

Chapter 1

# **Executive Summary—2005 Geologic Assessment of Undiscovered Oil and Gas Resources, Hanna, Laramie, and Shirley Basins Province, Wyoming and Colorado**

By U.S. Geological Survey Hanna, Laramie, and Shirley Basins Province Assessment Team



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Chapter 1 of

## **Petroleum Systems and Geologic Assessment of Undiscovered Oil and Gas, Hanna, Laramie, and Shirley Basins Province, Wyoming and Colorado**

By U.S. Geological Survey Hanna, Laramie, and Shirley Basins Province Assessment Team

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## Introduction

The U.S. Geological Survey (USGS) assessed the undiscovered oil and gas resource potential of the Hanna, Laramie, and Shirley Basins Province in Wyoming and northeastern Colorado (fig. 1) as part of a national oil and gas assessment project (U.S. Geological Survey Hanna, Laramie, Shirley Basins Assessment Team, 2005). The assessment of the petroleum potential of the province was based on the general geologic elements used to define a total petroleum system (TPS)—hydrocarbon source rocks (source rock maturation, hydrocarbon generation and migration), reservoir rocks (sequence stratigraphy and petrophysical properties), and hydrocarbon traps (trap formation and timing). By using this geologic framework, the USGS defined three TPSs and seven assessment units (AUs) within them; undiscovered resources for three of the seven AUs (table 1) were quantitatively assessed.

## Resource Summary

Assessment of the undiscovered oil and gas resources for the three AUs—Tensleep-Casper Oil and Gas AU, Mesozoic-Cenozoic Conventional Oil and Gas AU, and Niobrara Continuous Oil AU—resulted in estimated means of 94 million barrels of oil (MMBO), 298 billion cubic feet (BCFG) of nonassociated gas in gas fields combined with associated gas in oil fields, and 14 million barrels of natural gas liquids (MMBNGL) (table 1). All of the undiscovered gas is in conventional accumulations. The Mesozoic-Cenozoic Conventional Oil and Gas AU contains a mean estimate of 207 BCFG, representing nearly 70 percent of the total mean undiscovered gas resource (298 BCFG) for the province. Two continuous gas and two coalbed gas AUs were not quantitatively assessed owing to a lack of data.

## For Further Information

Geologic studies of total petroleum systems and assessment units, as well as reports on the methodology used in assessing resources for the Hanna, Laramie, and Shirley Basins Province, are available at the USGS Central Energy Team Web site: <http://energy.cr.usgs.gov/oilgas/noga/>.



**Figure 1.** Map of the Hanna, Laramie, and Shirley Basins Province (outlined in red) in Wyoming and northeastern Colorado.

## 2 Undiscovered Oil and Gas—Hanna, Laramie, and Shirley Basins Province, Wyoming and Colorado

**Table 1.** Hanna, Laramie, and Shirley Basins Province assessment results.

[TPS, total petroleum system; AU, assessment unit; MAS, minimum accumulation size assessed (MMBO for oil accumulations, BCFG for gas accumulations); Prob., probability (including both geologic and accessibility probabilities) of at least one accumulation equal to or greater than the MAS or, for continuous-type resources, at least one additional cell equal to or greater than the minimum estimated ultimate recovery; MMBO, million barrels of oil; BCFG, billion cubic feet of gas; NGL, natural gas liquids; MBNGL, thousand barrels of natural gas liquids; Accum., accumulations. Results shown are fully risked estimates. For gas accumulations, all liquids are included as NGL. F95 represents a 95 percent chance of at least the amount tabulated; other fractiles are defined similarly. A single major commodity and its coproducts were assessed for continuous-type assessment units. Fractiles are additive under the assumption of perfect positive correlation. Resource totals may not be equal to the sums of the fractiles or means because numbers have been independently rounded. Totals reflect rounding to nearest whole number. Shading indicates not applicable]

Total petroleum system (TPS) and assessment unit (AU)	MAS	Prob. (0-1)	Total undiscovered resources											
			Oil (MMBO)				Gas (BCFG)				NGL (MBNGL)			
			F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean

### Conventional oil and gas resources

#### Phosphoria TPS

##### Tensleep–Casper Conventional Oil and Gas AU

Oil accums.	0.5	1	6	19	39	20	6	18	42	20	190	650	1,590	740
Gas accums.	3.0						16	47	101	52	460	1,380	3,220	1,550
Total		1	6	19	39	20	22	66	143	72	650	2,030	4,810	2,290

#### Mowry–Hanna Composite TPS

##### Mesozoic–Cenozoic Conventional Oil and Gas AU

Oil accums.	0.5	1	7	31	79	36	17	75	208	89	1,620	7,320	21,610	8,910
Gas accums.	3.0						25	99	278	118	460	1,920	5,770	2,360
Total		1	7	31	79	36	42	174	486	207	2,080	9,240	27,380	11,270

#### Total undiscovered conventional oil and gas resources

Oil accums.			13	50	119	56	23	94	250	110	1,810	7,970	23,200	9,650
Gas accums.							42	146	379	170	920	3,300	8,990	3,910
Total			13	50	119	56	64	240	629	279	2,730	11,270	32,190	13,560

### Continuous oil and gas resources

#### Mowry-Hanna Composite TPS

Hanna Basin Continuous Gas AU—Not quantitatively assessed

#### Niobrara TPS

##### Niobrara Continuous Oil AU

Oil accums.	0.5	1	14	33	76	38	6	16	43	19	0	0	0	0
Gas accums.	3.0													
Total		1	14	33	76	38	6	16	43	19	0	0	0	0

#### Niobrara Biogenic Gas TPS

Niobrara Biogenic Gas AU—Not quantitatively assessed

#### Mesaverde–Hanna Coalbed Gas TPS

Medicine Bow–Ferris–Hanna Coalbed Gas AU—Not quantitatively assessed

Mesaverde Coalbed Gas AU—Not quantitatively assessed

#### Total undiscovered continuous oil and gas resources

Oil accums.			14	33	76	38	6	16	43	19	0	0	0	0
Gas accums.														
Total			14	33	76	38	6	16	43	19	0	0	0	0

#### Total undiscovered oil and gas resources

Oil accums.			28	83	195	94	29	110	292	129	1,810	7,970	23,200	9,650
Gas accums.							42	146	379	170	920	3,300	8,990	3,910
Total			28	83	195	94	70	256	671	298	2,730	11,270	32,190	13,560

## Hanna, Laramie, Shirley Basins Province Assessment Team

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