

Chapter 1

Executive Summary: Assessment of Coalbed Gas Resources of the Powder River Basin Province, Wyoming and Montana, 2003



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By USGS Powder River Basin Province Assessment Team

Chapter 1 *of*

Total Petroleum System and Assessment of Coalbed Gas in the Powder River Basin Province, Wyoming and Montana

By USGS Powder River Basin Province Assessment Team

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Introduction

The U.S. Geological Survey (USGS) assessed the potential for undiscovered resources in all types of continuous oil and gas accumulations of the Powder River Basin Province of Wyoming and Montana (fig. 1) (USGS Powder River Basin Province Assessment Team, 2002). This report documents only the assessment results for coalbed-gas resources, based on geologic principles and application of the total petroleum system (TPS) concept. The geologic elements of a TPS include hydrocarbon source rocks (source-rock maturation, hydrocarbon generation and migration), reservoir rocks (sequence stratigraphy, petrophysical properties), and hydrocarbon traps (seals, trap types and timing of trap formation). Using this geologic framework, the USGS defined a Tertiary-Upper Cretaceous Coalbed Methane TPS within the Powder River Basin and four assessment units (AU) within the TPS, and quantitatively estimated the potential for coalbed-gas resources in each AU (table 1).

Resources Assessed

For each geologic province to be assessed in the United States, the USGS defines both conventional and continuous oil and gas resources (fig. 2). Conventional oil and gas accumulations are defined as discrete geographic entities with well-delineated hydrocarbon-water contacts. Conventional gas fields typically have relatively high matrix permeabilities, readily identifiable seals and traps, and high recovery factors. Based on the geologic model used by the USGS in 2002, continuous accumulations (also called unconventional, tight sandstones, or basin-centered accumulations) (1) are regional in extent; (2) have diffuse boundaries; (3) commonly have low-matrix permeabilities; (4) may not have readily identifiable seals, traps, or hydrocarbon-water contacts; (5) are abnormally pressured; (6) are in close proximity to source rocks; and (7) have low hydrocarbon recovery factors (Schenk and Pollastro, 2002). For this study, coalbed gas trapped in coal beds is considered to be a type of continuous accumulation (Schenk and Pollastro, 2002), which is characteristic of three of the four AUs assessed in this study.

Resource Summary

The USGS estimated a mean of about 14.3 trillion cubic feet (TCFG) of coalbed-gas resource in the four AUs within the Tertiary-Upper Cretaceous Coalbed Methane TPS (table 1). The Upper Fort Union Formation AU contains 85 percent of the total (about 12.1 TCFG). Coalbed-gas resources of the Wasatch Formation AU were assessed at a mean of about 1.9 TCFG, and those in the Lower Fort Union-Lance AU were assessed at a mean of about 0.19 TCFG. The Eastern Margin Upper Fort Union Sandstones AU was defined to potentially contain conventional gas accumulations, in that the Fort Union sandstone reservoirs were interpreted to have been sourced by adjacent coals. Resources in this AU were estimated at about 0.027 TCFG at the mean (table 1).

U.S. Geological Survey Powder River Basin Province Assessment Team

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- Schenk, C.J., and Pollastro, R.M., 2002, Natural gas production in the United States: U.S. Geological Survey Fact Sheet FS-113-01, January 2002. [Also available at URL <http://pubs.usgs.gov/fs/fs-0113-01/>]

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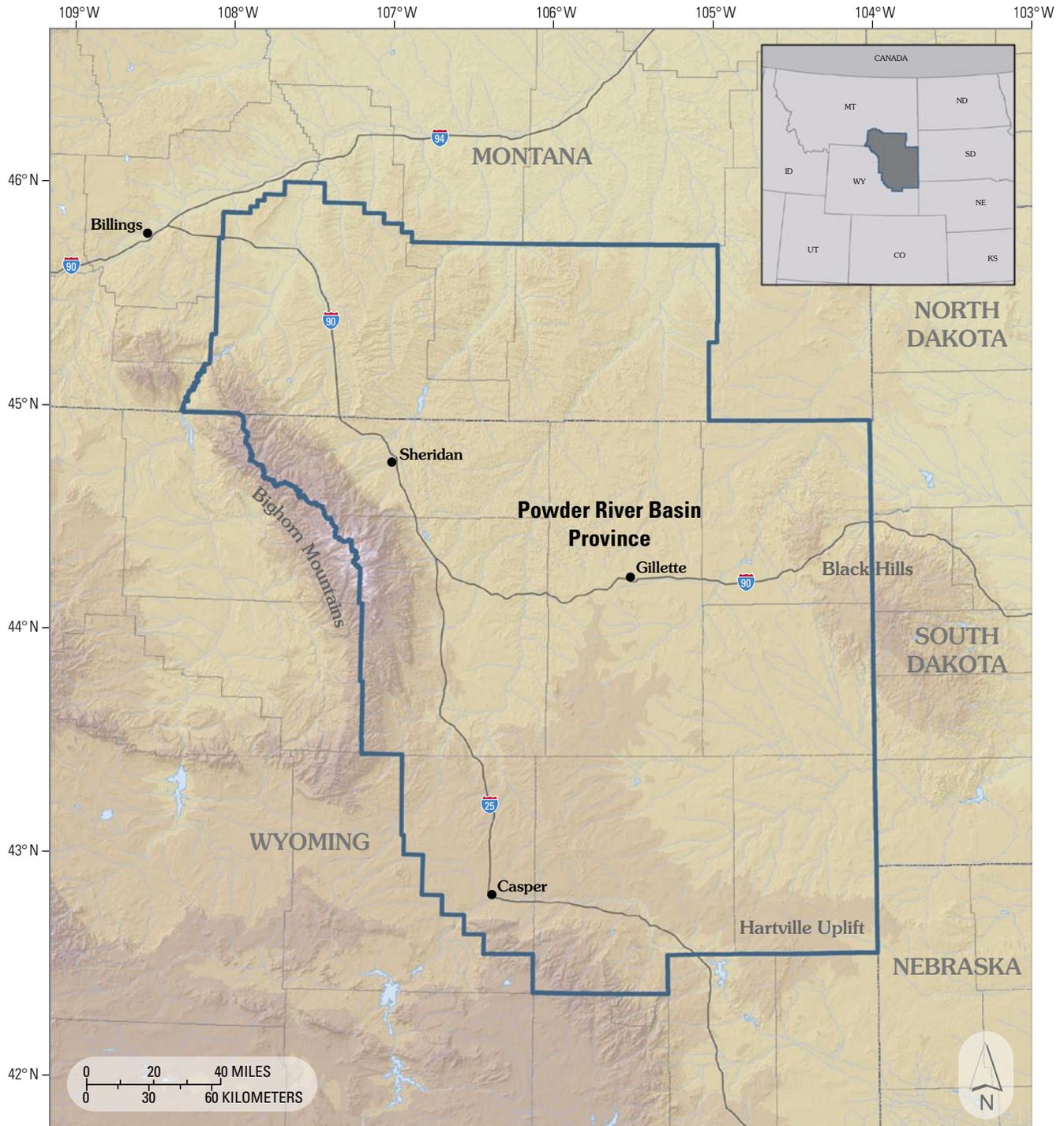


Figure 1. Powder River Basin Province of Wyoming and Montana.

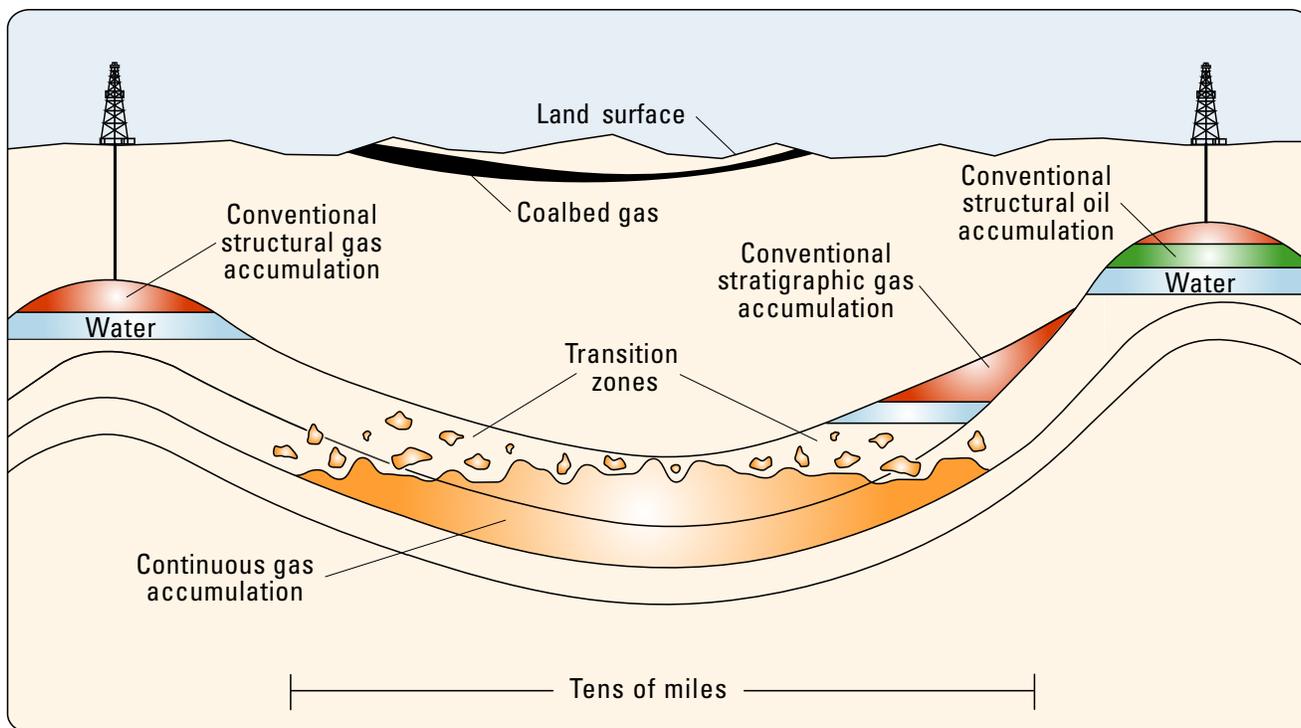


Figure 2. Schematic diagram of the types of oil and gas resources assessed in provinces of the United States. Both conventional and continuous resources are assessed. Coalbed gas is considered to be a type of continuous gas accumulation (Schenk and Pollastro, 2002).

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Table 1. Powder River Basin Province coalbed gas assessment results. [BCFG, billion cubic feet of gas. Results shown are fully risked estimates. F95 denotes a 95-percent chance that at least the listed amount of resources is present. Other fractiles are defined similarly. Fractiles are additive under the assumption of perfect positive correlation. TPS is Total Petroleum System. AU is Assessment Unit. CBG is coalbed gas]

<i>Total Petroleum Systems (TPS) and Assessment Units (AU)</i>		<i>Field Type</i>	<i>Total Undiscovered Resources</i>			
			<i>Gas (BCFG)</i>			
			F95	F50	F5	Mean
Conventional Gas Resources	Tertiary-Upper Cretaceous Coalbed Methane TPS					
	Eastern Basin Margin Upper Fort Union Sandstone AU	Gas	0.00	0.00	107.43	27.37
	Total Conventional Gas Resources		0.00	0.00	107.43	27.37
Continuous Gas Resources	Tertiary-Upper Cretaceous Coalbed Methane TPS					
	Wasatch Formation AU	CBG	1,011.94	1,815.71	3,257.89	1,934.09
	Upper Fort Union Formation AU	CBG	7,232.13	11,635.87	18,721.10	12,132.50
	Lower Fort Union-Lance Formation AU	CBG	0.00	171.67	440.90	197.90
	Total Continuous Gas Resources		8,244.07	13,623.25	22,419.89	14,264.49
	Total Undiscovered Gas Resources		8,244.07	13,623.25	22,527.32	14,291.86



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