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National Assessment of Oil and Gas Fact Sheet

Assessment of Undiscovered Oil and Gas Resources of the Powder River Basin Province of Wyoming and Montana, 2002

Using a geology-based assessment methodology, the U.S. Geological Survey estimated a mean of 16.5 trillion cubic feet of undiscovered natural gas, a mean of 1.5 billion barrels of undiscovered oil, and a mean of 86.5 million barrels of natural gas liquids in the Powder River Basin Province.

Introduction

The U.S. Geological Survey (USGS) recently completed an assessment of the potential for undiscovered resources in continuous oil and gas accumulations of the Powder River Basin Province of northeastern Wyoming and southeastern Montana (fig. 1). The assessment of continuous oil and gas resources is based on geologic elements such as hydrocarbon source rocks (source-rock maturation, hydrocarbon generation and migration), reservoir rocks (sequence stratigraphy and petrophysical properties), and hydrocarbon traps (trap formation and timing) in four Total Petroleum Systems (TPS) identified in the province by the USGS. Six continuous assessment units and one conventional assessment unit were defined within the TPSs. Estimates of the undiscovered oil and gas resources in these seven assessment units, along with previous estimates of undiscovered oil and gas resources in 11 conventional plays within the province (Dolton and Fox, 1996), are presented in table 1.

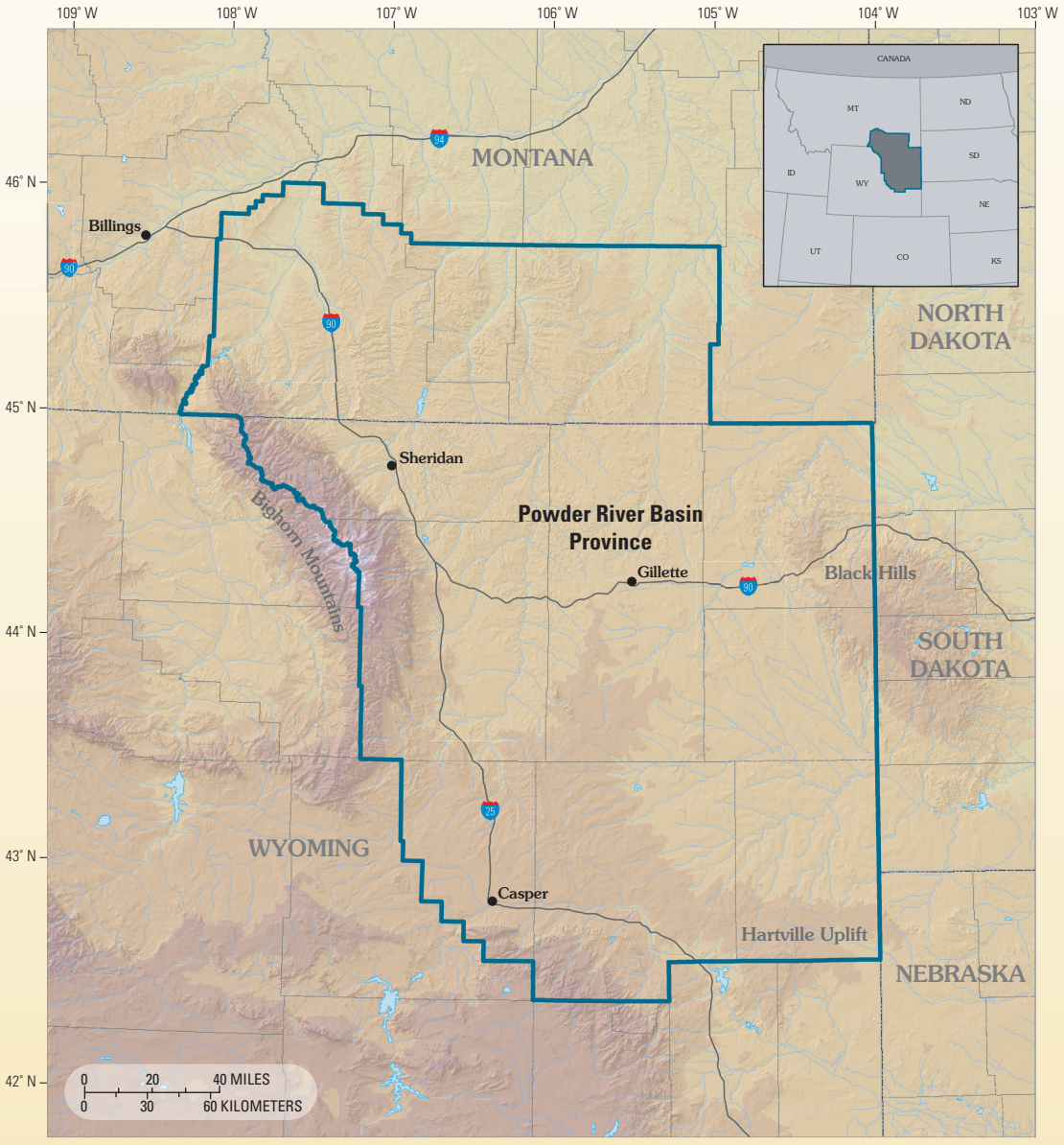

Figure 1. *Powder River Basin Province of northeastern Wyoming and southeastern Montana.*

Resource Summary

The USGS estimated a mean of 16.5 trillion cubic feet of undiscovered gas, a mean of 1.5 billion barrels of oil, and a mean of 86.5 million barrels of total natural gas liquids. Most of the undiscovered gas resource (94 percent, or 15.5 trillion cubic feet) is continuous (table 1). Of the 15.5 trillion cubic feet of continuous gas at the mean, about 14.3 trillion cubic feet is estimated to be coal-bed gas in three AUs of the Tertiary–Upper Cretaceous Coal-Bed Methane TPS. The Cretaceous Biogenic Gas TPS is estimated to contain a mean of 0.78 trillion cubic feet of gas (table 1).

The Mowry TPS is estimated to contain a mean of 198 million barrels of undiscovered continuous oil, and the Niobrara TPS is estimated to contain a mean of about 227 million barrels of undiscovered continuous oil, together representing about 27 percent (424 million barrels) of the total mean undiscovered oil in the province. One-third of the mean undiscovered oil (33 percent, or 522 million barrels) is estimated to be in conventional accumulations of the Upper Minnelusa Sandstone Play (table 1).

Table 1. *Powder River Basin 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 under the assumption of perfect positive correlation. CBG, coal-bed gas. Play assessments are from Dolton and Fox (1996). Gray shading indicates not applicable]

	Total Petroleum Systems (TPS) and Assessment Units (AU)	Field type	Total undiscovered resources: Oil (MMBO) F95	Oil (MMBO) F50	Oil (MMBO) F5	Oil (MMBO) Mean	Gas (BCFG) F95	Gas (BCFG) F50	Gas (BCFG) F5	Gas (BCFG) Mean	NGL (MMBNGL) F95	NGL (MMBNGL) F50	NGL (MMBNGL) F5	NGL (MMBNGL) Mean
Conventional Oil and Gas Resources	Basin-Margin Subthrust Play (1996)	Oil	0.00	0.00	113.00	20.10	0.00	0.00	113.00	20.10	0.00	0.00	3.39	0.60
	Basin-Margin Anticline Play (1996)	Oil	1.30	5.50	16.50	6.80	0.78	3.30	9.90	4.08	0.02	0.10	0.30	0.12
	Leo Sandstone Play (1996)	Oil	0.00	50.90	261.40	81.40	0.00	3.05	15.68	4.88	0.00	0.00	0.00	0.00
	Upper Minnelusa Sandstone Play (1996)	Oil	38.20	247.70	1,055.20	522.30	2.29	14.86	63.31	31.34	0.00	0.00	0.00	0.00
	Lakota Sandstone Play (1996)	Oil	2.80	23.30	126.40	53.80	1.12	9.32	50.56	21.52	0.08	0.65	3.54	1.51
	Fall River Sandstone Play (1996)	Oil	16.20	127.30	408.10	192.40	9.72	76.38	244.86	115.44	0.68	5.35	17.14	8.08
	Muddy Sandstone Play (1996)	Oil	3.50	28.40	118.40	59.10	10.50	85.20	355.20	177.30	0.74	5.96	24.86	12.41
		Gas					22.40	155.50	574.30	271.80	1.34	9.33	34.46	16.31
	Deep Frontier Sandstone Play (1996)	Oil	4.80	36.50	105.00	48.30	19.20	146.00	420.00	193.20	0.96	7.30	21.00	9.66
	Turner Sandstone Play (1996)	Oil	2.80	16.20	37.50	21.10	4.20	24.30	56.25	31.65	0.53	3.04	7.03	3.96
	Sussex-Shannon Sandstone Play (1996)	Oil	5.90	50.60	148.10	67.80	4.72	40.48	118.48	54.24	0.38	3.24	9.48	4.34
	Mesaverde-Lewis Play (1996)	Oil	5.20	43.30	124.20	58.10	5.20	43.30	124.20	58.10	0.36	3.03	8.69	4.07
	Eastern Basin Margin Upper Ft. Union Sandstone AU	Gas					0.00	0.00	107.43	27.37	0.00	0.00	0.00	0.00
	Total Conventional Resources		**80.70**	**629.70**	**2,513.80**	**1,131.20**	**80.13**	**602.01**	**2,253.35**	**1,011.02**	**5.09**	**38.00**	**129.89**	**61.06**
Continuous Oil and Gas Resources	**Tertiary-Upper Cretaceous Coal-Bed Methane TPS**													
	Wasatch Formation AU	CBG					1,011.94	1,815.71	3,257.89	1,934.09	0.00	0.00	0.00	0.00
	Upper Fort Union Formation AU	CBG					7,232.13	11,635.87	18,721.10	12,132.50	0.00	0.00	0.00	0.00
	Lower Fort Union-Lance Formation AU	CBG					0.00	171.67	440.90	197.90	0.00	0.00	0.00	0.00
	Mowry TPS													
	Mowry Continuous Oil AU	Oil	116.99	189.32	306.38	197.61	103.35	185.50	332.95	197.61	5.56	10.91	21.37	11.86
	Niobrara TPS													
	Niobrara Continuous Oil AU	Oil	135.53	217.49	349.03	226.67	119.54	213.10	379.87	226.67	6.43	12.53	24.40	13.60
	Cretaceous Biogenic Gas TPS													
	Shallow Continuous Biogenic Gas AU	Gas					341.92	712.15	1,483.26	786.64	0.00	0.00	0.00	0.00
	Total Continuous Resources		**252.52**	**406.81**	**655.41**	**424.28**	**8,808.88**	**14,734.00**	**24,615.97**	**15,475.41**	**11.99**	**23.44**	**45.77**	**25.46**
	Total Undiscovered Oil and Gas Resources		**333.22**	**1,036.51**	**3,169.21**	**1,555.48**	**8,889.01**	**15,336.00**	**26,869.32**	**16,486.43**	**17.08**	**61.44**	**175.66**	**86.52**

For Further Information

Supporting geologic studies and reports on the assessment methodology used in the Powder River Basin Province assessments of continuous resources are in progress. Assessment results from 1995 and 2002 are available at the USGS Central Energy Team website:

http://energy.cr.usgs.gov/oilgas/noga/

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