

## National and Global Petroleum Assessment

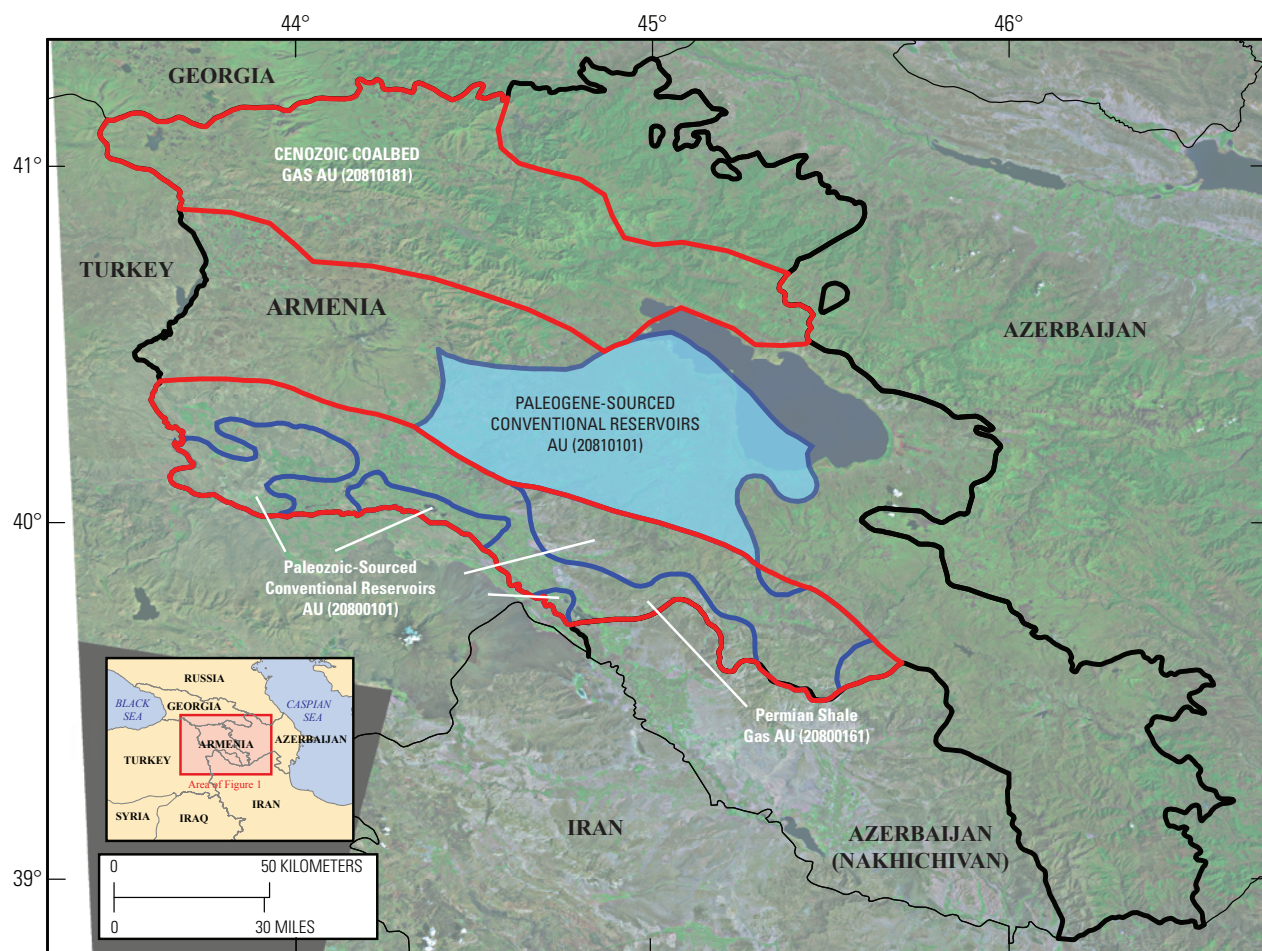
# Assessment of Undiscovered, Technically Recoverable Oil and Gas Resources of Armenia, 2014

*Using a geology-based assessment methodology, the U.S. Geological Survey estimated mean volumes of 1 million barrels of undiscovered, technically recoverable conventional oil and 6 billion cubic feet of undiscovered, technically recoverable conventional natural gas in Armenia.*

## Introduction

The U.S. Geological Survey (USGS) evaluated the potential for undiscovered conventional and unconventional oil and natural gas resources in Armenia (fig. 1). The assessment was based on the postulated presence and viability of petroleum-system elements, including petroleum source rocks (quality, source-rock maturation, generation, and migration); reservoir rocks (depositional environments, stratigraphy, and petrophysical properties); traps (type and formation); and timing considerations. Using this geologic framework, the USGS defined two hypothetical total petroleum systems (TPSs)—the Paleozoic Composite TPS and the Cenozoic Composite TPS (table 1). A total of four

assessment units (AUs) consisting of one conventional and one unconventional (shale gas and coalbed gas) in each TPS were evaluated. Only the Paleogene-Sourced Conventional Reservoirs AU was quantitatively assessed for potential conventional oil and gas resources because it had a sufficient probability for petroleum resources, a 10 percent chance or larger. This assessed AU focused on the potential for technically recoverable resources in new field discoveries; economic resources were not evaluated. The Paleozoic-Sourced Conventional Reservoirs AU, the Permian Shale Gas AU, and the Cenozoic Coalbed Gas AU were not quantitatively assessed because probability for petroleum resources was low.



**Figure 1.** Locations of assessment units (AUs) in Armenia. Solid area indicates that the AU was quantitatively assessed; outlined areas indicate that the AUs were not quantitatively assessed. Assessment units for conventional oil and gas resources are shown by blue outlines, and unconventional oil and gas resources are shown by red outlines. Maps of AUs were based on data from Mkrtchyan and others (1974). Base map from USGS Landsat Orthorectified Thematic Mapper mosaic.



**Table 1.** Assessment results for undiscovered, technically recoverable conventional and unconventional petroleum resources in Armenia.

[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 natural gas liquids (NGL) category. F95 denotes a 95-percent chance of at least the amount tabulated, F50 denotes a 50-percent chance, and F5 denotes a 5-percent chance. TPS, total petroleum system; AU, assessment unit; Accum., accumulation. Gray shading indicates not applicable.]

Geologic province, total petroleum system (TPS), and assessment unit (AU)	AU probability	Accum. type	Total undiscovered resources											
			Oil (MMBO)				Gas (BCFG)				NGL (MMBNGL)			
			F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Araks Province, 2080; Paleozoic Composite TPS, 208001														
Paleozoic-Sourced Conventional Reservoirs AU, 20800101	0.09	Oil	Not quantitatively assessed											
		Gas												
Permian Shale Gas AU, 20800161	Not quantitatively assessed													
Lesser Caucasus Province, 2081; Cenozoic Composite TPS, 208101														
Paleogene-Sourced Conventional Reservoir AU, 20810101	0.16	Oil	0	0	5	1	0	0	8	1	0	0	<1	<1
		Gas					0	0	33	5	0	0	1	<1
Cenozoic Coalbed Gas AU, 20810181	Not quantitatively assessed													
Total resources						1				6				<1

## Resource Summary

Four AUs were delineated entirely within the country of Armenia. The postulated petroleum-system elements of the Paleozoic-Sourced Conventional Reservoirs AU, the Permian Shale Gas AU, and the Cenozoic Coalbed Gas AU are uncertain, resulting in low geologic probabilities; thus they were not quantitatively assessed. The petroleum-system elements of the Paleogene-Sourced Conventional Reservoirs AU, although uncertain and risked, were quantitatively assessed because they resulted in a geologic AU probability above the threshold of 10 percent (that is, the probability of at least one conventional oil or gas accumulation of 5 million barrels of oil equivalent or greater based on postulated petroleum-system elements). We estimated fully risked mean volumes of about 1 million barrels of oil, about 6 billion cubic feet of natural gas, and less than 1 million barrels of natural gas liquids (table 1). The assessment of undiscovered petroleum resources at the 95th and 50th fractiles (table 1) is zero and reflects the low geologic AU probability of 16 percent and high geologic uncertainty on petroleum-system elements.

## For Further Information

Supporting geologic studies of the Armenia assessment are in progress. Assessment results are available at the USGS Energy Resources Program Web site: <http://energy.usgs.gov/OilGas/>.

## References Cited

Mkrtchyan, S.S., Vardanyants, L.A., Gabrielyants, A.A., Magak'yan, I.G., and Paffengol'ts, K.N., eds., 1974, *Geology of Armenia SSR, Volume 5, Lithology*: Yerevan, Publishing House of Armenia SSR, 495 p. [In Russian.]

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