

Chapter 1

# **Executive Summary—Geologic Assessment of Undiscovered Oil and Gas Resources of the Wind River Basin Province, Wyoming, 2005**

By U.S. Geological Survey Wind River Basin Assessment Team



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Chapter 1 of

## **Petroleum Systems and Geologic Assessment of Oil and Gas in the Wind River Basin Province, Wyoming**

Compiled by USGS Wind River Basin Province Assessment Team

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# Executive Summary—Geologic Assessment of Undiscovered Oil and Gas Resources of the Wind River Basin Province, Wyoming, 2005

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The U.S. Geological Survey estimated a mean of 2.4 trillion cubic feet of undiscovered natural gas, a mean of 41 million barrels of undiscovered oil, and a mean of 20.5 million barrels of undiscovered natural gas liquids in the Wind River Basin Province of Wyoming.

## Introduction

The U.S. Geological Survey (USGS) recently completed an assessment of the undiscovered oil and gas potential of the Wind River Basin Province (fig. 1), which encompasses

about 4.7 million acres in central Wyoming. The assessment is based on the geologic elements of each total petroleum system (TPS) 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 three TPSs: (1) Phosphoria TPS, (2) Cretaceous-Lower Tertiary Composite TPS, and (3) Waltman Shale TPS. Within these systems, 12 Assessment Units (AU) were defined and undiscovered oil and gas resources were quantitatively estimated within 10 of the 12 AUs (table 1).

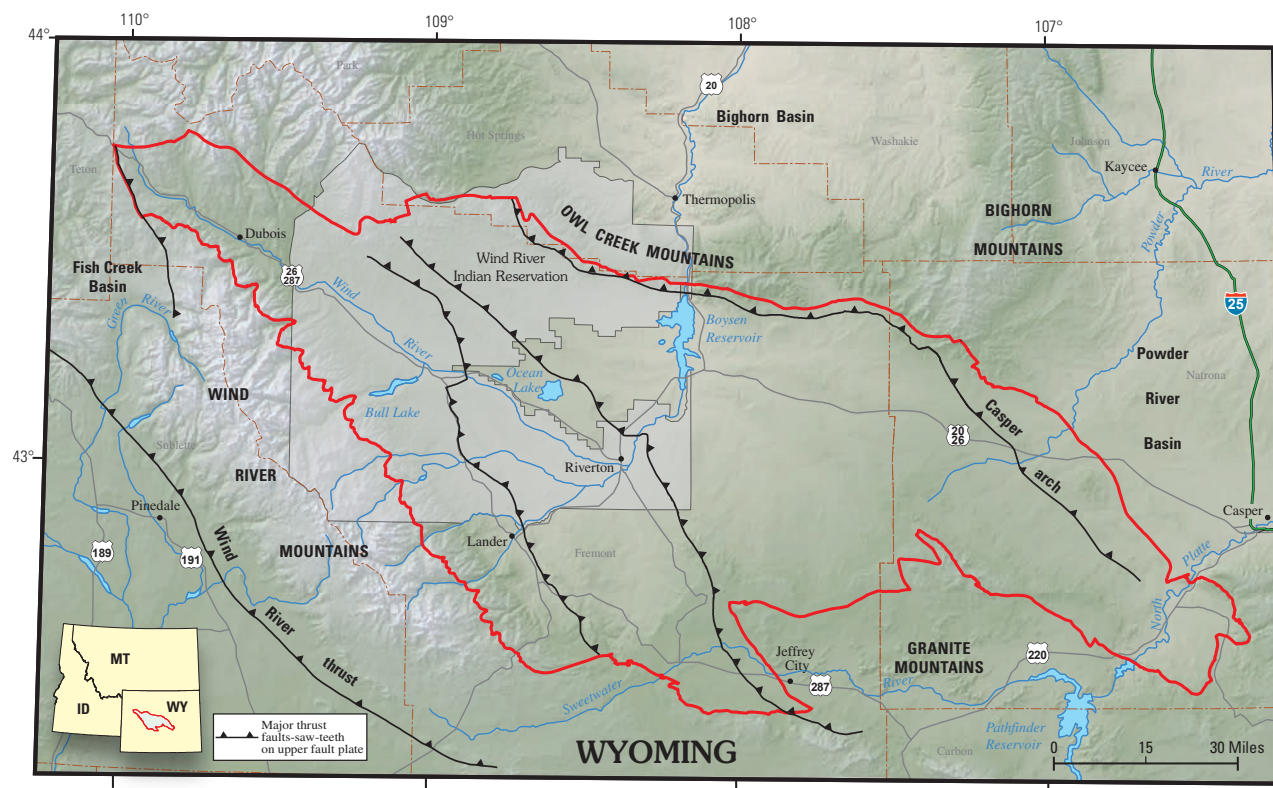


Figure 1. Wind River Basin Province located in central Wyoming.

## Resource Summary

The USGS assessed both undiscovered conventional oil and gas and undiscovered continuous (unconventional) oil and gas in the Wind River Basin Province, resulting in estimated means of 2.4 trillion cubic feet of gas (TCFG), 41 million barrels of oil (MMBO), and 20.5 million barrels of total natural gas liquids (MMBNGL) for the three TPSs. The majority of the undiscovered gas resource, 81 percent or 1.9 TCFG, is interpreted as continuous and is contained within the Cretaceous-Lower Tertiary Composite TPS. The continuous gas is contained within seven AUs of the Cretaceous-Lower

Tertiary Composite TPS; mean estimates include: Frontier-Muddy Continuous Gas AU (0.48 TCFG), Cody Sandstone Continuous Gas AU (0.12 TCFG); Mesaverde-Meeteetse Sandstone Gas AU (0.38 TCFG), Lance-Fort Union Sandstone Gas AU (0.71 TCFG), Mesaverde Coalbed Gas AU (0.11 TCFG), Meeteetse Coalbed Gas AU (0.02 TCFG), and Fort Union Coalbed Gas AU (0.12 TCFG) (table 1). The remainder of the undiscovered gas is associated/dissolved gas in oil accumulations (0.08 TCFG) or is in conventional nonassociated gas accumulations (0.37 TCFG) in the Tensleep-Park City, Cretaceous-Tertiary, and Upper Fort Union Sandstones Conventional Oil and Gas AUs (table 1).

**Table 1.** Wind River Basin Province assessment results.

[MMBO, million barrels of oil; BCFG, billion cubic feet of gas; MBNGL, thousand barrels of natural gas liquids; CBG, coal-bed gas. Results shown are fully risked estimates. For gas fields, all liquids are included under the NGL (natural gas liquids) category. 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. Gray shading indicates not applicable]

	Total Petroleum Systems (TPS) and Assessment Units (AU)	Field type	Oil (MMBO)				Total undiscovered resources Gas (BCFG)				NGL (MBNGL)				
			F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean	
Conventional Oil and Gas Resources	Phosphoria TPS														
	Tensleep-Park City Conventional Oil and Gas AU	Oil	4	16	42	18	4	15	44	19	90	360	1,090	440	
		Gas					56	244	600	275	1,040	4,710	12,550	5,490	
	Cretaceous-Lower Tertiary Composite TPS														
	Cretaceous-Tertiary Conventional Oil and Gas AU	Oil	3	10	23	11	10	35	84	40	230	820	2,130	950	
		Gas					30	92	190	99	230	720	1,620	790	
	Waltman Shale TPS														
	Upper Fort Union Sandstones Conventional Oil and Gas AU	Oil	3	11	25	12	6	21	54	24	330	1,250	3,370	1,470	
		Gas					0	0	0	0	0	0	0	0	
	Total Conventional Resources		10	37	90	41	106	407	972	457	1,920	7,860	20,760	9,140	
Continuous Oil and Gas Resources	Cretaceous-Lower Tertiary Composite TPS														
	Frontier-Muddy Continuous Gas AU	Gas					198	430	934	481	110	320	970	400	
	Cody Sandstone Continuous Gas AU	Gas					48	103	224	115	10	30	10	40	
	Cody Fractured Shale Continuous Oil AU	Oil	Not quantitatively assessed												
	Mesaverde-Meeteetse Sandstone Gas AU	Gas					163	345	732	383	360	960	2,580	1,150	
	Lance-Fort Union Sandstone Gas AU	Gas					373	668	1,198	711	2,670	7,700	22,250	9,480	
	Mesaverde Coalbed Gas AU	CBG					45	96	205	107	70	210	570	250	
	Meeteetse Coalbed Gas AU	CBG					9	19	41	21	10	40	120	50	
	Fort Union Coalbed Gas AU	CBG					49	106	228	118	10	20	70	30	
	Waltman Shale TPS														
	Waltman Fractured Shale Continuous Oil AU	Oil	Not quantitatively assessed												
	Total Continuous Resources		10	37	90	41	885	1,767	3,562	1,936	3,240	9,280	26,570	11,400	
	Total Undiscovered Oil and Gas Resources		10	37	90	41	991	2,174	4,534	2,393	5,160	17,140	47,330	20,540	

## Wind River Basin Province Assessment Team

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