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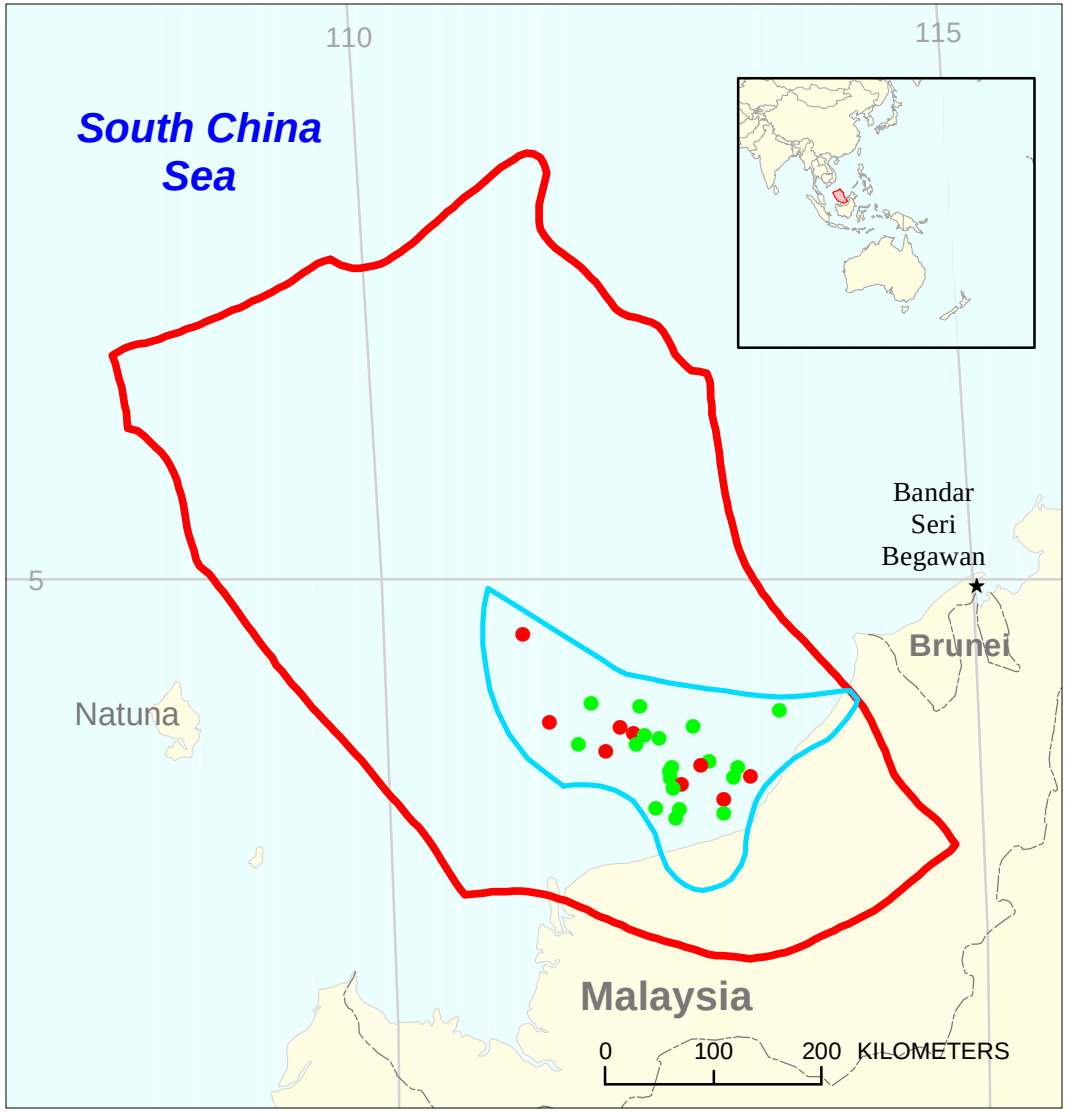
Balingian
Assessment Unit 37020102



Balingian Assessment Unit 37020102

Greater Sarawak Basin Geologic Province 3702

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: Greater Sarawak Basin (3702) **GEOLOGIST:** P.J. McCabe

TOTAL PETROLEUM SYSTEM: Sarawak Basin (370201)

ASSESSMENT UNIT: Balingian Province (37020102)

DESCRIPTION: The reservoirs are present in Late Oligocene to Middle Miocene deltaic complexes. These deltas were built by clastic sediment derived from the present day south and west. Overall the succession is transgressive in nature with expansion of the sea from the northeast.

SOURCE ROCKS: Geochemical analysis indicates that the hydrocarbons are derived from terrestrially derived organic matter. The oils have a high pristane/phytane ratio. Coals and marine condensed intervals within the deltaic succession are probable source rocks.

MATURATION: The offshore area is still undergoing subsidence but most of the overburden was deposited by the mid-Pliocene. Differential subsidence across the area during the Miocene was related to strikeslip faulting and created a series of sub-basins in which the hydrocarbon kitchens developed. The area has a high geothermal gradient averaging 42^{o} C/km.

MIGRATION: It is probable that upward migration of hydrocarbons was along faults associated with Miocene strike slip movement. Migration through facies in an updip direction from condensed intervals is also likely.

RESERVOIR ROCKS: All discovered fields are in sandstones. These probably represent a mixture of facies: upper shoreface sandstones, fluvial and distributary sandstones of regressive parasequences, and fluvial and tidal sandstones that infill incised lowstand valleys.

TRAPS AND SEALS: Anticlines form the major traps but there are presumably many stratigraphic traps also. Marine condensed intervals probably form most of the seals.

PETROLEUM INDUSTRY ACTIVITY: Interest in the area commenced in the 1950s and accelerated during the late 1960s.

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Du Bois, E.P., 1985, Review of principal hydrocarbon-bearing basins around the South China Sea: Bulletin of the Geological Society of Malaysia, v. 18, p. 167-209.

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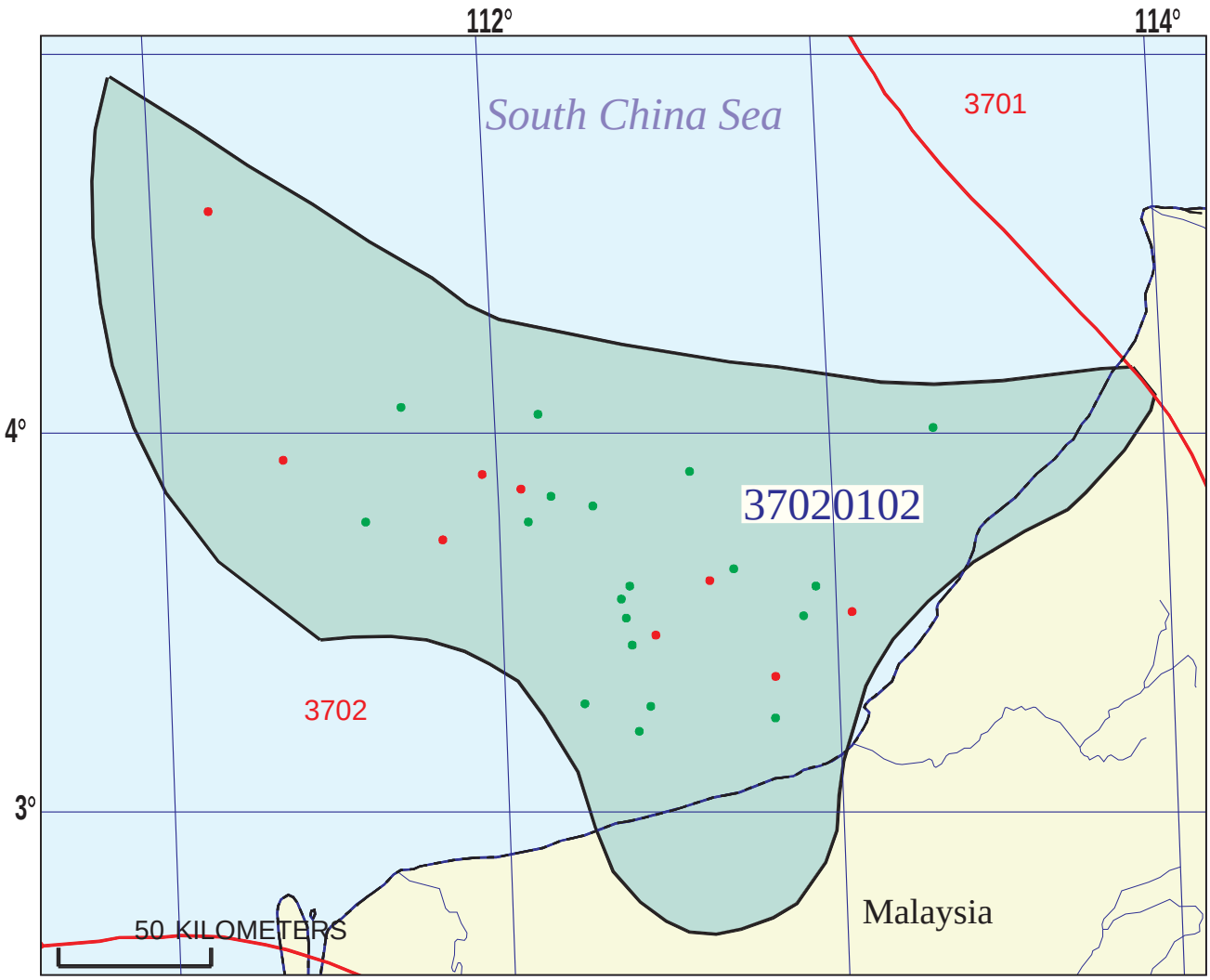

Balingian
Assessment Unit - 37020102

EXPLANATION

- Hydrography
- Shoreline
- 3702 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 37020102 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:……..	8/17/99		
Assessment Geologist:……..	P.J. McCabe		
Region:……..	Asia Pacific	Number:	3
Province:……..	Greater Sarawak Basin	Number:	3702
Priority or Boutique……	Priority		
Total Petroleum System:……	Sarawak Basin	Number:	370201
Assessment Unit:……	Balingian	Number:	37020102
* 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?……. 1 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: 19 Gas: 9
Established (>13 fields) X Frontier (1-13 fields) _____ Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 17 2nd 3rd 29 3rd 3rd 13
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 58 2nd 3rd 113 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)	10	median no.	50	max no.	140
Gas fields:……min. no. (>0)	5	median no.	30	max no.	75

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	1	median size	5	max. size	200
Gas in gas fields (bcfg):……min. size	6	median size	20	max. size	500

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)……	1100	2200	3300
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)……	25	36	48
Sulfur content of oil (%)……	0	0	0.1
Drilling Depth (m) ……	1000	1700	2500
Depth (m) of water (if applicable)……	0	100	200

Gas Fields:	minimum	median	maximum
Inert gas content (%)……	2	4	8
CO_2 content (%)……	0.1	0.2	0.5
Hydrogen-sulfide content (%)……	0	0	0
Drilling Depth (m)……	1000	1700	2500
Depth (m) of water (if applicable)……	0	100	200

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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. Malaysia 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%)……		95	

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%)……		98	

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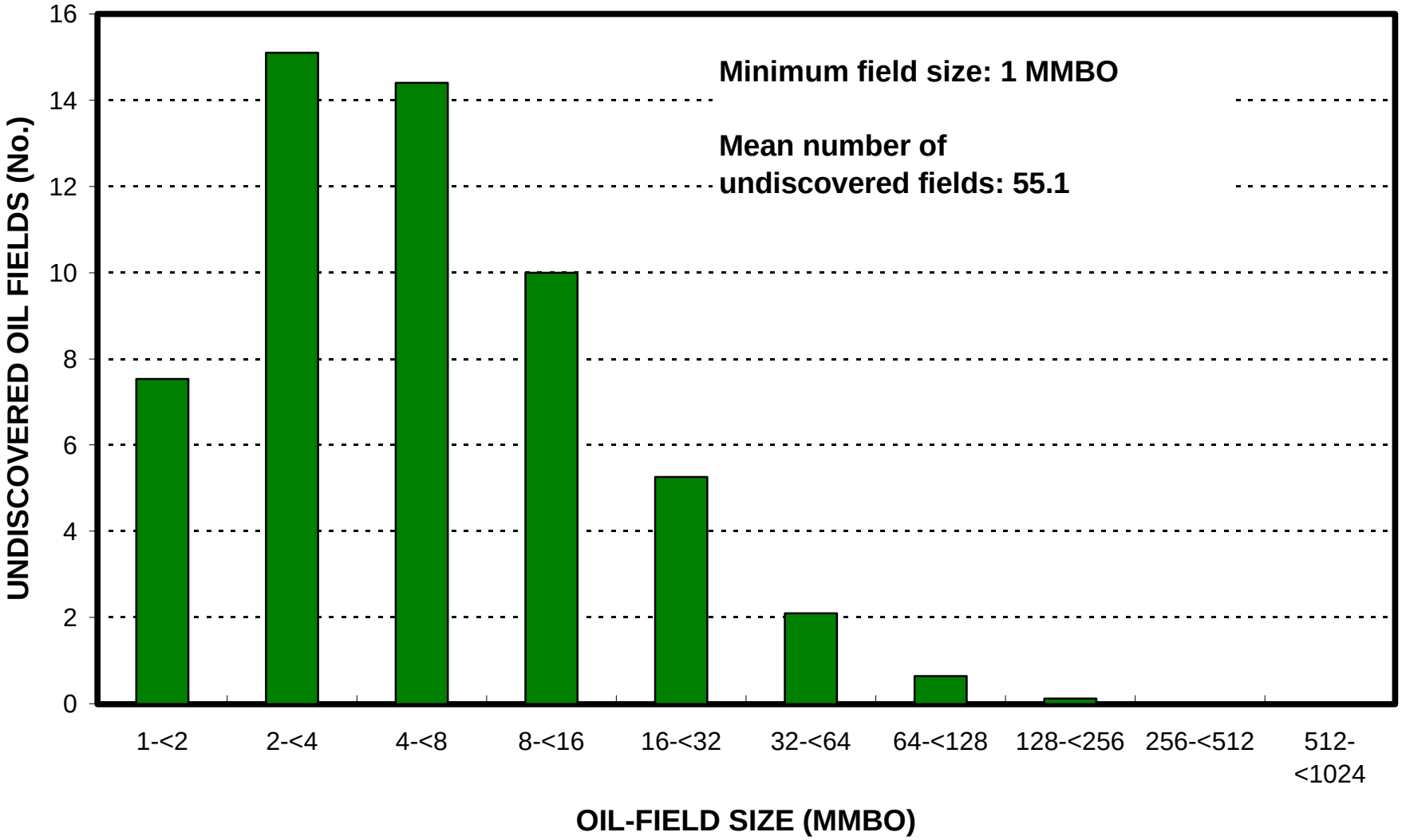
Undiscovered Field-Size Distribution



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Undiscovered Field-Size Distribution