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World Petroleum Resources Project

Assessment of Undiscovered, Conventional Oil and Gas Resources of Mexico, Guatemala, and Belize, 2012

Using a geology-based assessment methodology, the U.S. Geological Survey estimated means of 19 billion barrels of oil and 83 trillion cubic feet of undiscovered natural gas resources in 10 geologic provinces of Mexico, Guatemala, and Belize.

Introduction

The U.S. Geological Survey (USGS) assessed the potential for undiscovered conventional oil and gas accumulations within priority geologic provinces of Mexico, Guatemala, and Belize as part of the USGS World Petroleum Resources Project. Ten priority geologic provinces were assessed in this study, which represent a complete reassessment of this area last published in 2000 (U.S. Geological Survey World Energy Assessment Team, 2000). The 10 geologic provinces include Burgos Basin, Tampico–Misantla Basin, Veracruz Basin, Tuxla Uplift, Saline–Comalcalco Basin, Villahermosa Uplift, Macuspana Basin, Campeche–Sigsbee Salt Basin, Yucatan Platform, and Sierra Madre de Chiapas-Peten Basin (fig. 1).

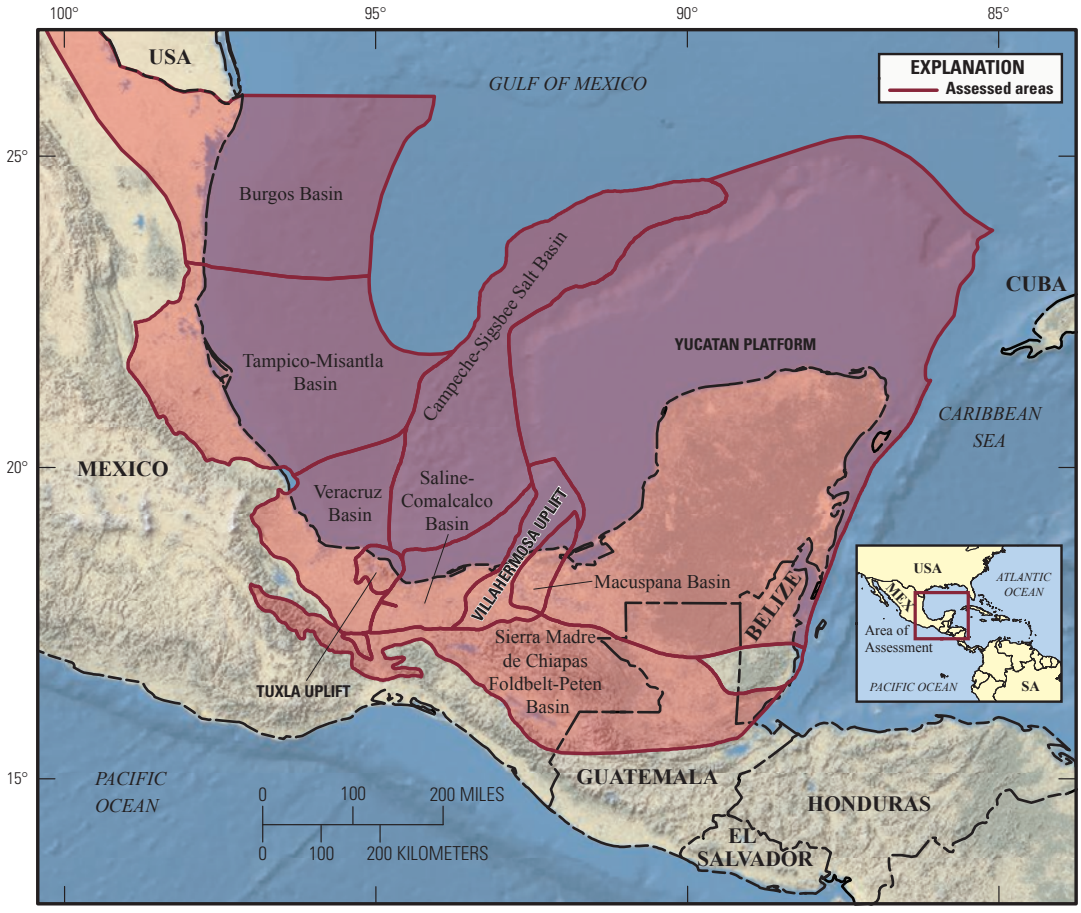

Figure 1. Locations of 10 priority geologic provinces of Mexico, Guatemala, and Belize assessed in this study of undiscovered, conventional oil and gas resources.

The methodology for the assessment included a complete geologic framework description for each province based mainly on published literature and definitions of petroleum systems and assessment units (AU) within these systems. Exploration and discovery history was a critical part of the methodology used to estimate sizes and numbers of undiscovered conventional accumulations. Each AU was assessed for undiscovered oil and nonassociated gas accumulations, and coproduct ratios were used to calculate the volumes of associated gas (gas in oil fields) and volumes of natural gas liquids.

Resource Summary

The USGS assessed undiscovered conventional oil and gas resources in 17 AUs within 10 geologic provinces, with the following estimated mean totals: (1) for conventional oil resources, 19,315 million barrels of oil (MMBO), with a range from 7,174 to 36,714 MMBO; (2) for undiscovered conventional gas, 82,891 billion cubic feet of gas (BCFG), with a range from 32,394 to 156,012 BCFG; and (3) for natural gas liquids (NGL), 1,720 MMBNGL, with a range from 666 to 3,258 MMBNGL.

Of the mean undiscovered conventional oil resource of 19,315 MMBO, about 75 percent (14,295 MMBO) is estimated to be in the offshore portions of AUs of three geologic provinces: Burgos Basin (Eocene−Miocene Sandstones AU, 6,065 MMBO); Tampico−Misantla Basin (Tampico Mesozoic−Cenozoic Reservoirs AU, 5,365 MMBO); and Campeche−Sigsbee Salt Basin (Salt Structures AU, 2,865 MMBO). Other significant AUs for undiscovered oil include the Salt Basin Reservoirs AU (1,137 MMBO) and the Reforma Trend Reservoirs AU (1,427 MMBO). The same three provinces are estimated to contain about 70 percent (58,355 BCFG) of the mean undiscovered conventional gas resources (Burgos Basin, 20,292 BCFG; Tampico−Misantla Basin, 24,282 BCFG; and Campeche−Sigsbee Salt Basin, 13,781 BCFG).

Some AUs within the provinces assessed in this study have long histories of exploration and production and represent an extreme level of exploration maturity, with minor potential for undiscovered resources. For example, the Golden Lane El Abra AU and Golden Lane Tamabra AU of the Tampico−Misantla Basin Province had initial oil discoveries in the 1920s, and few discoveries have been made since the 1970s. The Reforma Trend Reservoirs AU of the Villahermosa Uplift Province has seen more success with discoveries, but these are trending towards smaller field sizes. Exploration is immature in some AUs, such as the Platform Reservoirs and Southeast Yucatan Margin AUs of the Yucatan Platform Province, and in the clastic sequences of the offshore Burgos Basin and Tampico−Misantla Basin Provinces.

For Further Information

Supporting studies of the geologic models and the methodology used in the assessment of Mexican provinces are in progress. Assessment results are available at the USGS Energy Program website, *http://energy.usgs.gov/oilgas/*.

Reference Cited

U.S. Geological Survey World Energy Assessment Team, 2000, U.S. Geological Survey World Petroleum Assessment 2000—Description and results: U.S. Geological Survey Digital Data Series DDS-60, 4 CD-ROMs.

Mexico-Guatemala-Belize Assessment Team

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Table 1. Assessment results for undiscovered, conventional oil and gas resources for provinces of Mexico, Guatemala, and Belize.

[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 in gas fields) and associated gas (gas in oil fields). 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. Shading indicates not applicable]

Provinces, total petroleum systems (TPS), and assessment units (AU)	AU probability	Field type	Total undiscovered resources											
			Oil (MMBO)				Gas (BCFG)				NGL (MMBNGL)			
			F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Burgos Basin, Mesozoic-Cenozoic Composite TPS														
Upper Jurassic-Cretaceous Reservoirs AU	1.0	Oil	10	50	141	59	12	58	175	71	0	2	5	2
		Gas					80	522	1,449	613	2	13	39	16
Wilcox Lobo Sandstones AU	1.0	Oil	0	0	0	0	0	0	0	0	0	0	0	0
		Gas					465	1,495	3,161	1,614	9	29	67	32
Wilcox-Eocene Sandstones AU	1.0	Oil	0	0	0	0	0	0	0	0	0	0	0	0
		Gas					1,357	3,903	6,758	3,965	38	114	220	119
Frio-Vicksburg Sandstones AU	1.0	Oil	10	37	80	40	12	43	102	48	0	1	2	1
		Gas					2,184	6,535	11,286	6,609	61	189	368	199
Eocene-Miocene Sandstones AU	1.0	Oil	476	5,248	14,425	6,065	555	6,096	18,116	7,276	11	118	375	145
		Gas					17	82	225	96	0	2	5	2
Tampico-Misantla Basin, Mesozoic-Cenozoic Composite TPS														
Golden Lane El Abra Reservoirs AU	0.9	Oil	0	9	15	9	0	12	31	13	0	0	1	0
		Gas					0	18	41	19	0	1	1	1
Golden Lane Tamabra Reservoirs AU	1.0	Oil	9	49	225	75	12	70	332	107	0	2	10	3
		Gas					0	0	0	0	0	0	0	0
Tampico Mesozoic-Cenozoic Reservoirs AU	1.0	Oil	2,982	5,182	8,387	5,365	5,499	9,614	15,721	9,984	168	295	486	307
		Gas					5,964	13,168	25,854	14,159	154	343	682	370
Veracruz Basin, Mesozoic-Cenozoic Composite TPS														
Cretaceous-Cenozoic Reservoirs AU	1.0	Oil	37	85	189	95	47	114	270	130	0	0	1	0
		Gas					4,274	8,239	14,642	8,683	21	42	79	45
Tuxla Uplift, Mesozoic-Cenozoic Composite TPS														
Cretaceous-Cenozoic Reservoirs AU	1.0	Oil	4	15	82	25	5	20	114	35	0	0	0	0
		Gas					283	779	2,006	911	1	4	11	5
Saline-Comalcalco Basin, Mesozoic-Cenozoic Composite TPS														
Salt Basin Reservoirs AU	1.0	Oil	667	1,100	1,729	1,137	1,154	1,991	3,357	2,089	84	147	251	155
		Gas					261	621	1,598	731	1	4	13	5
Villahermosa Uplift, Mesozoic-Cenozoic Composite TPS														
Reforma Trend Reservoirs AU	1.0	Oil	587	1,297	2,699	1,427	1,803	4,078	9,082	4,586	19	43	99	49
		Gas					919	2,574	8,043	3,238	19	53	168	68
Macuspana Basin, Mesozoic-Cenozoic Composite TPS														
Mesozoic-Cenozoic Reservoirs AU	1.0	Oil	7	18	53	22	41	112	345	142	0	0	1	0
		Gas					102	315	1,093	416	0	1	5	2
Campeche-Sigsbee Salt Basin, Mesozoic-Cenozoic Composite TPS														
Salt Structures AU	1.0	Oil	1,304	2,677	5,079	2,865	4,198	8,805	17,043	9,484	27	57	112	61
		Gas					1,519	3,812	8,747	4,297	31	79	185	90
Yucatan Platform, Mesozoic-Cenozoic Composite TPS														
Platform Reservoirs AU	1.0	Oil	324	701	1,394	758	712	1,625	3,422	1,786	4	10	23	12
		Gas					0	0	0	0	0	0	0	0
Southeast Yucatan Margin Reservoirs AU	1.0	Oil	221	413	751	440	487	969	1,815	1,036	3	6	12	7
		Gas					0	0	0	0	0	0	0	0
Sierra Madre de Chiapas Foldbelt-Peten Basin, Mesozoic Composite TPS														
Chiapas-Peten Basin Reservoirs AU	1.0	Oil	536	892	1,465	933	432	720	1,184	753	13	23	37	24
		Gas					0	0	0	0	0	0	0	0
Total conventional resources			**7,174**	**17,773**	**36,714**	**19,315**	**32,394**	**76,390**	**156,012**	**82,891**	**666**	**1,578**	**3,258**	**1,720**

Pleistocene eolianite on the coast of Cancun, Quintana Roo, Mexico. Photograph by C.J. Schenk, U.S. Geological Survey, 2004.