

Assessment of Undiscovered Oil and Gas Resources in Tertiary Strata of the Gulf Coast, 2007

Using a geology-based assessment methodology, the U.S. Geological Survey estimated a mean of 113.7 trillion cubic feet of undiscovered natural gas, a mean of 690 million barrels of undiscovered oil, and a mean of 3.7 billion barrels of undiscovered natural gas liquids in onshore lands and State waters of the Gulf Coast.

(fig. 1). The assessment is based on geologic elements of a total petroleum system (TPS), including characterization of hydrocarbon source rocks (source-rock maturation, hydrocarbon generation and migration), reservoir rocks (sequence stratigraphy and petrophysical properties), and hydrocarbon traps (trap formation, timing, and seals). Using these criteria, the USGS defined an Upper Jurassic-Cretaceous-Tertiary Composite TPS for conventional oil and gas resources that extends around the entire Gulf of Mexico, including portions of both the United States and Mexico. However, the present assessment of undiscovered conventional oil and gas resources includes only that portion of the TPS that lies onshore and in State waters of the United States (fig. 1). In addition, the USGS defined three self-sourced coalbed gas TPSs. Two are entirely

Introduction

The U.S. Geological Survey (USGS) recently completed an assessment of the undiscovered oil and gas resources in Tertiary strata and coalbed gas resources in Cretaceous-Tertiary strata of the onshore areas and State waters of the Gulf Coast

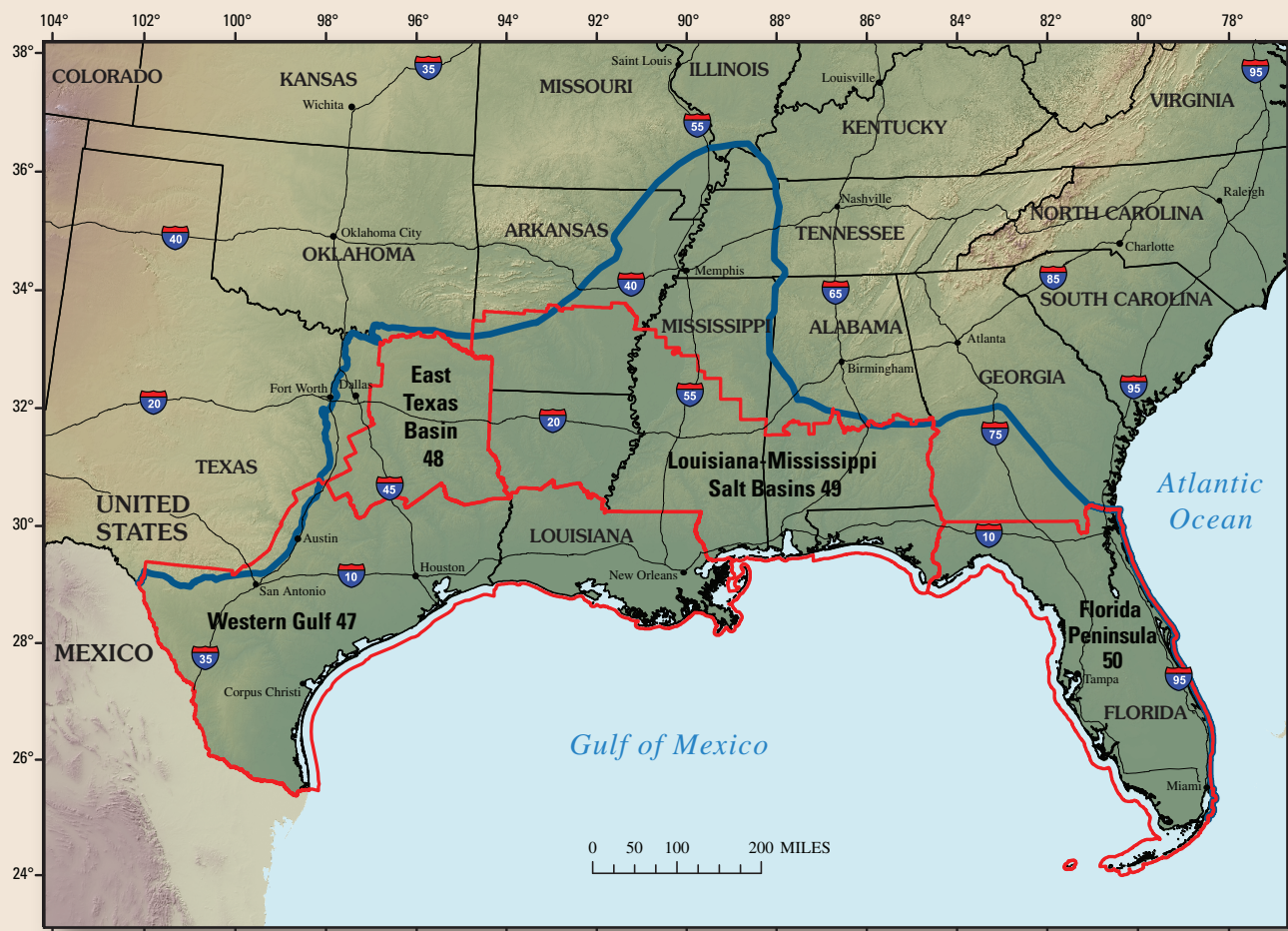


Figure 1. Map showing the part of the Upper Jurassic-Cretaceous-Tertiary Composite Total Petroleum System that is onshore and in State waters of the Gulf Coast of the United States (blue line). Province boundaries defined by the U.S. Geological Survey are indicated by red outlines.

Table 1. Gulf Coast 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). 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)	Field Type	Total Undiscovered Resources											
		Oil (MMBO)				Gas (BCFG)				NGL (MMBNGL)			
		F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Upper Jurassic-Cretaceous-Tertiary Composite TPS (504701)													
Wilcox Stable Shelf Oil and Gas AU (50470116)	Oil	12	49	111	54	8	33	83	38	0	1	3	1
	Gas					117	403	846	434	4	13	30	14
Wilcox Expanded Fault Zone Gas and Oil AU (50470117)	Oil	18	49	95	52	74	215	459	234	2	6	14	7
	Gas					714	2,114	4,299	2,264	20	61	136	68
Wilcox Slope and Basin Floor Gas AU (50470118)	Oil	0	0	0	0	0	0	0	0	0	0	0	0
	Gas					5,173	23,629	56,486	26,398	78	366	959	423
Wilcox-Lobo Slide Block Gas AU (50470119)	Oil	1	4	9	4	6	20	48	23	0	0	1	1
	Gas					1,543	6,803	15,732	7,498	24	109	276	125
Lower Claiborne Stable Shelf Gas and Oil AU (50470120)	Oil	3	7	13	7	7	19	40	21	0	0	1	0
	Gas					21	63	124	67	0	2	3	2
Lower Claiborne Expanded Fault Zone Gas AU (50470121)	Oil	1	3	8	4	6	16	43	19	0	1	3	1
	Gas					351	942	1,767	987	13	37	76	39
Lower Claiborne Slope and Basin Floor Gas AU (50470122)	Oil	0	0	0	0	0	0	0	0	0	0	0	0
	Gas					573	3,195	8,044	3,620	21	124	338	145
Lower Claiborne Cane River AU (50470123)	Oil	Not quantitatively assessed											
	Gas	Not quantitatively assessed											
Upper Claiborne Stable Shelf Gas and Oil AU (50470124)	Oil	4	12	23	13	12	36	78	40	0	1	2	1
	Gas					97	357	858	402	3	10	25	11
Upper Claiborne Expanded Fault Zone Gas AU (50470125)	Oil	8	26	53	28	39	128	287	142	3	9	21	10
	Gas					1,417	4,386	9,096	4,740	95	307	698	341
Upper Claiborne Slope and Basin Floor Gas AU (50470126)	Oil	0	0	0	0	0	0	0	0	0	0	0	0
	Gas					1,706	8,147	19,632	9,107	116	569	1,489	655
Jackson Stable Shelf Oil and Gas AU (50470127)	Oil	2	4	10	5	2	6	16	7	0	0	0	0
	Gas					7	16	32	17	0	0	1	1
Jackson Expanded Fault Zone Gas and Oil AU (50470128)	Oil	5	17	40	19	7	26	66	30	0	1	3	1
	Gas					110	449	1,036	495	4	16	39	18
Jackson Slope and Basin Floor Gas AU (50470129)	Oil	0	0	0	0	0	0	0	0	0	0	0	0
	Gas					94	393	929	438	3	15	39	18
Jackson Louisiana-Mississippi-Alabama Area AU (50470130)	Oil	Not quantitatively assessed											
	Gas	Not quantitatively assessed											
Vicksburg Stable Shelf Oil and Gas AU (50470131)	Oil	5	16	35	17	18	61	147	69	0	1	4	2
	Gas					39	114	218	120	1	3	5	3
Vicksburg Expanded Fault Zone Gas and Oil AU (50470132)	Oil	6	19	41	21	17	58	133	65	1	3	7	3
	Gas					2,057	8,598	19,880	9,511	68	295	747	336
Vicksburg Slope and Basin Floor Gas AU (50470133)	Oil	0	0	0	0	0	0	0	0	0	0	0	0
	Gas					1,607	6,920	15,840	7,621	61	269	668	305
Vicksburg Mississippi-Alabama Area AU (50470134)	Oil	Not quantitatively assessed											
	Gas	Not quantitatively assessed											
Frio Stable Shelf Oil and Gas AU (50470135)	Oil	2	5	11	5	7	22	52	25	0	0	1	0
	Gas					88	227	437	241	2	5	11	6
Frio Expanded Fault Zone Oil and Gas AU (50470136)	Oil	4	14	30	16	24	82	186	90	1	2	5	2
	Gas					509	1,265	2,292	1,321	13	34	68	36

Conventional Oil and Gas Resources

Table 1. Gulf Coast assessment results.—Continued

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
Upper Jurassic-Cretaceous-Tertiary Composite TPS (504701)—Continued													
Frio Slope and Basin Floor Gas AU (50470137)	Oil	28	102	220	110	84	320	756	358	2	9	24	11
	Gas					1,271	4,829	10,397	5,231	81	322	757	358
Anahuac Oil and Gas AU (50470138)	Oil	3	13	39	16	8	33	103	41	0	1	2	1
	Gas					62	240	578	270	2	7	17	8
Hackberry Oil and Gas AU (50470139)	Oil	6	22	52	25	17	69	178	80	0	2	6	2
	Gas					539	1,632	3,187	1,727	34	109	233	118
Lower Miocene Shelf Oil and Gas AU (50470140)	Oil	4	15	40	17	9	34	99	42	0	0	1	1
	Gas					82	301	641	324	1	5	11	5
Lower Miocene Slope and Basin Gas AU (50470141)	Oil	5	16	37	18	20	74	181	84	1	2	6	3
	Gas					5,786	17,582	37,327	19,116	137	445	1,027	496
Middle Miocene Shelf Oil and Gas AU (50470142)	Oil	5	21	56	25	21	92	263	110	0	2	6	2
	Gas					673	3,000	7,040	3,321	12	54	140	62
Middle Miocene Slope and Basin Gas AU (50470143)	Oil	25	115	315	135	75	358	1,040	432	2	8	26	10
	Gas					277	1,242	3,081	1,405	7	30	81	35
Upper Miocene Shelf Oil and Gas AU (50470144)	Oil	7	28	70	32	9	40	108	47	0	1	1	1
	Gas					101	441	1,077	498	3	13	33	15
Upper Miocene Slope and Basin Gas AU (50470145)	Oil	8	33	88	38	40	168	483	203	1	5	16	6
	Gas					41	144	320	158	2	8	20	9
Plio-Pleistocene Shelf Oil and Gas AU (50470146)	Oil	7	26	62	29	9	37	95	43	0	0	1	1
	Gas					21	70	154	77	1	4	10	5
Wilcox Mississippi Embayment AU (50470147)	Oil	Not quantitatively assessed											
	Gas	Not quantitatively assessed											
Frio Basin Margin AU (50470148)	Oil	Not quantitatively assessed											
	Gas	Not quantitatively assessed											
Total Conventional Resources		169	616	1,458	690	25,595	99,449	226,294	109,651	819	3,287	8,091	3,724
Continuous Oil and Gas Resources													
Olmos Coalbed Gas TPS (504702)													
Cretaceous Olmos Coalbed Gas AU (50470281)	CBG					37	70	133	75	0	0	1	0
Rio Escondido Basin Olmos Coalbed Gas AU (53000281)	CBG					60	114	215	123	0	0	1	0
Wilcox Coalbed Gas TPS (504703)													
Wilcox Coalbed Gas AU (50470381)	CBG					1,565	3,442	7,570	3,861	0	0	0	0
Cretaceous-Tertiary Coalbed Gas TPS (504704)													
Cretaceous-Tertiary Coalbed Gas AU (50470481)	CBG	Not quantitatively assessed											
Total Continuous Resources						1,662	3,626	7,918	4,059	0	0	2	0
Total Undiscovered Oil and Gas Resources		169	616	1,458	690	27,257	103,075	234,212	113,710	819	3,287	8,093	3,724

within the United States, and the third has one assessment unit (AU) in the United States and one AU in Mexico. The portion of the composite conventional TPS that lies within the United States covers a geographic area that extends from the southwest boundary of the Western Gulf Province on the Texas-Mexico border eastward into Texas and Louisiana, including the East Texas Basin Province, and continues to State waters and onshore lands primarily in Louisiana, Mississippi, Arkansas, and Alabama in the Louisiana-Mississippi Salt Basins Province. The TPS also includes Florida and small parts of Oklahoma, Missouri, Illinois, Kentucky, Tennessee, and Georgia (fig. 1). The Florida Peninsula Province was not assessed as part of this study. The Upper Jurassic-Cretaceous-Tertiary Composite TPS contains 33 AUs for undiscovered conventional oil and (or) gas resources (table 1) that lie predominantly on the coastal plain and in State waters of Texas, Louisiana, Mississippi, Alabama, and a small part of the Florida panhandle. The three coalbed TPSs contain four AUs (table 1).

Resource Summary

The USGS assessment of undiscovered conventional oil and gas resources and continuous coalbed gas resources resulted in estimated means of 113.7 trillion cubic feet of gas (TCFG), 690 million barrels of oil (MMBO), and 3.7 billion barrels of natural gas liquids in the AUs that were assessed (table 1). A large portion of the undiscovered gas resource is considered to be in conventional accumulations trapped in sedimentary strata ranging in age from Paleocene to Pliocene-Pleistocene (fig. 2). The remaining undiscovered gas resource occurs as continuous coalbed gas in Tertiary and Cretaceous-Tertiary strata. The conventional oil and gas resources reside primarily in clastic reservoirs deposited on continental shelves, in shelf-margin deltas, and in slope fans and basin-floor fans. The continuous coalbed gas resources are present within coal beds.

For Additional Information

Supporting geologic studies of Gulf Coast region total petroleum systems and assessment units are in progress, as well as studies of the methodology used in the assessment of both conventional resources in Tertiary strata and continuous coalbed gas resources in Cretaceous-Tertiary rocks of the Gulf Coast. Assessment results are available at the USGS Central Energy Team web site: <http://energy.cr.usgs.gov/oilgas/noga>

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ERATHEM	SYSTEM	SERIES	GEOLOGIC UNIT
Cenozoic	Quat.	Pleist.	Undifferentiated
		Pliocene	Undifferentiated
	Miocene		Upper
			Middle
			Lower
	Oligocene		Anahuac Formation
			Frio Formation
			Hackberry Formation
			Vicksburg Group
	Eocene		Jackson Group
			Upper Claiborne Group
			Lower Claiborne Group
	Paleocene		Wilcox Group
			Midway Group
	Tertiary		

Figure 2. Generalized stratigraphic section showing geologic units that were assessed in the Gulf Coast region. Nomenclature is a combination of formal and informal groups, and formation and member names that are based on physical or biostratigraphic correlations in outcrop and subsurface studies. The nomenclature reflects the common designation and usage in the region by State, industry, and academic geologists.