

Chapter 1

# **Executive Summary—Assessment of Undiscovered Oil and Gas Resources of the Black Warrior Basin Province of Alabama and Mississippi**

By U.S. Geological Survey Black Warrior Basin Province Assessment Team



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Chapter 1 of

## **Geologic Assessment of Undiscovered Oil and Gas Resources of the Black Warrior Basin Province, Alabama and Mississippi**

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# Executive Summary—Assessment of Undiscovered Oil and Gas Resources of the Black Warrior Basin Province of Alabama and Mississippi

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## Overview

The U.S. Geological Survey (USGS) assessed the undiscovered oil and gas resources of the Black Warrior Basin Province in northeastern Mississippi and northwestern Alabama (fig. 1). This assessment is based on the geologic elements of each total petroleum system (TPS) defined in the province,

including (1) hydrocarbon source rocks (source-rock maturation, and hydrocarbon generation and migration); (2) reservoir rocks (sequence stratigraphy and petrophysical properties); and hydrocarbon traps (trap formation and timing). Using this geologic framework, the USGS defined two TPSs and three assessment units (AU) and estimated the volume of undiscovered oil and gas resources within each AU.

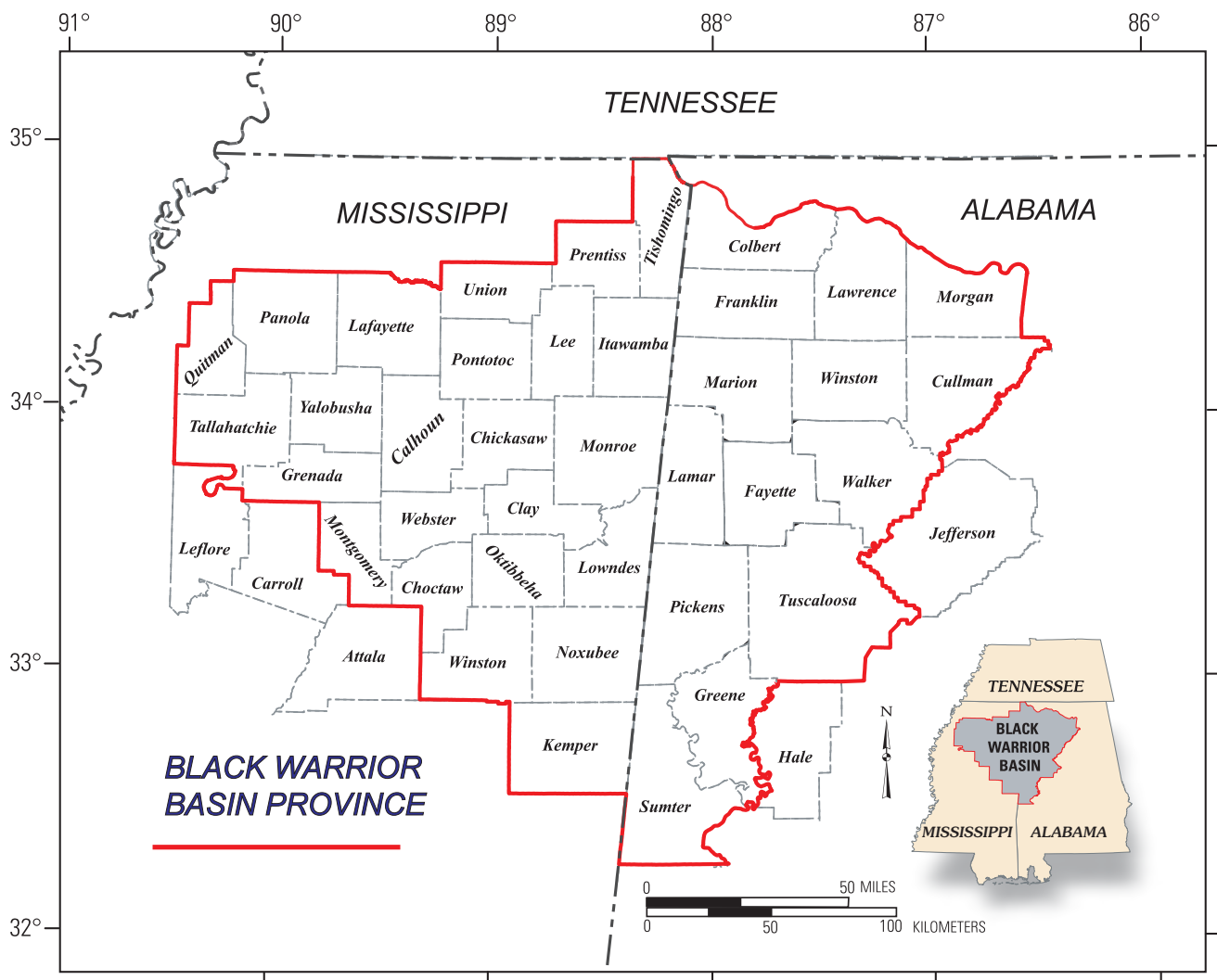
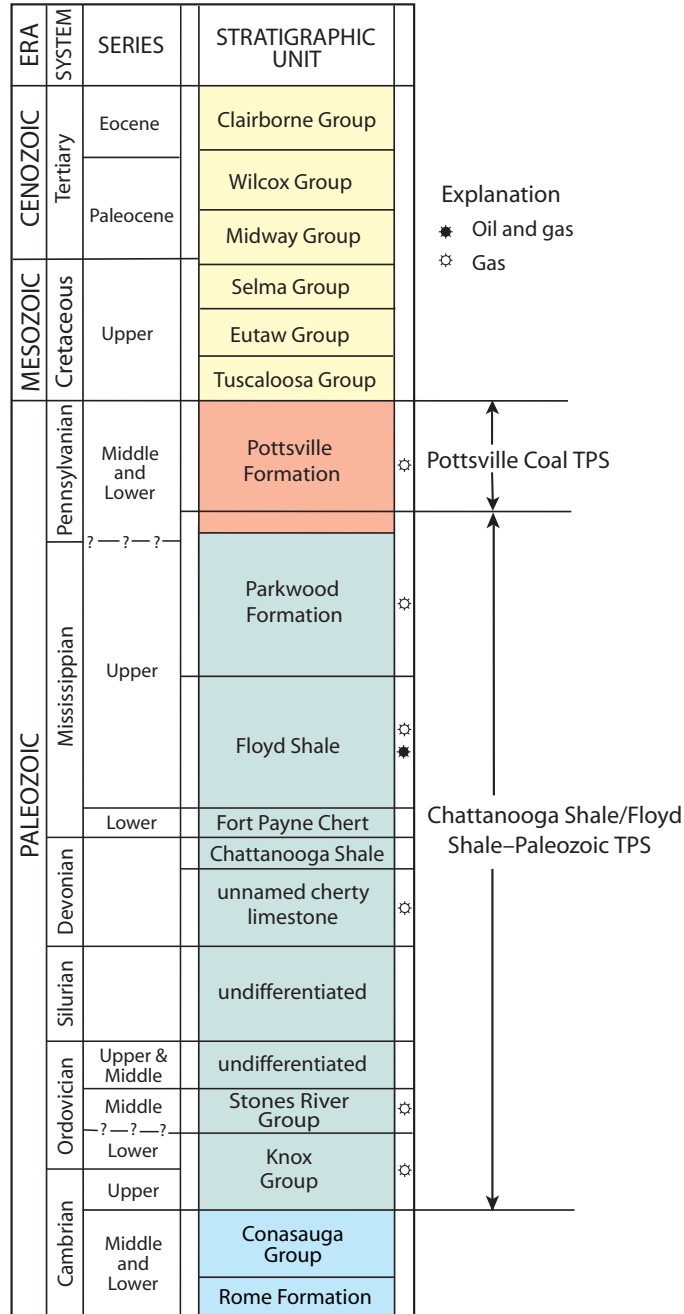


Figure 1. Location of the Black Warrior Basin Province in northwestern Alabama and northeastern Mississippi.

## Assessment Units

The two TPSs identified within the Black Warrior Basin Province are the Chattanooga Shale/Floyd Shale–Paleozoic TPS and the Pottsville Coal TPS (fig. 2). Two AUs were identified within the Chattanooga Shale/Floyd Shale–Paleozoic TPS: (1) Pre-Mississippian Carbonates AU, which is defined by gas trapped primarily in Cambrian and Ordovician platform-carbonate reservoirs by basement-controlled fault blocks; and (2) Carboniferous Sandstones AU, which is defined by gas

and oil trapped in Upper Mississippian and Lower Pennsylvanian deltaic and shallow-marine sandstone reservoirs by a variety of basement-involved fault blocks, stratigraphic traps (sandstone to shale facies changes), and a combination of structural and stratigraphic traps. The Pottsville Coal TPS contains the Black Warrior Basin AU, which is defined as the potential for gas having been generated and trapped in Lower and Middle Pennsylvanian coals, primarily in the Alabama portion of the Black Warrior Basin.



**Figure 2.** Generalized stratigraphic column for the Black Warrior Basin showing stratigraphic units within the Chattanooga Shale/Floyd Shale–Paleozoic and the Pottsville Coal Total Petroleum Systems (TPS). Modified from Montgomery (1986) and Carroll and others (1995, their fig.1).

## Resource Summary

For the Black Warrior Basin Province, the USGS estimated means of 8,511 billion cubic feet of gas (BCFG), 5.9 million barrels of oil (MMBO), and 7.6 million barrels of total natural gas liquids (MMBNGL). Most (83 percent, or 7,056 BCFG) of the potential undiscovered gas resource is continu-

ous (unconventional) coal-bed gas in the Pottsville Coal TPS (table 1). Undiscovered conventional gas resources in the Chattanooga Shale/Floyd Shale–Paleozoic TPS are estimated to be about 1,455 BCFG at the mean, whereas undiscovered conventional oil resources within the Chattanooga Shale/Floyd Shale–Paleozoic TPS are estimated to be about 5.9 MMBO at the mean (table 1).

**Table 1.** Black Warrior Basin Province assessment results.

[MMBO, million 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. CBG is coal-bed gas]

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	
<b>Chattanooga Shale/Floyd Shale–Paleozoic TPS</b>															
Conventional Oil and Gas Resources	Pre-Mississippian Carbonates AU	Gas					116	939	2,551	1,087	0.5	4.5	15.0	5.7	
	Carboniferous Sandstones AU	Oil	1.8	5.3	12.0	5.9	2	7	18	8	<0.1	<0.1	0.1	<0.1	
		Gas					74	320	775	360	0.3	1.5	4.6	1.9	
	<b>Total Conventional Resources</b>			<b>1.8</b>	<b>5.3</b>	<b>12.0</b>	<b>5.9</b>	<b>192</b>	<b>1,267</b>	<b>3,343</b>	<b>1,455</b>	<b>0.9</b>	<b>6.1</b>	<b>19.7</b>	<b>7.6</b>
<b>Pottsville Coal TPS</b>															
Continuous Oil and Gas Resources	Black Warrior Basin AU	CBG					4,615	6,854	10,181	7,056	0.0	0.0	0.0	0.0	
	<b>Total Continuous Resources</b>			<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>4,615</b>	<b>6,854</b>	<b>10,181</b>	<b>7,056</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>	<b>0.0</b>
	<b>Total Undiscovered Oil and Gas Resources</b>			<b>1.8</b>	<b>5.3</b>	<b>12.0</b>	<b>5.9</b>	<b>4,807</b>	<b>8,121</b>	<b>13,525</b>	<b>8,511</b>	<b>0.9</b>	<b>6.1</b>	<b>19.7</b>	<b>7.6</b>

## Black Warrior Basin Province Assessment Team

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Montgomery, S.L., 1986, The Black Warrior Basin—Proving the potential of the southeast, *in* Petroleum Frontiers, Petroleum Information Corporation Quarterly, v. 3, no. 3, 62 p.

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