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Structural Traps
Assessment Unit 31440201

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Songliao Basin Geologic Province 3144

Geologic Summary

Detailed map of this assessment unit

Assessment Input Data

Assessment Results

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

USGS PROVINCE: Songliao Basin (3144) **GEOLOGIST:** R.T. Ryder

TOTAL PETROLEUM SYSTEM: Jurassic Coal-Denglouku/Nongan (314402)

ASSESSMENT UNIT: Structural Traps (31440201)

DESCRIPTION: The assessment unit is characterized by gas fields trapped primarily in anticlines and anticlinal noses (in combination with sandstone pinchouts). Reservoirs consist of Lower Cretaceous alluvial fan and braided fluvial sandstone and conglomeratic sandstone. Most fields are confined to about 15 rift-controlled pods of active Upper Jurassic source rocks distributed throughout the basin.

SOURCE ROCKS: Source rocks are coal beds of the Upper Jurassic Shahezi and Yingcheng Formations.

MATURATION: The Upper Jurassic coal beds reached peak maturity with respect to gas generation in the Lower Cretaceous (late Aptian; ~118 Ma). A high geothermal gradient (~45°C/km) probably accompanied gas generation.

MIGRATION: Vertical migration was the main mechanism of gas dispersal from source to reservoir. In rift sub-basins, gas generated from Jurassic coal beds has migrated as much as several thousand meters vertically along normal faults. Lateral migration was very local and confined to the pods of mature Jurassic source rocks.

RESERVOIR ROCK: Reservoir rocks are alluvial fan and braided fluvial sandstone and conglomeratic sandstone beds of Early Cretaceous age. In ascending order, three reservoirs are recognized: Member 1 of the Denglouku Formation, (D-1); Member 3 of the Denglouku Formation; and Nongan (reservoir unit in the lower part of the Quantou Formation). Gross reservoir interval thickness for the three reservoirs ranges from about 60 to 250 m whereas pay thickness ranges from about 3 to 44 m.

TRAPS AND SEALS: The major traps are anticlines and anticlinal noses formed by compaction over extensional fault blocks or by a Late Cretaceous to early Tertiary compressional event that led to partial structural inversion of the rift basin. The regional seal rock is the widespread lacustrine black shale and mudstone of the Lower Cretaceous Qingshankou Formation. Other seals consist of mudrock- and shale-dominated Members 2 and 4 of the Denglouku Formation and Member 2 of the Quantou Formation.

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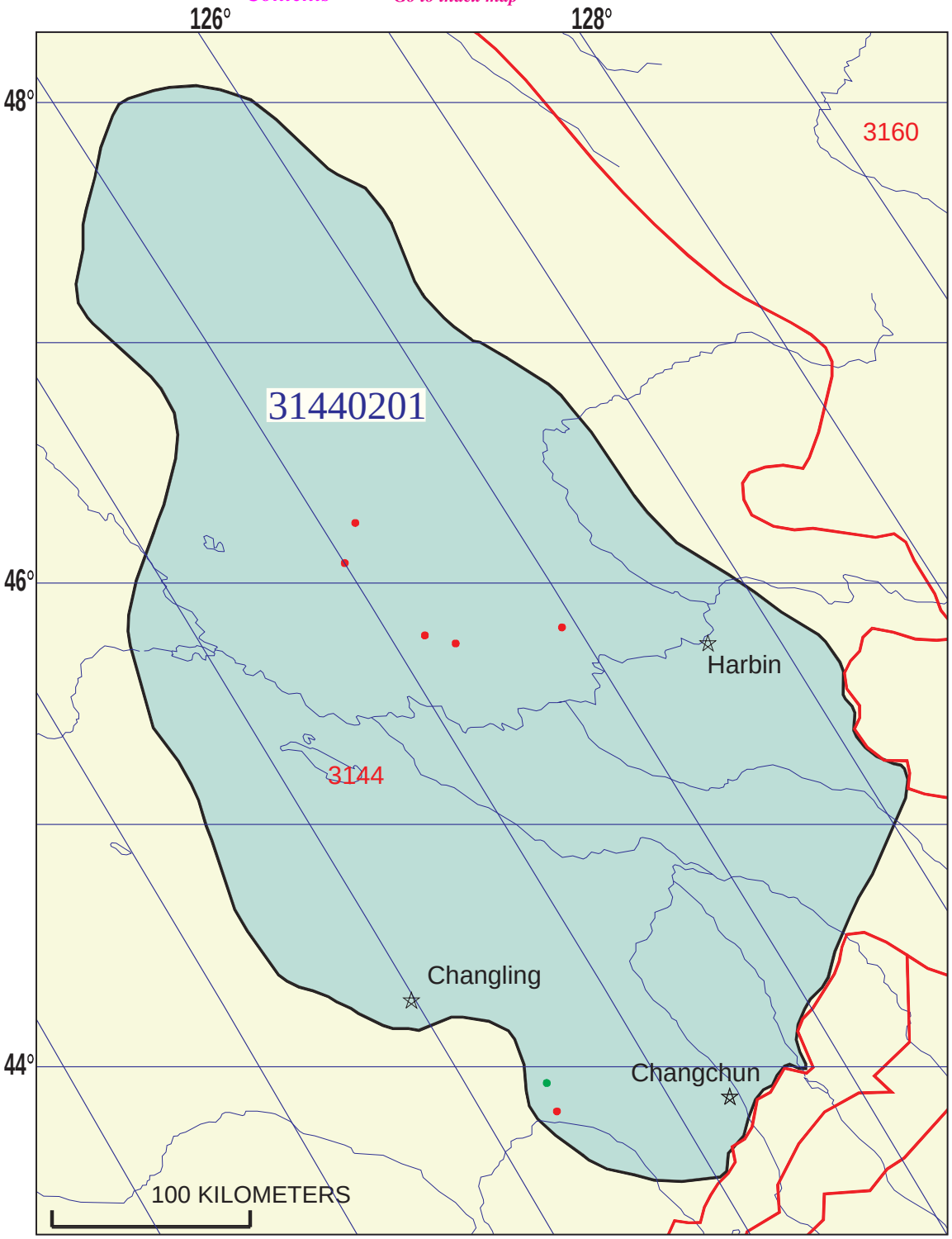

Structural Traps
Assessment Unit - 31440201

EXPLANATION

- Hydrography
- Shoreline
- 3144 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 31440201 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:…….. 11/20/98
Assessment Geologist:…….. R.T. Ryder
Region:…….. Asia Pacific Number: 3
Province:…….. Songliao Basin Number: 3144
Priority or Boutique…… Priority
Total Petroleum System:…… Jurassic Coal-Denglouku/Nongan Number: 314402
Assessment Unit:…… Structural Traps Number: 31440201
* Notes from Assessor

CHARACTERISTICS OF ASSESSMENT UNIT

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

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: 0 Gas: 8
Established (>13 fields) _____ Frontier (1-13 fields) X Hypothetical (no fields) _____
*2 fields only had dates-median=20
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) _____ median no. _____ max no. _____
Gas fields:……min. no. (>0) 10 median no. 30 max no. 60

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 _____ median size _____ max. size _____
Gas in gas fields (bcfg):…… min. size 30 median size 75 max. size 1000

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

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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)……			
NGL/gas ratio (bngl/mmcfg)……			

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	15	30	45
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)……			
Sulfur content of oil (%)……			
Drilling Depth (m) ……			
Depth (m) of water (if applicable)……			

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……			
Hydrogen-sulfide content (%)……			
Drilling Depth (m)……	1500	2800	4500
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):…			
Portion of volume % that is offshore (0-100%)……			

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	

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Undiscovered Field-Size Distribution