

Beni Suef Basin the Key for Exploration Future Success in Upper Egypt*

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Abstract

The Beni Suef Basin is a relatively under-explored basin in N. Central Egypt. It lies approximately 150 km south of Cairo and is bisected by the present day Nile Valley.

It is currently believed that hydrocarbons, sourced from the Albian Lower Kharita (shales and siltstones) and Turonian Abu Roash F (carbonates), have been expelled and have subsequently migrated into up-dip structural closures along the margins of the basin.

The stratigraphic column of the Beni Suef Basin extends from the Pre-Cambrian granitic basement through the major Cretaceous reservoirs and seals and up into the Eocene Apollonia carbonates. Late Tertiary to recent deposition is also recorded within the ancestral Nile valley and along its margins. Some uncertainty exists as to the age of inception of the Beni Suef Basin and the extent of sedimentation within the basin prior to the deposition of the Lower Kharita shales. Current 3D seismic mapping is endeavoring to delineate more clearly these older sedimentary packages.

The Beni Suef Oil Field was discovered in September 1997 by Seagull Energy Corporation and was followed by the discovery of five additional oil fields - Azhar, Yusif, Gharibon, Lahun and Sobha by Qarun Petroleum Company.

Beni Suef Oil Field contains excellent reservoir quality rocks in both the Kharita and Bahariya Formations with additional reserves being calculated in the Abu Roash "A & G" Members. Due to some of the complex mineralogy observed in the Cenomanian Bahariya Formation a detailed petrophysical model was built using Schlumberger's ELAN&IP software to ensure an accurate understanding of reservoir properties could be achieved. This petrophysical work combined with detailed sedimentological work has greatly aided the understanding of the field's reserves distribution.

Recent geochemical work along with detailed mapping of newly acquired 3D seismic is greatly helping the delineation of the two potential source rocks and helping to formulate a clearer picture of hydrocarbon expulsion and migration within the Beni Suef basin. The results of this work may be applicable to the hydrocarbon potential of other basins such as the Minya and Asyut basins of Upper Egypt.



Qarun Petroleum Company

Beni Suef Basin

The Key For Exploration Future Success in Upper Egypt

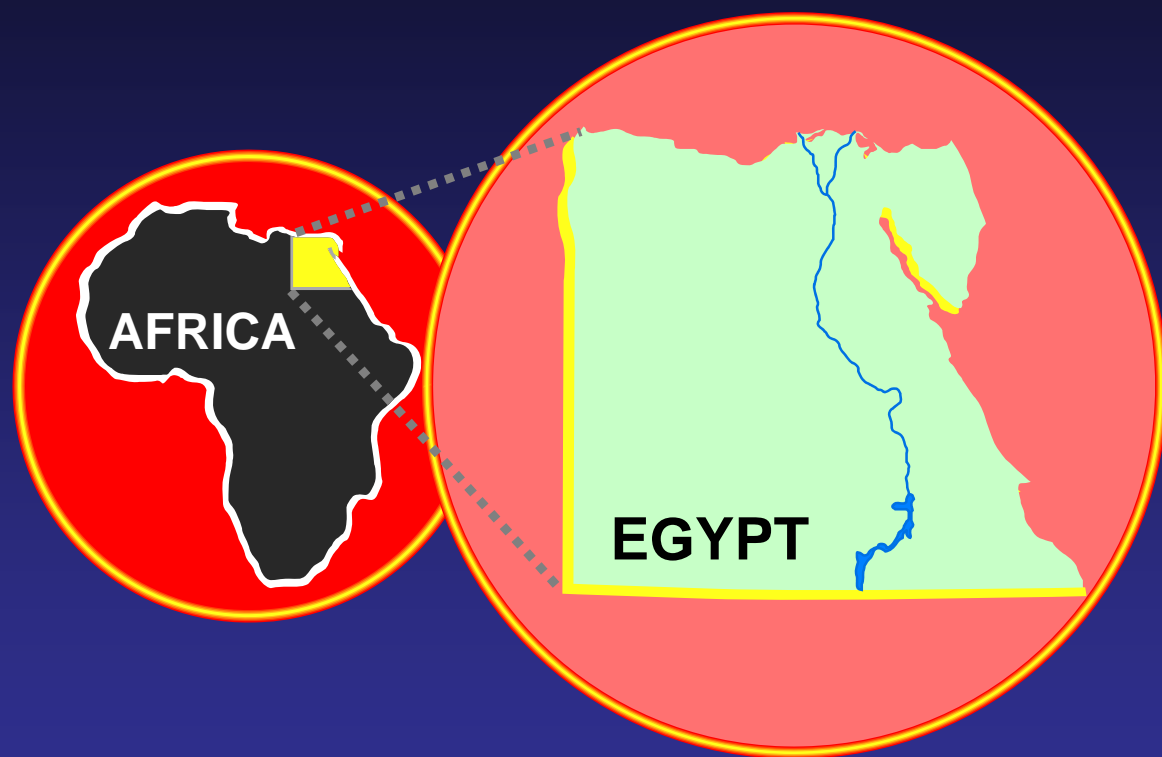
By

Hemida Zahran *

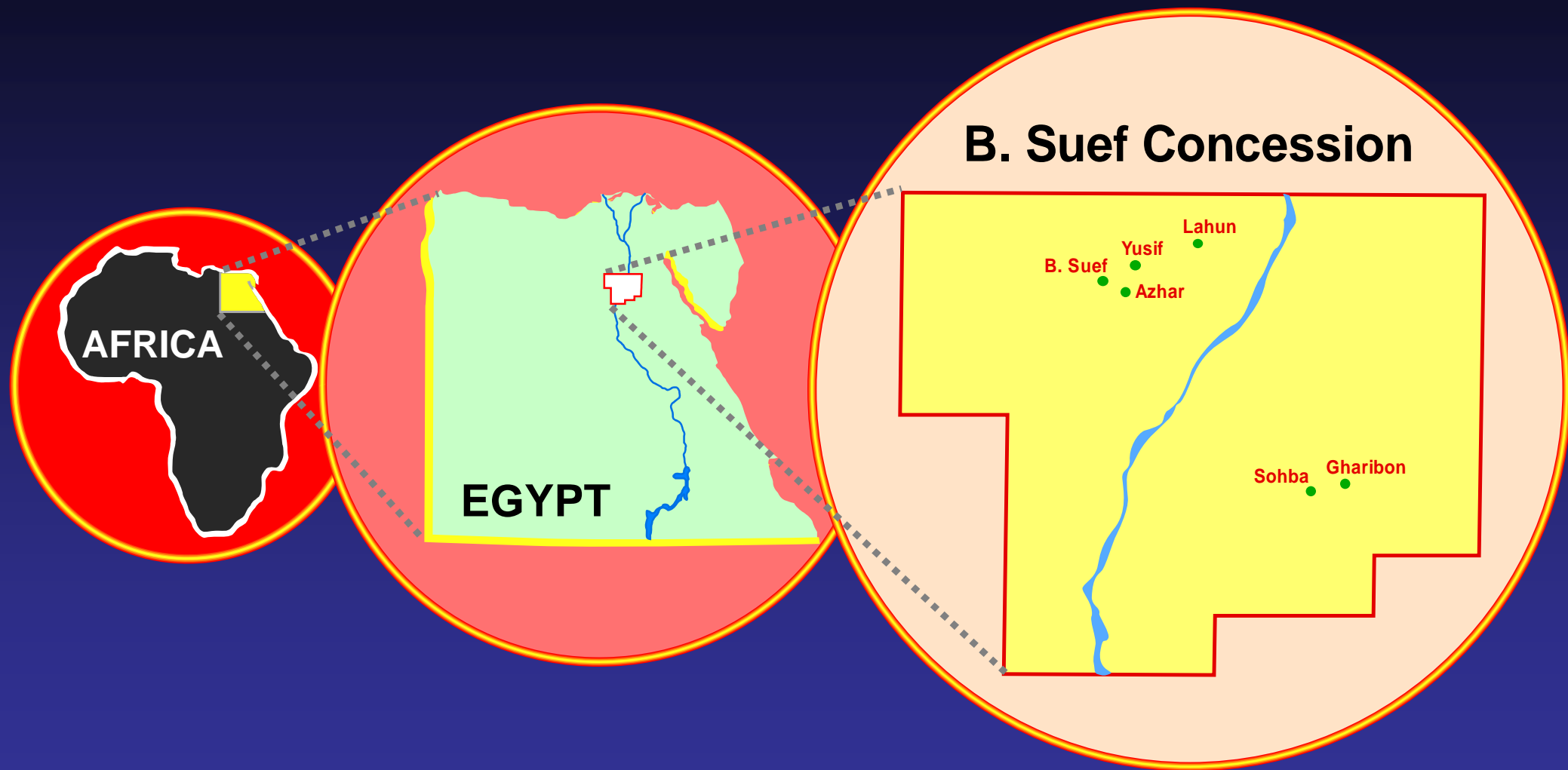
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Mostafa Mohamad

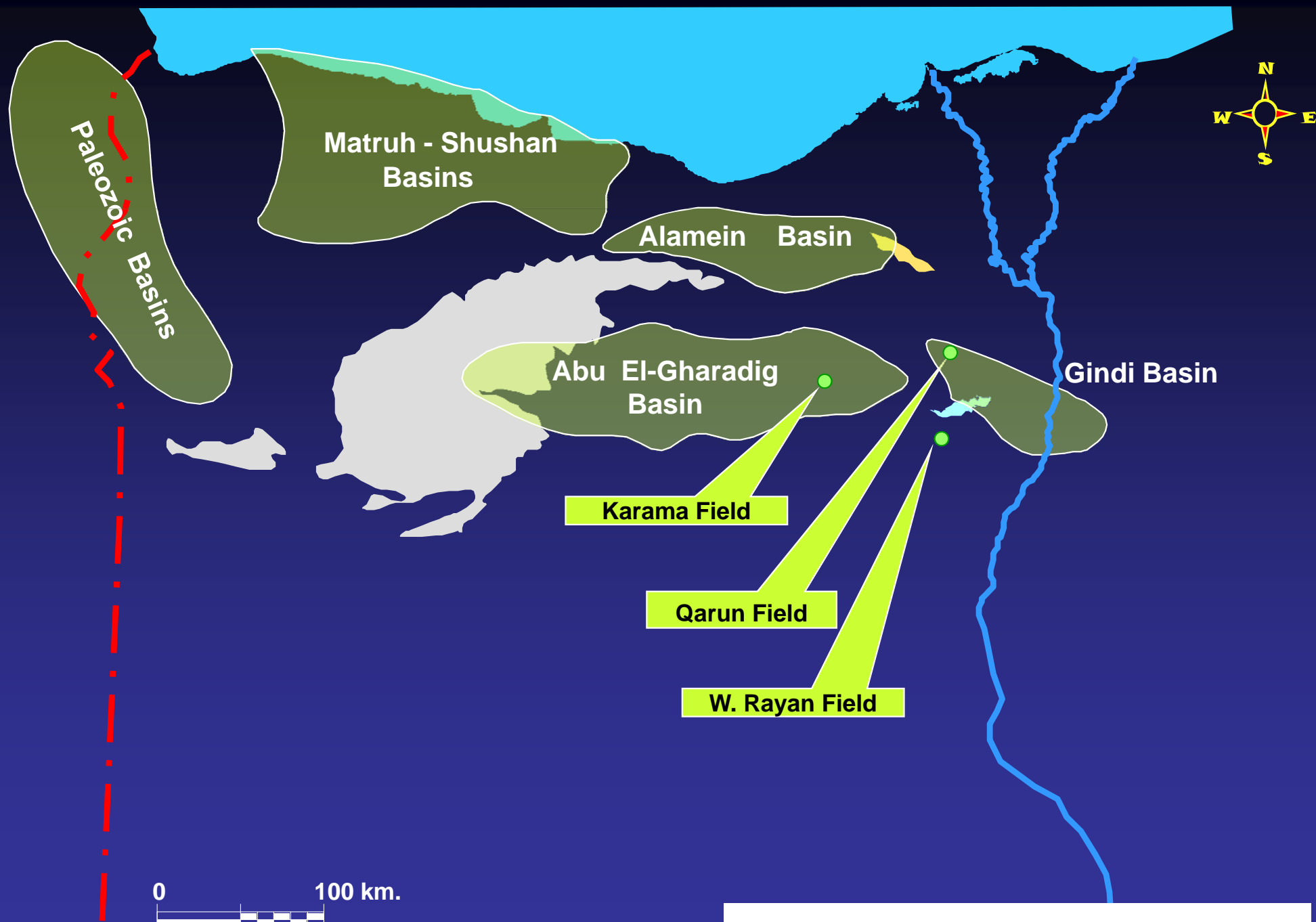
April 2011



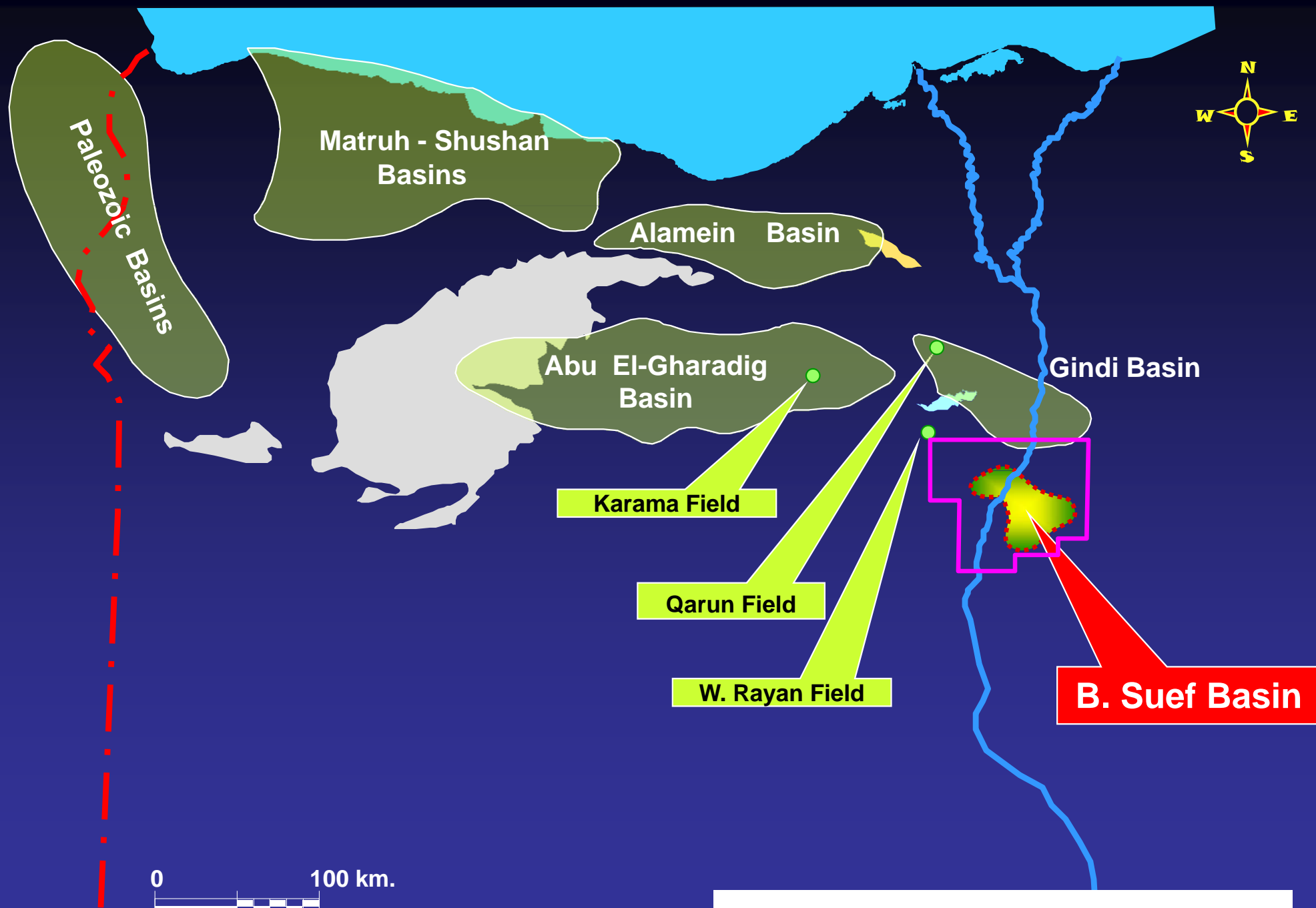
Location map



Location map

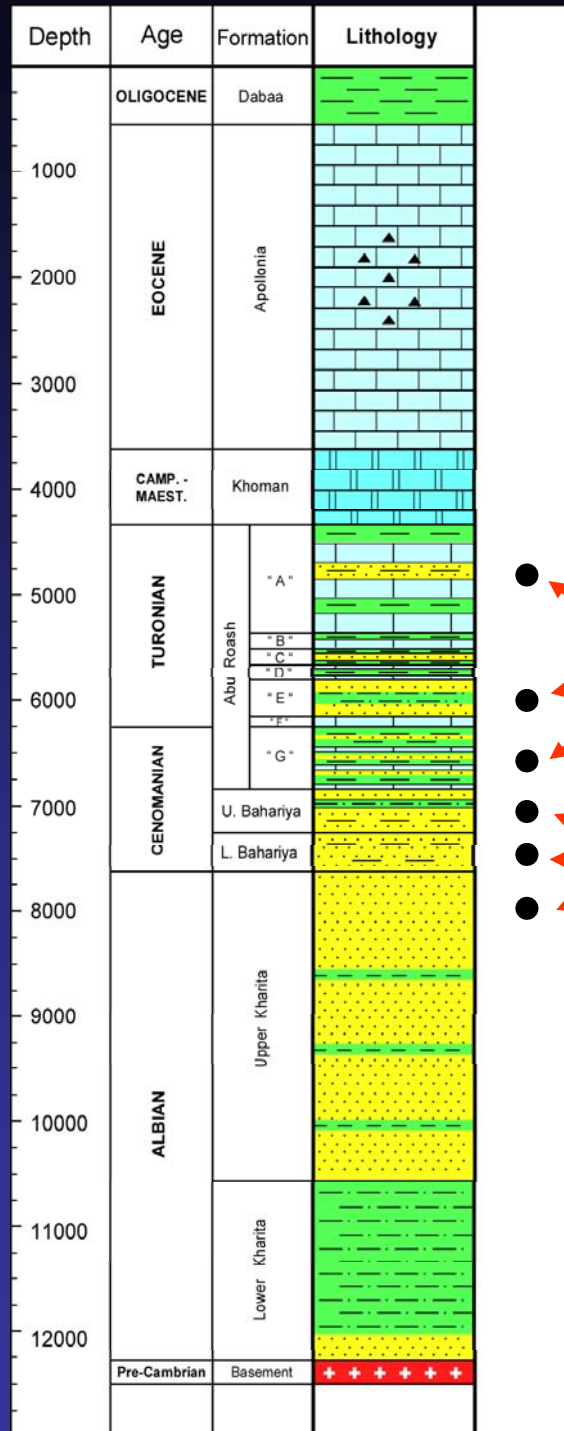


Basins Distribution Map



Basins Distribution Map

Stratigraphic Column of B. Suez Basin



Reservoirs :

A / R " A , E & G "

Bahariya & Kharita

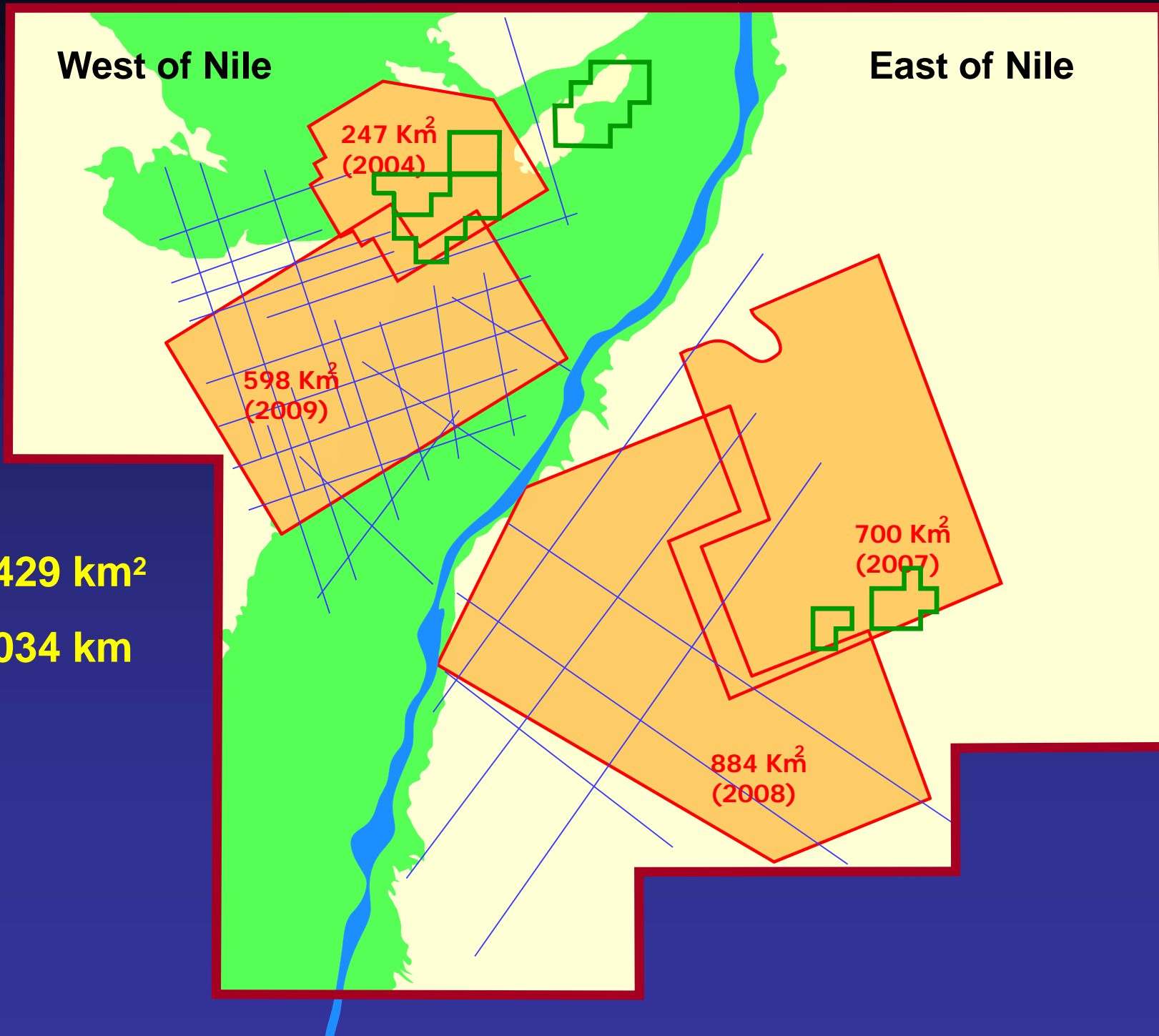
Source Rocks :

A / R " F " carbonates

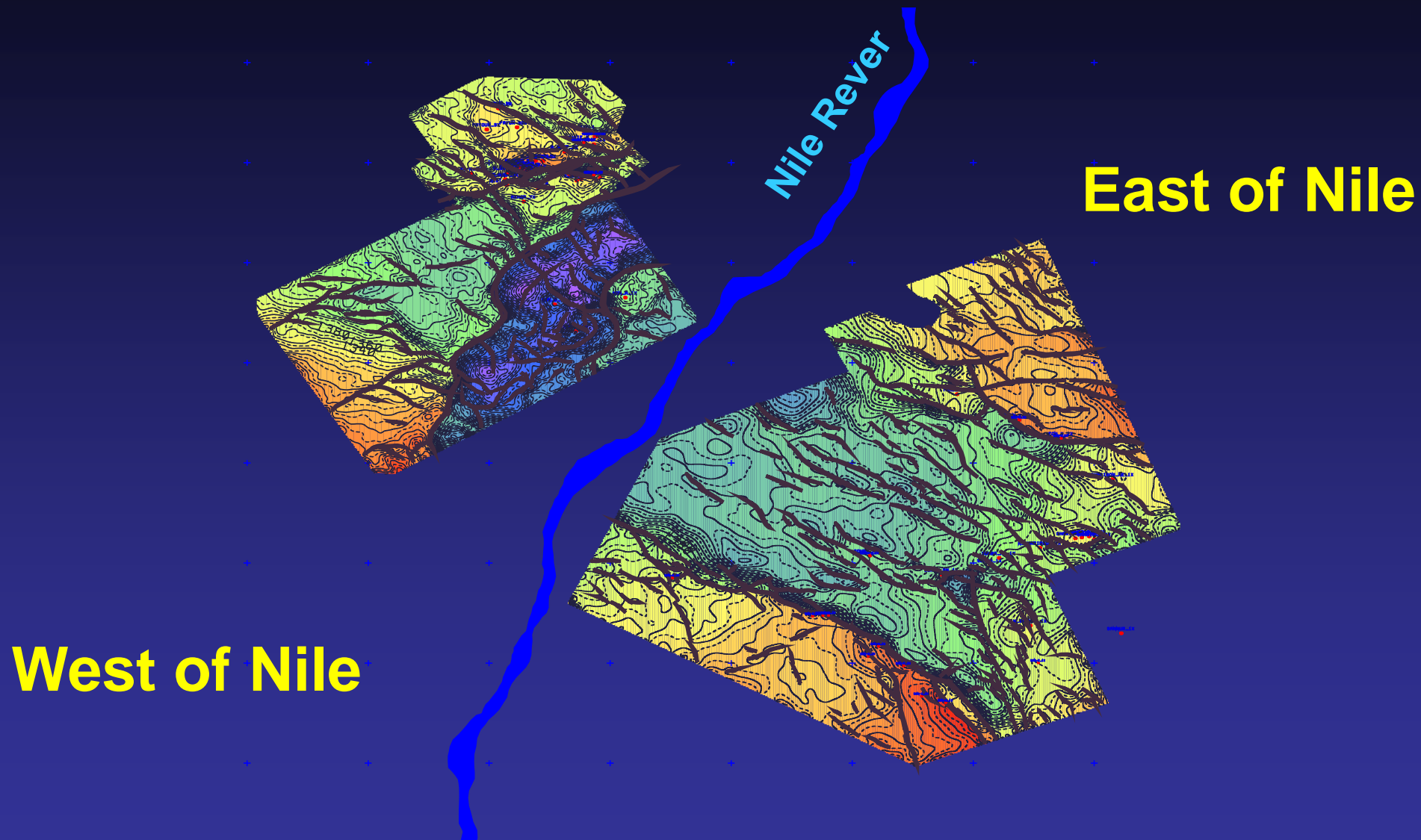
L. Kharita Shale & Siltstone

2D & 3D Seismic Surveys In Beni-Suef Concession

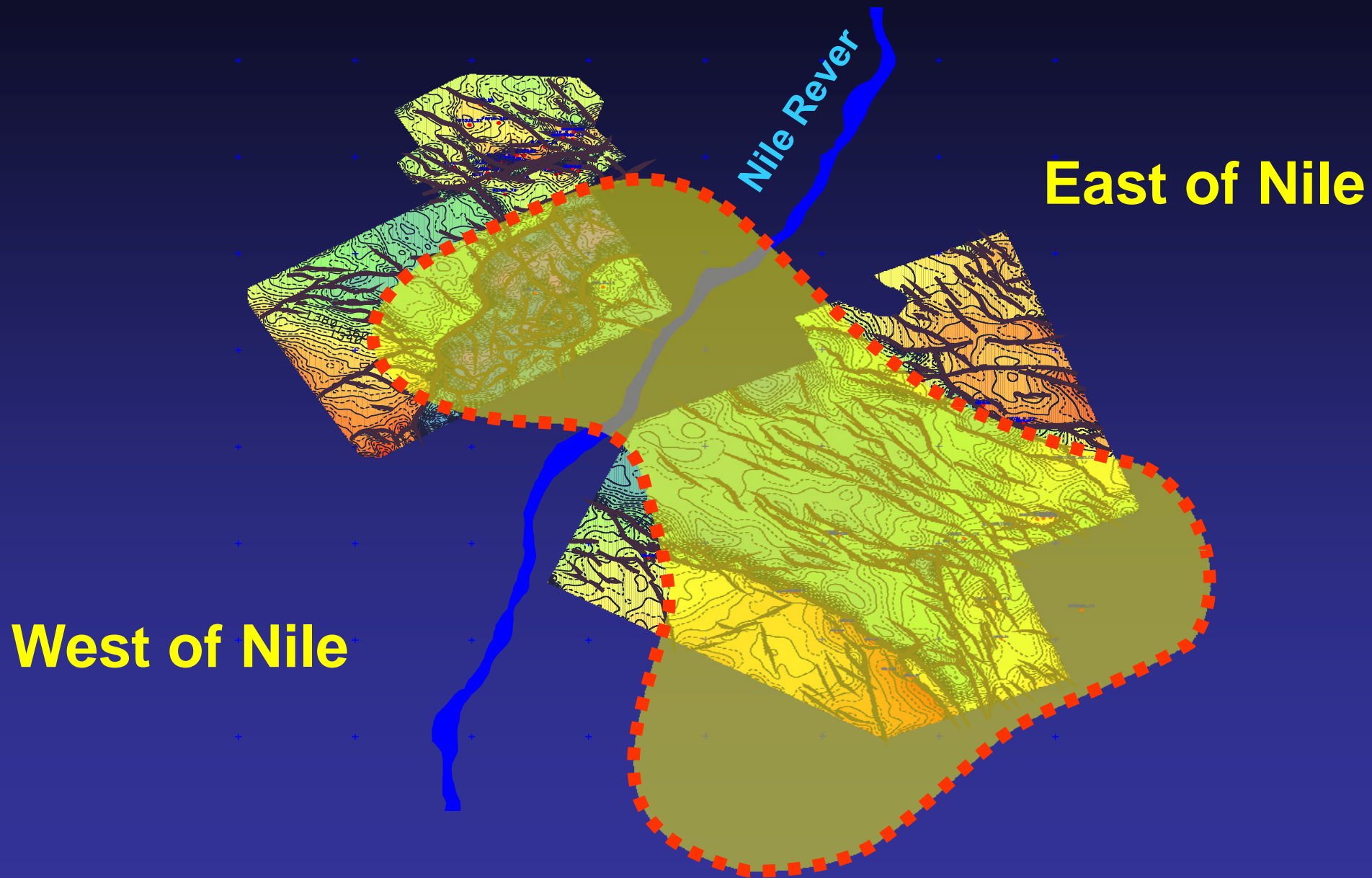
3D : 2429 km²
2D : 3034 km



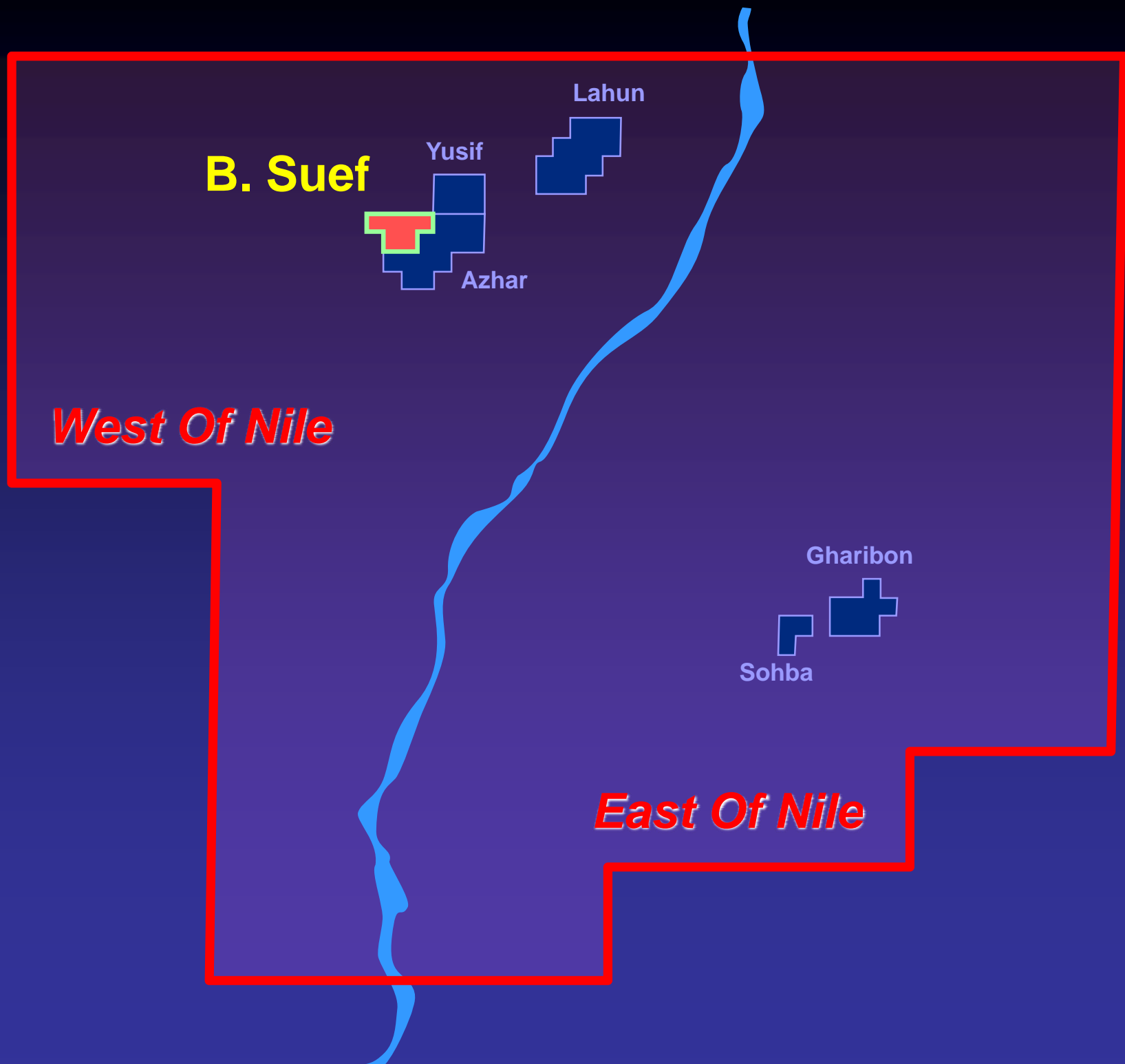
Combined TWT Structure maps



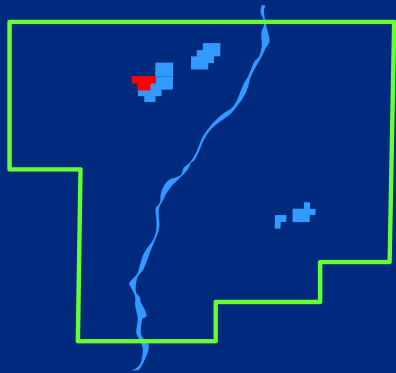
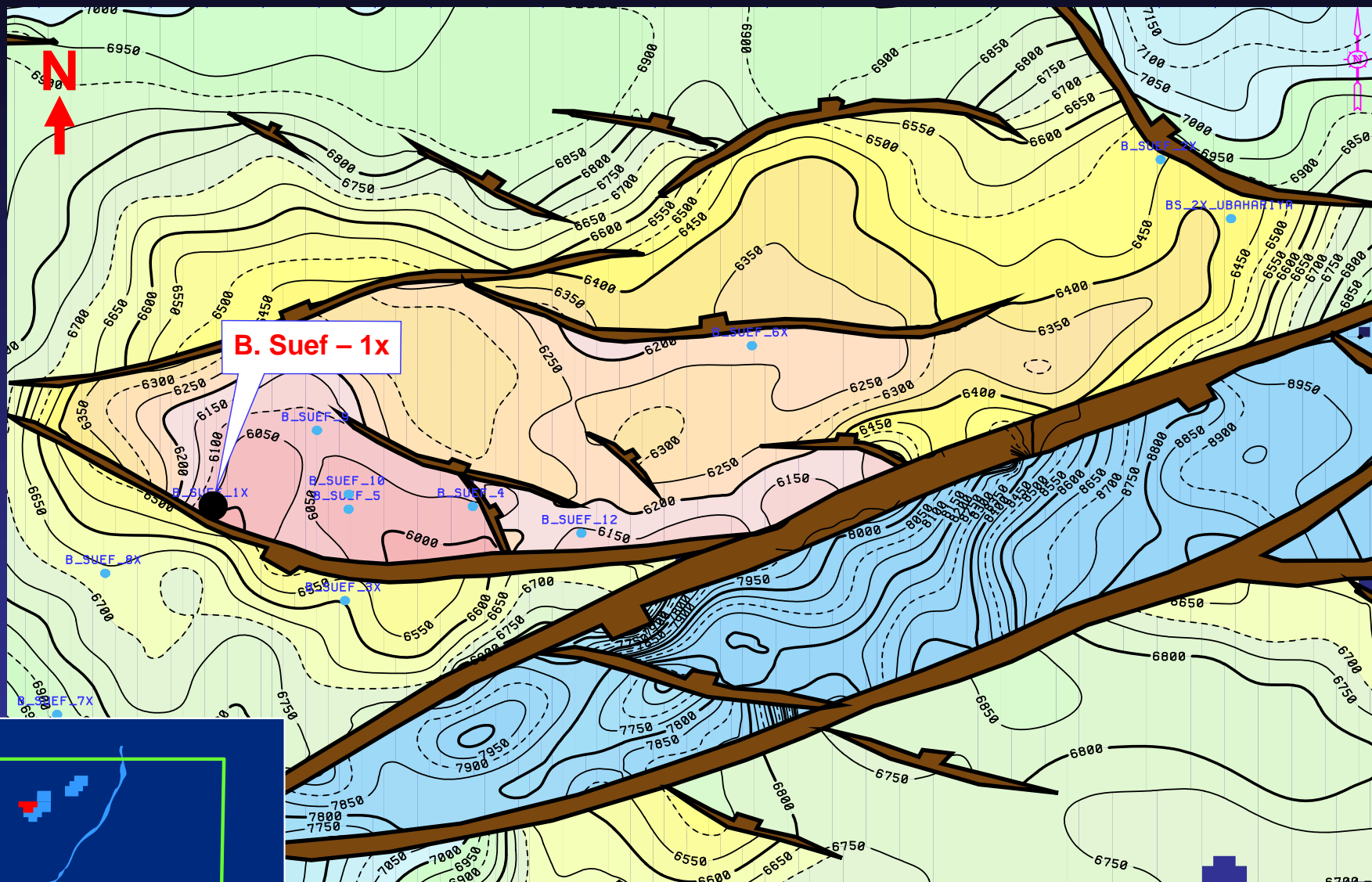
Combined TWT Structure maps



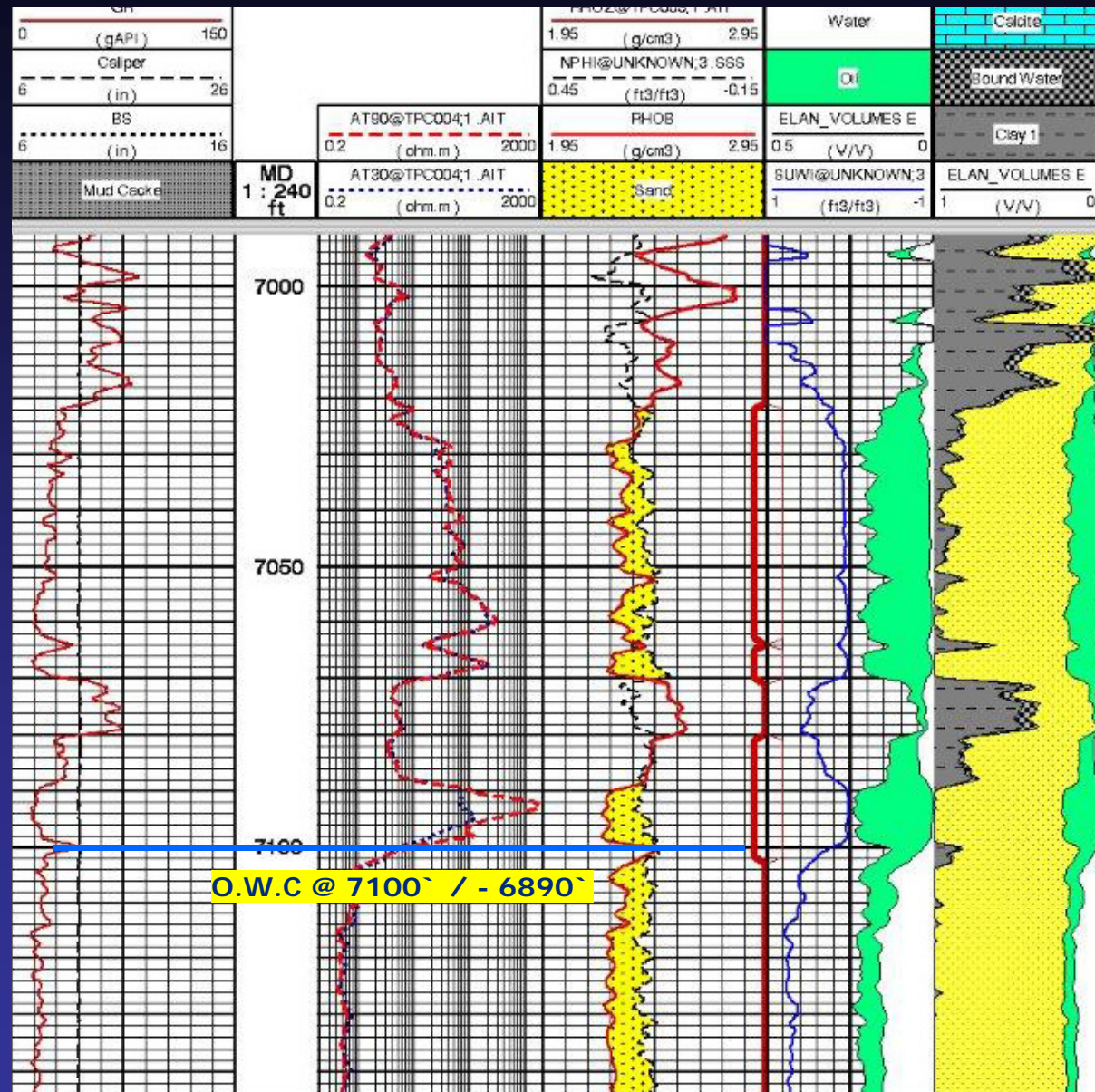




B. Suf Field Bahariya Depth Structure



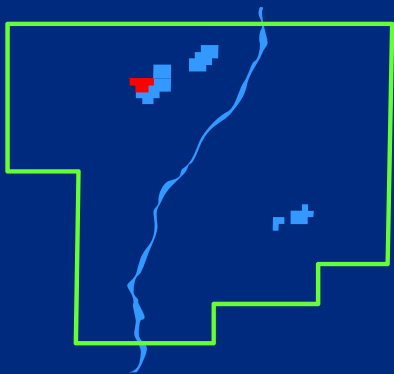
B.Suef – 5x Kharita



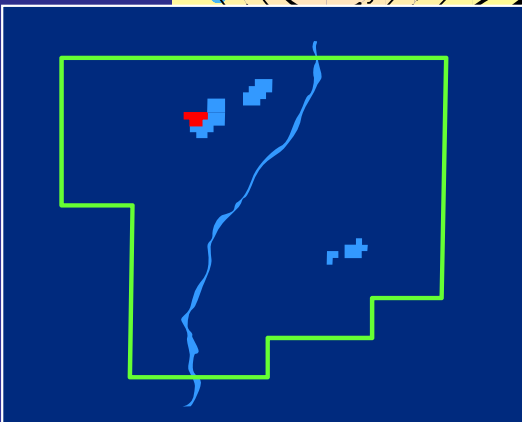
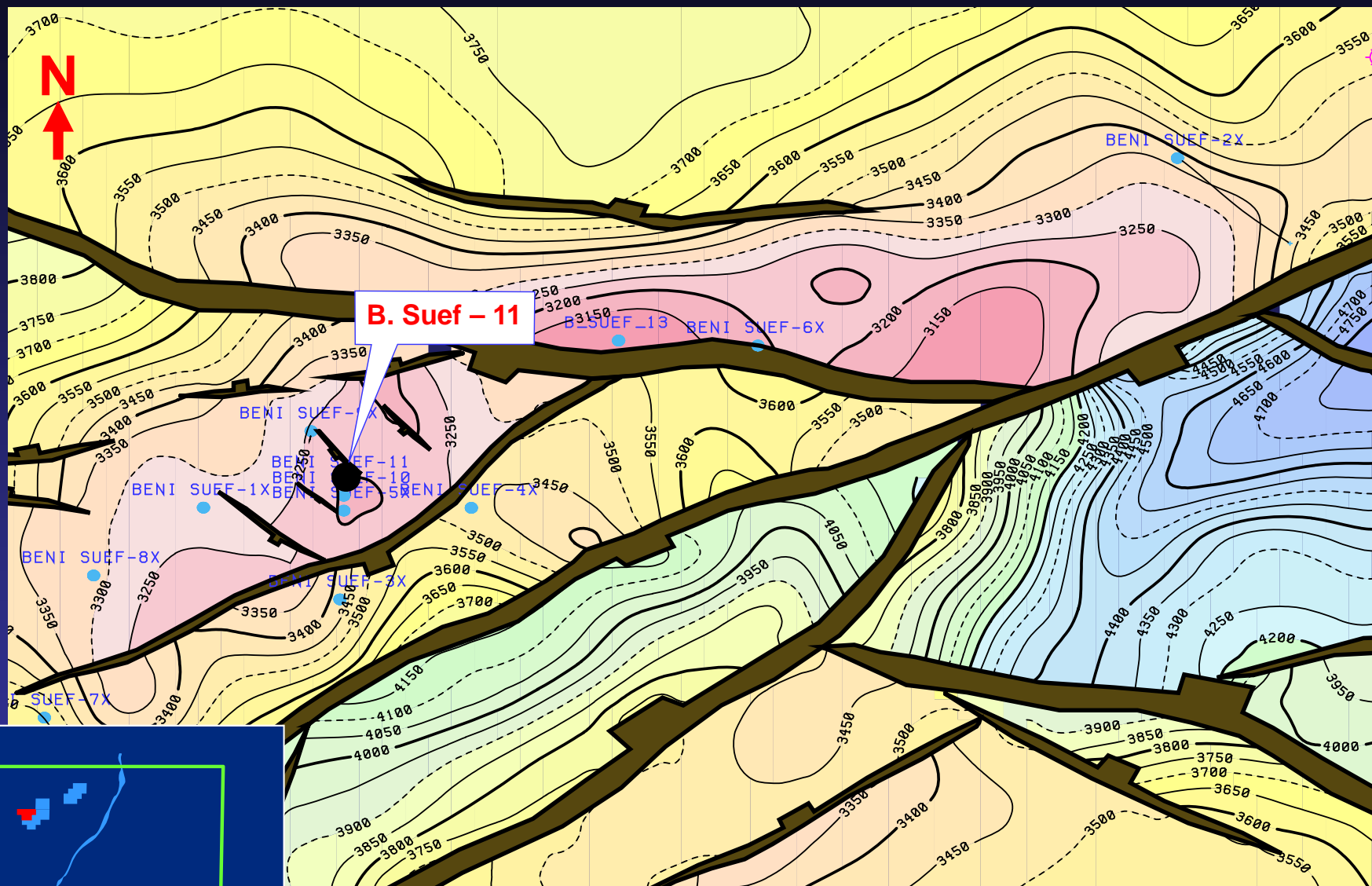
$\phi = 20-22 \%$

SW = 15-20 %

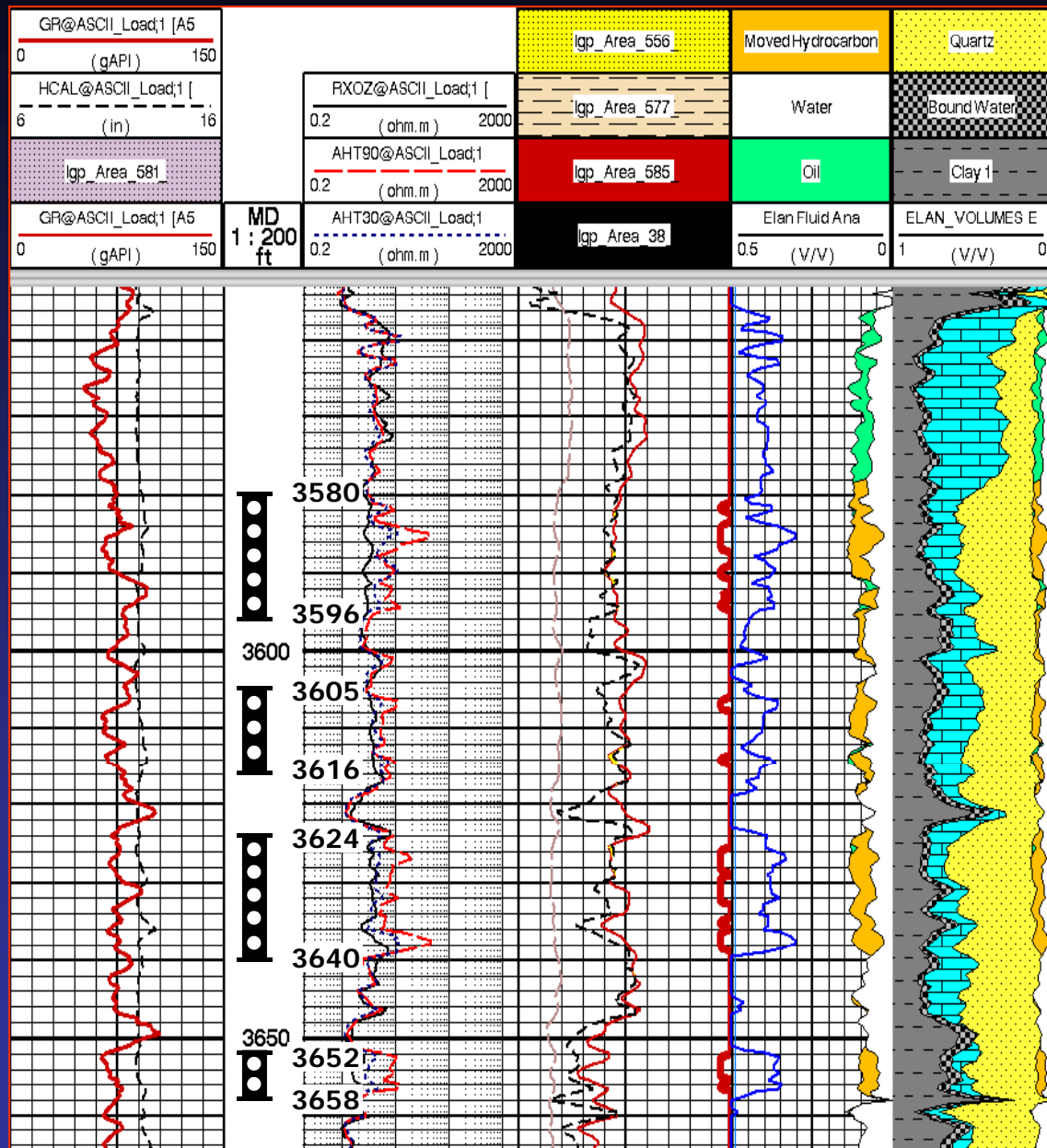
NP = 70 ft.



B. Suef Field A / R “ A “ Depth Structure



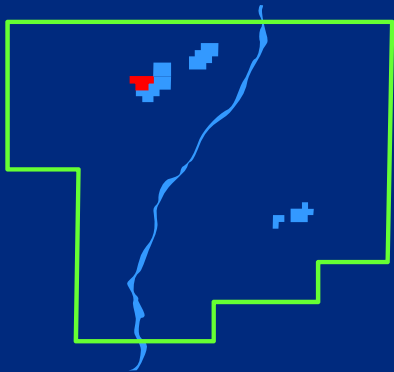
BS-11 Abu Roash "A" Pay Sands

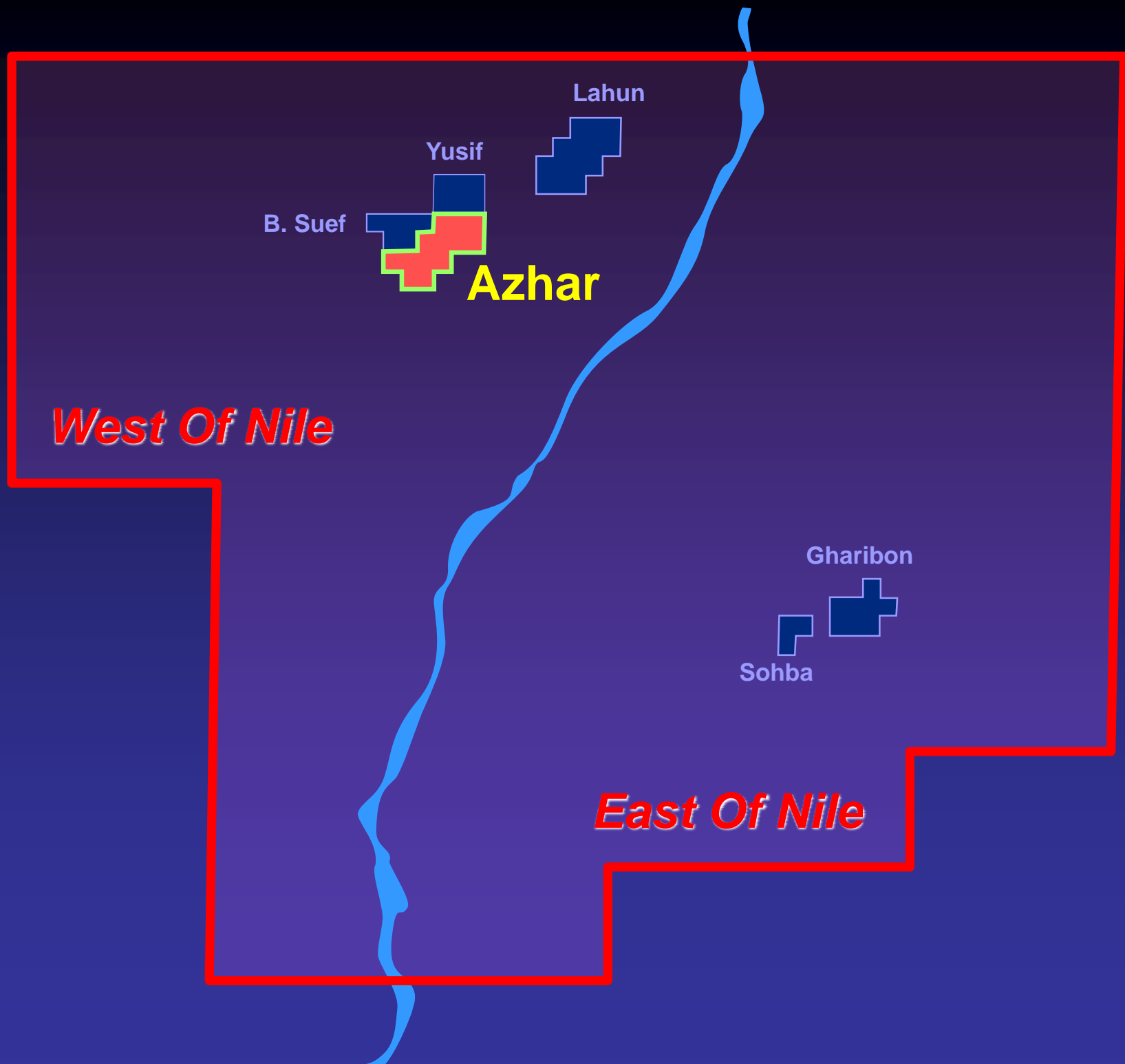


$\phi = 19 \%$

SW = 35 %

NP = 23 ft.





Lahun

Yusif

B. Suef

Azhar

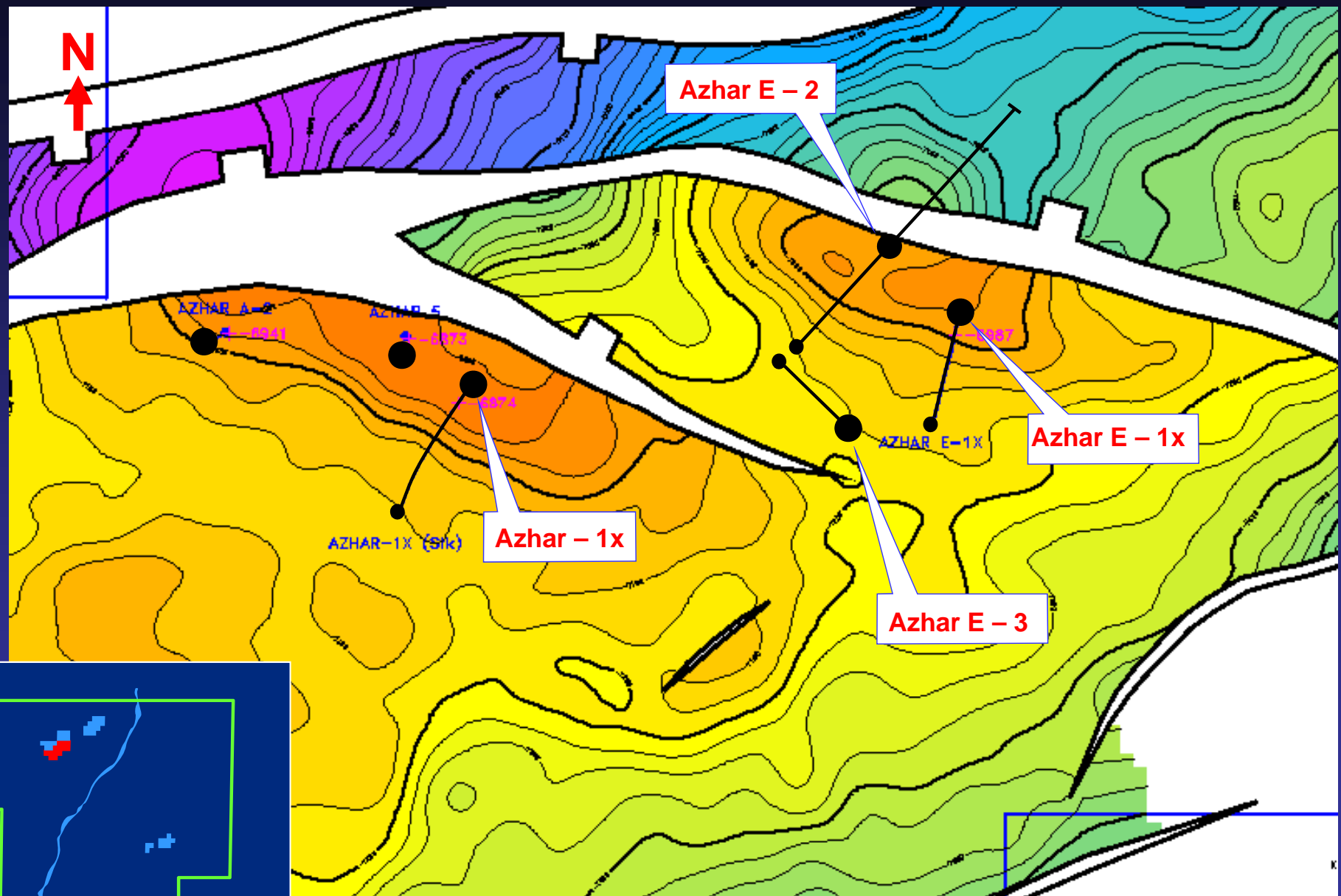
West Of Nile

Gharibon

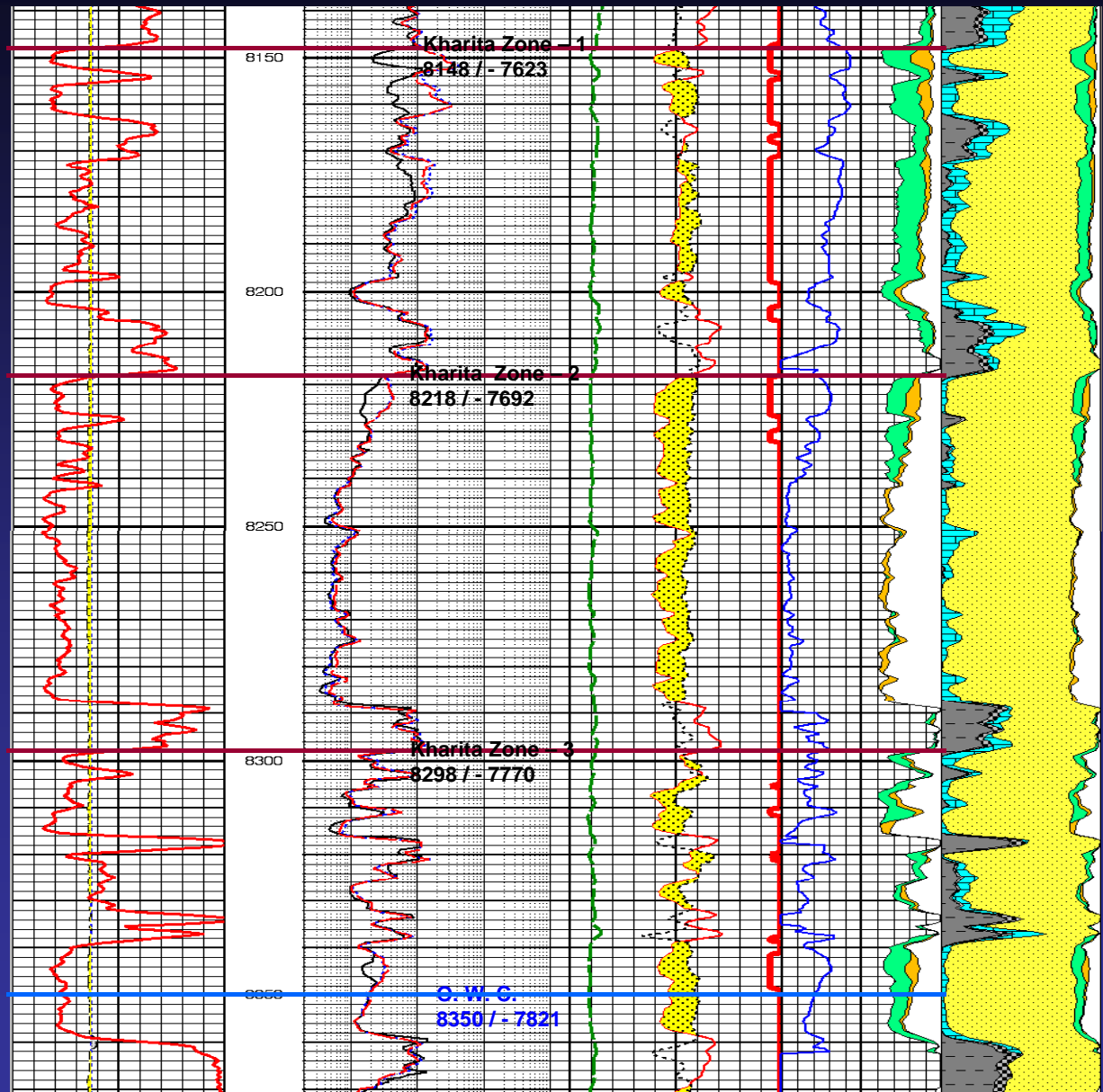
Sohba

East Of Nile

Azhar Field Bahariya Depth Structure



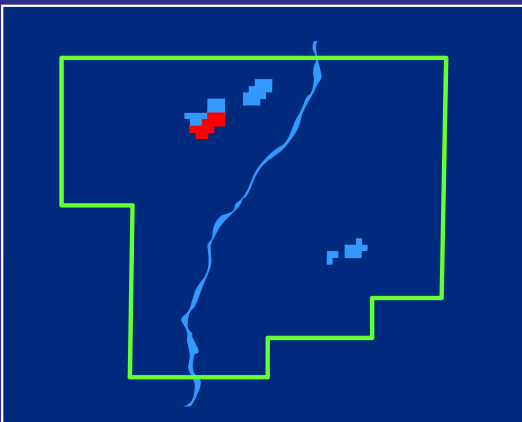
Azhar – 1x Kharita Sand



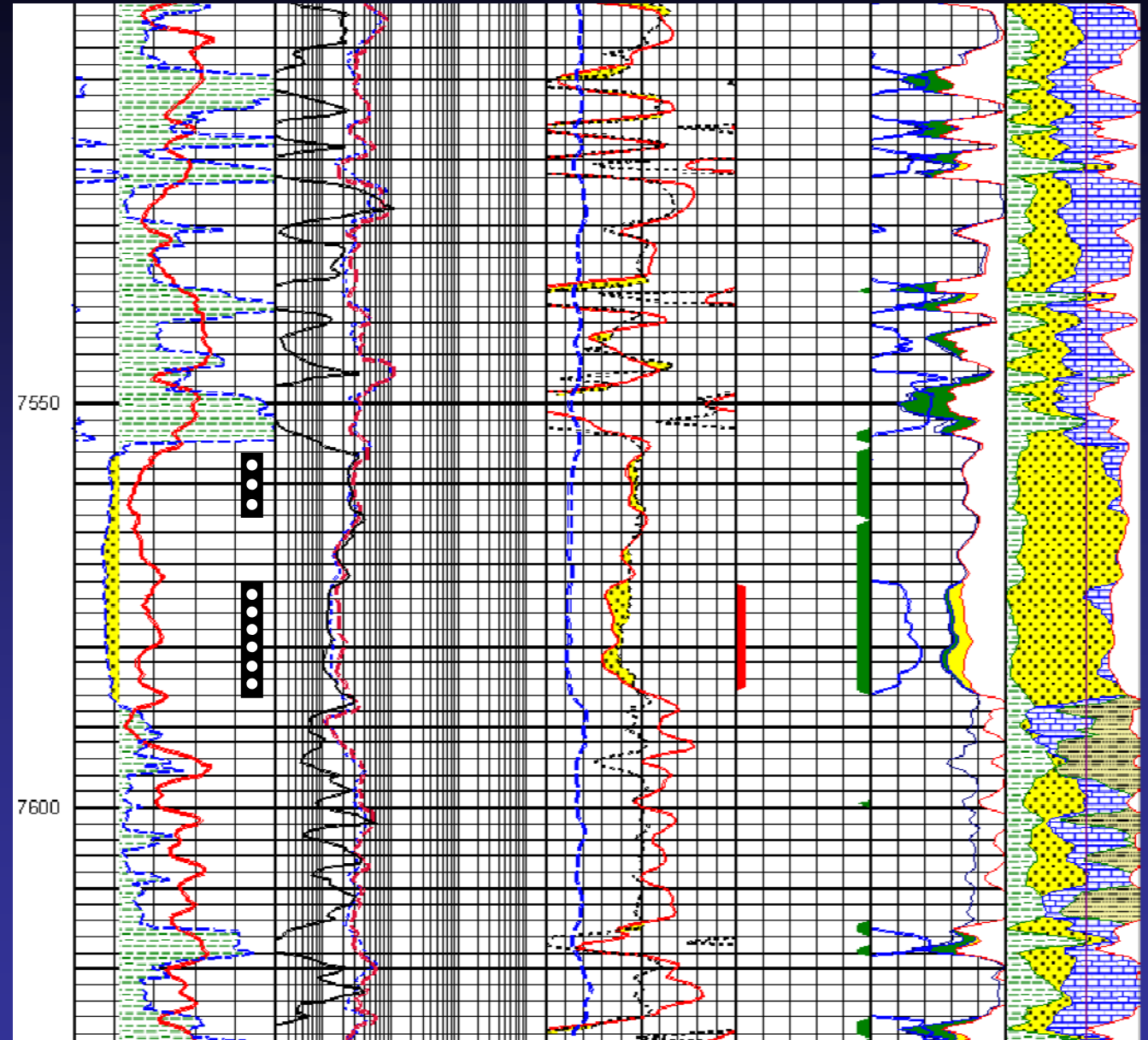
$\phi = 14 \%$

SW = 38 %

NP = 80 %



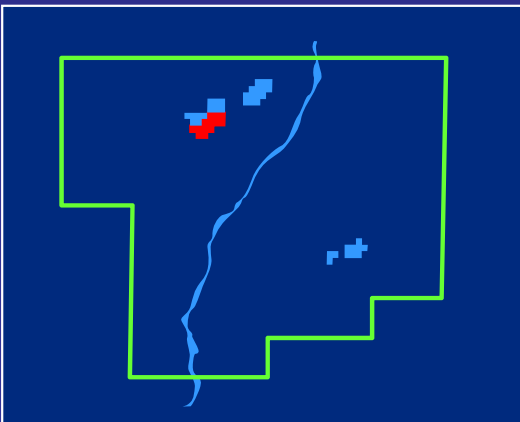
Azhar E. – 1x U. Bahariya



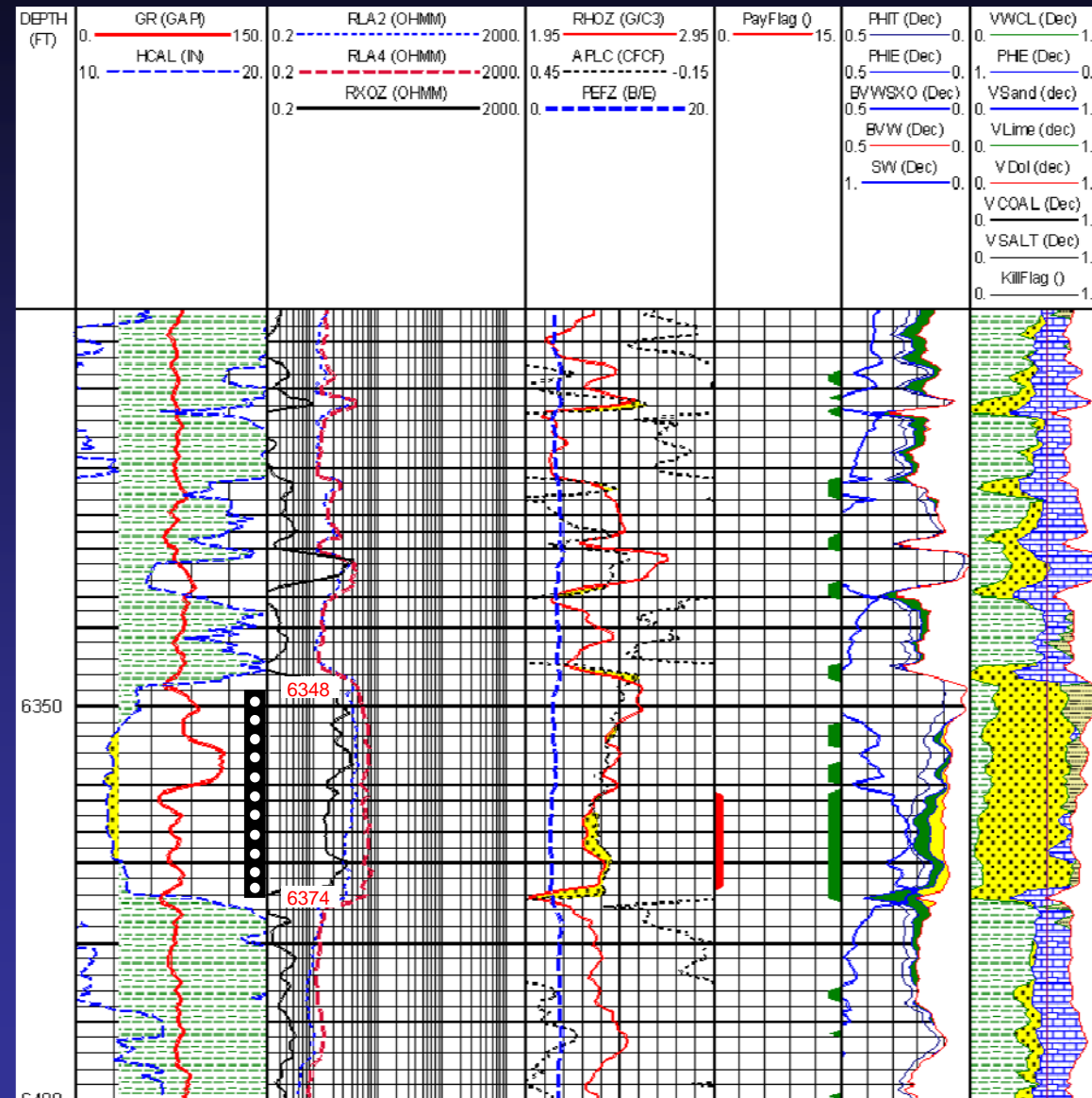
$\phi = 21 \%$

SW = 40 %

NP = 12 ft.



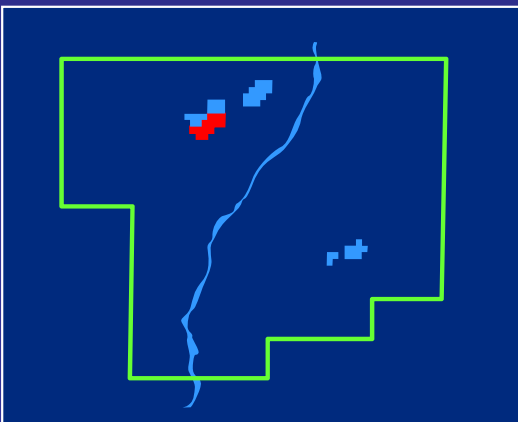
Azhar E. – 1x Up. A / R “ G – 5 “

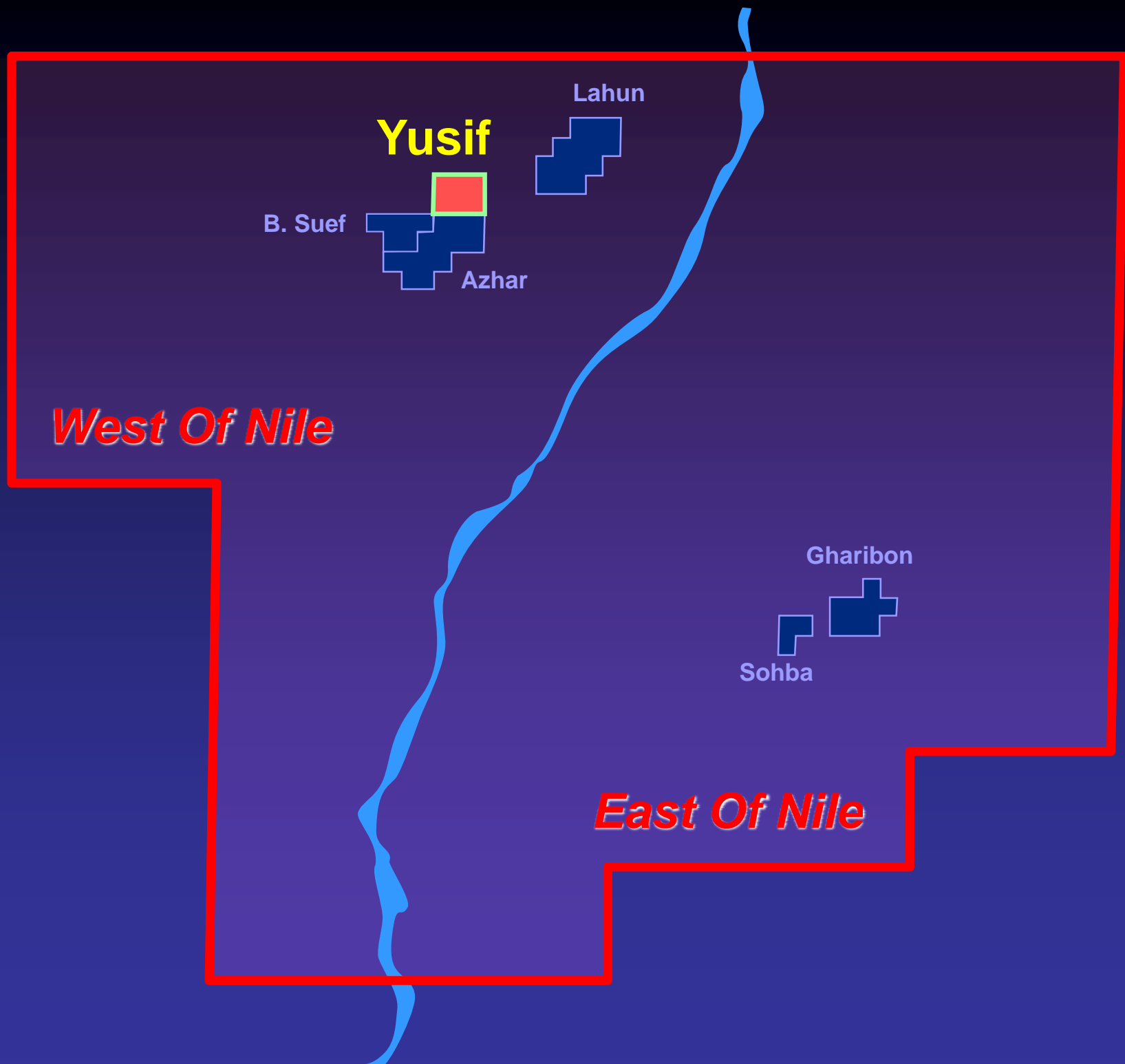


$\phi = 12\%$

SW = 32%

NP = 20 ft.





Yusif

B. Suef

Azhar

Lahun

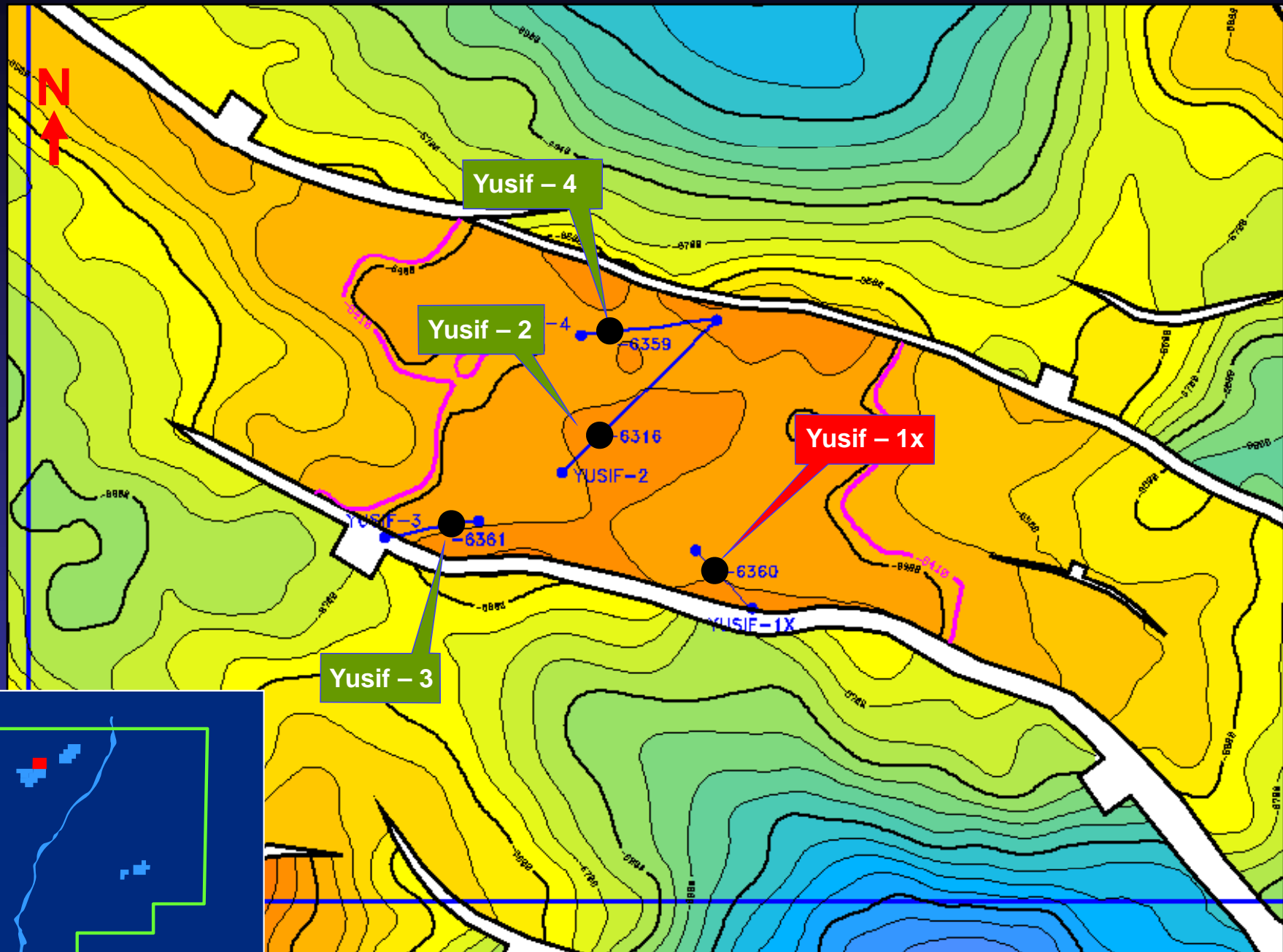
Gharibon

Sohba

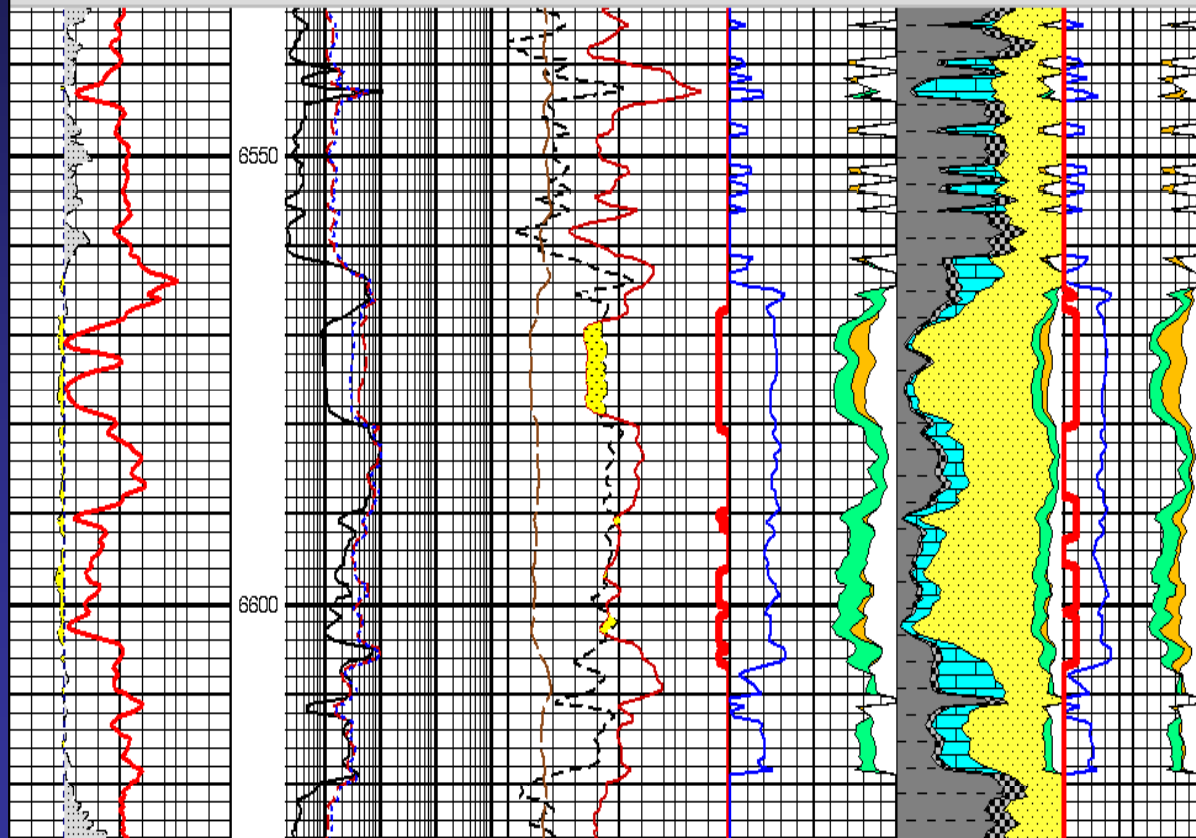
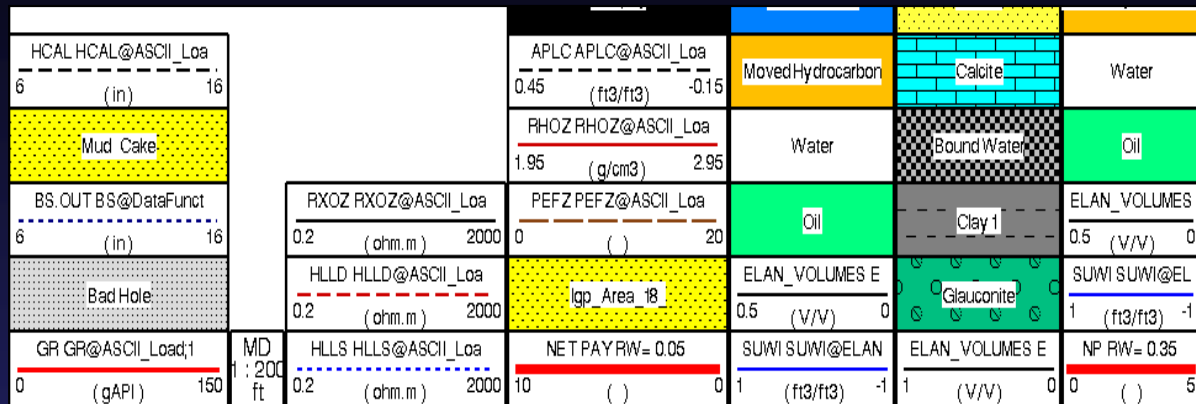
West Of Nile

East Of Nile

Yusif Field L. A /R “ G “ Depth Structure



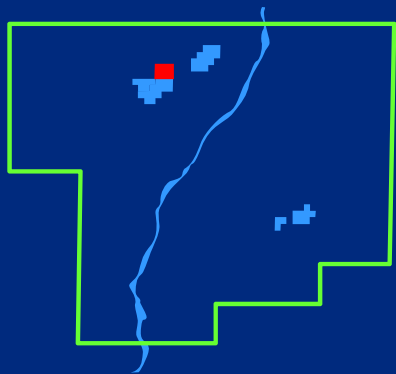
Yusif – 1x L. A / R “ G “ Sands



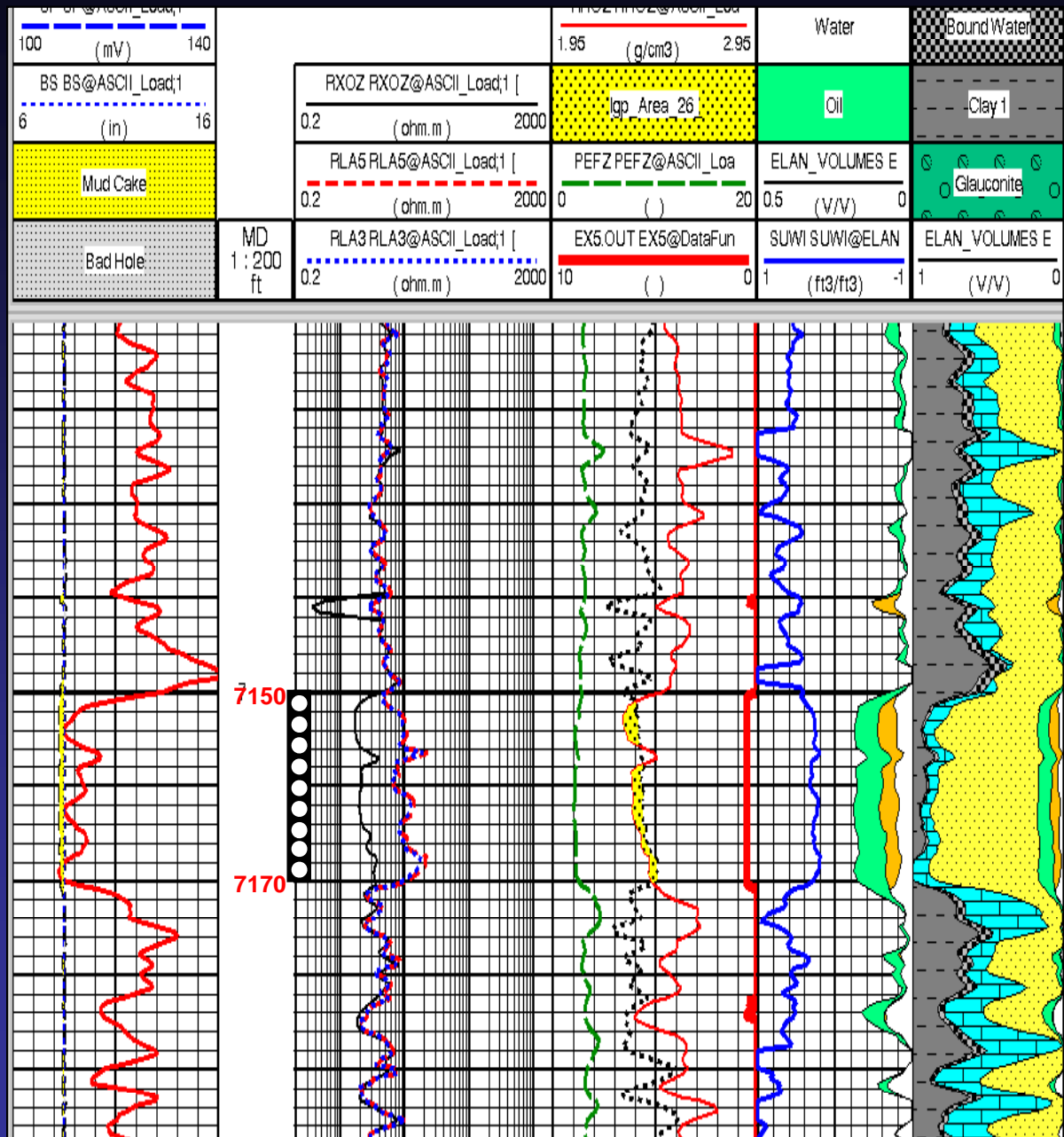
$\Phi = 17 \%$

SW = 48 %

NP = 21.5 ft.



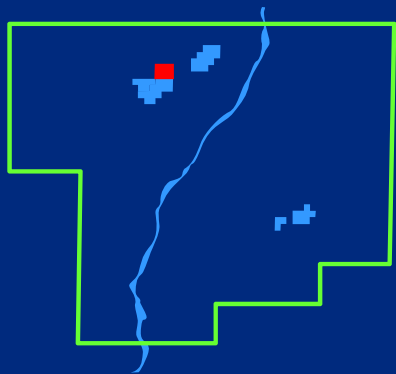
Yusif - 3 U. Bahariya Sands



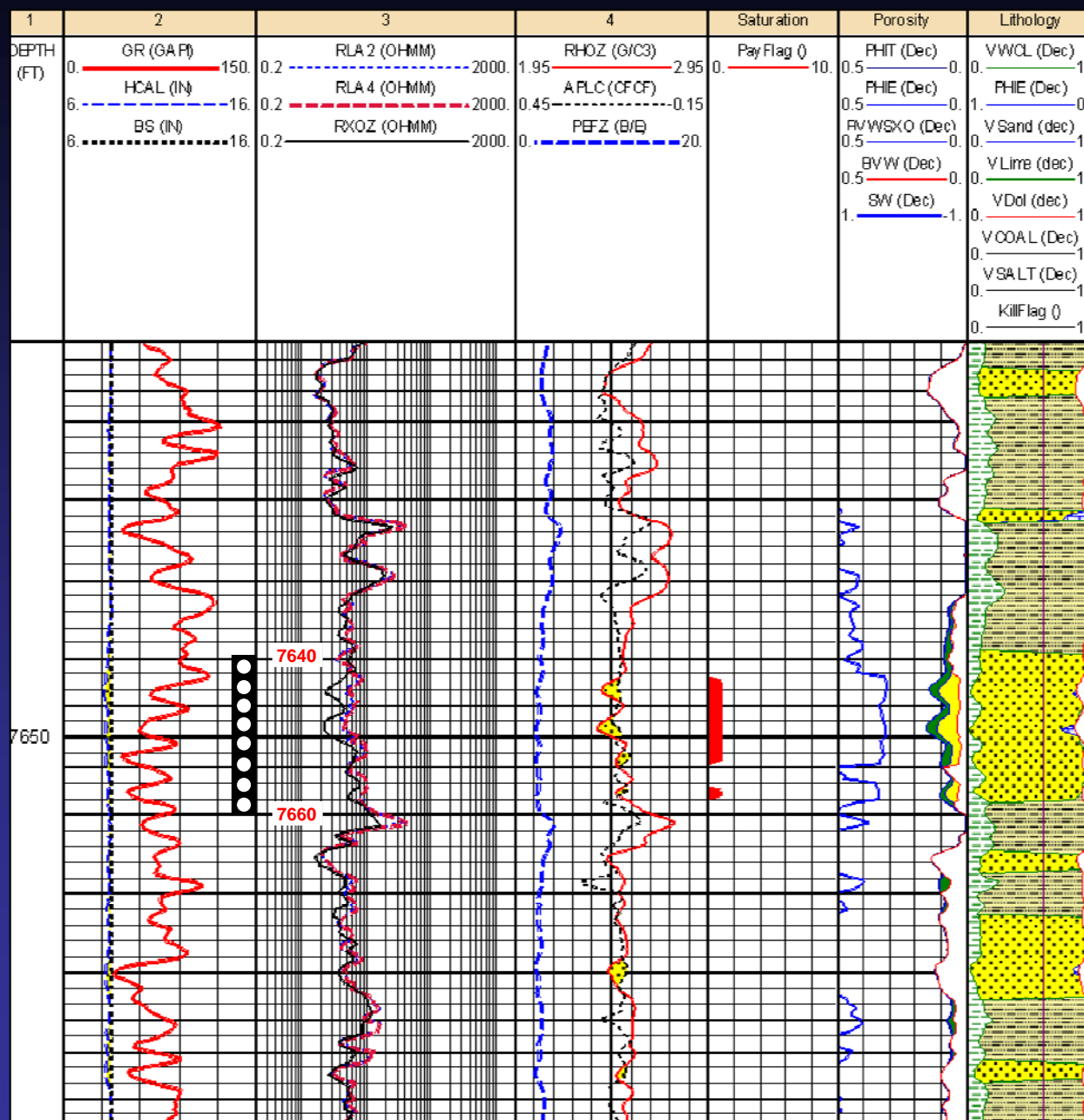
$\phi = 17 \%$

SW = 29 %

NP = 20 ft.



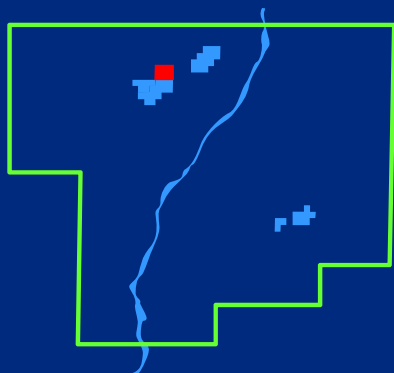
Yusif - 4 L. Bahariya Sands

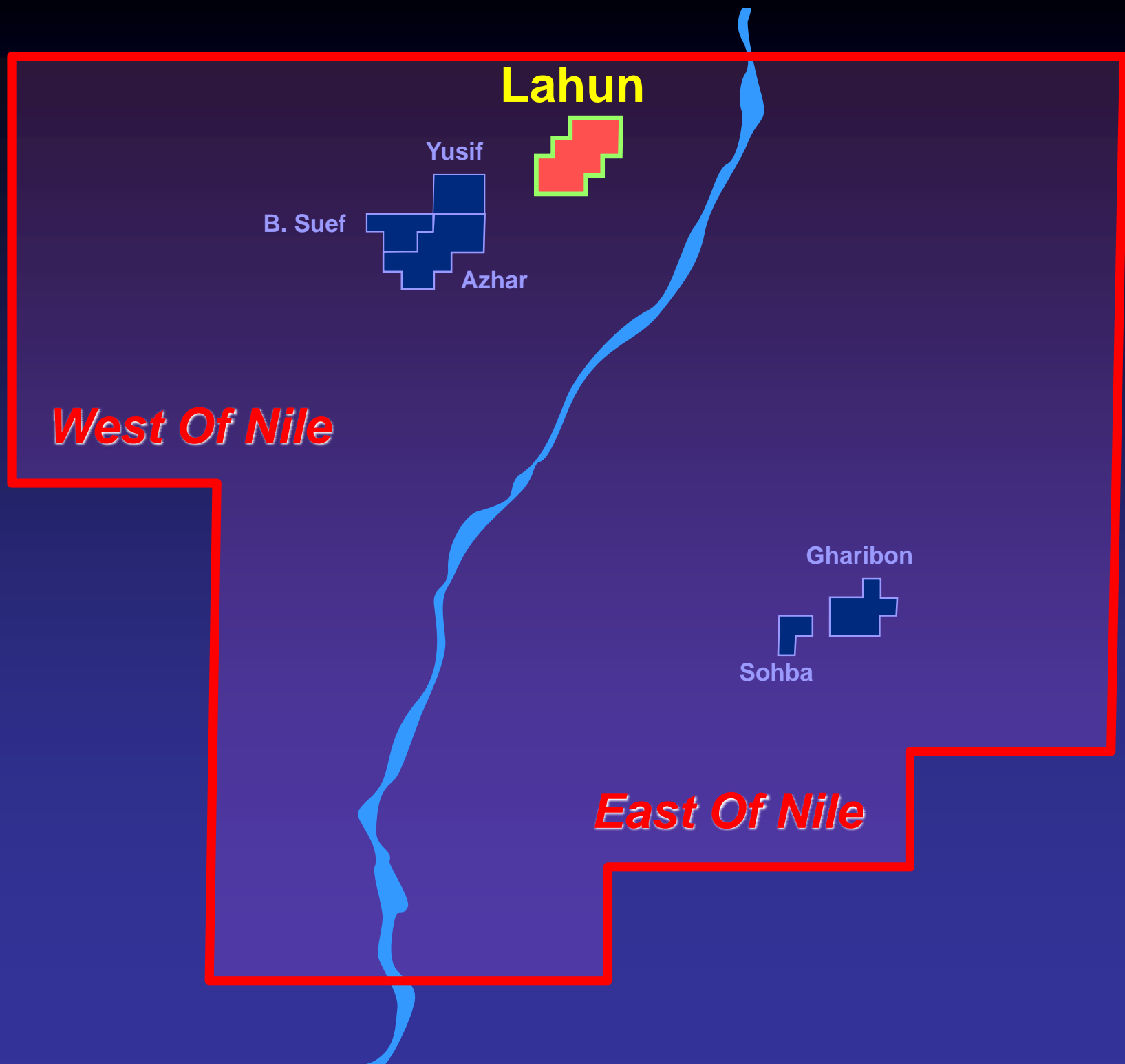


$\phi = 14 \%$

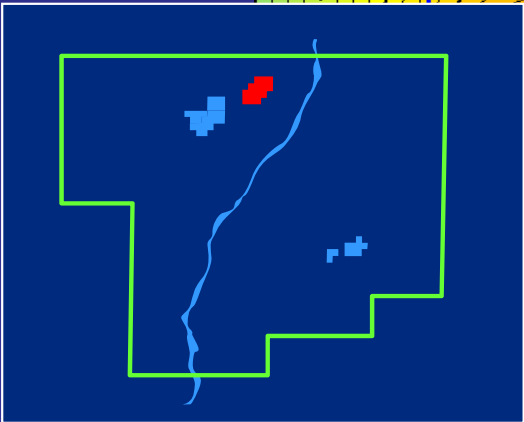
SW = 50 %

NP = 14 ft.

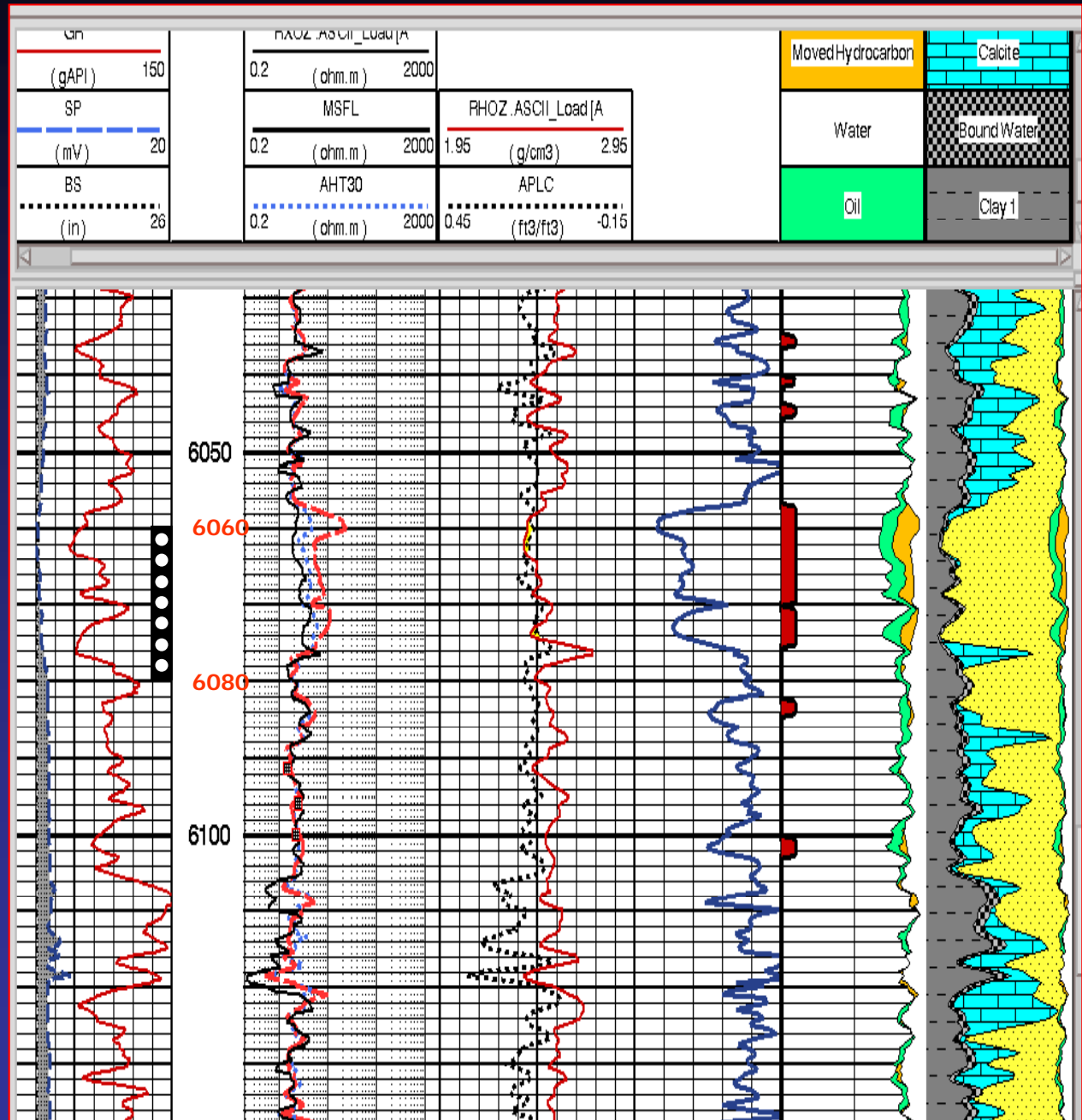




Lahun Field Bahariya Depth Structure



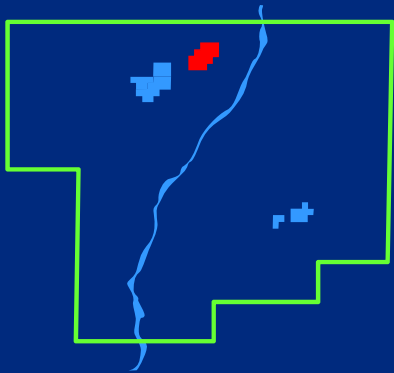
Lahun -1x U. Bahariya



$\phi = 15 \%$

SW = 32 %

NP = 29 ft.



West Of Nile

B. Suef

Yusif

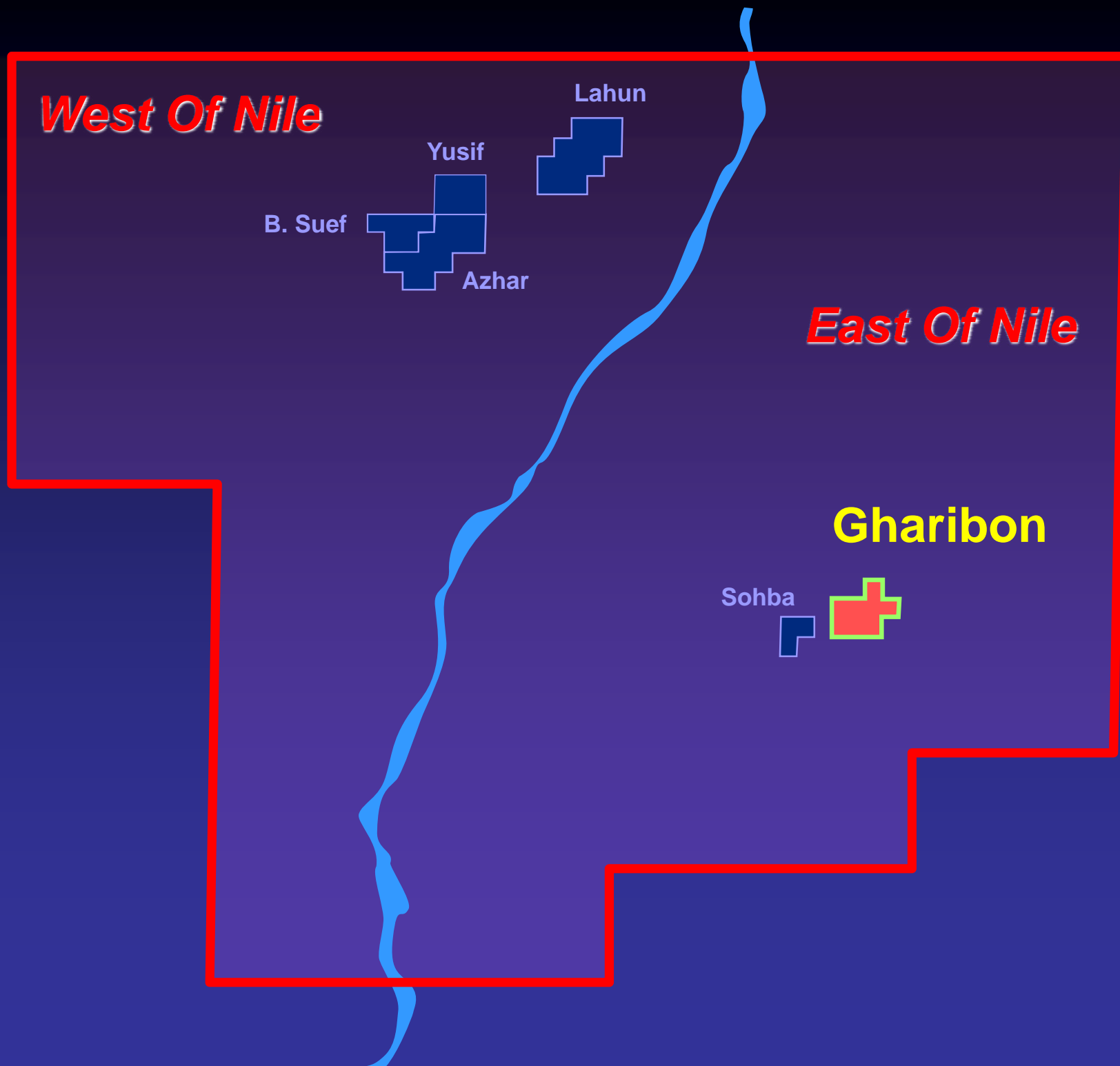
Azhar

Lahun

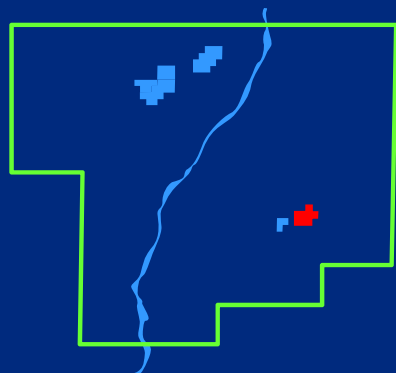
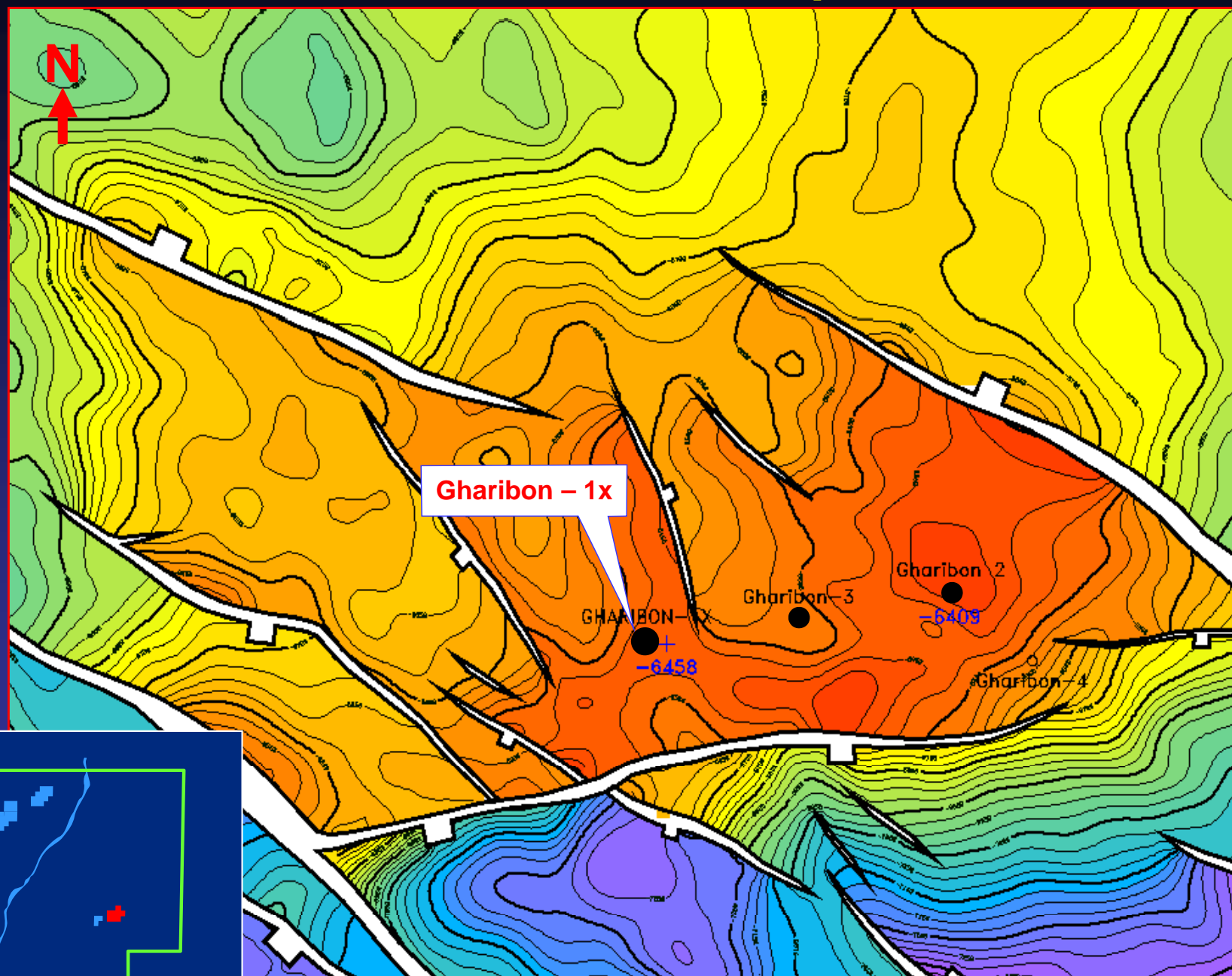
East Of Nile

Gharibon

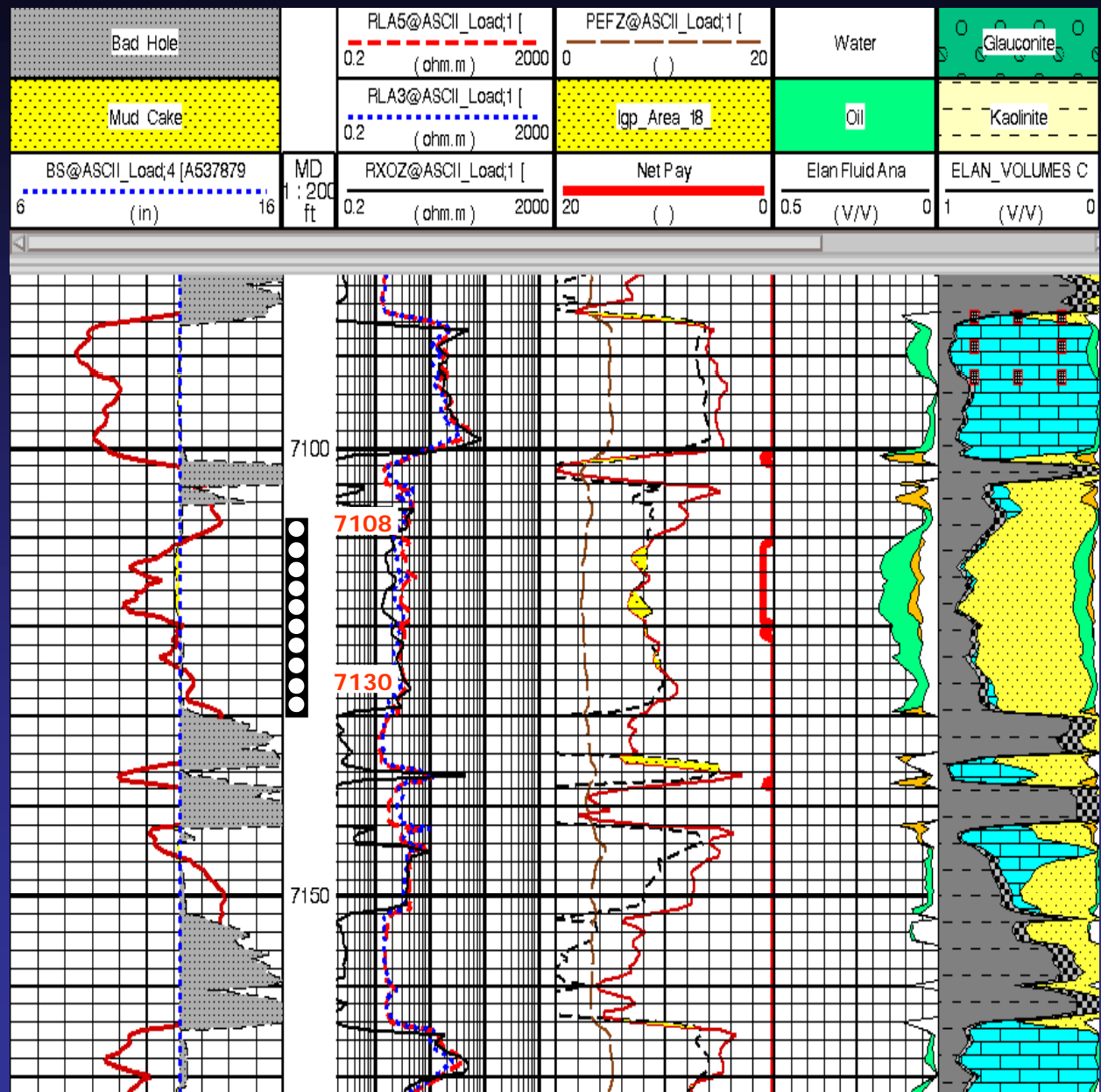
Sohba



Gharibon Field A / R " G " Depth Structure



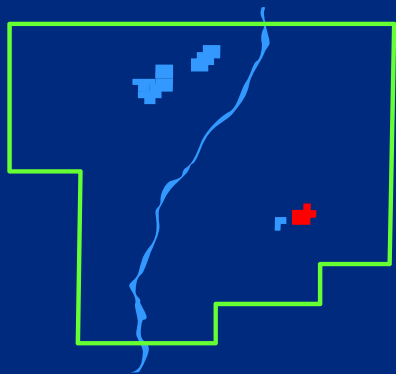
Gharibon – 1x A / R “ G – 10 “

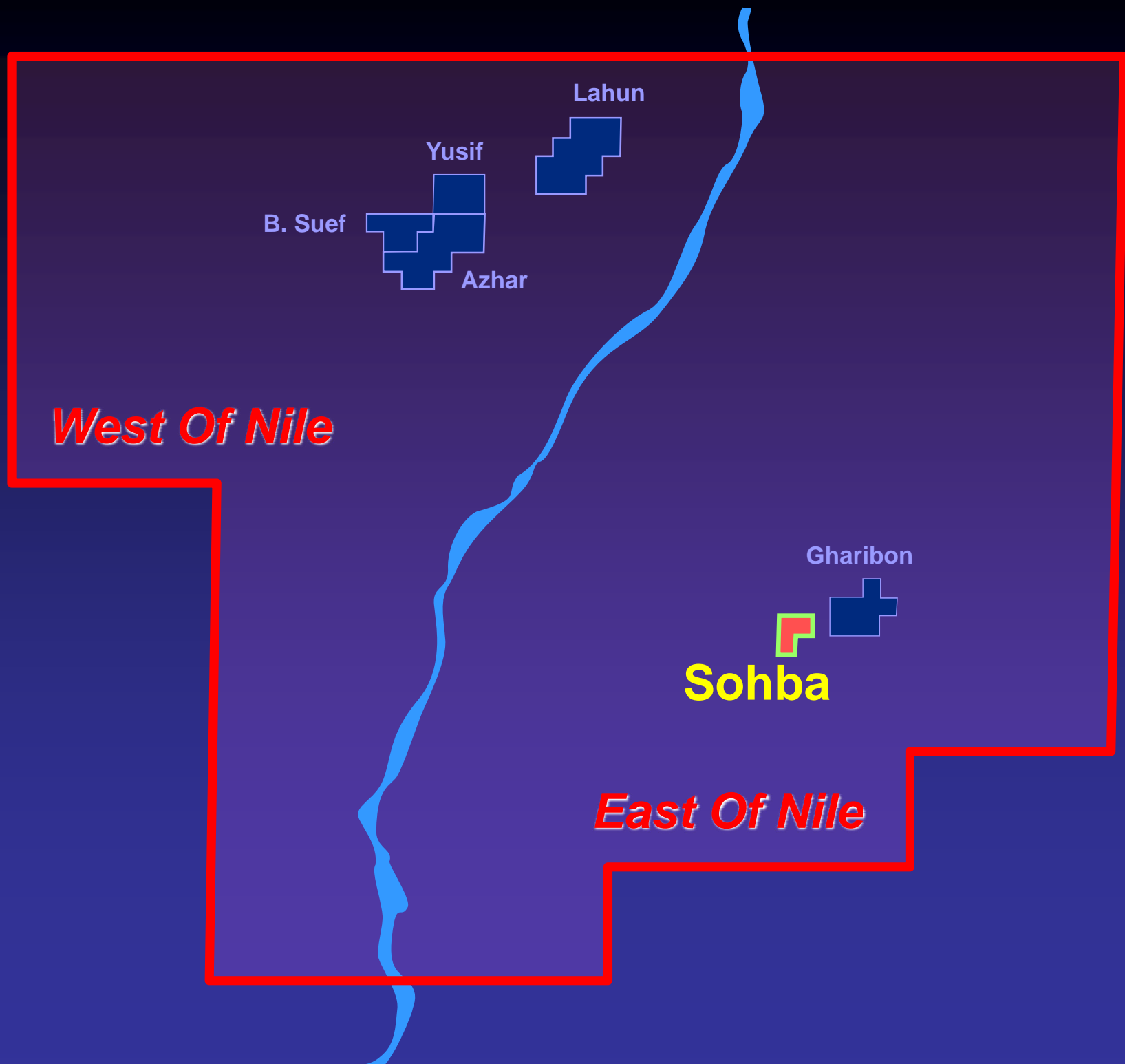


$\phi = 21 \%$

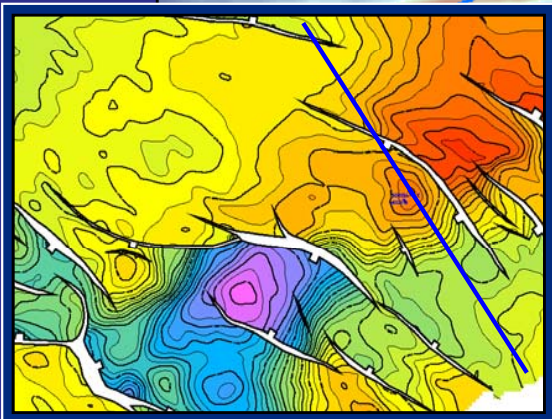
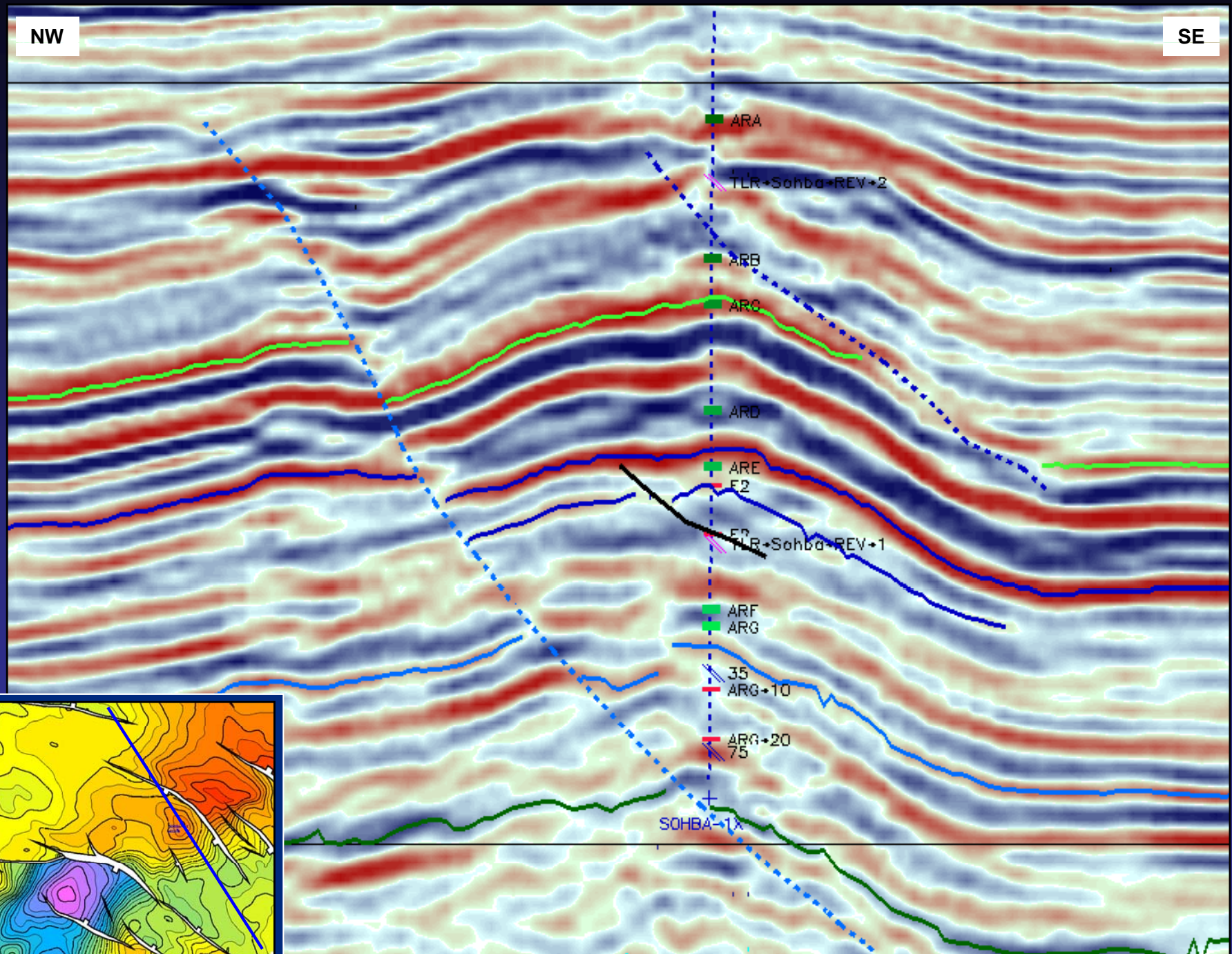
SW = 42 %

NP = 16 ft.

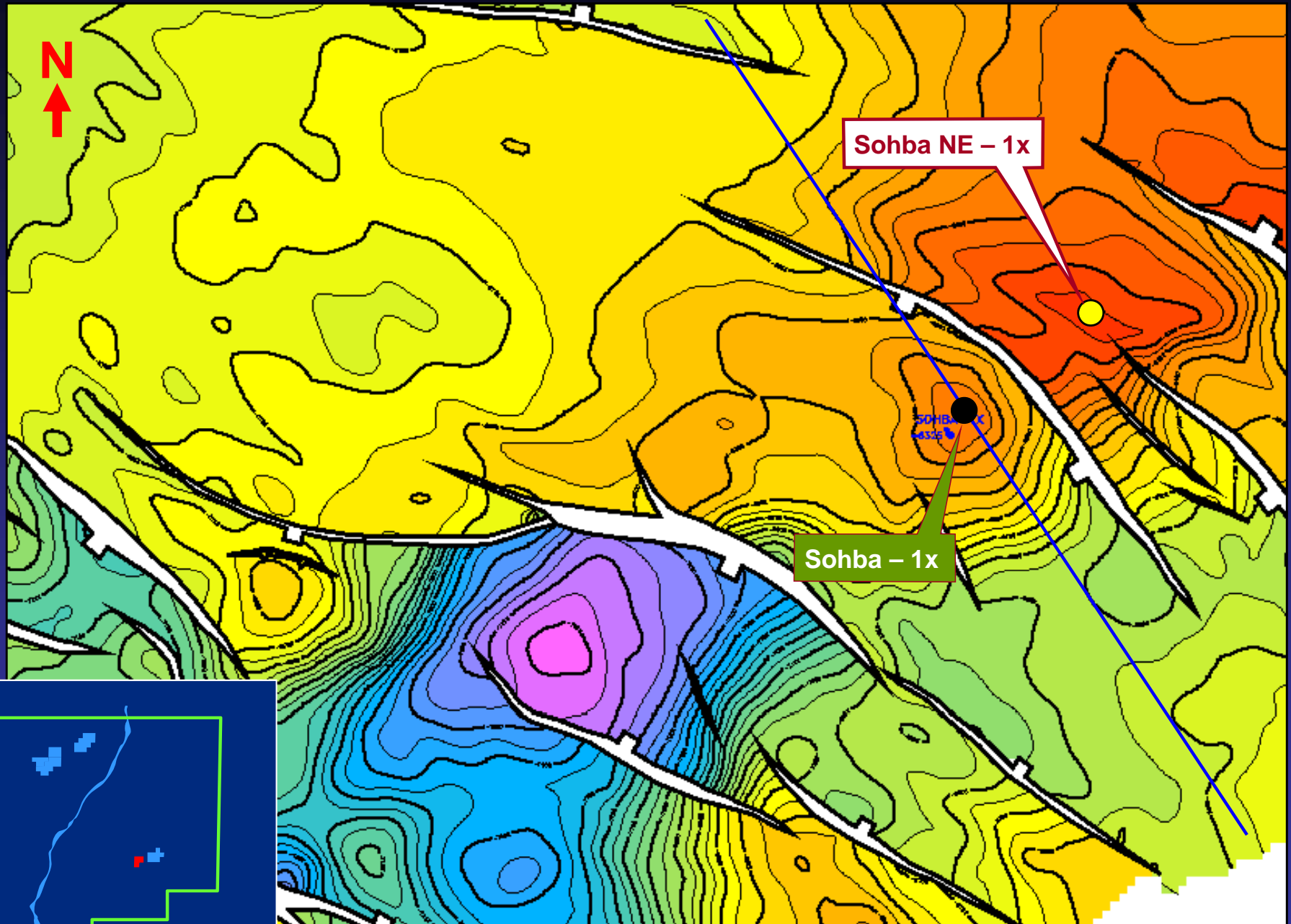




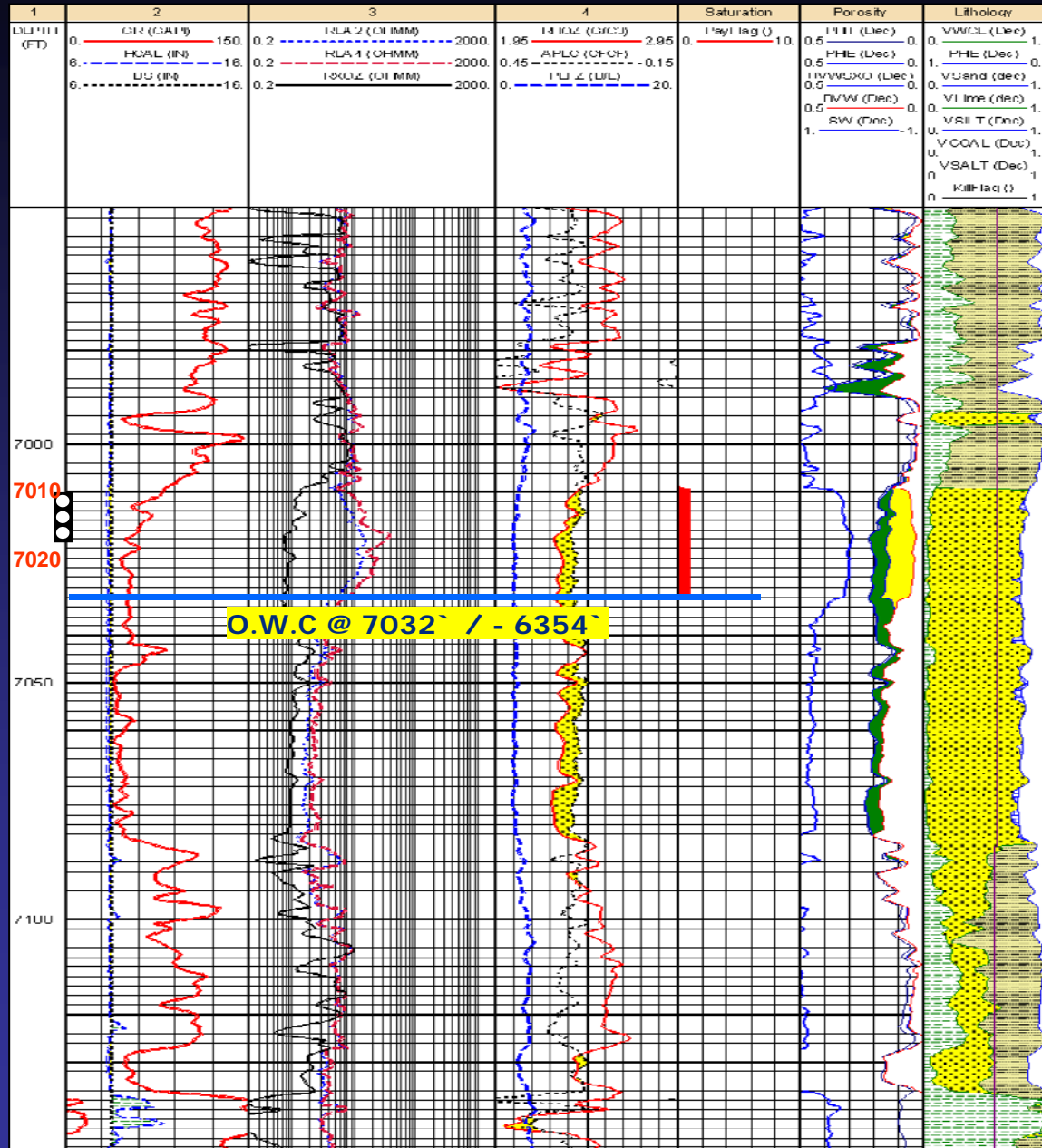
Sohba – 1x



Depth Structure Top A / R “E” Sand

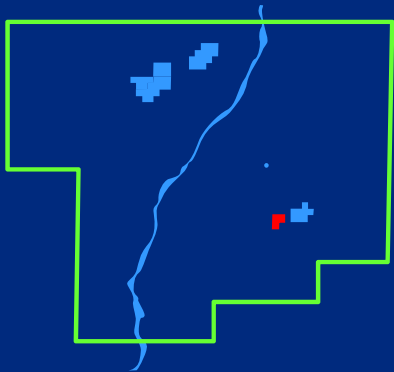


Sohba – 1x A / R “ E “



SW = 35 %

NP = 23 ft.



Beni Suef Oils Correlation

Oil-oil correlation for the oils recovered from Beni Suef Concession suggests there are two oil groups .

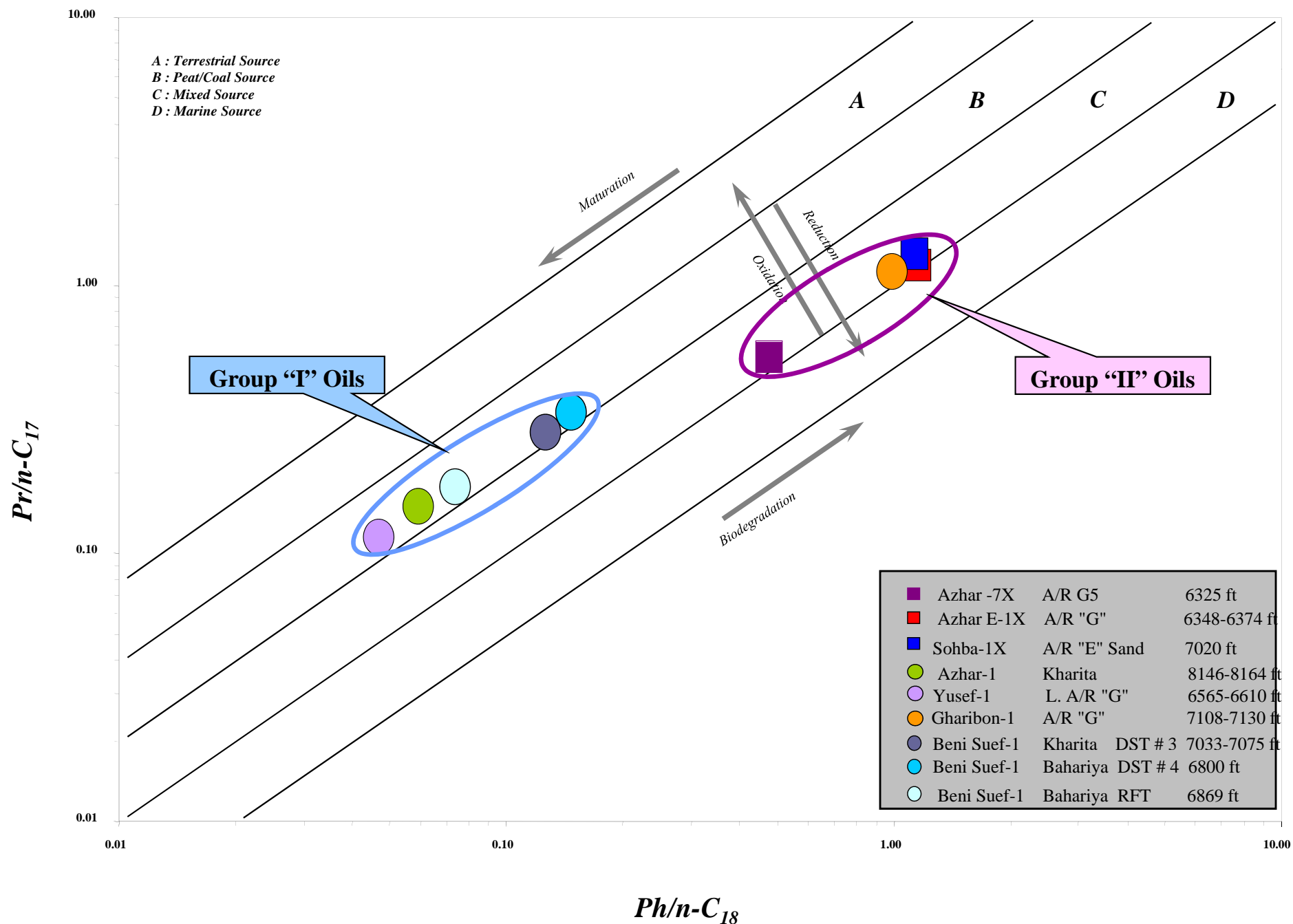
Group I :

includes the oils that appear to be generated from predominantly terrestrial organic matter and are represented by Beni Suef-1X, Azhar -1X and Yusef -1X oils. These oils appear to be generated at a high thermal maturity (Paraffinic waxy , high API & high Pour Point .)

Beni Suef Oils Correlation

Group II :

represented by Azhar -7X, Azhar E-1X, Sohba -1X and Gharibon-1X oils appears to be generated from a predominantly marine organic matter at moderate thermal maturity (API 25° , pour point Zero).



Conclusions

- Stratigraphic column of E.Desert is similar to W.Desert with the exception that Basin inception may be controlled by Aptian/Albian NE-SW extension and resulted in the Kharita Formation being deposited directly on basement.
- Major part of Beni Suef basin is located in the East of Nile
- Three oil discoveries were achieved based on 2D seismic interpretation and other three oil discoveries were achieved based on 3D seismic interpretation .

- **Geochemical studies confirmed presence of two oil families in Beni Suef basin, first is generated from lower Kharita shale & siltstones, second is generated from A/R “F”.**
- **Basement is encountered in Azhar-2 & Azhar-5 more than 12,000 ft which confirmed the presence of more than 1500 ft of shale & siltstone as an excellent source rock of lower Kharita.**
- **Very high gas readings were recorded (more than 30%) while drilling L. Kharita shale & siltstones in Azhar field which could be a gas producer in future by using hydraulic frac.**

Recommendations

- The results of this work may be applied to the south for hydrocarbon potential of other basins such as Minya & Assyut of Upper Egypt.
- Conduct required geological studies to evaluate lower Kharita shales & siltstones as gas producer.
- Re-evaluate any dry hole well data in the light of applying hydraulic frac. and in case of having encouraged results, study the visibility of re-enter or drill a twin well.
- Conduct hydraulic frac. in case of having poor oil rate or oil slugs in the testing of an exploratory well .

Acknowledgement

This contribution reflects work carried out as joint Exploration team between QPC, Dana Petroleum and Apache. All staff involved are acknowledged here for their input and efforts. In closing EGPC, QPC, Dana Petroleum and Apache Egypt management are thanked for their input and permission to release this information.



Thank You
Thank You