



UNCOVERING MYANMAR'S ONSHORE OIL AND GAS POTENTIALS

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MYANMA OIL AND GAS ENTERPRISE

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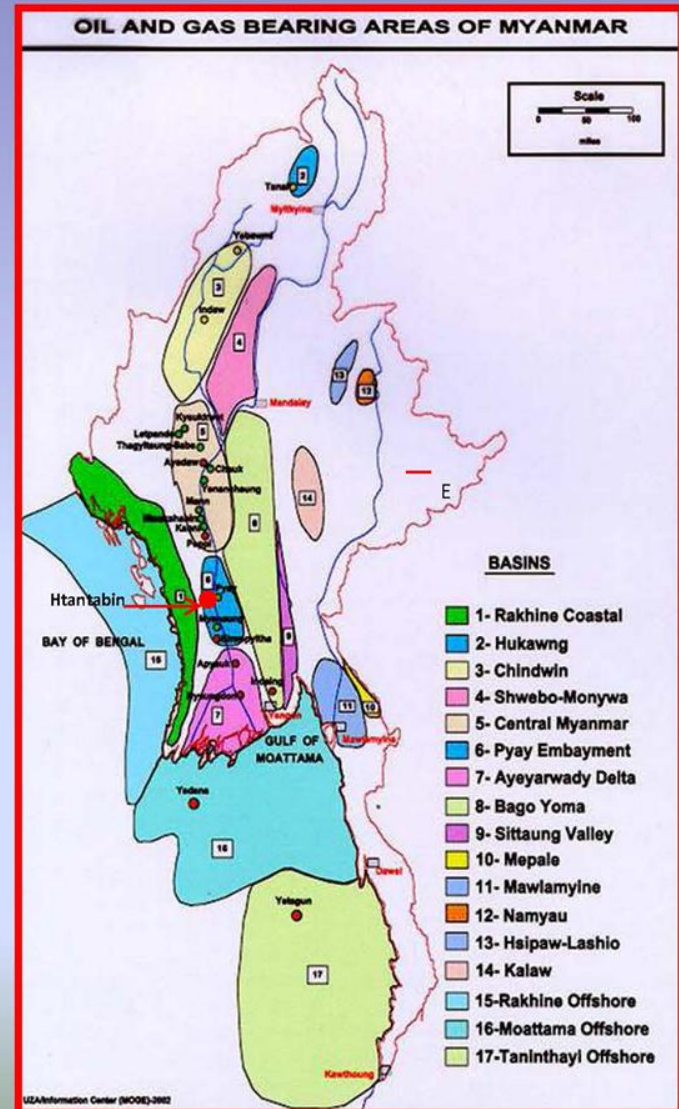
CONTENT

- INTRODUCTION
- CARBONATE PROSPECT
- EOCENE PROSPECT
- CONCLUSION



Introduction

- 95 % of the whole Myanmar Oil Production from Miocene and Oligocene.
- Mostly from Clastic reservoirs, only one carbonate reservoir.
- A few Eocene reservoirs discovered in Salin and Chindwin Basins
- Little is known about geology of the carbonate and Eocene reservoirs.
- Carbonate reservoir and Eocene reservoir still remain to be explored and developed





- INTRODUCTION
- **CARBONATE PROSPECT**
- EOCENE PROSPECT
- CONCLUSION



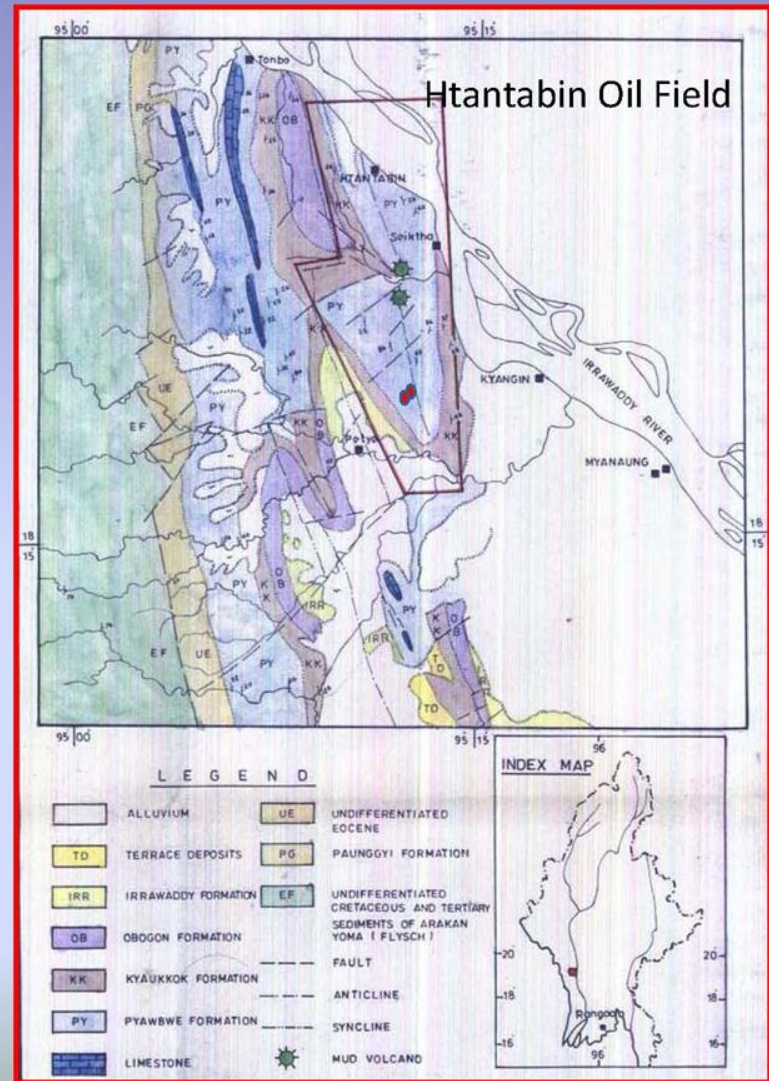
Carbonate Prospect

- Htantabin Oil Field**
- Ayeyarwady Delta Carbonate Prospect



Htantabin Oil Field

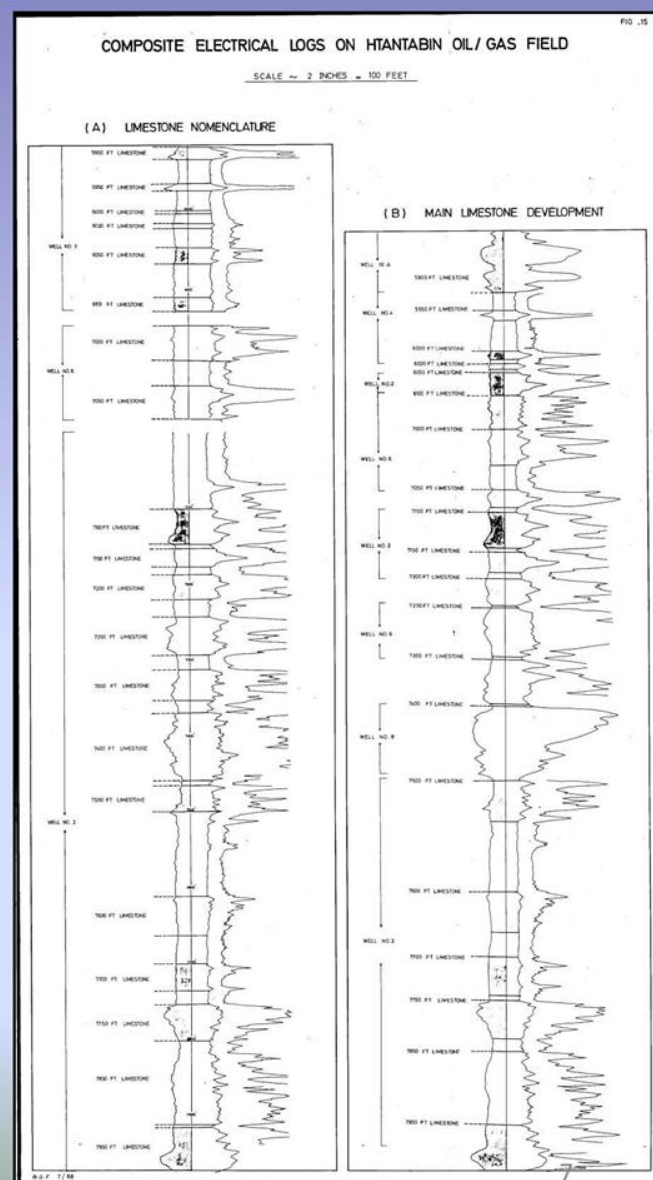
- First discovery Tertiary carbonate reservoir in Myanmar, in 1980.
- Combination trap
- Northern part of the Pyay Embayment, west of Mayaman Anticline, north of Tegyigone anticline, east of Akaukaung syncline
- Reservoir layer- 5400 to 7400 ft bdf, a small table – type trap
- Maximum carbonate thickness- 1257 ft in well#2.
- Facies by MOGE
 - Reefal limestone (Biosparites), high resistivity, low GR, High sep SP, Productive
 - Calcarene Lst beds (Biomicrosparites), mod resistivity, low to high GR, not productive
 - Argillaceous mudstones, low resistivity, high GR, flat SP
- Environment – outer shelf , outer talus slope, near barrier shelf- patch reefs inside a channel filled limestone deposits
- Both faunal and variation of limestone build up, indicating deposition in the outer Neritic Foreslope to Open Sea Shelf facies belts of a regressive sea in Pyawbwe time.
- Distribution of patch reefs- random or arrangement on shelf?

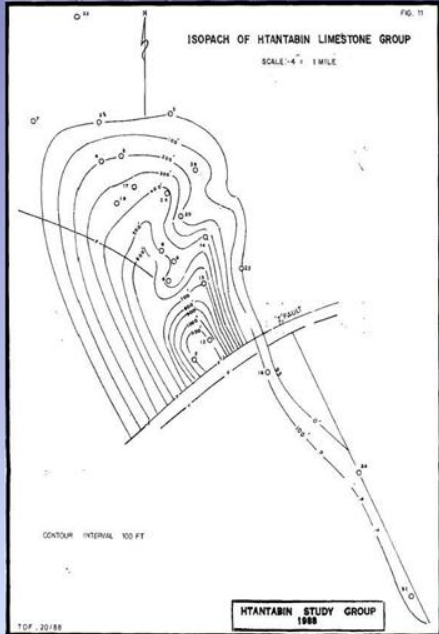




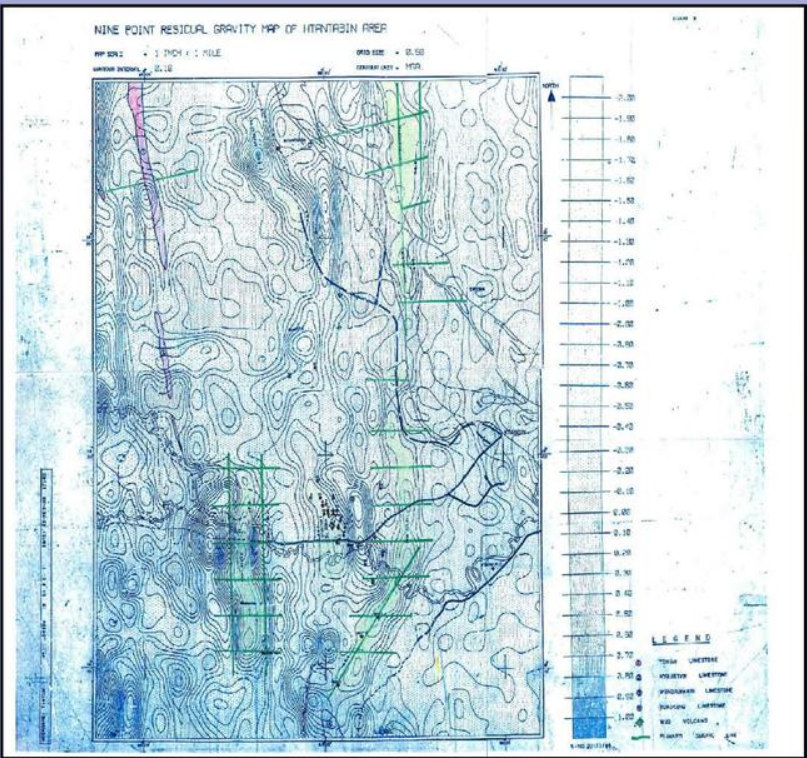
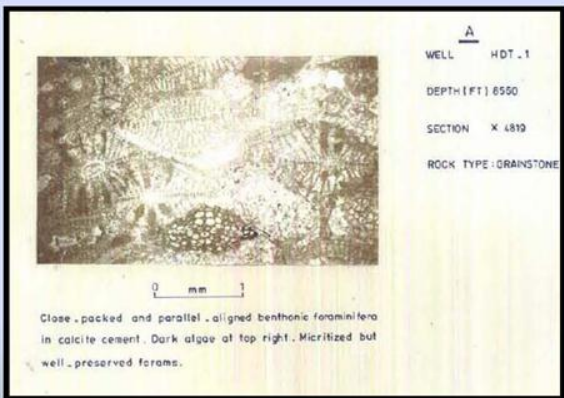
Htantabin Oil Field

- Reservoir limestone- foraminifera grain stones.
- Reservoir characteristics- porosity- 17 % (12 to 24 %), primary porosity. Post diagenetic features not developed.
- Fracture porosity common, widespread, no dolomitization.
- 37 wells drilled up to 1987, daily peak production 511+471+10.344(July, 1982).
- Cumulative production – 286,844 bl oil, 468,171 bl water, 8590.393 mmcf(Dec, 87).
- Correlation uncertain both in log and seismic section (poor reflection).
- Only 13 wells produced oil/gas.
- 11 wells limestone without oil/gas reservoir, 12 wells- no limestone encountered.
- Some wells still have potential due time constrain, incomplete testing.
- Reservoir pressure about 3000 to 4000 psi, BHP 1500 to 2000 psi.
- Initial prod rate high, but early water cut and condensate blockage?
- Acidizing – not success.
- Reserves- 0.365 MMSTB Oil, 9724 MMCF Gas (P1),
- Future drilling was terminated mainly due to logistic problems.
- The initial production rates are good enough, however these are followed by rapid decline and even ceased-flowing after water incursion.

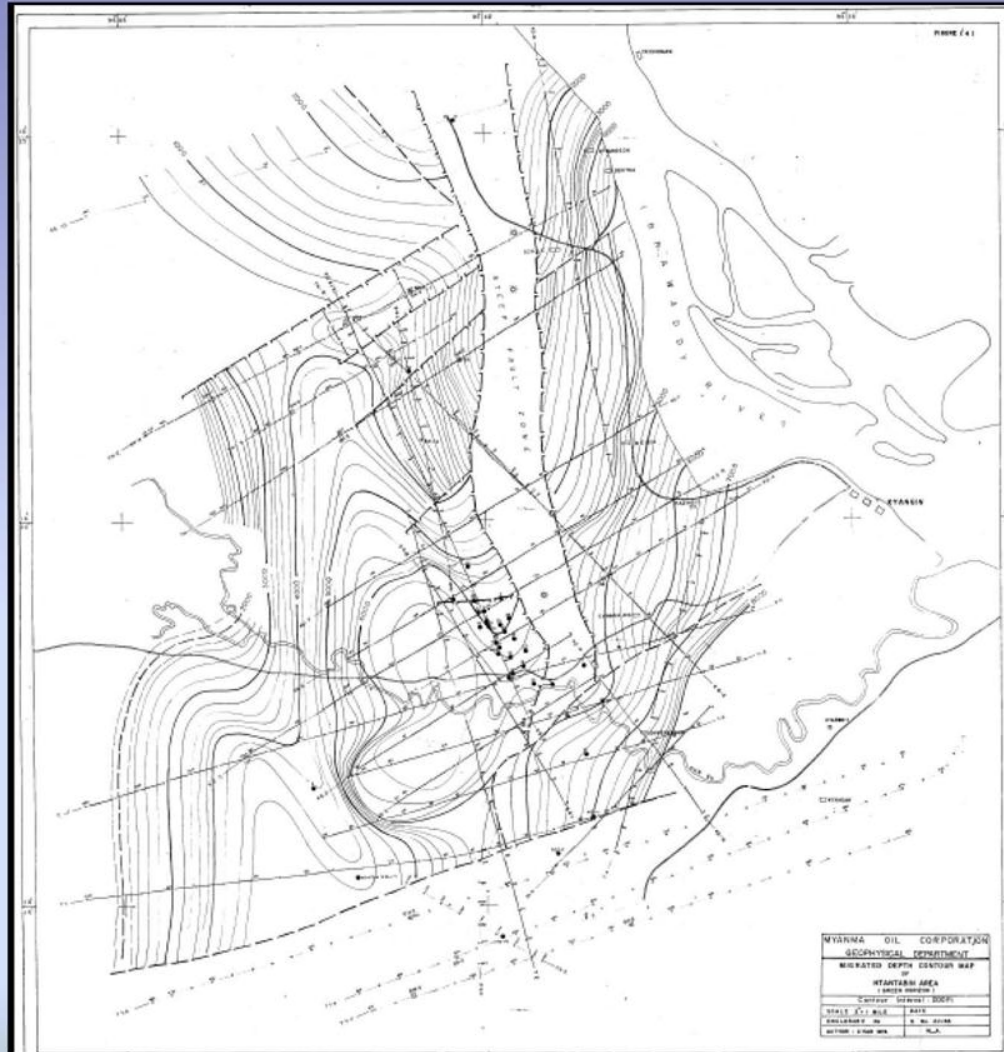
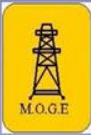




Isopach of Htantabin Limestone Group



Residual Gravity Map of Htantabin Area

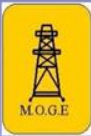


Migrated depth contour map of Htantabin Area



Carbonate Prospect

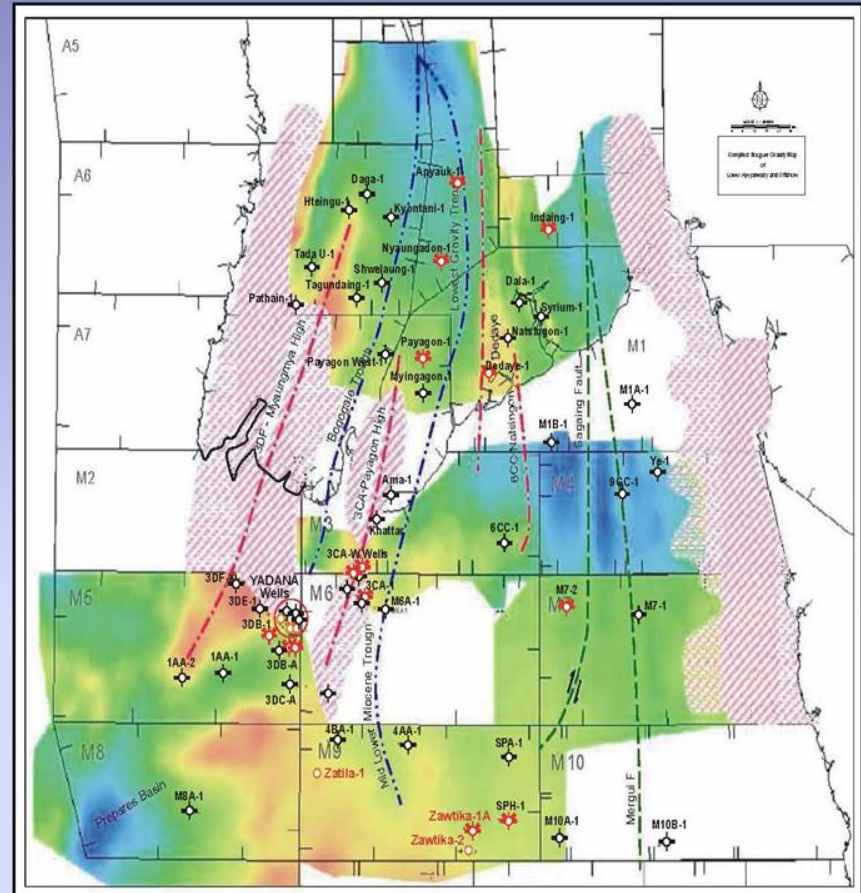
- ❑ Htantabin Oil Field
- ❑ **Ayeyarwady Delta Carbonate Prospect**



Ayeyarwady Delta Carbonate Prospect

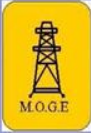
Occurrence

- Zayathla well-1
- Lemyethna-Payagyi-Takon
- Kyontani well 1, 2 and west-1
- Tada-U well-1
- Labutta-Yesaing-Tumyaung
- Shwelaung well-1
- Khatta well-1
- Ama well-1
- Myinkagone DT-1



Petrography

- Skeletal origin, remain of benthonic and planktonic, red algae bivalved and gastropodal shells and sponges.
- Coral are not commonly found.
- Micrites, Biomicrites, Biosparites, Biosparudites (Folk, 1962)
- Mudstones, Wackestone, Packstone, Grainstones (Dunham, 1962)



Stratigraphy

- Tabyin carbonate near Mindon- oldest
- Yaw equivalent to Taungale carbonate
 - Developed in Kyontani west-1, Tada-U -1, Shwelaung-1
- Oligocene carbonate-west of Yenama, Thayet-Tondaung, Khatta-1, Ama-1
- Lower Miocene- Htonbo, Tondaung-Natmi, Lemyathna, Yesaing Htantabin, Mayaman, Inbin, Tegyigon, Mezaligon Zayathla, Kyontani

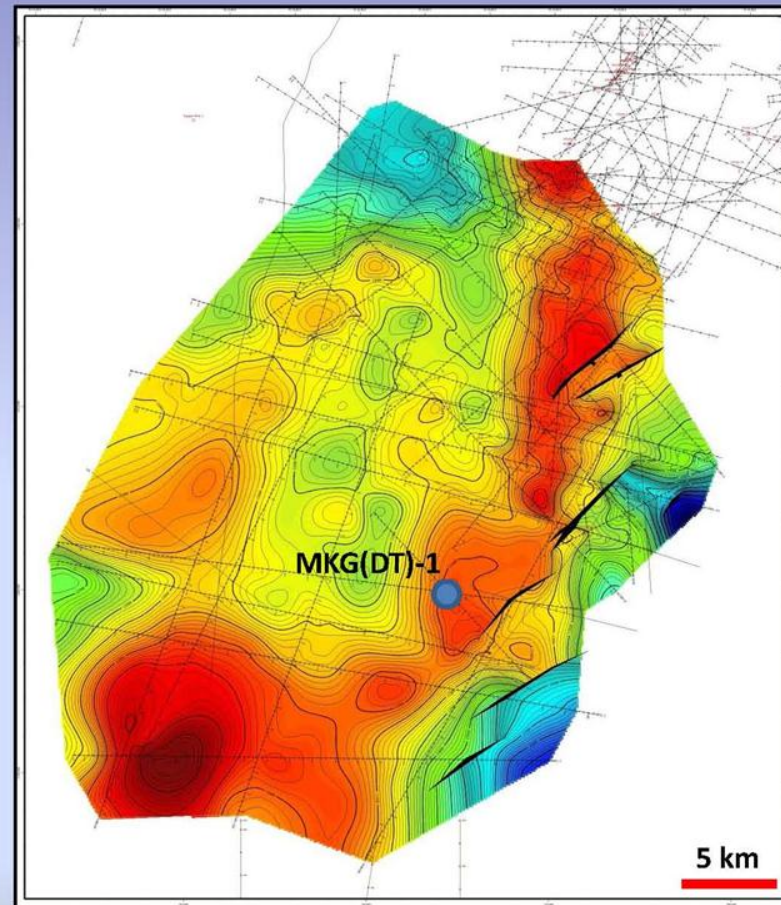
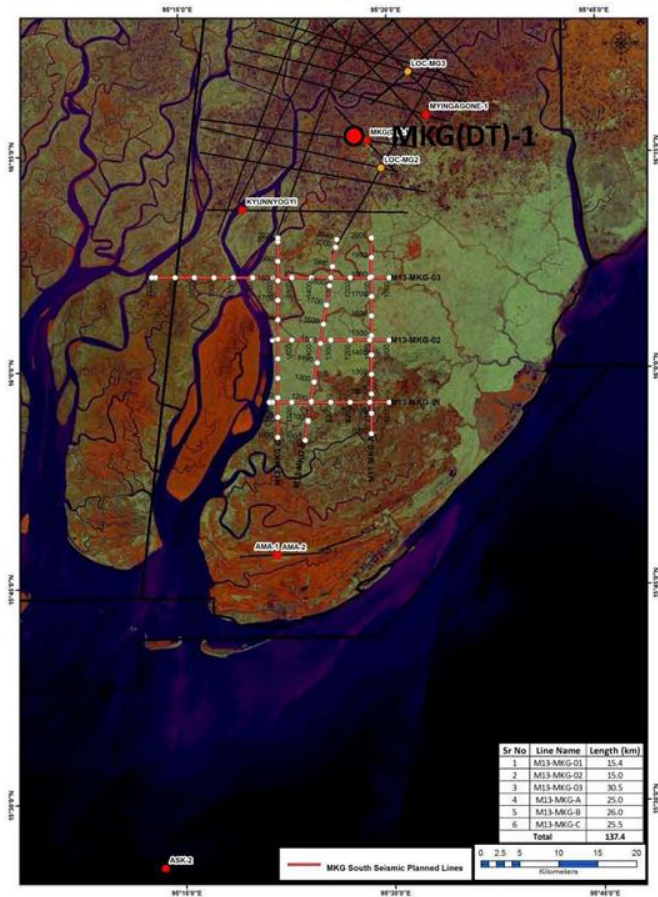
Geometry

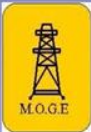
- Regular bedded to current bedded deposits
- Shaly to marly mudstones-thinly bedded between relatively thicker shales
- Thick bed carbonate near Htonbo – 8 miles in length, packstone, grainstones
- 1280 ft thick in Htantabin Condensate field, NS directions 1.5 miles, EW less.
- 350 ft thick in Kyontani well-1, in thin shale intercalations, but 150 ft in Kyontani North-2



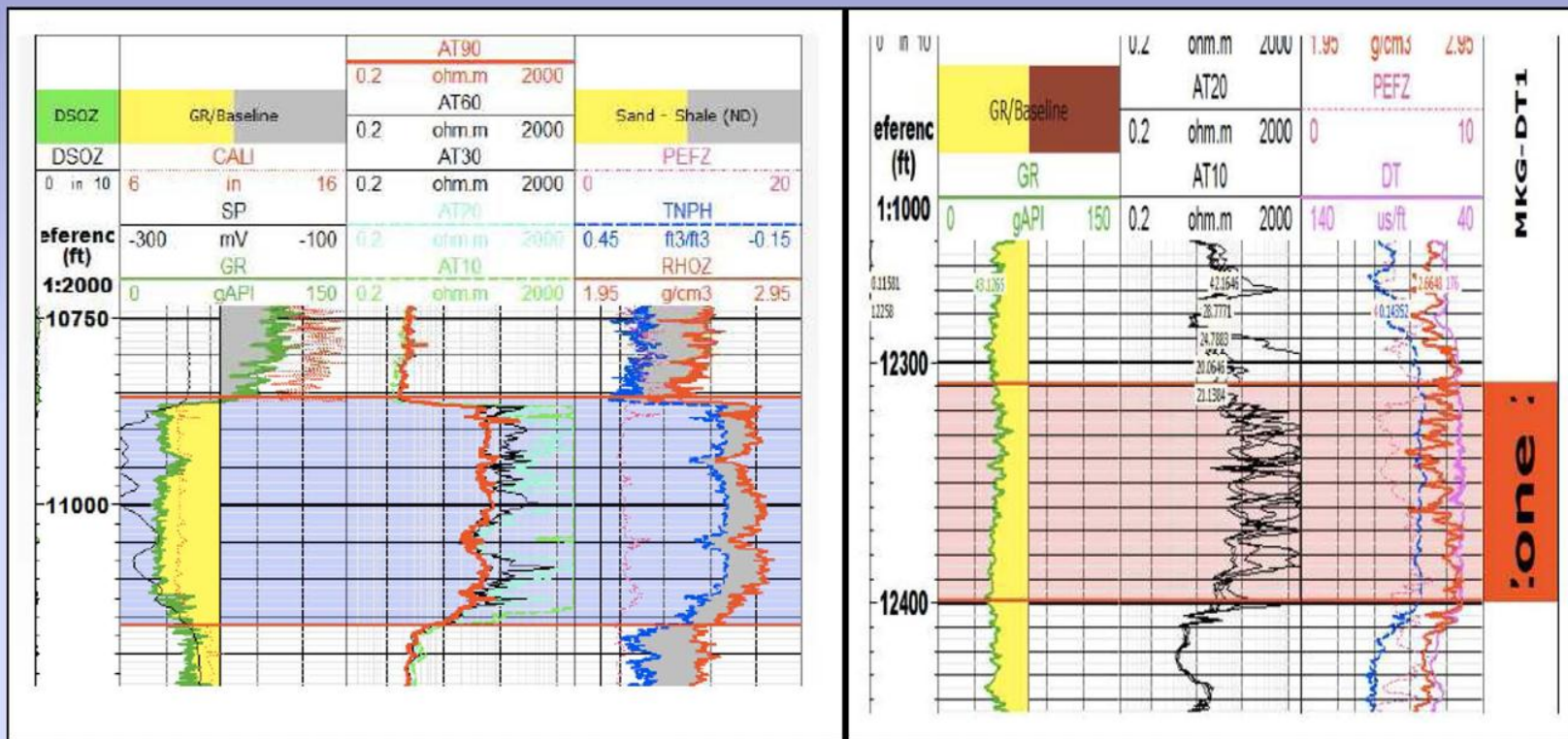
Myinkagone DT-1

Seismic Survey Plan Map of Myinkagone South Area (2013)





Well Log response of Carbonate at Myinkagone-DT-1





DISCUSSION ON CARBONATE POTENTIAL

For Htantabin Field

- Only 2D seismic lines 29 lines, 300 Line Km
- Some wells not in conclusive production testing
- Reservoir problem- condensate blockage?
- Require 3D seismic surveys
- Prospective both clastic and carbonate
- Facies Model for carbonate exploration.

For Ayeyarwady Delta

- Carbonate occurrence extension?
- Need to define carbonate facies and model



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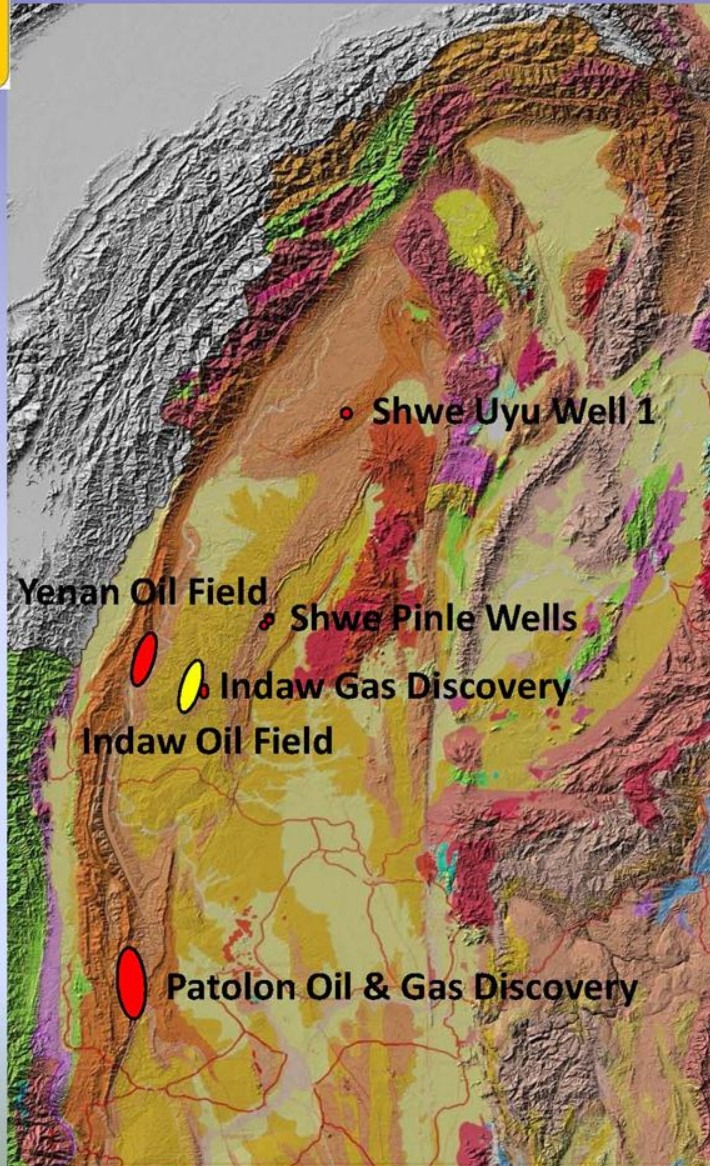
Eocene Prospect in Central Myanmar Basin

Chindwin Basin

- Shwe Uyu Prospect
- Yenau Prospect
- Patolon Prospect

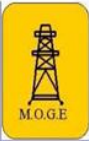
Salin Basin

- Kyaukkwet/ Letpando
- Ngahlaingdwin

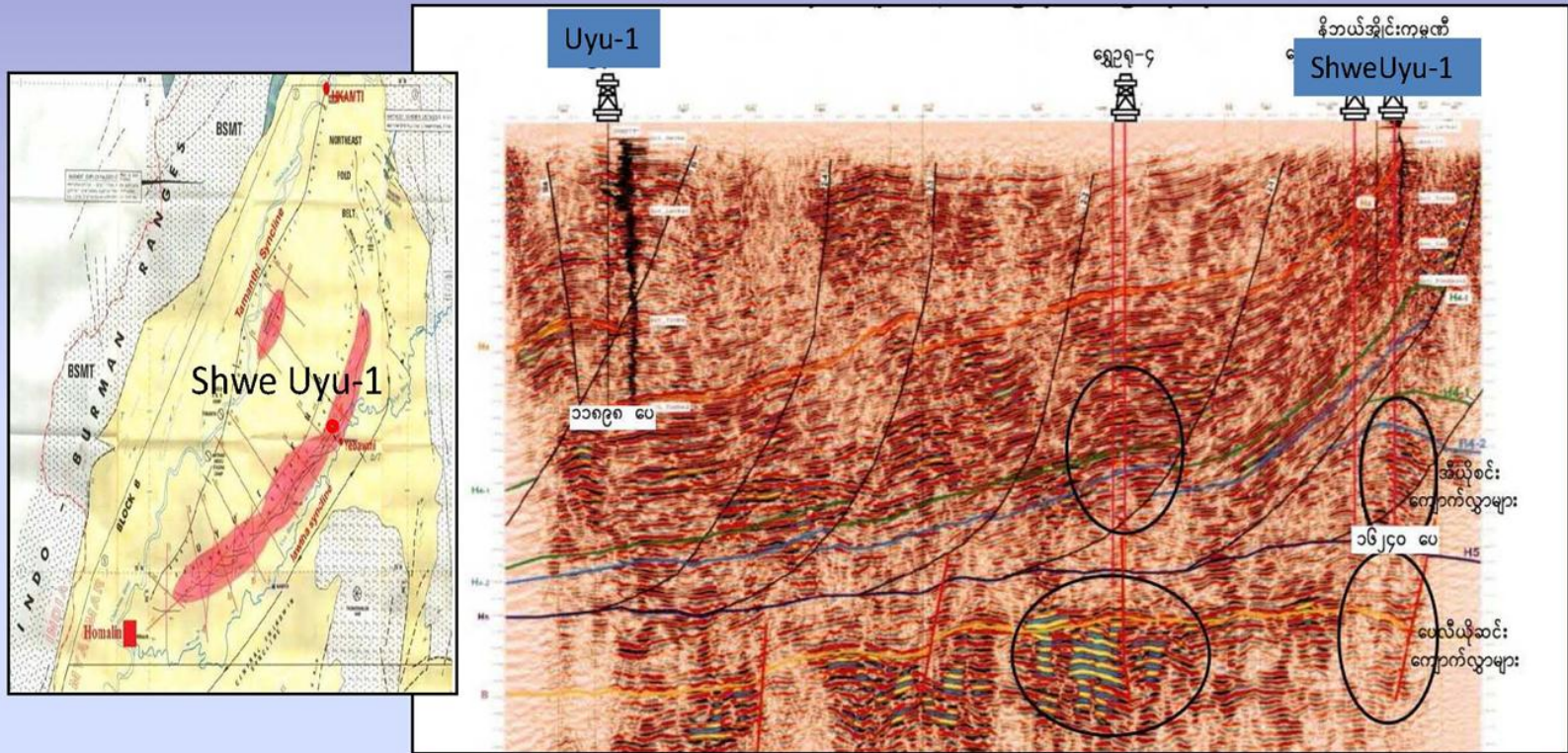


Chindwin Basin

- Shwe Uyu-1 (TD 16240ft) Drilling in progress
- Yen-an Wells- Yen-an#3 shows oil from 3000ft
- Patolon Wells- Condensate, Gas Discovery
-from Tabyin Formation

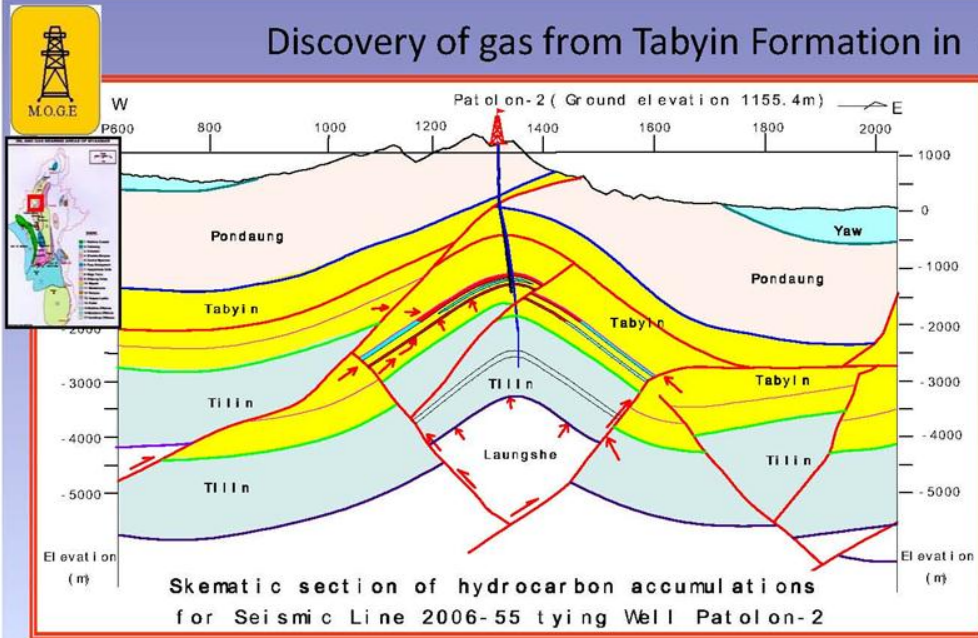


North – South Sections of Well Shwe Uyu -1 and Uyu-1



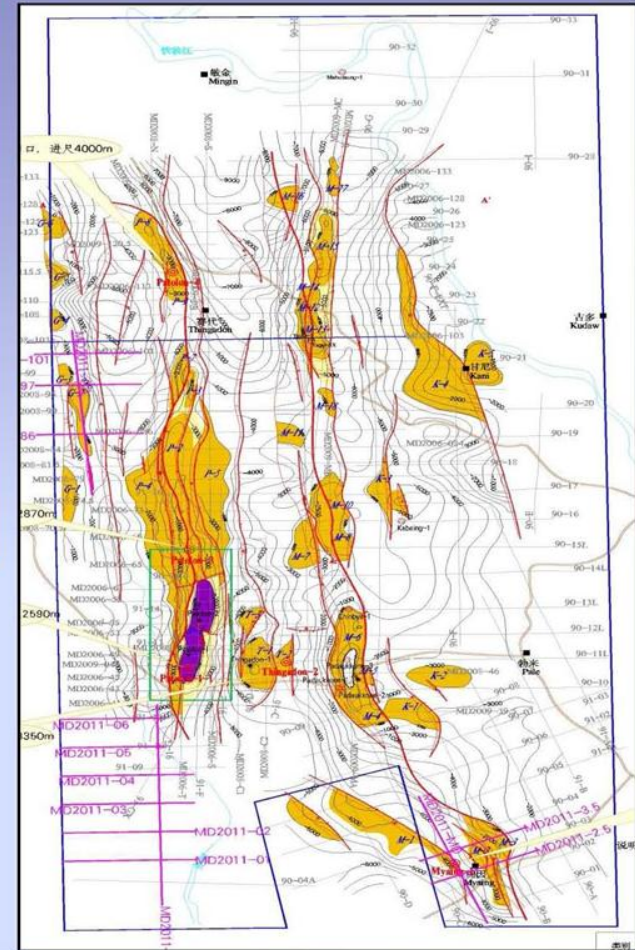
Drill show at 701m, TG 21.%, C1-17.8%, C2-0.55%, C3-0.32%, C4-0.24%

Discovery of gas from Tabyin Formation in Chindwin Basin



Production Testing Results

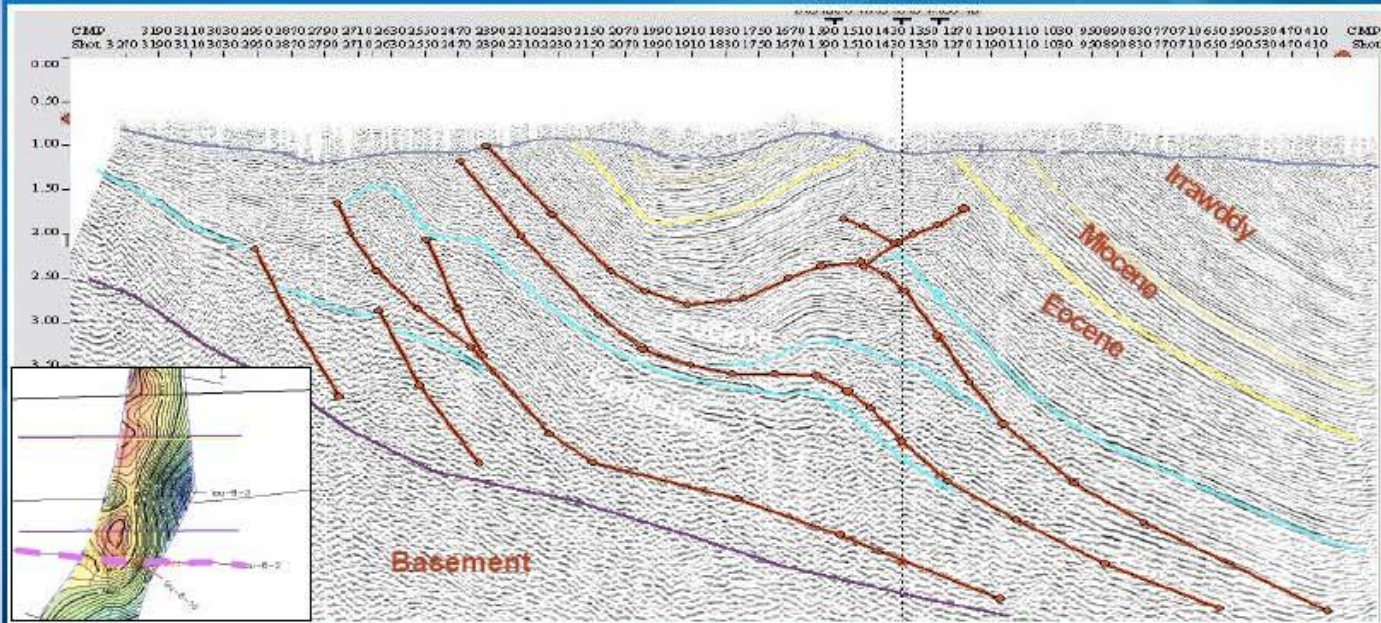
Well	Depth (m)	Daily Flow Rate
Patolon-1	2381-2397	Gas 147000 m ³
	2401-2409	Oil 9.76 m ³
Patolon-2	2360-2367	Gas 100684 m ³
		Oil 4.83 m ³



Prospect Map of Block D

Yeyein Prospects

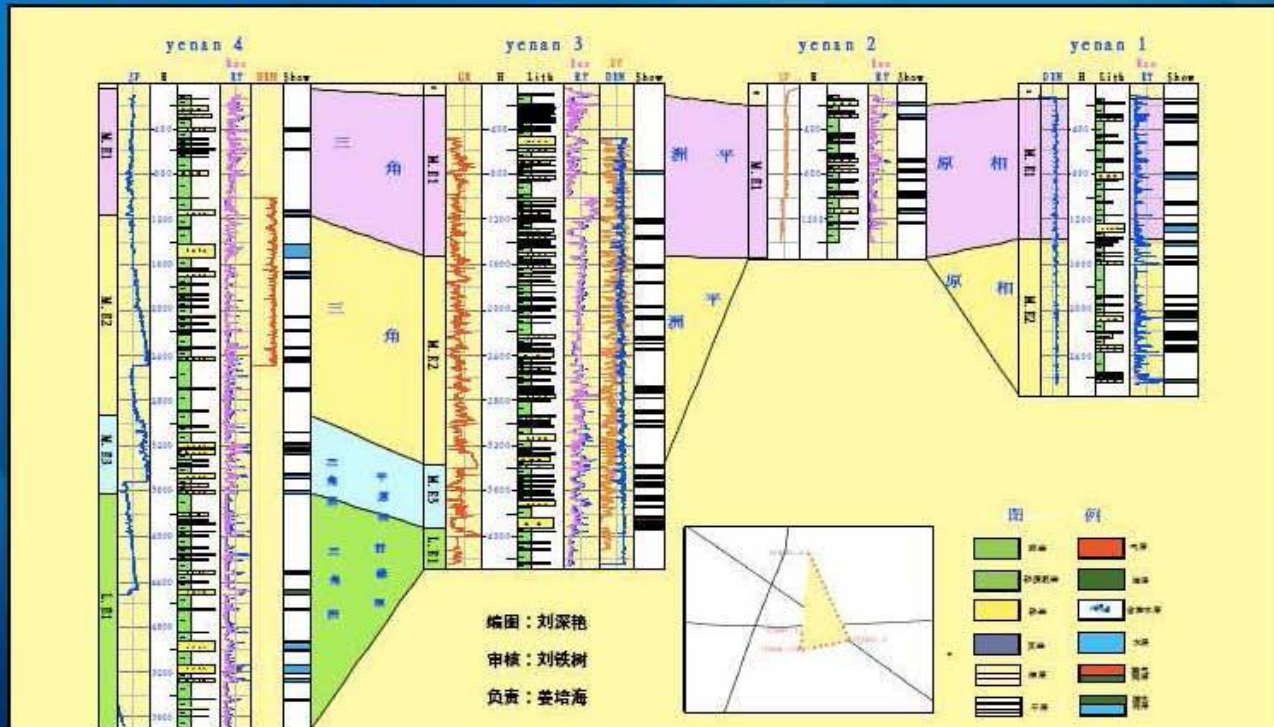
The structure is controlled by 3 seismic lines, and CNOOC interprets the structure high is at 3000m, the lowest closure line is 3400m. The height is 400m, and trap area is 40km². The line and the cross line running through the structure are line lau8-2 and line lau8-7 .



Inline Profile of Yen'an Structure (lau8-2)

Yeyin Prospects

In Yenan structure Middle-Lower Eocene penetrated by 4 wells is deltaic system, and the reservoir is sandstones of meandering channel or distributary channel, which is interbedding of thick mudstone with middle-thin sandstone and which is a type of middle porosity and low permeability reservoir.



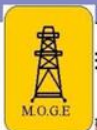
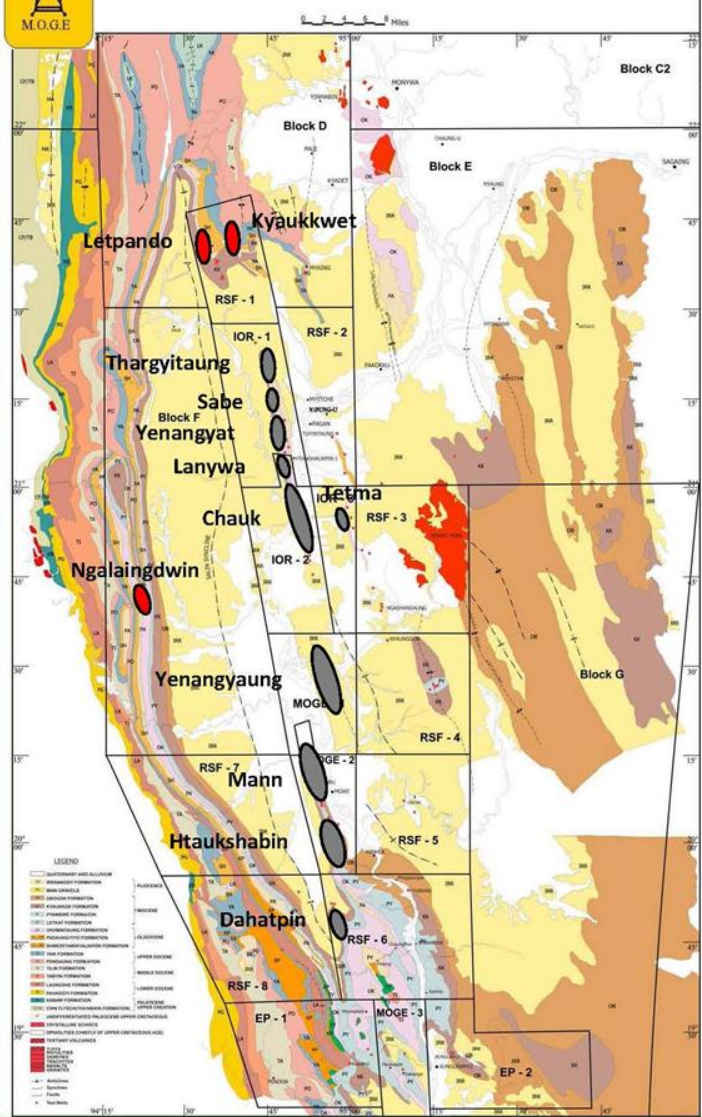


Figure -7
GEOLOGICAL MAP OF CENTRAL MYANMAR BASIN



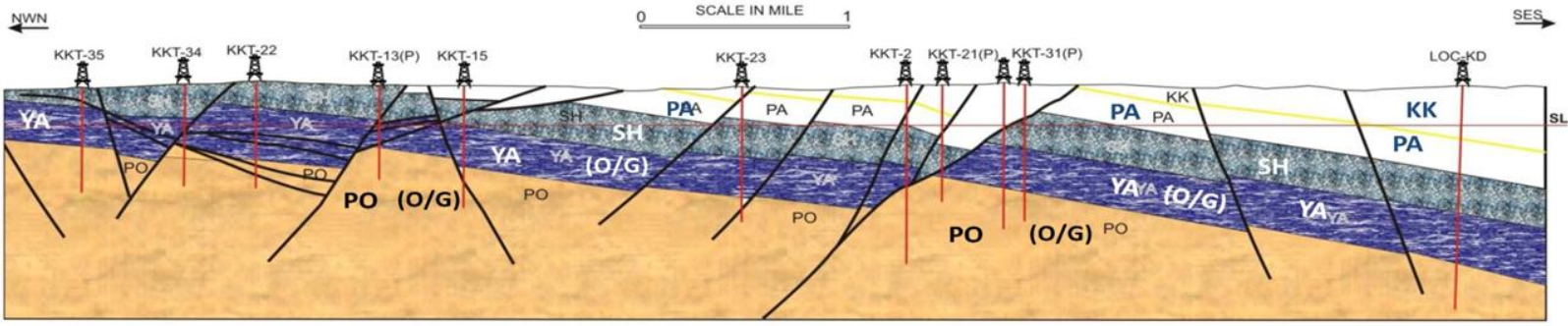
CENTRAL MYANMAR BASIN

Cumulative Production of Yaw and Pondaung Formation

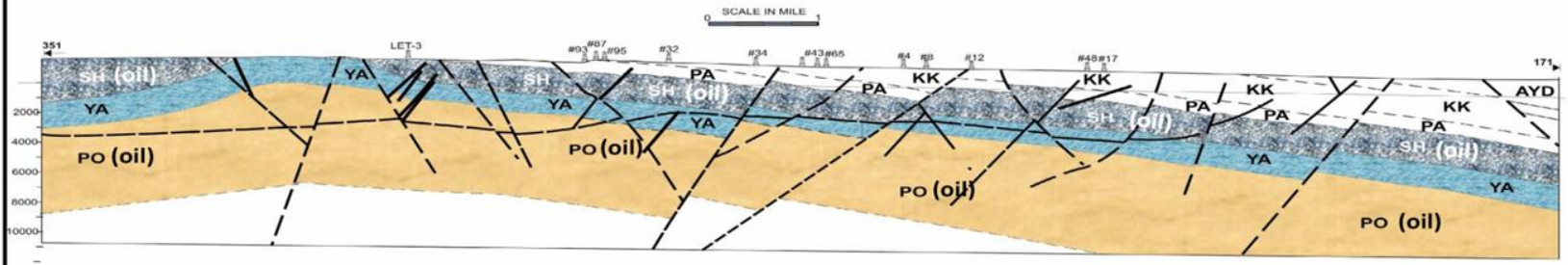
Fields	Yaw Fm	Pondaung Fm
Kyaukkwet	Oil (0.112 MMBL)	Oil/Gas (0.4 MMBL/ 20.2 BCF)
Letpando		0.018 MMBL/ 0.12 BCF
Ngahlaingdwin		Gas tested (3.3 mmscfd)

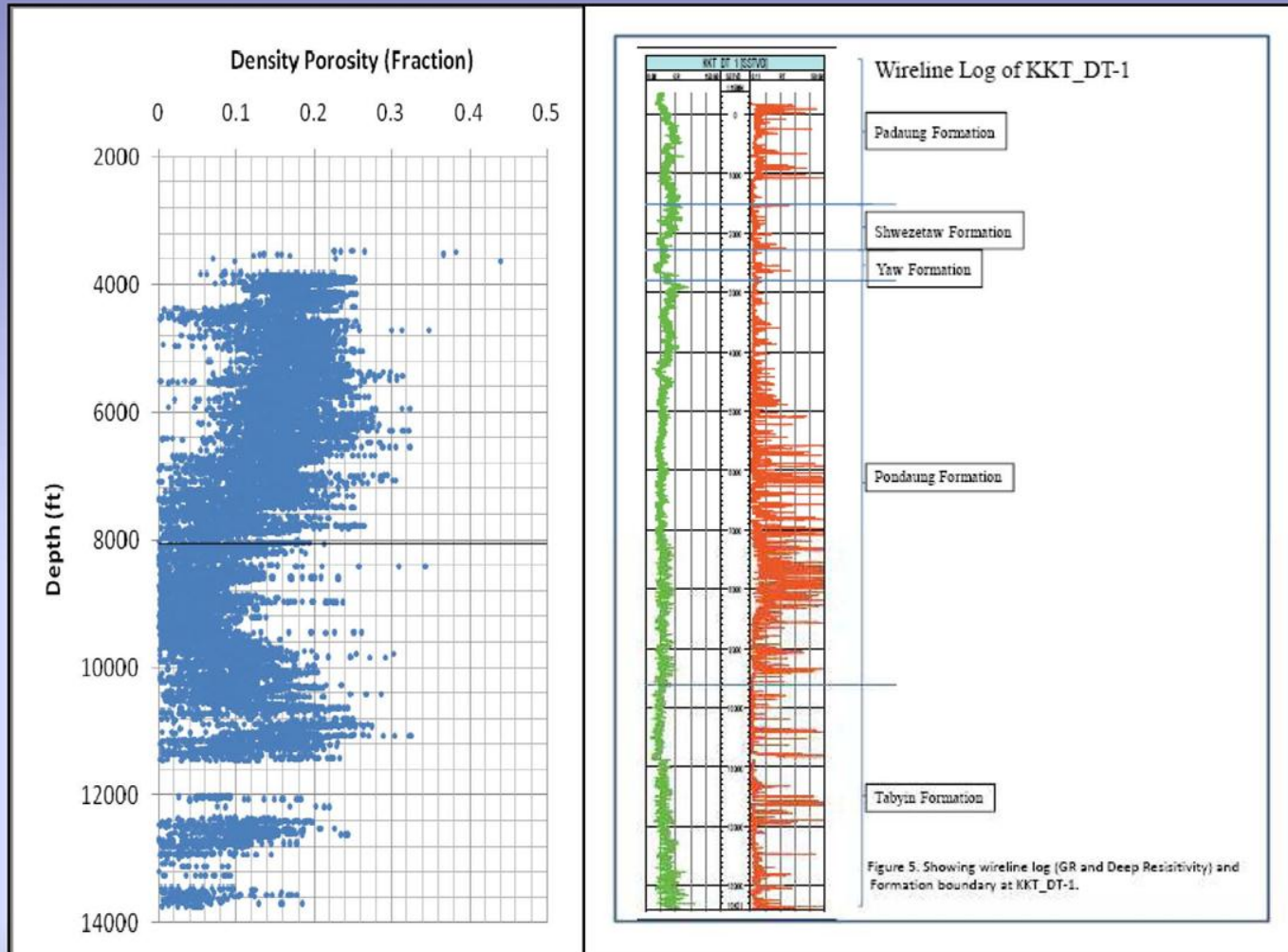


LONGITUDINAL SECTION DRAWN THROUGH KYAUKKWET STRUCTURE



LONGITUDINAL SECTION DRAWN THROUGH LETPANDO STRUCTURE

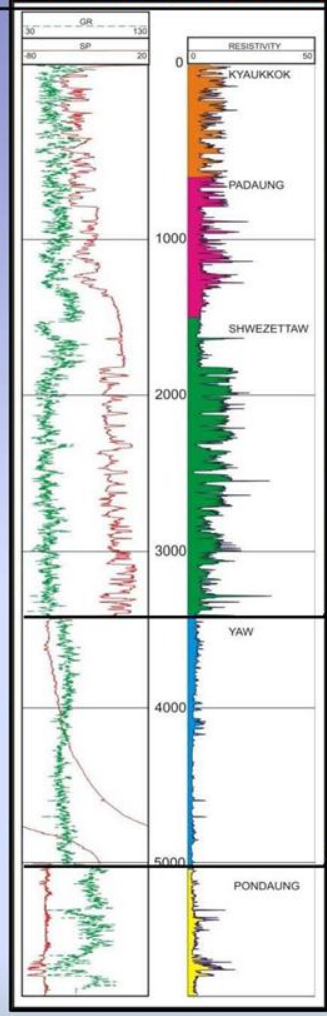




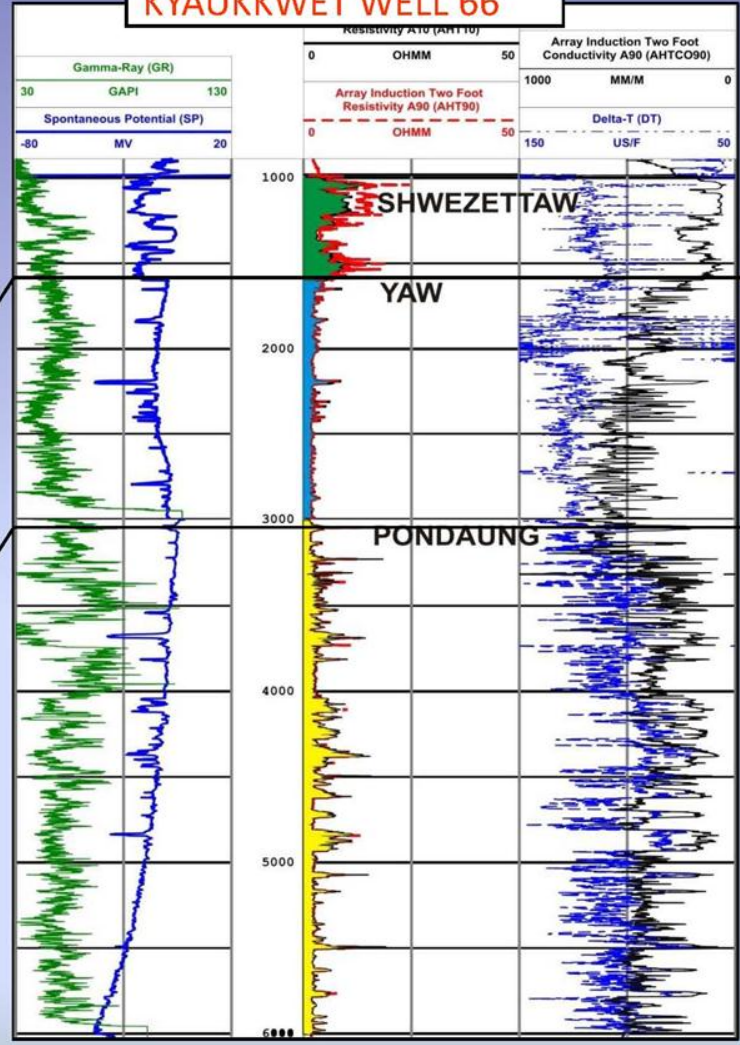
Log Porosity vs Depth and Wireline Log of Kyaukkwet Deep Test -1



LETPANDO WELL 56



KYAUKKWET WELL 66



Yaw and Pondaung Formation in Letpando and Kyaukkwet Area



DISCUSSION ON EOCENE POTENTIAL

- Reservoir complex, due to fluvial sandstone development
- Only 2D seismic, require 3D for reservoir development
- Tabyin reservoir encountered in Patolon structure is still searching in Kyaukkwet Deep wells.



CONCLUSION

- Carbonate distribution is more widespread than previously known areas.
- Offshore carbonate 3CA discovery enhances carbonate prospects both in onshore and offshore area in Myanmar.
- Eocene reservoir remain attractive in oil and gas prospects in Chindwin and Northern most part of Salin Basins.
- Reservoir complex and heterogeneity is a main challenging for Eocene reservoirs.

THANK YOU