National Assessment of Oil and Gas Fact Sheet

Assessment of Undiscovered Oil and Gas Resources of the San Joaquin Basin Province of California, 2003

Using a geology-based assessment methodology, the U.S. Geological Survey estimated a mean of 1.7 trillion cubic feet of undiscovered natural gas, a mean of 393 million barrels of undiscovered oil, and a mean of 86 million barrels of natural gas liquids in the San Joaquin Basin Province.

Figure 1. *San Joaquin Basin Province of California.*

Introduction

The U.S. Geological Survey (USGS) recently completed an assessment of the undiscovered oil and gas potential of the San Joaquin Basin Province of California (fig. 1). The assessment is based on the geologic elements of each total petroleum system defined in the province, including hydrocarbon source rocks (source-rock type and maturation, and hydrocarbon generation and migration), reservoir rocks (sequence stratigraphy and petrophysical properties), and hydrocarbon traps (trap formation and timing). Using this geologic framework, the USGS defined 5 total petroleum systems and 10 assessment units within these systems. Undiscovered oil and gas resources were quantitatively estimated for the 10 assessment units (table 1).

Resource Summary

With respect to undiscovered conventional hydrocarbon resources in the San Joaquin Basin Province, the USGS estimated means of 1.7 trillion cubic feet of gas (TCFG), 393 million barrels of oil (MMBO), and 86 million barrels of total natural gas liquids (MMBNGL) for the five total petroleum systems (exclusive of reserve growth in existing oil and gas fields). Well over half of both the mean undiscovered gas resource (62 percent, 1 TCFG) and the mean NGL resource (67 percent, or 57 MMBNGL) is in the Deep Fractured Pre-Monterey Assessment Unit of the Eocene-Miocene Composite Total Petroleum System (table 1). Of the mean 393 MMB of total undiscovered oil, about 328 MMBO (83 percent) is estimated to be in five assessment units of the Miocene Total Petroleum System, and 46 MMBO (12 percent) is estimated for the Eocene West Side Fold Belt Assessment Unit of the Eocene Composite Total Petroleum System (table 1). Nearly 31 percent, or 121 MMB, of the total mean undiscovered oil resource in the San Joaquin Basin Province is estimated to be in the Central Basin Monterey Diagenetic Traps Assessment Unit.
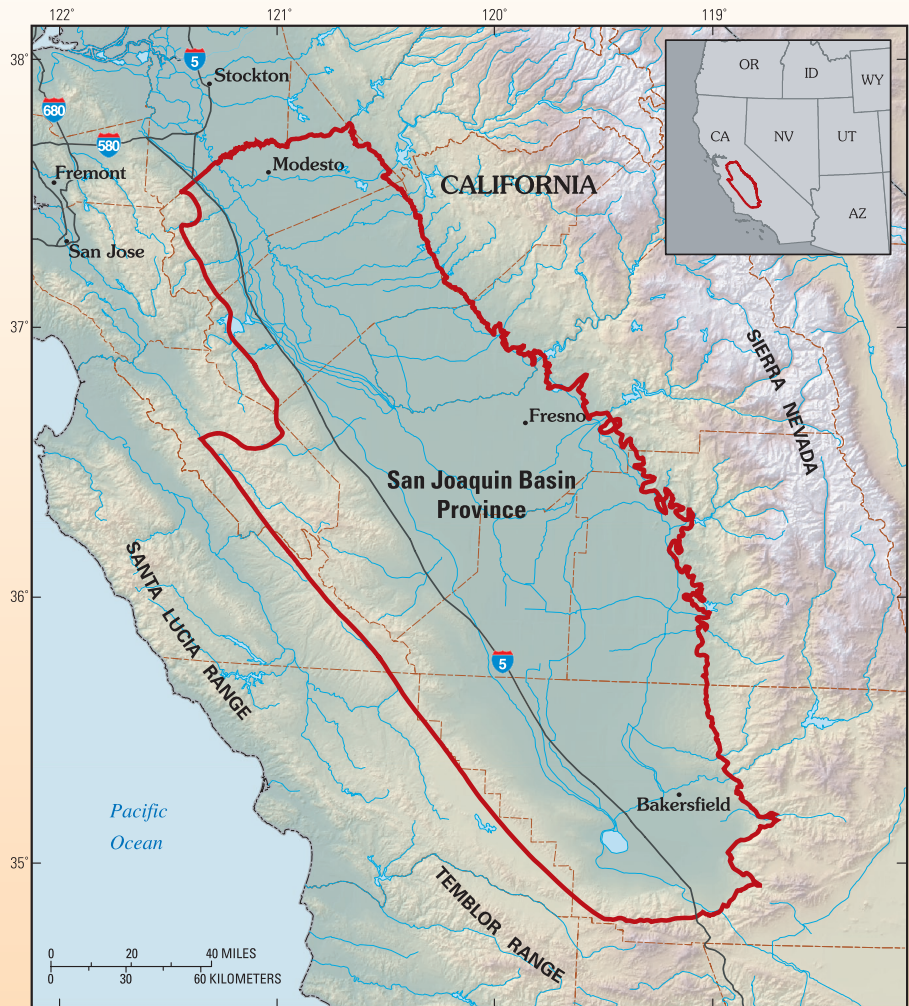
Potential reserve growth in existing oil and gas fields in the San Joaquin Basin Province was calculated during our study. Based on the analyses of recovery efficiencies and remaining oil-in-place, we estimated that another 3.5 billion barrels of oil may be added to reserves in existing fields. Most additional reserves may come from improved recovery in diatomite reservoirs of the Miocene Monterey Formation. This estimate of potential reserve growth suggests that most oil in the future may come from existing fields rather than from new oil field discoveries in the San Joaquin Basin.

Table 1. *San Joaquin 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 denotes a 95 percent chance of at least the amount tabulated. Other fractiles are defined similarly. Fractiles are additive, assuming perfect positive correlation. TPS, Total Petroleum System; AU, Assessment Unit. Gray shading indicates not applicable]

Conventional Oil and Gas Resources

Total Petroleum Systems (TPS) and Assessment Units (AU)	Field type	Oil (MMBO)				Total undiscovered resources Gas (BCFG)				NGL (MMBNGL)			
		F95	F50	F5	Mean	F95	F50	F5	Mean	F95	F50	F5	Mean
Winters-Domengine TPS													
Northern Nonassociated Gas AU	*Oil*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Gas					33.17	98.76	199.64	105.78	0.00	0.00	0.00	0.00
Eocene-Miocene Composite TPS													
Deep Fractured Pre-Monterey AU	*Oil*	1.16	3.82	21.25	6.60	2.58	9.43	53.75	16.49	0.14	0.55	3.23	0.99
	Gas					164.51	847.52	2,738.31	1,063.22	8.34	44.81	150.92	57.30
Eocene Composite TPS													
Eocene West Side Fold Belt AU	*Oil*	10.84	41.45	96.52	46.03	25.53	100.69	254.07	115.31	1.14	4.70	12.85	5.54
	Gas					8.84	29.43	114.10	41.38	0.77	2.78	11.13	3.97
North and East of Eocene West Side Fold Belt AU	*Oil*	2.77	10.59	27.77	12.33	2.32	9.30	26.07	11.10	0.06	0.23	0.70	0.29
	Gas					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Miocene TPS													
Southeast Stable Shelf AU	*Oil*	5.41	21.39	50.08	23.78	2.43	10.65	29.98	12.67	0.09	0.42	1.24	0.51
	Gas					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Lower Bakersfield Arch AU	*Oil*	14.24	66.78	162.89	75.01	15.80	82.68	274.50	105.06	0.89	4.83	16.87	6.31
	Gas					17.29	58.34	169.58	71.25	0.80	2.86	8.76	3.57
Miocene West Side Fold Belt AU	*Oil*	19.69	79.79	188.31	88.79	20.59	88.10	239.71	103.56	1.16	5.16	14.93	6.23
	Gas					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
South of White Wolf Fault AU	*Oil*	5.07	17.18	41.44	19.45	8.00	28.46	73.90	33.08	0.14	0.51	1.36	0.60
	Gas					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Central Basin Monterey Diagenetic Traps AU	*Oil*	20.99	107.36	265.01	120.93	8.30	42.76	107.31	48.39	0.06	0.31	0.81	0.35
	Gas					0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Neogene Nonassociated Gas TPS													
Neogene Nonassociated Gas AU	*Oil*	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	Gas					11.83	27.30	49.81	28.62	0.00	0.00	0.00	0.00
Total Conventional Resources		80.17	348.36	853.27	392.92	321.19	1,433.42	4,330.73	1,755.91	13.59	67.16	222.80	85.66

For Further Information

Supporting geologic studies of total petroleum systems, assessment units, reserve growth, and the methodology used in the San Joaquin Basin Province assessment are in progress. Assessment results are available at the USGS Central Energy Team website, http://energy.cr.usgs.gov/oilgas/noga.

San Joaquin Basin Province Assessment Team

Donald L. Gautier (Task Leader; gautier@usgs.gov), Allegra Hosford Scheirer, Marilyn E. Tennyson, Kenneth E. Peters, Leslie B. Magoon, Paul G. Lillis, Ronald R. Charpentier, Troy A. Cook, Christopher D. French, Timothy R. Klett, Richard M. Pollastro, and Christopher J. Schenk.