

World Petroleum Resources Project

Assessment of Undiscovered Conventional Oil and Gas Resources of the Arabian Peninsula and Zagros Fold Belt, 2012

Using a geology-based assessment methodology, the U.S. Geological Survey estimated means of 86 billion barrels of oil and 336 trillion cubic feet of undiscovered natural gas resources in the Arabian Peninsula and Zagros Fold Belt.

Introduction

The U.S. Geological Survey (USGS) assessed the potential for undiscovered conventional oil and gas accumulations within the Arabian Peninsula and Zagros Fold Belt as part of the USGS World Petroleum Resources Project. Twenty-three assessment units within seven petroleum systems were quantitatively assessed in this study, which represents a reassessment of this area last published in 2000 (U.S. Geological Survey World Energy Assessment Team, 2000) (fig. 1).

The methodology for the assessment included geologic definitions of total petroleum systems (TPS) and assessment units (AU) within these systems. Exploration and discovery history was a critical part of the methodology used to estimate sizes and numbers of undiscovered conventional accumulations. Each AU was assessed for undiscovered oil and non-associated gas accumulations, and coproduct ratios were used to calculate the volumes of associated gas (gas in oil fields) and volumes of natural gas liquids.

Total Petroleum Systems

The seven TPSs and the main geologic elements used to define them are as follows: (1) Huqf–Paleozoic TPS—petroleum generated from Precambrian–Cambrian shales of the Huqf Supergroup in three Oman basins; (2) Paleozoic Composite TPS—petroleum generated from Silurian (and possibly Ordovician) marine source rocks over much of the Arabian Peninsula; (3) Paleozoic–Mesozoic Composite TPS includes the Euphrates Graben of Syria in which petroleum from Triassic source rock is present in addition to that from Paleozoic source rocks;

(4) Mesozoic Composite TPS—petroleum generated from synrift Triassic and other Mesozoic source rocks in the Palmyra and Sinjar areas; (5) Madbi–Amran–Qishn TPS of Yemen—petroleum generated from Upper Jurassic marine source rocks; (6) Middle Cretaceous Natih TPS—petroleum from the Natih Formation trapped in the Fahud Salt Basin of Oman; and (7) Mesozoic–Cenozoic Composite TPS—petroleum generated from Middle and Upper Jurassic and Lower and Upper Cretaceous source marine rocks over a wide area of the eastern Arabian Peninsula and Zagros. The 23 AUs that were defined geologically and assessed within these TPS are listed in table 1.

Resource Summary

The USGS assessed undiscovered conventional oil and gas resources in 23 AUs within seven petroleum systems, with the following estimated mean totals: (1) for conventional oil resources, 85,856 million barrels of oil (MMBO), with a range from 34,006 to 161,651 MMBO; (2) for undiscovered conventional gas, 336,194 billion cubic feet of gas (BCFG), with a range from 131,488 to 657,939 BCFG; and (3) for natural gas liquids (NGL), 11,972 MMBNGL, with a range from 4,513 to 24,788 MMBNGL (table 1).

Of the mean undiscovered conventional oil resource of 85,856 MMBO, about 92 percent (78,747 MMBO) is estimated to be in six AUs within the Mesozoic–Cenozoic Composite Total Petroleum System (fig. 1B); most of this oil is estimated to be in the Zagros Fold Belt Structures AU (mean of 38,464 MMBO), the Mesopotamian Basin Anticlines AU (mean of 26,856 MMBO), the Arabian Platform

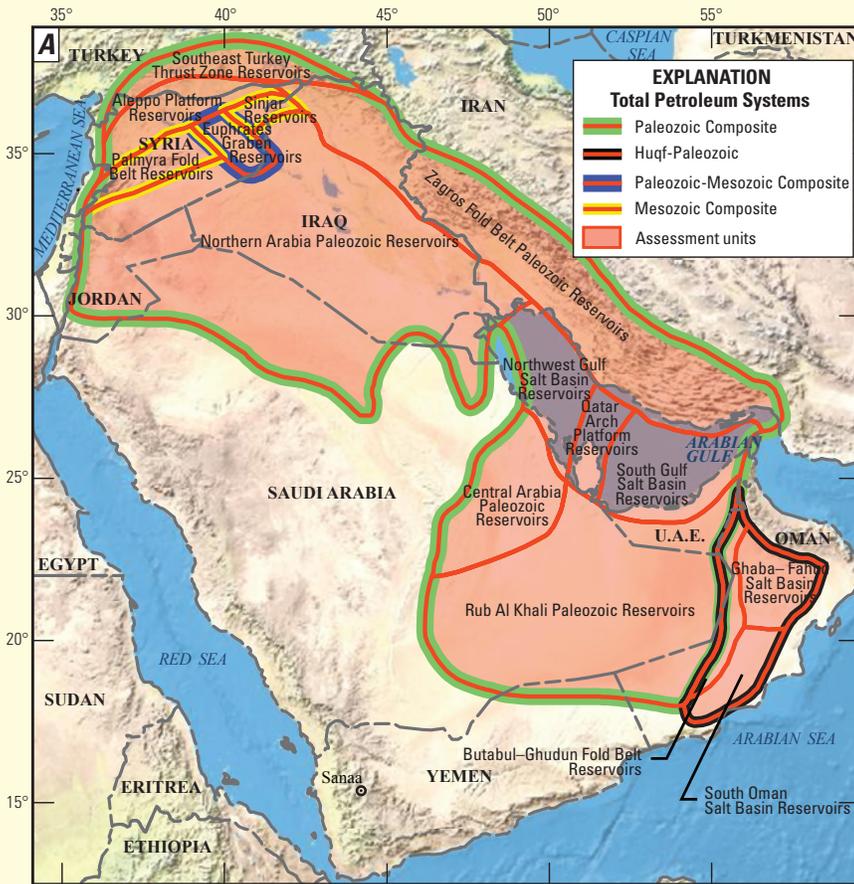


Figure 1. A. Locations of Huqf–Paleozoic Total Petroleum System (TPS), Paleozoic Composite TPS, Paleozoic–Mesozoic Composite TPS, and Mesozoic Composite TPS and associated assessment units (AU) of the Arabian Peninsula and Zagros Fold Belt. B. Locations of the Madbi–Amran–Qishn TPS, Middle Cretaceous Natih TPS, and Mesozoic–Cenozoic Composite TPS and associated AUs of the Arabian Peninsula and Zagros Fold Belt.

Structures AU (mean of 6,626 MMBO), and the Horst Block and Suprasalt Structural Oil AU (mean of 5,300 MMBO).

For the undiscovered conventional gas resource mean of 336,194 BCFG, 96 percent is in two total petroleum systems: Paleozoic Composite TPS (mean of 189,273 BCFG) and the Mesozoic–Cenozoic Composite TPS (mean of 132,876 BCFG). In the Paleozoic Composite TPS, 56 percent (106,180 BCFG) of the undiscovered gas is estimated to be in the Zagros Fold Belt Reservoirs AU (table 1).

Similarly, 64 percent (85,610 BCFG) of the undiscovered gas in the Mesozoic–Cenozoic Composite TPS is in the Zagros Fold Belt Structures AU.

Reference Cited

U.S. Geological Survey World Energy Assessment Team, 2000, U.S. Geological Survey World Petroleum Assessment 2000—Description and results: U.S. Geological Survey Digital Data Series DDS-60, 4 CD-ROMs.

For Further Information

Supporting studies of the geologic models and the methodology used in the assessment of Arabian Peninsula and Zagros Fold Belt provinces are in progress. Assessment results are available at the USGS Energy Program website, <http://energy.usgs.gov/>.

Arabian Peninsula and Zagros Fold Belt Assessment Team

Janet K. Pitman, Christopher J. Schenk, Michael E. Brownfield, Ronald R. Charpentier, Troy A. Cook, Timothy R. Klett, and Richard M. Pollastro.