

National Assessment of Oil and Gas Fact Sheet

Assessment of Undiscovered Oil and Gas Resources of the Montana Thrust Belt Province, 2002

Using a geology-based assessment methodology, the U.S. Geological Survey estimated a mean of 8.6 trillion cubic feet of undiscovered natural gas, a mean of 109 million barrels of undiscovered oil, and a mean of 240 million barrels of natural gas liquids in the Montana Thrust Belt Province of northwestern Montana.

Introduction

The U.S. Geological Survey (USGS) recently completed an assessment of the undiscovered oil and gas potential of the Montana Thrust Belt Province of northwestern Montana (fig. 1). The assessment of the Montana Thrust Belt Province is based on the geologic elements of each Total Petroleum System defined in the province, including hydrocarbon source rocks (source-rock maturation, hydrocarbon generation and migration), reservoir rocks (sequence stratigraphy and petrophysical properties), and hydrocarbon traps (trap formation and timing). Using this geologic framework, the USGS defined seven Total Petroleum Systems (TPS) and nine Assessment Units within these Total Petroleum Systems and quantitatively estimated the undiscovered oil and gas resources within seven of the nine Assessment Units (table 1).

Resource Summary

The USGS assessed undiscovered conventional oil and gas and continuous (unconventional) oil. The USGS estimated a mean of 8.6 trillion cubic feet of gas (TCFG), a mean of 109 million barrels of oil (MMBO), and a mean of 240 million barrels of total natural gas liquids (MMBNGL) in five Total Petroleum Systems. Nearly all (99 percent) of the undiscovered gas resource is conventional, whereas about 75 percent of the undiscovered oil resource is conventional (table 1). Of the 8.6 TCFG, about 7.7 TCFG is estimated to be in the Paleozoic/Mesozoic Composite Total Petroleum System of the Thrust Belt, and 0.68 TCFG is in the Central Montana Trough Paleozoic Composite Total Petroleum System of the Helena Salient. The remainder of the gas (about 0.28 TCFG) is associated/dissolved gas in oil accumulations (table 1). Because the USGS assessment



Figure 1. Montana Thrust Belt Province of northwestern Montana.

of natural gas is for total gas, the conventional gas in these TPS may contain significant percentages of gases other than hydrocarbon gases, such as carbon dioxide.

The Tertiary Lacustrine Shale Total Petroleum System is estimated to contain a mean of about 69 MMB of conventional oil, whereas the Marias River Shale Total Petroleum System is estimated to contain about 28 MMB of continuous (unconventional) oil. The Bakken Formation and Jurassic/Cretaceous Total Petroleum Systems were not quantitatively assessed in this study.

Table 1. Montana Thrust Belt Province 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 fields, all liquids are included under the NGL (natural gas liquids) category. F95 denotes a 95-percent chance of at least the amount tabulated. Other fractiles are defined similarly. Fractiles are additive only under the assumption of perfect positive correlation. CBG, coal-bed gas. Shading indicates not applicable]

	Total Petroleum Systems (TPS) and Assessment Units (AU)	Field type	Total undiscovered resources											
			Oil (MMBO)				Gas (BCFG)				NGL (MMBNGL)			
			F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Conventional Oil and Gas Resources	Paleozoic/Mesozoic Composite TPS													
	Thrust Belt Gas AU	Gas					783.40	4,857.60	13,772.70	5,761.40	17.10	109.20	331.80	133.60
	Sawtooth Range Structure Gas AU	Gas					88.80	655.20	1,963.70	794.50	2.00	14.70	47.20	18.40
	Frontal Structures Oil and Gas AU	Oil	1.70	5.70	14.90	6.70	6.20	22.30	61.80	26.70	0.30	1.10	3.20	1.30
		Gas					135.50	963.90	2,901.10	1,165.30	6.60	48.40	153.90	60.30
	Central Montana Trough Paleozoic Composite TPS													
	Helena Salient Gas AU	Gas					67.80	517.80	1,627.90	638.50	1.50	12.00	40.40	15.30
	Blacktail Salient Paleozoic Composite TPS													
	Blacktail Salient Gas AU	Oil	1.30	4.70	12.00	5.40	3.70	13.70	37.70	16.30	0.20	0.70	2.00	0.80
	Tertiary Lacustrine Shale TPS													
Tertiary Basins Oil AU	Oil	8.80	58.20	164.60	68.80	15.10	101.50	309.30	124.10	0.50	3.60	11.50	4.50	
Total Conventional Resources		11.80	68.60	191.50	80.90	1,100.50	7,132.00	20,674.20	8,526.80	28.20	189.70	590.00	234.20	
Continuous Oil and Gas Resources	Bakken Formation TPS													
	Bakken Continuous Oil	Oil	Not quantitatively assessed											
	Marias River Shale TPS													
	Marias River Shale Continuous Oil	Oil	12.90	25.50	50.60	27.90	46.80	100.10	214.30	111.40	2.10	4.90	11.30	5.60
	Jurassic/Cretaceous TPS													
	Jurassic/Cretaceous Coal-Bed Gas	CBG	Not quantitatively assessed											
	Total Continuous Resources		12.90	25.50	50.60	27.90	46.80	100.10	214.30	111.40	2.10	4.90	11.30	5.60
Total Undiscovered Oil and Gas Resources		24.70	94.10	242.10	108.80	1,147.30	7,232.10	20,888.50	8,638.20	30.30	194.60	601.30	239.80	

For Further Information

Supporting geologic studies of Total Petroleum Systems and Assessment Units, and reports on the methodology used in the Montana Thrust Belt Province assessment, are in progress. Assessment results are available at the USGS Central Energy Team website: <http://energy.cr.usgs.gov/oilgas/noga/>

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