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National Assessment of Oil and Gas Fact Sheet

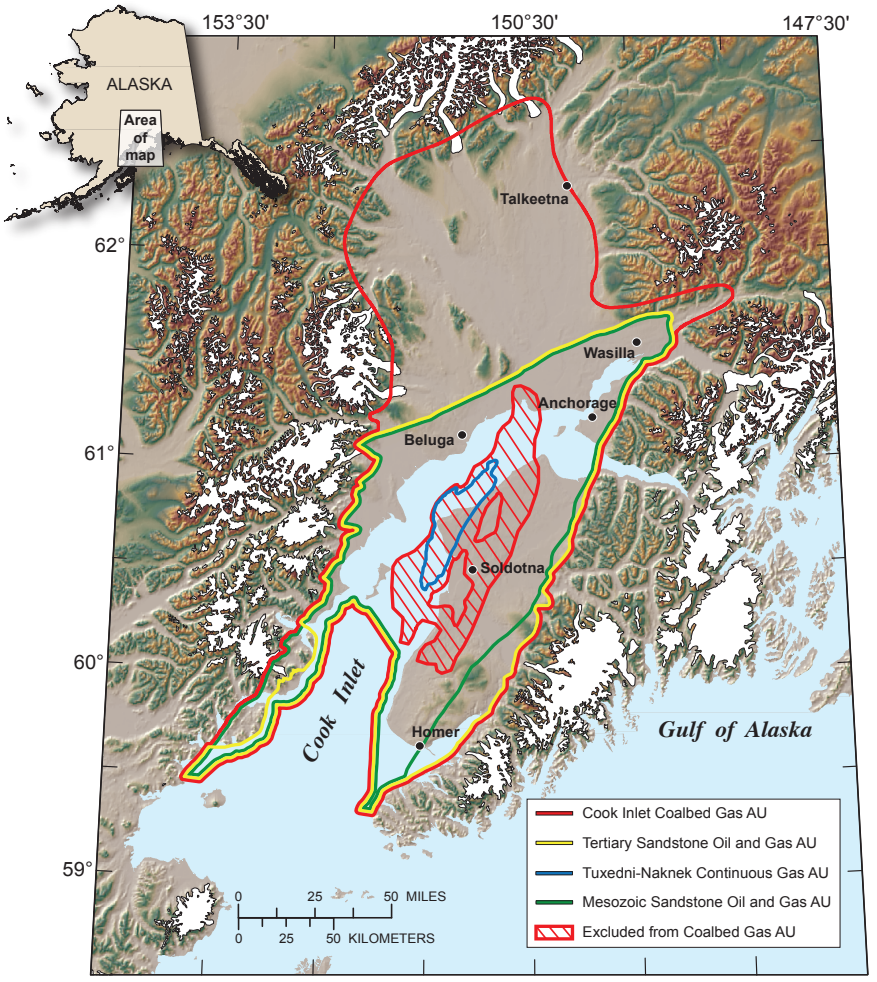
Assessment of Undiscovered Oil and Gas Resources of the Cook Inlet Region, South-Central Alaska, 2011

The U.S. Geological Survey (USGS) recently completed a new assessment of undiscovered, technically recoverable oil and gas resources in the Cook Inlet region of south-central Alaska. Using a geology-based assessment methodology, the USGS estimates that mean undiscovered volumes of nearly 600 million barrels of oil, about 19 trillion cubic feet of natural gas, and 46 million barrels of natural gas liquids remain to be found in this area.

Introduction

The Cook Inlet region is a partially explored petroleum province from which more than 1.3 billion barrels of oil, 7.8 trillion cubic feet of gas, and 12,000 barrels of natural gas liquids have been produced since commercial development of the region's hydrocarbons began in 1958. Nearly all of this petroleum has been obtained from conventional sandstone and conglomerate reservoirs of Tertiary age (about 66 to 2.6 million years old) in structural traps on anticlines and faulted anticlines.

Geologist examines an outcrop of dark shale of Middle Jurassic age (about 176 to 161 million years old) located on the west side of Cook Inlet about 130 miles (210 kilometers) southwest of Anchorage. Rocks of similar type and age are the original source of all oil in the Cook Inlet region. (USGS photograph by Richard G. Stanley).



U.S. Geological Survey (USGS) scientists have estimated undiscovered oil and gas resources within four assessment units (AUs) in the Cook Inlet region, Alaska. The AU perimeters are based on geological criteria, except offshore, where some of the AU perimeters coincide with the boundary between State and Federal waters. In the area excluded from the Coalbed Gas AU, the principal coal-bearing units are buried deeper than 6,000 feet and are unlikely to be productive of gas, because fractures that allow gas to escape from coal at shallower depths are probably closed. White areas are ice, whereas colors show elevations ranging from lowest (light brown) to higher (green) to highest (dark brown).

Recently, the U.S. Geological Survey (USGS) completed an assessment of the undiscovered oil and gas potential of the Cook Inlet region. The assessment indicates the probable existence of additional oil and gas resources that are technically recoverable—those resources that can be discovered and produced by using current technology. The USGS assessment is intended to provide an updated, scientifically based estimate of petroleum potential at a time of increased public concern about possible shortages of natural gas supplies in Anchorage and nearby communities, where natural gas produced from the Cook Inlet region is the principal source of energy for heating and electric power generation.

The new assessment is based on the geologic elements used to define a Total Petroleum System, including characterization of hydrocarbon source rocks (distribution, thickness, organic richness, thermal maturation, and timing of petroleum generation and

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migration), reservoir rocks (distribution, quality, time of formation, and conventional or continuous), and hydrocarbon traps (character and time of formation). Using this geologic framework, the USGS defined three Total Petroleum Systems and four assessment units (AU) within them. Undiscovered oil and gas resources were quantitatively estimated for each assessment unit.

The USGS assessment includes undiscovered petroleum resources in both conventional and unconventional (continuous) accumulations. Conventional resources are expected in two assessment units—the Tertiary Sandstone Oil and Gas AU and the Mesozoic Sandstone Oil and Gas AU—where undiscovered petroleum accumulations probably exist in sandstone and conglomerate reservoirs in structural traps (for example, on anticlines or adjacent to faults) and in stratigraphic traps (for example, where sandstone reservoirs that formed in ancient river channels are confined by impermeable fine-grained strata that formed on the adjacent floodplains). Unconventional resources are anticipated in two additional assessment units: (1) the Cook Inlet Coalbed Gas AU, where methane gas may exist within layers of coal in Tertiary strata, and (2) the Tuxedni-Naknek Continuous Gas AU, where continuous accumulations of methane gas may exist in low-permeability sandstones of Jurassic and Cretaceous age (about 200 to 66 million years old) that are buried at depths greater than 20,000 feet.

Resource Summary

The USGS assessment strategy provides estimates of the volumes of undiscovered oil, gas, and natural gas liquids that are technically recoverable. For the Cook Inlet region, the USGS estimates that total undiscovered oil resources range between 108 and 1,359 million barrels of oil (MMBO), with a mean estimate of 599 MMBO. The low and high numbers in this and other estimate ranges represent 95% and 5% probabilities of greater than these amounts, respectively. All of the forecasted oil resources are expected to be found in conventional accumulations in just two assessment units, the Tertiary Sandstone Oil and Gas AU and the Mesozoic Sandstone Oil and Gas AU.

The USGS estimates that total undiscovered gas resources range between 4,976 and 39,737 billion cubic feet of gas (BCFG), with a mean estimate of 19,037 BCFG. Of this mean natural gas estimate, about 72%, or 13,726 BCFG, is expected to be found in conventional accumulations in the Tertiary Sandstone Oil and Gas AU and the Mesozoic Sandstone Oil and Gas AU, whereas about 25%, or 4,674 BCFG, is expected in unconventional accumulations in the Cook Inlet Coalbed Gas AU, and 3%, or 637 BCFG, is anticipated in unconventional accumulations in the Tuxedni-Naknek Continuous Gas AU.

For natural gas liquids, the USGS estimates that total undiscovered resources range between 6 and 121 million barrels of natural gas liquids (MMBNGL), with a mean estimate of 46 MMBNGL. Of this mean estimate, about 80%, or 37 MMBNGL, is forecast to be in conventional accumulations in the Tertiary Sandstone Oil and Gas AU and the Mesozoic Sandstone Oil and Gas AU, and the remaining 20%, or 9 MMBNGL, is expected in the Tuxedni-Naknek Continuous Gas AU.

Cook Inlet USGS Assessment Team:

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For Further Information

Supporting documentation on the geology of the total petroleum systems, descriptions of the assessment units, and the methodology used in the Cook Inlet Region assessment is in preparation. Assessment results and geological reports will be available as completed at the USGS Energy Resources Program Web Site, http://energy.usgs.gov/ or contact Richard G. Stanley, rstanley@usgs.gov (650-329-4918)

This Fact Sheet and updates to it are available at http://pubs.usgs.gov/fs/2011/3068/.

Cook Inlet 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 accumulations, all liquids are included as NGL (natural gas liquids). 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. Largest expected oil field in MMBO; largest expected gas field in BCFG. TPS, total petroleum system; AU, assessment unit. Gray shading indicates not applicable]

	Total Petroleum Systems (TPS) and Assessment Units (AU)	Field type	Largest expected mean field size	*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	**Cook Inlet Composite Total Petroleum System**														
	Tertiary Sandstone Oil and Gas AU	*Oil*	111	68	322	844	372	32	156	443	186	0	2	5	2
		Gas	2,002					2,836	11,004	24,422	11,992	1	14	60	20
	Mesozoic Sandstone Oil and Gas AU	*Oil*	65	40	197	515	227	19	96	269	114	0	1	3	1
		Gas	426					251	1,241	3,280	1,434	2	12	34	14
	Total Conventional Resources			**108**	**519**	**1,359**	**599**	**3,138**	**12.497**	**28,414**	**13,726**	**3**	**29**	**102**	**37**
Continuous Oil and Gas Resources	**Tuxedni-Naknek Continuous Gas Total Petroleum System**														
	Tuxedni-Naknek Continuous Gas AU	*Gas*						257	568	1,254	637	3	8	19	9
	Cook Inlet Coalbed Gas Total Petroleum System														
	Cook Inlet Coalbed Gas AU	*Gas*						1,581	3,989	10,069	4,674	0	0	0	0
	Total Continuous Resources							**1,838**	**4,557**	**11,323**	**5,311**	**3**	**8**	**19**	**9**
	Total Undiscovered Oil and Gas Resources			**108**	**519**	**1,359**	**599**	**4,976**	**17,054**	**39,737**	**19,037**	**6**	**37**	**121**	**46**