

# **Two Kinds of Low Resistivity Pay Zones Identifications and Evaluations in South Sumatra Basin, Indonesia\***

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## **Abstract**

The South Sumatra Basin is the hydrocarbon prolific basin in Indonesia and also is one of the highly explored basins. But in the recent years, some low resistivity zones were discovered in development wells. In this paper, two different kinds of low resistivity zones are showed in the Low Tanglar Formation and Gumai Formation. There are some strange phenomena in LRP zones in the Low Tanglar Formation. The resistivity of the pay zones is about 4 Ohms. There is the typical water zone according to regular petrophysical analysis, even water samples collected by the Formation tester. There are still high productive hydrocarbon zones proved by DST results. Further analysis showed the reason of the low resistivity is because of deep invasion of high salinity mud according to well correlation and neighbor well production status. But the reason of the low resistivity zone in the Gumai Formation is different. The resistivity of the pay zone is still 4 Ohms with high gas reading according to petrophysical composite analysis and well correlation, integrated by core analysis result. There are fine and glauconitic sandstones in the Gumai Low resistivity pay zone, which caused high irreducible water saturation and low resistivity. The above low resistivity pay zones examples show there are different reasons for LRP zones. The mud invasion correction is key for the LRP zones in the Low Tanglar Formation and high shale volume and high irreducible water saturation is key for the LRP zones in the Gumai Formation.

## **References Cited**

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Hall, R., B. Clements, and H.R. Smyth, 2009, Sundaland: Basement Character, Structure and Plate Tectonic Development: Indonesian Petroleum Association, Proceedings 33rd Annual Convention, IPA09-G-134, p. 1-27.

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Hall, R., 2002, Cenozoic Geological and Plate Tectonic Evolution of SE Asia and the SW Pacific: Computer-Based Reconstructions, Model and Animations: *Journal of Asian Earth Sciences*, v. 20, p. 353-431. doi:10.1016/S1367-9120(01)00069-4



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## Two Kinds of Low Resistivity Pay Zones Identifications and Evaluations In South Sumatra Basin, Indonesia

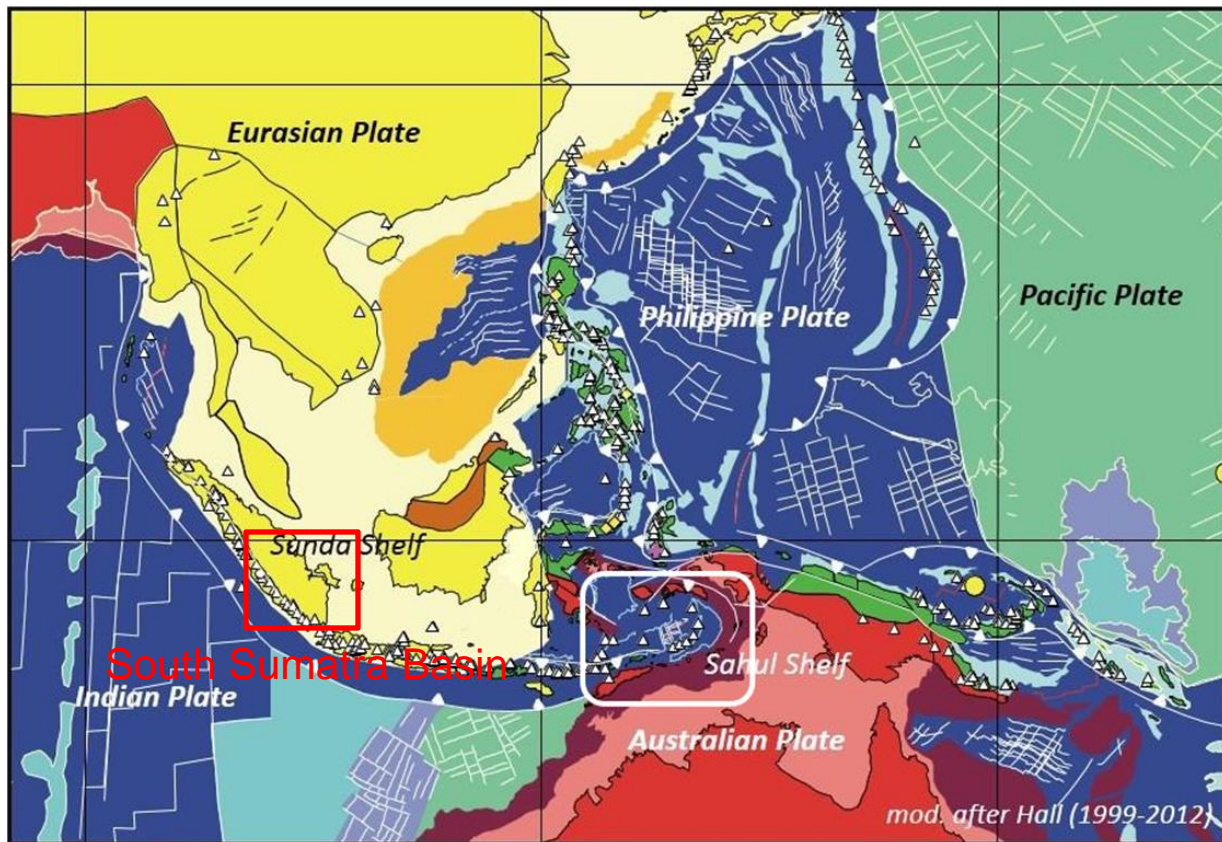
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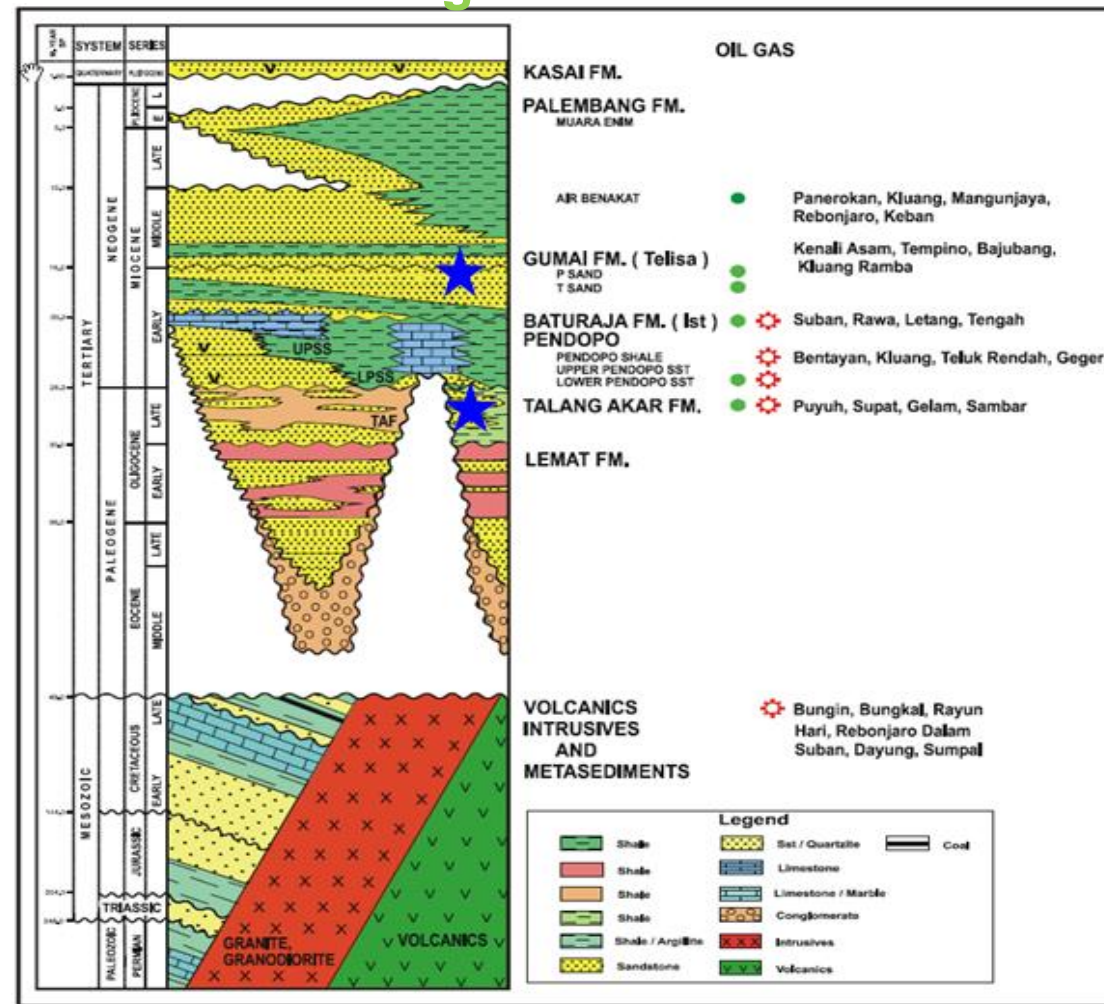
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The South Sumatra Basin is the hydrocarbon prolific basin in Indonesia. The Gumai and LTAF is two main target formation.



Present Tectonic Setting of Indonesia



Typical Formation Column in South Sumarta Basin

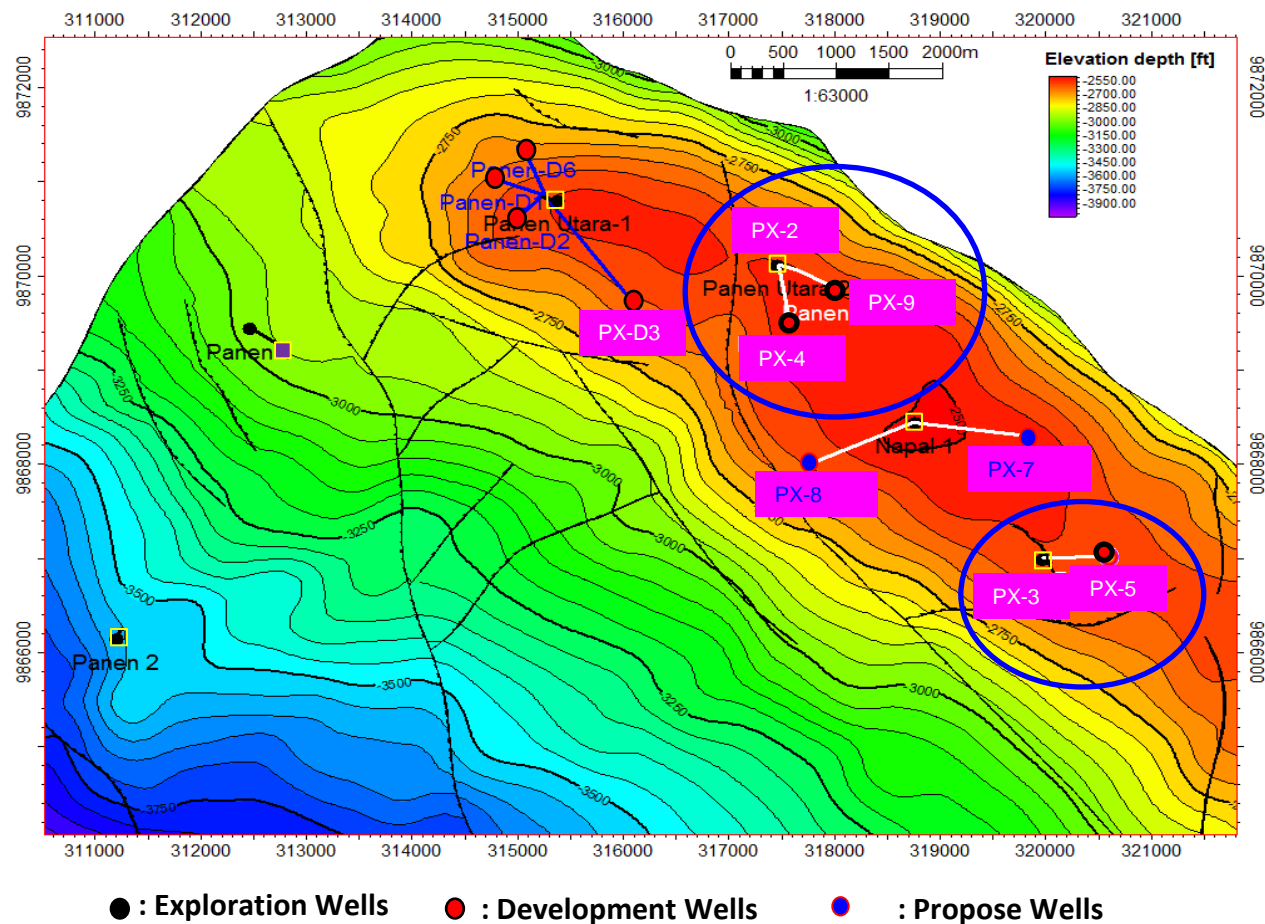




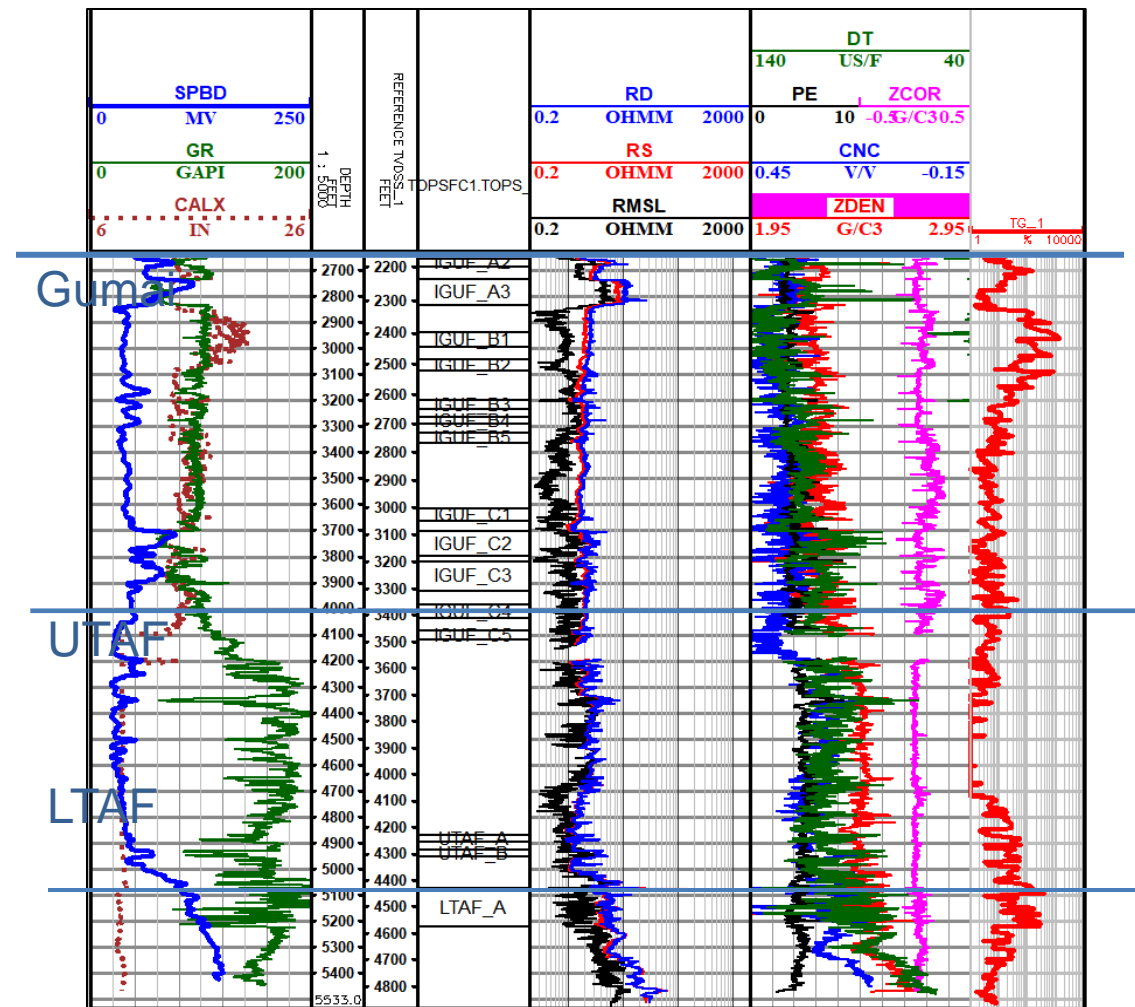
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## PX Field is a new development field in South Sumatra Basin



PX Field Structure map(GUMAI Tops)



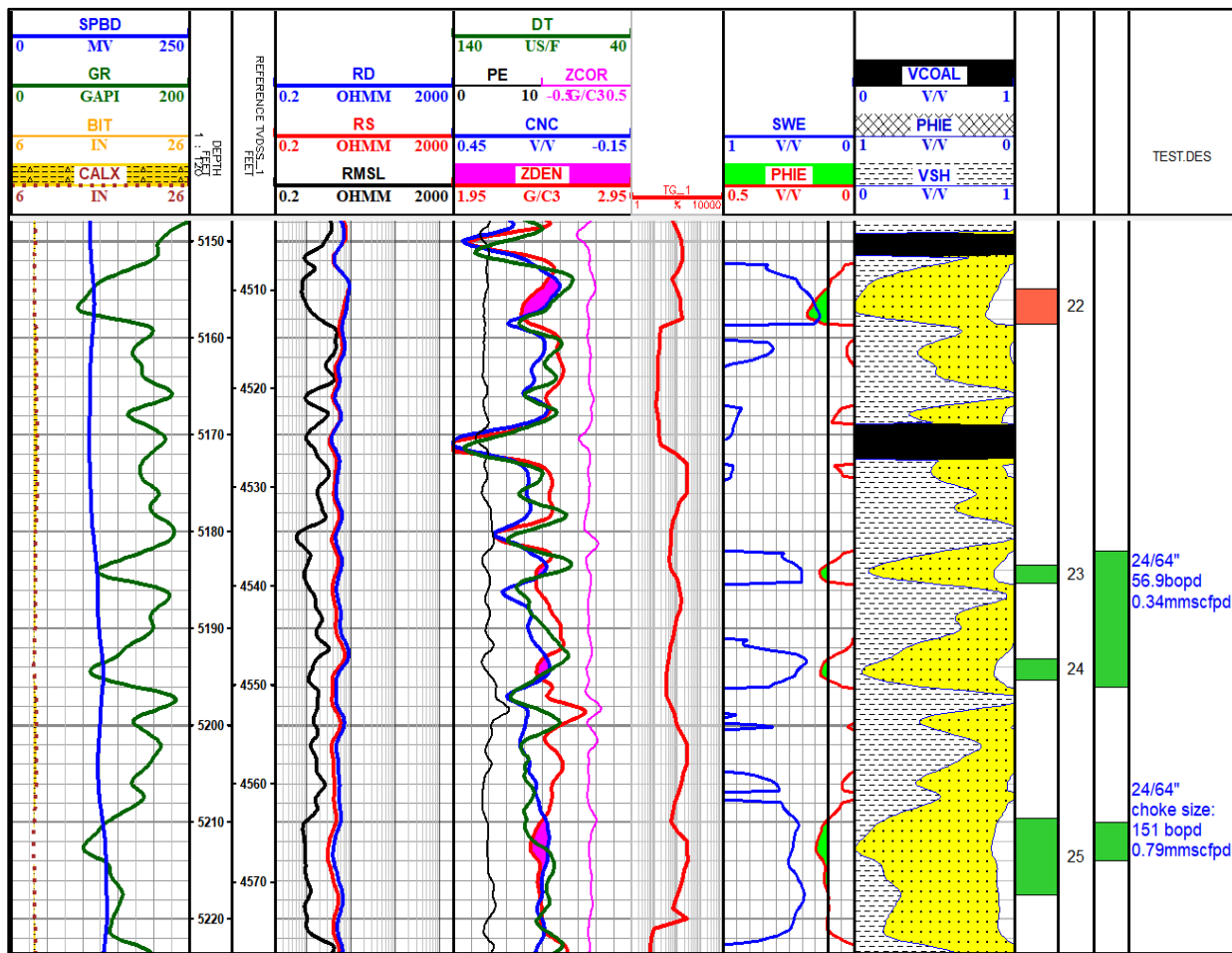
PX-4 Conventional log Plot



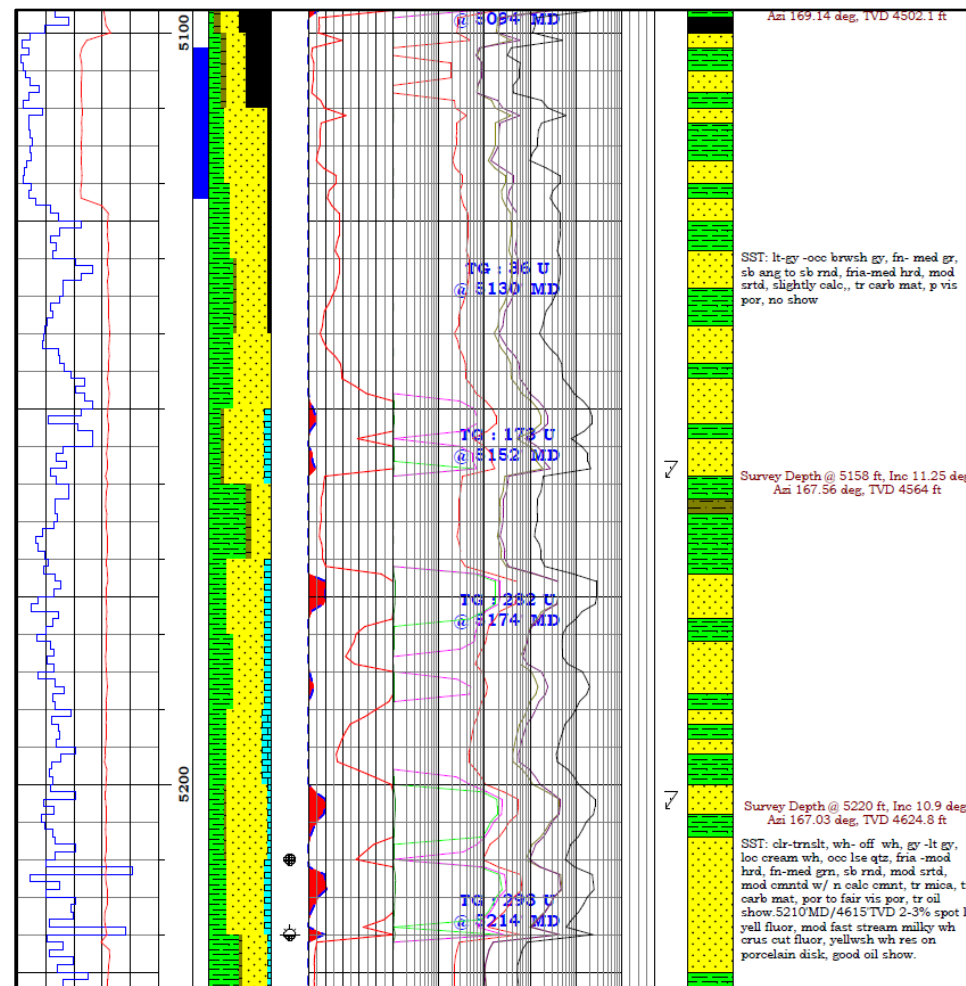
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## Mud log and conventional log display hydrocarbon shows in PX-4



PX-4 LTAF Petrophysical Result Plot



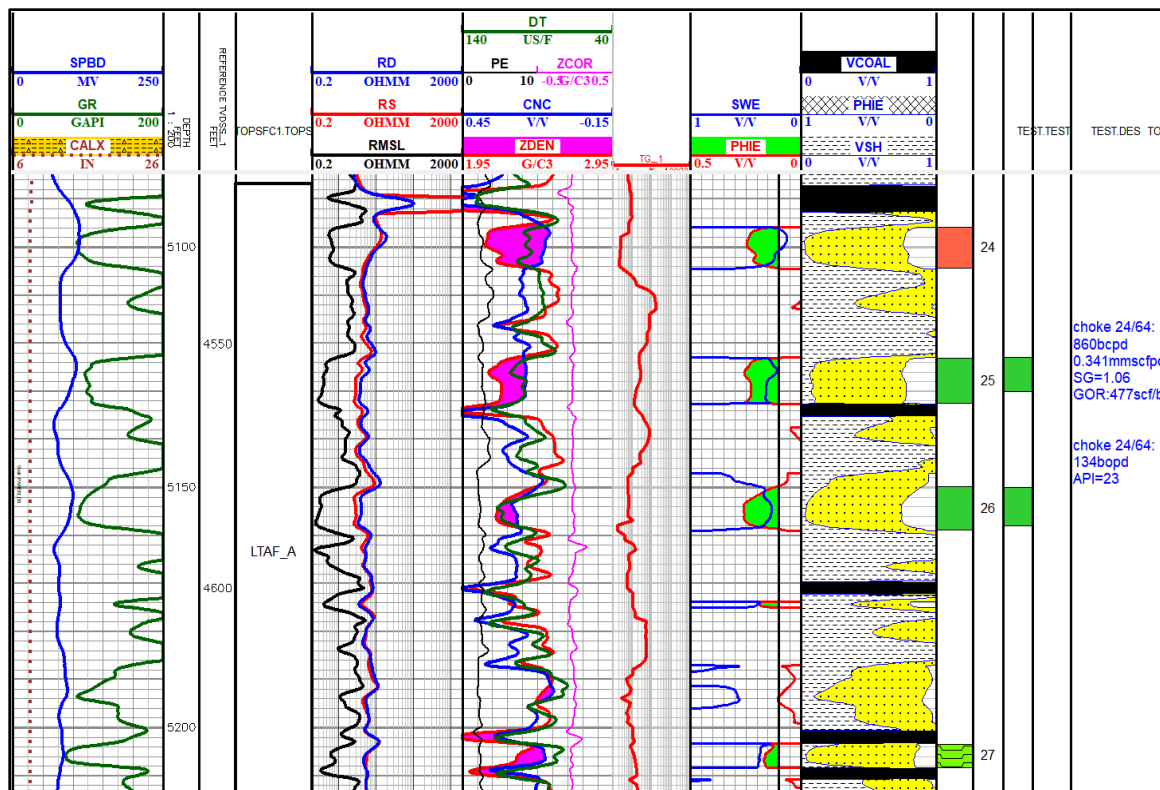
PX-4 LTAF Mudlog Result Plot



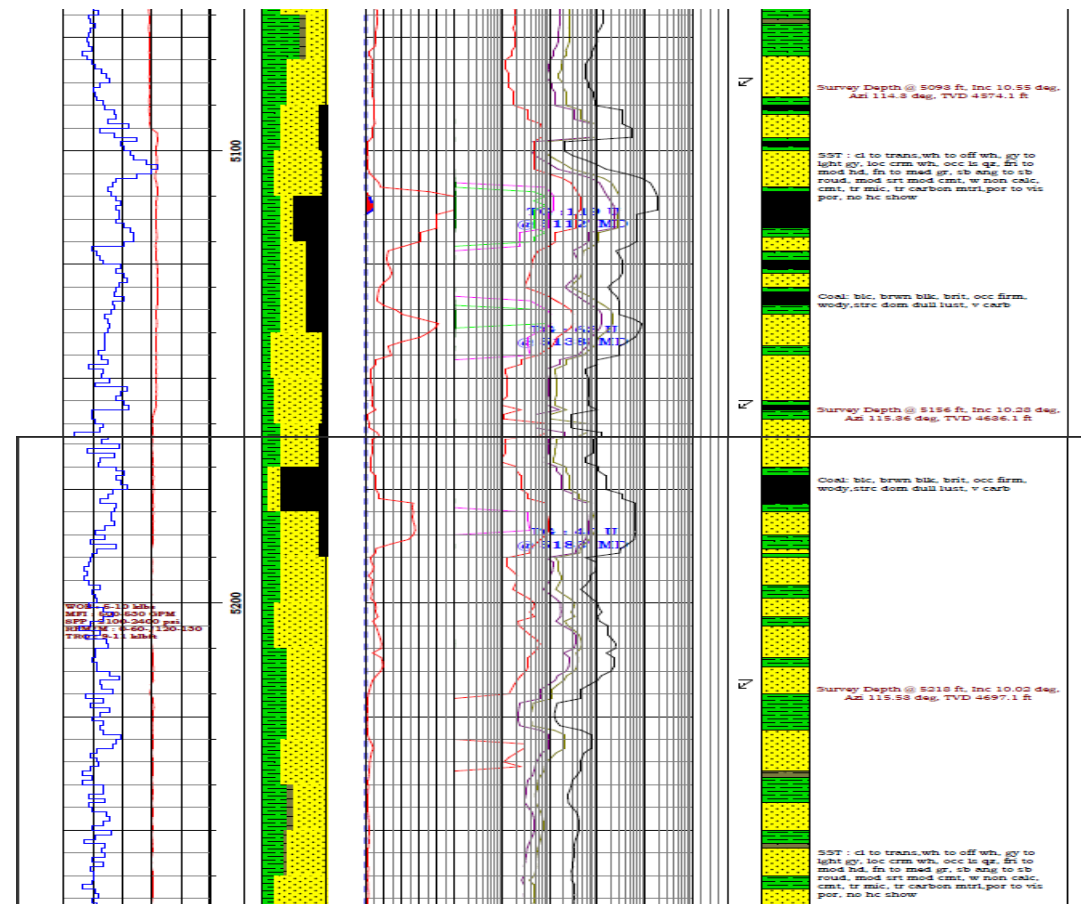
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Mud log and conventional log display same hydrocarbon shows in PX-9



PX-9 LTAF Petrophysical Result Plot



PX-9 LTAF Mudlog Result Plot





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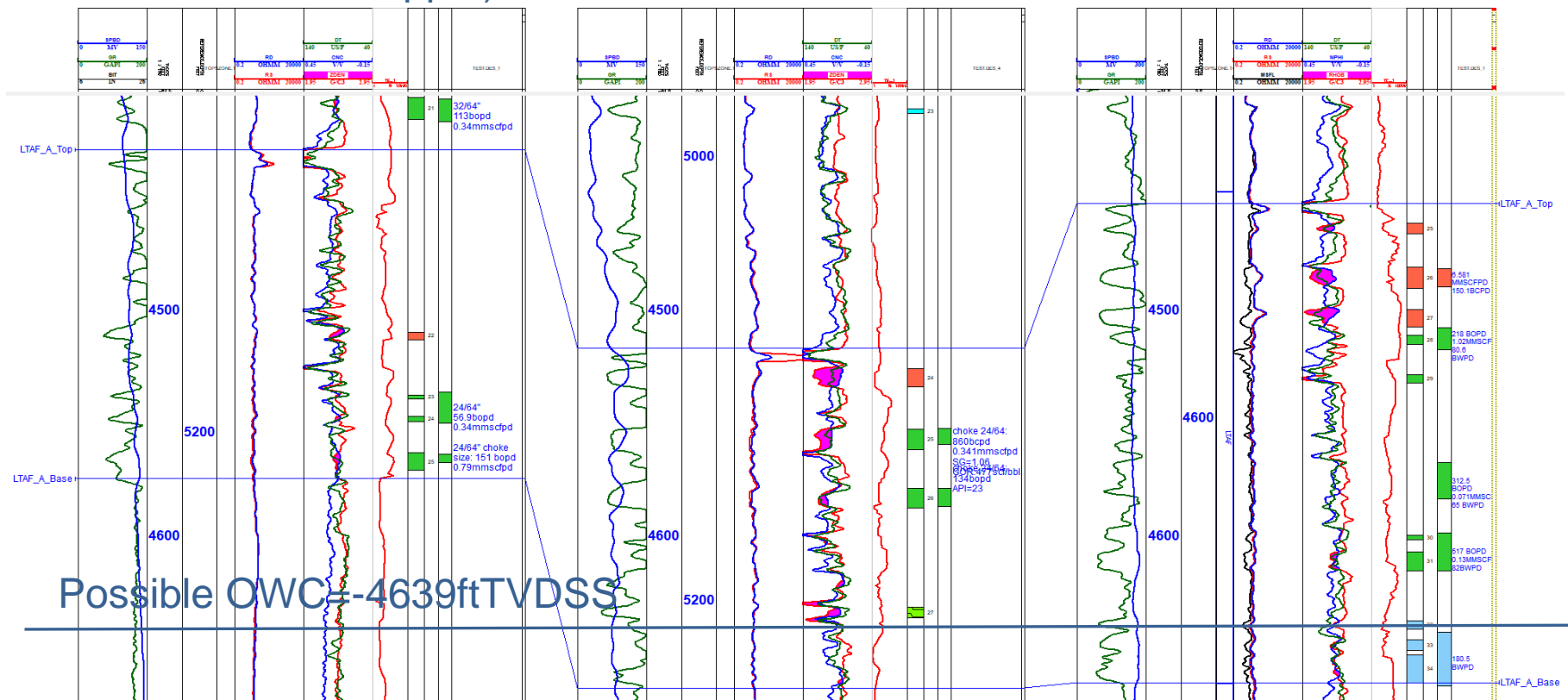
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## Composite Analysis Proved possible Same OWC in LTAF Formation

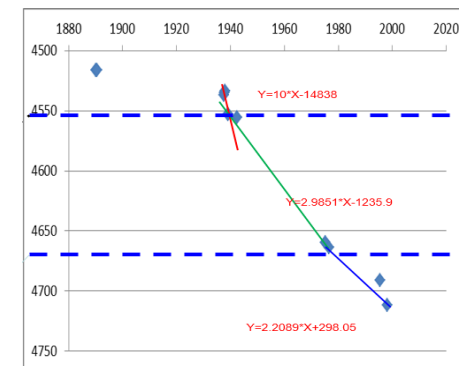
PX-4(Jan,2019)  
Mud:CI=49000ppm

PX-9(Mar,2019)  
Mud:CI=49000ppm

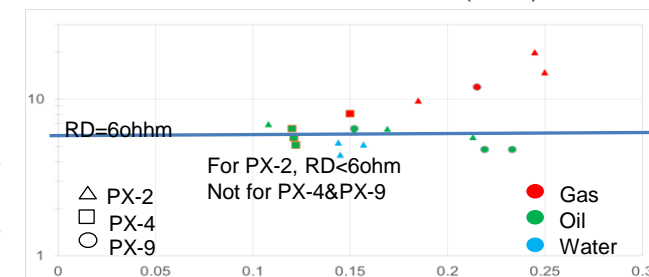
PX-2(Oct,2015)  
Mud:CI=40000ppm



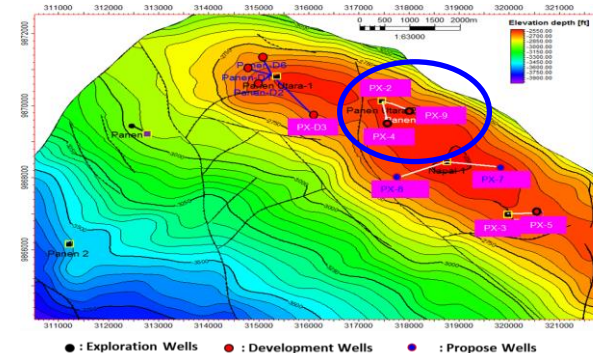
PX-4-PX-9-PX-2 Correlation Plot



Formation Pressure Gradient(PX-2)



RD&PHIE Crossplot



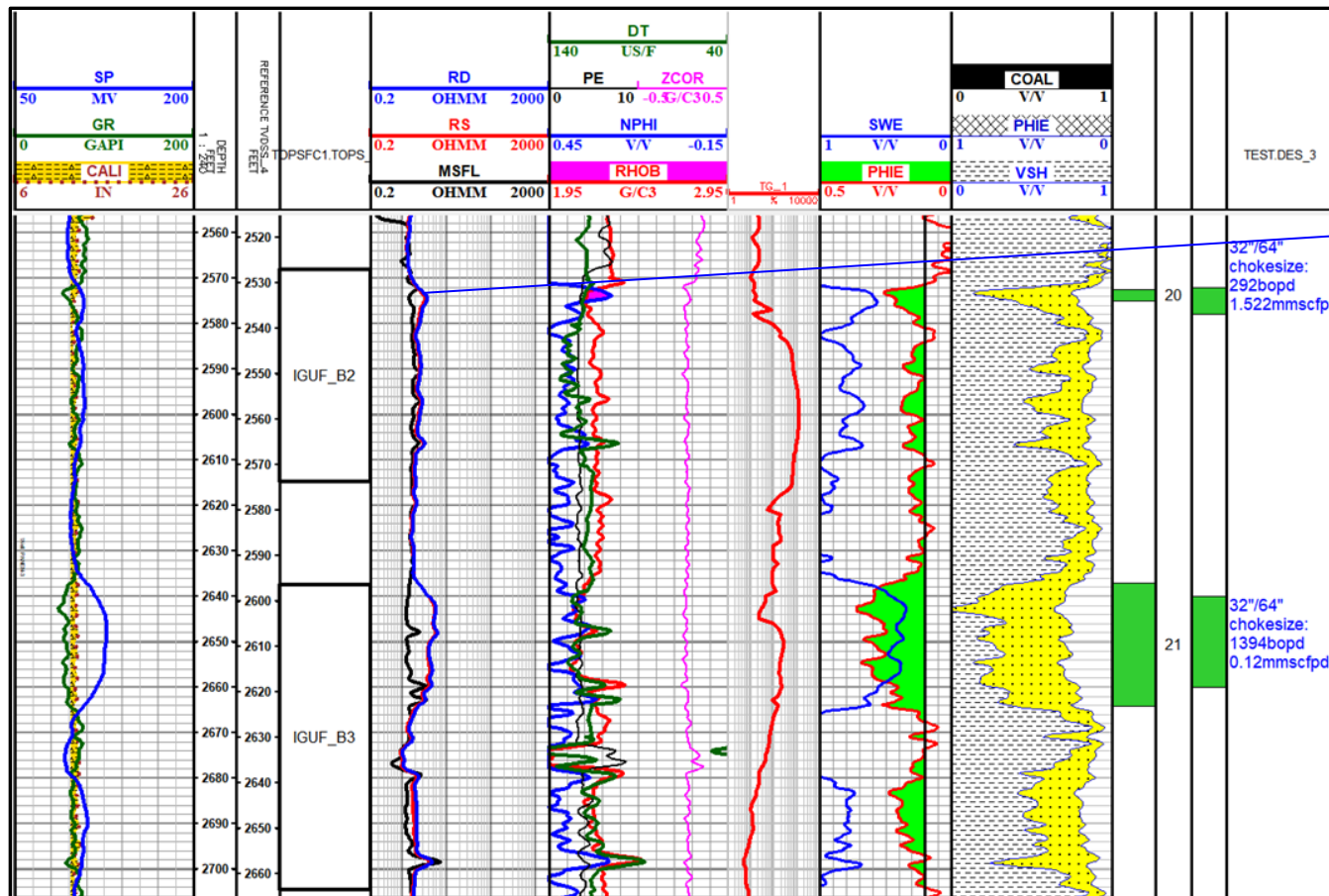




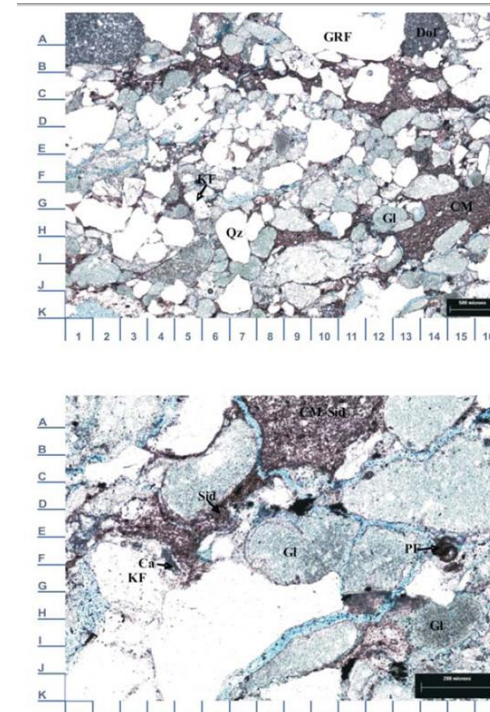
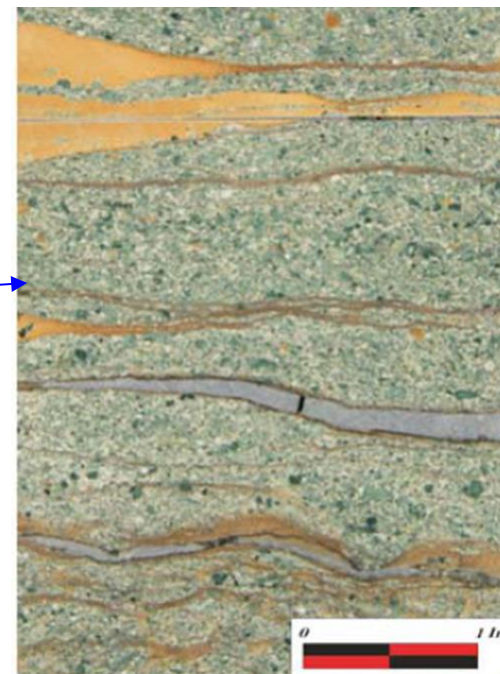
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## High Glauconite volume found in elementary Core analysis of PX-3



PX-3 Gumai Petrophysical Result Plot



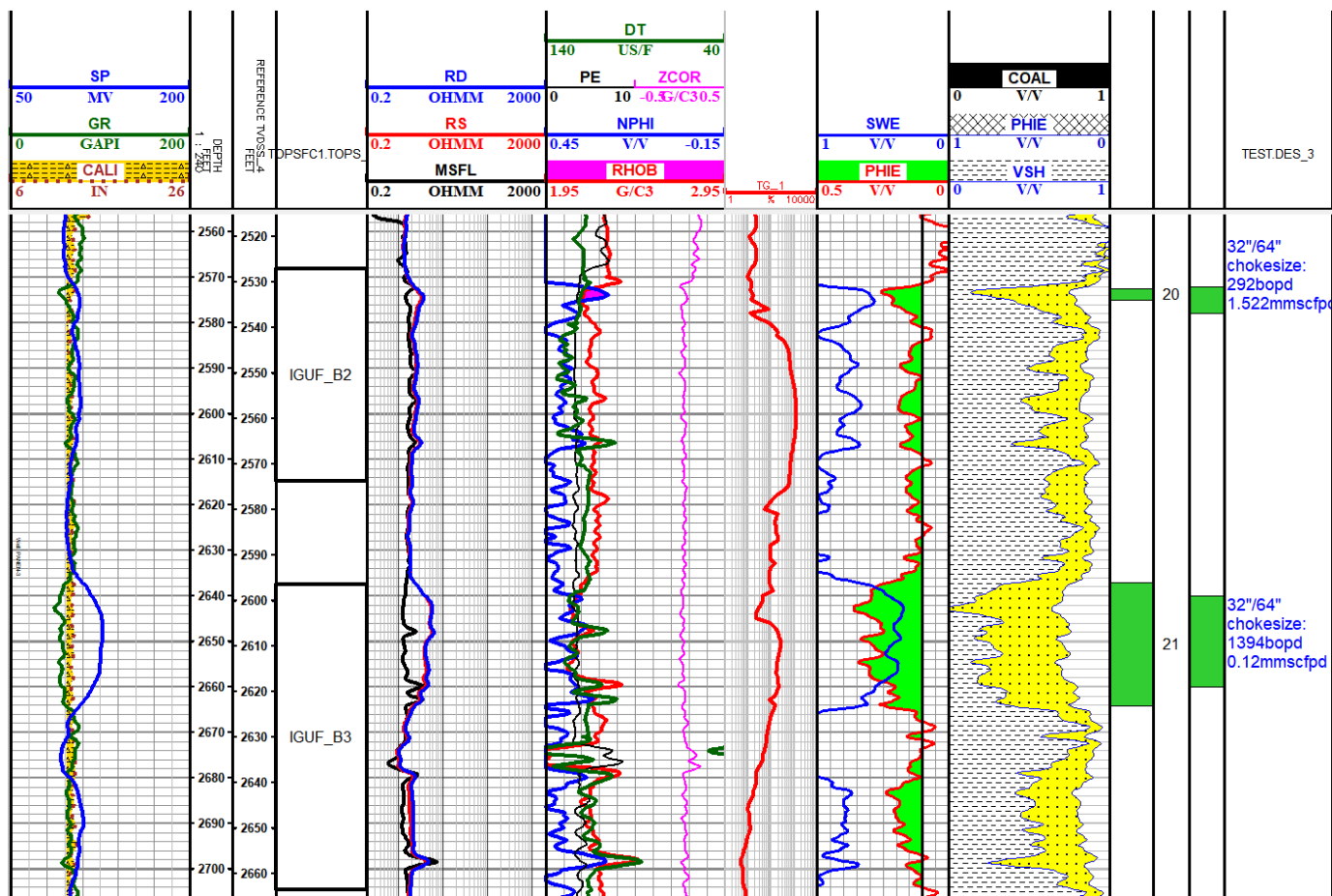
Images show that the framework grains are mainly quartz [Qz], with subordinate glaucony [Gl]. K-feldspar [KF], granitic rock fragments [GRF], dolomitic clasts [Do] and planktic foraminifers [PF]. The clay matrix [CM] is partially replaced by siderite [Sid]. Locally calcite [Ca] occurs as a partial replacement of feldspar grains.



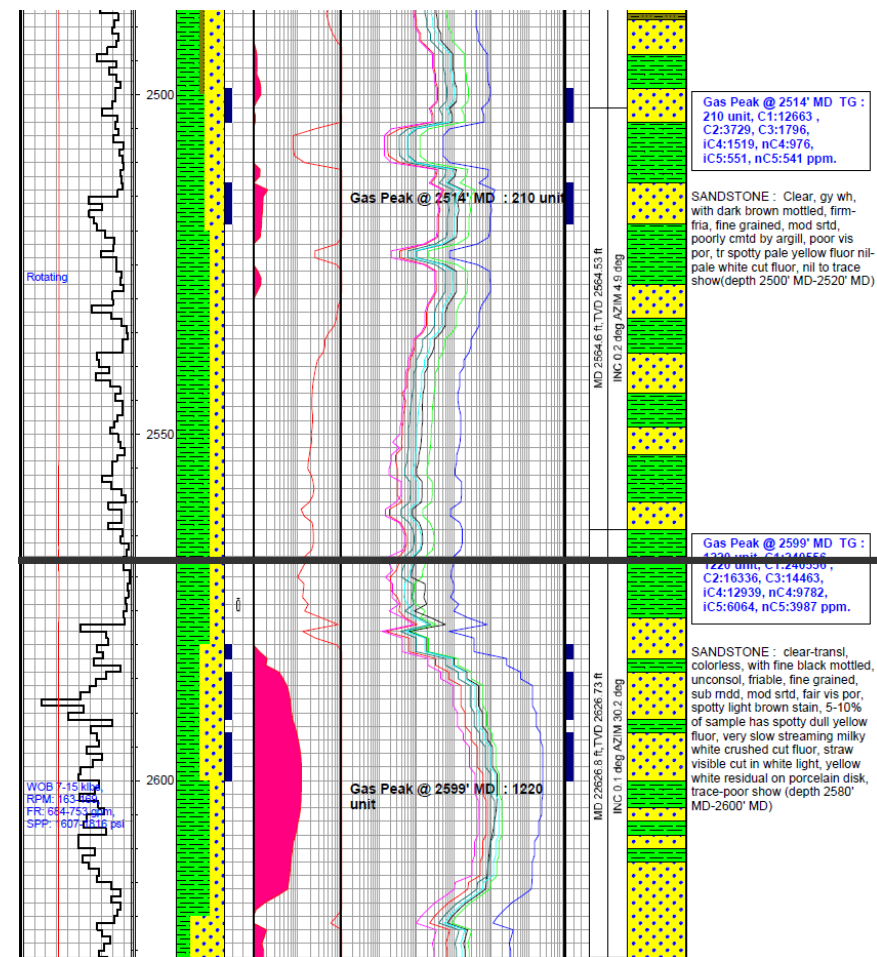
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## Mud log and conventional log display hydrocarbon shows in PX-3



PX-3 Gumai Petrophysical Result Plot



PX-3 Gumai Mudlog Result Plot





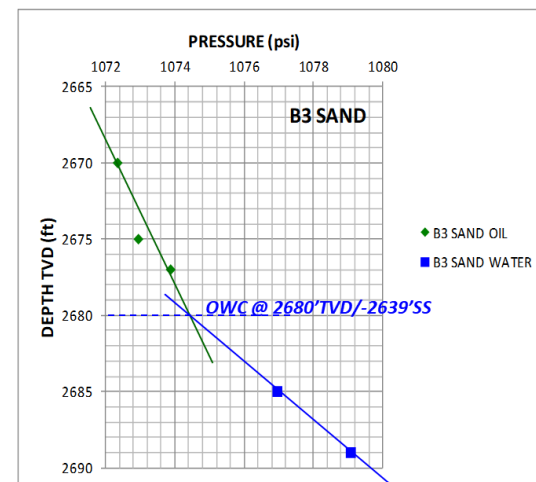
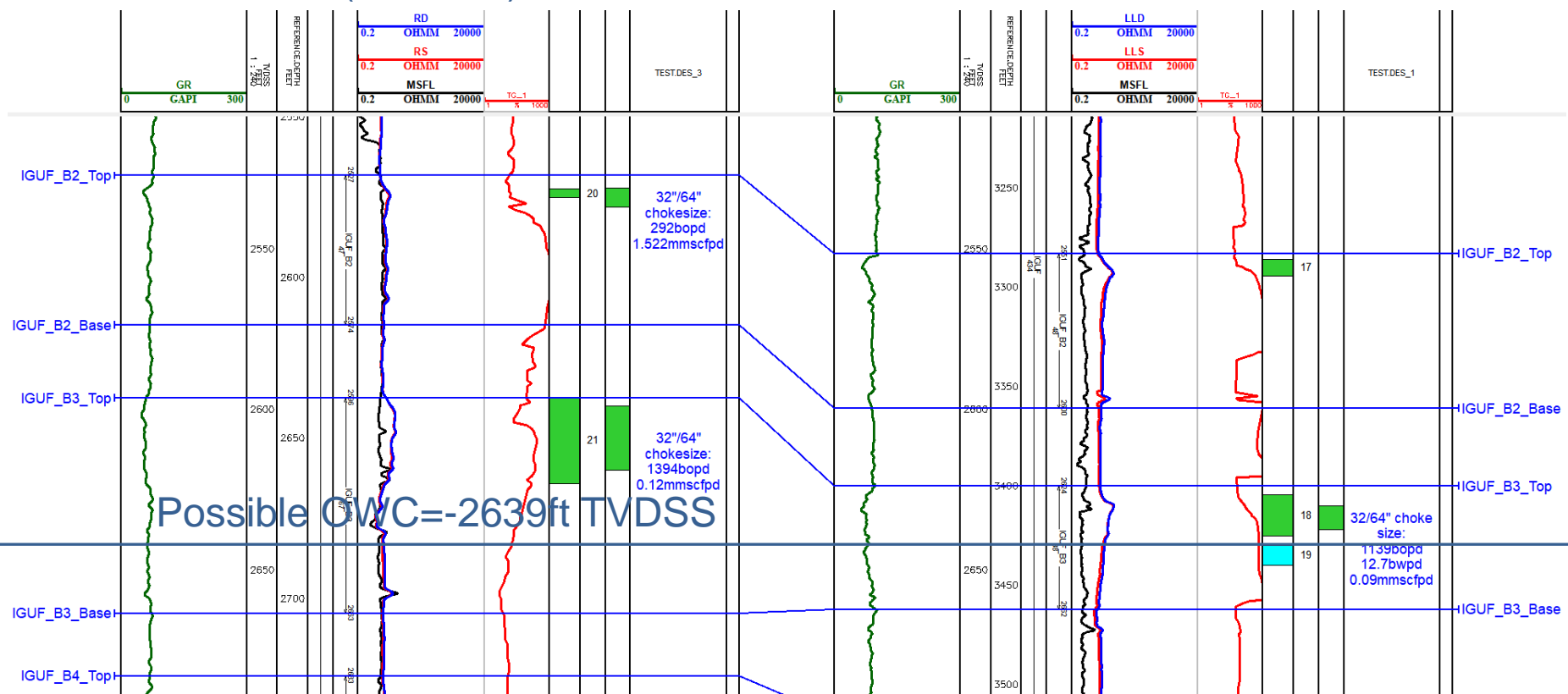
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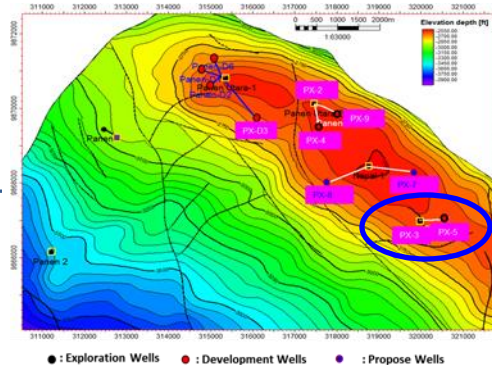
## Correlation Plot Proved possible Same OWC in IGUF\_B3 Formation

PX-3(Jul,2015)

PX-5(Nov,2018)



Formation Pressure Gradient(PX-5)



PX-3-PX-5 Correlation Plot





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## Summary

- The above presentation shows two different LRP examples in South Sumarta Basin, Indonsia.
- The high salinity mud invasion is the possible reason for the LRP zones in Low Tanglar formation.
- High shale volume and high glauconite volume is the possible reason for the LRP zones in Gumai formation.
- Further evaluation need to integrate with the Core analysis!!!

Thank you!!!