AGIBA
PETROLEUM COMPANY

MASAJID RESERVOIR CHARACTERIZATION CASE STUDY IN MELEIHA DL

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Geo. Ahmed Mahdy
Senior Petrophysicist

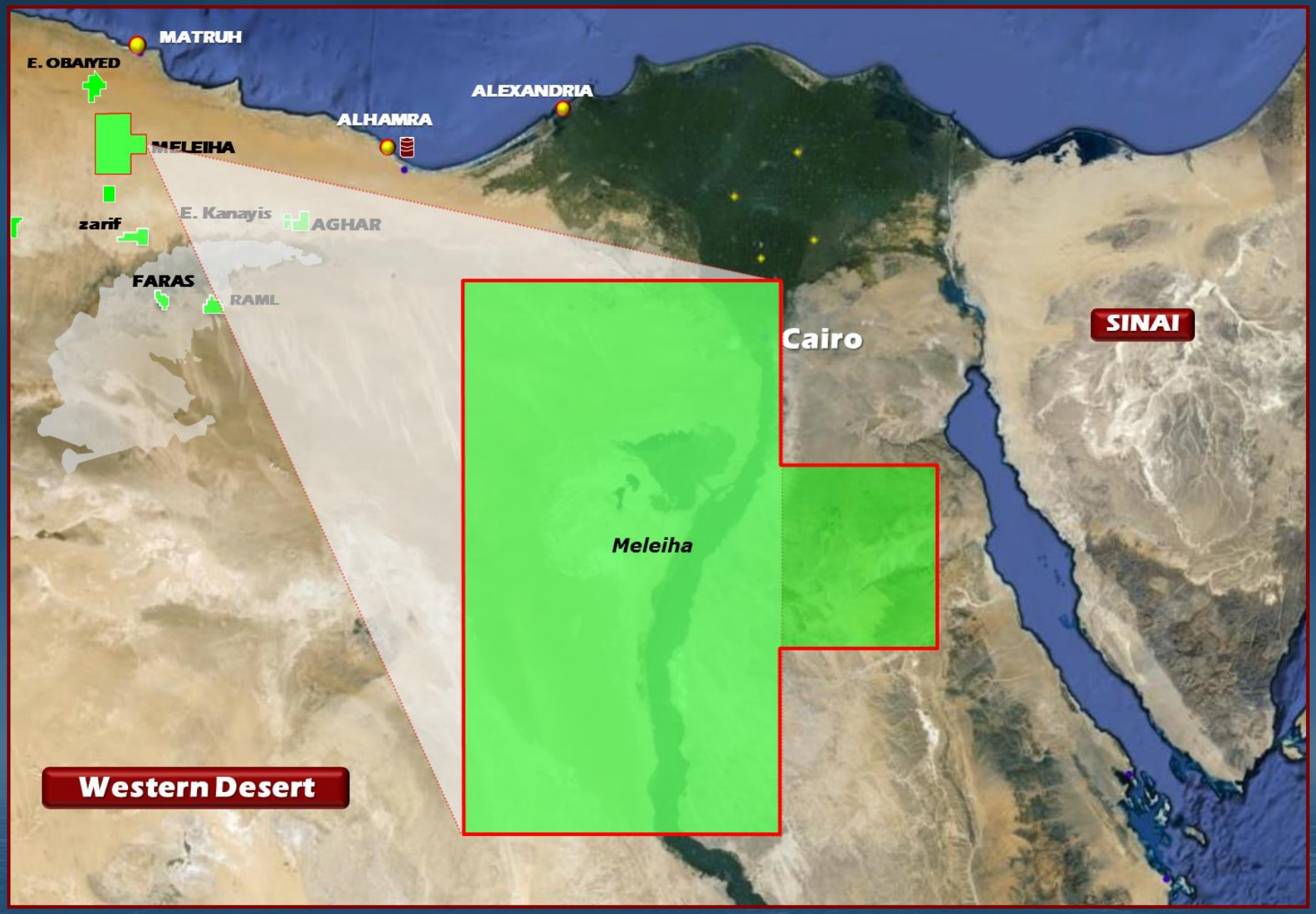
Eng. Mohamed Darweesh
Reservoir Engineering Team Leader

OUTLINES

- Geological Regional view in Meleiha DL
- Overview and Statistics
- Production Profiles
- Hydrocarbon Reserves
- Case Study
- Conclusion and Recommendation

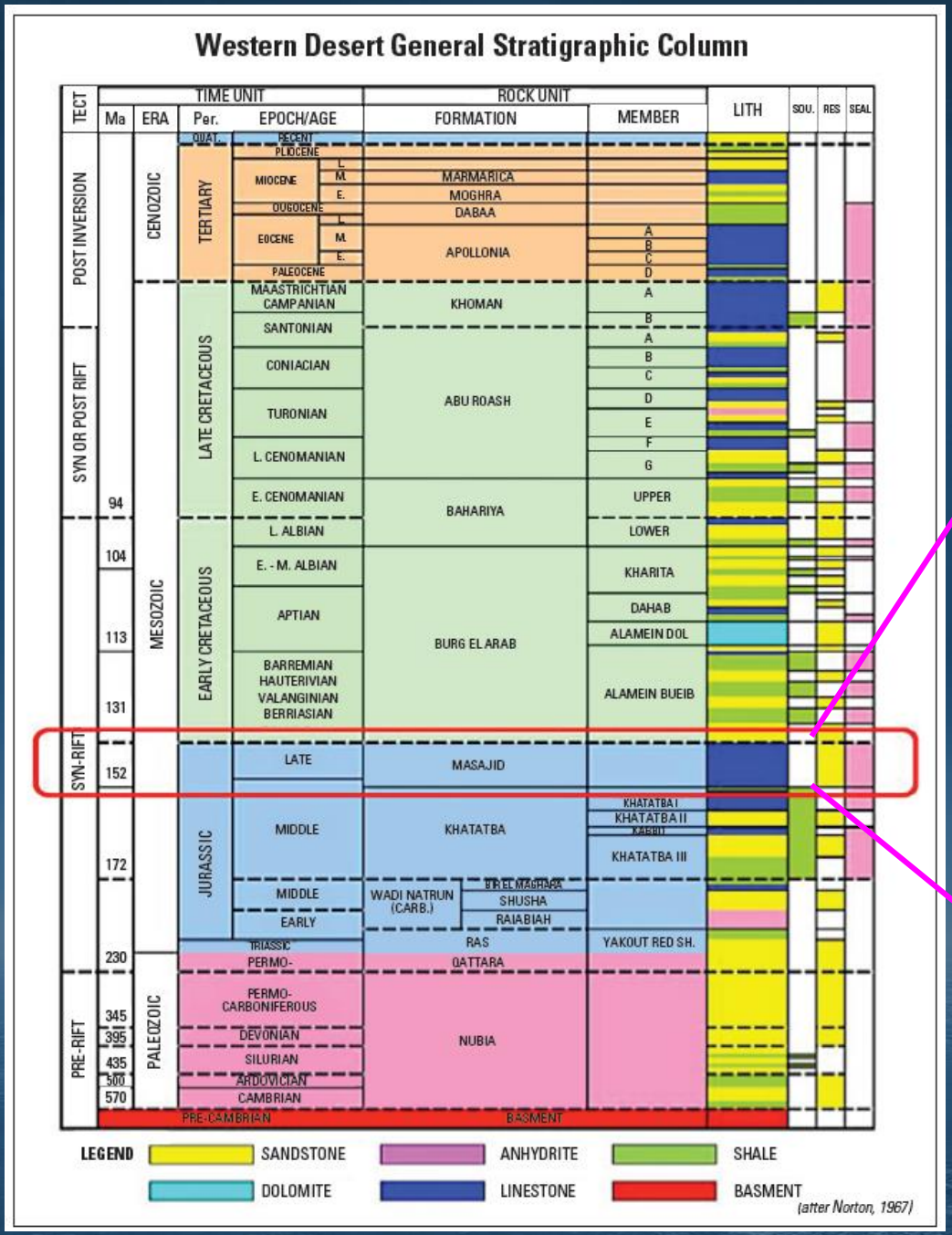
AGIBA PETROLEUM COMPANY OPERATING AREAS

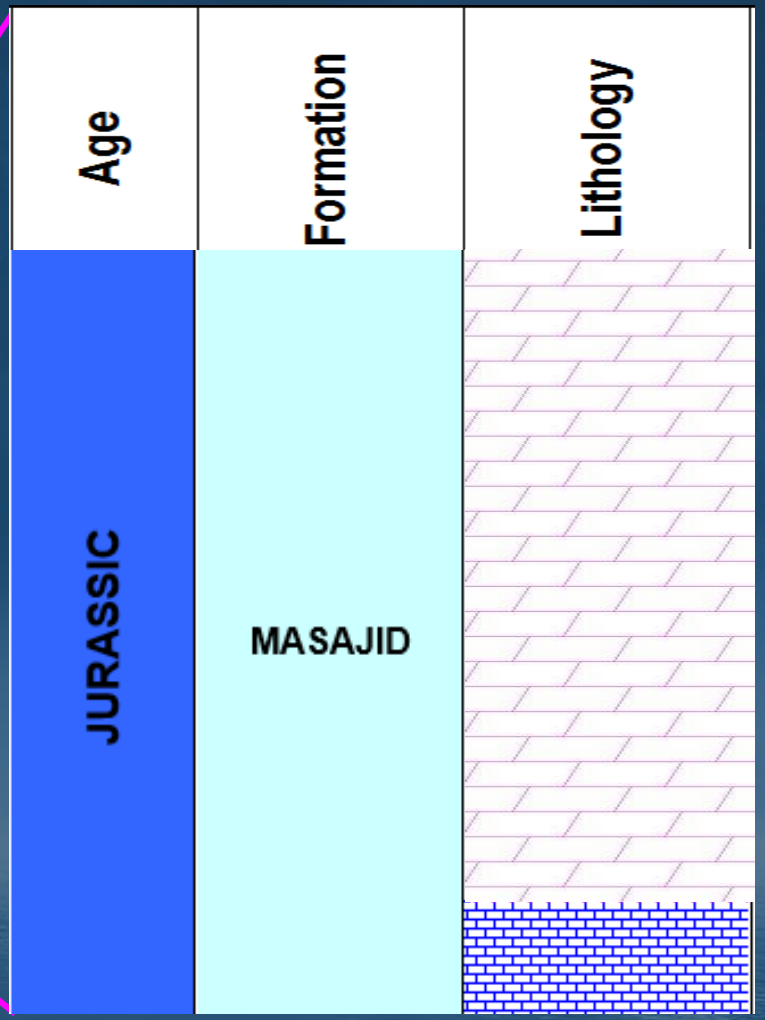
MELEIHA CONCESSION



Meleiha concession lies 65 km south of the coastal Marsa Matruh city, and covering an area of approximately 700 km².

MASAJID FM. GEOLOGICAL REGIONAL VIEW IN MELEIHA D.L.

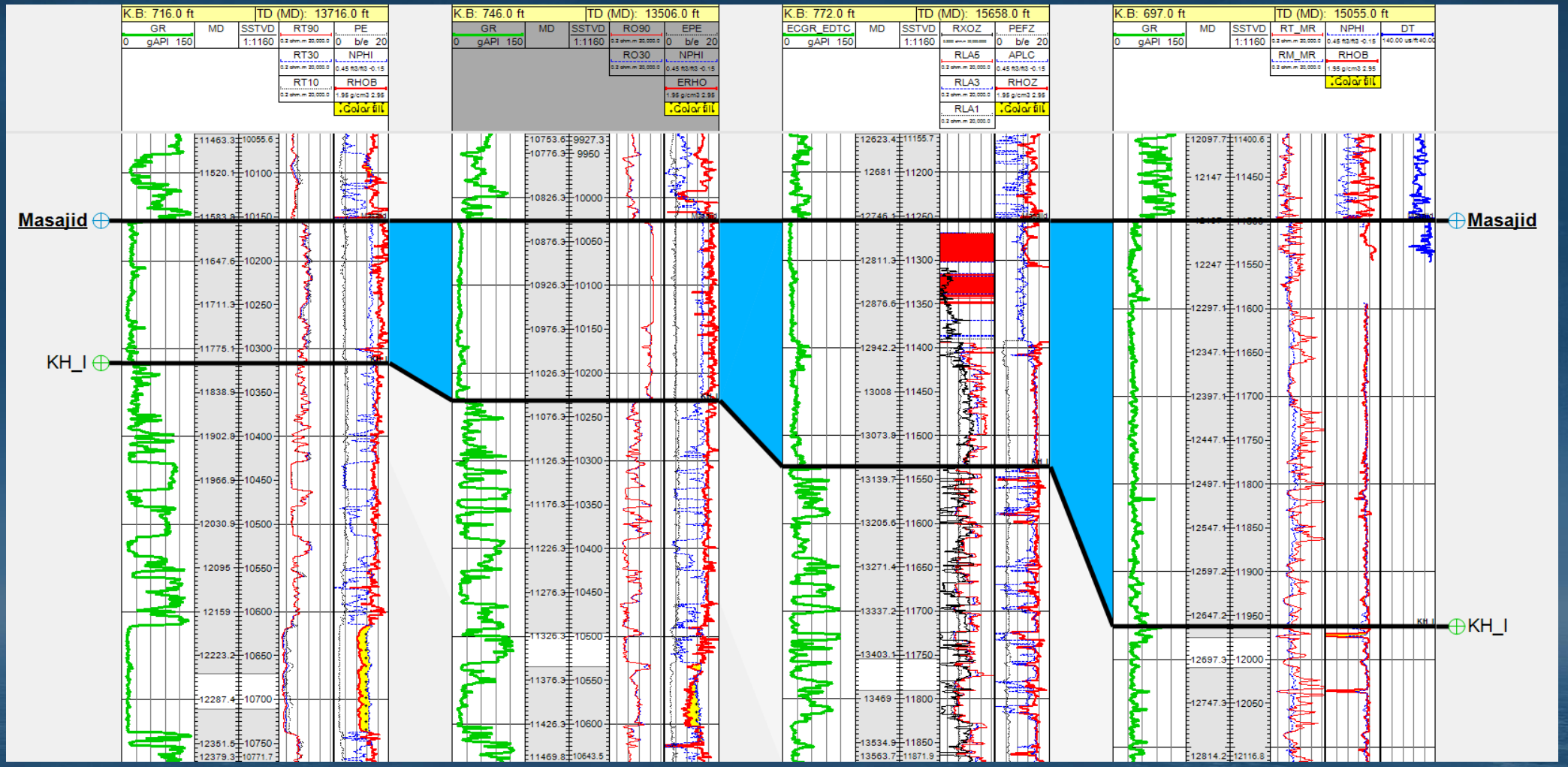




MASAJID FM. STRATIGRAPHIC CORRELATION (S-N)

S

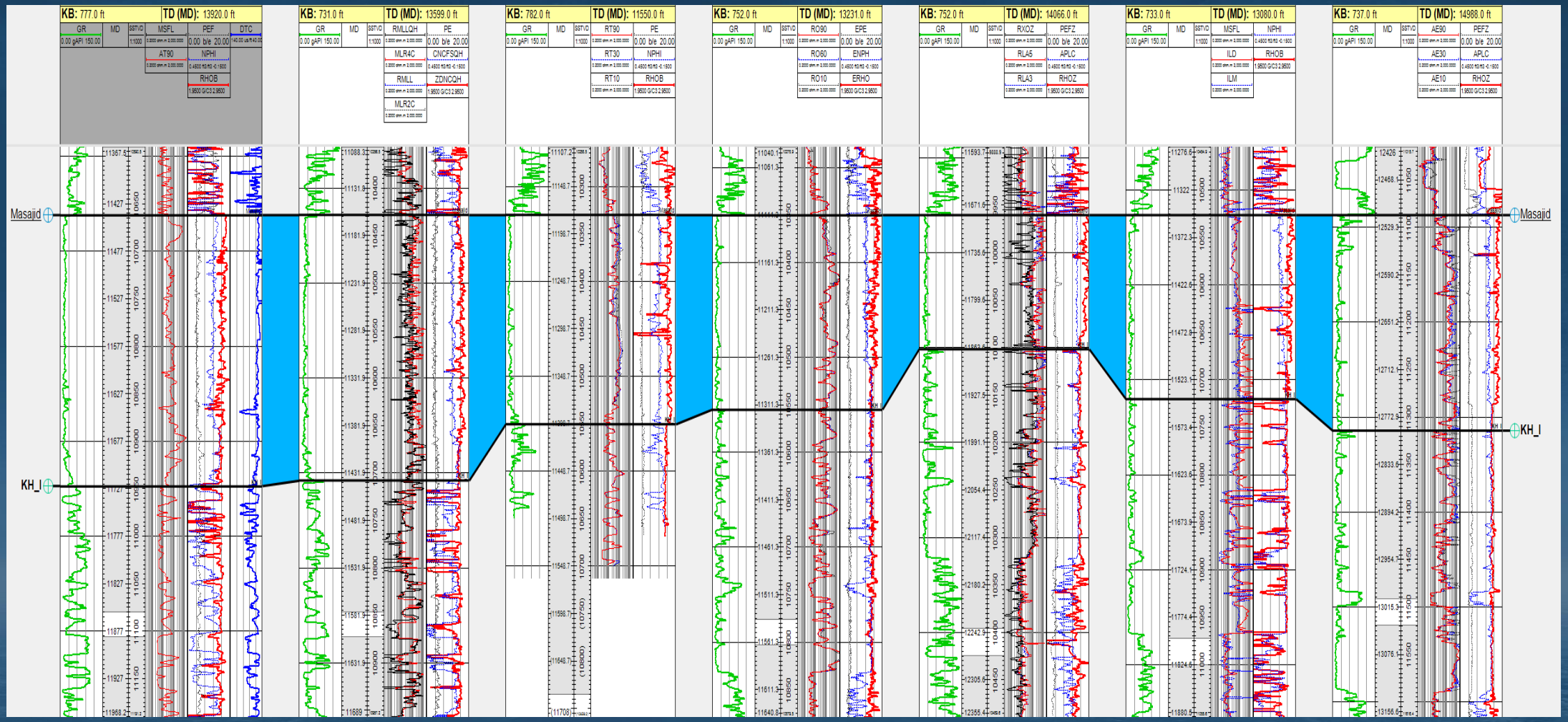
N



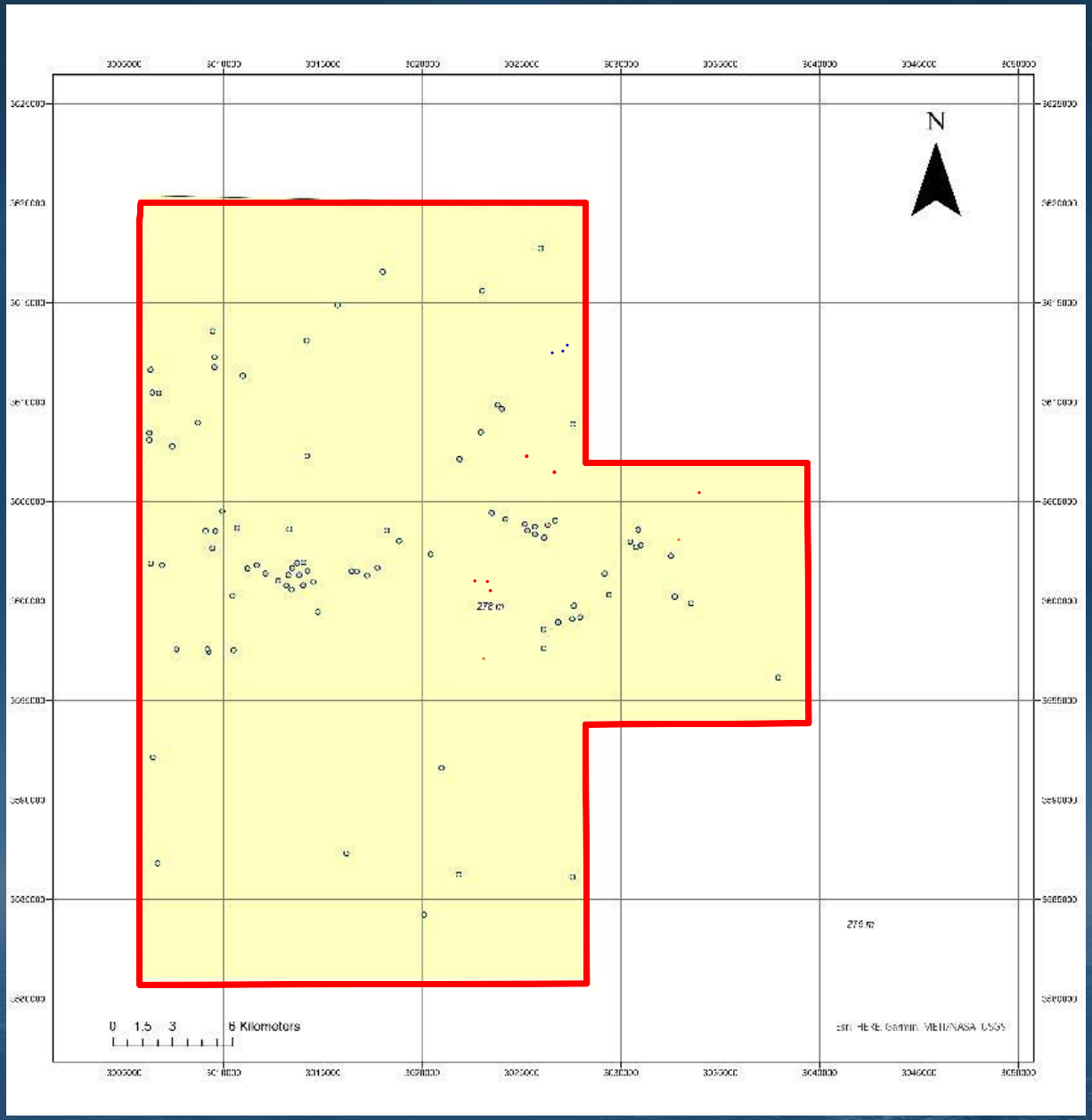
MASAJID FM. STRATIGRAPHIC CORRELATION (W-E)

W

E

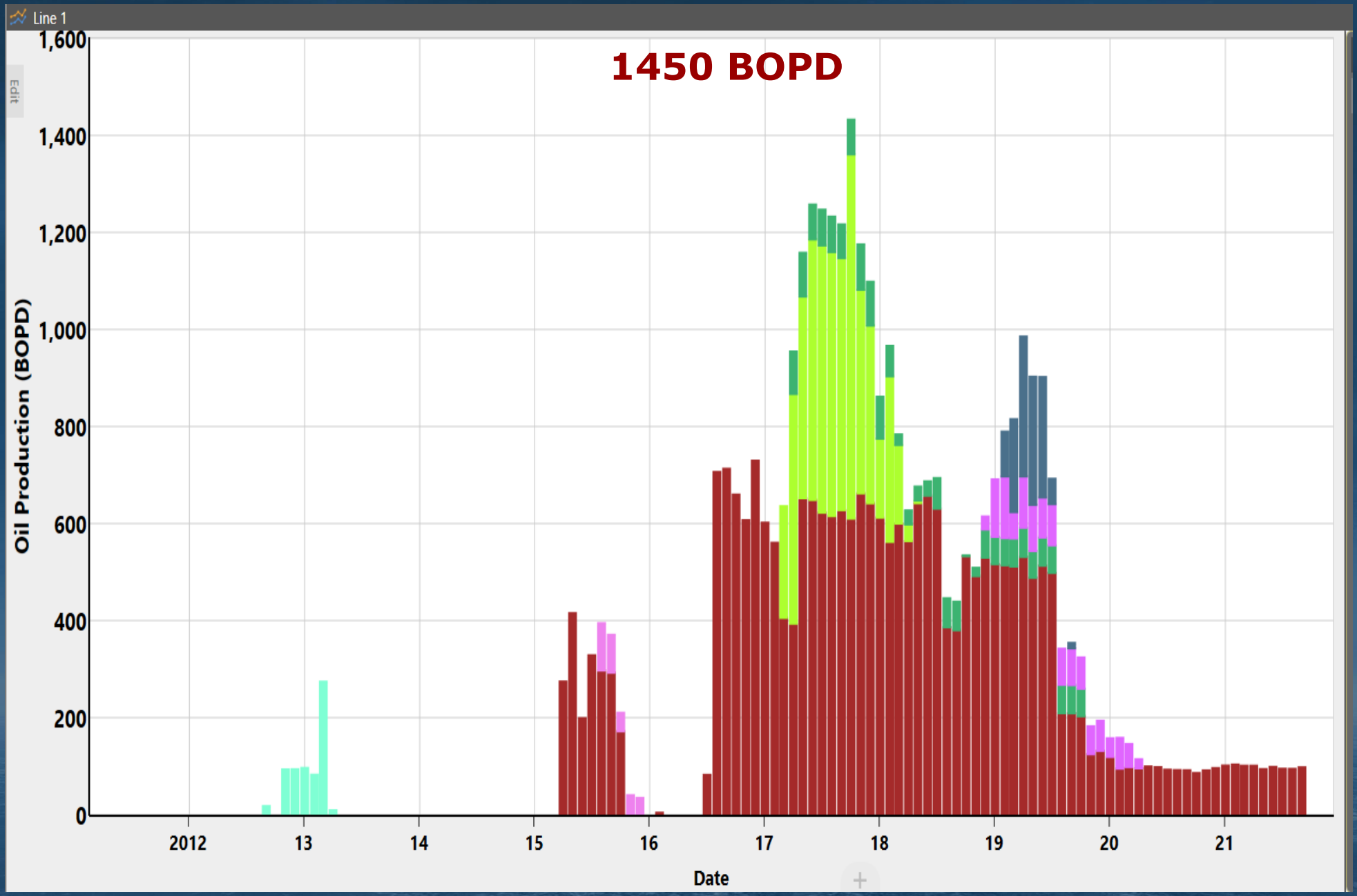


MASAJID FORMATION STATISTICS

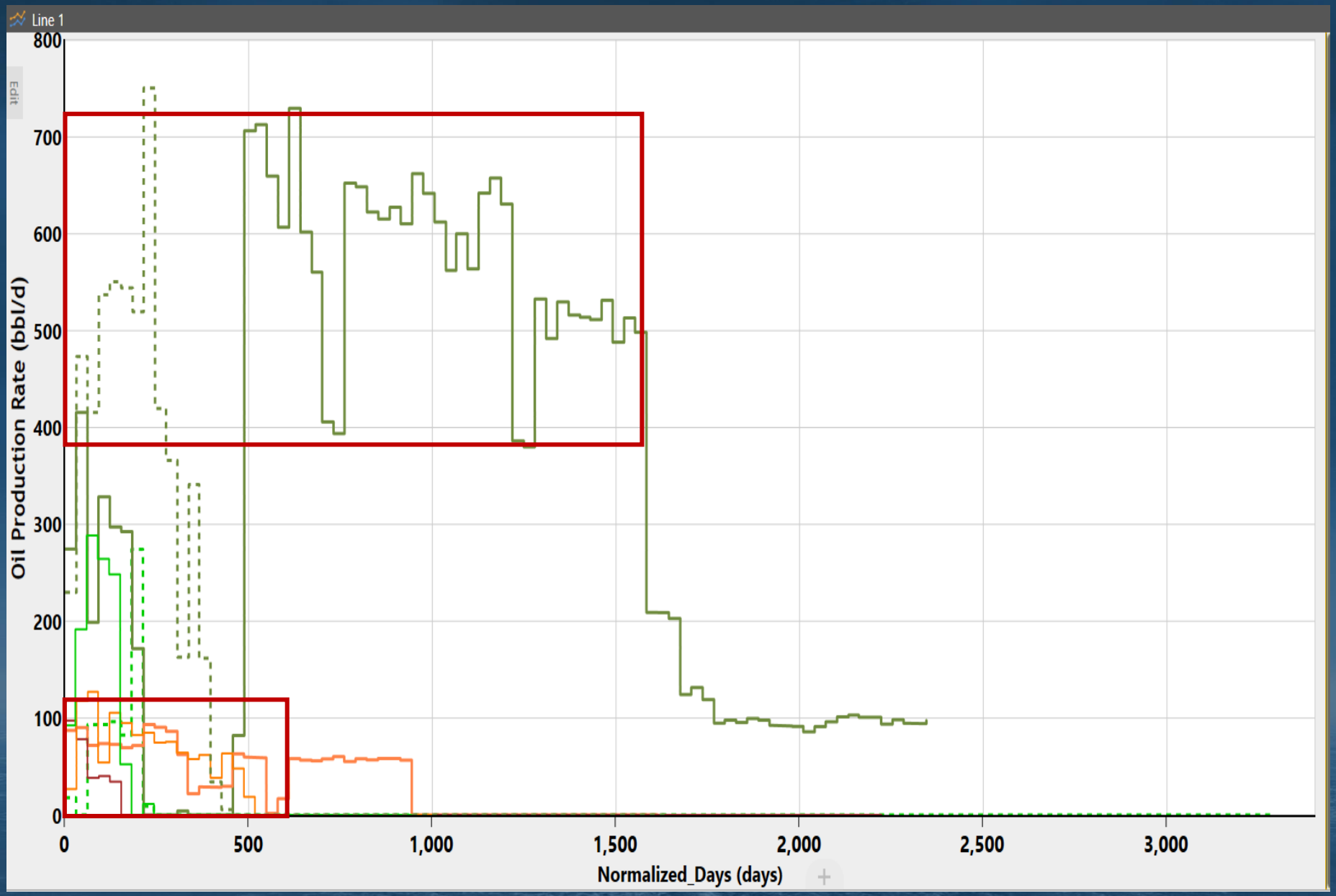


20	Tested Wells
98	Total Wells

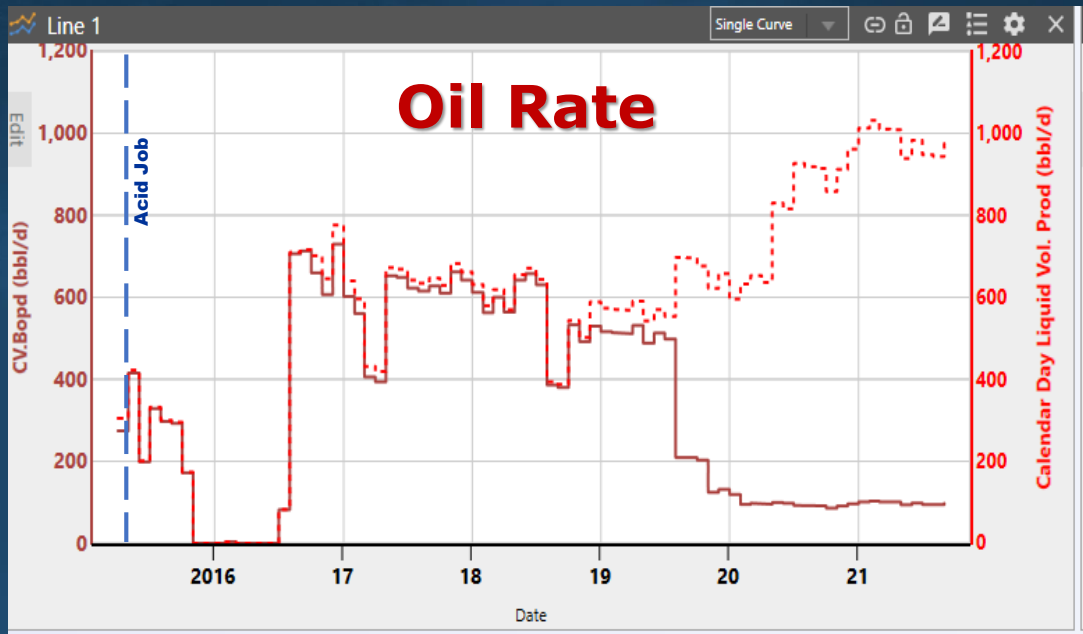
MASAJID PRODUCTION PROFILES

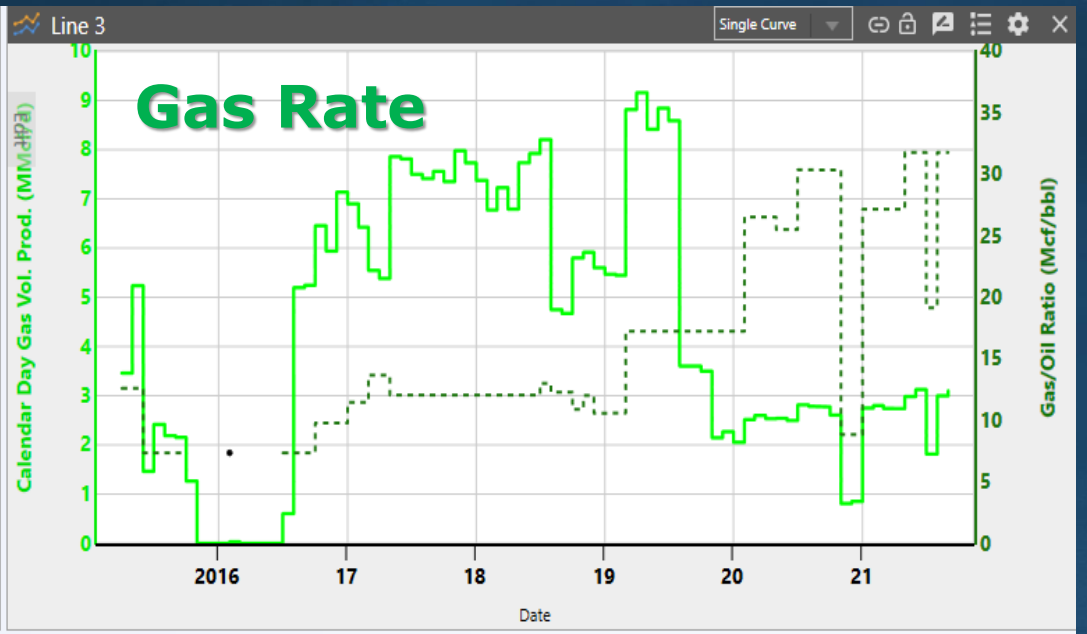


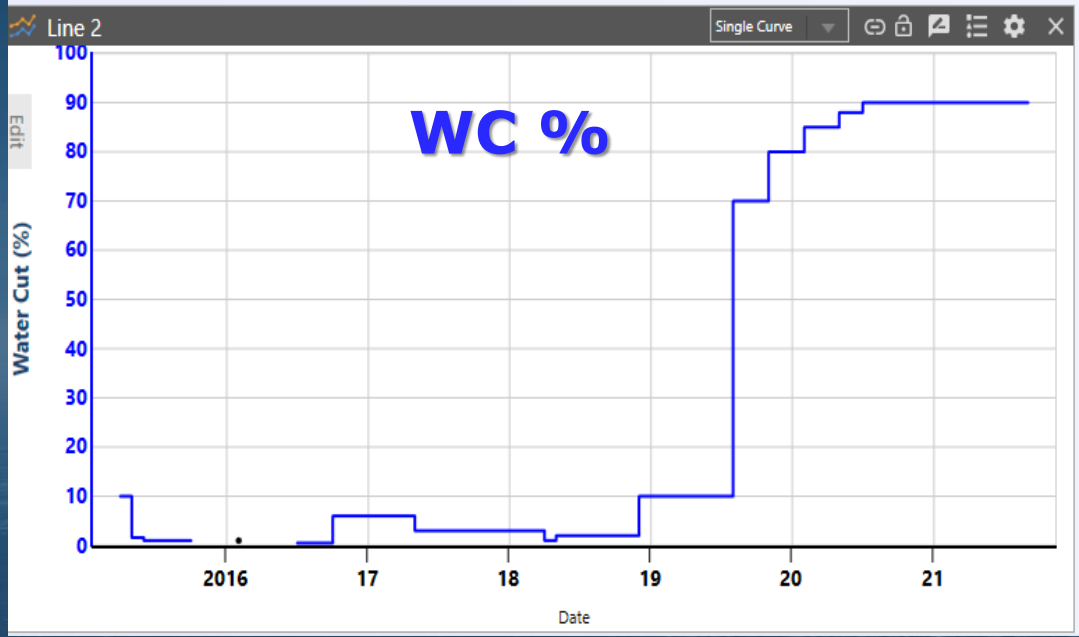
MASAJID PRODUCTION PROFILES - PER WELL

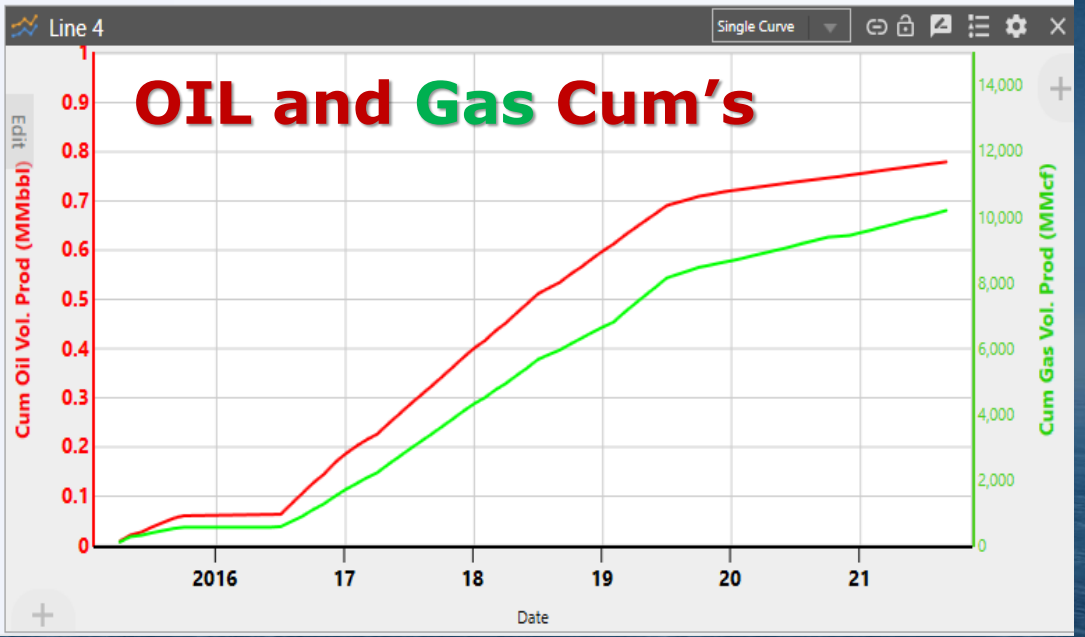


WELL-3X

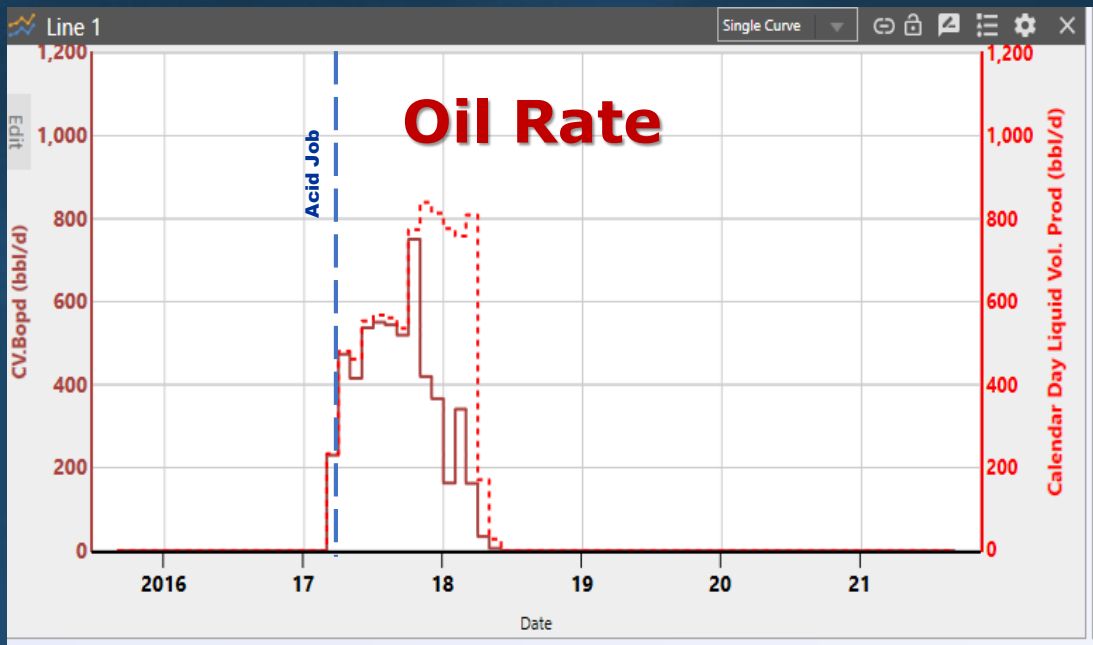

Line 1
Single Curve
Oil Rate
Acid Job
CV.Bopd (bbl/d)
Calendar Day Liquid Vol. Prod (bbl/d)
Date

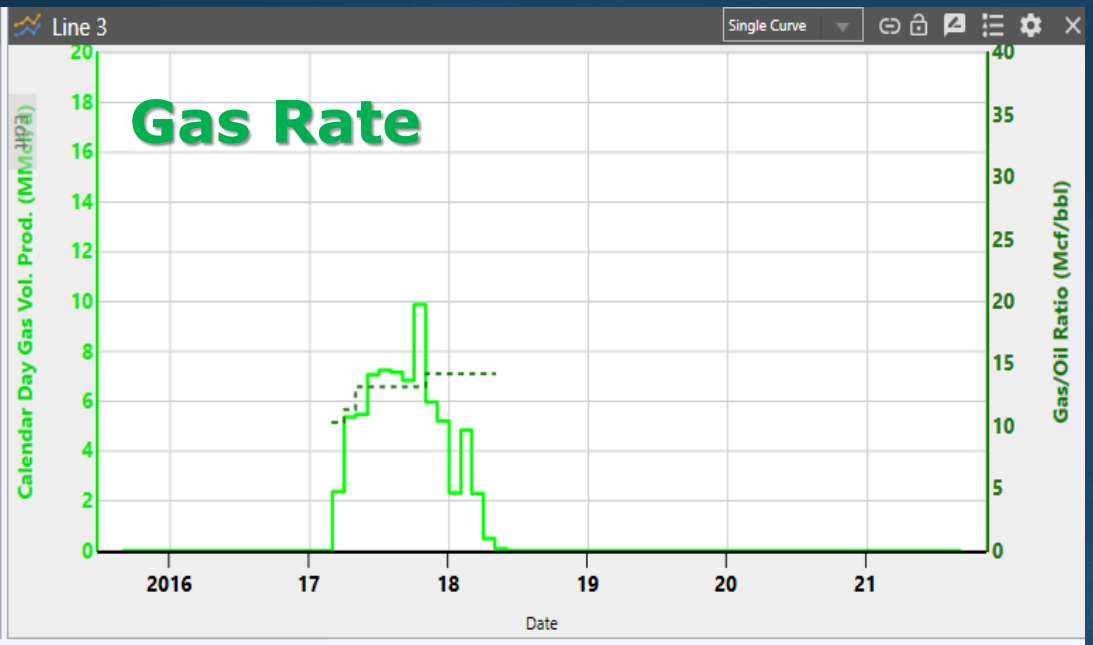

Line 3
Single Curve
Gas Rate
Calendar Day Gas Vol. Prod. (MMcf/d)
Gas/Oil Ratio (Mcf/bbl)
Date

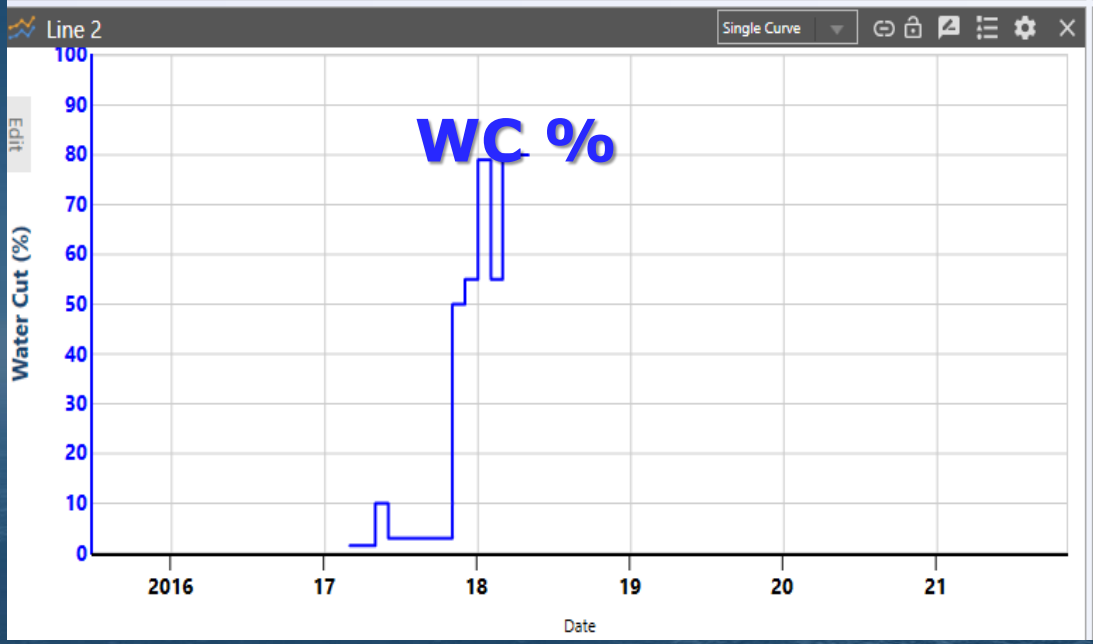

Line 2
Single Curve
WC %
Water Cut (%)
Date

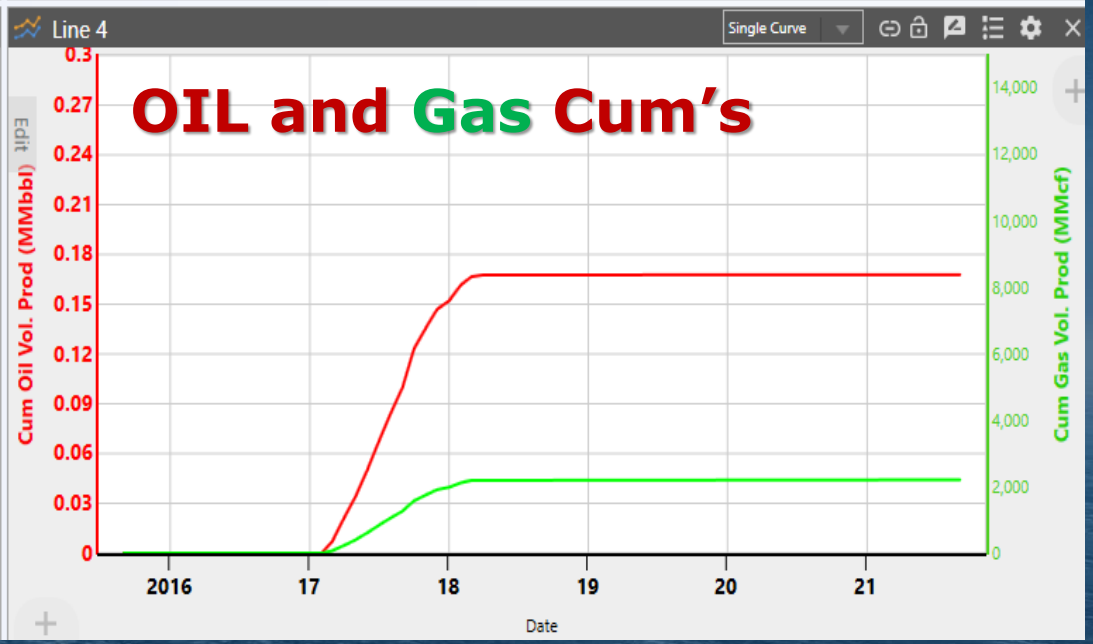

Line 4
Single Curve
OIL and Gas Cum's
Cum Oil Vol. Prod (MMbbl)
Cum Gas Vol. Prod (MMcf)
Date

WELL-4X

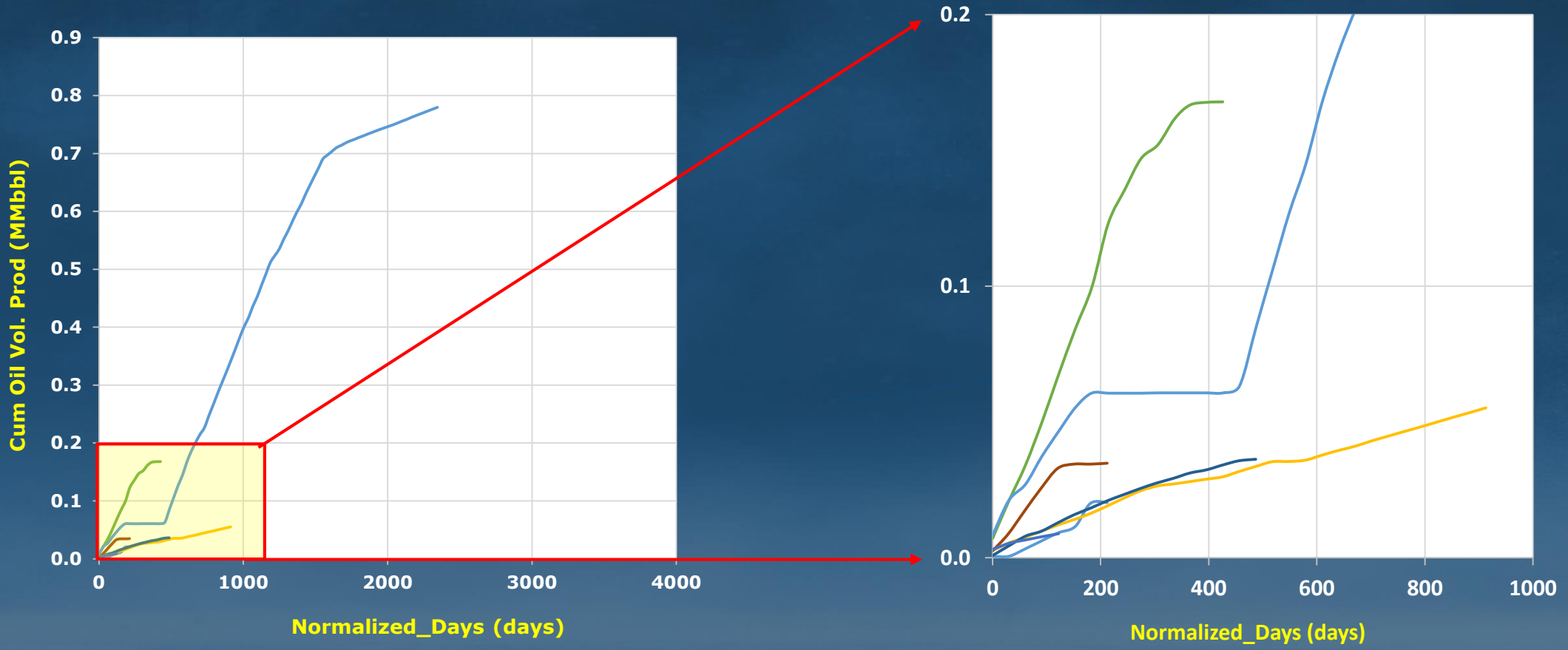

Line 1
Single Curve
Oil Rate
Acid Job
CV.Bopd (bbl/d)
Calendar Day Liquid Vol. Prod (bbl/d)
Date


Line 3
Single Curve
Gas Rate
Calendar Day Gas Vol. Prod. (MMcf/d)
Gas/Oil Ratio (Mcf/bbl)
Date

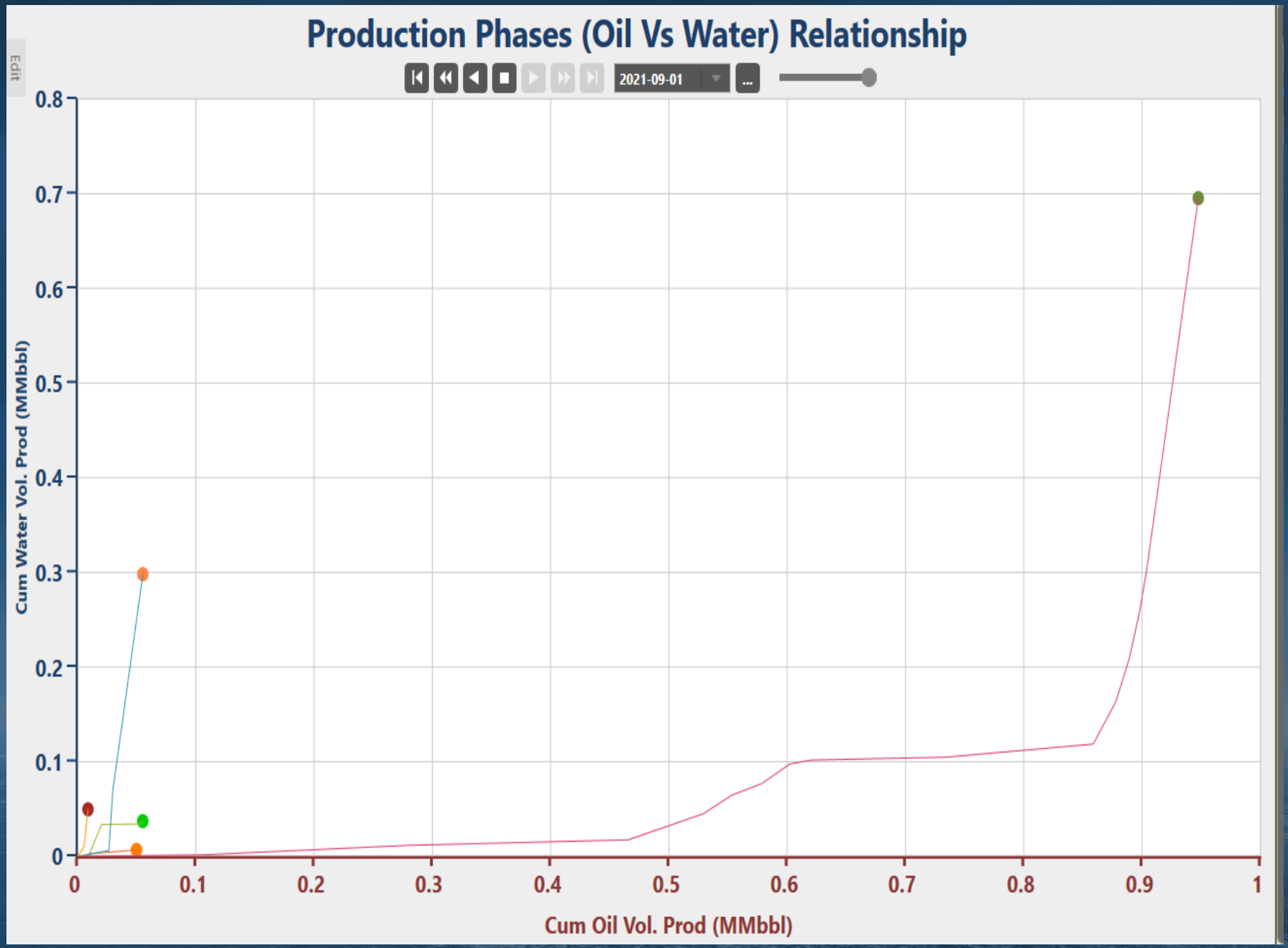

Line 2
Single Curve
WC %
Water Cut (%)
Date


Line 4
Single Curve
OIL and Gas Cum's
Cum Oil Vol. Prod (MMbbl)
Cum Gas Vol. Prod (MMcf)
Date

CUMULATIVE OIL PRODUCTION PER WELL



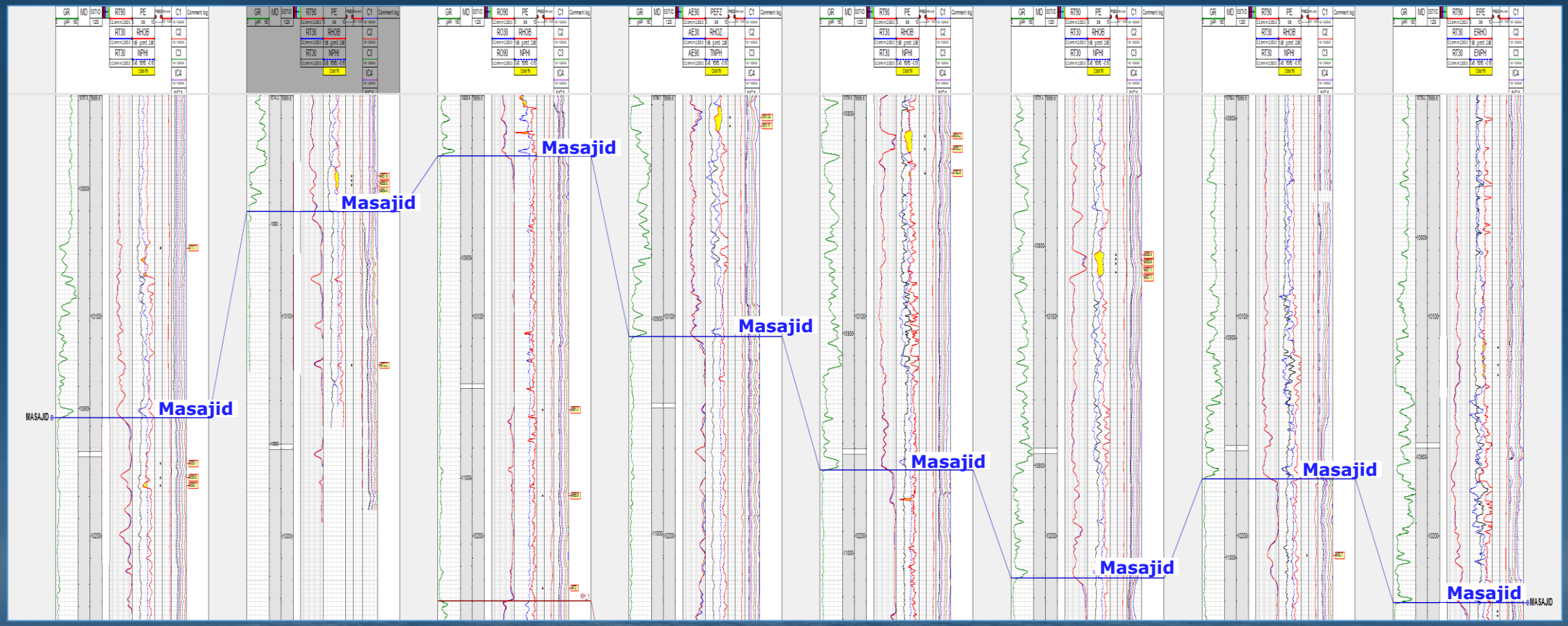
PRODUCTION PHASES RELATIONSHIP CUMULATIVE OIL VS CUMULATIVE WATER



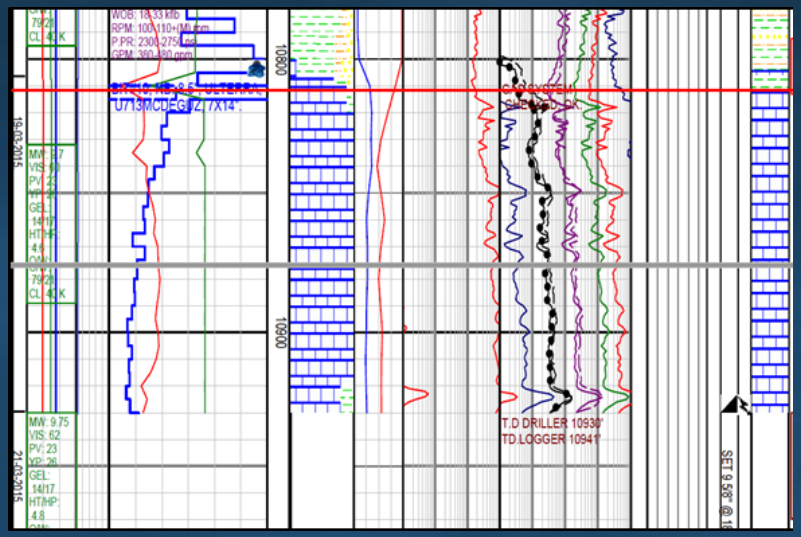
MASAJID FM. STRUCTURAL CORRELATION (W-SE)

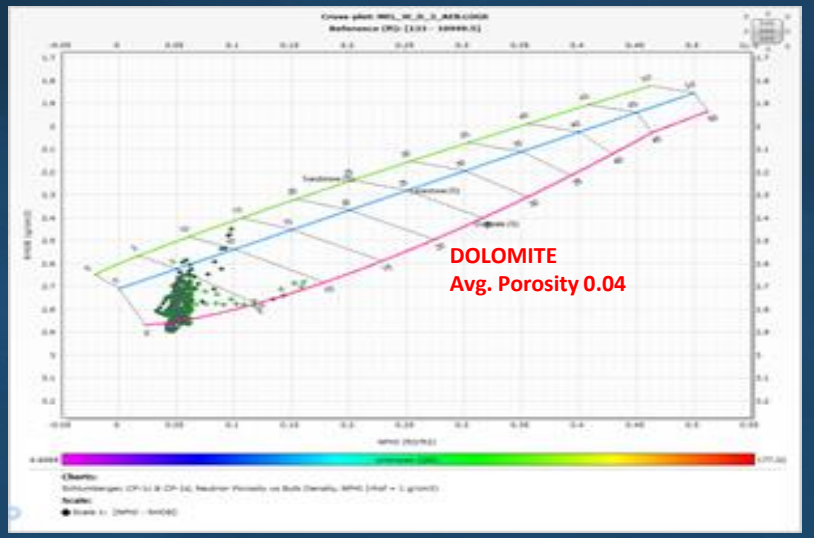
(MASAJID_IN DIRECTION W-SE)

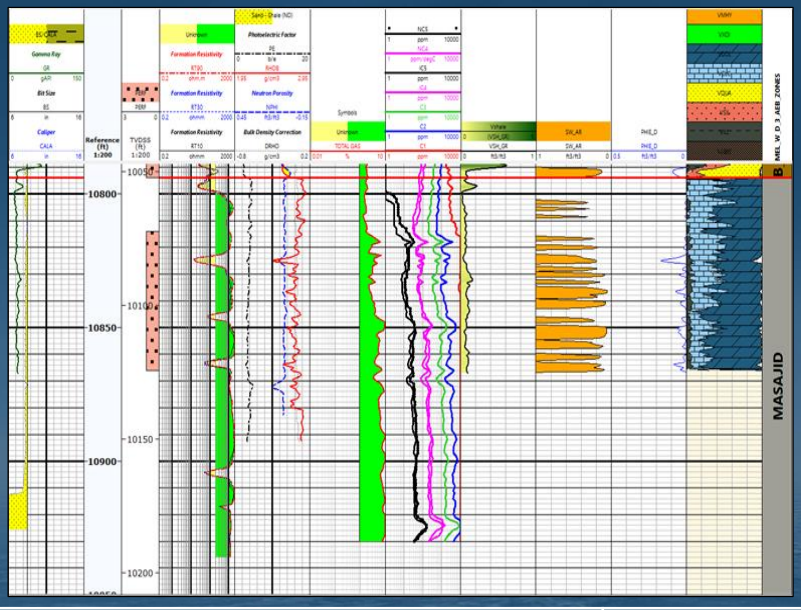
W SE

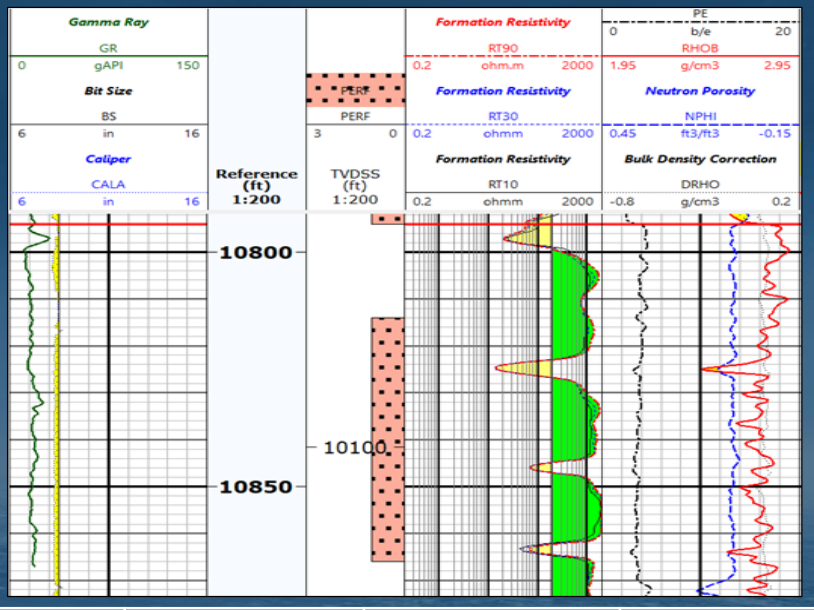


WELL-3X (TESTED)



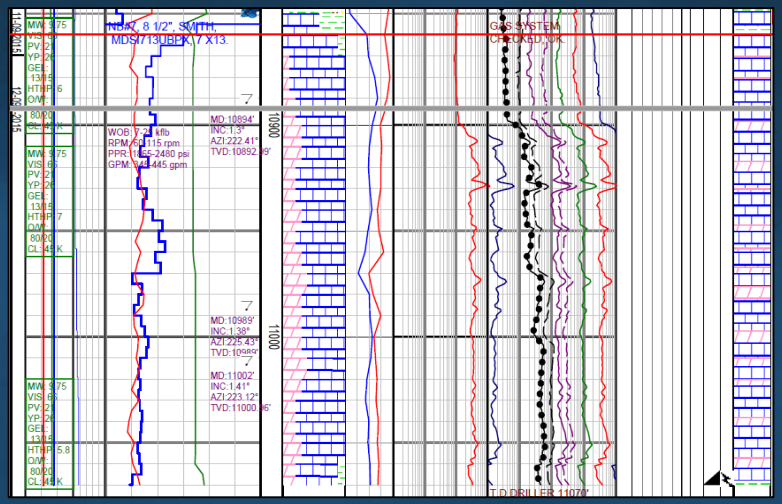


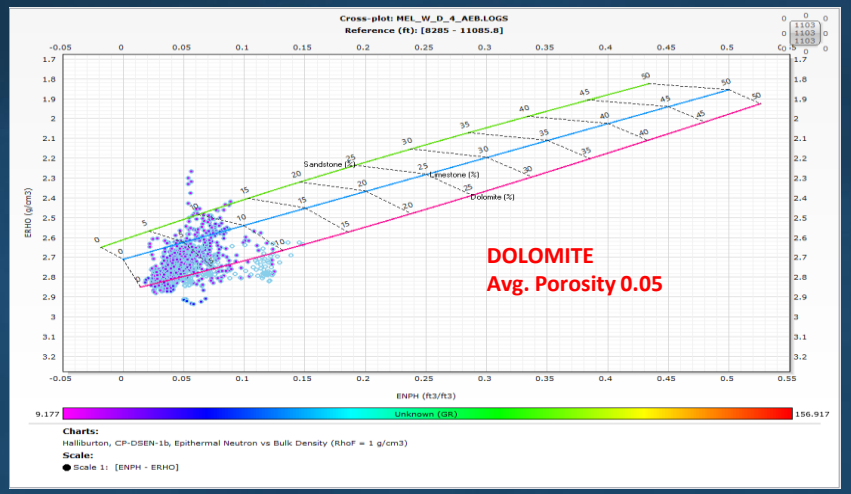


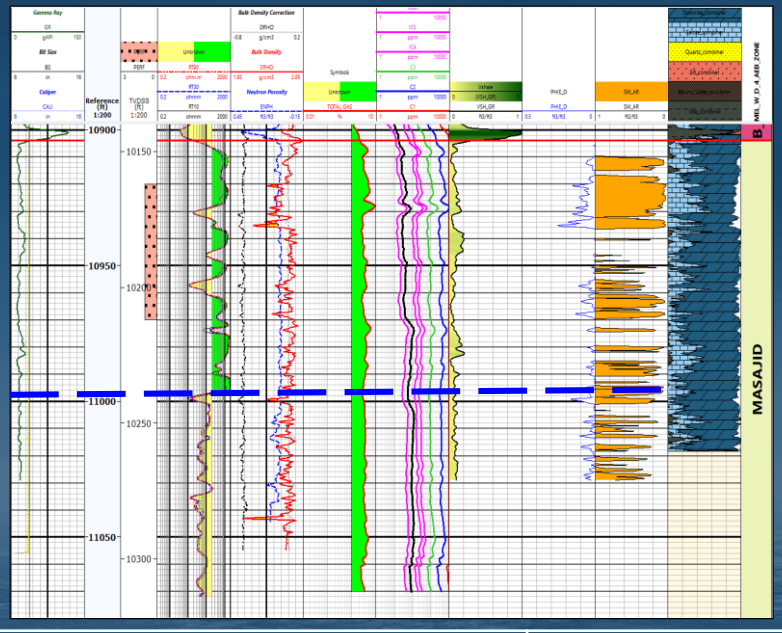


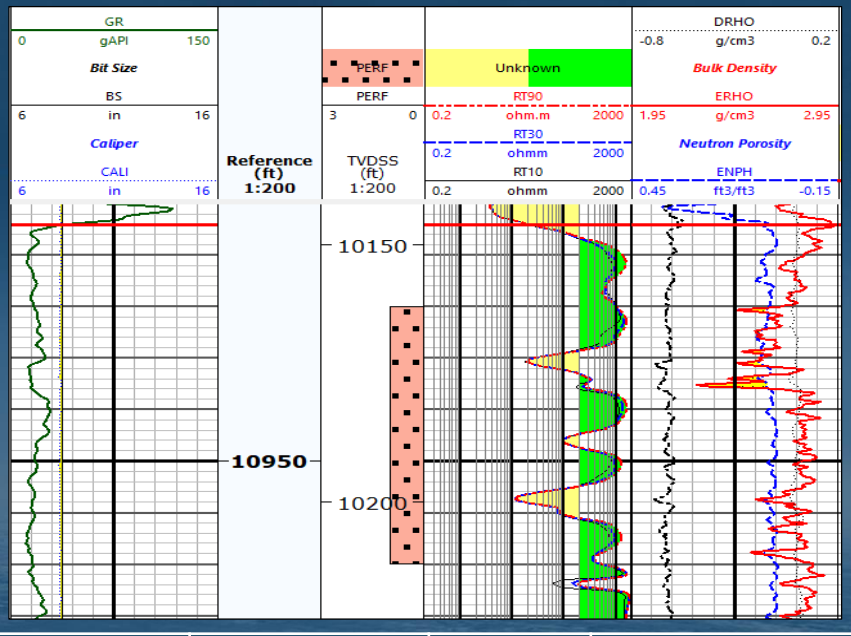
Initial Rate						Last Test						Masajid Current Status	Wellbore States	Note
Date	Gross	Net	W.C	Gas Rate	GOR	Date	Gross	Net	W.C	Gas Rate	GOR			
7-Apr-15	250	250	0	3.63	14532	22-Jul-21	1035	103.5	90	1.982	19150	Open	Producing (MSJD + AEB-VI)	Last Test provided was on MSJD only without AEB

WELL-4X (TESTED)



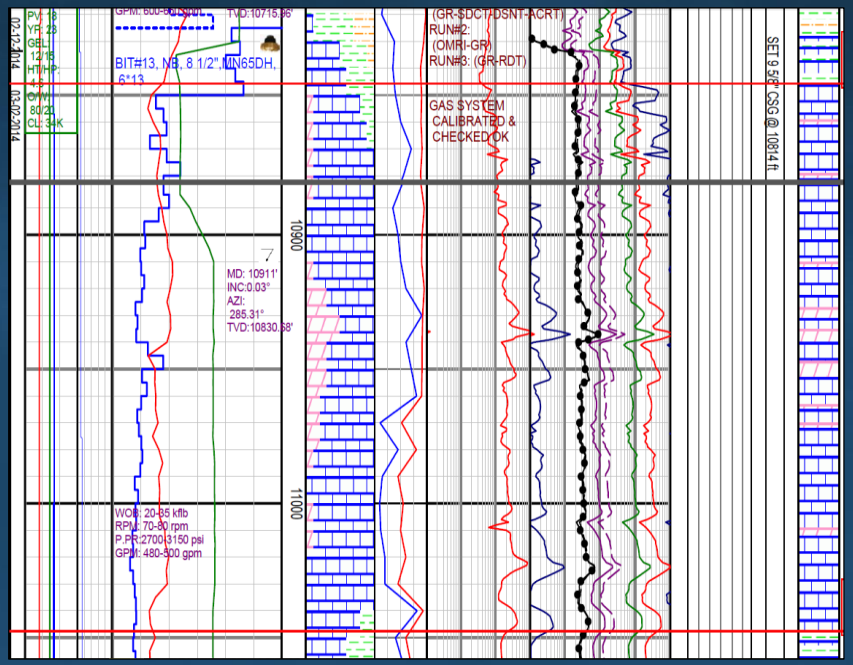


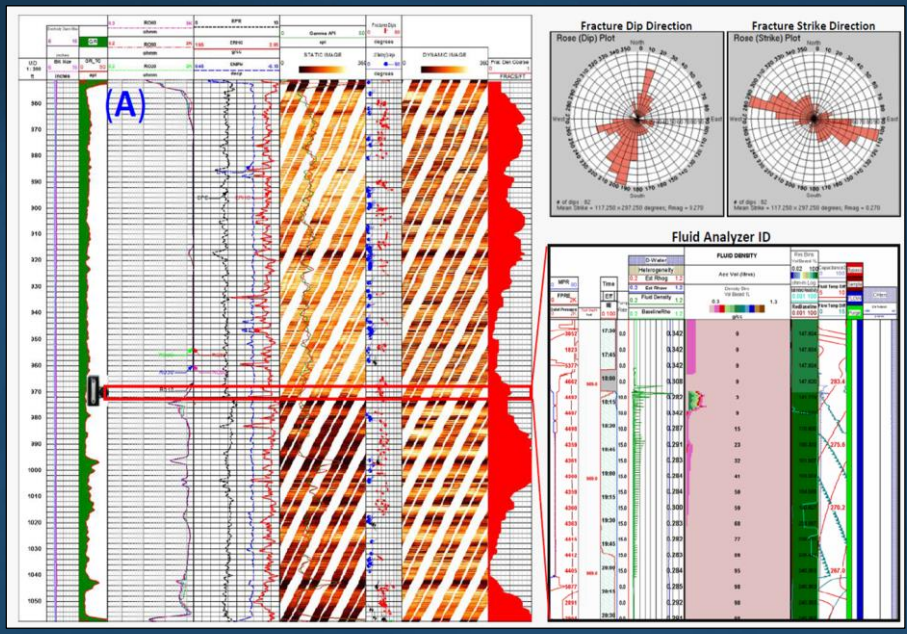


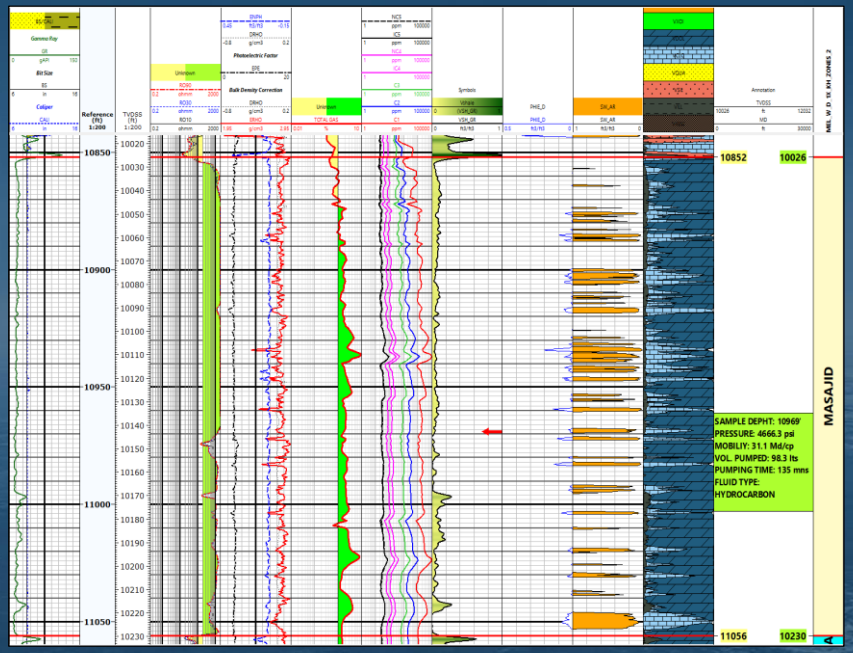


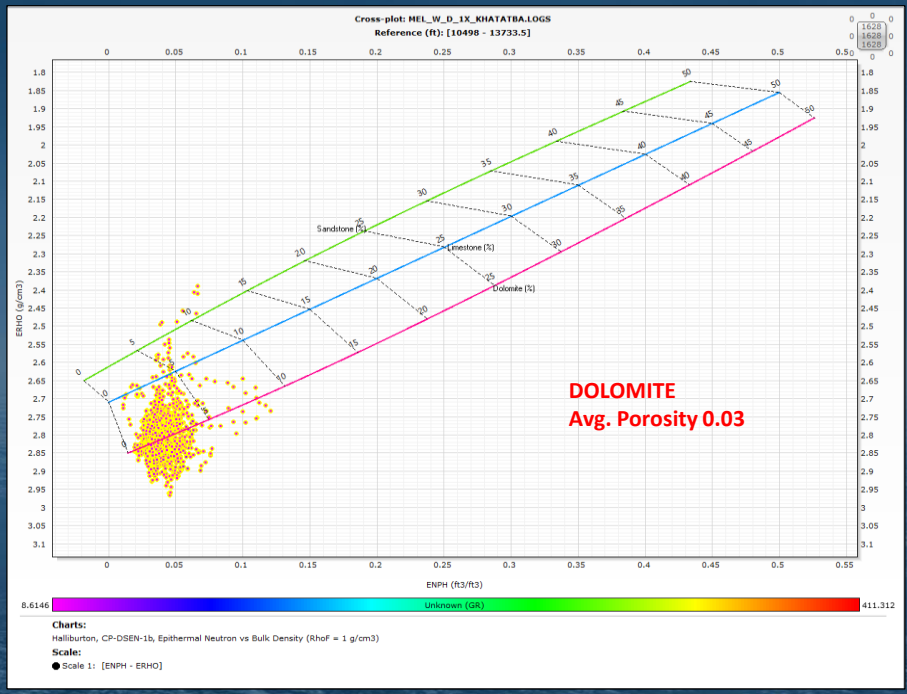
Initial Rate						Last Test						Masajid Current Status	Wellbore States	Note
Date	Gross	Net	W.C	Gas Rate	GOR	Date	Gross	Net	W.C	Gas Rate	GOR			
19-Mar-17	240	218.4	9	2.138	9789.4	25-Feb-19	1265	50.6	96	0.165	3260.9	Open	Closed	After acid, rate increased to 360 bfpd & 4% wc

WELL-1X (POTENTIAL)

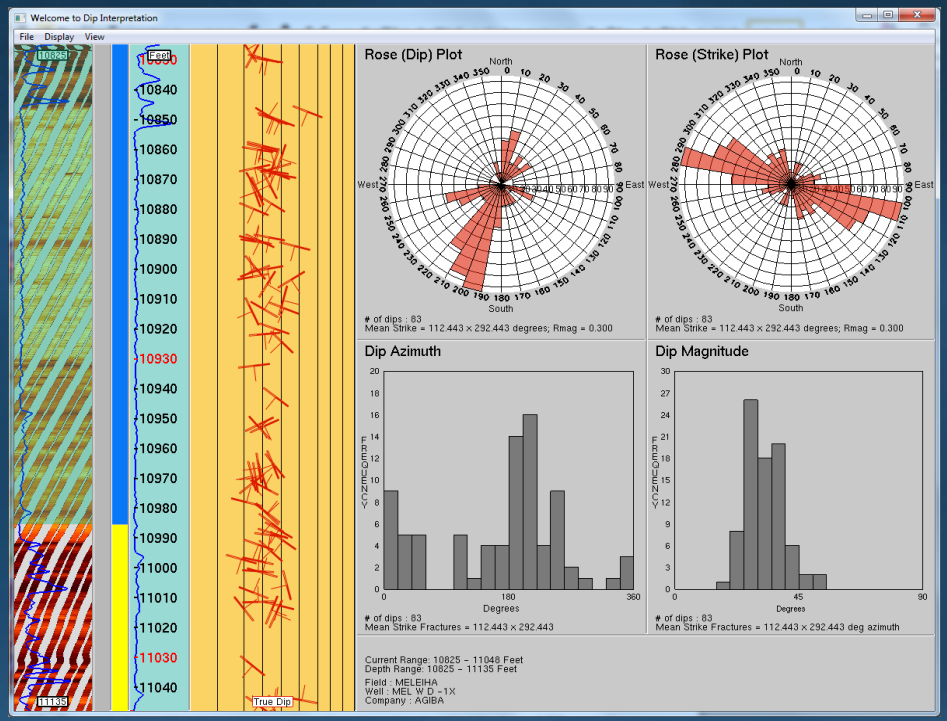


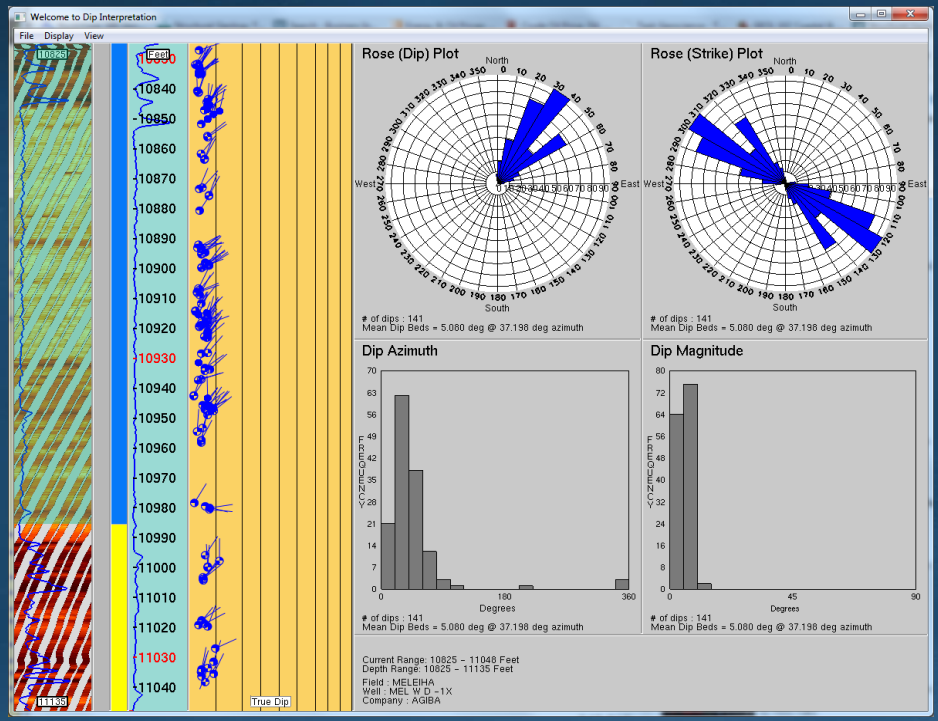


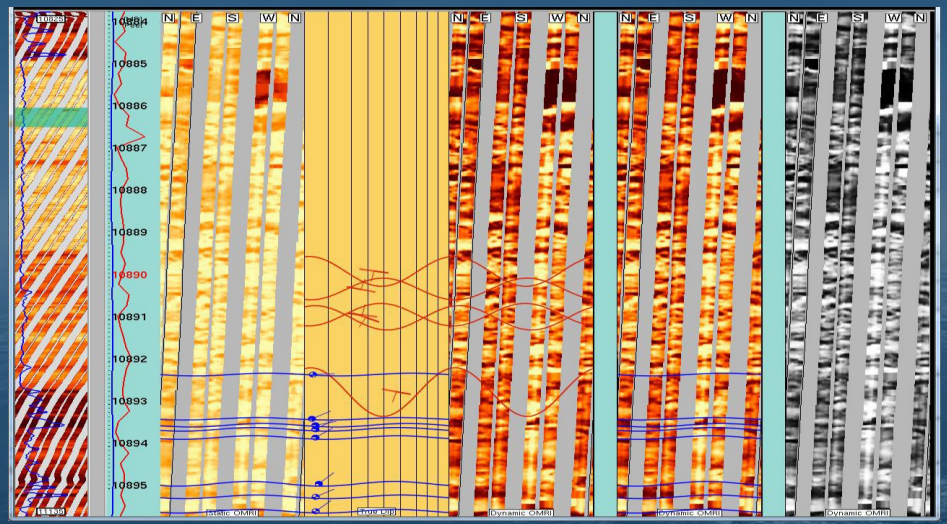


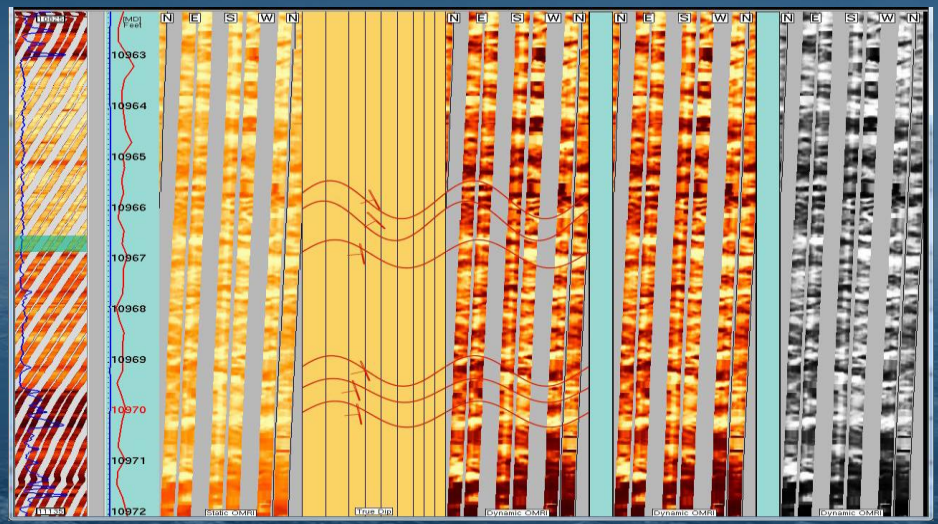


WELL-1X (POTENTIAL)

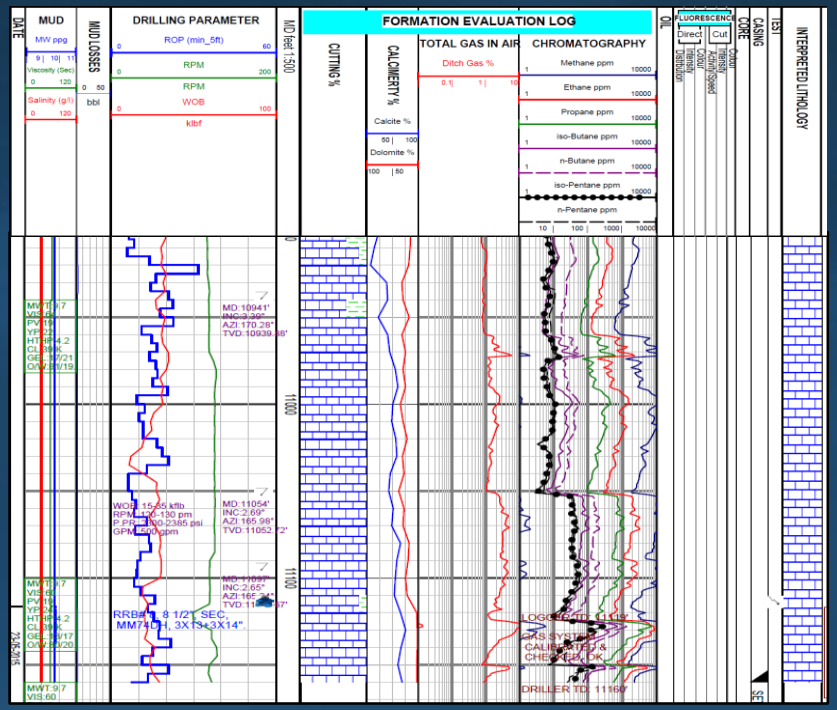


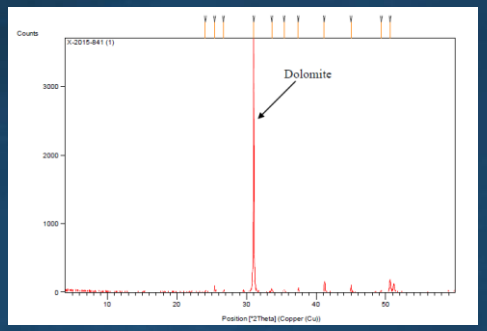


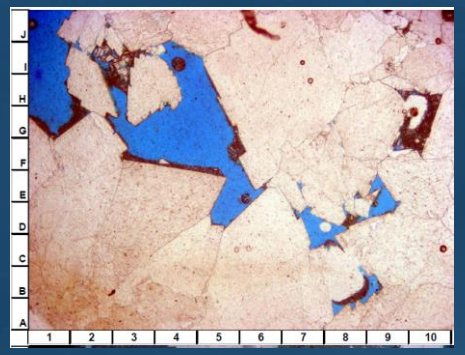


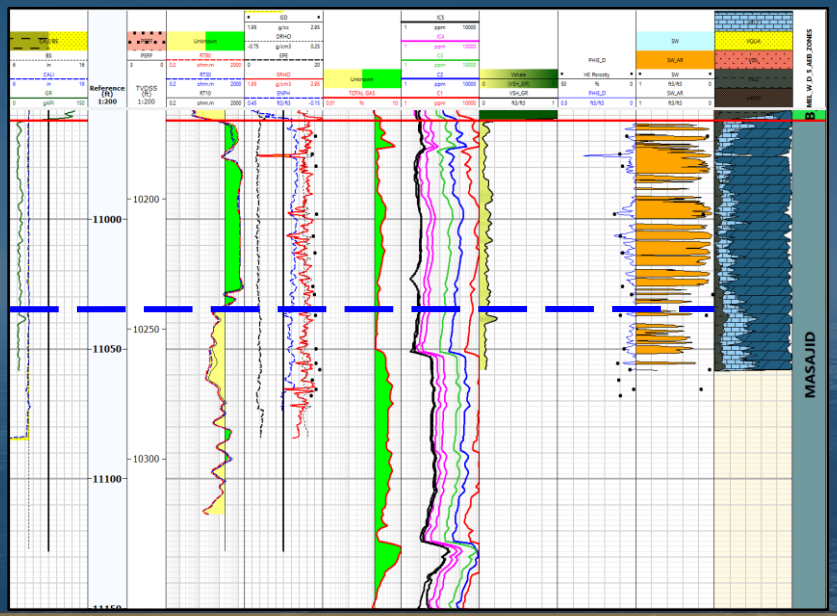


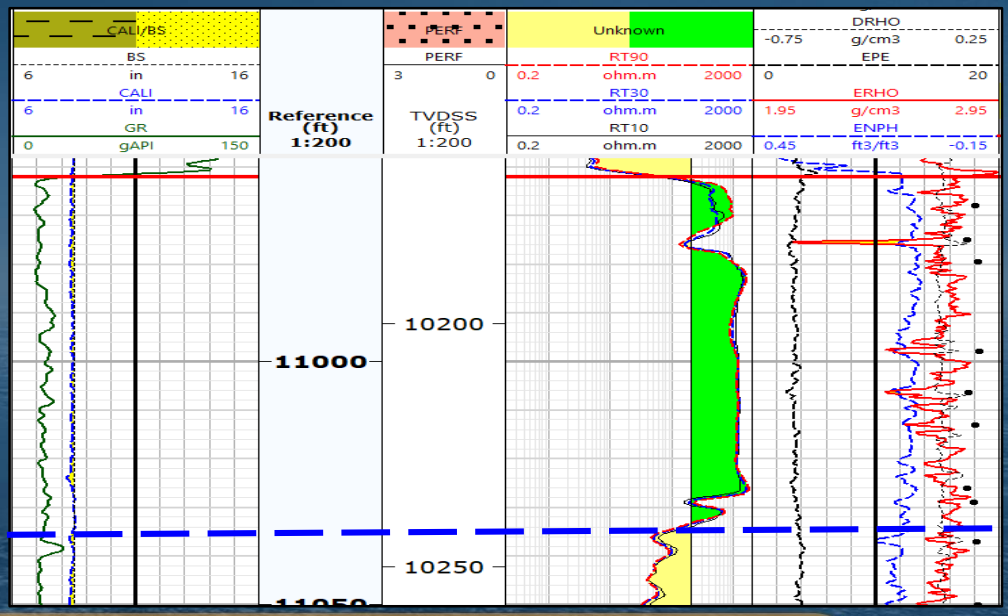
WELL-5X (POTENTIAL)



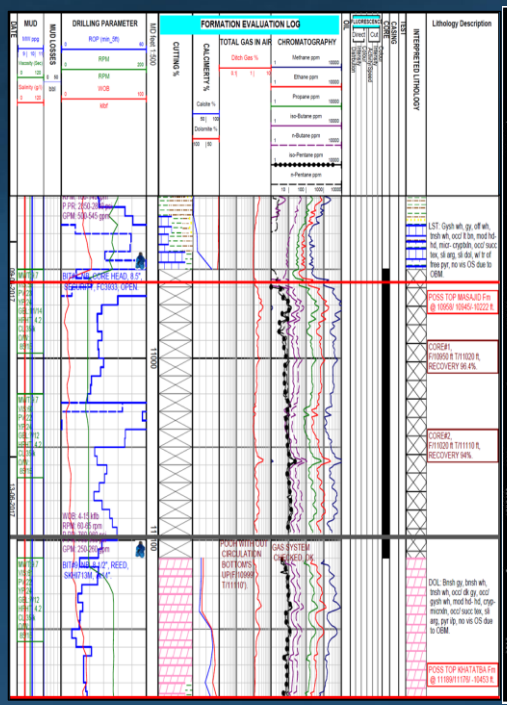


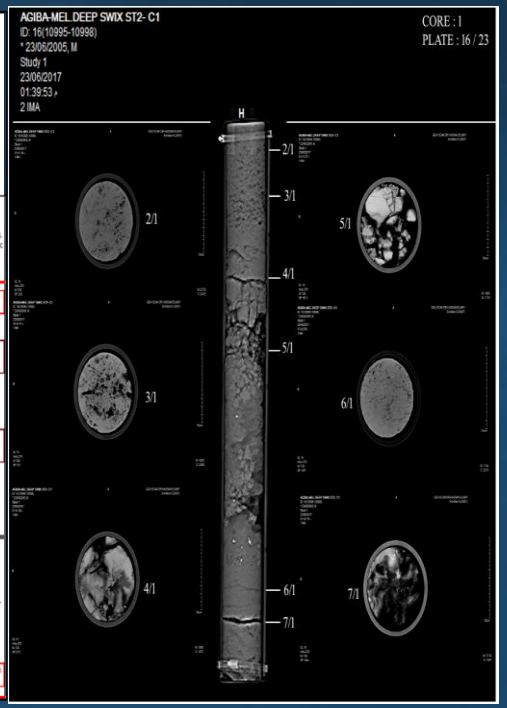


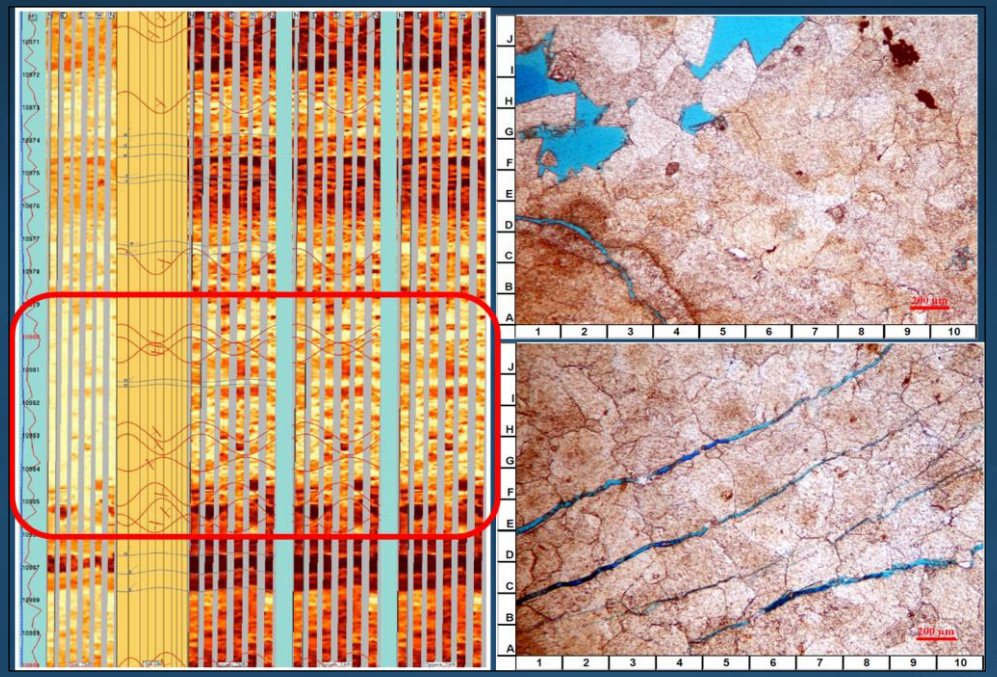


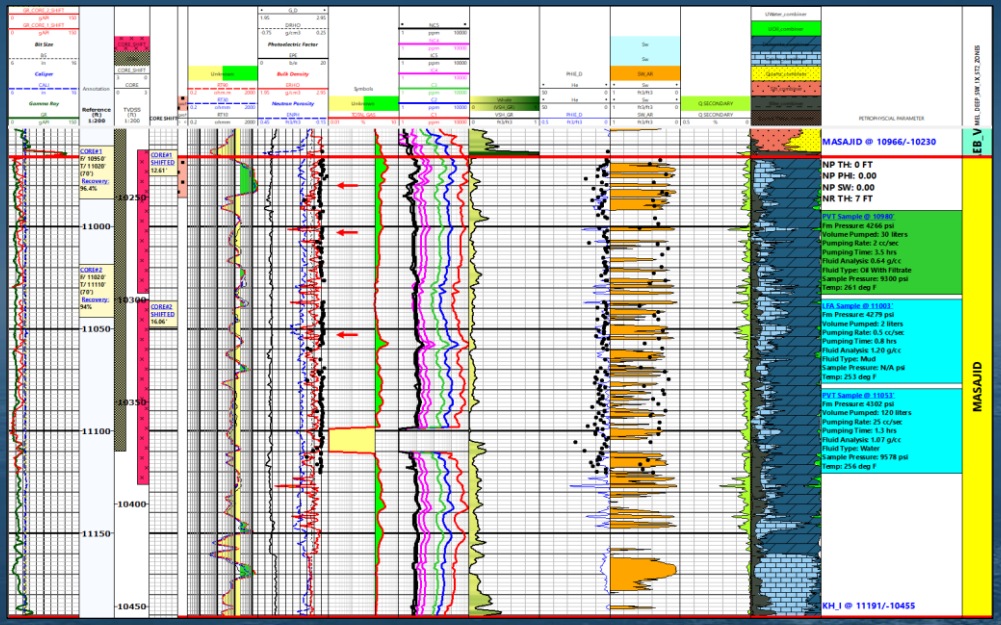


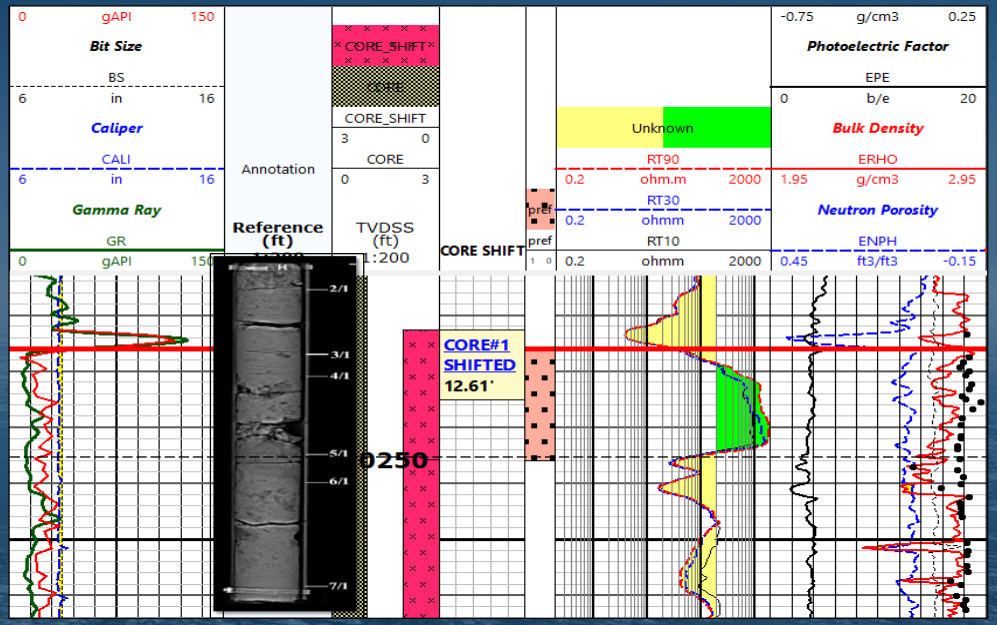
WELL-1DX (TESTED)



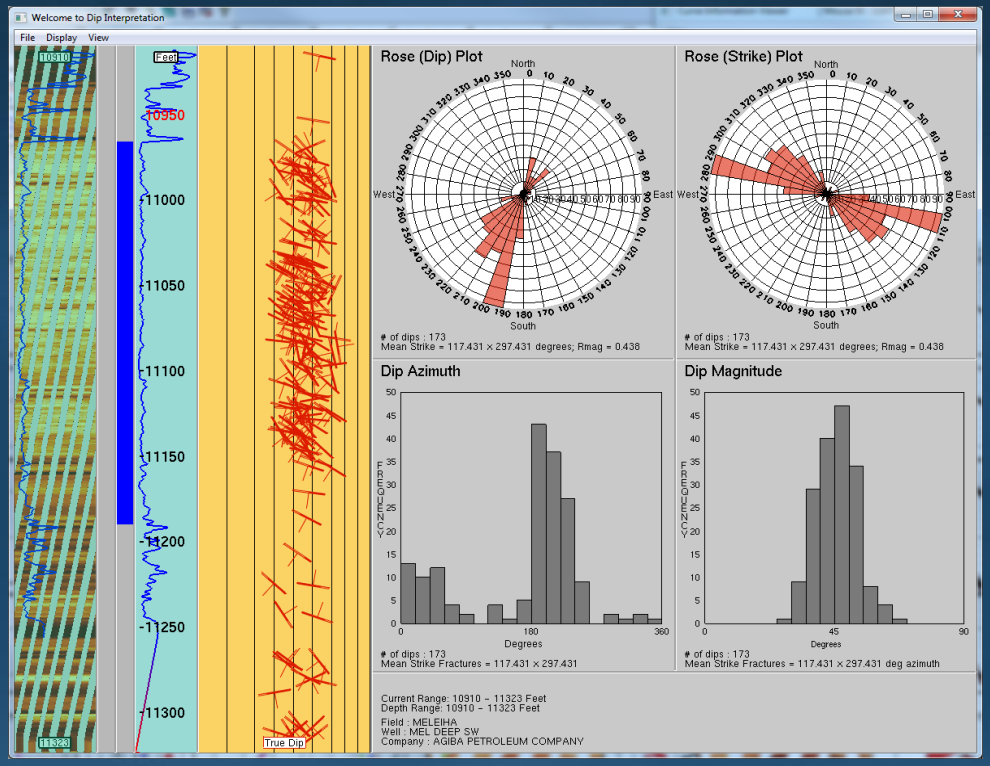


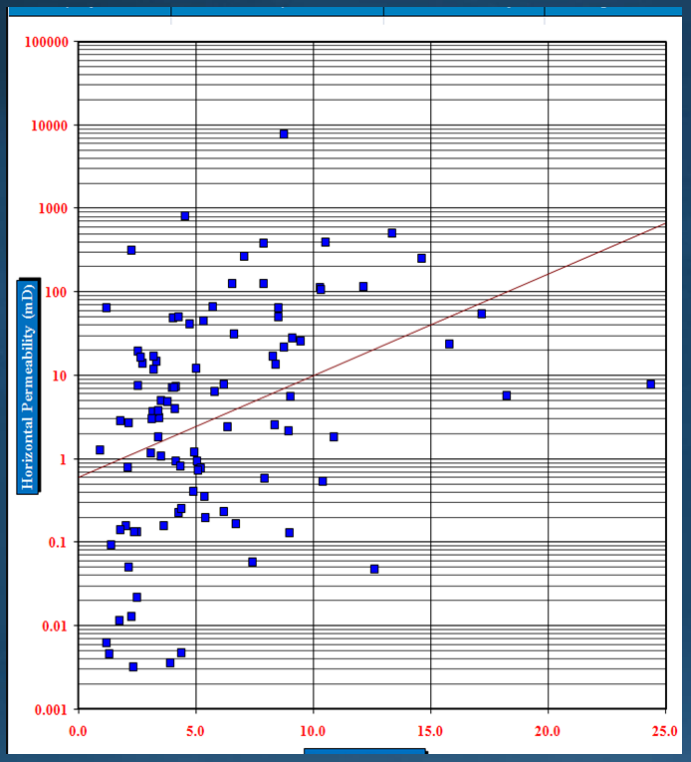


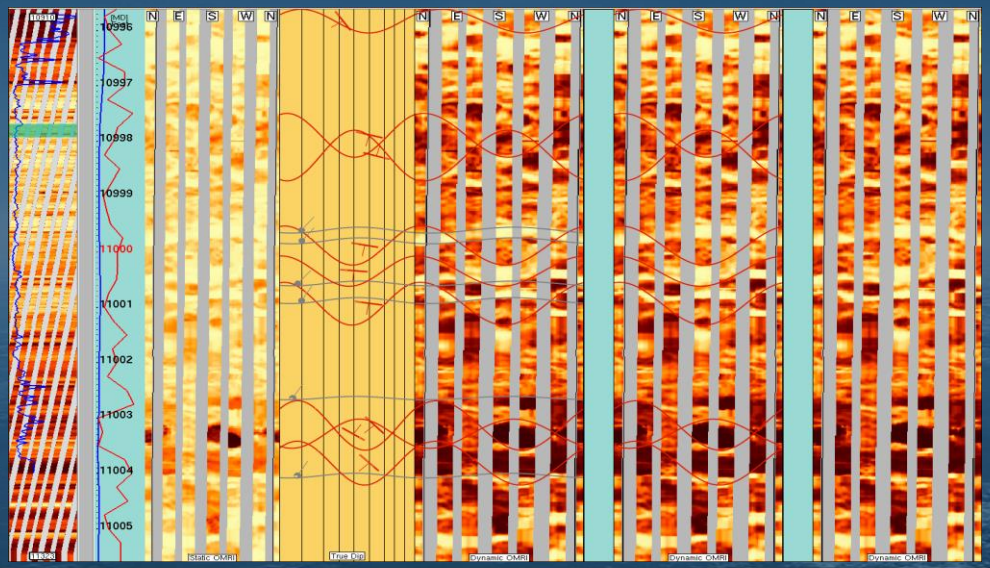


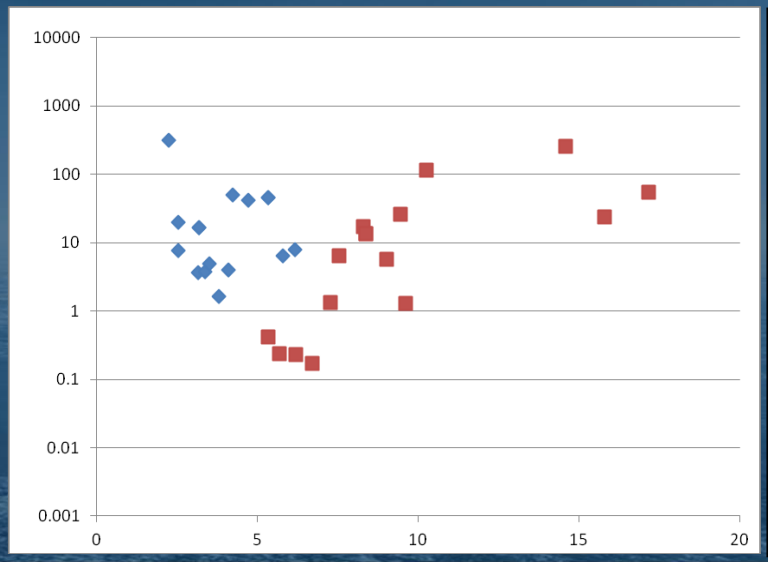


WELL-1DX (TESTED)







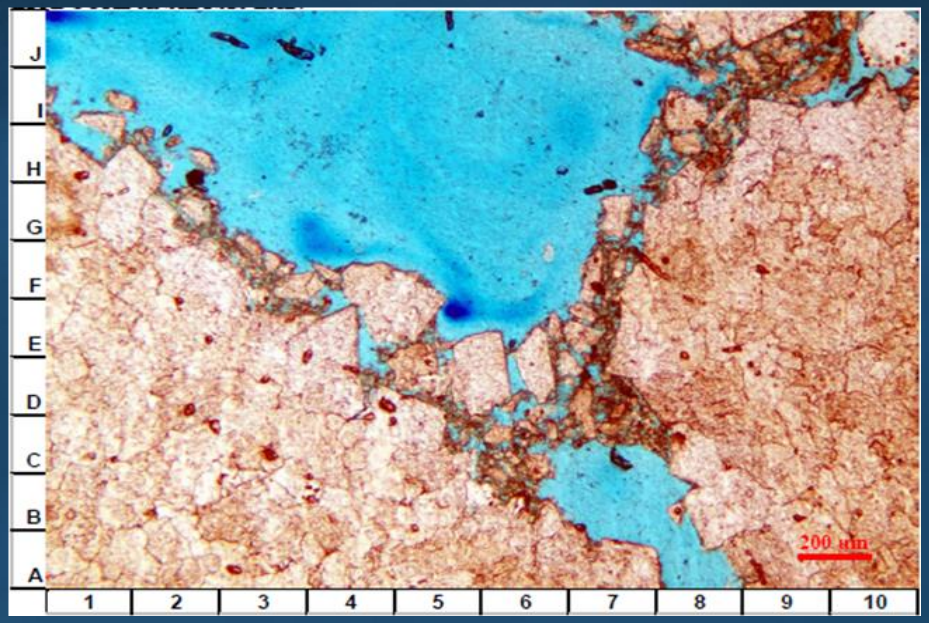


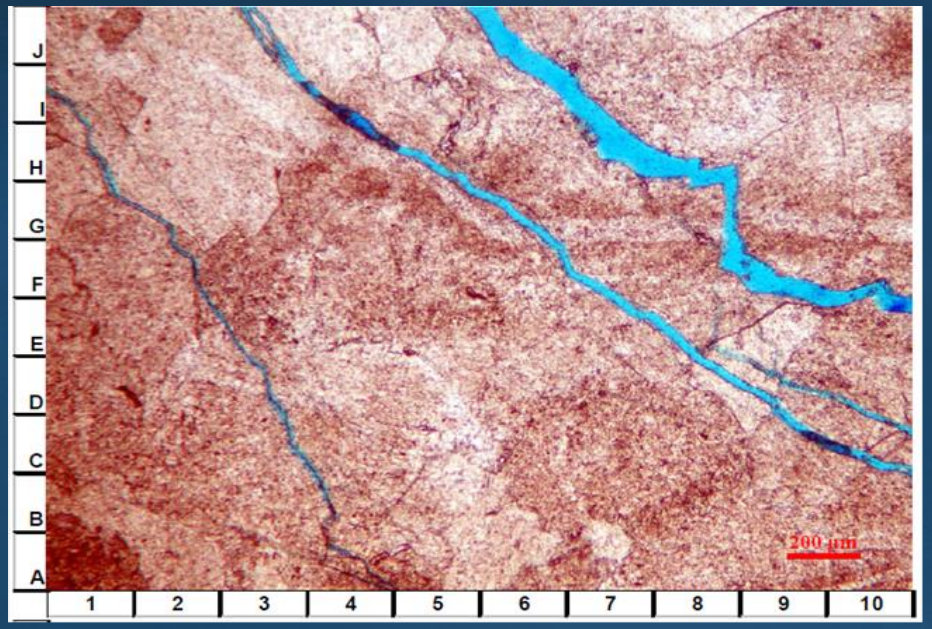
Rock type (I): Fracture Reservoir
Ka average = 36.9 mD
Φ average = 3.95%

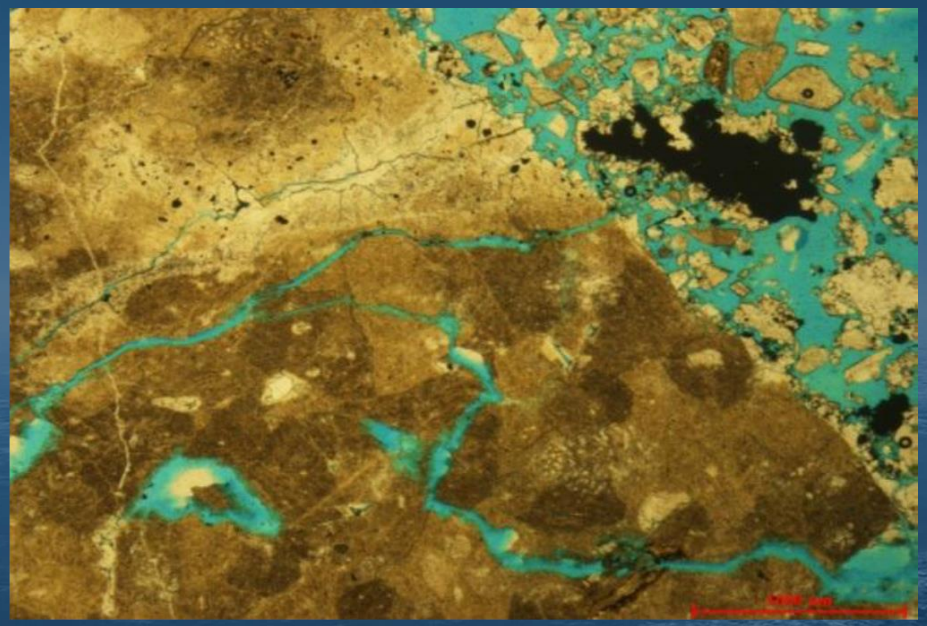
Rock type (II): Vuggy Reservoir
Ka average = 33.43 Md
Φ average = 9.35%

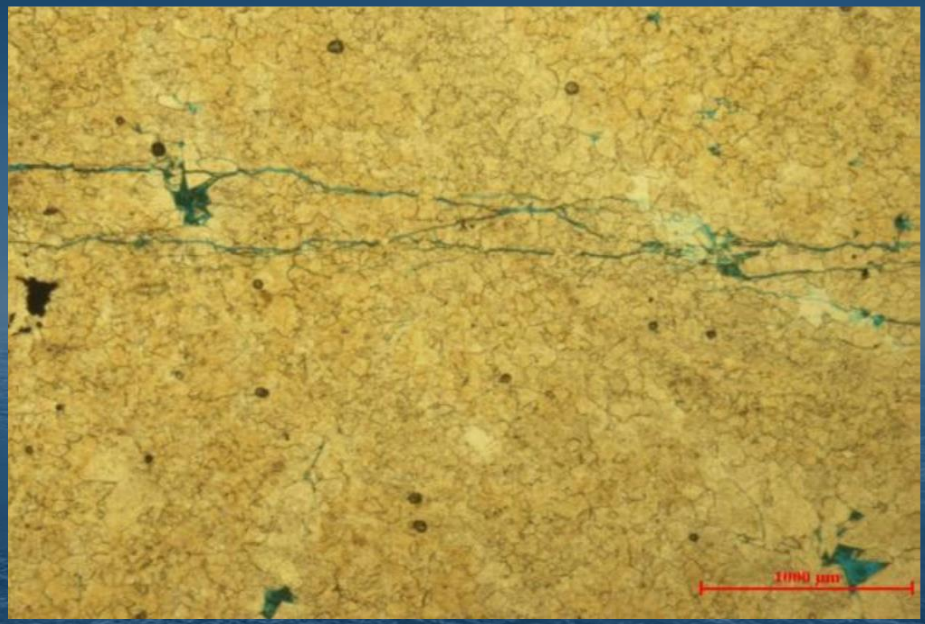
THE MAIN DIAGENETIC PROCESSES RECORDED IN MASAJID FM.

1- Carbonate dissolution/karstification:- dissolution cavernous/vugs and channel fracturing

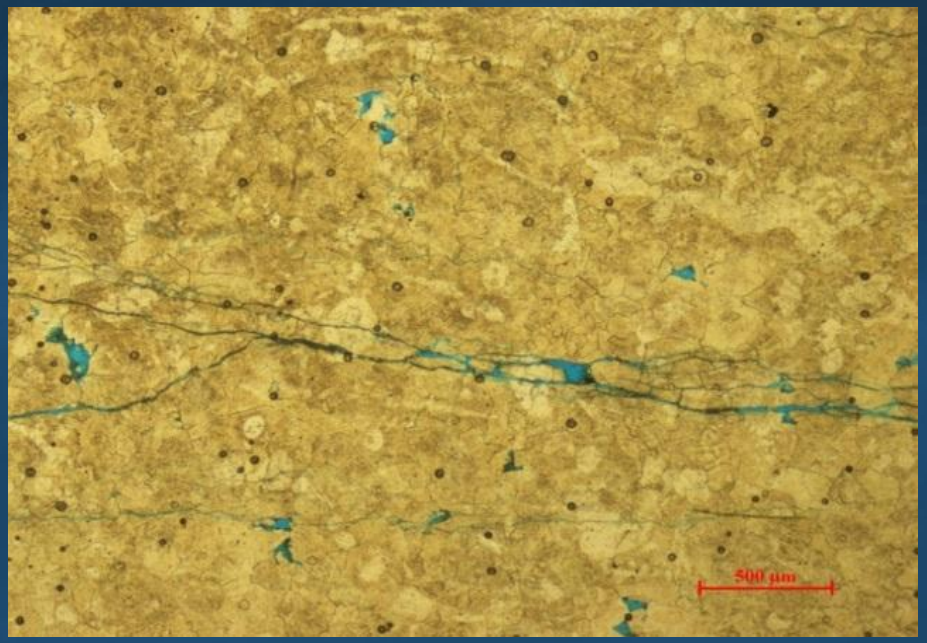




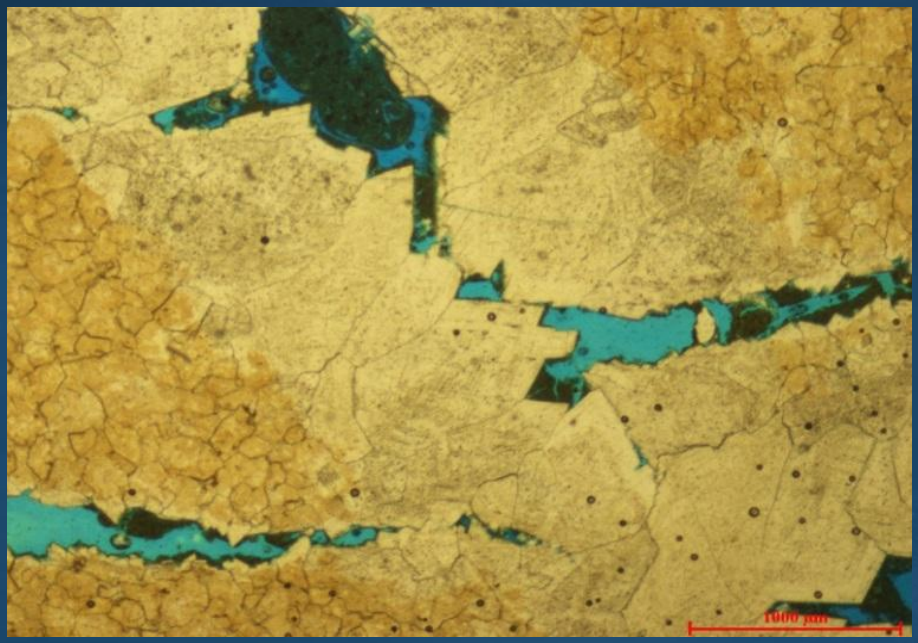




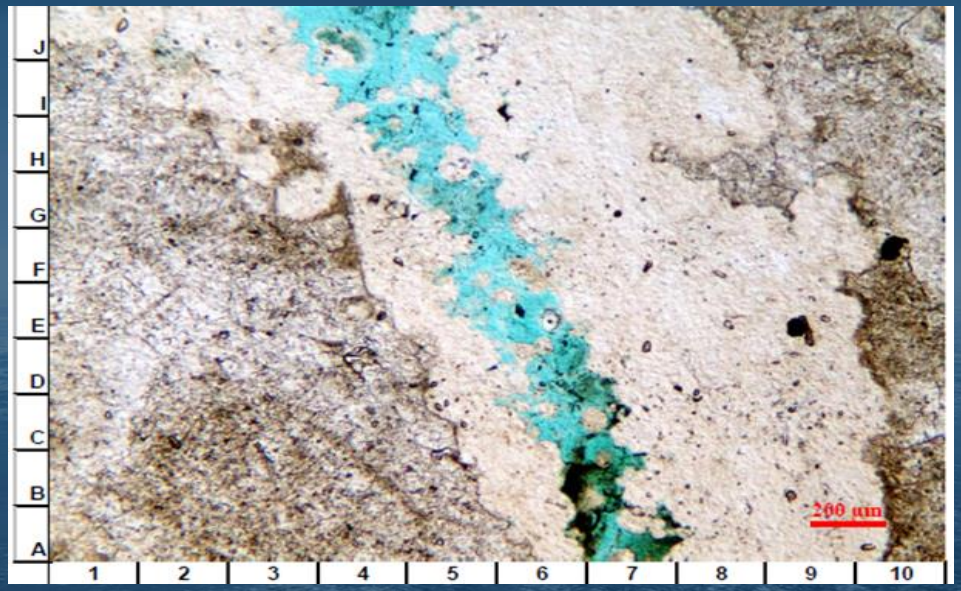
THE MAIN DIAGENETIC PROCESSES RECORDED IN MASAJID FM.



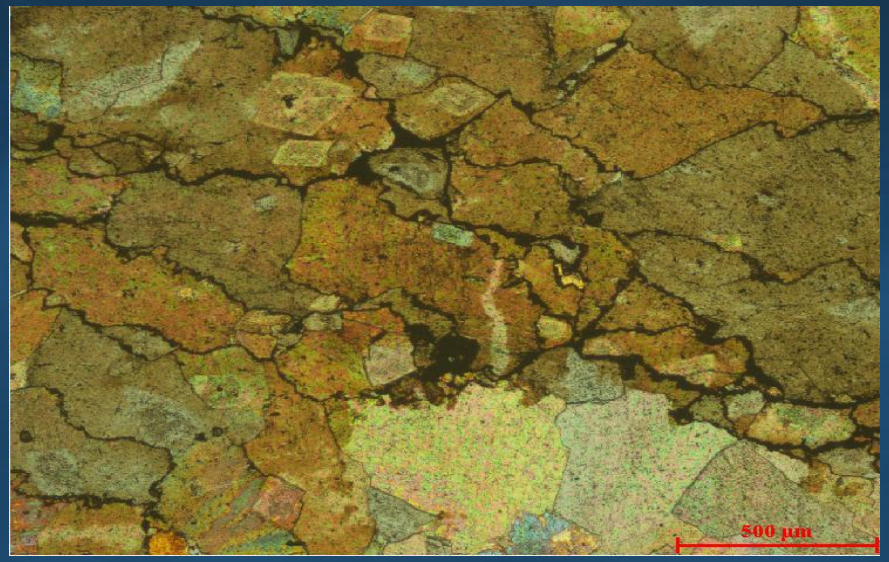
Early Dolomitization



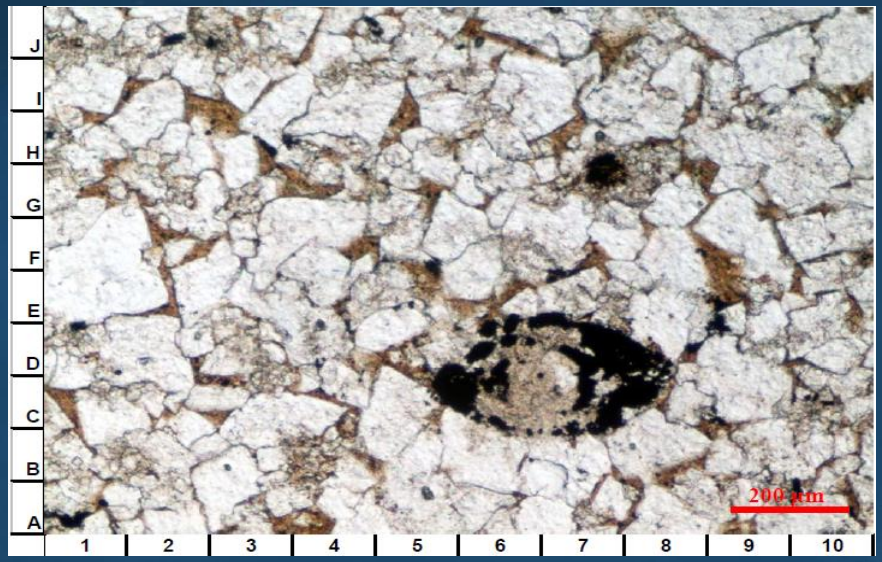
Late Dolomitization



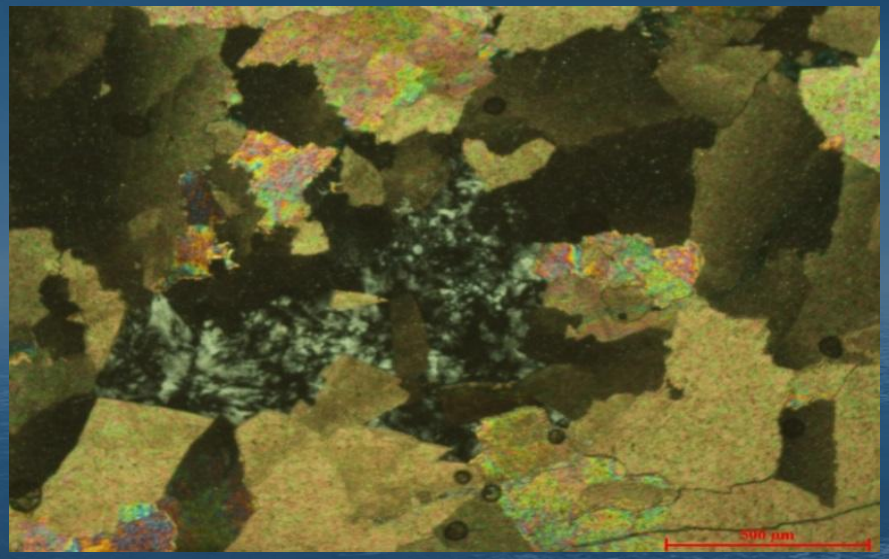
THE MAIN DIAGENETIC PROCESSES RECORDED IN MASAJID FM.



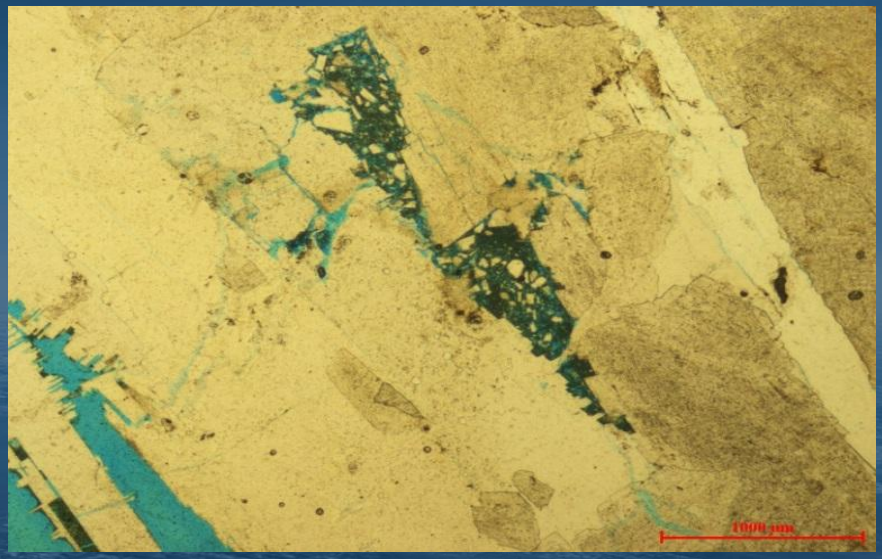
Compaction (chemical compaction concavo-convex &) serrated contacts



Few bioclasts partially cemented by bituminous materials

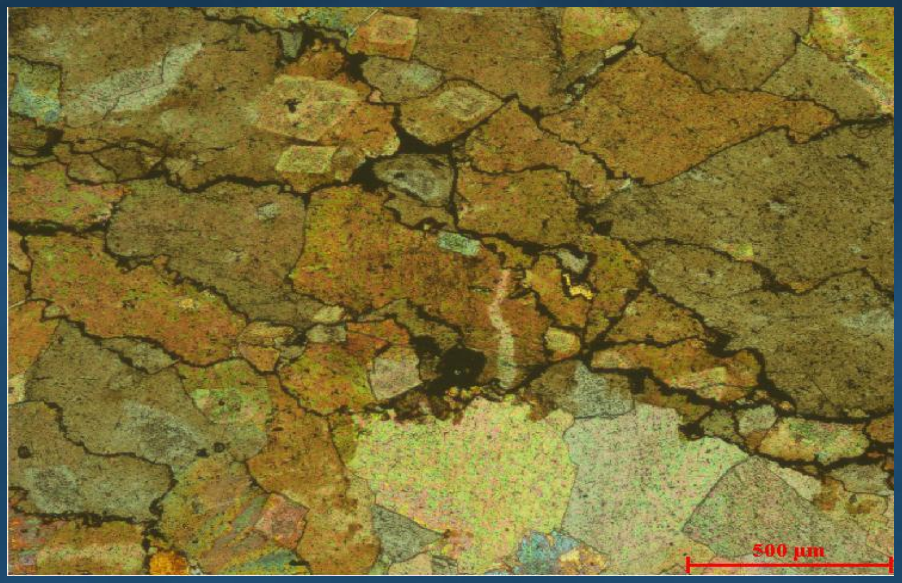


Micro-crystalline silica pore filling

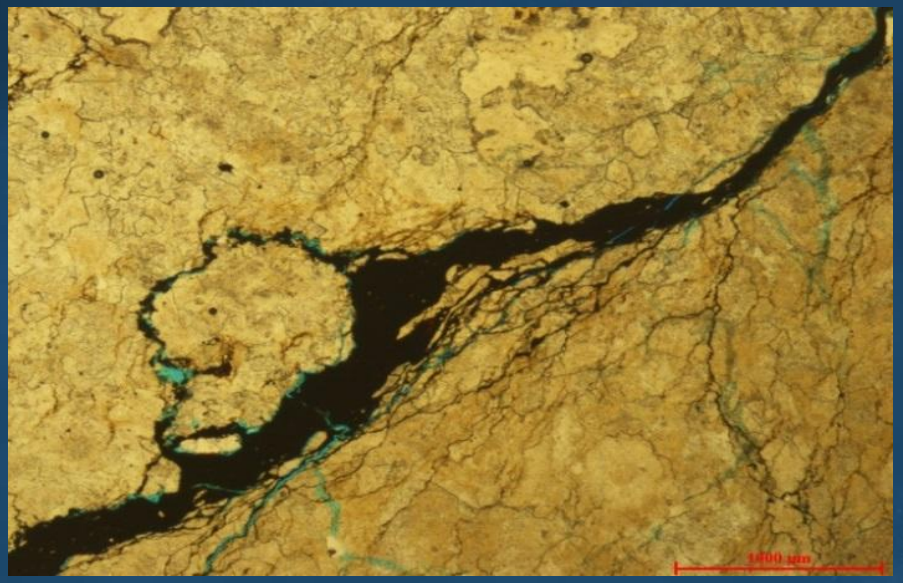


Nodular anhydrite crystals with prismatic texture

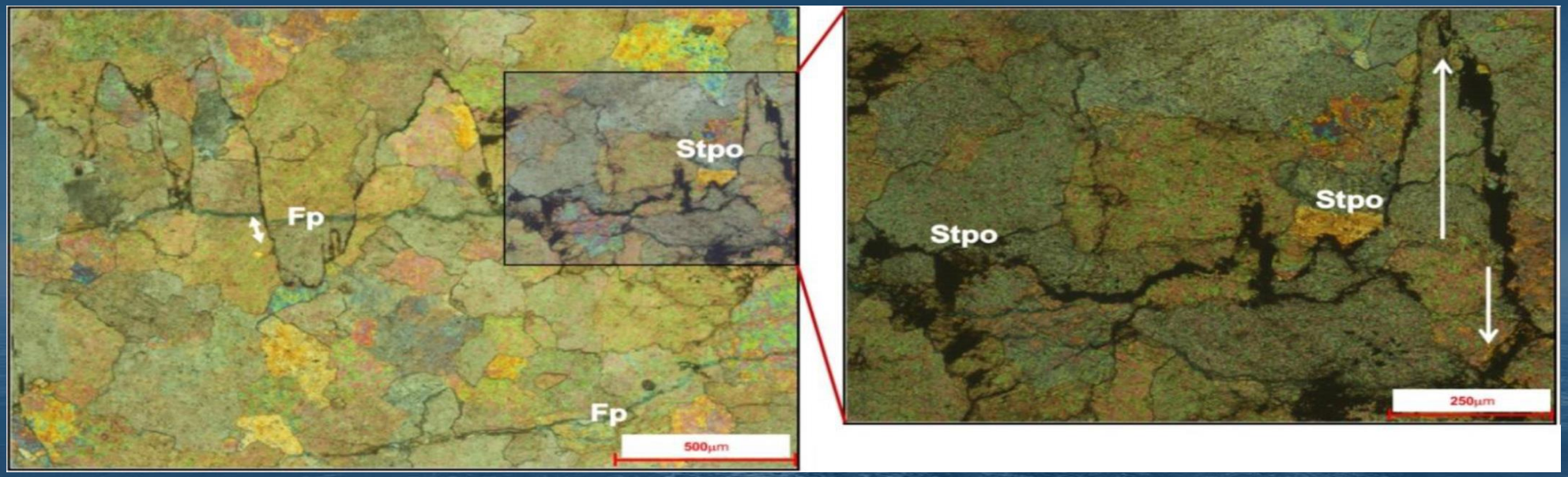
STYLOLITE'S TYPES



(1) Wave-like stylolite's



2) Horsetail stylolite's



(3) High-amplitude stylolite's

CONCLUSION

Prediction of Masajid reservoir quality is a critical challenge for hydrocarbon exploration and field development.

- **From Geological Point Of View:**
  - The variations in the preserved thickness of the Masajid Formation are largely a function of the local variations in the severity of "Cimmerian" erosion. Also "Cimmerian" unconformity is controlling to a great extent the degree of dissolution and dolomitization of the Masajid reservoir.
- **From Petrophysical Point Of View:**
  - The promising hydrocarbon bearing reservoir characterized by high Gas anomaly & high Resistivity (fourth cycle), while water bearing reservoir characterized by low Gas anomaly & low Resistivity.
- **From Petrographical Point Of View:**
  - Karstification, dissolution vugs, fracturing, early dolomitization and pressure solution contribute much to enhance porosity of the Masajid carbonate reservoir in Meleiha West Deep field
  - On the other hand, several diagenetic processes diminish porosity and damage the reservoir quality such as compaction as well as the cementation of the late dolomitization phase.
- **From Production Point Of View:**
  - The production of Masajid ranges from 100 to 700 barrels per day, depending on the formation quality.
  - The water production increases suddenly after water breakthrough.
  - Due to the poor formation quality, It has been observed that the production increases after closing the well for a while due to the pressure build-up.

RECOMMENDATION

- **From Petrophysical point of view:**
  - Advanced Logging Tools (IMAGE-NMR-SONIC) to be performed to reduce uncertainty in Petrophysical interpretation in Masajid Formation.
- **From Petrographic point of view:**
  - Detailed rock typing based on petrographic analysis to track the high reservoir quality in Masajid Formation.
- **From geological point of view:**
  - Maps for high reservoir quality in Masajid Formation for hydrocarbon exploration and field development.
- **From Production point of view:**
  - Acid stimulation is recommended to improve well productivity, with careful perforation strategy being taken away from the water source.
  - Open hole completion is highly recommended.
  - The integration Studies by Engineers and G&G are required in all the development Processes.
- **From Drilling point of view:**
  - WBM to be used instead of OBM for drilling in Masajid Fm.

AGIBA

Petroleum Company

THANK YOU