PILOT PROJECTS OF UNCONVENTIONAL GAS

Delivered at
A Regional Workshop on the Changing Global Gas Market and Unconventional Gas

RESEARCH AND DEVELOPMENT CENTRE FOR OIL AND GAS TECHNOLOGY "LEMIGAS"

AGENCY FOR RESEARCH AND DEVELOPMENT OF ENERGY AND MINERAL RESOURCES

MINISTRY OF ENERGY AND MINERAL RESOURCES

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INTRODUCTION

- Lemigas has been conducting two major projects consisting of Coal Bed Methane (CBM) and Shale Gas.
- These projects are aimed to explore CBM and Shale Gas potential in order to increase Indonesia's Gas Reserve.
- These projects are also intended to verify the potency of CBM and Shale Gas in Indonesia with the purpose of encouraging investment in CBM and Shale Gas exploitation.
- These projects provide the opportunity to master the exploration and exploitation technologies of CBM and Shale Gas.

DEVELOPMENT OF CBM PILOT PROJECT

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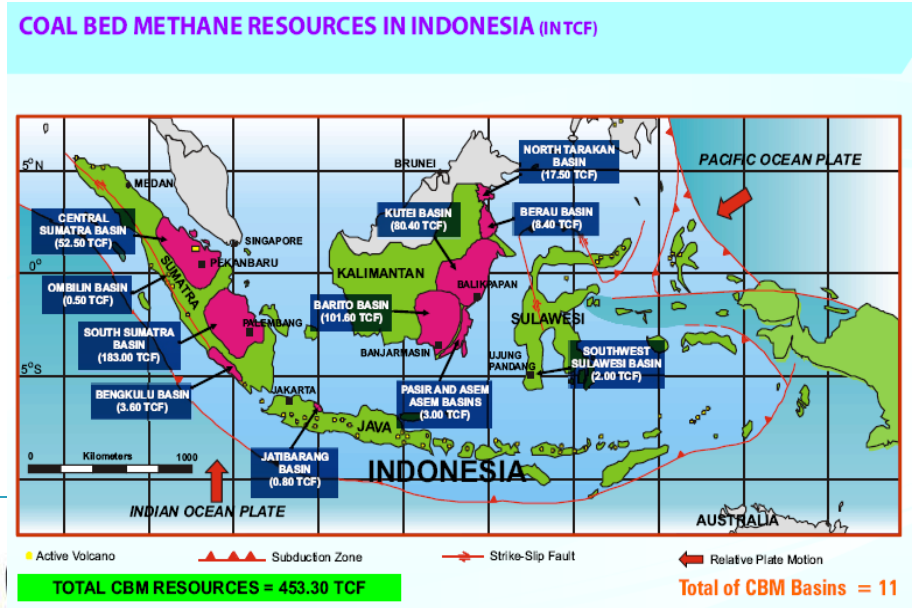
CBM R&D TECHNOLOGY

MOTIVATIONS

- Exploring the potential of Coal Bed Methane in order to increase National Gas Reserve.
- Verifying the potency of CBM in Indonesia with the purpose of encouraging investment in CBM exploitation.
- Mastery of exploration and exploitation technologies of CBM.



Basin	Target Formation	Coal Thickness (m)	Coal Rank (Ro %)	Avg. Depth (m)	Resources		Ranking
					Completable (TCF)	Concentration (Bcf/mi^2)	
S. Sumatra	M. Enim	37	0.47	762	183.0	24.9	High
Barito	Warukin	28	0.45	915	101.6	16.0	
Kutei	Prangat	21	0.5	915	80.4	13.2	
C. Sumatra	Petani	15	0.4	762	52.5	10.2	
N. Tarakan	Tabul	15	0.45	701	17.5	6.4	Moderate
Berau	Latih	24	0.45	671	8.4	10.8	
Ombilin	Sawaht	24	0.8	762	0.5	10.7	
Pasir/Asem	Warukin	15	0.45	701	3.0	7.9	
NW Java	T. Akar	6	0.7	1524	0.8	7.6	
Sulawesi	Toraja	6	0.55	610	2.0	4.0	Low
Bengkulu	Lemau	12	0.4	610	3.6	4.7	
Total					453.3	15.0	

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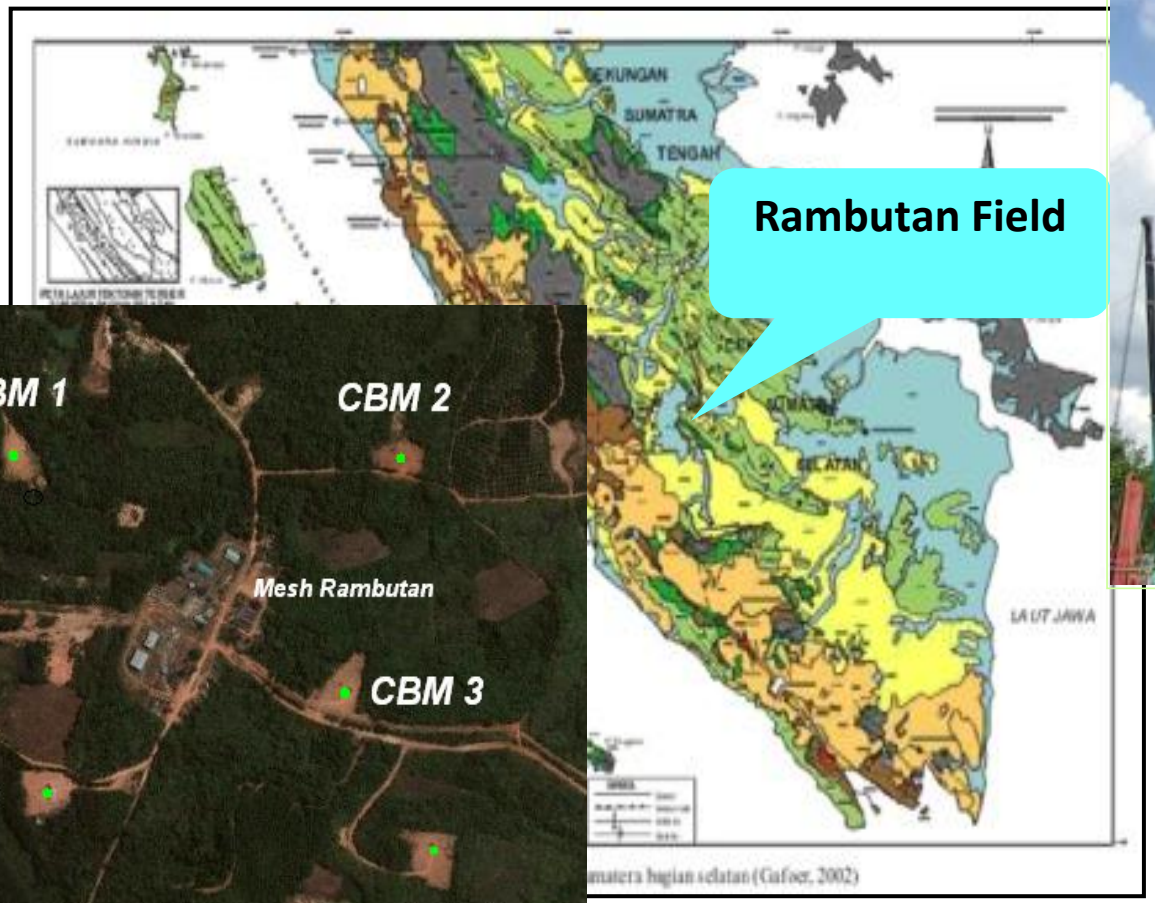
CBM R&D TECHNOLOGY

LOCATION OF CBM PILOT PROJECT RAMBUTAN FIELD



CBM-1 Well
Drilled in 2004

CBM Wells with “Five Spot” Model

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CBM R&D TECHNOLOGY

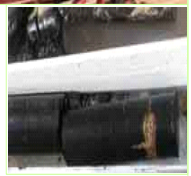
Drilling Activity

CBM-1 Well In 2004

CBM-2 Well In 2005

CBM-3,-4,-5 Wells In 2006

Onsite Analysis



Core Samples

CBM Mobile Lab

Gas Content Analysis

Gas Composition Analysis

Laboratory Analysis

Proximate

Ultimate

Petrography

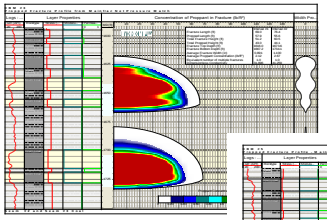
Adsorption Isoterm

Dewatering 2008

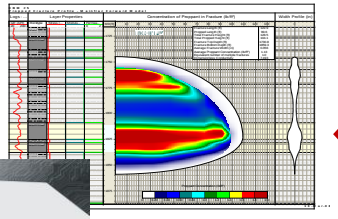
The First Gas Produced from the CBM Pilot Project

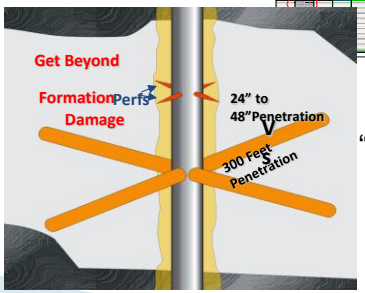
Prod Optimization 2011

Fracturing CBM-3 well



Fracturing CBM-5 Well





"Radial Jetting" CBM-4 Well

CBM to Power 2011

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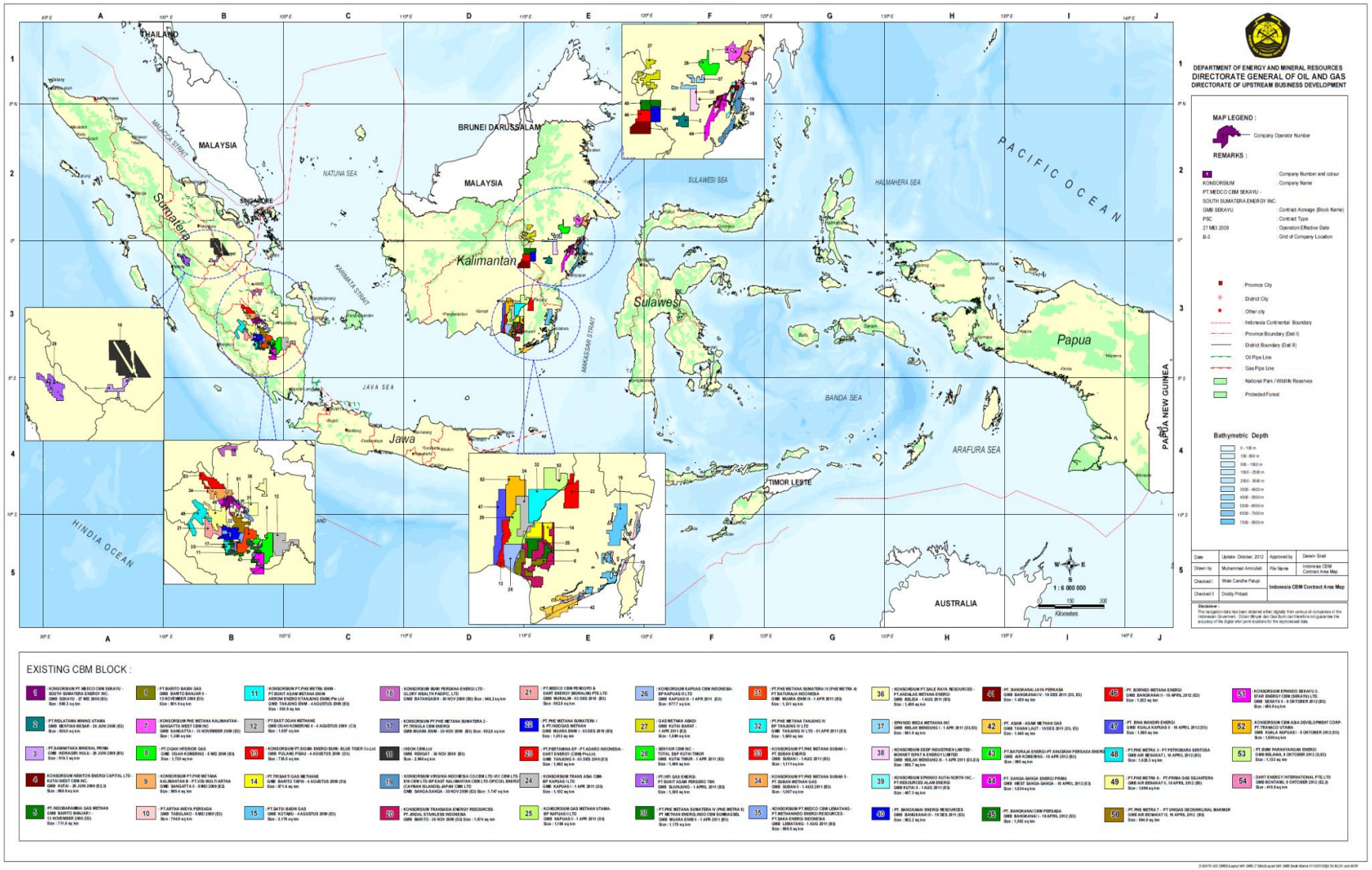
INDONESIA CBM CONTRACT AREA MAP @OCTOBER 2012



SHALE GAS PILOT PROJECT IN NORTH SUMATRA AND SOUTH KALIMANTAN

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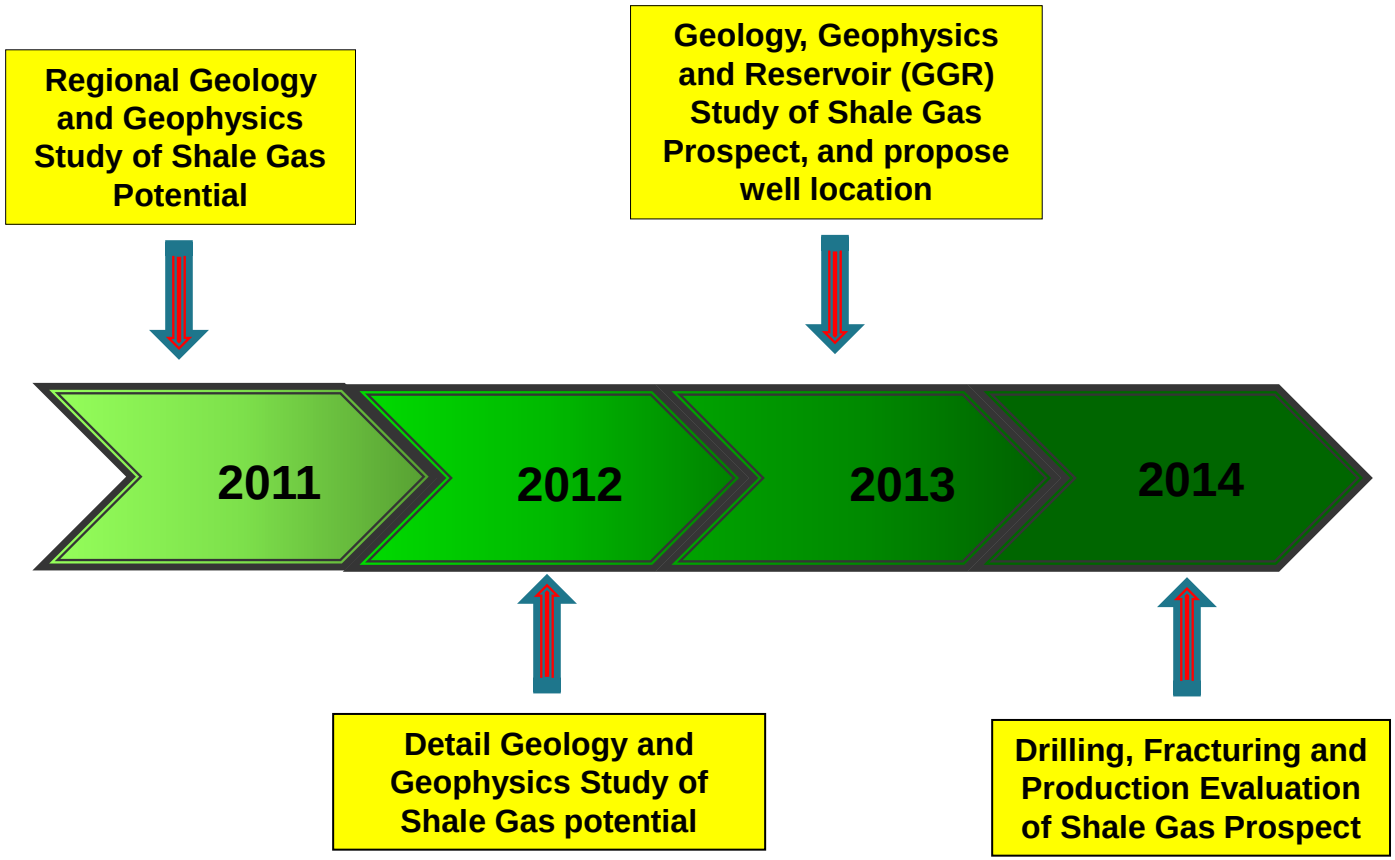
ROAD MAP OF SHALE GAS PILOT PROJECT IN NORTH SUMATRA AND SOUTH KALIMANTAN

Lemigas in cooperation with PT. Pertamina EP:



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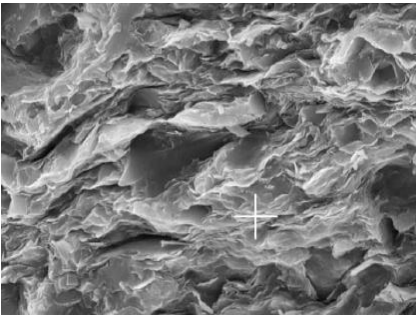
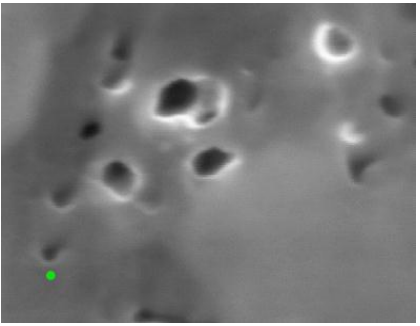
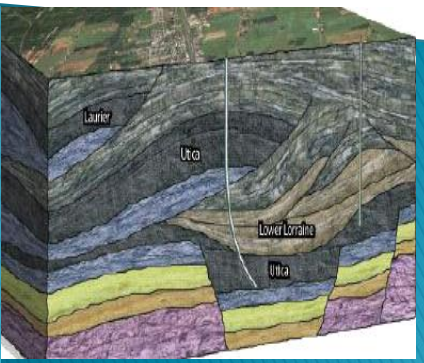




Shale Gas Reservoir :

- Unconventional natural gas reservoir contained in fine grained sedimentary rocks, dominated by shale containing clay and other minerals like quartz, calcite
- The shales typically serve as source, reservoir and seal of the hydrocarbons.
- Total organic carbon, Thermal maturity, Mineralogy and Natural fractures are key



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SHALE GAS POTENTIAL STUDY IN NORTH SUMATRA

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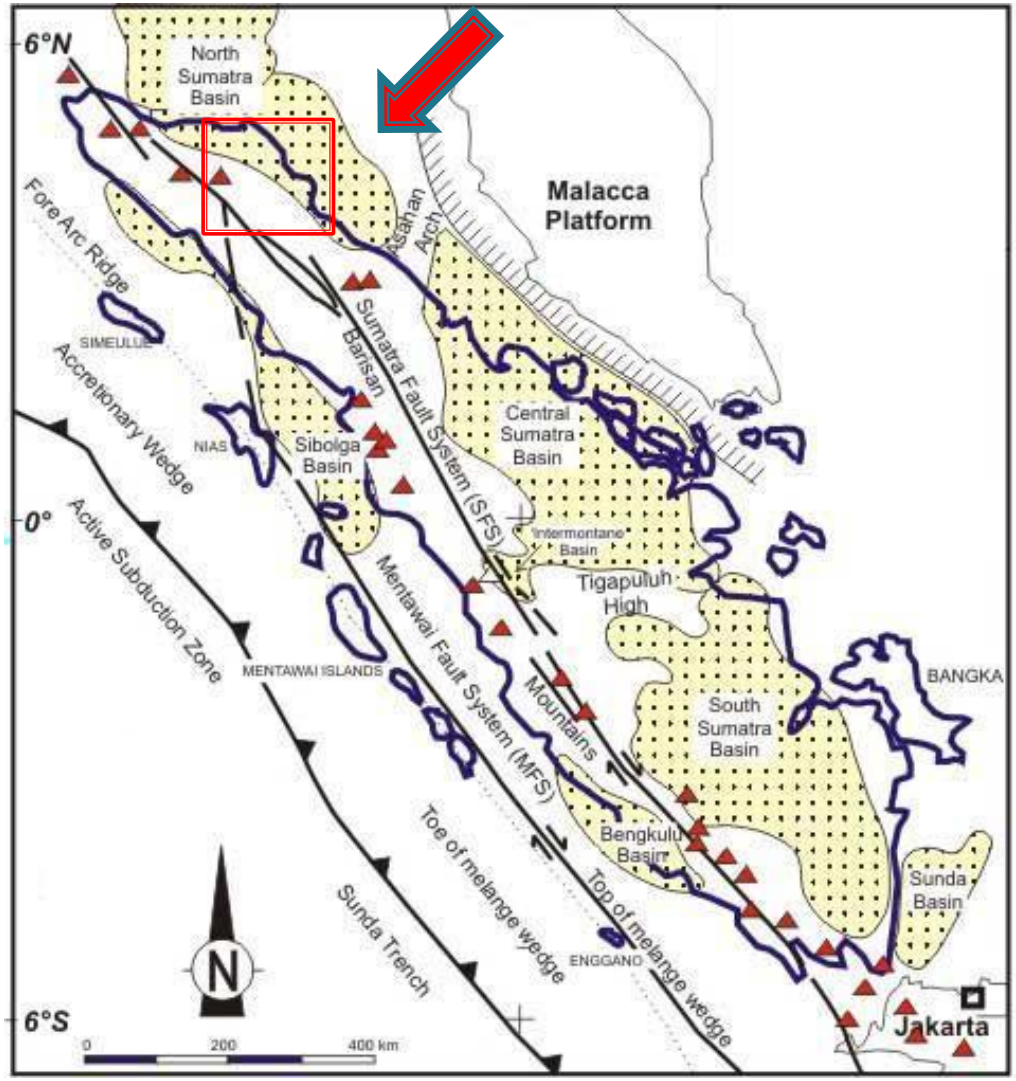
LOCATION OF NORTH SUMATRA BASIN



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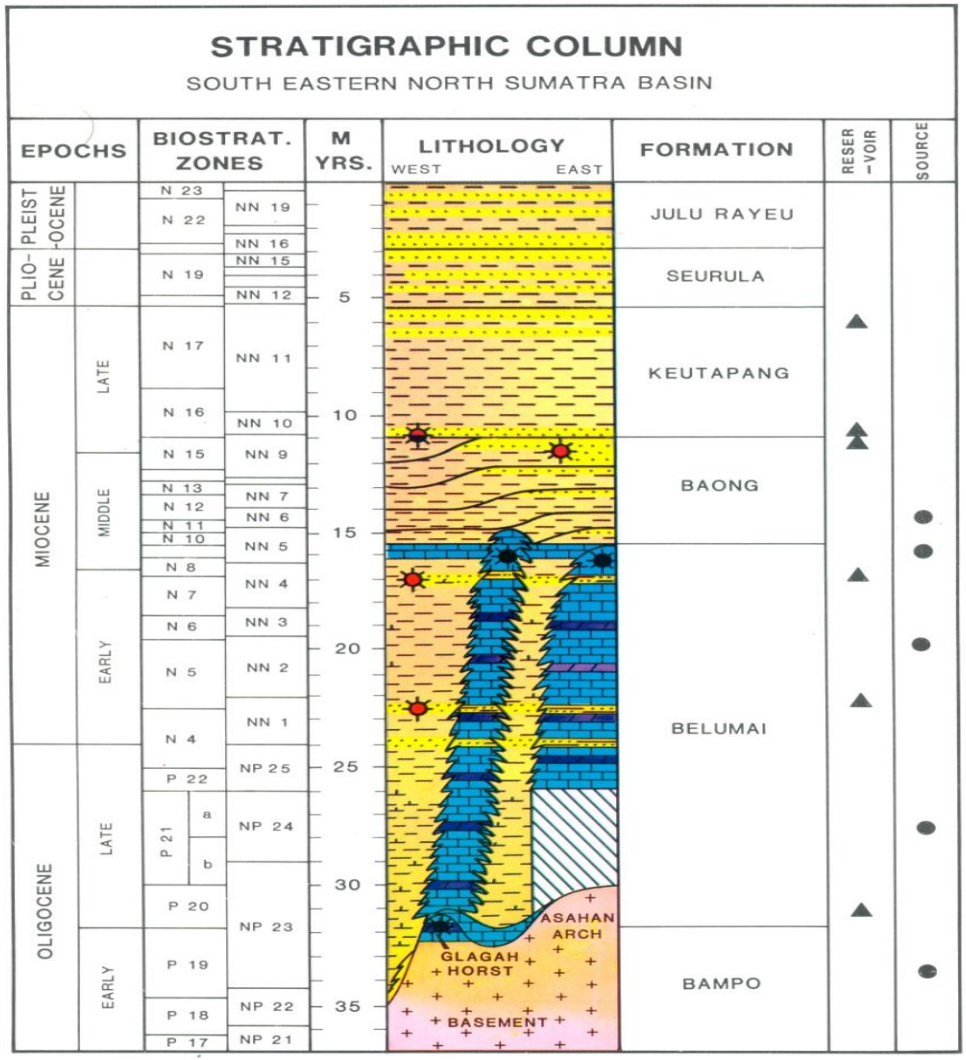
STRATIGRAPHY OF NORTH SUMATRA BASIN



SHALE GAS PROSPECT

(Kjellgren & Sugiarto, 1989)

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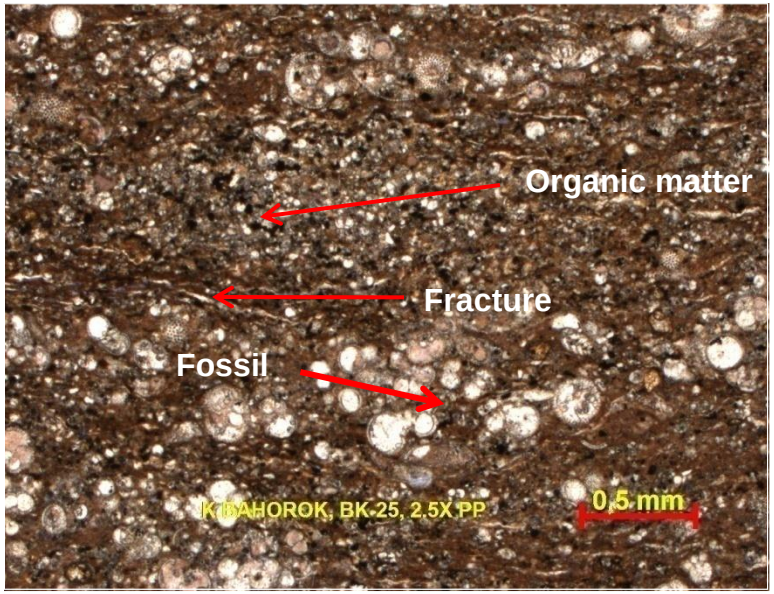
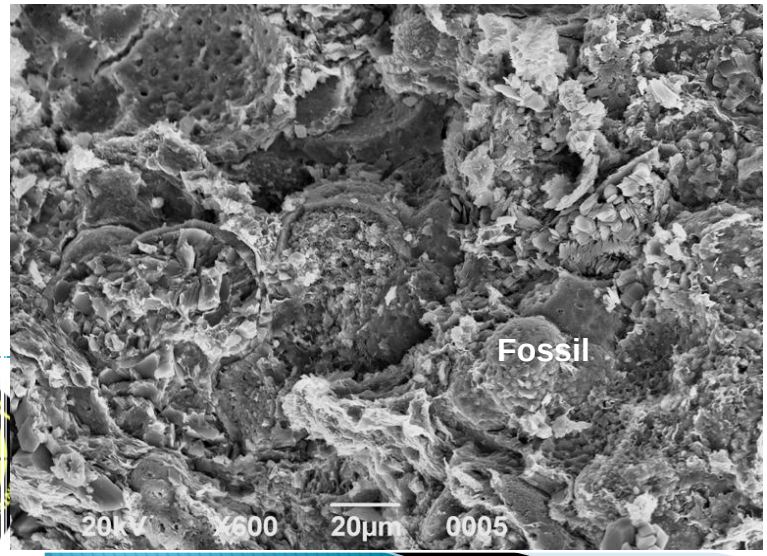
BAONG FORMATION

Sample No : BK-25





No. samples : 10

- Lithology : Fossilliferous Shale
- Mineralogi : Quartz, Carbonate, and Clay
- Brittleness Index (average) : 0.64
- TOC (average) : 0.90
- Tmax (average) : 433˚C
- VR (average) : 0.59

Summary : fair - good shale gas quality

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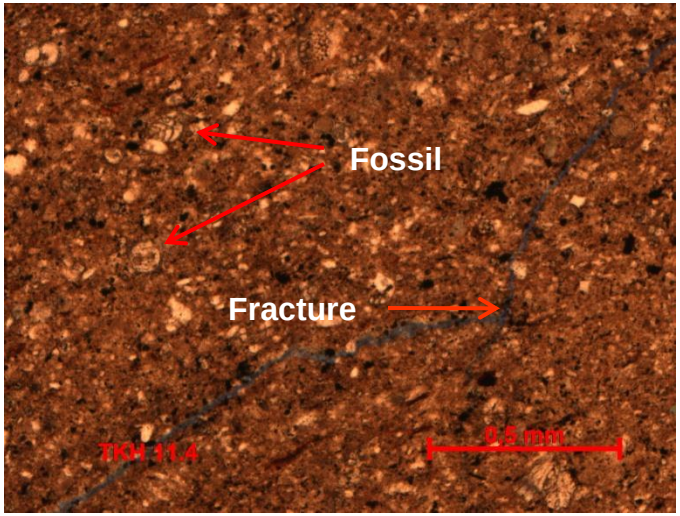
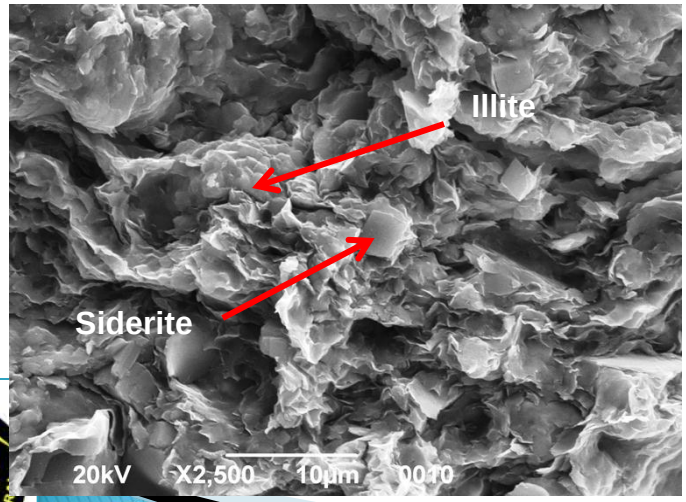
BELUMAI FORMATION

Sample No : TKH-II 4





No. samples : 8

- Lithology : Fossilliferous Shale
- Mineralogi : Quartz, Carbonate, and Clay
- Brittleness Index (average) : 0.67
- TOC (average) : 0.94
- Tmax (average) : 429 ˚C

Summary : fair – good shale gas quality

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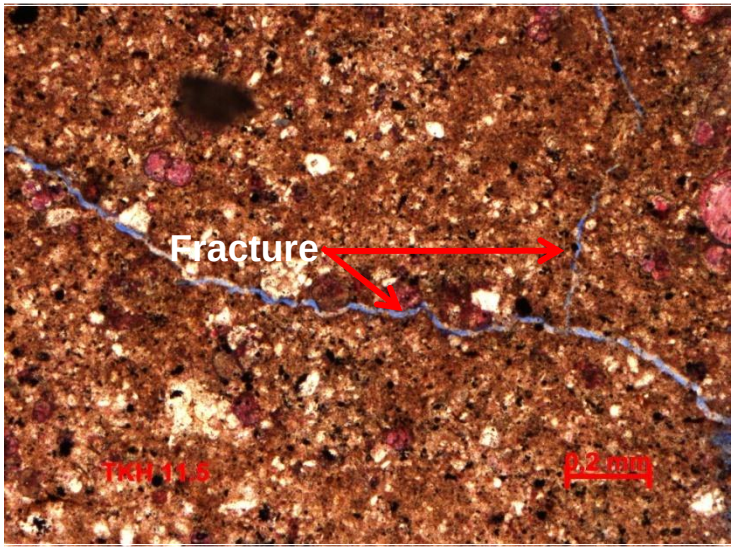
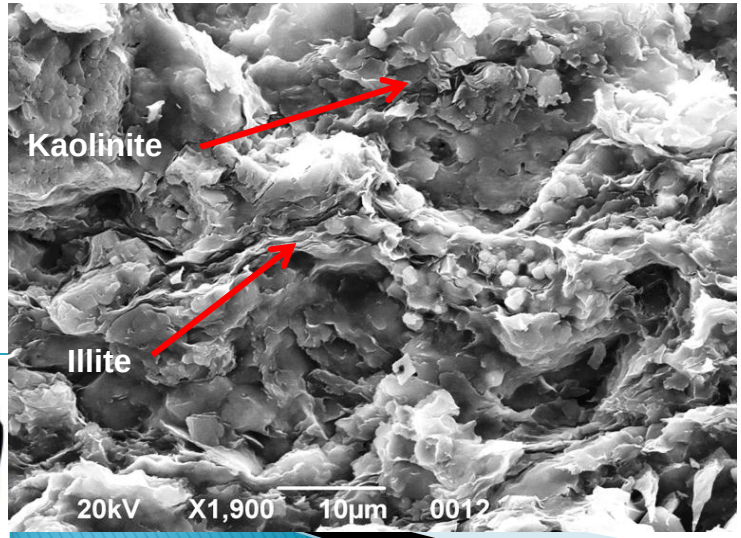
BAMPO FORMATION

Sample No : TKH-11-5





No. samples : 5

- Lithology : Silty Shale
- Mineralogi : Quartz, Carbonate, and Clay
- Brittleness Index (average) : 0.56
- TOC (average) : 0.59
- Tmax (average) : 439 ˚C
- VR (average) : 1.0

Summary : fair shale gas quality

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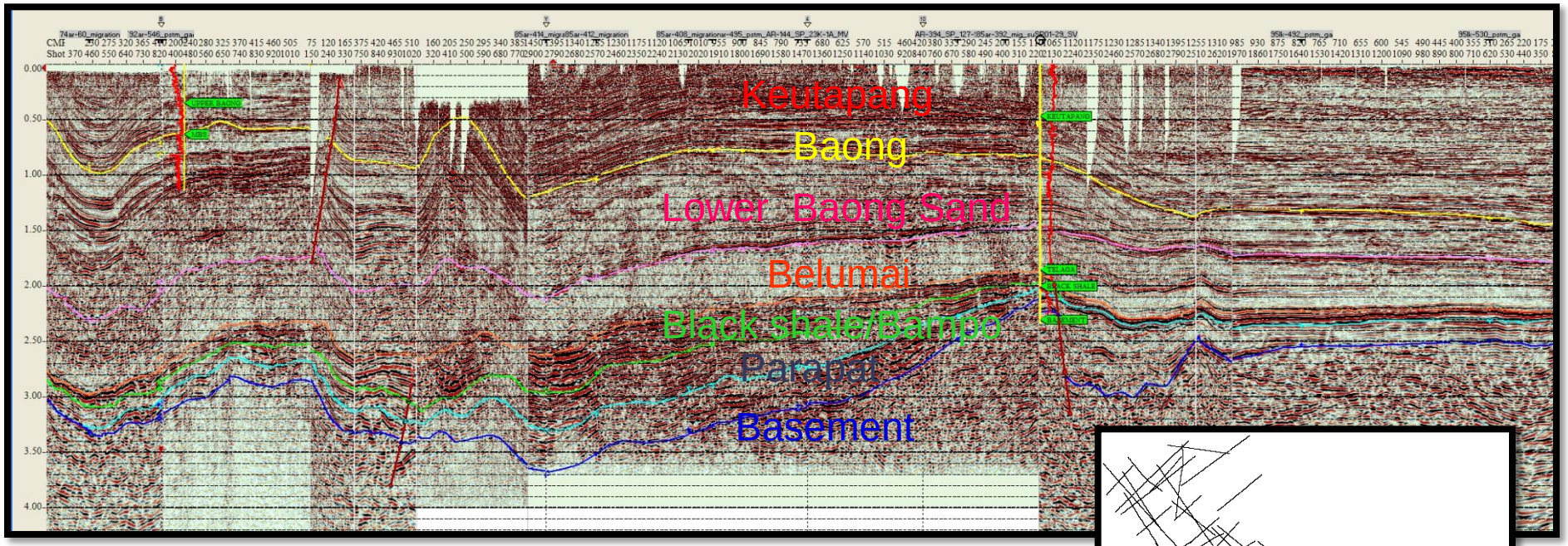
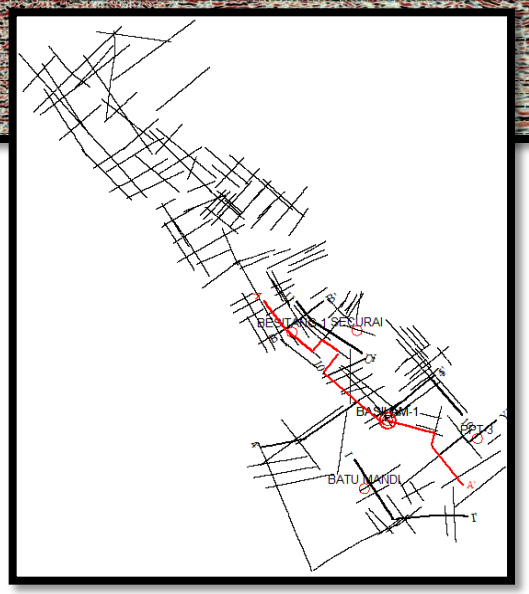
NW – SE SEISMIC SECTION OF NORTH SUMATRA AREA

NW Besitang-1 Basilam-1 SE





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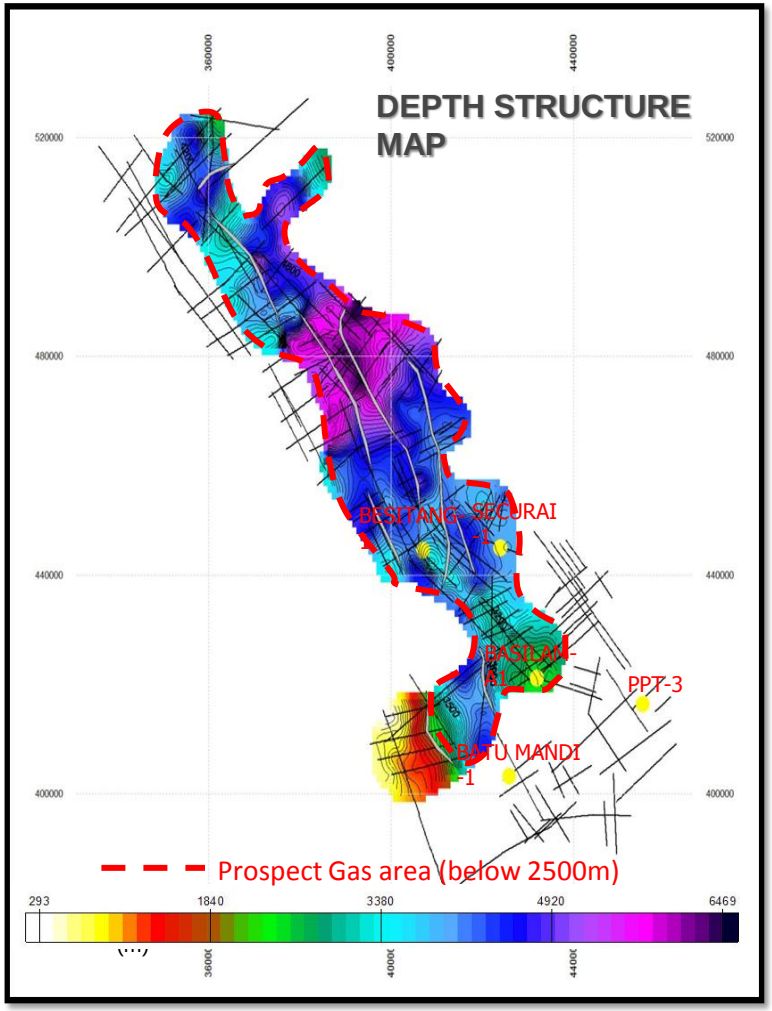
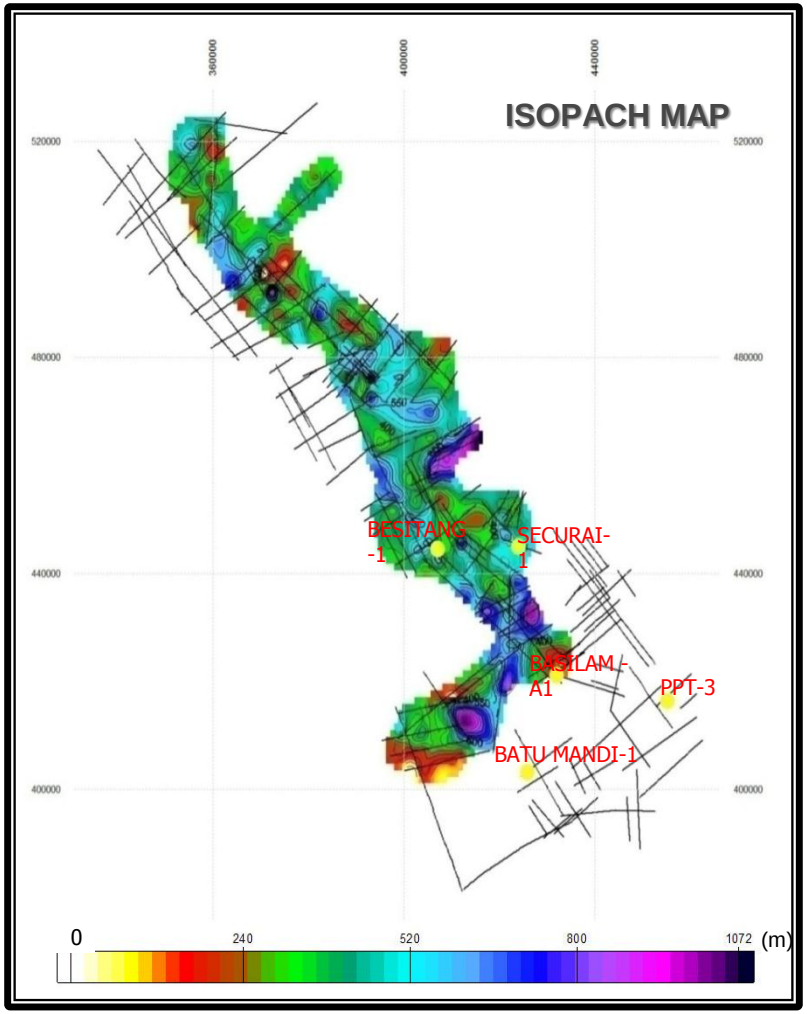
SHALE GAS PROSPECT OF BAMPO FORMATION





SUMMARY:

- Prospecting formations are Baong, Belumai and Bampo Formations
- Bampo Formation indicates fair shale gas quality, whereas Belumai and Baong Formations show fair-good shale gas quality
- Shale gas resource calculation of these formations is 114.35 TCF

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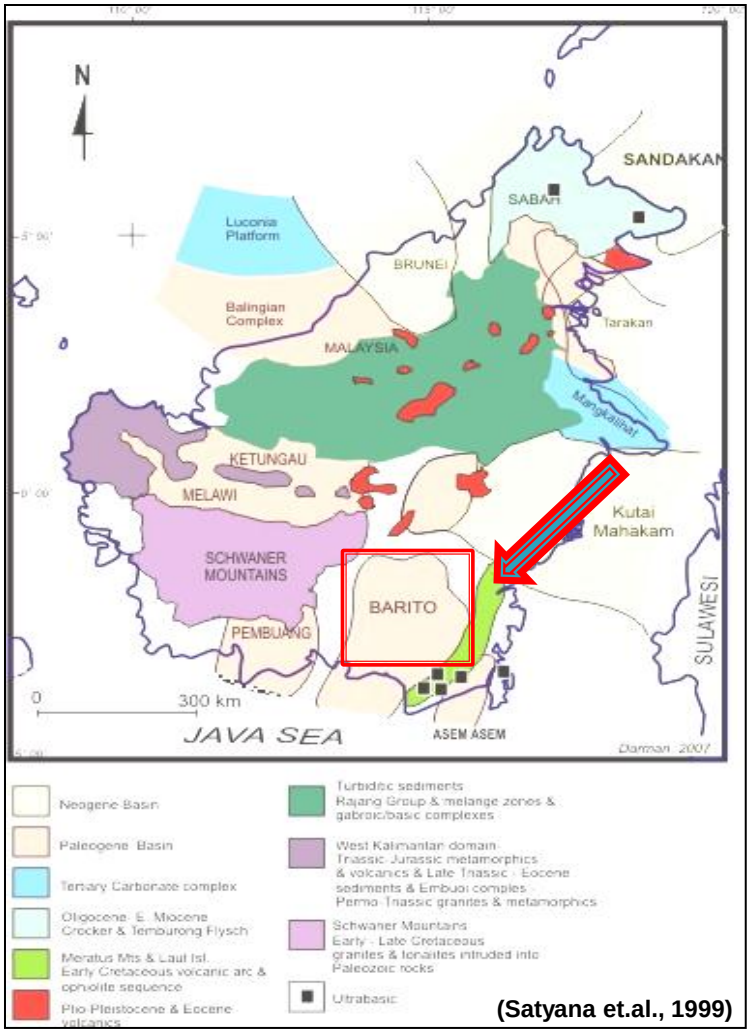
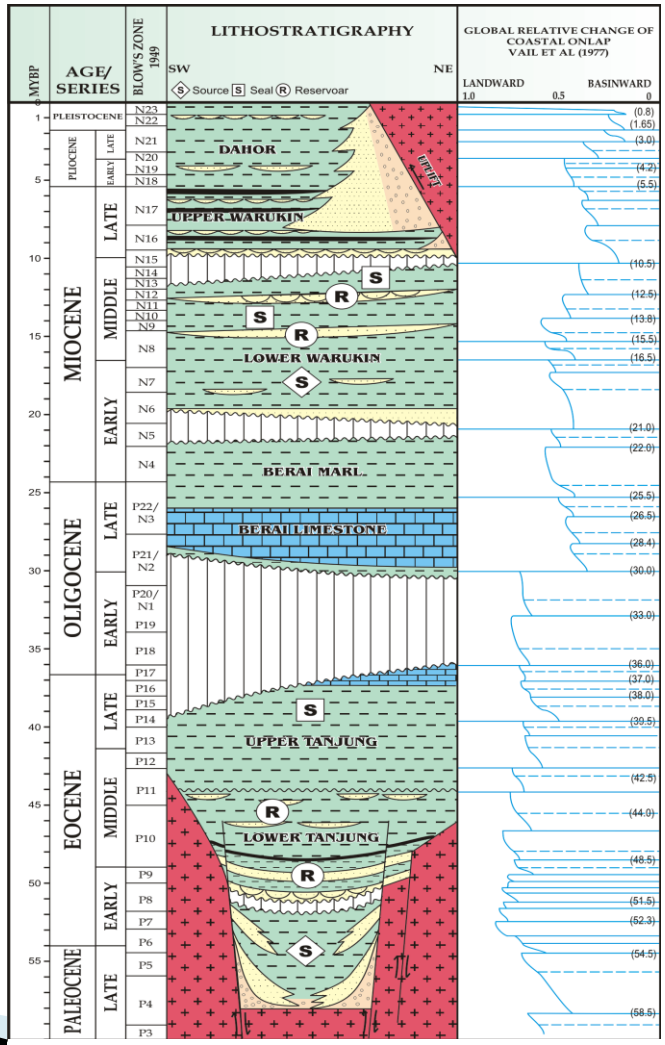
LOCATION OF BARITO BASIN SOUTH KALIMANTAN



(Satyana et.al., 1999)

STRATIGRAPHY OF BARITO BASIN SOUTH KALIMANTAN

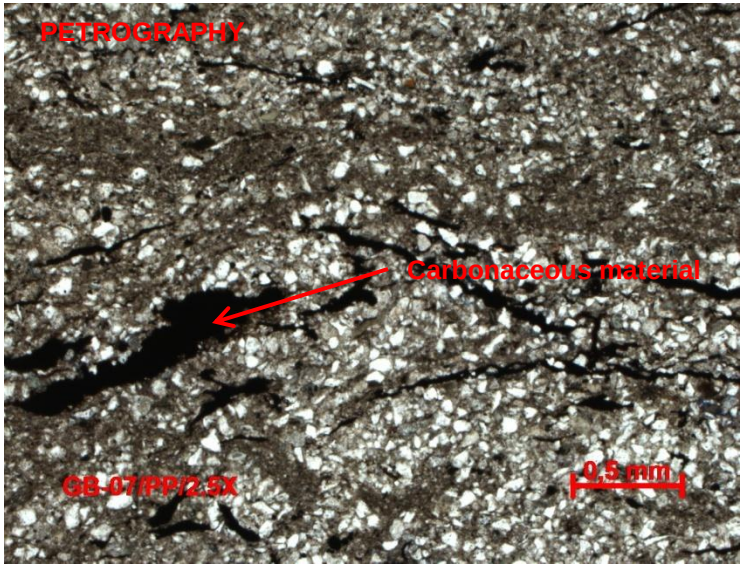


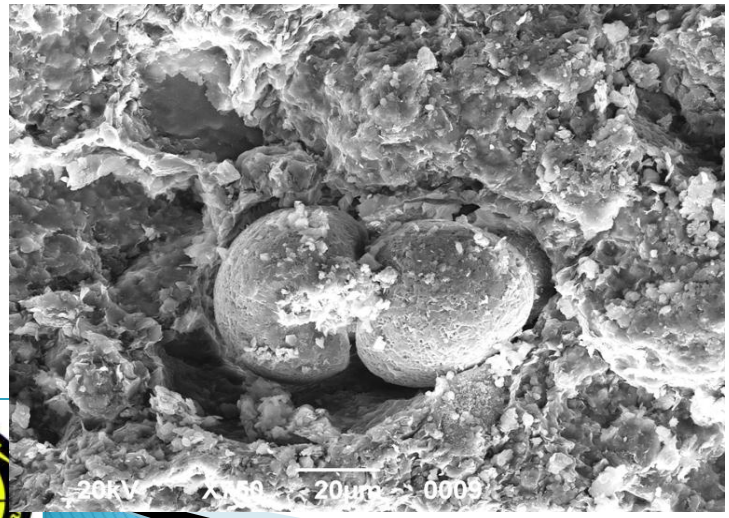
SHALE GAS PROSPECT

(Rotinsulu, 1993)

TANJUNG FORMATION

Sample No : GB-7





No. samples : 20

- Lithology : Silty Shale
- Mineralogi : Quartz, Carbonate, and Clay
- Brittleness Index (average) : 0.59
- TOC (average) : 0.53
- Tmax (average) : 450˚C

Summary : poor - fair shale gas quality

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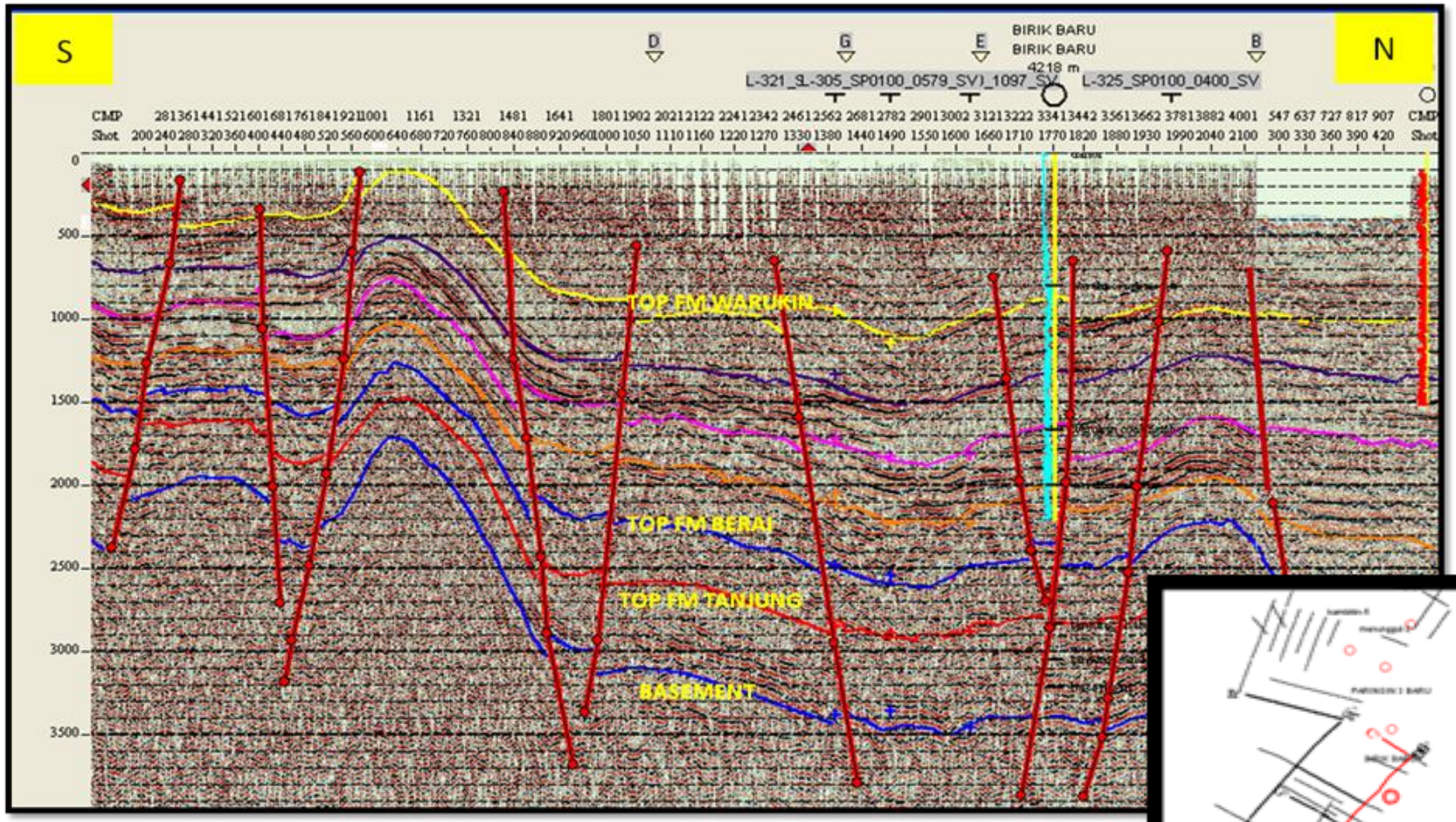
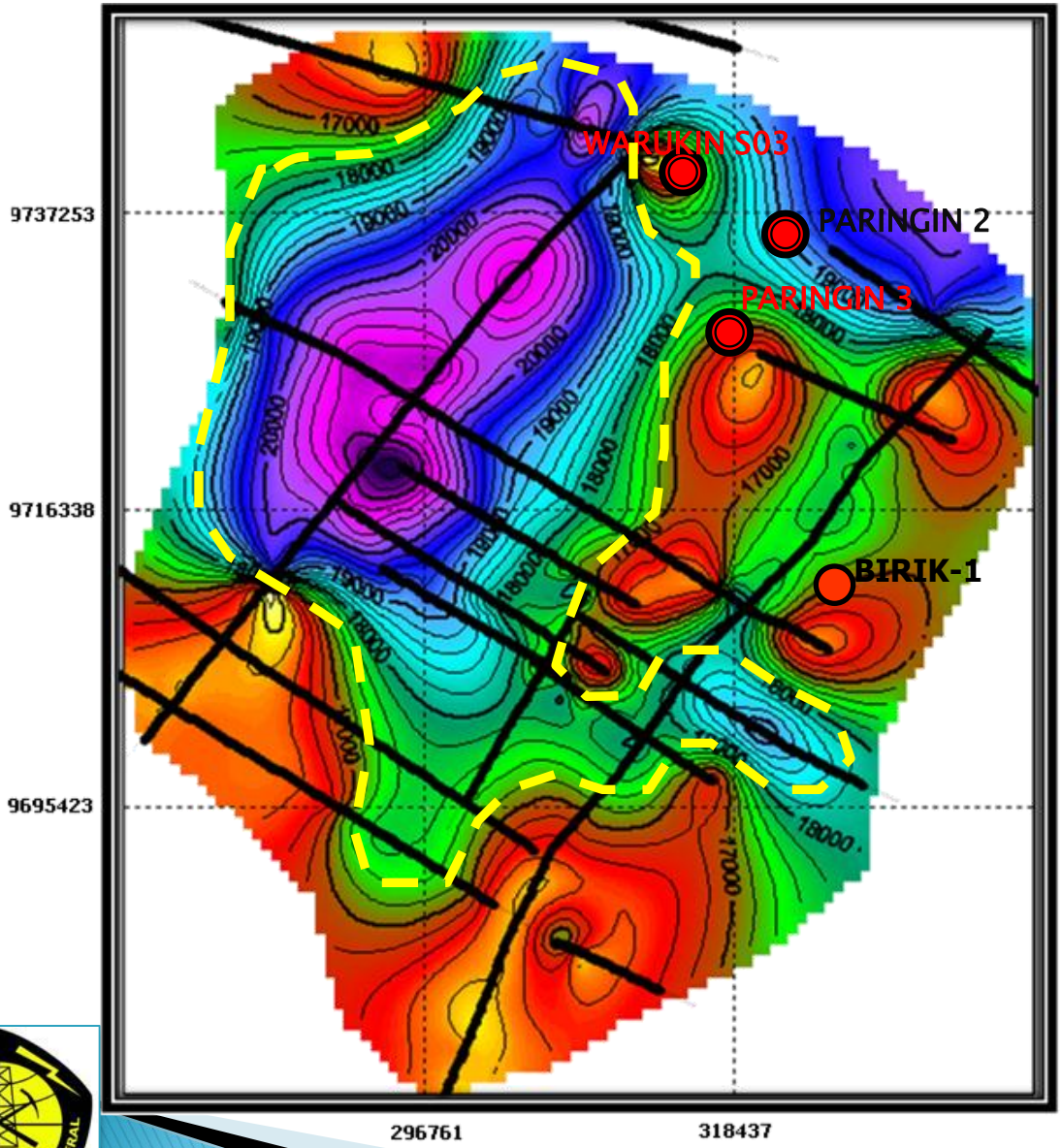
NE – SW SEISMIC SECTION OF SOUTH KALIMANTAN AREA



SHALE GAS PROSPECT OF TANJUNG FORMATION



SUMMARY:

- The most prospecting formation in South Kalimantan is Tanjung Formation
- Tanjung Formation indicates poor-fair shale gas quality
- Shale Gas resource calculation of the Tanjung Formation is 165.1 TCF

PROSPECT AREAS (BELOW 5200M)

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CONCLUSION

- Lemigas has concluded the CBM pilot project in South Sumatra area. The exploration and exploitation activities proved CBM reserve discovery which was then produced to generate electricity (CBM to power).
- Shale gas pilot project is currently in the exploration stage which is anable to define prospecting locations and calculate its gas resource within North Sumatra and South Kalimantan areas.
- With support from PT. Pertamina EP, shale gas project will continue to perform drilling and fracturing activities next year to prove new gas discovery.
- Both CBM and shale gas projects are hoped to encourage CBM and shale gas activities by investors which results in the increase of Indonesia's gas reserve.

THANK YOU