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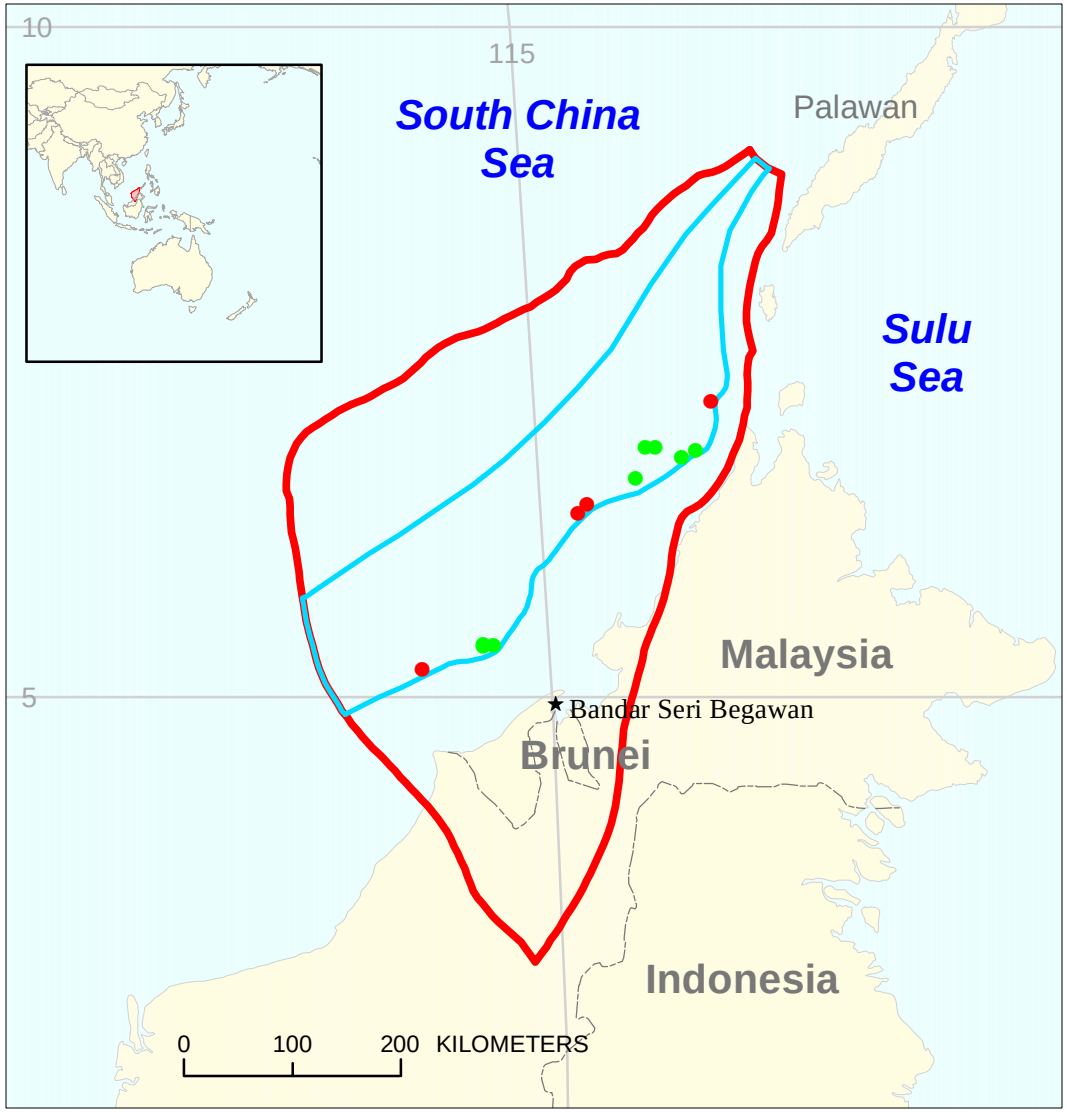
Brunei-Sabah Turbidites
Assessment Unit 37010102



Brunei-Sabah Turbidites Assessment Unit 37010102

Baram Delta/Brunei-Sabah Geologic Province 3701

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: Baram Delta/Brunei-Sabah Basin (3701) **GEOLOGIST:** P.J. McCabe

TOTAL PETROLEUM SYSTEM: Brunei-Sabah (370101)

ASSESSMENT UNIT: Brunei-Sabah Turbidites (37010102)

DESCRIPTION: Miocene-Pliocene turbidites accumulated at a convergent margin.

SOURCE ROCKS: Geochemistry indicates that the hydrocarbon is sourced from terrigenous organic matter. No discrete, rich source rock layers are known but the terrestrially derived organics are probably concentrated in marine condensed intervals that accumulated during highstands in sea level.

MATURATION: The timing of maturation may be from Middle Miocene to the present. The area is still undergoing subsidence.

MIGRATION: Some migration through facies, presumably in an updip direction from condensed intervals. Migration along faults is probably a major method of migration though many faults act as seals.

RESERVOIR ROCKS: Sandstones that were deposited by turbidity currents. Sedimentation was ponded between thrust sheets associated with subduction.

TRAPS AND SEALS: Producing reservoirs are turbidites in synclinal features, but fields discovered so far appear to be related to sealing against faults. Within reservoirs, the seals are marine flooding surfaces and faults. Presumably there are also stratigraphic traps unrelated to faulting.

PETROLEUM INDUSTRY ACTIVITY: Exploration in this assessment unit was an outgrowth of earlier exploration in the Brunei-Sabah Deltaics (37010101) assessment unit as drilling progressed into deeper water over time. The initial discoveries in turbidite facies were made in the early 1970s. New drilling techniques may allow exploration in deeper subbasins further offshore

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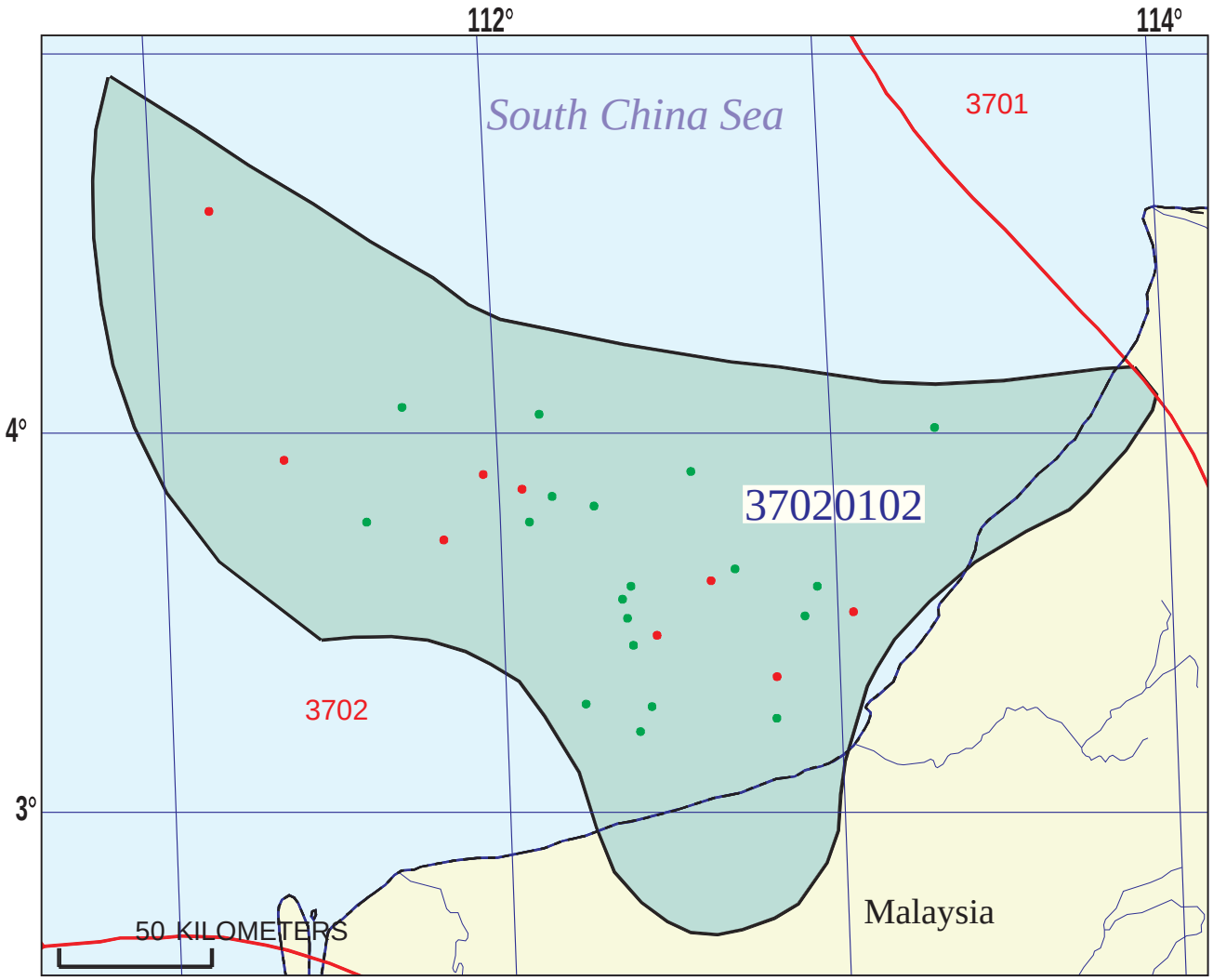


Balingian
Assessment Unit - 37020102

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:……..	7/2/99		
Assessment Geologist:……..	P.J. McCabe		
Region:……..	Asia Pacific	Number:	3
Province:……..	Baram Delta/Brunei-Sabah Basin	Number:	3701
Priority or Boutique……	Priority		
Total Petroleum System:……	Brunei-Sabah	Number:	370101
Assessment Unit:……..	Brunei-Sabah Turbidites	Number:	37010102
* 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: 8 Gas: 3
Established (>13 fields) _____ Frontier (1-13 fields) X Hypothetical (no fields) _____

Median size (grown) of discovered oil fields (mmboe):
1st 3rd 43 2nd 3rd 18 3rd 3rd _____
Median size (grown) of discovered gas fields (bcfg):
1st 3rd 320 2nd 3rd 4665 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)	3	median no.	30	max no.	60
Gas fields:……min. no. (>0)	1	median no.	15	max no.	30

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	5	median size	20	max. size	1000
Gas in gas fields (bcfg):……min. size	30	median size	120	max. size	6000

Assessment Unit (name, no.)
Brunei-Sabah Turbidites, 37010102

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	1400	2800	4200
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	30	40
Sulfur content of oil (%)……	0.05	0.08	0.14
Drilling Depth (m) ……	500	1500	5000
Depth (m) of water (if applicable)……	75	750	2900

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……			
Hydrogen-sulfide content (%)……	0	0	0
Drilling Depth (m)……	500	1500	5000
Depth (m) of water (if applicable)……	75	750	2900

Assessment Unit (name, no.)
Brunei-Sabah Turbidites, 37010102

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

1. Brunei represents 30 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		50	
Portion of volume % that is offshore (0-100%)……		100	

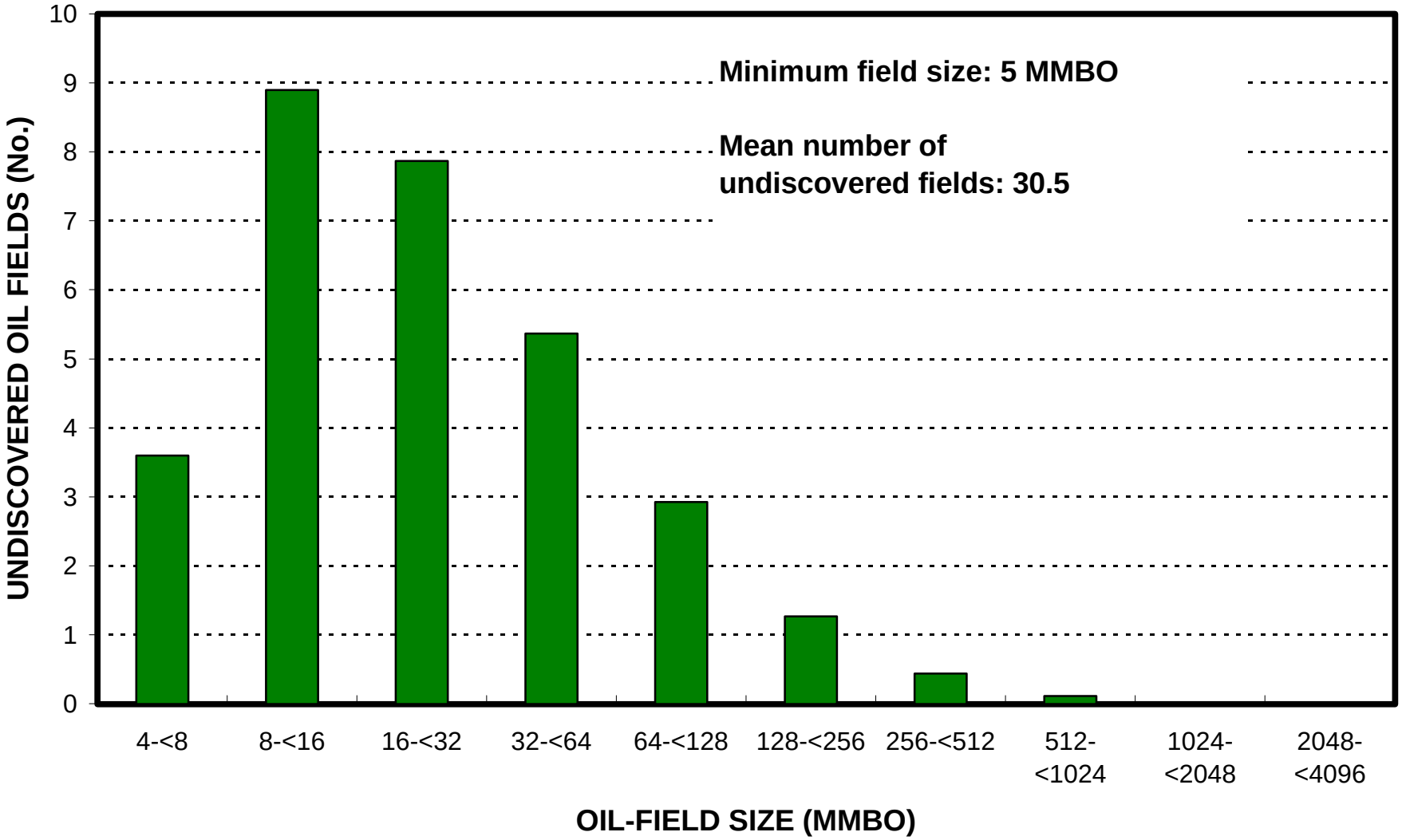
Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		50	
Portion of volume % that is offshore (0-100%)……		100	

2. Malaysia represents 70 areal % of the total assessment unit

Oil in Oil Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		50	
Portion of volume % that is offshore (0-100%)……		100	

Gas in Gas Fields:	minimum	median	maximum
Richness factor (unitless multiplier):……			
Volume % in parcel (areal % x richness factor):…		50	
Portion of volume % that is offshore (0-100%)……		100	

Brunei-Sabah Turbidites, AU 37010102
Undiscovered Field-Size Distribution



Brunei-Sabah Turbidites, AU 37010102
Undiscovered Field-Size Distribution