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North Malay Lacustrine
Total Petroleum System 37030102

North Malay Lacustrine Assessment Unit 37030102

Malay Basin Geologic Province 3703

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: Malay Basin (3703) **GEOLOGIST:** M.G. Bishop

TOTAL PETROLEUM SYSTEM: Oligocene-Miocene Lacustrine (370301)

ASSESSMENT UNIT: North Malay Lacustrine (37030102)

DESCRIPTION: Offshore oil and gas sourced in Paleogene transtensional, extensional, continental half-graben basin, the Khmer Trough, formed by plate rearrangements and fault movement due to collision of the India plate. From Oligocene to Late Miocene fluvial and lacustrine conditions prevailed but a major transgression in Late Miocene resulted in marine conditions in the entire Gulf of Thailand. Assessment unit is in Cambodian waters.

SOURCE ROCKS: The self-contained lacustrine nature of this basin produced Oligocene to Lower Miocene, high quality, oil-prone algal source rocks; TOC 3 wt. % and 500 mg HC/gTOC modified hydrogen index.

MATURATION: The Upper Oligocene source rocks in the Khmer Trough began generating oil in late Miocene; Lower and lower Upper Oligocene section has been generating gas since Pliocene.

MIGRATION: Migration occurs primarily vertically out of the lacustrine source rock area and along carrier beds. Peak migration occurred at Middle Miocene time.

RESERVOIR ROCKS: Oligocene to Middle Miocene alluvial, fluvial and lacustrine clastics.

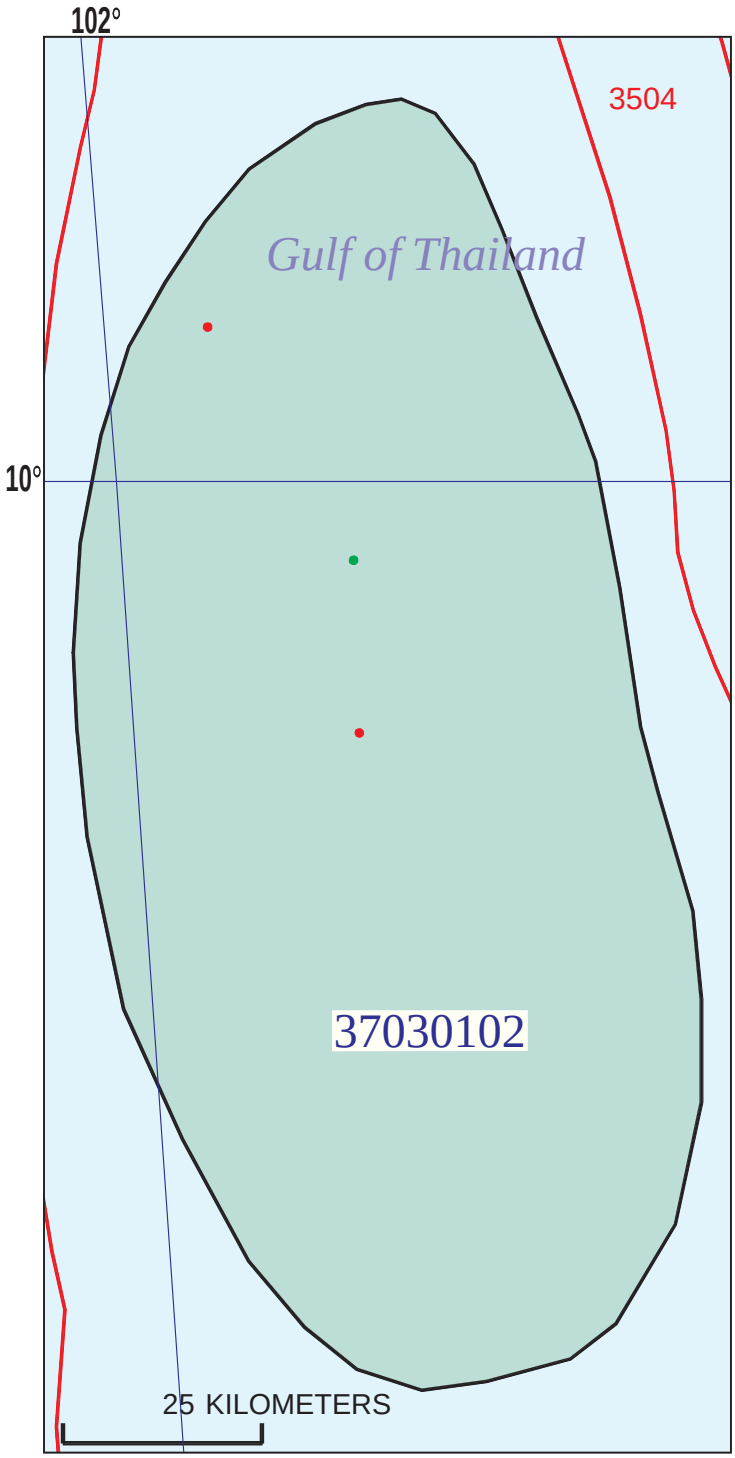
TRAPS AND SEALS: Anticlines draped on fault blocks and formed during mid to late Miocene transpressional tectonic inversion phase are important hydrocarbon traps. Intraformational seals and regional Pliocene marine transgressive shales and marls.

REFERENCES:

Okui, A., Imayoshi, A., and Tsuji, K., 1997, Petroleum system in the Khmer Trough, Cambodia: Proceedings of the Indonesian Petroleum Association, p. 365-379.

Petroconsultants, 1996, Petroleum Exploration and Production Database: Petroconsultants, Inc., P.O. Box 740619, 6600 Sands Point Drive, Houston TX 77274-0619, USA or Petroconsultants, Inc., P.O. Box 152, 24 Chemin de la Mairie, 1258 Perly, Geneva, Switzerland.

Tjia, H.D., 1994, Inversion tectonics in the Malay Basin–evidence and timing of events: Geological Society of Malaysia Bulletin 36, p. 119-126.



North Malay Lacustrine Assessment Unit - 37030102

EXPLANATION

- Hydrography
- Shoreline
- 3703 Geologic province code and boundary
- Country boundary
- Gas field centerpoint
- Oil field centerpoint
- 37030102 Assessment unit code and boundary

Projection: Robinson. Central meridian: 0

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

Date:……..	9/28/99		
Assessment Geologist:……..	P.J. McCabe		
Region:……..	Asia Pacific	Number:	3
Province:……..	Malay Basin	Number:	3703
Priority or Boutique……..	Priority		
Total Petroleum System:……	Oligocene-Miocene Lacustrine	Number:	370301
Assessment Unit:……..	North Malay Lacustrine	Number:	37030102
* 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: 0 Gas: 2

Established (>13 fields) _____ Frontier (1-13 fields) X 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 311 2nd 3rd 233 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)	1	median no.	4	max no.	10
Gas fields:……min. no. (>0)	3	median no.	8	max no.	20

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	300
Gas in gas fields (bcfg):……min. size	30	median size	100	max. size	1200

Assessment Unit (name, no.)
North Malay Lacustrine, 37030102

AVERAGE RATIOS FOR UNDISCOVERED FIELDS, TO ASSESS COPRODUCTS

(uncertainty of fixed but unknown values)

Oil Fields:	minimum	median	maximum
Gas/oil ratio (cfg/bo)……	2400	4800	7200
NGL/gas ratio (bngl/mmcfg)……	7	14	21

Gas fields:	minimum	median	maximum
Liquids/gas ratio (bngl/mmcfg)……	10	20	30
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)……	30	40	50
Sulfur content of oil (%)……			
Drilling Depth (m) ……	1000	2700	3500
Depth (m) of water (if applicable)……	40	60	100

Gas Fields:	minimum	median	maximum
Inert gas content (%)……			
CO_2 content (%)……		30	
Hydrogen-sulfide content (%)……			
Drilling Depth (m)……	1000	2700	3500
Depth (m) of water (if applicable)……	40	60	100

Assessment Unit (name, no.)
North Malay Lacustrine, 37030102

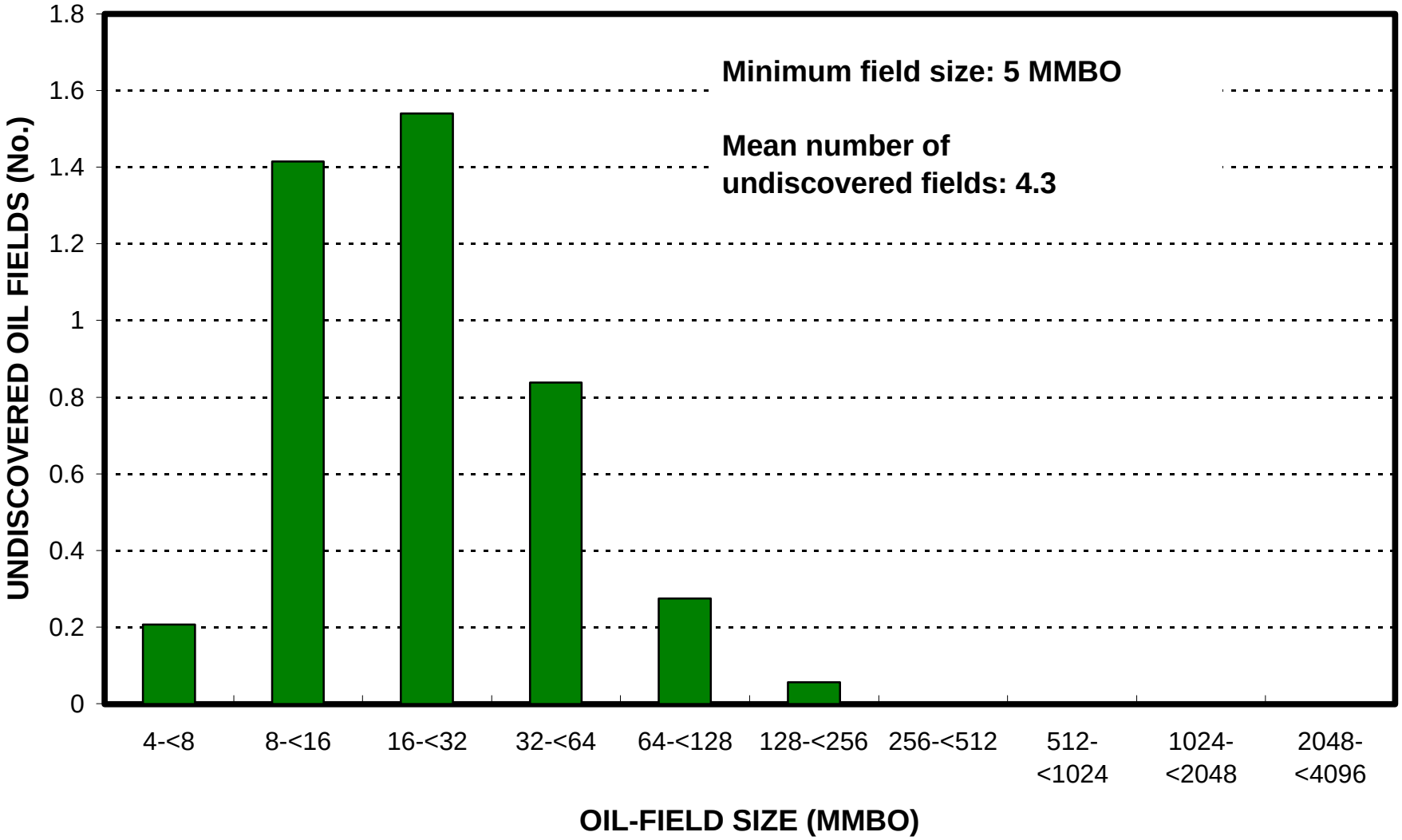
ALLOCATION OF UNDISCOVERED RESOURCES IN THE ASSESSMENT UNIT TO COUNTRIES OR OTHER LAND PARCELS (uncertainty of fixed but unknown values)

1. Cambodia 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%)……		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%)……		100	

North Malay Lacustrine, AU 37030102
Undiscovered Field-Size Distribution



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Undiscovered Field-Size Distribution