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Coal-Sourced Gas Assessment Unit 31270201

Geologic Summary

Detailed map of this assessment unit

Assessment Input Data

Assessment Results

☐ This assessment unit was not
☐ assessed quantitatively.

USGS PROVINCE: Bohaiwan Basin (3127) **GEOLOGIST:** R.T. Ryder

TOTAL PETROLEUM SYSTEM: Carboniferous/Permian Coal-Paleozoic (312702)

ASSESSMENT UNIT: Coal-Sourced Gas (31270201)

DESCRIPTION: The assessment unit is characterized by gas accumulation in low-permeability Carboniferous and Permian sandstone reservoirs and locally in buried hills consisting of Proterozoic and lower Paleozoic carbonates. Gas accumulation is expected in five (Bozhong, Huanghua, Linqing/Dongpu, Jiyang, Jizhong) of the six sub-basins in the Bohaiwan basin, each having one or more pod(s) of mature Permian and Carboniferous coal-bearing source rock. The depth to the gas accumulation ranges from about 3,000 to 7,000 m.

SOURCE ROCKS: Source rocks are coal beds and carbonaceous shale of the Upper Carboniferous Taiyuan Formation and the Lower Permian Shanxi Formation. The thickness of Carboniferous and Permian carbonaceous shale-and coal-bearing strata ranges from 100 to 400 m.

MATURATION: The Carboniferous/Permian coal beds have been mature with respect to gas generation since about the middle Eocene. A relatively high geothermal gradient of about 32 to 36°C/km accompanied gas generation.

MIGRATION: Gas migration was limited to the pods of mature source rock in the rifted sub-basins. There, gas generated from the Carboniferous/Permian coal beds migrated short distances laterally into intercalated sandstone reservoirs and vertically into sandstone reservoirs overlying the coal beds. Locally, gas generated from the coal beds migrated into adjoining buried hills consisting of Proterozoic and lower Paleozoic carbonate reservoirs.

RESERVOIR ROCK: Reservoir rocks are low-permeability sandstone beds of fluvial and deltaic origin in the Lower Permian Shanxi and Shihezhi Formations. These sandstone reservoirs either overlie or are intercalated with the coal-bearing source rocks. Locally, reservoirs consist of Proterozoic, Cambrian, and Ordovician carbonates in pre-Tertiary buried hills.

TRAPS AND SEALS: By analogy to other continuous-type gas accumulations, gas entrapment may be controlled by updip zones of high water saturation. Mesozoic and (or) widespread Tertiary lacustrine mudstone and shale, resting unconformably on the Carboniferous/Permian coal beds and reservoirs, act as the major seal rocks.

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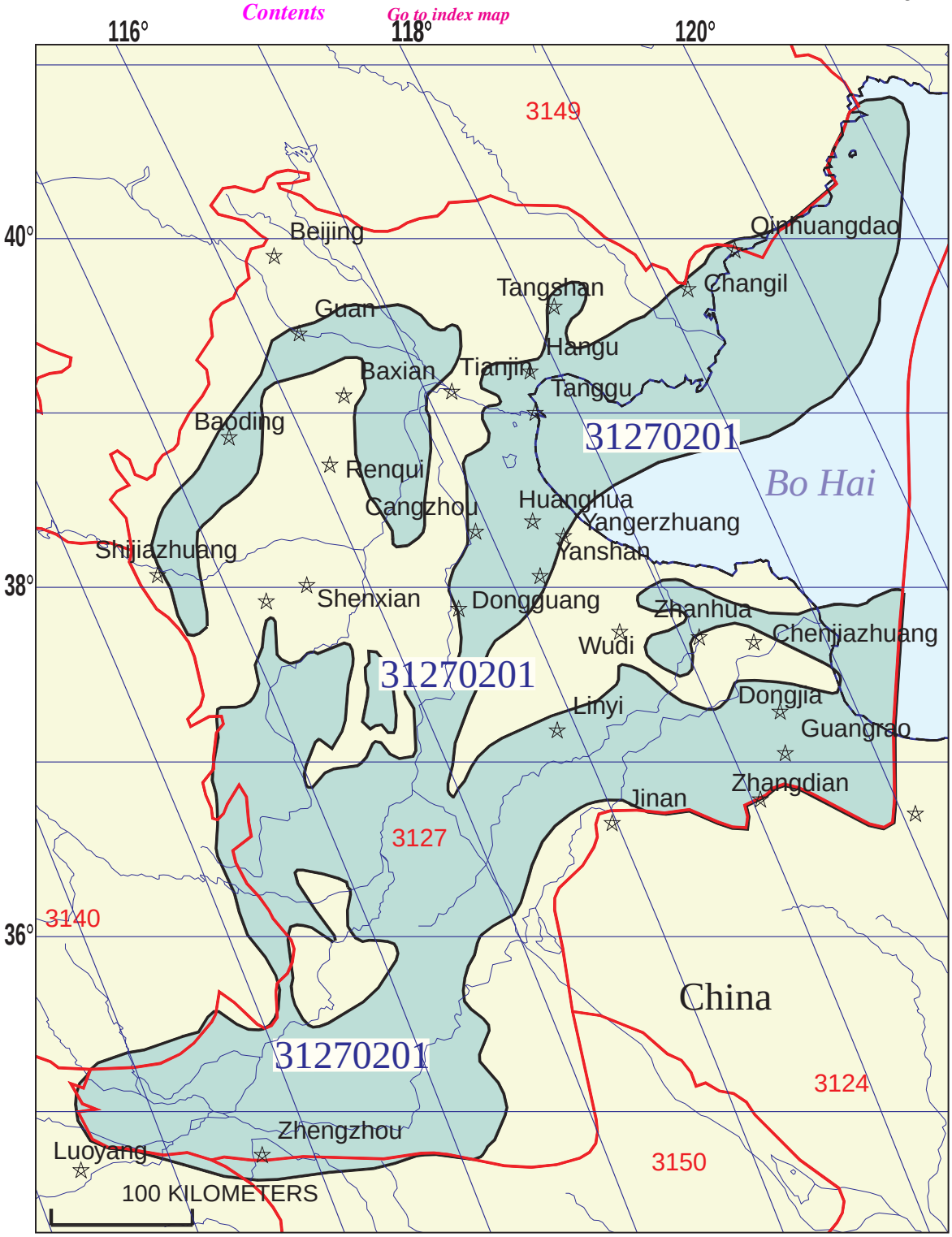
Shen X.Z., Liu D.L., Lin D.Y., Xue A.M., Li X.X., Gou S.P., and Wan L., 1993, A preliminary analysis on the reservoir condition of late Paleozoic coal-related gas in the southern basin of north China (in Chinese with English abstract): Journal of Nanjing University (Earth Sciences), v. 5, p. 192-199.



Coal-Sourced Gas
Assessment Unit - 31270201

EXPLANATION

- Hydrography
- Shoreline
- 3127 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 31270201 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:…….. 4/28/99
Assessment Geologist:…….. R.T. Ryder
Region:…….. Asia Pacific Number: 3
Province:…….. Bohaiwan Basin Number: 3127
Priority or Boutique…… Priority
Total Petroleum System:…… Carboniferous/Permian Coal-Paleozoic Number: 312702
Assessment Unit:…… Coal-Sourced Gas Number: 31270201
* Notes from Assessor Approximately 10% of assessment unit is offshore.

CHARACTERISTICS OF ASSESSMENT UNIT

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

What is the minimum field size?……. _____ 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) _____ 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……	
2. **ROCKS:** Adequate reservoirs, traps, and seals for an undiscovered field ≥ minimum size……	
3. **TIMING OF GEOLOGIC EVENTS:** Favorable timing for an undiscovered field ≥ minimum size	
Assessment-Unit GEOLOGIC Probability (Product of 1, 2, and 3):……	
4. **ACCESSIBILITY:** Adequate location to allow exploration for an undiscovered field ≥ minimum size……	

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) _____ median no. _____ max no. _____

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 _____ median size _____ max. size _____

Assessment Unit (name, no.)

_____

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)……			
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)……			
Depth (m) of water (if applicable)……			

Assessment Unit (name, no.)

_____

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

1. _____ represents _____ 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):…			
Portion of volume % that is offshore (0-100%)……			