

Chapter 1

Executive Summary—Geologic Assessment of Undiscovered Oil and Gas Resources of the Eastern Great Basin Province, Nevada, Utah, Idaho, and Arizona



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By U.S. Geological Survey Eastern Great Basin Assessment Team

Chapter 1 of

Geologic Assessment of Undiscovered Oil and Gas Resources of the Eastern Great Basin Province, Nevada, Utah, Idaho, and Arizona

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Introduction

The U.S. Geological Survey (USGS) recently completed an assessment of the undiscovered oil and gas potential of the Eastern Great Basin Province of eastern Nevada, western Utah, southeastern Idaho, and northwestern Arizona (fig. 1). The province includes Neogene basins, Neogene ranges and structures, the central Nevada thrust belt, and the Sevier thrust belt. The assessment was based on the primary geologic elements that constitute a total petroleum system (TPS): petroleum source rocks (source rock maturation, petroleum generation, and migration), reservoir rocks (based on sequence stratigraphy and petrophysical properties), and petroleum traps (formation and timing). Using this geologic framework, the USGS defined the Paleozoic-Tertiary Composite TPS and three assessment units (AU) within the TPS, and quantitatively estimated the undiscovered oil and gas resources within the three AUs (table 1).

Resource Summary

The USGS estimated a mean of 1.6 billion barrels of oil (BBO), a mean of 1.8 trillion cubic feet of gas (TCFG), and a mean of 85 million barrels of total natural gas liquids (MMBNGL) in the Paleozoic-Tertiary Composite TPS. All of the assessed undiscovered oil and gas resources are conventional (table 1).

Of the total mean 1.6 billion barrels of oil (BBO), a mean of 827 million barrels of oil (MMBO) is estimated to be in the Neogene Basins AU, a mean of 470 MMBO in the Ranges and Other Structures AU, and a mean of 301 MMBO in the Sevier Thrust System AU.

Of the 1.8 TCFG, about 0.1 TCFG is estimated to be in the Neogene basins AU, 1.2 TCFG in the Ranges and Other Structures AU, and 0.5 TCFG in the Sevier Thrust System AU.

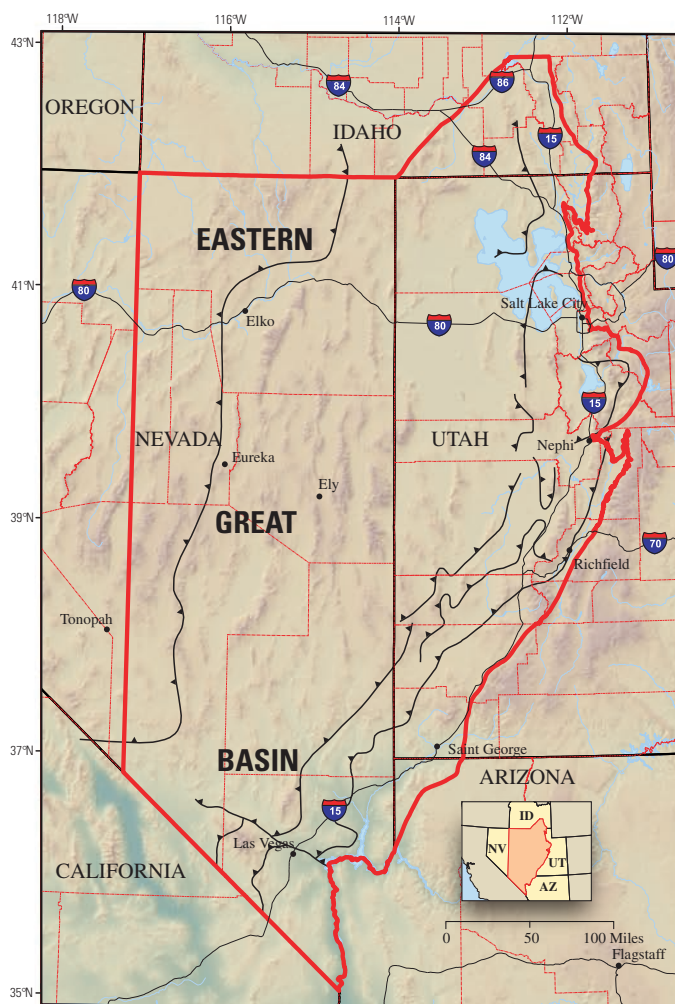


Figure 1. The Eastern Great Basin Province (red line) of Nevada, Utah, Idaho, and Arizona. Shown are major thrust faults, teeth on upthrown side.

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Table 1. Eastern Great 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. 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. Gray shade indicates not applicable]

| | 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 |
| Conventional Oil and Gas Resources | Paleozoic-Tertiary Composite TPS | | | | | | | | | | | | | |
| | Neogene Basins AU | <i>Oil</i> | 160 | 740 | 1,780 | 827 | 20 | 93 | 244 | 108 | 1 | 5 | 15 | 6 |
| | | <i>Gas</i> | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Neogene Ranges and other Structures AU | <i>Oil</i> | 47 | 375 | 1,216 | 470 | 6 | 48 | 162 | 61 | 0 | 3 | 10 | 4 |
| | | <i>Gas</i> | | | | | 114 | 898 | 2,981 | 1,133 | 5 | 38 | 135 | 50 |
| | Sevier Thrust System AU | <i>Oil</i> | 33 | 231 | 809 | 301 | 10 | 75 | 279 | 100 | 1 | 4 | 17 | 6 |
| | | <i>Gas</i> | | | | | 42 | 295 | 1,317 | 434 | 2 | 13 | 58 | 19 |
| | Total Conventional Resources | | 240 | 1,346 | 3,805 | 1,598 | 192 | 1,409 | 4,983 | 1,836 | 9 | 63 | 235 | 85 |

For Further Information

The range in estimates of undiscovered conventional oil and gas (table 1) reflects the uncertainty of assessing new field discoveries in the Eastern Great Basin Province. The small number of drilled wells and producing wells compared to the total geographic area of the province indicates a frontier (or unproven) status. The Neogene Basins AU has the best potential to add new reserves, with current production serving as a successful analogue. The Ranges and Other Structures AU is hypothetical with no current production. The recently discovered Covenant field in the Sevier Thrust System AU provides insight into the potential of that area.

Oil shale, coal-bed gas, and biogenic gas were not quantitatively assessed in this study.

Supporting geologic studies of total petroleum systems and assessment units and the methodology used in the Eastern Great Basin Province are in progress. Assessment results are available at the USGS Central Energy Team Web site: <http://energy.cr.usgs.gov/oilgas/noga/index.htm>

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