

Assessment of Undiscovered Oil and Gas Resources of the Illinois Basin, 2007

Using a geology-based assessment methodology, the U.S. Geological Survey estimated the following quantities of undiscovered, technically recoverable oil and gas resources in the Illinois Basin, USA: (1) a mean of 214 million barrels of oil; (2) a mean of 4.65 trillion cubic feet of natural gas; and (3) a mean of 24 million barrels of natural gas liquids.

Introduction

The U.S. Geological Survey (USGS) has completed an assessment of the undiscovered oil and gas potential of the Illinois Basin (fig. 1). The assessed area includes parts of the States of Illinois, Indiana, Kentucky, Missouri, Ohio, and Tennessee. The assessment is based on the geologic elements of each total petroleum system (TPS) defined in the basin. These geologic elements include the hydrocarbon source rocks, reservoir rocks, and hydrocarbon traps. By using this geologic framework, the USGS defined 4 total petroleum systems and 19 assessment units (AUs) within the basin and estimated the quantity of undiscovered technically recoverable oil and gas resources within 14 of the 19 AUs (table 1).

Total Petroleum Systems

The four total petroleum systems identified in the Illinois Basin are the (1) Precambrian to Cambrian Rift-Fill AU, (2) Cambrian Mount Simon to Eau Claire AU, (3) Cambrian to Ordovician Knox Group AU, (4) Cambrian to Ordovician Carbonates Cumberland Saddle AU, (5) Ordovician St. Peter/Everton AU, (6) Ordovician Dutchtown to Galena AU, (7) Lower Silurian Carbonates (Reef) AU, (8) Upper Silurian Calcareous Siltstones AU, (9) Upper Silurian Carbonates (Reef) AU, (10) Lower Devonian Carbonates AU, (11) Middle Devonian Dutch Creek Sandstone AU, (12) Middle Devonian Carbonates AU, (13) Lower Mississippian Borden AU, (14) Lower Mississippian Carbonates AU, (15) Upper Mississippian Sandstones AU, and (16) Pennsylvanian Sandstones AU. All of these conventional AUs were assessed quantitatively, except for the Precambrian to Cambrian Rift-Fill AU, the Cambrian Mount Simon to Eau Claire AU, the Cambrian to Ordovician Knox Group AU, and the Ordovician St. Peter/Everton AU.

Assessment Units

Sixteen of the AUs are characterized as conventional oil and gas accumulations, and three of the AUs are characterized as continuous accumulations. The 16 conventional AUs are the (1) Pre-

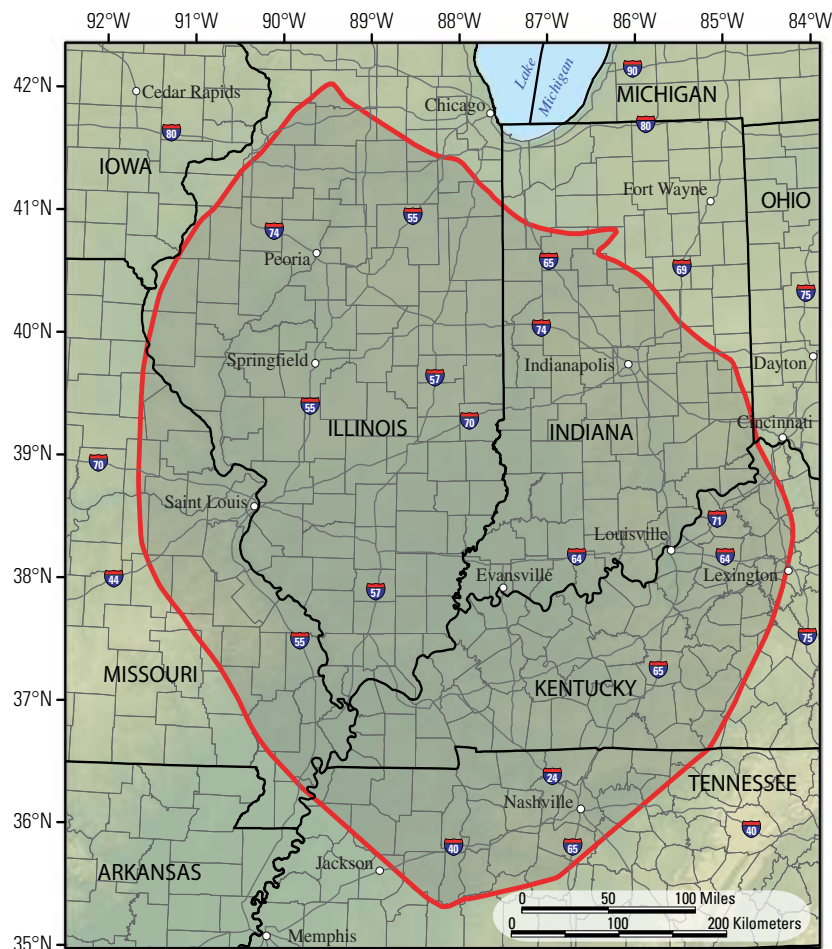


Figure 1. Location of the Illinois Basin (assessed area is within the red boundary).

cambrian to Cambrian Rift-Fill AU, (2) Cambrian Mount Simon to Eau Claire AU, (3) Cambrian to Ordovician Knox Group AU, (4) Cambrian to Ordovician Carbonates Cumberland Saddle AU, (5) Ordovician St. Peter/Everton AU, (6) Ordovician Dutchtown to Galena AU, (7) Lower Silurian Carbonates (Reef) AU, (8) Upper Silurian Calcareous Siltstones AU, (9) Upper Silurian Carbonates (Reef) AU, (10) Lower Devonian Carbonates AU, (11) Middle Devonian Dutch Creek Sandstone AU, (12) Middle Devonian Carbonates AU, (13) Lower Mississippian Borden AU, (14) Lower Mississippian Carbonates AU, (15) Upper Mississippian Sandstones AU, and (16) Pennsylvanian Sandstones AU. All of these conventional AUs were assessed quantitatively, except for the Precambrian to Cambrian Rift-Fill AU, the Cambrian Mount Simon to Eau Claire AU, the Cambrian to Ordovician Knox Group AU, and the Ordovician St. Peter/Everton AU.

The three continuous AUs are the (1) Ordovician Maquoketa Continuous AU, (2) Devonian to Mississippian New Albany Continuous AU, and (3) Pennsylvanian Coal Bed Gas AU. All of these continuous AUs were assessed quantitatively, except for the Ordovician Maquoketa Continuous AU.

Resource Summary

For the Illinois Basin, the USGS estimated the quantities of undiscovered, technically recoverable oil and gas resources as follows (table 1):

- (1) a mean of 214 million barrels of oil,
- (2) a mean of 4.65 trillion cubic feet of natural gas, and
- (3) a mean of 24 million barrels of natural gas liquids.

The Ordovician Dutchtown to Galena AU has the greatest potential for undiscovered oil, with an estimated mean of 72 million barrels of undiscovered, technically recoverable oil. The Upper Silurian Carbonates (Reef) AU and the Middle Devonian Carbonates AU also have substantial potential for undiscovered, technically recover-

able oil. The Devonian to Mississippian New Albany Continuous AU has the greatest potential for undiscovered gas, with an estimated mean of 3.79 trillion cubic feet of undiscovered, technically recoverable gas.

Additional Information

Supporting geologic studies of the Illinois Basin total petroleum systems and assessment units are in progress. Assessment results, as well as information on the assessment methodology, are posted on the USGS web site <http://energy.cr.usgs.gov/oilgas/noga> as they become available.

Illinois Basin Assessment Team

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Table 1. Illinois Basin oil and gas assessment results.

[All tabulated results are for technically recoverable resources. MMBO is million barrels of oil. BCFG is billion cubic feet of gas. MMBNGL is million barrels of natural gas liquids. Results shown are fully risked estimates. For gas accumulations, 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. TPS is Total Petroleum System. AU is Assessment Unit. CBG is Coal Bed Gas. Gray shade indicates not applicable or not assessed quantitatively]

Total Petroleum Systems and Assessment Units	Field Type	Total Undiscovered Resources											
		Oil (MMBO)				Gas (BCFG)				NGL (MMBNGL)			
		F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Conventional Oil and Gas Resources													
Devonian to Mississippian New Albany TPS													
Pennsylvanian Sandstones AU	Oil	0	1	5	2	0	2	8	3	0	0	1	0
	Gas					0	0	0	0	0	0	0	0
Upper Mississippian Sandstones AU	Oil	2	6	11	6	2	7	15	8	0	0	1	1
	Gas					0	0	0	0	0	0	0	0
Lower Mississippian Carbonates AU	Oil	5	13	23	13	4	14	28	15	0	1	2	1
	Gas					0	0	0	0	0	0	0	0
Lower Mississippian Borden AU	Oil	0	1	5	1	0	0	6	2	0	0	0	0
	Gas					0	0	0	0	0	0	0	0
Middle Devonian Carbonates AU	Oil	6	26	64	29	6	27	75	32	0	1	5	2
	Gas					0	0	0	0	0	0	0	0
Middle Devonian Dutch Creek Sandstone AU	Oil	0	7	21	8	0	7	25	9	0	0	1	0
	Gas					0	0	0	0	0	0	0	0
Lower Devonian Carbonates AU	Oil	0	5	16	6	0	5	18	7	0	0	1	0
	Gas					0	0	0	0	0	0	0	0
Upper Silurian Carbonates (Reef) AU	Oil	13	46	102	51	13	49	122	56	1	3	7	3
	Gas					0	0	0	0	0	0	0	0
Upper Silurian Calcareous Siltstones AU	Oil	0	0	61	10	0	0	45	8	0	0	2	0
	Gas					0	0	0	0	0	0	0	0
Lower Silurian Carbonates AU	Oil	2	10	25	11	2	8	25	10	0	0	1	1
	Gas					0	0	0	0	0	0	0	0
Cambrian to Ordovician Carbonates Cumberland Saddle AU	Oil	2	4	10	5	2	5	12	6	0	0	1	0
	Gas					0	0	0	0	0	0	0	0
Ordovician Ancell/Maquoketa TPS													
Ordovician Dutchtown to Galena AU	Oil	11	63	162	72	13	78	205	86	1	5	15	6
	Gas					25	150	419	177	0	3	9	4
Ordovician St. Peter/Everton AU		Not assessed quantitatively											
Precambrian to Cambrian TPS													
Cambrian to Ordovician Knox Group AU		Not assessed quantitatively											
Cambrian Mount Simon to Eau Claire AU		Not assessed quantitatively											
Precambrian to Cambrian Rift-Fill AU		Not assessed quantitatively											
Total Conventional Resources		41	182	505	214	67	352	1,003	419	2	13	46	18
Continuous Oil and Gas Resources													
Pennsylvanian Coal and Shale TPS													
Pennsylvanian Coal Bed Gas AU	CBG	0	0	0	0	182	396	861	443	0	0	1	1
Devonian to Mississippian New Albany TPS													
Devonian to Mississippian New Albany Continuous AU	Gas	0	0	0	0	1,300	3,248	8,116	3,792	1	4	13	5
Ordovician Ancell/Maquoketa TPS													
Ordovician Maquoketa Continuous AU	Gas	Not assessed quantitatively											
Total Continuous Resources		0	0	0	0	1,482	3,644	8,977	4,235	1	4	14	6
Total Undiscovered Oil and Gas Resources		41	182	505	214	1,549	3,996	9,980	4,654	3	17	60	24