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Tarim Basin Excluding Marginal Foldbelts
Assessment Unit 31540101

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Tarim Basin Geologic Province 3154

Geologic Summary

Detailed map of this assessment unit

Exploration/Discovery-History Data

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- Undiscovered Field-Size Distributions

USGS PROVINCE: Tarim Basin (3154) **GEOLOGIST:** R.T. Ryder

TOTAL PETROLEUM SYSTEM: Ordovician/Jurassic-Phanerozoic (315401)

ASSESSMENT UNIT: Tarim Basin Excluding Marginal Foldbelts (31540101)

DESCRIPTION: The assessment unit is characterized by structurally and stratigraphically controlled oil and gas fields in Ordovician carbonate reservoirs, Carboniferous sandstone and carbonate reservoirs, and Mesozoic and Cenozoic sandstone reservoirs accompanying central basin depressions and paleouplifts. Deeply buried pods of mature Ordovician, Carboniferous, and Jurassic source rocks are located in the north (Manjaer-Awati) and southwest depressions of the basin.

SOURCE ROCKS: The dominant source rocks are marine shelf shale and mudstone of Ordovician age deposited in an anoxic marine environment. The thickness of the Ordovician source rock sequence probably is about 50 to 100 m. Total organic carbon (TOC) values range from 1.2 to 2.8 percent and average about 1.9 percent. Secondary source rocks are marine shelf shale and argillaceous carbonate of Carboniferous age and coal and lacustrine shale of Jurassic age.

MATURATION: The Ordovician and Carboniferous source rocks have been mature with respect to oil and gas generation since about Late Devonian to Early Carboniferous time. Following a Carboniferous to late Mesozoic stage of major uplift and erosion, a second phase of maturation occurred in the early Neogene (Miocene). The Jurassic source rocks have been mature since about early Neogene time. A geothermal gradient of about 20 to 22°C/km probably accompanied oil and gas generation.

MIGRATION: Oil and gas in the assessment unit may have migrated laterally as much as 100 km from the pods of mature Ordovician, Carboniferous, and Jurassic source rocks before entrapment on the central (Tazhong-Bachu) and northern (Tabei) basement uplifts. Also, oil, condensate, and gas derived from mature Ordovician/Carboniferous source rocks migrated vertically along high-angle reverse faults into Mesozoic and Cenozoic sandstone reservoirs on the uplifts. The central basin Tazhong-Bachu paleouplift was an eroding land mass during most of the late Paleozoic (early Carboniferous to Permian). Thus, large quantities of oil and possibly gas that reached it during the late Devonian to early Permian migration were soon exhumed or escaped entrapment altogether. A mid-Cenozoic stage of oil and gas migration reintroduced hydrocarbons from Ordovician/Carboniferous source rocks to many structures that were previously poorly sealed and (or) exhumed. Also in the middle Cenozoic, gas and local oil was generated from Jurassic source rocks and migrated into Mesozoic and Cenozoic sandstone reservoirs.

RESERVOIR ROCK: Primary reservoir rocks consist of Ordovician carbonate and Carboniferous sandstone and carbonate. Carbonate reservoirs contain abundant karst-related fractures and caverns owing to intense weathering accompanying regional unconformities. Reservoir quality of the Carboniferous shoreface sandstone (Donghe Sandstone) is generally

good because of its quartzose composition. Sandstone reservoirs of Mesozoic and Cenozoic age are fine- to medium-grained.

TRAPS AND SEALS: The major traps are large anticlines and fault blocks of compressional origin. Stratigraphic traps (unconformity, paleotopographic, and facies-change varieties) may provide additional entrapment along the margins of the Tazhong-Bachu and Tabei paleouplifts. Evaporite-bearing shale and mudstone sequences of Late Carboniferous, Middle Jurassic, Early Cretaceous, and early Paleogene age are the best regional seals.

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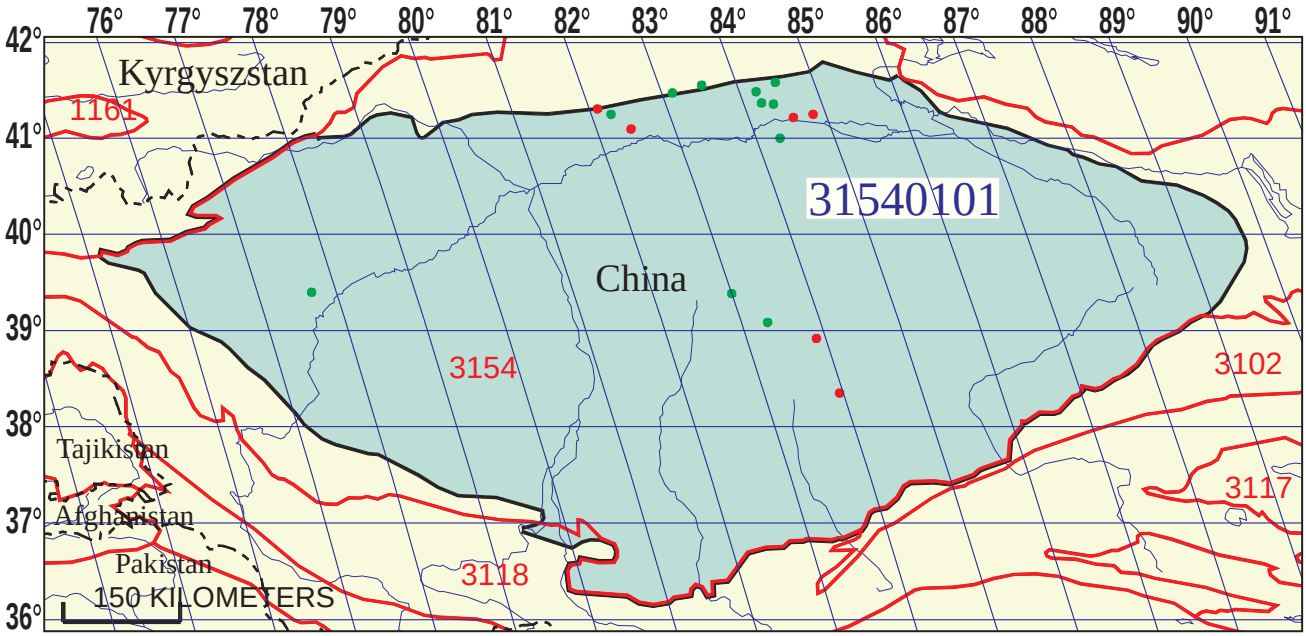

Tarim Basin Excluding Marginal Foldbelts Assessment Unit - 31540101

EXPLANATION

- Hydrography
- Shoreline
- 3154 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 31540101 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:……..	11/10/99		
Assessment Geologist:……..	R.T. Ryder		
Region:……..	Asia Pacific	Number:	3
Province:……..	Tarim Basin	Number:	3154
Priority or Boutique……	Boutique		
Total Petroleum System:……	Ordovician/Jurassic-Phanerozoic	Number:	315401
Assessment Unit:……..	Tarim Basin Excluding Marginal Foldbelts	Number:	31540101
* 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?……. 10 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: _____ Gas: _____

Established (>13 fields)	X	Frontier (1-13 fields)		Hypothetical (no fields)	

Median size (grown) of discovered oil fields (mmboe):
1st 3rd _____ 2nd 3rd _____ 3rd 3rd _____

Median size (grown) of discovered gas fields (bcfg):
1st 3rd _____ 2nd 3rd _____ 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)

Oil fields:……min. no. (>0)	5	median no.	50	max no.	150
Gas fields:……min. no. (>0)	5	median no.	40	max no.	115

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

Oil in oil fields (mmbo)……..……min. size	10	median size	50	max. size	2000
Gas in gas fields (bcfg):……min. size	60	median size	300	max. size	12000

Assessment Unit (name, no.)
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AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	1500	3000	4500
NGL/gas ratio (bngl/mmcfg)……	37	75	113

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	25	50	75
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)……	15	40	55
Sulfur content of oil (%)……	0	0.1	0.3
Drilling Depth (m) ……	1500	4000	6500
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	2	6	28
CO_2 content (%)……	0.2	3	6.5
Hydrogen-sulfide content (%)……			
Drilling Depth (m)……	3500	5000	7500
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)
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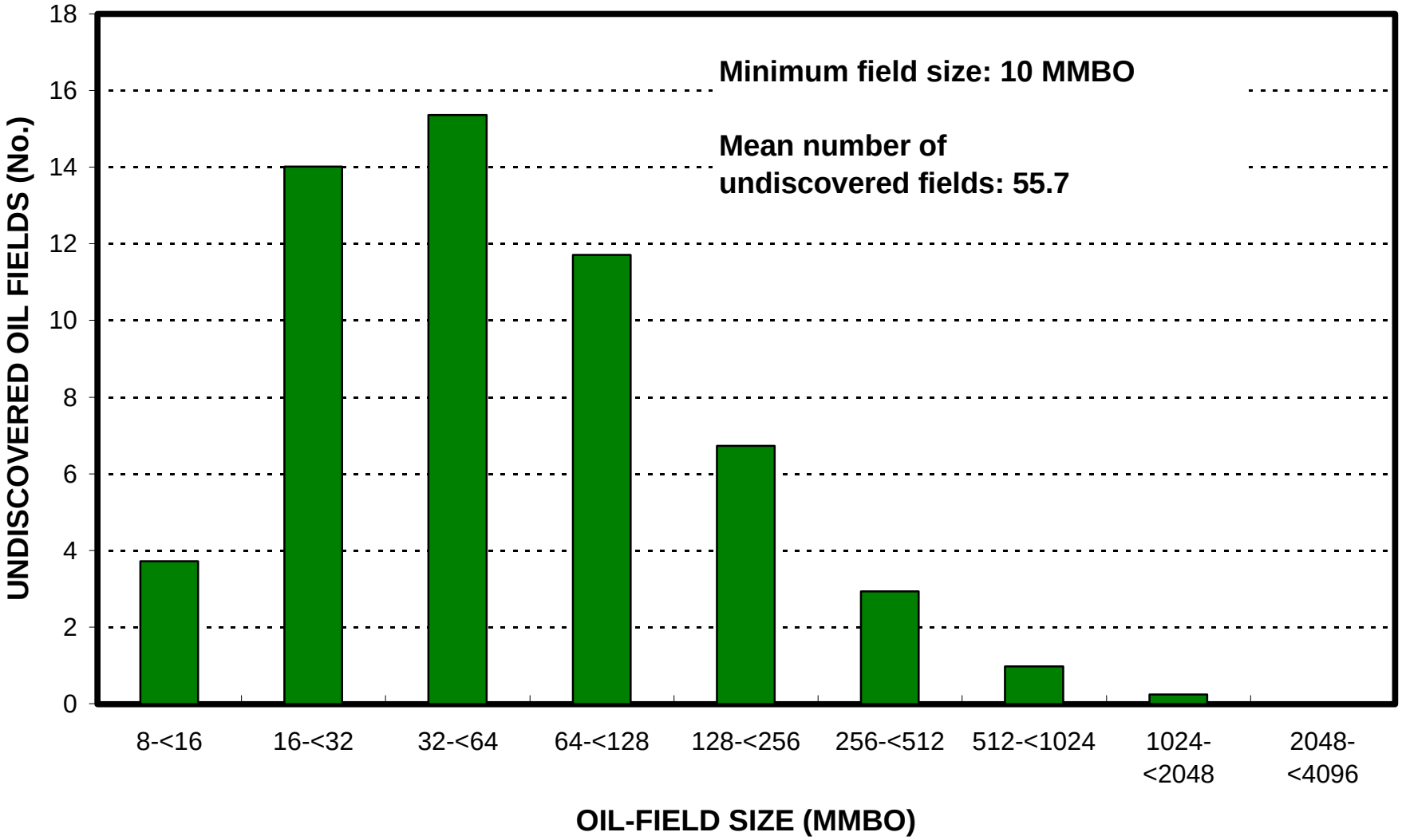
ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

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	

Tarim Basin Excluding Marginal Foldbelts, AU 31540101
Undiscovered Field-Size Distribution



Tarim Basin Excluding Marginal Foldbelts, AU 31540101
Undiscovered Field-Size Distribution