quantitatively assessed											
		Gas												
San Juan Basin AU (61170202)	0.04	Oil	Not quantitatively assessed											
		Gas												
North Mona Basin AU (61170203)	0.02	Oil	Not quantitatively assessed											
		Gas												
Paleogene TPS														
South Coast Basin AU (61160201)	0.008	Oil	Not quantitatively assessed											
		Gas												
Upper Cretaceous-Tertiary TPS														
Muertos Deformed Belt AU (61160101)	0.20	Oil	0	0	120	19	0	0	236	39	0	0	9	1
		Gas					0	0	1,296	205	0	0	30	5
Total conventional resources			0	0	120	19	0	0	1,532	244	0	0	39	6

Resource Summary

The areas represented by the AUs of the Puerto Rico–U.S. Virgin Islands EEZ, with the exception of the Muertos Deformed Belt AU, have been considered in previous oil and gas investigations (Zapp and others, 1948; Monroe, 1973; Meyerhoff and others, 1983; Larue and Torrini, 1995). In this study the postulated petroleum-system elements of the North Coast Basin AU, San Juan Basin AU, South Coast Basin AU, and the North Mona Basin AU are highly uncertain resulting in low geologic probabilities (that is, the geologic probability of at least one oil or gas accumulation of 5 million barrels of oil equivalent or greater based on postulated petroleum-system elements) (table 1) and were not quantitatively assessed. The petroleum-system elements of the Muertos Deformed Belt AU, although largely uncertain and risked, resulted in geologic AU probability above the threshold of 10 percent, and the AU was assessed quantitatively (table 1). Within the portion of the Muertos Deformed Belt AU that is part of the Puerto Rico–U.S. Virgin Islands EEZ, we estimated fully risked means of 19 million barrels of oil, 244 billion cubic feet of gas, and 6 million barrels of natural gas liquids. The assessment of undiscovered petroleum resources at the 95th and 50th fractiles (table 1) is zero and reflects the low geologic AU probability of 20 percent and high geologic uncertainty on petroleum-system elements.

For Further Information

Supporting geologic studies of the Puerto Rico–U.S. Virgin Islands EEZ assessment are in progress. Assessment results are available at the USGS Energy Program Web site at <http://energy.usgs.gov/OilGas/>.

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