

Appalachian Basin Oil and Natural Gas: Stratigraphic Framework, Total Petroleum Systems, and Estimated Ultimate Recovery

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Table

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Conversion Factors

Multiply	By	To obtain
	Volume	
cubic foot (ft ³)	0.02832	cubic meter (m ³)
barrel (bbl; 42 U.S. gallons)	0.1590	cubic meter (m ³)

Appalachian Basin Oil and Natural Gas: Stratigraphic Framework, Total Petroleum Systems, and Estimated Ultimate Recovery

By Robert T. Ryder,¹ Robert C. Milici,¹ Christopher S. Swezey,¹ and Michael H. Trippi¹

Discussion

The most recent U.S. Geological Survey (USGS) assessment of undiscovered oil and gas resources of the Appalachian basin was completed in 2002 (Milici and others, 2003). This assessment was based on the total petroleum system (TPS), a concept introduced by Magoon and Dow (1994) and developed during subsequent studies such as those by the U.S. Geological Survey World Energy Assessment Team (2000) and by Biteau and others (2003a,b). Each TPS is based on specific geologic elements that include source rocks, traps and seals, reservoir rocks, and the generation and migration of hydrocarbons. This chapter identifies the TPSs defined in the 2002 Appalachian basin oil and gas assessment and places them in the context of the stratigraphic framework associated with regional geologic cross sections *D–D'* (Ryder and others, 2009, which was re-released in this volume, chap. E.4.1) and *E–E'* (Ryder and others, 2008, which was re-released in this volume, chap. E.4.2). Furthermore, the chapter presents a recent estimate of the ultimate recoverable oil and natural gas in the basin.

In ascending stratigraphic order, the four TPSs identified and assessed in the Appalachian basin by Milici and others (2003) are the following: the Conasauga-Rome/Conasauga TPS, Utica-Lower Paleozoic TPS, Devonian Shale-Middle and Upper Paleozoic TPS, and Carboniferous Coal-bed Gas TPS. The first part of the TPS name refers to the major source rock, and the second part refers to the major reservoir rock(s). The stratigraphic positions of the four TPSs are shown on the correlation charts constructed for geologic cross section *D–D'* (Ryder and others, 2009; this volume, chap. E.4.1) and cross section *E–E'* (Ryder and others, 2008; this volume, chap. E.4.2) (figs. 1, 2). Because the geologic cross sections are restricted to Ohio and West Virginia, the ranges of the TPSs shown in figures 1 and 2 are confined to those parts of the Appalachian basin. For detailed descriptions, interpretations, and supporting data for the TPSs, the reader is referred to Milici (2004; this volume, chap. G.1), Ryder and others

(2005; this volume, chap. G.8), Milici and Swezey (2006; this volume, chap. G.9), and Ryder (2008; this volume, chap. G.10).

According to a recent estimate by Milici and others (2004), the ultimate recoverable oil and natural gas in the Appalachian basin is about 25.5 billion barrels of oil equivalent (BBOE) (4.76 billion barrels of oil (BBO) and 124.9 trillion cubic feet of gas (TCFG) (table 1). Most of this oil and gas is located in the four TPSs mentioned earlier in this report. Of the estimated 25.5 BBOE of ultimate recoverable oil and gas in the basin, about 0.93 BBO (including natural gas liquids) and about 70.3 TCFG are considered to be technically recoverable undiscovered resources (Milici and others, 2003) (table 1). The known volume of oil and natural gas in the basin (cumulative production + proven reserves) is about 12.9 BBOE (3.83 BBO and 54.6 TCFG) (Milici and others, 2004) (table 1). This known volume of about 12.9 BBOE in the Appalachian basin places it among the top 50 oil and gas provinces in the world (Klett and others, 1997). Note: estimates in table 1 do not include recent oil and gas production from the black shale beds.

Table 1. Estimated ultimate recoverable oil and gas in the Appalachian basin.

[Abbreviations used: BBO, billion barrels of oil; TCFG, trillion cubic feet of gas (cubic feet $\times 10^{12}$); BBOE, billion barrels of oil equivalent]

	Oil, in BBO	Gas, in TCFG ¹	Total BBOE
Cumulative production ²	3.5	44 (7.3)	10.8
Proven reserves ²	0.329	10.6 (1.76)	2.1
Cumulative production + proven reserves ²	3.83	54.6 (9.1)	12.9
Technically recoverable undiscovered resources ³	0.93	70.3 (11.7)	12.6
Ultimate recoverable oil and gas ⁴	4.76	124.9 (20.8)	25.5 ²

¹Equivalent billion barrels of oil (BBOE) shown in parentheses.

²Data from Milici and others (2004).

³Data from Milici and others (2003).

⁴Cumulative production + proven reserves + technically recoverable undiscovered resources.

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