Go to Table of Contents

Go to index map

Jurassic/Tertiary Fluvial and Lacustrine Sandstone Assessment Unit 31150201

Jurassic/Tertiary Fluvial and Lacustrine Sandstone Assessment Unit 31150201

Junggar Basin Geologic Province 3115

Geologic Summary

Detailed map of this assessment unit

Exploration/Discovery-History Data

- Plots of Known Field Sizes
- Plots of Grown Resources
- Tables

Assessment Input Data

Assessment Results

- Assessment Unit Summary
- Detailed Assessment Results
- Undiscovered Field-Size Distributions

USGS PROVINCE: Junggar Basin (3115) **GEOLOGIST:** R.T. Ryder

TOTAL PETROLEUM SYSTEM: Jurassic Coal-Jurassic/Tertiary (311502)

ASSESSMENT UNIT: Jurassic/Tertiary Fluvial and Lacustrine Sandstone (31150201)

DESCRIPTION: The assessment unit is characterized by oil and gas fields in anticlines and thrust-faulted blocks on the margins of a large Cenozoic foreland basin. Also, oil and gas is trapped in compaction anticlines that overlie basement-involved horst(?) blocks on the south-dipping homoclinal flank of the basin. A deeply buried pod of mature Jurassic coal source rocks that occurs in the south-central part of the foreland basin is the source of the oil and gas. Jurassic and Tertiary nonmarine sandstones are the dominant reservoirs. Many of the fields in the assessment unit are overpressured.

SOURCE ROCKS: Source rocks are coal beds of the Lower to Middle Jurassic Sangonghe, Xishanyao, and Toutunhe Formations.

MATURATION: The Jurassic coal beds have been mature with respect to oil generation since about the late Eocene. The coal beds have been mature with respect to gas generation since about the early Miocene. A geothermal gradient of about 22°C/km probably accompanied oil and gas generation.

MIGRATION: Most oil and gas in the assessment unit has migrated laterally about 10 to 50 km from the pod of mature Jurassic coal source rocks before entrapment. In the fold-and-thrust belt along the southwestern margin of the basin, gas has migrated vertically as much as 1,000 m into Tertiary reservoirs.

RESERVOIR ROCK: Primary reservoir rocks consist of sandstone of fluvial and nearshore lacustrine origin. Reservoir quality is generally very poor because of the volcanic litharenite composition of the sandstone. The best sandstone reservoirs are the Lower Jurassic Songonghe Formation, Middle Jurassic Xishanyao Formation, and Upper Jurassic Qigu Formation. Secondary reservoir rocks in the southwestern fold-and-thrust belt part of the assessment unit consist of Paleogene/Neogene fluvial sandstone.

TRAPS AND SEALS: The major traps are anticlines and fault blocks of compressional origin. However, drape anticlines that overlie extensional(?) fault blocks in the Carboniferous basement may be important traps. Stratigraphic traps (lithologic, diagenetic, onlap, and unconformity varieties) may account for additional entrapment. The 1000-m-thick, shale and mudstone sequence of the Lower Cretaceous Tugulu Group is the best regional seal. Local shale and mudstone seals exist in Upper Jurassic alluvial plain and lacustrine sequences.

REFERENCES:
Clayton, J.L., Yang J., King, J.D., Lillis, P.G., and Warden, A., 1997, Geochemistry of oils from the Junggar basin, northwest China: American Association of Petroleum Geologists Bulletin, v. 81, p. 1926-1944.

Editorial Committee, 1989, Petroleum geology of the Junggar basin (in Chinese), *in* Petroleum Geology of China: Beijing, Petroleum Industry Press, v. 15A, 222 p.

Hendrix, M.S., Brassell, S.C., Carroll, A.R., and Graham, S.A., 1995, Sedimentology, organic geochemistry, and petroleum potential of Jurassic coal measures–Tarim, Junggar, and Turpan basins, northwest China: American Association of Petroleum Geologists Bulletin, v. 79, p. 929-959.

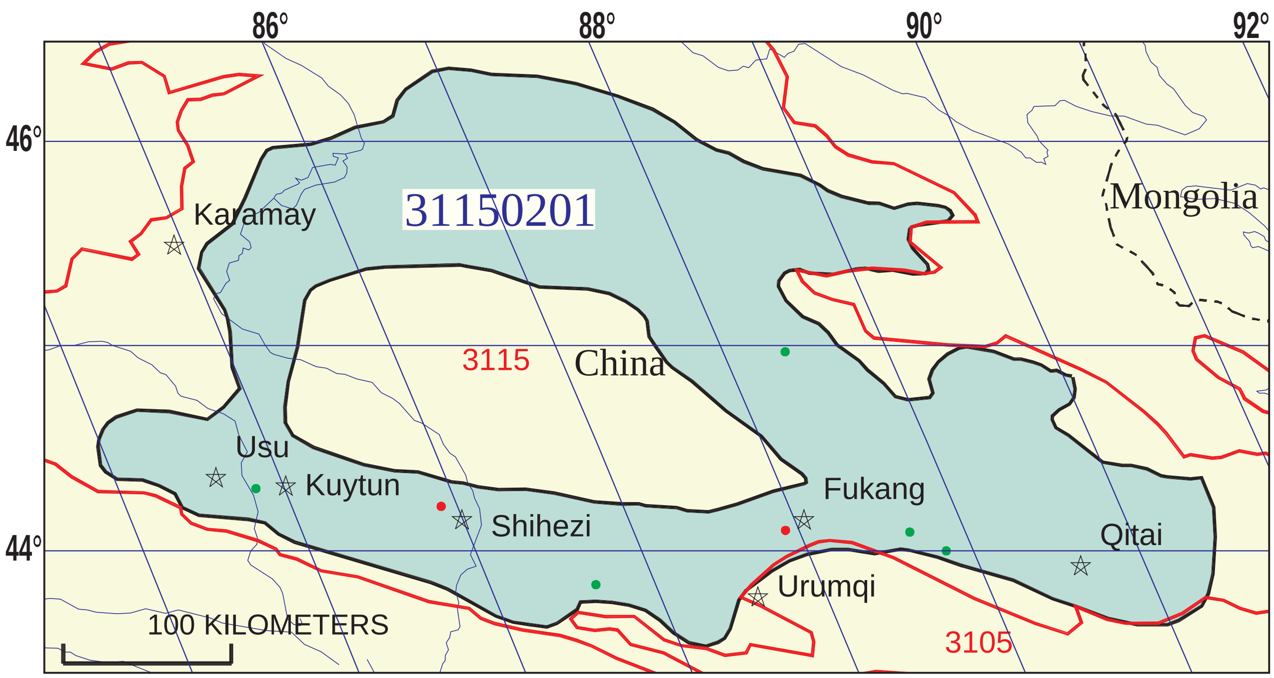
Peng X.L. and Zhang G.J., 1989, Tectonic features of the Junggar basin and their relationship with oil and gas distribution, *in* Zhu X., ed., Chinese sedimentary basins–Sedimentary basins of the world: Amsterdam, Elsevier, p. 17-31.

Zha M., Zhang W.H., and Qu J.X., 1999, Overpressure compartments in Junggar basin, northwest of China–Mechanism and hydrocarbon distribution (abs.): American Association of Petroleum Geologists Annual Convention Official Program, v. 8 [April 11-14, 1999, San Antonio, Texas], p. 158-159.

Zhao W., Zhang Y., Xu D., and Zhao C., 1997, Formation and distribution of coal measure-derived hydrocarbon accumulation in NW China, *in* Sun Z. C. and others, eds., Geology of fossil fuels–oil and gas: Proceedings 30th International Geological Congress, v. 18A, p. 87-101.

Go to Table of Contents

Go to index map



Jurassic/Tertiary Fluvial and Lacustrine Sandstone Assessment Unit - 31150201

EXPLANATION

- Hydrography
- Shoreline
- 3115 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 31150201 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

USGS science for a changing world

SEVENTH APPROXIMATION
NEW MILLENNIUM WORLD PETROLEUM ASSESSMENT
DATA FORM FOR CONVENTIONAL ASSESSMENT UNITS

Date:………………………….	5/27/99		
Assessment Geologist:……..	R.T. Ryder		
Region:………………………..	Asia Pacific	Number:	3
Province:………………………	Junggar Basin	Number:	3115
Priority or Boutique…………	Priority		
Total Petroleum System:……	Jurassic Coal-Jurassic/Tertiary	Number:	311502
Assessment Unit:……………	Jurassic/Tertiary Fluvial and Lacustrine Sandstone	Number:	31150201
* Notes from Assessor	MMS growth function.		

CHARACTERISTICS OF ASSESSMENT UNIT

Oil (<20,000 cfg/bo overall) **or** Gas (≥20,000 cfg/bo overall):… Oil

What is the minimum field size?………. 5 mmboe grown (≥1mmboe)
(the smallest field that has potential to be added to reserves in the next 30 years)

Number of discovered fields exceeding minimum size:………… Oil: 6 Gas: 2
Established (>13 fields) ____ Frontier (1-13 fields) X Hypothetical (no fields) ____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 14 2nd 3rd 50 3rd 3rd ____
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 50 2nd 3rd 359 3rd 3rd ____

Assessment-Unit Probabilities:

Attribute	Probability of occurrence (0-1.0)
1. **CHARGE:** Adequate petroleum charge for an undiscovered field ≥ minimum size………………	1.0
2. **ROCKS:** Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size……	1.0
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size	1.0

Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):……..………...…. 1.0

4. **ACCESSIBILITY:** Adequate location to allow exploration for an undiscovered field ≥ minimum size………………………………………………………..………………..……..………… 1.0

UNDISCOVERED FIELDS

Number of Undiscovered Fields: How many undiscovered fields exist that are ≥ minimum size?:
(uncertainty of fixed but unknown values)

	min. no. (>0)	median no.	max no.
Oil fields:…………………………………	1	6	15
Gas fields:………………………………	1	10	20

Size of Undiscovered Fields: What are the anticipated sizes (**grown**) of the above fields?:
(variations in the sizes of undiscovered fields)

	min. size	median size	max. size
Oil in oil fields (mmbo)……………….…….	5	10	200
Gas in gas fields (bcfg):……………………	30	60	1200

U.S. GEOLOGICAL SURVEY WORLD PETROLEUM ASSESSMENT 2000— DESCRIPTION AND RESULTS
U.S. Geological Survey World Energy Assessment Team

Assessment Unit (name, no.)
Jurassic/Tertiary Fluvial and Lacustrine Sandstone, 31150201

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS
(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)………………………...………	250	500	750
NGL/gas ratio (bngl/mmcfg)……………………..…..	30	60	90

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)…………………..…..	22	44	66
Oil/gas ratio (bo/mmcfg)……………………………..			

SELECTED ANCILLARY DATA FOR UNDISCOVERED FIELDS
(variations in the properties of undiscovered fields)

Oil Fields:	minimum	median	maximum
API gravity (degrees)………………………………….	20	33	40
Sulfur content of oil (%)…………………………..…..	0	0.1	0.5
Drilling Depth (m) ……………...……………………..	500	2000	4000
Depth (m) of water (if applicable)…………….……..			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……………………….....……	0	0.5	4
CO_2 content (%)……………………………….....…..	0.01	0.1	1
Hydrogen-sulfide content (%)……………….…….…			
Drilling Depth (m)……………………………………	500	2000	4000
Depth (m) of water (if applicable)………………….			

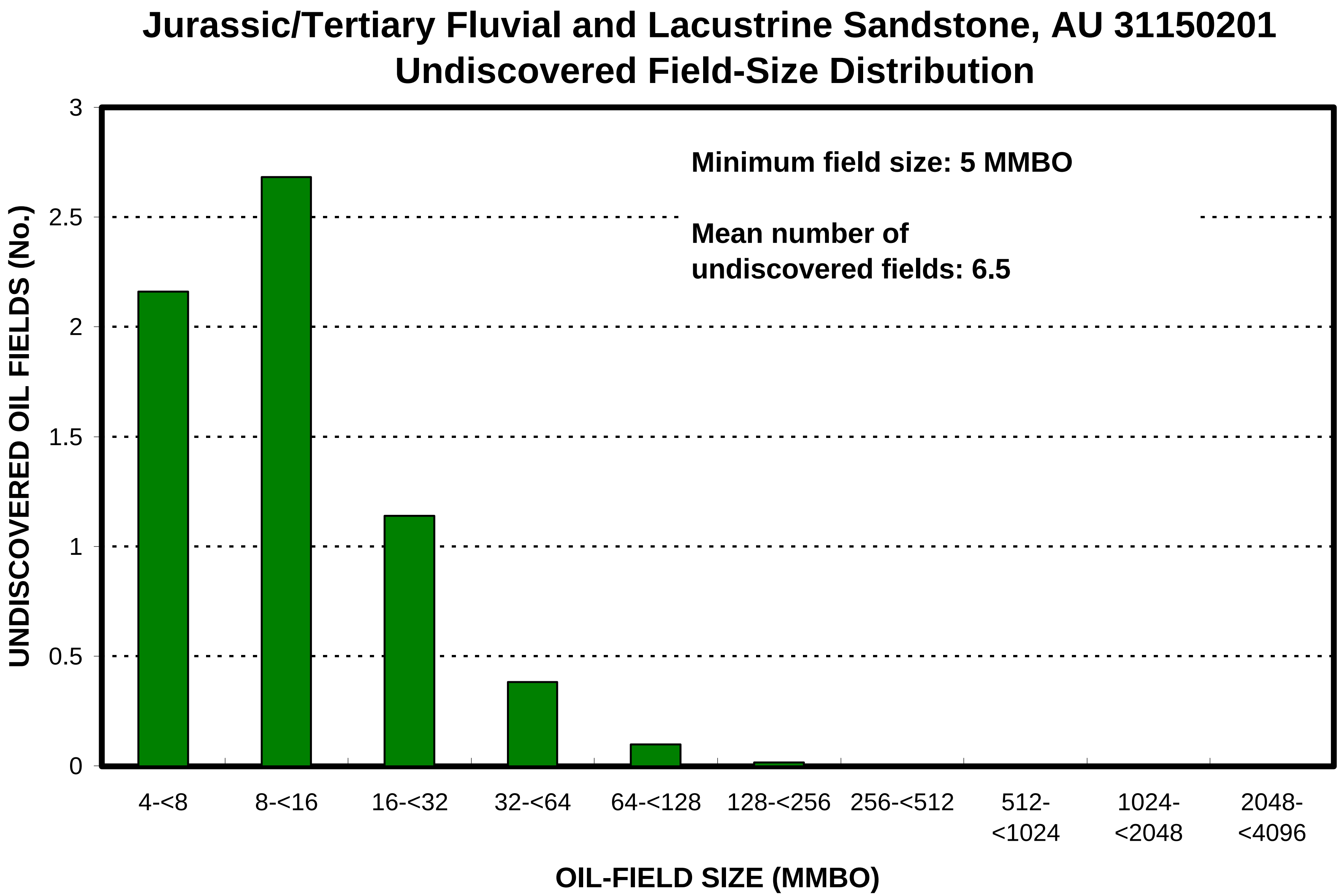
Assessment Unit (name, no.)
Jurassic/Tertiary Fluvial and Lacustrine Sandstone, 31150201

ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT
TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. China represents 100 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……………..…			
Volume % in parcel (areal % x richness factor):…		100	
Portion of volume % that is offshore (0-100%)……		0	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……………..…			
Volume % in parcel (areal % x richness factor):…		100	
Portion of volume % that is offshore (0-100%)……		0	


Jurassic/Tertiary Fluvial and Lacustrine Sandstone, AU 31150201
Undiscovered Field-Size Distribution
Minimum field size: 5 MMBO
Mean number of undiscovered fields: 6.5
UNDISCOVERED OIL FIELDS (No.)
0
0.5
1
1.5
2
2.5
3
4-<8
8-<16
16-<32
32-<64
64-<128
128-<256
256-<512
512-<1024
1024-<2048
2048-<4096
OIL-FIELD SIZE (MMBO)

Jurassic/Tertiary Fluvial and Lacustrine Sandstone, AU 31150201
Undiscovered Field-Size Distribution