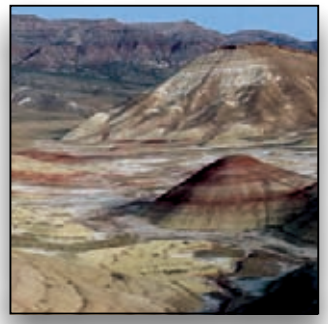
Chapter 1

Executive Summary—Assessment of Undiscovered Gas Resources of the Eastern Oregon and Washington Province



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By USGS Eastern Oregon and Washington Province Assessment Team

Chapter 1 of
Geologic Assessment of Undiscovered Gas Resources of the Eastern Oregon and Washington Province

By U.S. Geological Survey Eastern Oregon and Washington Province Assessment Team

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By U.S. Geologic Survey Eastern Oregon and Washington Province Assessment Team

Introduction

The U.S. Geological Survey (USGS) recently completed an assessment of the undiscovered gas resources of the Eastern Oregon and Washington Province; the province includes about 60,000 mi2 in eastern Oregon and Washington (fig. 1). The assessment of the province was geology based and used the total petroleum system (TPS) concept. The geologic elements of a total petroleum system include hydrocarbon source rocks (source rock maturation and hydrocarbon generation and migration), reservoir rocks (quality and distribution), and traps for hydrocarbon accumulation. Using these geologic criteria, the USGS assessment team defined the Cretaceous-Tertiary Composite Total Petroleum System. Three assessment units (AU) were defined within the TPS: (1) the hypothetical Columbia Basin Continuous Gas AU; (2) the hypothetical Eastern Oregon and Washington Conventional Gas AU; and (3) the Republic Graben Gas AU (fig. 1). Undiscovered gas resources within the first two of the three assessment units were quantitatively estimated (table 1). The Republic Graben Gas Assessment Unit was not quantitatively assessed.

The Eastern Oregon and Washington Province is located within a complex geologic setting east of the western continental margin of North America. Much of the province is overlain by the Columbia River Basalt Group (CRBG; fig. 2) ranging from 4,000 to as much as 13,800 ft thick in the Richland, Wash., area (fig. 1; Reidel and others, 1989). In addition, the southernmost part of the province is overlain by non CRBG Miocene to Quaternary volcanic and volcaniclastic rocks. These volcanic rock units have limited the current extent of knowledge of the underlying stratigraphy and structural geology of the province.

Some 5,000 to 10,000 ft of arkosic sandstone, mudstone, lacustrine shale, and coal are known to be present below the basalt in north-central Oregon and central Washington; these rocks include potential source and reservoir rocks. The only discovered commercial gas accumulation in the province is the abandoned Rattlesnake Hills gas field, which produced an estimated 1.3 billion cubic feet of gas (BCFG). Numerous other gas shows are known within the province but as of 2006, there have been no new commercial accumulations found.

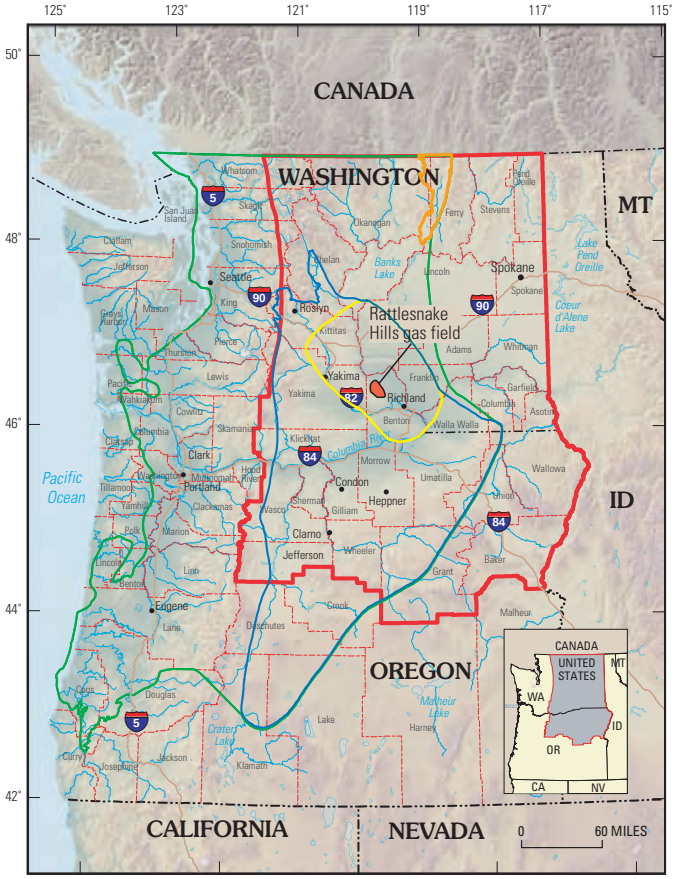

Figure 1. Eastern Oregon and Washington Province in north-central and northeastern Oregon and eastern Washington; Province boundary outlined in red. The Cretaceous-Tertiary Composite Total Petroleum System is outlined in green. Columbia Basin Continuous Gas Assessment Unit outlined in yellow. Eastern Oregon and Washington Conventional Gas Assessment Unit outlined in blue. Republic Graben Gas Assessment Unit outlined in orange.

Figure 2. The Columbia River Basalt Group and the Columbia River, looking north from the Oregon side of the river. The town of Lyle, Washington is visible on left side of photograph.

Resource Summary

The USGS assessed undiscovered conventional gas and undiscovered continuous (unconventional) gas in the Eastern Oregon and Washington Province (table 1), resulting in an estimated mean total of 2,400 billion cubic feet (BCF) of gas and 9.8 million barrels of natural gas liquids (MMBNGL) (table 1). More than 87 percent (2,100 BCF) of gas and 9.2 MMBNGL is contained within the hypothetical Columbia Basin Continuous Gas AU, which encompasses an area of more than 4 million acres. The estimated mean size of the largest undiscovered gas field is 362.9 BCFG. Undiscovered resources within this AU are considered to be within an overpressured, continuous accumulation of gas trapped within Tertiary rocks that are overlain by the Columbia River Basalt Group. An estimated 300 billion cubic feet (BCF) of conventional gas and 0.61 MMBNGL are present in the hypothetical Eastern Oregon and Washington Conventional Gas AU, which includes more than 22.2 million acres. The estimated mean size of the largest undiscovered gas field is 78.3 BCFG. Potential reservoir and source rocks are known or inferred to exist in this assessment unit, although thick Miocene to Holocene volcanic sequences cover the reservoir and source rock intervals.

For Additional Information

Supporting geologic studies of total petroleum system and assessment units, assessment data, and reports on the methodology used in the Eastern Oregon and Washington Province assessment are included in this volume. Assessment results and supporting methodology reports are also available at the USGS Central Energy Team website: http://energy.cr.usgs.gov/oilgas/noga/.

Table 1. Summary of estimated undiscovered volumes of conventional oil, gas, and natural gas liquids and continuous gas for undiscovered oil and gas fields for the Eastern Oregon and Washington Province.

[MMBO, millions 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. Undiscovered gas resources are the sum of nonassociated and associated gas. 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	*Total undiscovered resources*											
		Oil (MMBO)				*Gas (BCFG)*				*NGL (MMBNGL)*			
		F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Cretaceous-Tertiary Composite TPS													
Eastern Oregon and Washington Conventional Gas AU	***Oil***	0	0	0	0	0	0	0	0	0	0	0	0
	Gas					0	242	857	305	0	0.41	1.94	0.61
Republic Graben Gas AU		*Not quatitatively assessed*											
Columbia Basin Continuous Gas AU													
	Gas					1,179	2,013	3,436	2,122	3.12	7.85	19.79	9.20
Total Undiscovered Oil and Gas Resources		**0**	**0**	**0**	**0**	**1,179**	**2,255**	**4,293**	**2,427**	**3.12**	**8.26**	**21.73**	**9.81**

Eastern Oregon and Washington Province Assessment Team

Michael E. Brownfield (mbrownfield@usgs.gov), Marilyn E. Tennyson, Thomas S. Ahlbrandt, Ronald R. Charpentier, Troy A. Cook, Timothy R. Klett, Richard M. Pollastro, and Christopher J. Schenk.

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