AUGUSTIN

EXPLORATION

# *Crossing the "Line of Death";*

## A Progress Update on the southern Dawson County "conventional/unconventional Hybrid Plays" Development (2019-2025)

# Acknowledgements


- **Dan Jarvie/Mark Sonnenfeld/Lynn Kantor**

  **Diagenetic Model of Unconventional oil generation and production, Migration through Source Rock, Diagenetic Model of basinal oil Migration**

- **Pinon Resources (Greg Palko – Geologist)**

  **2019 Drilled the Golden # 1 (1 ½ mile lateral), 1st commercial horizontal well in Dawson County, 1st Dean Test**

- **EOG Resources (Keith Trasko – Geologist)**

  **2020 Drilled the Santorini # 1 Middle Spraberry Test, 1st commercial horizontal Middle Spraberry producer**

- **Reliance Resources (David Schmidt/Stephen Fanning – Geologist)**

  **Developed the Dean "Halo" in Tex Hamon, Had the 1st commercial sale to SM Energy**

# Brief Geo Review

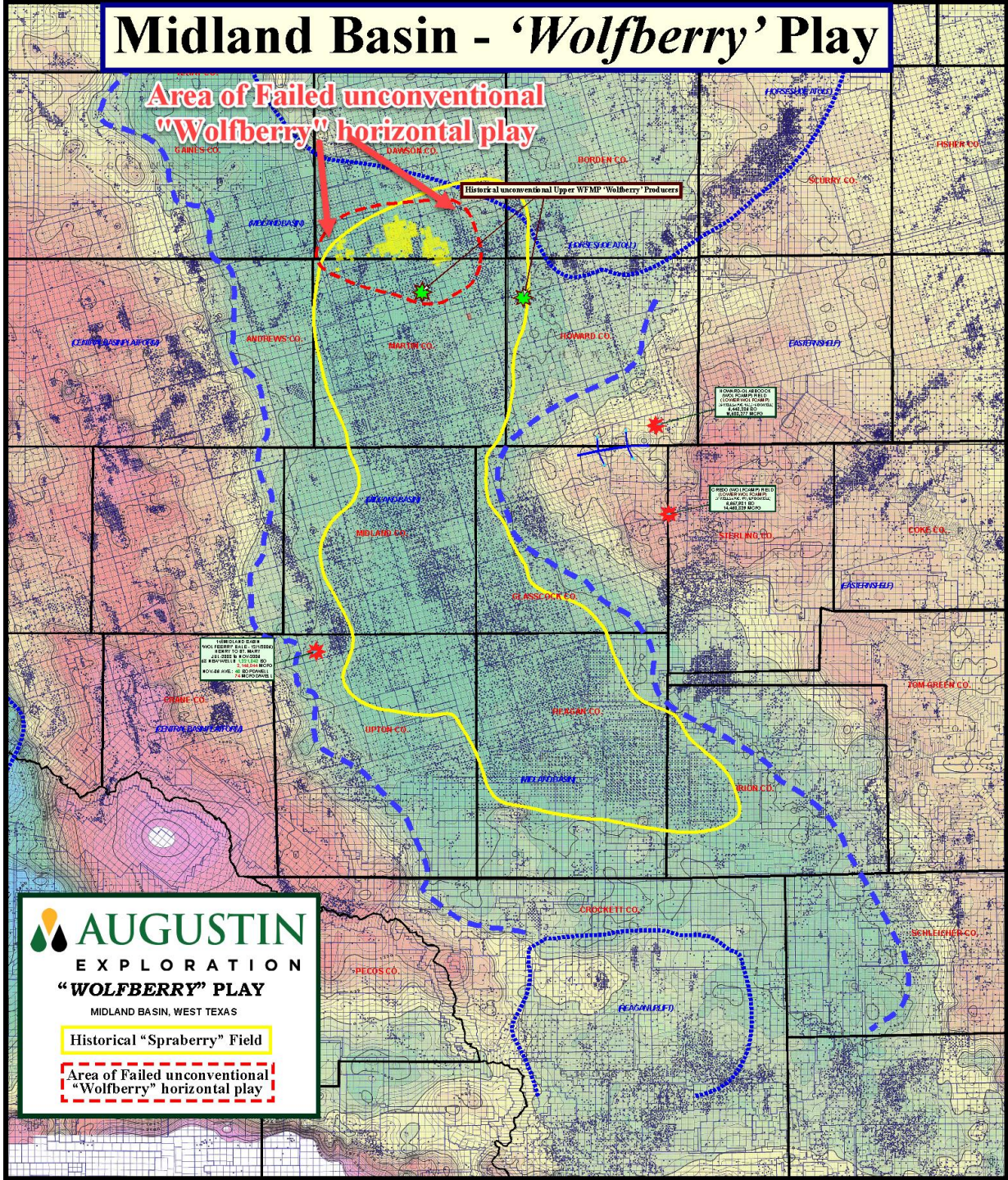
# Midland Basin Resource Development Status – *November 2016*

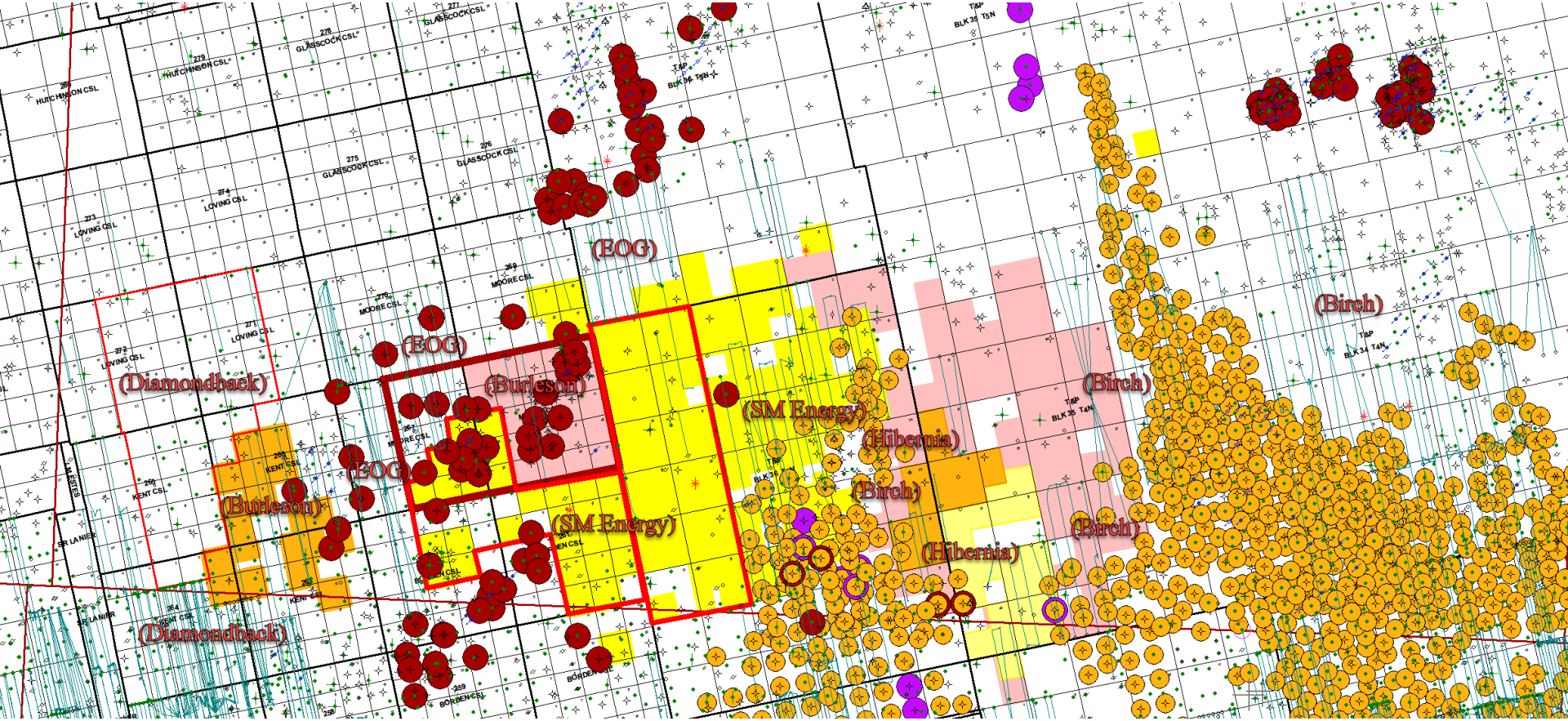
**The Commercial Boundaries for multiple Shale Benches continue to be tested and successfully expanded**

**Longer laterals (2+ miles) and Vintage 3-4 frac Designs continue to significantly Expand the Commercial Boundaries for multiple Horizontal Benches**

**Basinal Sands were the first Driver of the Delaware Basin Resource Development and the last Frontier of the Midland Basin Resource Development**

**The Benches that contain interbedded "Conventional Reservoir/Delivery Systems" to engage/produce the unconventional reservoir (*Conventional/Unconventional Hybrid Systems*) are the most prolific resource in the basin**





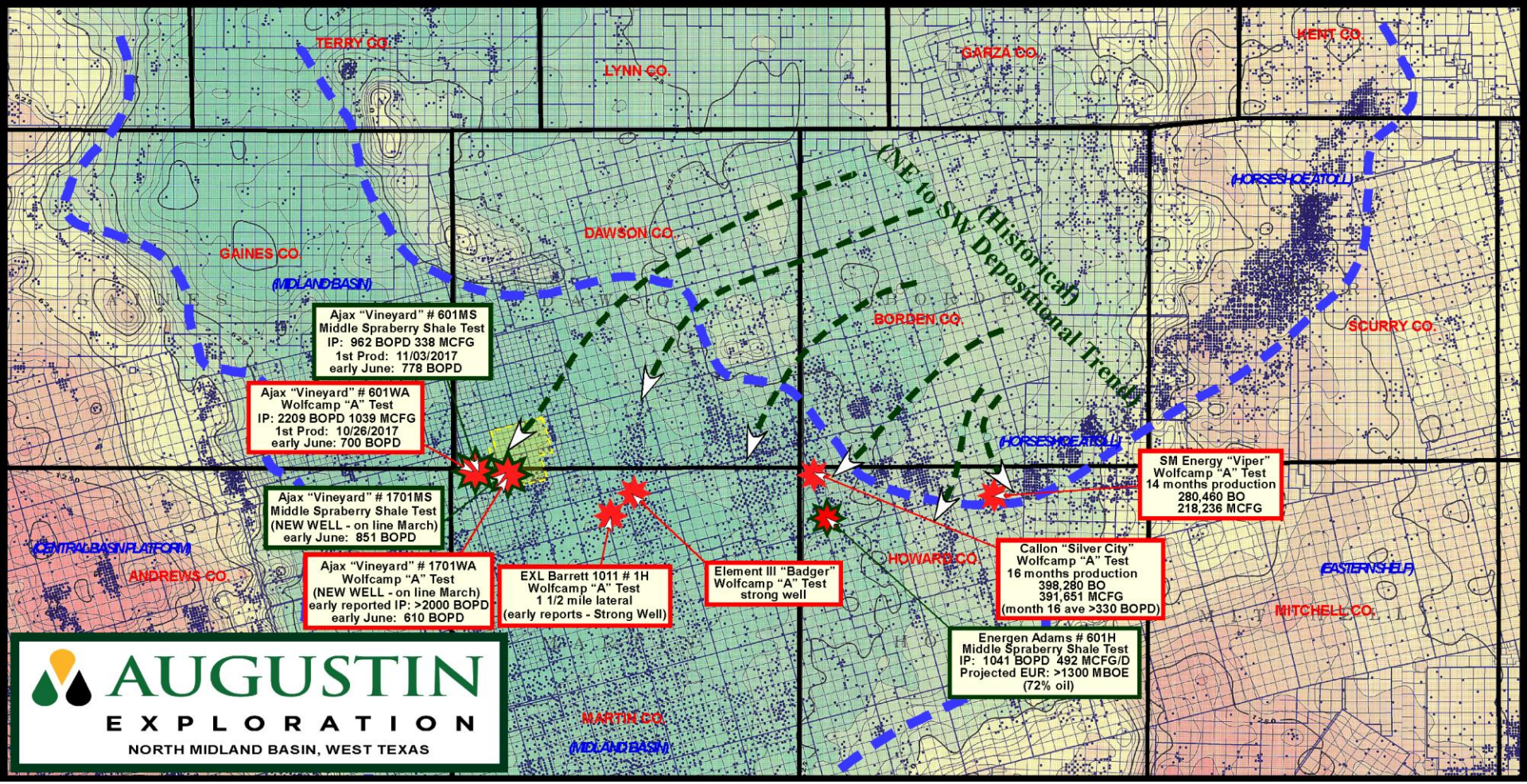

# Southern Dawson County Plat Operators 1/25

# Regional Geomorphology
## *North Central Midland Basin*

Two Geomorphologic features dominate this Region: **1. Deposition** and **2. early Light End Hydrocarbon Migration**.

1. (**Deposition**) - Regional Geology comprised of basinal facies dominated by clastics from the modern day western entrant point across lows of the high stand Pennsylvanian/Wolfcampian Horseshoe Atoll. Modern day clastic source for the Midland Basin was North East (NE) to South West (SW) into the Basin – ***see Figure on Slide 6***.

2. (**early light end Hydrocarbon Migration**) - Early Permian Wolfcampian/Leonardian western basinal tilt exaggerated depositional structure allowed early light end hydrocarbon migration travels along brittle basinal micro-fracture network and interbedded conventional pathways from basinal temp gradient max (S/SW) to the NE trapped against heavy clay barriers and/or impermeable shelf facies in both the WFMP A and Middle Spraberry Shale




***(3rd order residual map top of the Wolfcamp of the northern Midland Basin)***

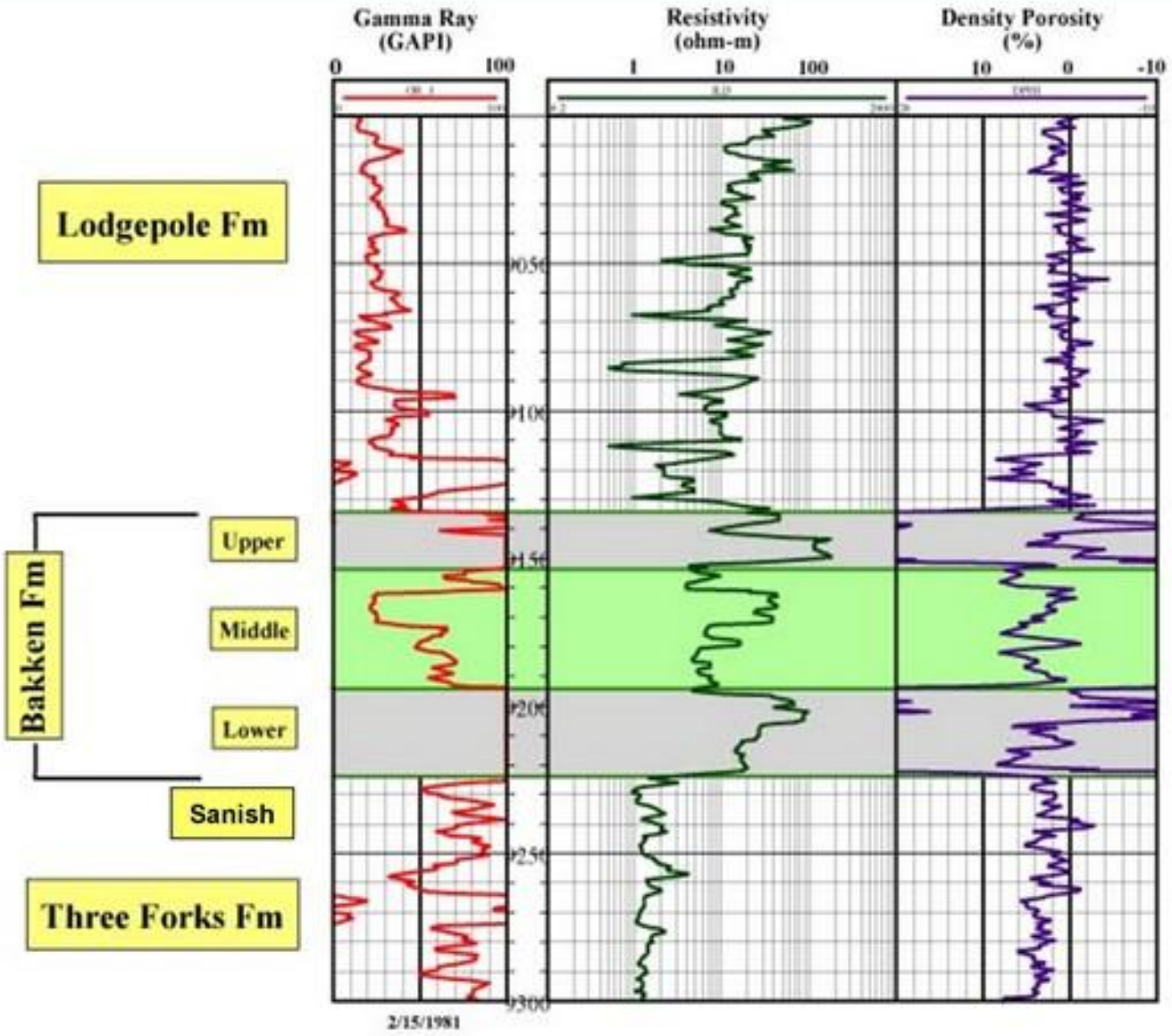
**Note:** modern day NE to SW detritus entrant across lows of the Wolfcampian/Pennsylvanian high stand Horseshoe Atoll.

**Note:** The Basinal Position of this region giving Radiolarins (- *dominant plankton of Permian age organics*) access to shelf nutrients across lows in the high stand Atoll explains why this northern region is one of the most "Organic Rich" parts of the Midland Basin

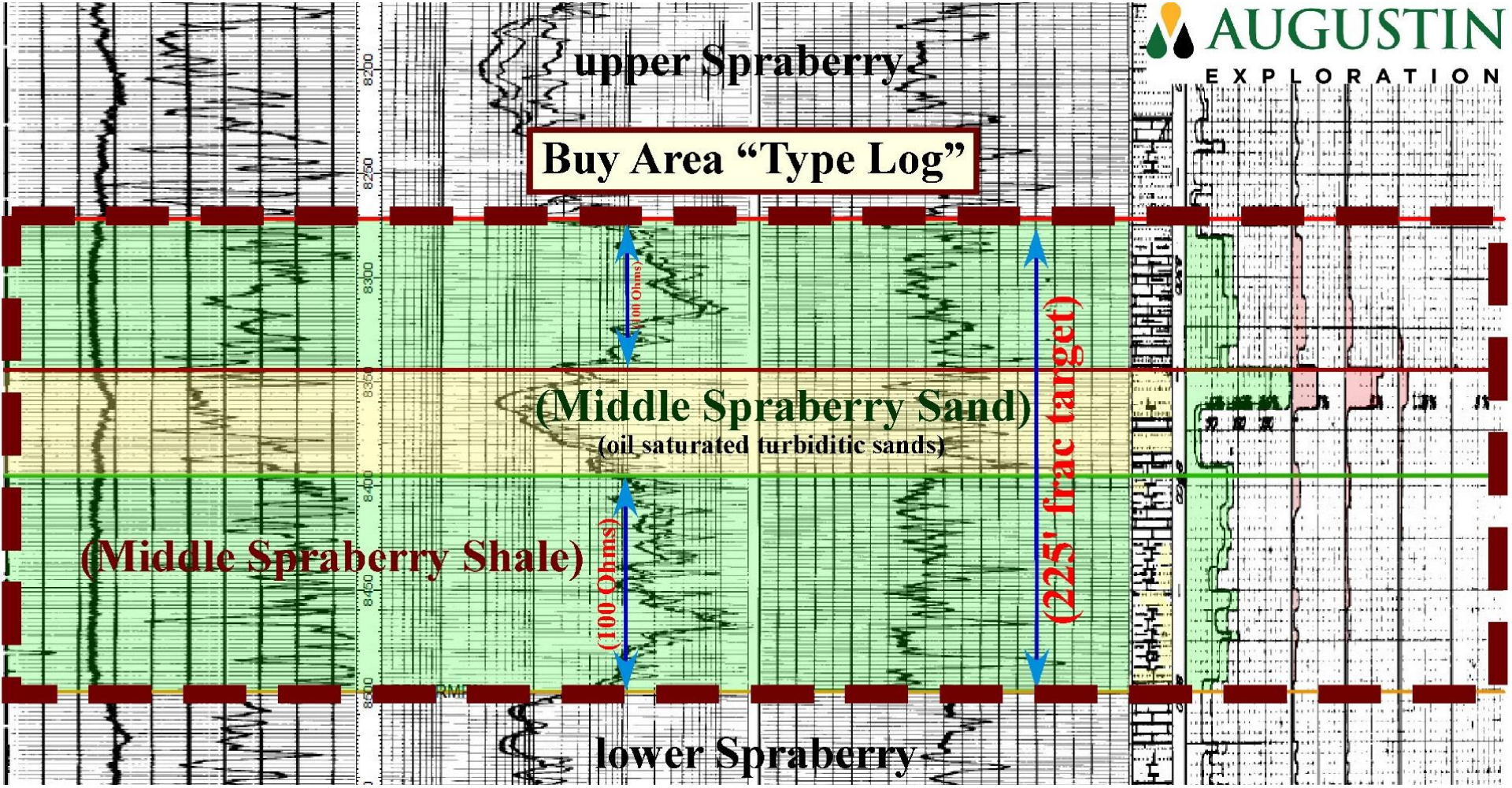
**Note:** Recent Wolfcamp "A" and Middle Spraberry Shale horizontal tests across the northern Midland Basin (***i.e. the two benches composed of interbedded conventional/unconventional "hybrid" systems***)

# Mountrail County Bakken Type Log

## Lear Petroleum East Parshall S #1




**Note:** **east Parshall Bakken Shale Tmax is 424 ave. Crude gravity is 39 api (*see Jarvie for oil migration diagentic explanation*)**

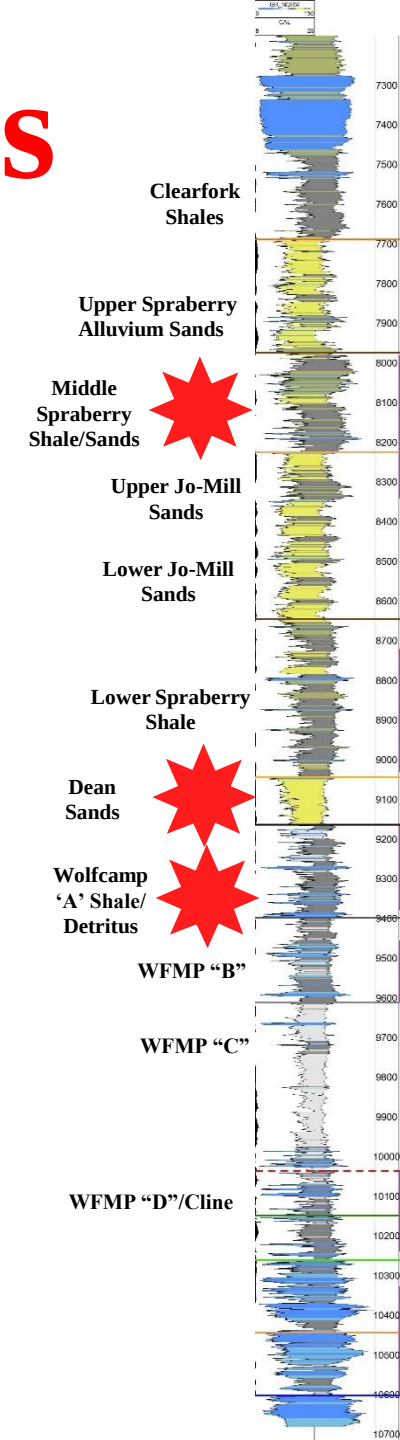


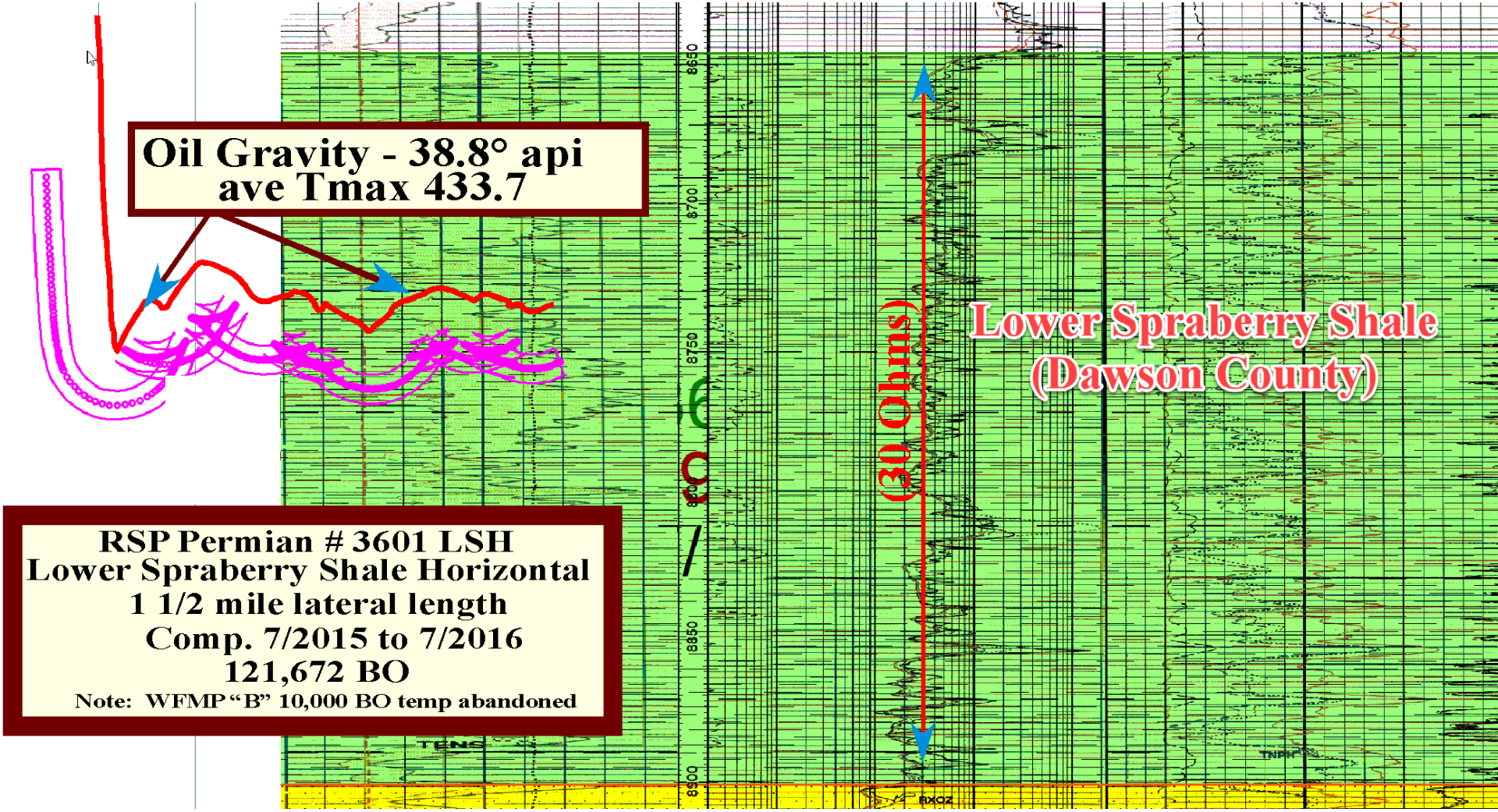

**North Midland Basin Middle Spraberry Shale/Sand – *"Midland Basin Bakken"***

***(Hydrocarbon Saturated Basinal Clastics bounded by high Ohm Organic Rich Shales)***

# Three Targeted Benches

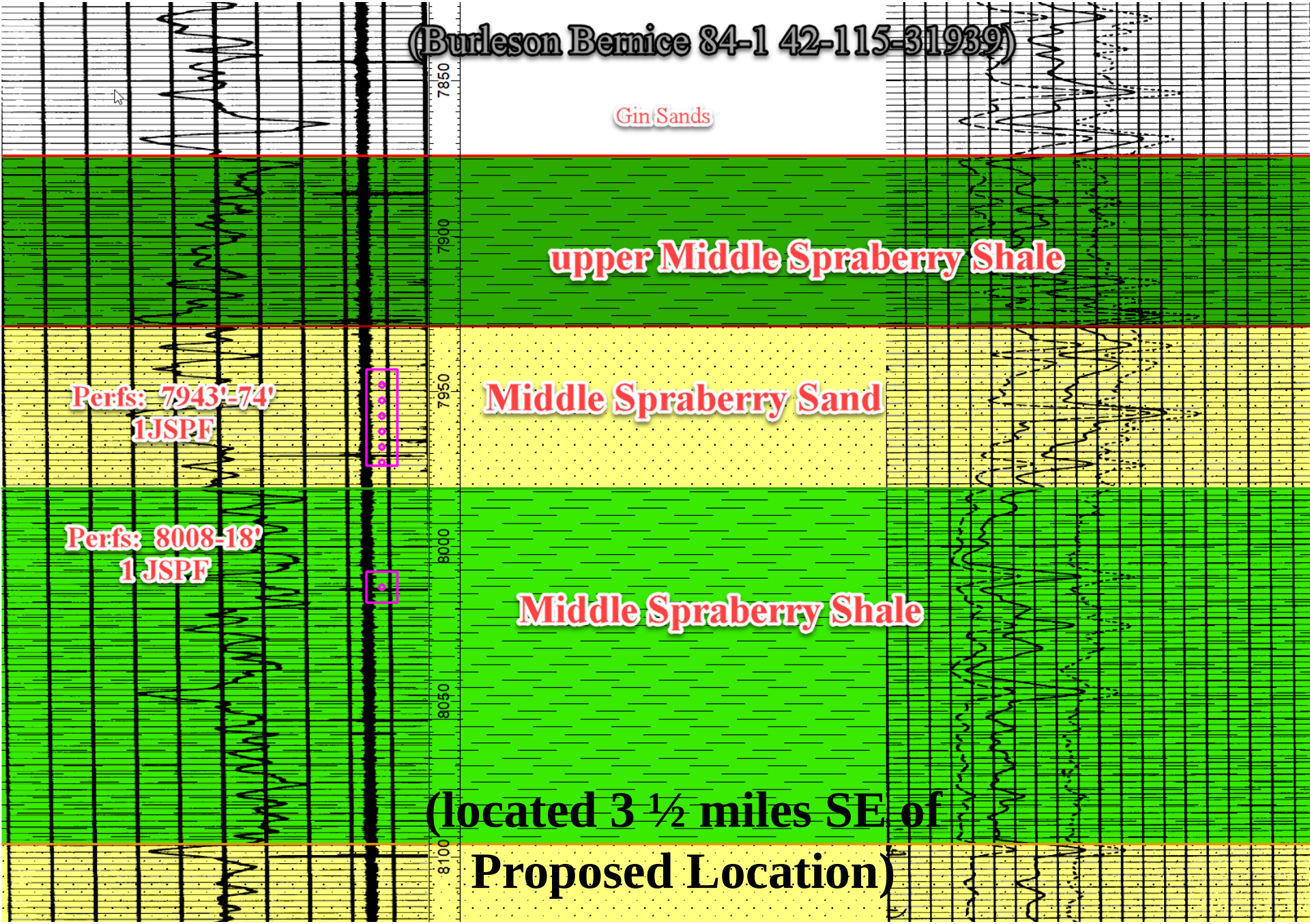
- Middle Spraberry Shale/Sand
- Dean Sands
- Wolfcamp “A” Shale/Detritus



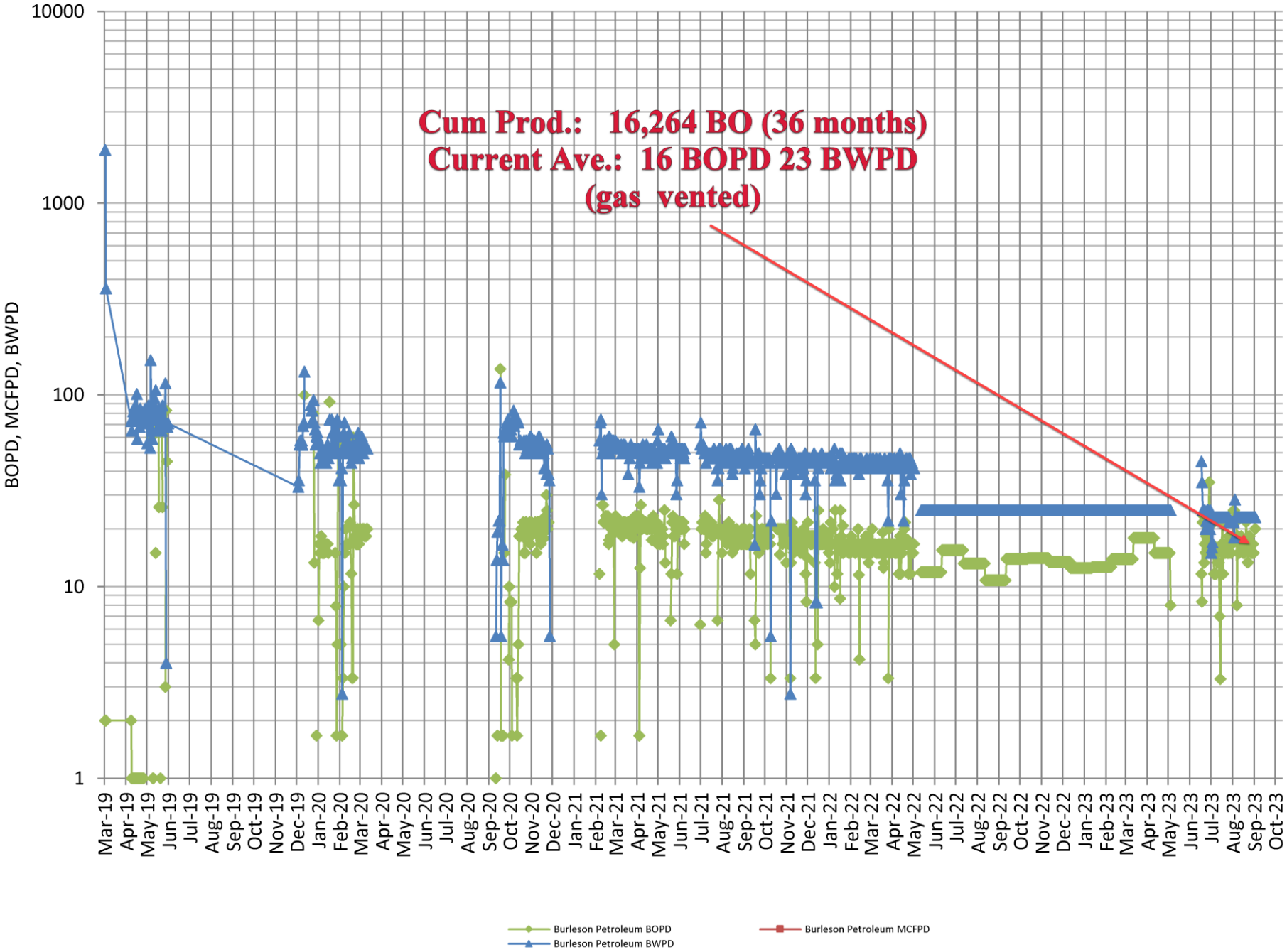


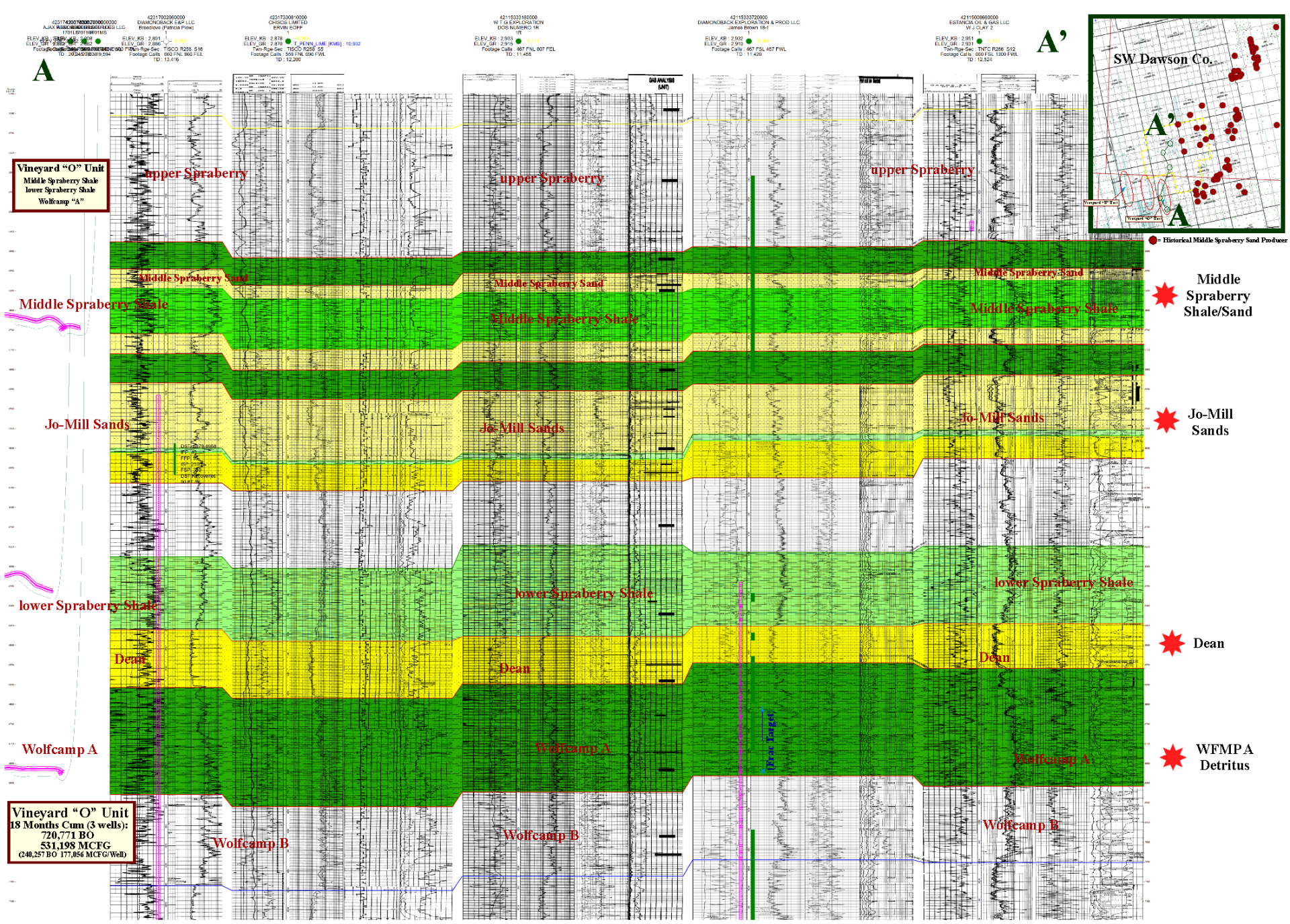

# Observations:

- 433 TMax is classified as "low maturity" yet produced oil of 38.8º api gravity. Q. How???
- RSP Permian landed properly and used a standard unconventional slick water frac which should not have had frac growth out of zone resulting in no contact with conventional sands.
- 120,000+ BO in 6 years is non-commercial. Commonly, commercial lower Spraberry Shale wells show ave. of 100+ ohms vs this well ave. of 30 ohms. Significant?


(Burleson Bernice 84-1 42-115-31939)
Gin Sands
7850
upper Middle Spraberry Shale
7900
Perfs: 7943'-74'
1JSPF
Middle Spraberry Sand
7950
Perfs: 8008-18'
1 JSPF
Middle Spraberry Shale
8000
8050
8100
(located 3 ½ miles SE of
Proposed Location)

# Bernice 84 # 1 (Middle Spraberry vertical stage) Production Summary






# Vineyard "0" Horizontals *vs* Offset Acreage Block (North) - NW Martin/SW Dawson County

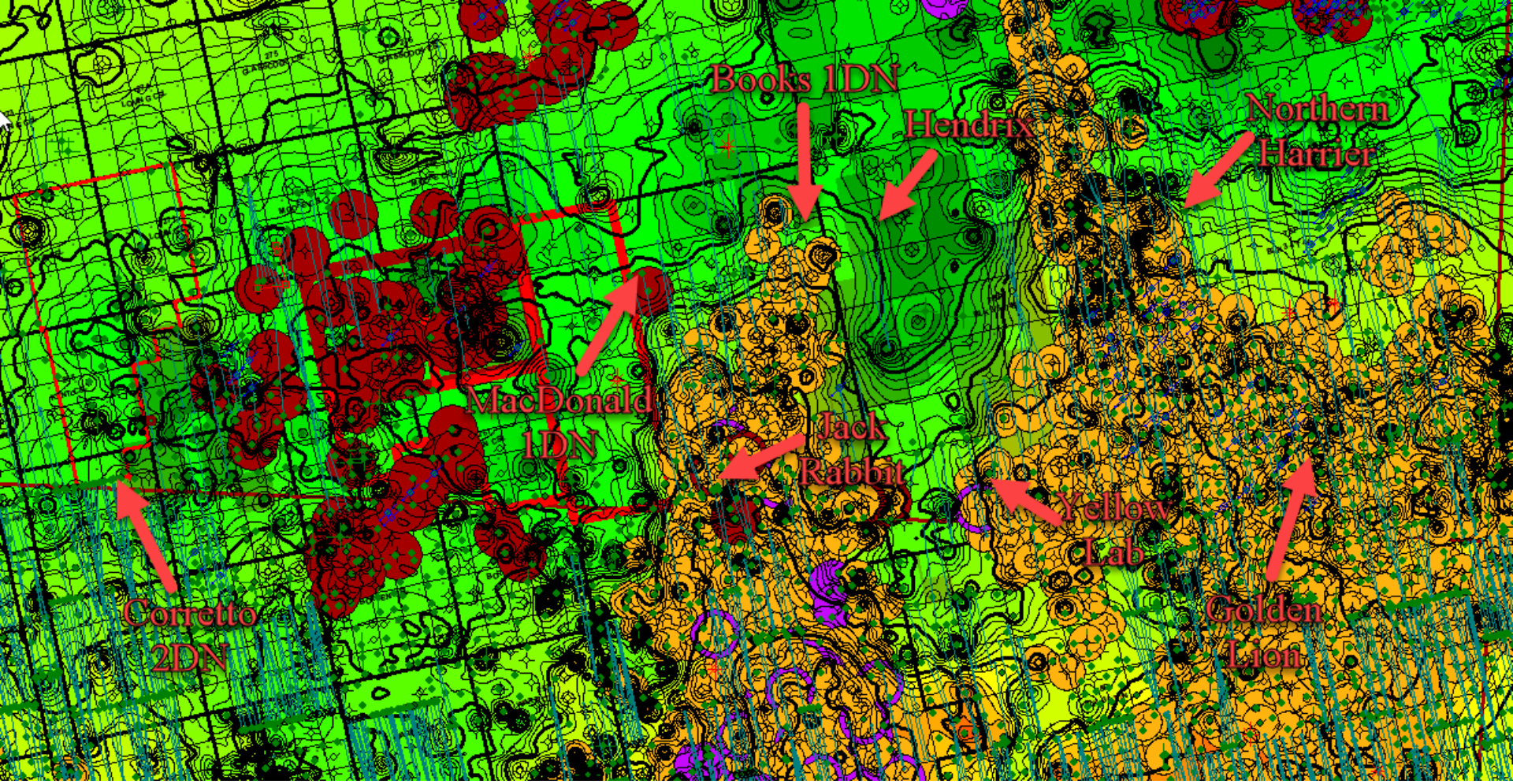
# Dean Development Review

**Notes:**

- **This play was kicked off in 2019 by the Pinon Golden #1 (*cum production 347,000+ BO*). Most of the early successful production and development has been infield or in the productive isopach "halo" of the historical Dean Fields (*Ackerly, Tex-Hamon, and Sulfur Draw*).**

- **Recent "Dean" horizontal tests landing in or just at the top of the WFMP A/base of the Dean outside the Halo are encouraging in their early production profile (*i.e. Diamondback's Corretto # 2DN had an IP 2141 BOPD on the Martin/Dawson county line*).**

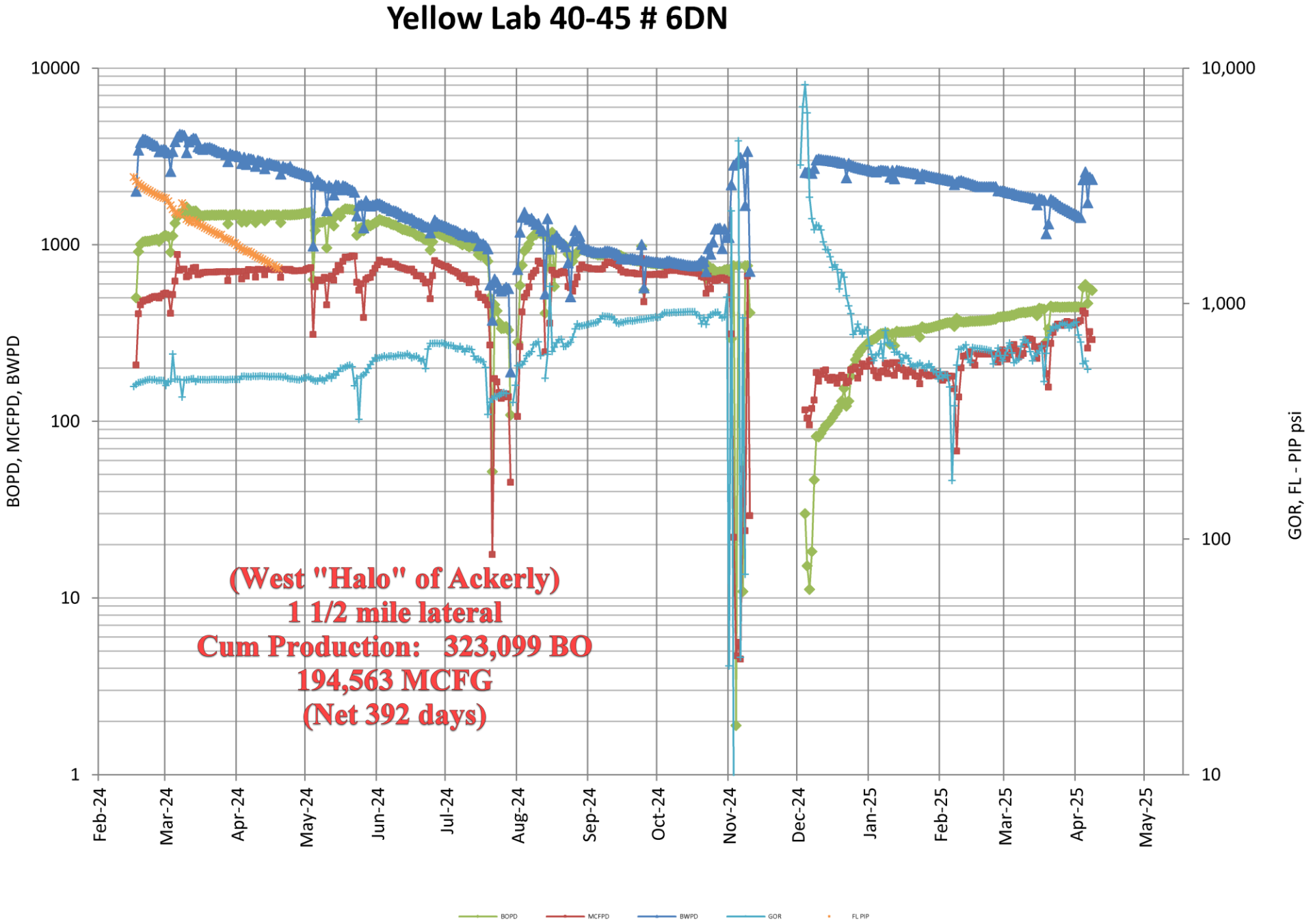
- **Fracs initiated in the brittle Dean sands grow up into the non-commercial but productive lower Spraberry Shale. The lower Spraberry Shale will be more productive as it trends west across southern Dawson County as interbedded heavy clays "decrease" basinward. The SM Energy Joey MacDonald # 1DN is a step-out west of Tex-Hamon and is a very commercial well benefiting from "de-watering" of the lower Spraberry Shale – *IP of 733 BOPD, currently 500 BOPD 7 months later.***




# South Dawson County – *Gross*

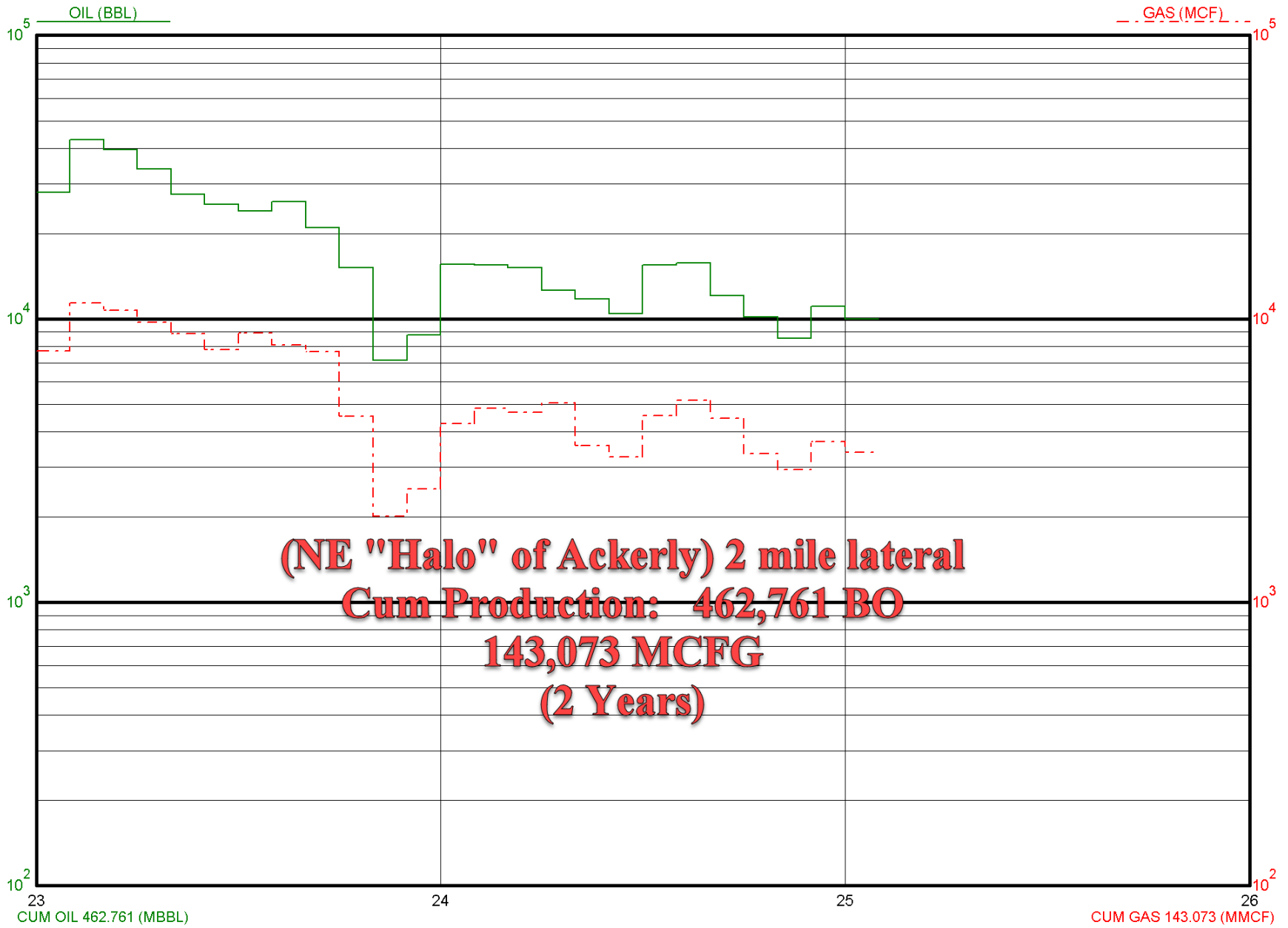
# *Isopach Map of Dean Sand*

**Key Wells: Corretto # 2DN (*west*), MacDonald # 1DN (*north center*), EOG Overton base Dean/top WFMP A Tests**

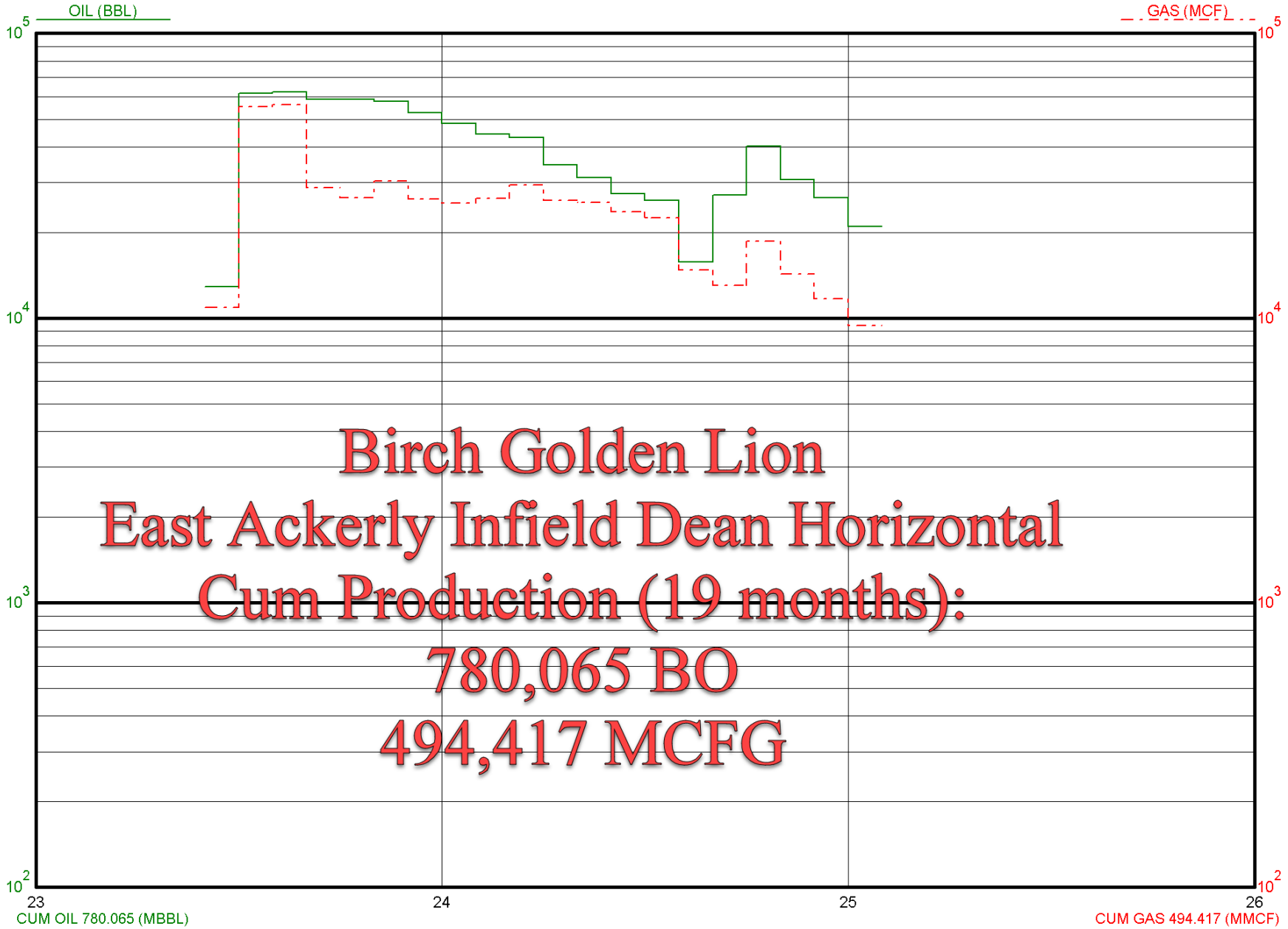



**Birch Yellow Lab:** ***1 ½ mile Dean Halo Producer***

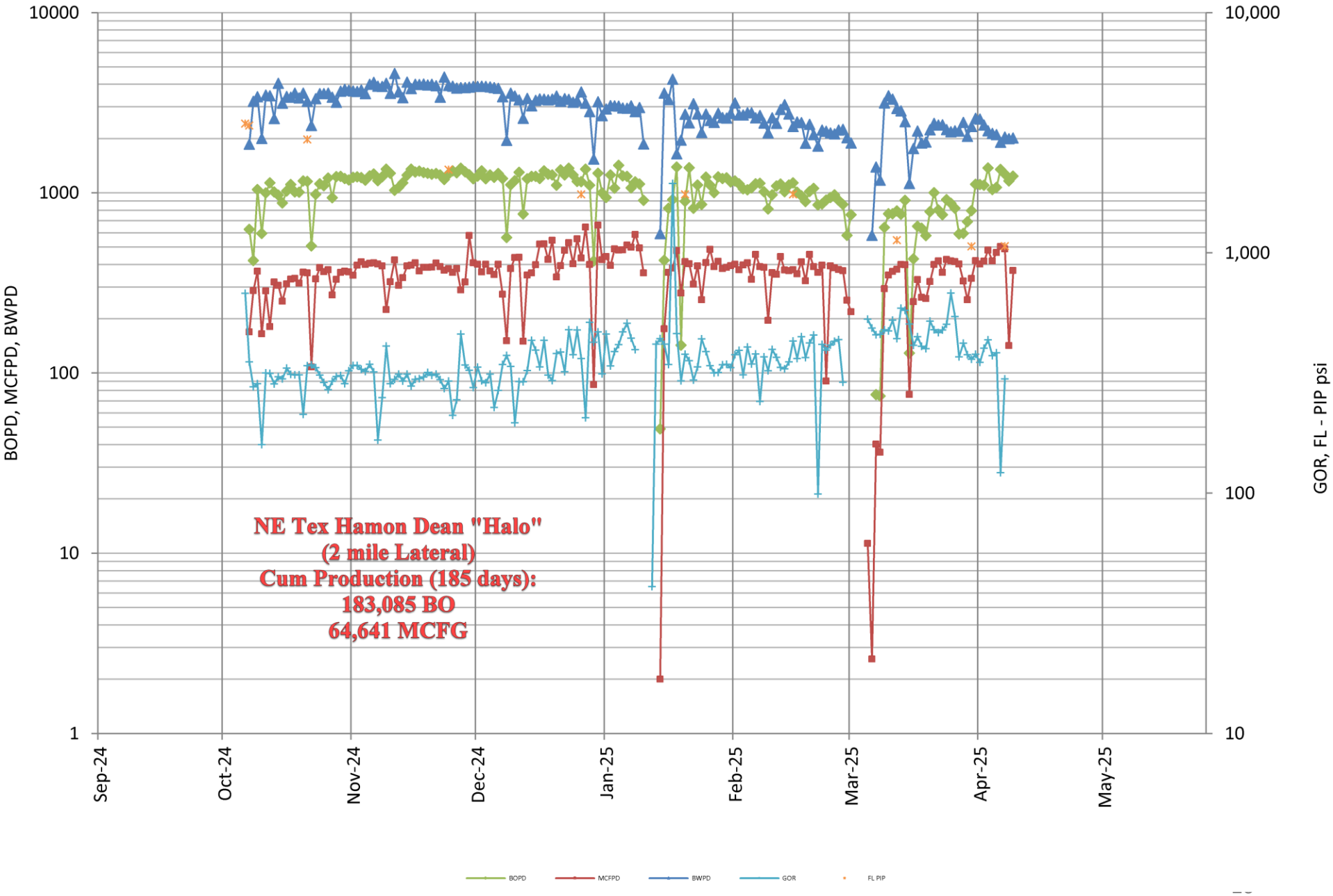
Midland Basin 'Wolfberry' Play
Wsn:618067 WELL: 42-115-33887-0000 (42115338870000) [DEV]
2DN
42-115-33887 Northern Harrier Dean Test



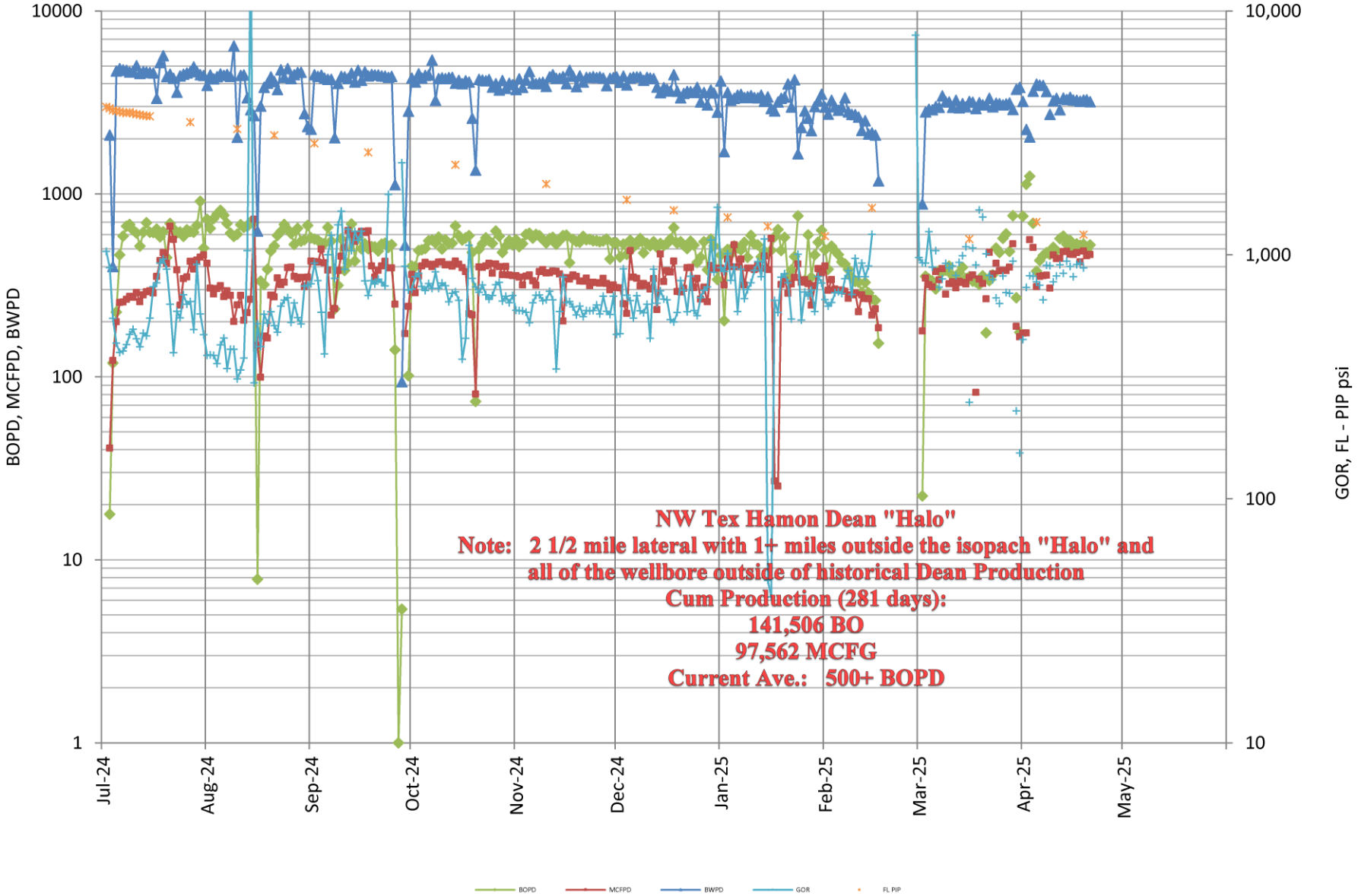
Midland Basin 'Wolfberry' Play
Wsn:619530 WELL: 42-115-33899-0000 (42115338990000) [DEV]
2DN
42-115-33899 east Ackerly Infield Dean horizontal (Dawson County)



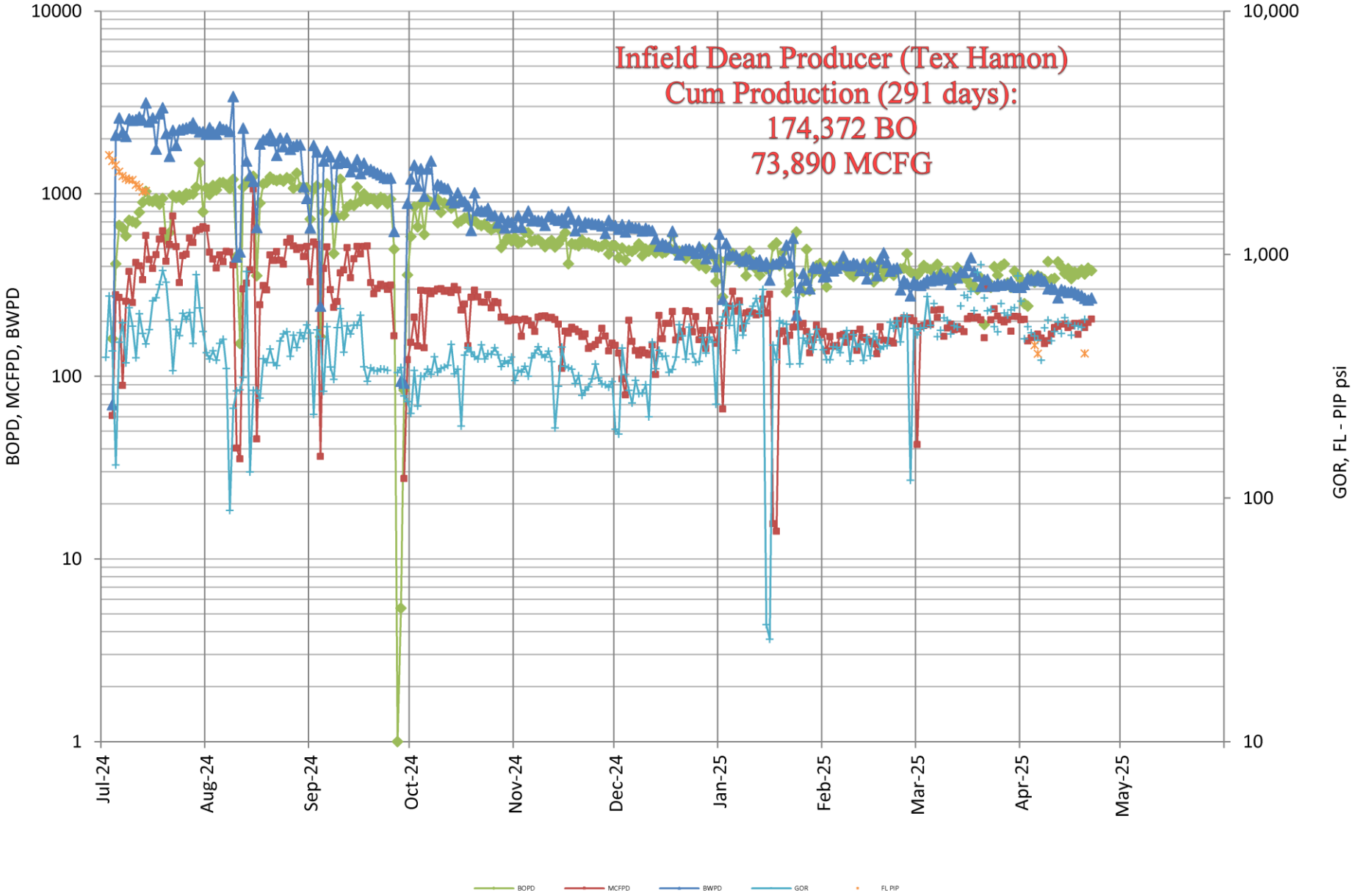
# JB Books 1382DN (Dean Test)

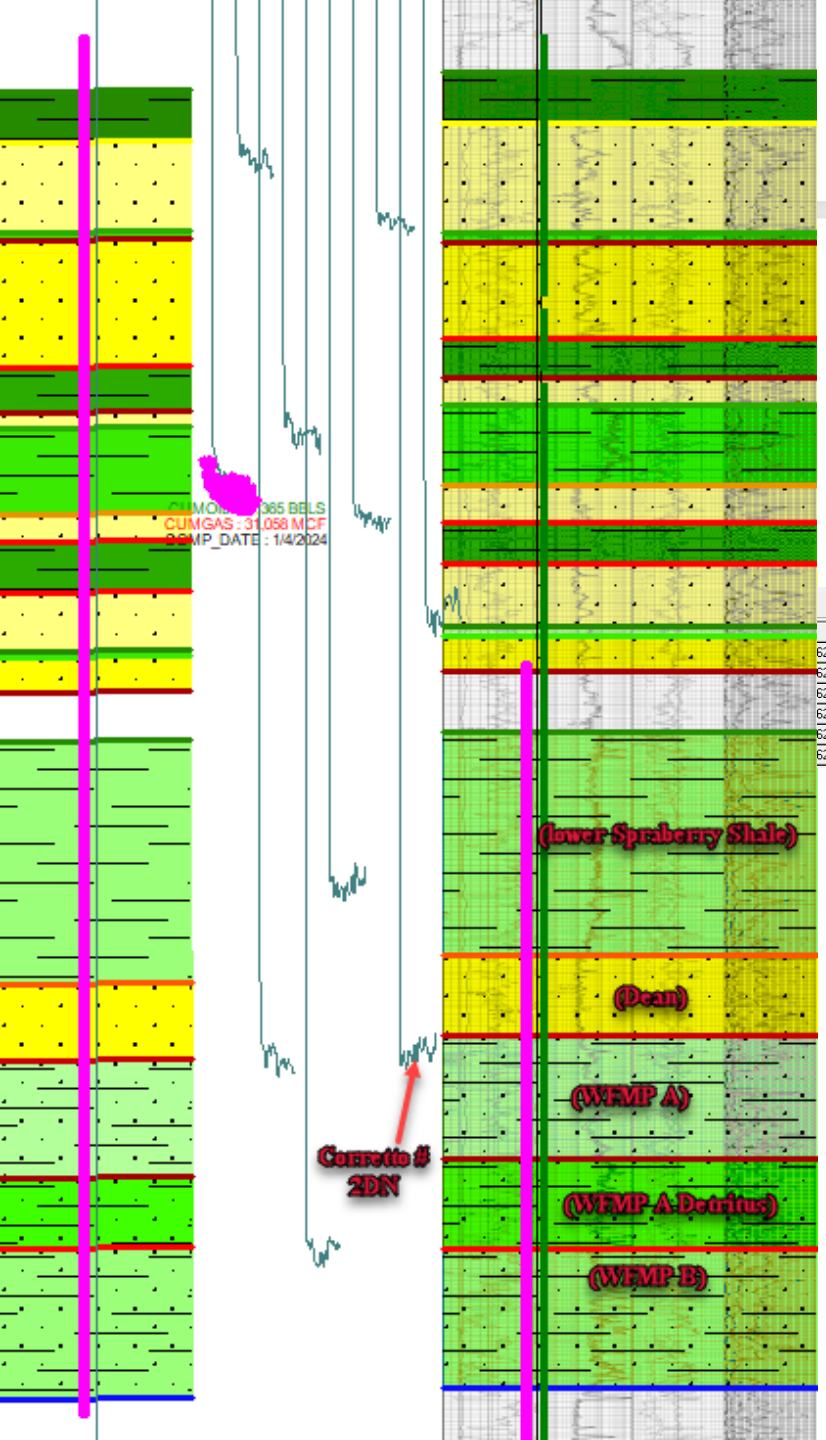


# Joey MacDonald A 2181DN (Dean Test)



# Jack Rabbit Special 2881DN (Dean Test)






| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-27 | 835.14 | 1,961.19 | 2,706.49 | 331.00 | 254.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-26 | 785.78 | 1,908.52 | 2,657.48 | 475.00 | 356.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-25 | 730.04 | 1,915.69 | 2,701.87 | 475.00 | 356.00 | 24.00 |

| Well ID | API | Well Name | Prod Date | Gas Prod | Oil Prod | Water Prod | Tubing PSI | Casing PSI | Hours Flowed |
|---|---|---|---|---|---|---|---|---|---|
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-24 | 733.42 | 1,843.42 | 2,644.10 | 475.00 | 356.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-23 | 746.59 | 1,884.18 | 2,674.37 | 475.00 | 356.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-22 | 752.32 | 1,920.54 | 1,495.49 | 475.00 | 356.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-21 | 757.32 | 1,922.24 | 2,078.98 | 475.00 | 356.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-20 | 776.80 | 1,906.36 | 2,235.73 | 475.00 | 356.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-19 | 730.52 | 1,895.04 | 1,714.84 | 492.00 | 421.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-18 | 744.72 | 1,930.36 | 2,097.62 | 492.00 | 421.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-17 | 736.76 | 1,938.73 | 2,047.12 | 492.00 | 421.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-16 | 731.75 | 1,828.20 | 1,977.09 | 490.00 | 400.00 | 24.00 |
| 1001151600 | 4231745847 | CORRETTO 97-9 F 2DN | 2024-10-15 | 614.93 | 1,465.93 | 1,730.53 | 410.00 | 389.00 | 24.00 |
| | | | Total : | 9,676.09 | 24,320.40 | 28,761.71 | | | |

Wsn:625221 WELL: 42-317-45847-0000 (42317458470000) [DEV]

Diamonback Corretto # 2DN

| WSN | Unique Well ID | Well Label |
|---|---|---|
| 625067 | 42317457700000 | 42317457700000 |
| 625068 | 42317457710000 | 42317457710000 |
| 625069 | 42317457720000 | 42317457720000 |
| 625070 | 42317457730000 | 42317457730000 |
| 625071 | 42317457740000 | 42317457740000 |
| 625072 | 42317457760000 | 42317457760000 |

Project | Well | Location | FmTops | Zones | Logs | IP Tests | Fm Tests | Cores | Perfs | Shows | Production | Prod Cu

IP Test Data

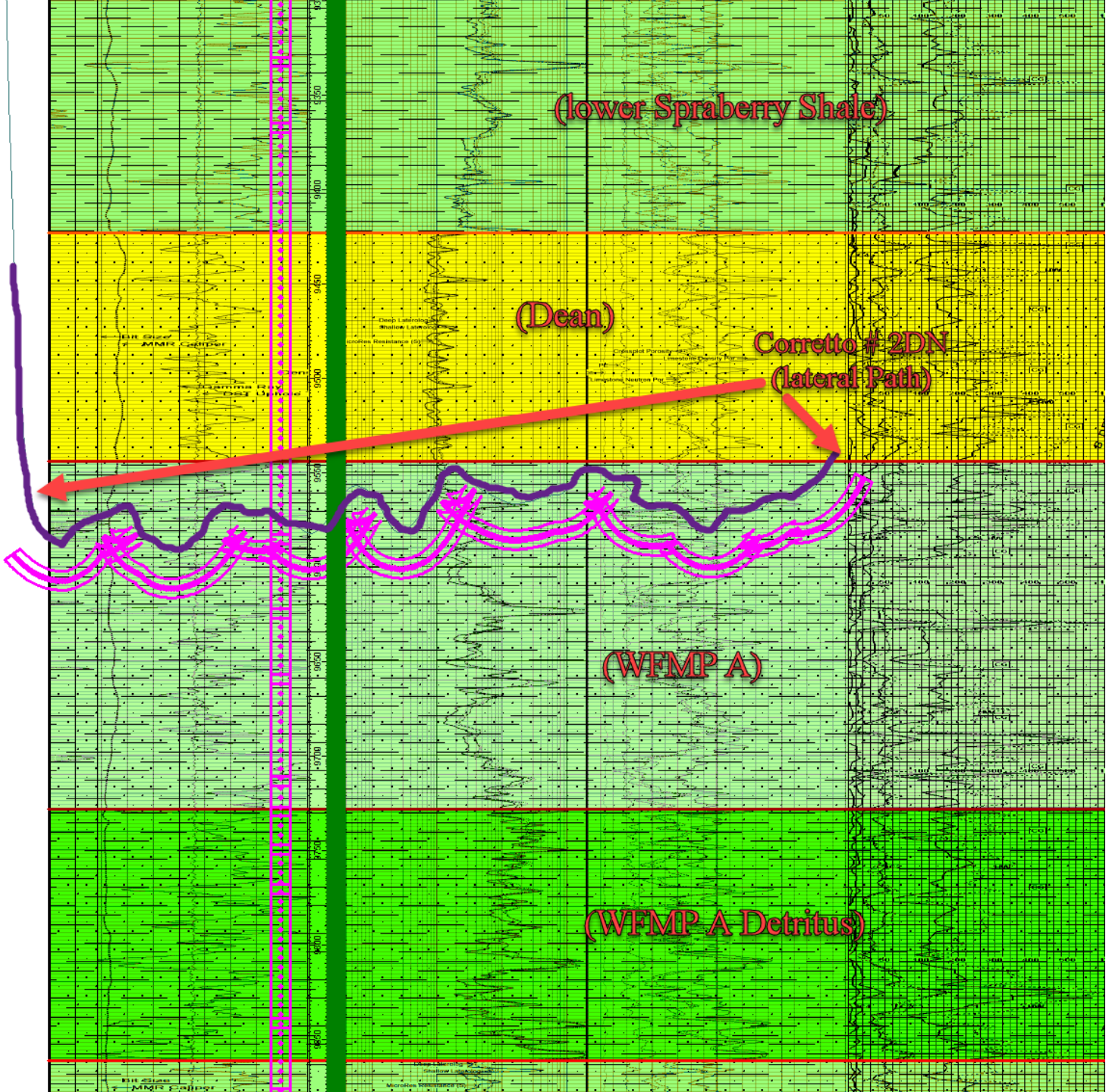
Show Combined Well Completions

Details... Locked Sort by Date

CHGD: 01/29/2025 Preferred

| Test Type | FmName | Top | Base | Date | Oil | Gas | Water | # Treat |
|---|---|---|---|---|---|---|---|---|
| IPP | 451WFMP | 10204 | 22126 | 12/5/2024 | 2141 | 666 | 921 | 0 |

# Recent Diamondback Landing targets at Martin/Dawson County Line

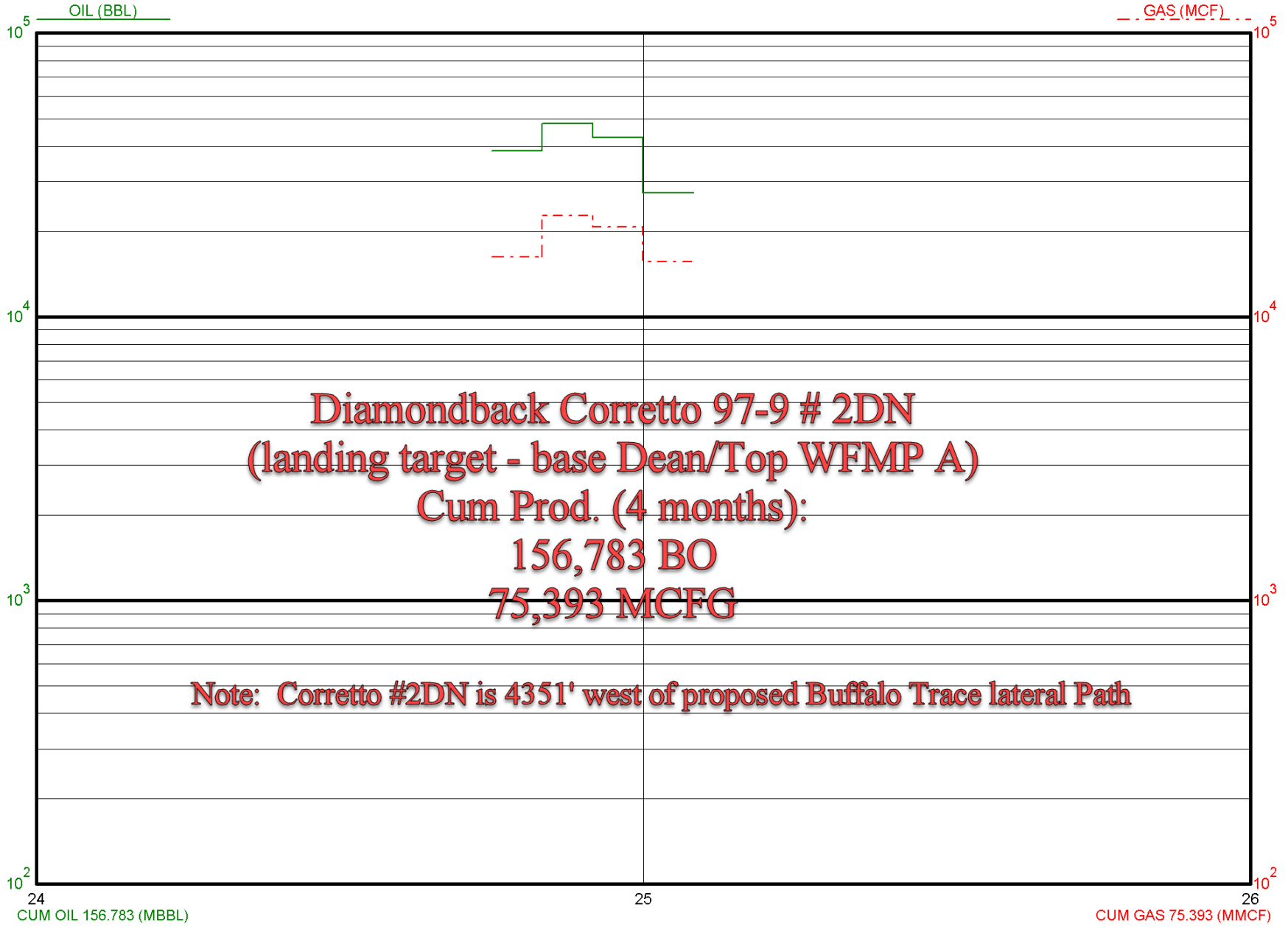



## Diamondback Corretto # 2DN lateral path

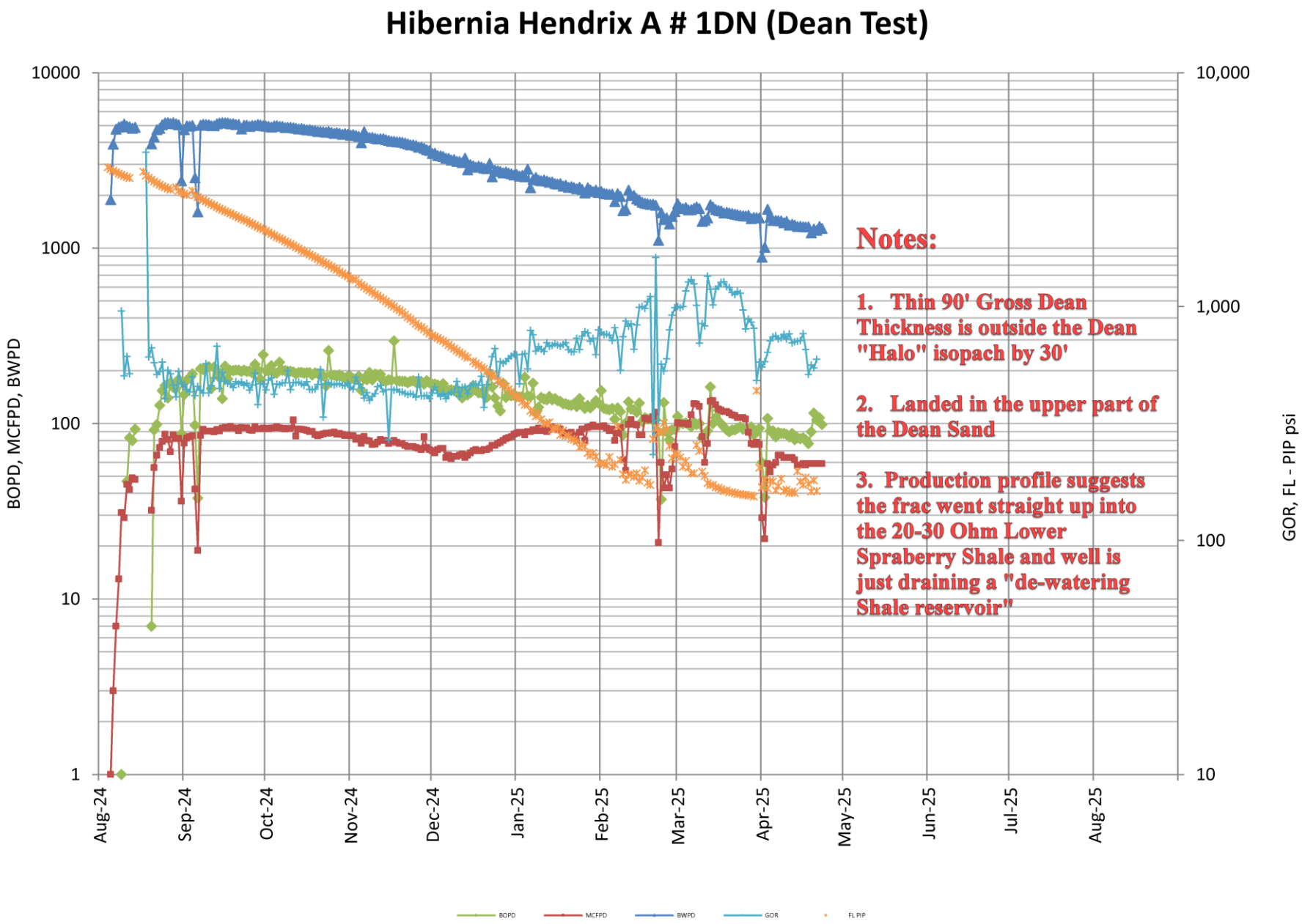
**Notes:**

- **Lateral targeted and landed at the base of the Dean/top of the omnipresent WFMP A organics**
- **Dean is fractured so frac should treat the lower Spraberry Shales.**

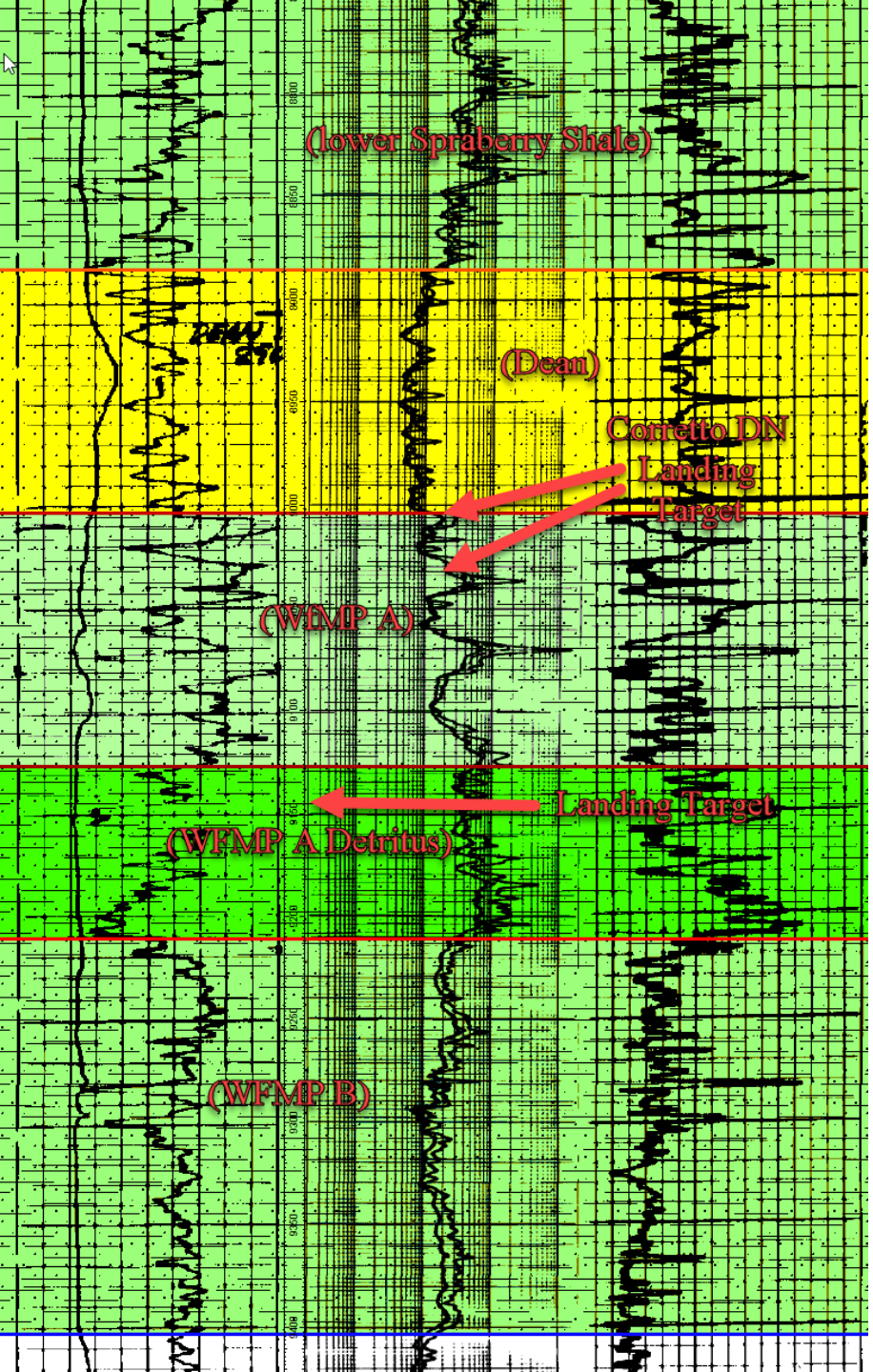
Midland Basin 'Wolfberry' Play
Wsn:625221 WELL: 42-317-45847-0000 (42317458470000) [DEV]
2DN
42-317-45847 Corretto (Dean Test)



# Q. Can you give us an example of a Dean test outside the “Halo”?




**Example Production Profile: Dean well "outside" the historical production and Isopach of the Dean "Halo"**



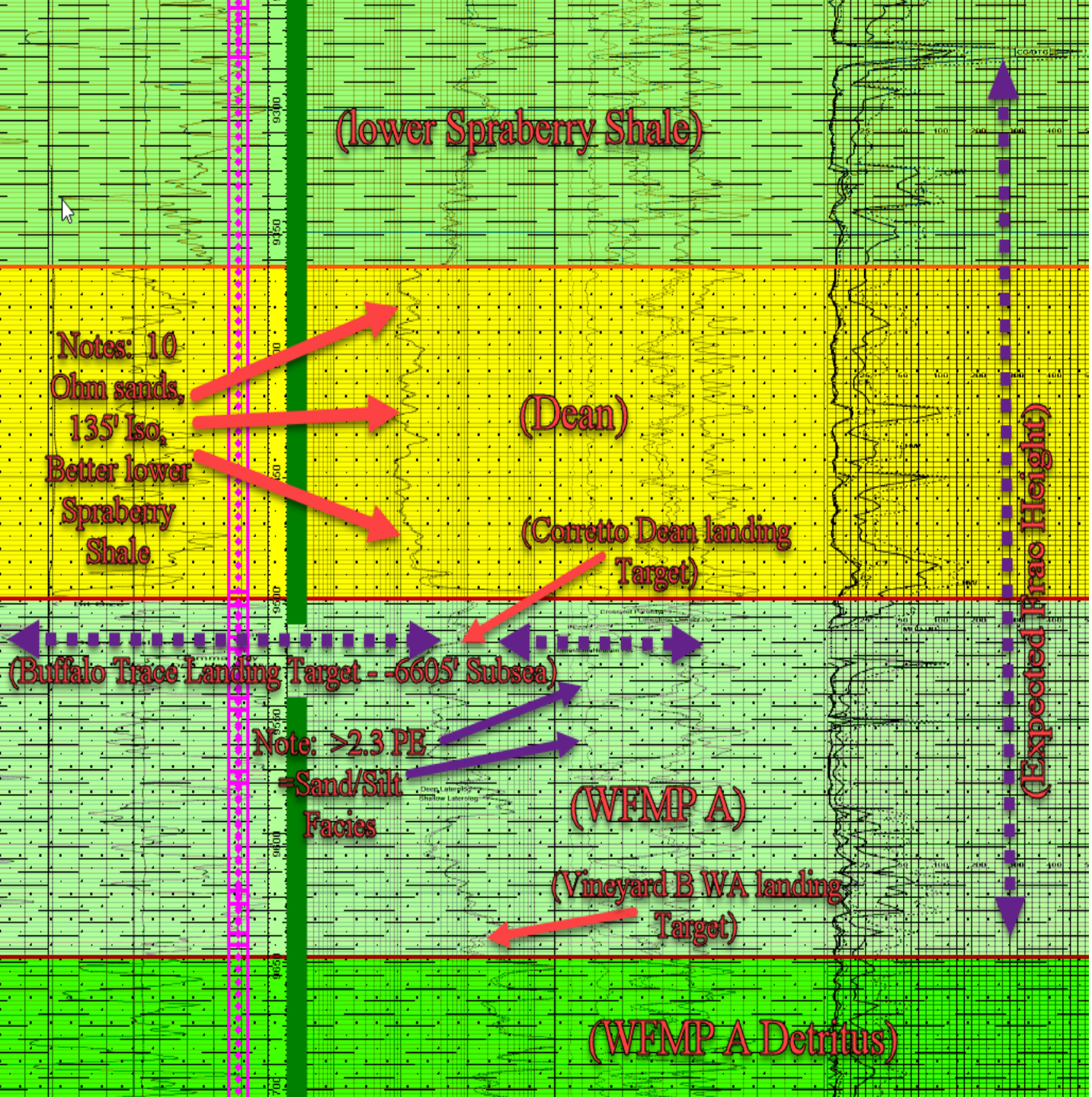

# Notes: (*Morgan Ranch - Hidden Gem Area*)

- **Hydrocarbon Saturated WFMP A Detritus zone equivalent in ohms to the recent PetroLegacy Stubbs WA a few miles to the SW which is proven to be commercial.**

- **Landing lower in the Dean/organic top WFMP A should provide maximum delta pressure drainage for the lower Spraberry Shale above and some of the WFMP A shales below.**

- **The WFMP A detritus thickens significantly just to the east of this acreage giving us mineral and leasing opportunities.**

**(East Southern Dawson County - *West offset to Hendrix Dean Test*)**




# Buffalo Trace "Type Log"

## Notes:

- Landing target in hydrocarbon saturated organics at the base of the Dean Sand/top of the WFMP A
- PE less than 2.3 shows brittle sand/silt facies below the top WFMP A organics to allow frac to grow down to pick up more pay
- Dean Sand showing 10-20 ohms is hydrocarbon saturated
- With omnipresent vertical fracturing in the Dean Sands, frac height should still reach up into the lower Spraberry Shale to drain additional reserves

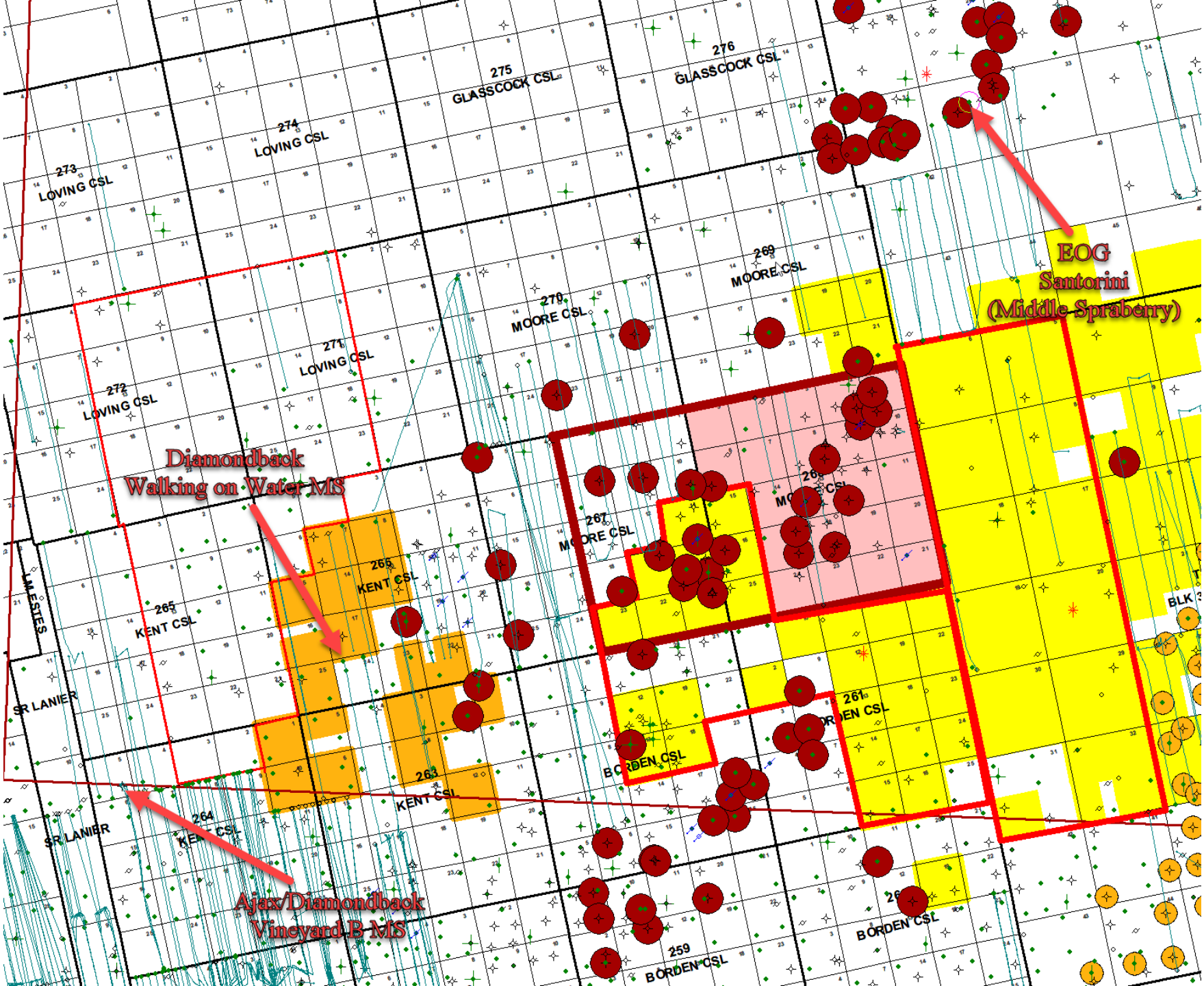
# (Conclusions)

- **The Dean "Halo" as defined by historical offset under-stimulated production and isopach thickness indicative of higher energy deposition is proven ready for exploitation.**

- **All fracs in the brittle Dean Sands frac up into the lower Spraberry Shale. While non commercial due to heavy clays, the lower Spraberry Shale does "clean up" as you move west and could provide the commercial reserves for the Dean horizontal resource play moving west from the historic vertical Tex-Hamon Dean Field.**

- **Recent Dean completions landing at the base of the Dean/top of the omnipresent WFMP A organics have had very encouraging early production and may provide the additional reserves to make the Dean Horizontal play in southern Dawson County a pure resource play moving outside the productive Dean Isopach "halo".**

# Southern Dawson County Middle Spraberry Review Landing targets/etc.


EOG
Santorini
(Middle Spraberry)
Diamondback
Walking on Water MS
Ajax/Diamondback
Vineyard B MS
273
LOVING CSL
274
LOVING CSL
275
GLASSCOCK CSL
276
GLASSCOCK CSL
271
LOVING CSL
272
LOVING CSL
270
MOORE CSL
269
MOORE CSL
267
MOORE CSL
266
KENT CSL
265
KENT CSL
263
KENT CSL
264
KENT CSL
261
BORDEN CSL
259
BORDEN CSL
SR LANIER
SR LANIER
LMESLES


# Structure Map - Base Middle Spraberry Shale
## (*Top Lower Spraberry*)

Historical Middle Spraberry Shale/Sand vertical producer

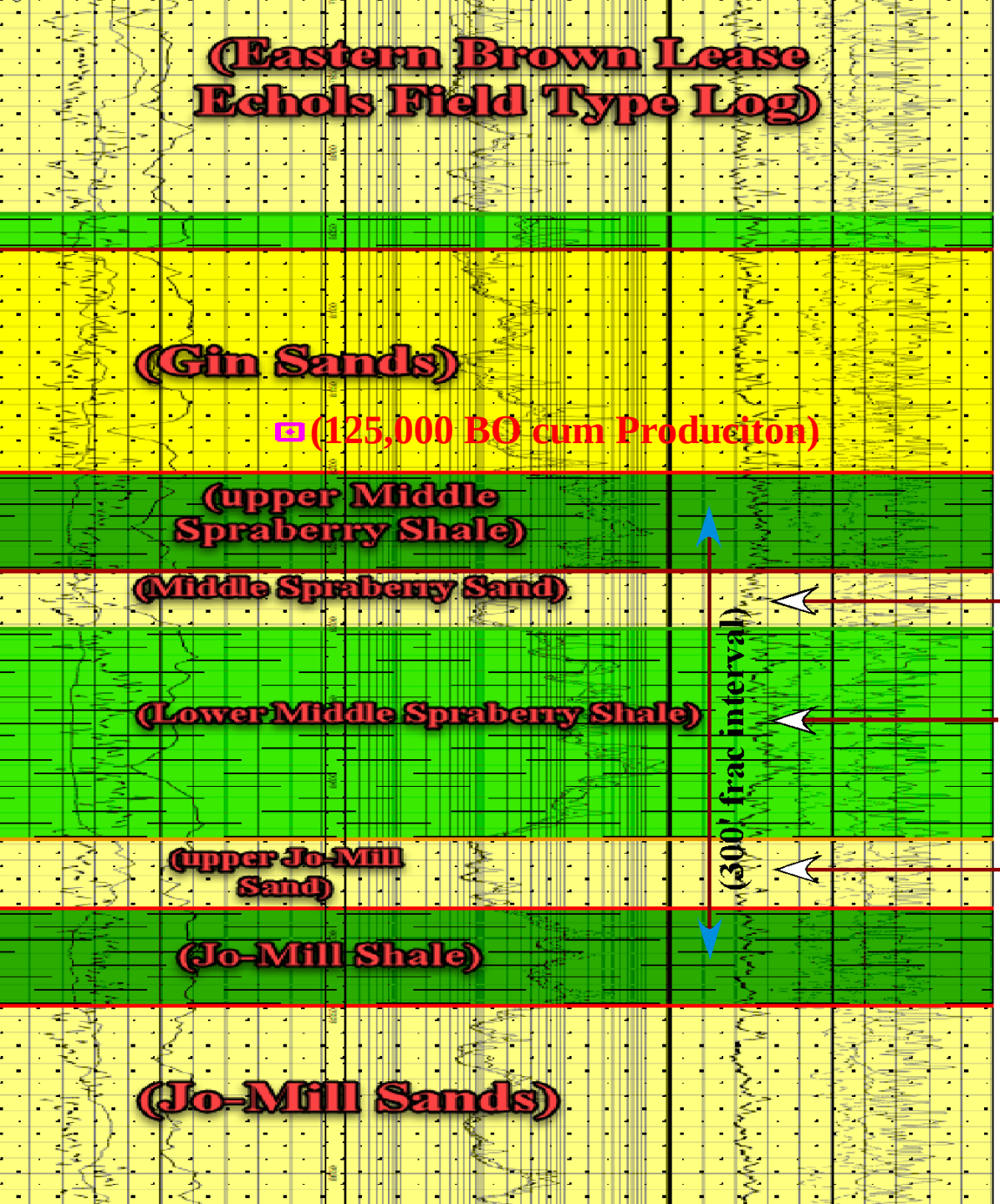
# Notes:

**(Middle Spraberry Sand/Shale)**

**Deposited on a Basinal pre-depositional "low"**

**Surrounded by historical conventional production**

**New Commercial Horizontal Middle Spraberry Shale Production on the North, West, South, and Southeast.**




## Notes: Middle Spraberry Landing Targets

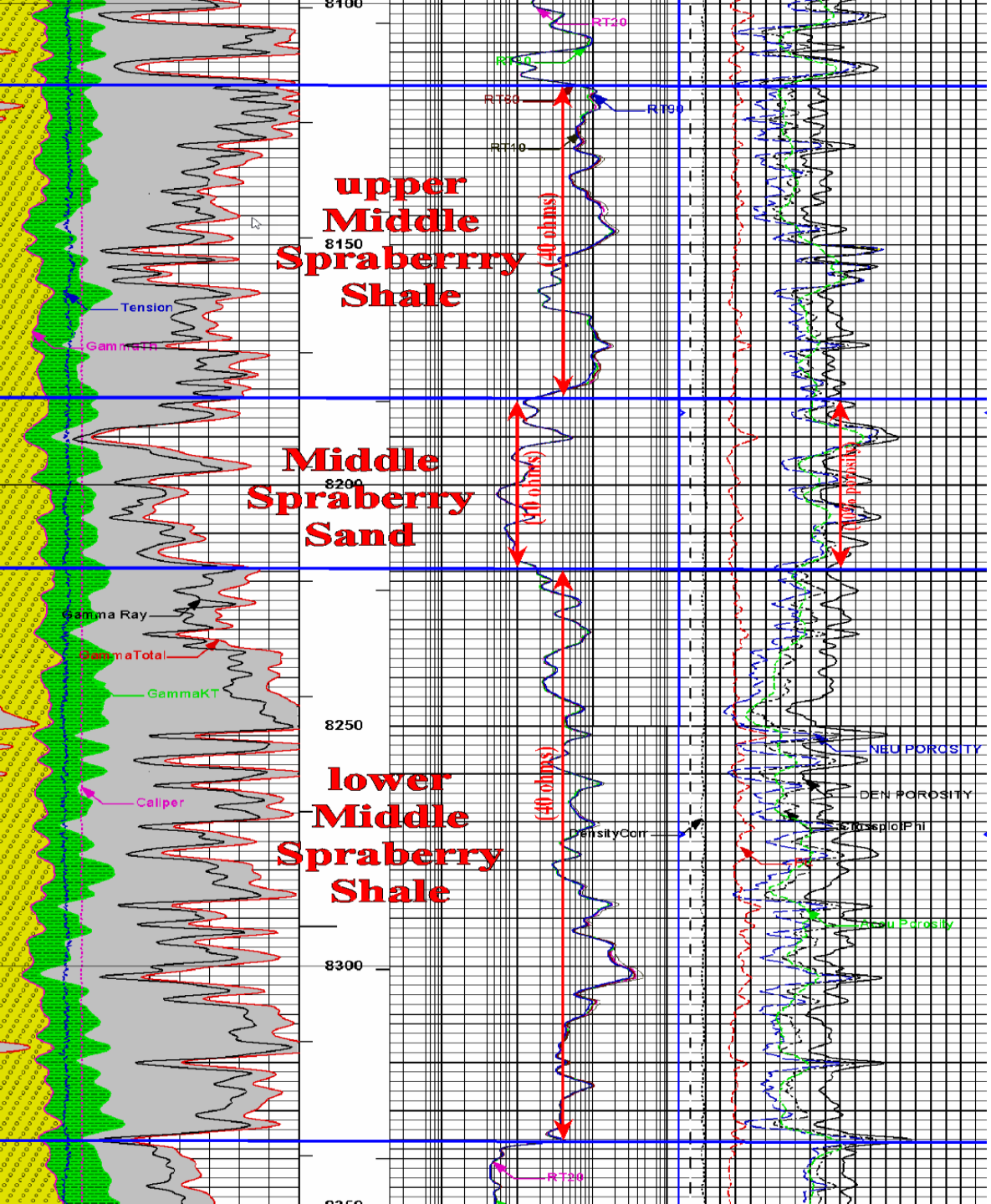
- Initiating fracs in tight basinal sands has resulted in rapid height growth fracing outside of pay and limiting downward growth of frac into productive resource shale pays below landing target
- Anytime basinal sands have 7-10ohms and 8-10% porosities they will be hyrdrocarbon saturated and serve as great landing targets for efficient ΔP drainage to the well bore
- Initiating fracs in basinal sands with 4+ ohms and 14% or greater porosities will have conventional pay, limit frac height growth regardless of frac size or rate

(EOG et al Landing Target)

(Energen/Ajax/Vineyard Landing Target)
*(Preferred Target for this Area)*

(Black Swan Landing Target)

- Brittle hydrocarbon saturated shales will be a "preferred pathway" for frac energy limited height growth
- Wet and or depleted conventional porosity sands need to be avoided by choosing lower landing targets either in a brittle hydrocarbon saturated shale or hydrocarbon saturated tight basinal sand




# Santorini Triple Combo Log (Pilot hole)

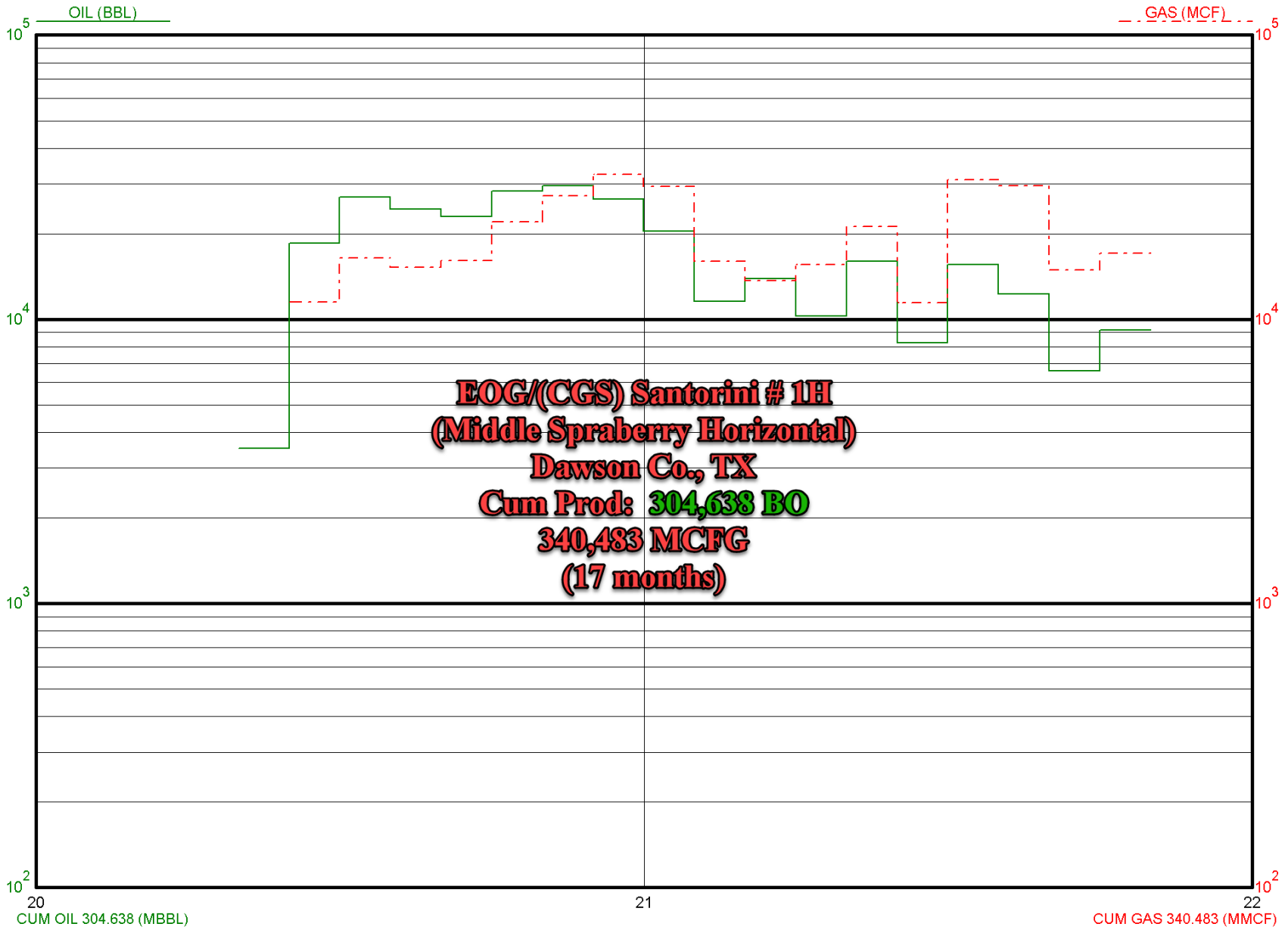
- Clean basinal turbiditic sands in Middle Spraberry
- EOG landed in the Sand the entire 2 mile lateral
- Ohms and porosity of the MS Sand similar to Burleson RIP
- Turbiditic sand deposition with brittle clays/carbonates inhibit neutron/density gas effect cross-plot

Midland Basin 'Wolfberry' Play

Wsn:588950 WELL: 42-115-33810-0100 (42115338100100) [DEV]

1H

42-115-33810 EOG Santorini Middle Spraberry Test

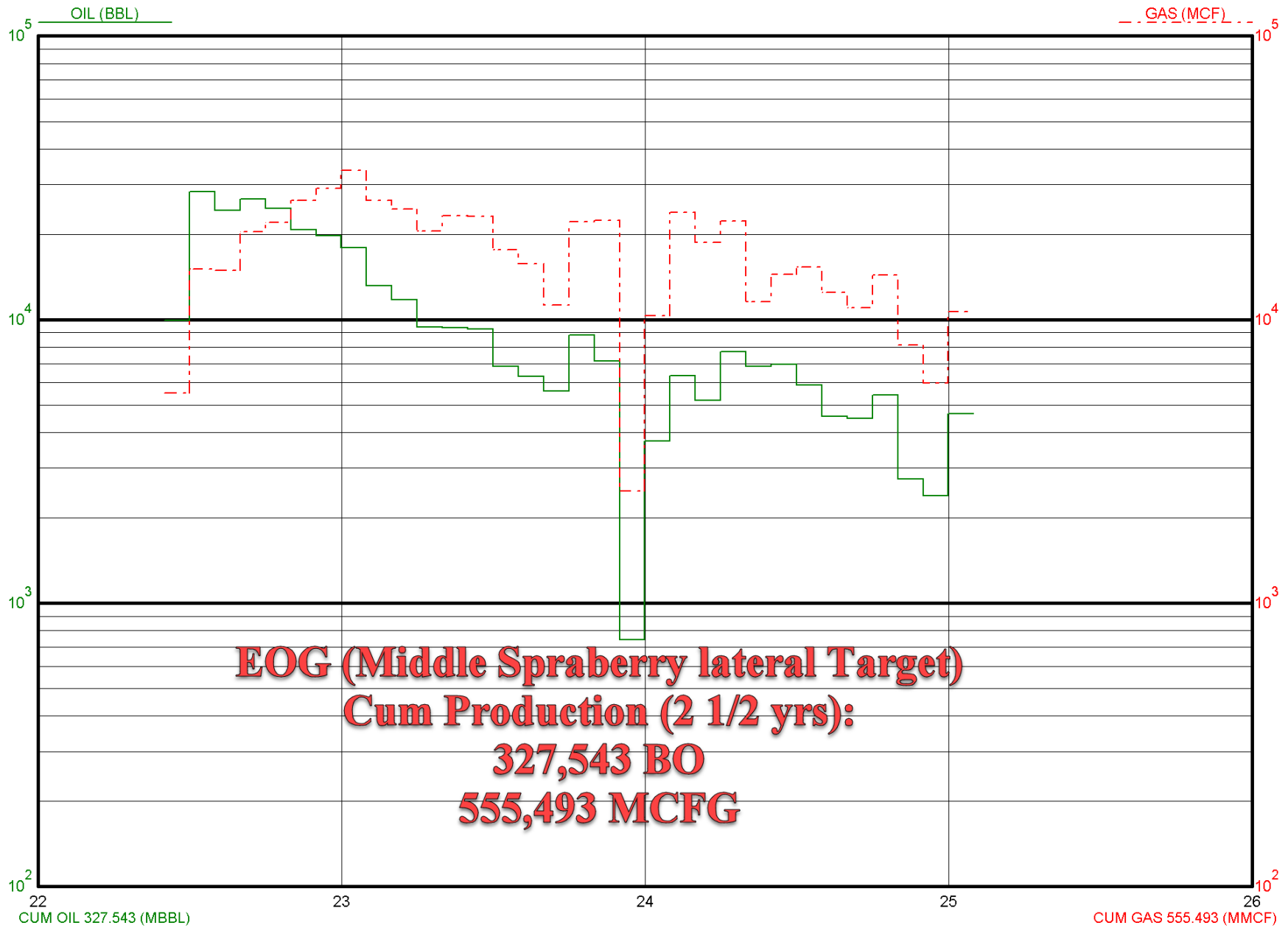


Midland Basin 'Wolfberry' Play

Wsn:597298 WELL: 42-115-33867-0000 (42115338670000) [DEV]

M 2H

42-115-33867 EOG Middle Spraberry Sand lateral target (Dawson County)

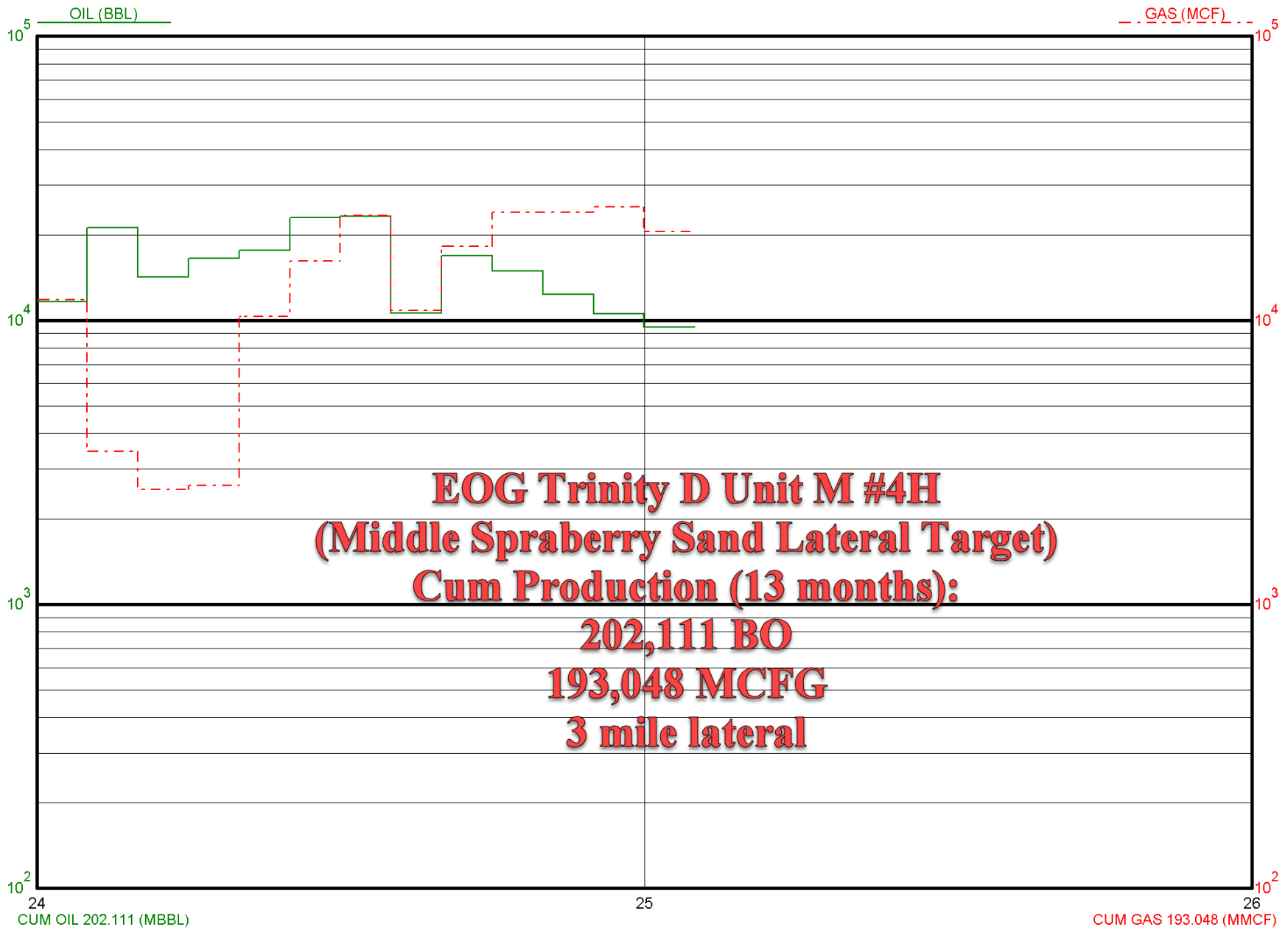


Midland Basin 'Wolfberry' Play

Wsn:619421 WELL: 42-115-33894-0000 (42115338940000) [DEV]

M 4H

42-115-333894 EOG Middle Spraberry Sand lateral target (Dawson County)

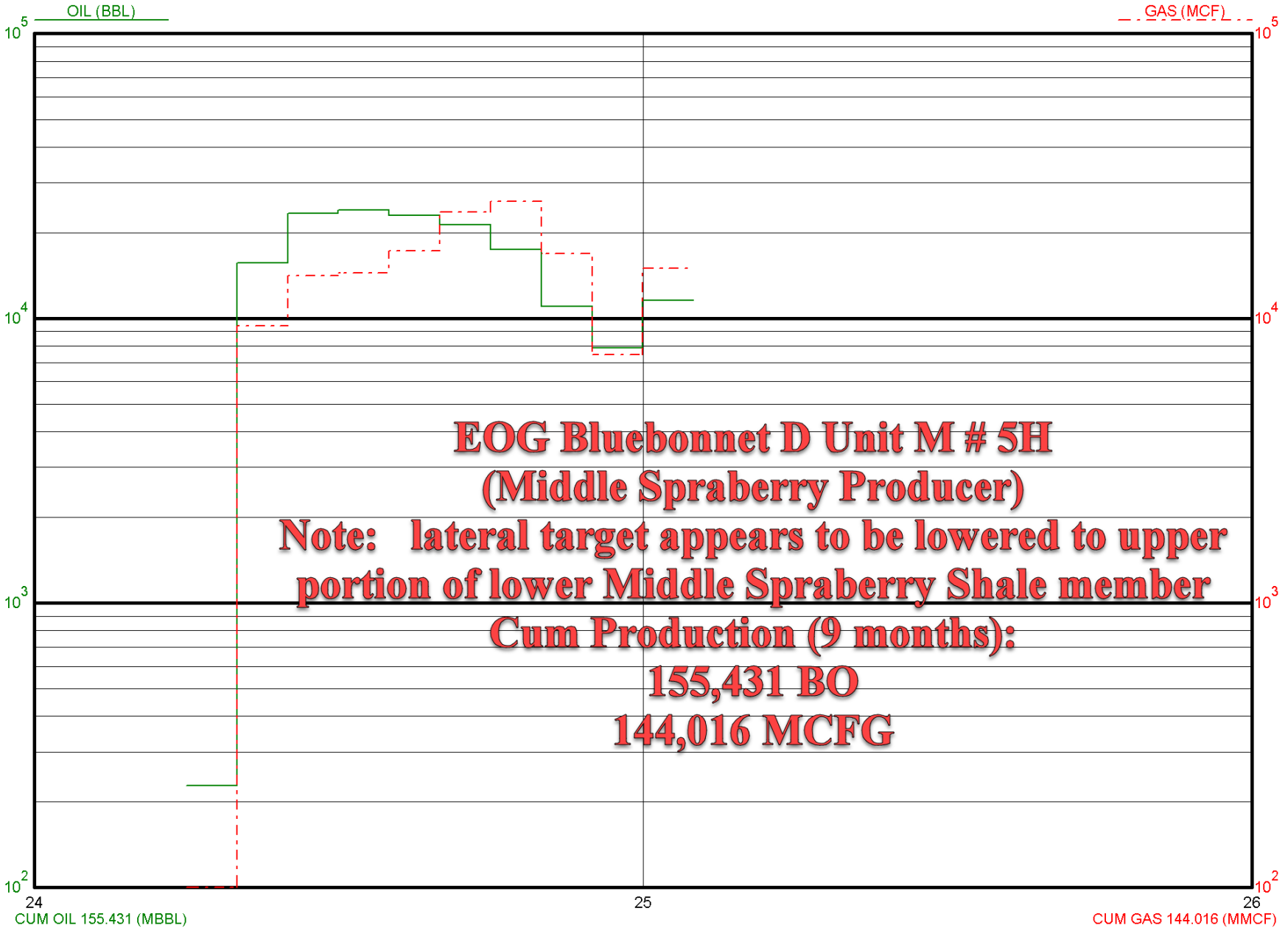


Midland Basin 'Wolfberry' Play

Wsn:624983 WELL: 42-115-33947-0000 (42115339470000) [DEV]

M 5H

42-115-33867 EOG upper portion of lower Middle Spraberry Shale member lateral target (Dawson County)

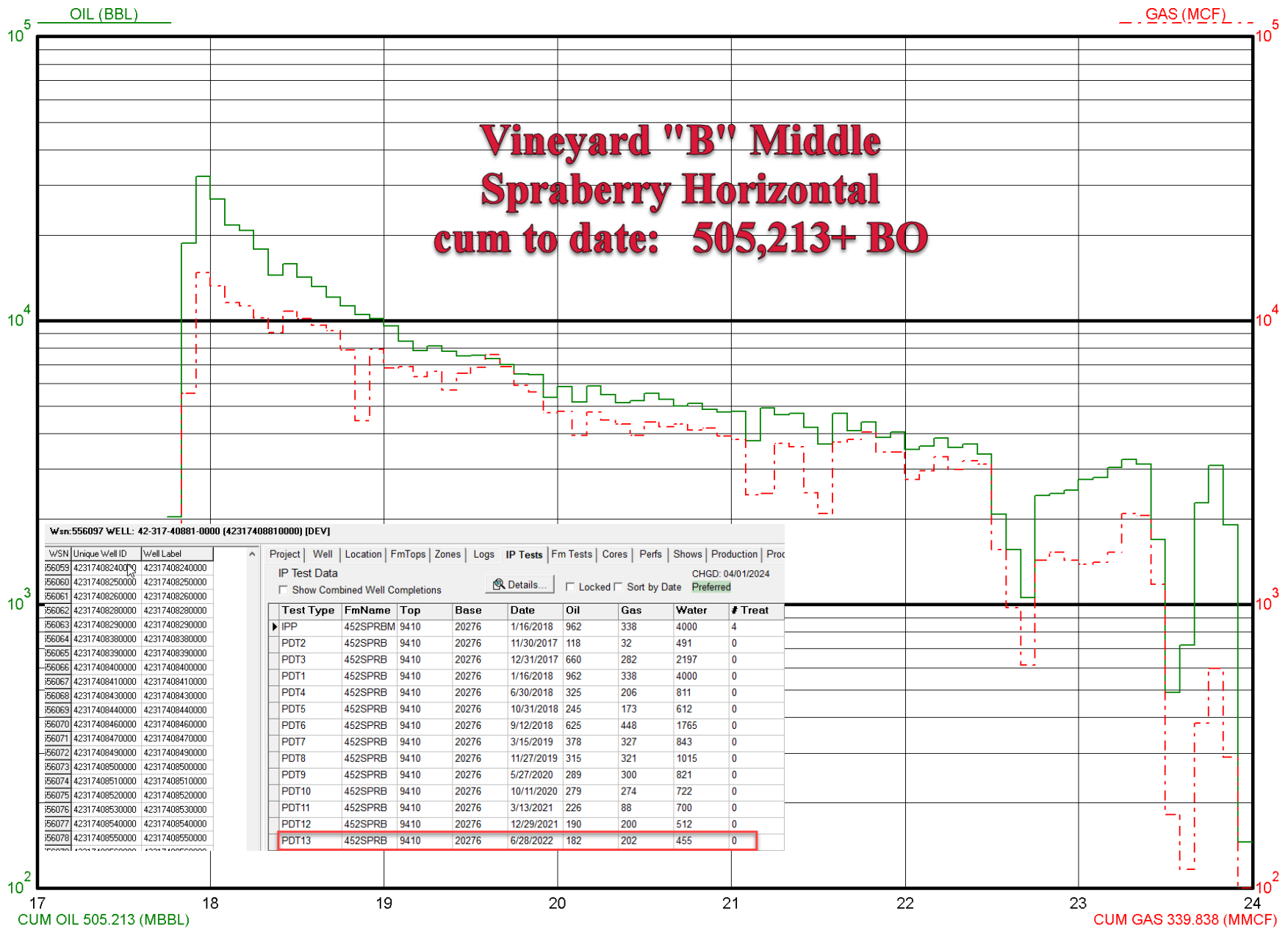


Midland Basin 'Wolfberry' Play

Wsn:556097 WELL: 42-317-40881-0000 (42317408810000) [DEV]

0601MS

Vineyard 'B' Middle Spraberry




Wsn:556097 WELL: 42-317-40881-0000 (42317408810000) [DEV]

| WSN | Unique Well ID | Well Label |
|---|---|---|
| 56059 | 42317408240000 | 42317408240000 |
| 56060 | 42317408250000 | 42317408250000 |
| 56061 | 42317408260000 | 42317408260000 |
| 56062 | 42317408280000 | 42317408280000 |
| 56063 | 42317408290000 | 42317408290000 |
| 56064 | 42317408380000 | 42317408380000 |
| 56065 | 42317408390000 | 42317408390000 |
| 56066 | 42317408400000 | 42317408400000 |
| 56067 | 42317408410000 | 42317408410000 |
| 56068 | 42317408430000 | 42317408430000 |
| 56069 | 42317408440000 | 42317408440000 |
| 56070 | 42317408460000 | 42317408460000 |
| 56071 | 42317408470000 | 42317408470000 |
| 56072 | 42317408490000 | 42317408490000 |
| 56073 | 42317408500000 | 42317408500000 |
| 56074 | 42317408510000 | 42317408510000 |
| 56075 | 42317408520000 | 42317408520000 |
| 56076 | 42317408530000 | 42317408530000 |
| 56077 | 42317408540000 | 42317408540000 |
| 56078 | 42317408550000 | 42317408550000 |

Project | Well | Location | FmTops | Zones | Logs | **IP Tests** | Fm Tests | Cores | Perfs | Shows | Production | Proc

IP Test Data

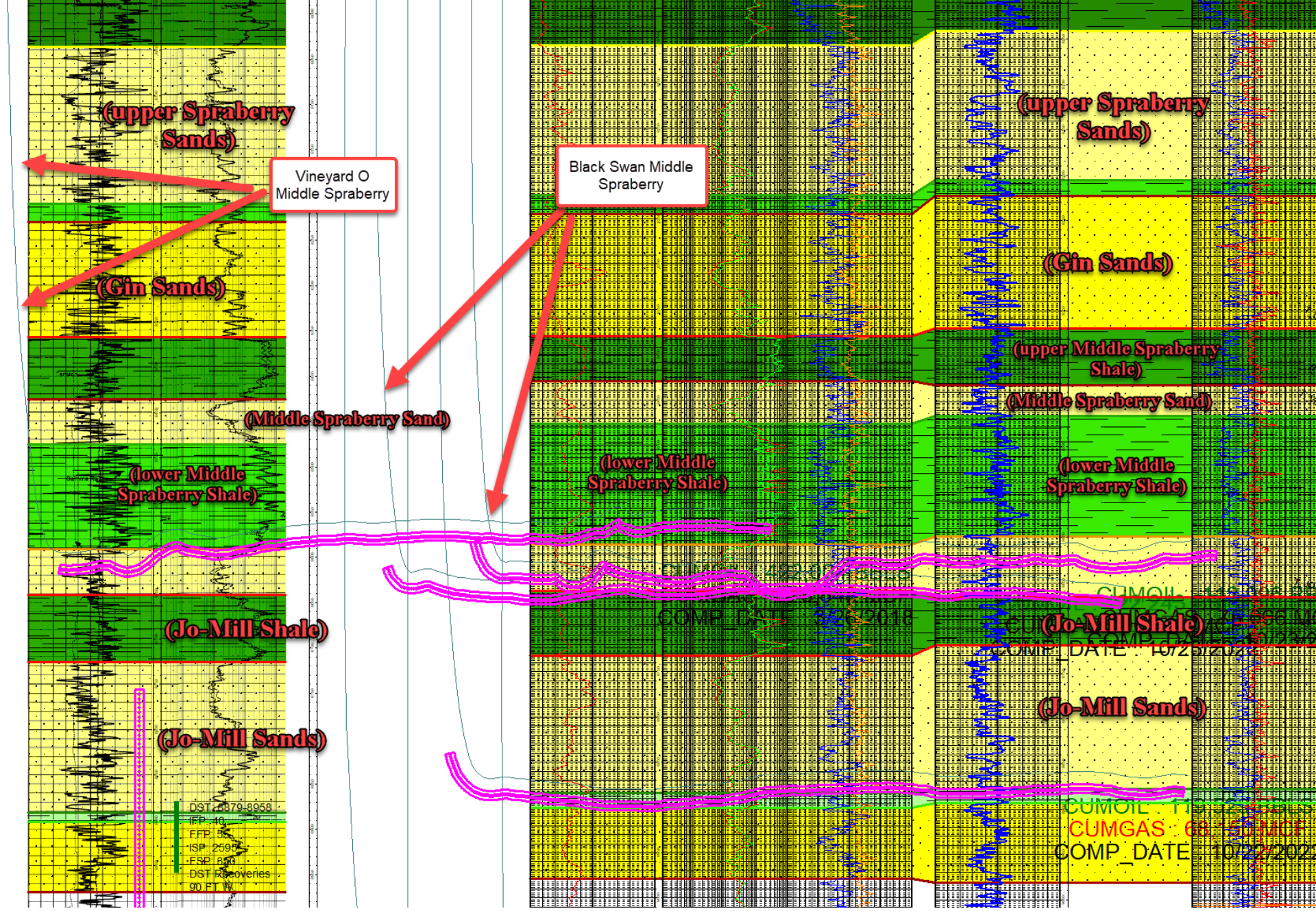
☐ Show Combined Well Completions

Details... ☐ Locked ☐ Sort by Date

CHGD: 04/01/2024

Preferred

| Test Type | FmName | Top | Base | Date | Oil | Gas | Water | # Treat |
|---|---|---|---|---|---|---|---|---|
| IPP | 452SPRBM | 9410 | 20276 | 1/16/2018 | 962 | 338 | 4000 | 4 |
| PDT2 | 452SPRB | 9410 | 20276 | 11/30/2017 | 118 | 32 | 491 | 0 |
| PDT3 | 452SPRB | 9410 | 20276 | 12/31/2017 | 660 | 282 | 2197 | 0 |
| PDT1 | 452SPRB | 9410 | 20276 | 1/16/2018 | 962 | 338 | 4000 | 0 |
| PDT4 | 452SPRB | 9410 | 20276 | 6/30/2018 | 325 | 206 | 811 | 0 |
| PDT5 | 452SPRB | 9410 | 20276 | 10/31/2018 | 245 | 173 | 612 | 0 |
| PDT6 | 452SPRB | 9410 | 20276 | 9/12/2018 | 625 | 448 | 1765 | 0 |
| PDT7 | 452SPRB | 9410 | 20276 | 3/15/2019 | 378 | 327 | 843 | 0 |
| PDT8 | 452SPRB | 9410 | 20276 | 11/27/2019 | 315 | 321 | 1015 | 0 |
| PDT9 | 452SPRB | 9410 | 20276 | 5/27/2020 | 289 | 300 | 821 | 0 |
| PDT10 | 452SPRB | 9410 | 20276 | 10/11/2020 | 279 | 274 | 722 | 0 |
| PDT11 | 452SPRB | 9410 | 20276 | 3/13/2021 | 226 | 88 | 700 | 0 |
| PDT12 | 452SPRB | 9410 | 20276 | 12/29/2021 | 190 | 200 | 512 | 0 |
| PDT13 | 452SPRB | 9410 | 20276 | 6/28/2022 | 182 | 202 | 455 | 0 |



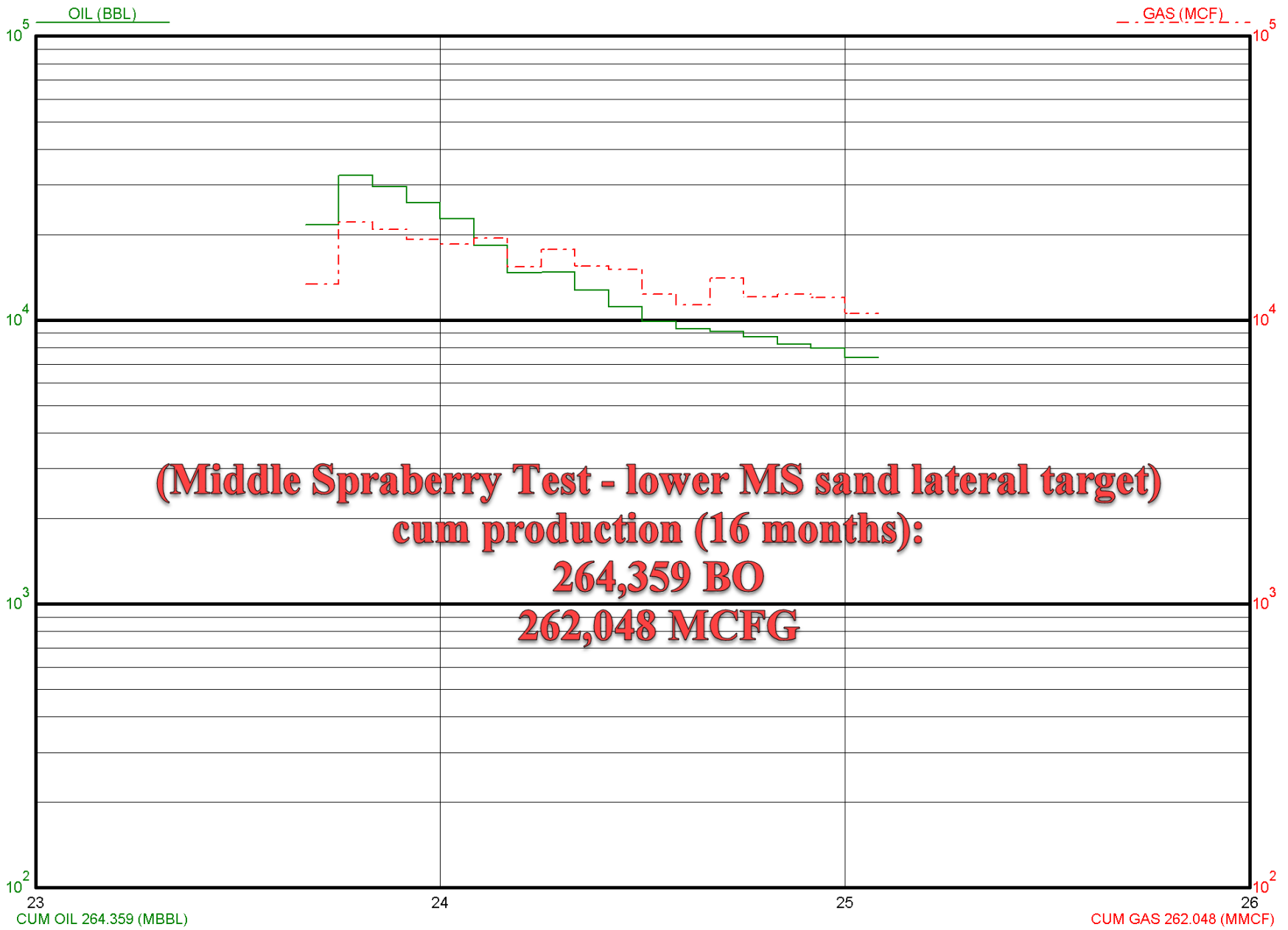

**New Area Middle Spraberry Landing targets**

Midland Basin 'Wolfberry' Play

Wsn:619565 WELL: 42-317-45033-0000 (42317450330000) [DEV]

1MS

42-317-45033 (Middle Spraberry Test) lower Sand lateral target

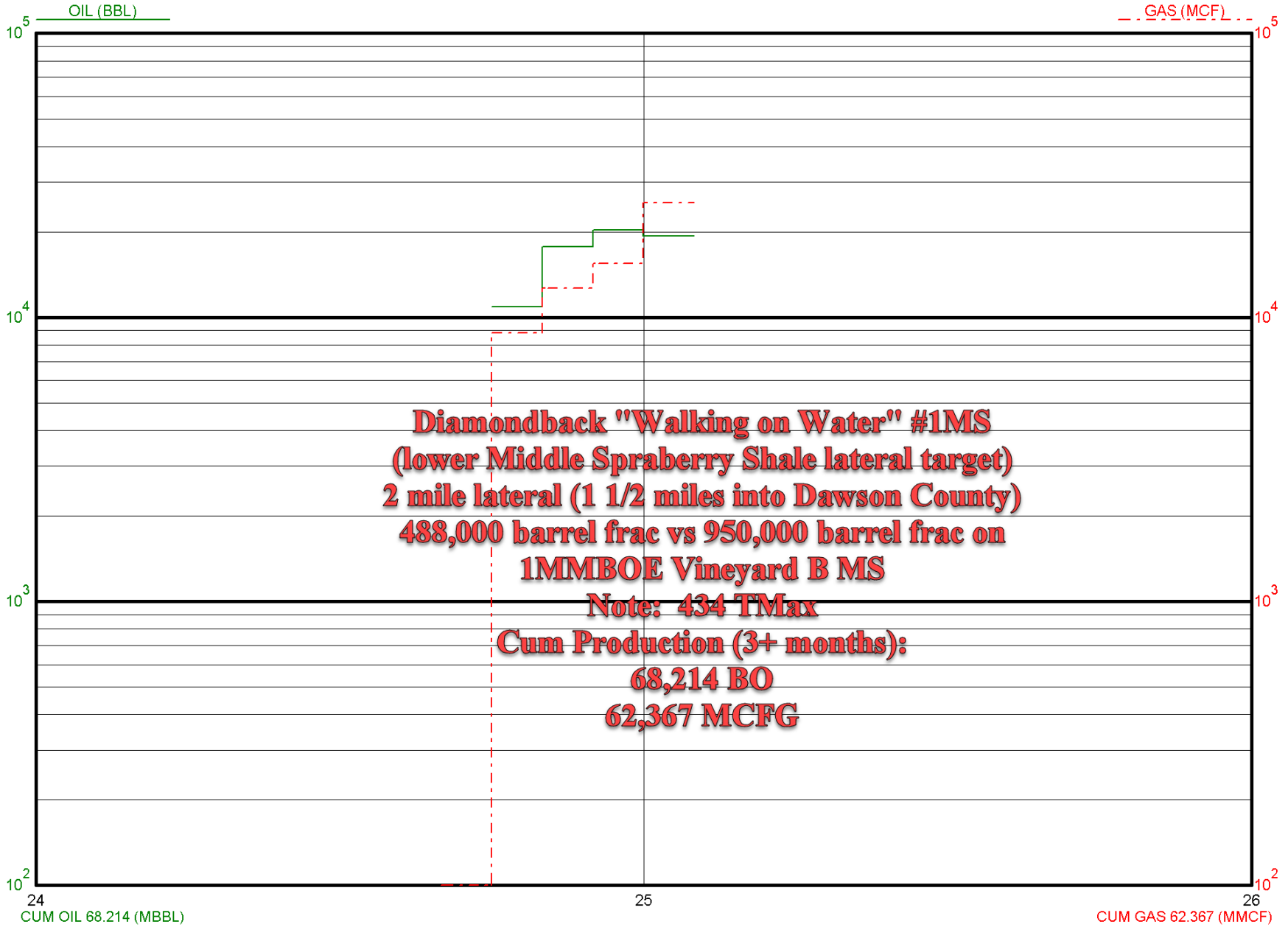


Midland Basin 'Wolfberry' Play

Wsn:625030 WELL: 42-317-45795-0000 (42317457950000) [DEV]

1MS

42-317-45795 "Walking on Water" MS (southern Dawson County)



# (Conclusions)

- **The EOG Santorini was the 1st Middle Spraberry horizontal drilled in Southern Dawson County. The Santorini landed in the Middle Spraberry Sand and is a prolific producer. EOG continued to land in the Middle Spraberry Sand and made good commercial wells, they never matched the performance of the Santorini.**

- **Before the EOG Santorini, Ajax drilled the Vineyard "B" Middle Spraberry right on the SW Dawson/NW Martin County line. Landing in the lower Shale member of the Middle Spraberry, this well is the actually a more commercial Middle Spraberry Shale producer than the EOG Santorini.**

- **Diamondback (successor to Ajax) continued to drill commercial Middle Spraberry wells along the Martin/Dawson County line landing in the lower shale member of the Middle Spraberry. While not matching the original Vineyard B MS, all subsequent fracs were no more than ½ the size of the Ajax Vineyard B MS. Recently, Diamondback has been doing larger fracs on the Middle Spraberry.**

- **Diamondback crossed into Southern Dawson County with the Walking on Water #1MS IP 1134 BOPD landing in the lower shale member of the Middle Spraberry.**

- **On their most recent wells, EOG has moved their landing target down to the lower shale member of the Middle Spraberry as well.**

# WFMP A Detritus Review

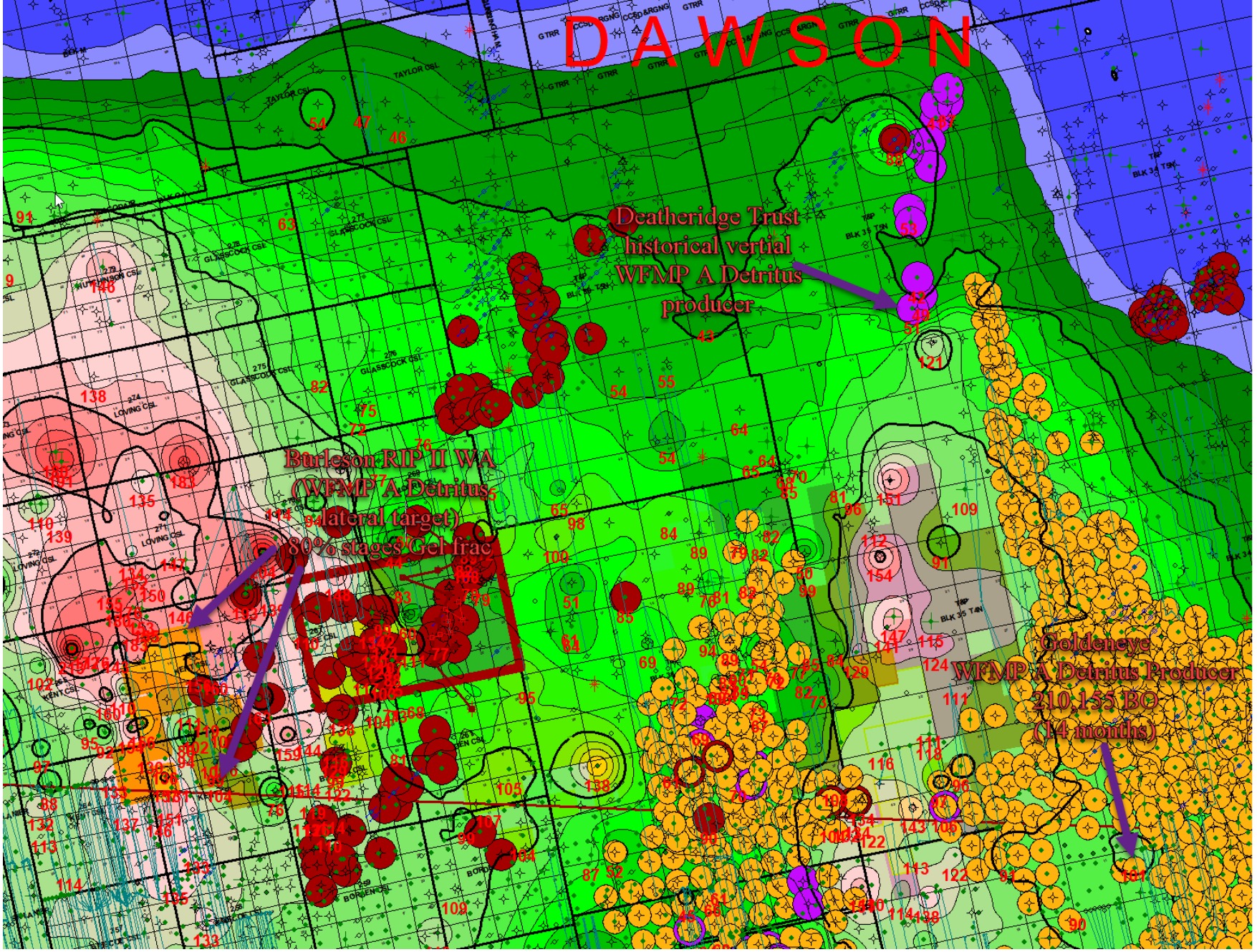
**Notes:**

- **While there is historical vertical WFMP A Detritus production in Dawson County, there is no commercial WFMP A Detritus horizontal test. The vast majority of the EXL Crockett horizontal WFMP A test landed in the low ohm WFMP A shale interval.**

- **Recent horizontal tests landing in or just at the top of the WFMP A Detritus close to the Martin/Dawson county line have had encouraging initial production results.**

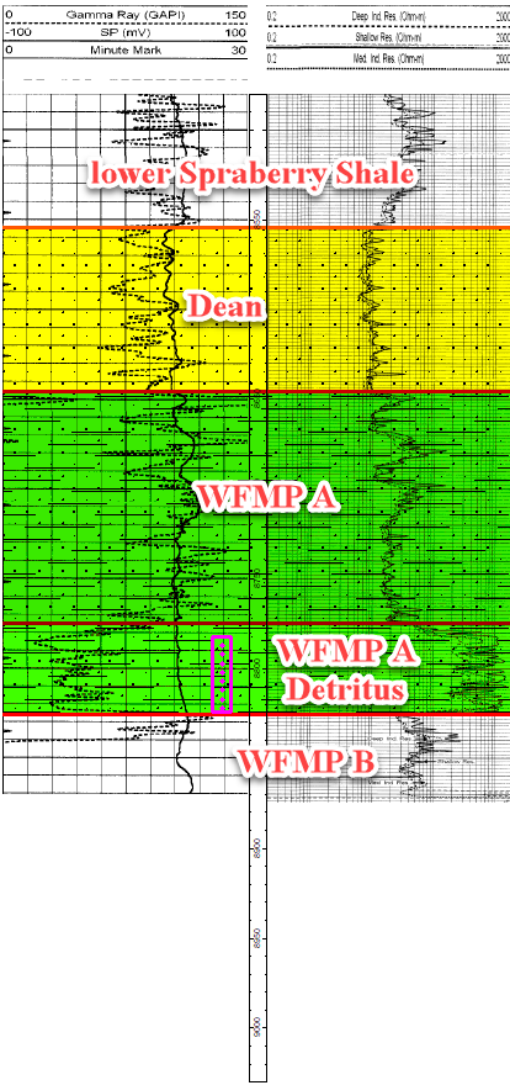
- **The Burleson Buffalo Trace/RIP 8 # 8 in SW Dawson County will be the first horizontal to land in the middle of the WFMP A Detritus. Results will apply across the southern Dawson County resource play.**

- **To the east at the Martin/Dawson County line, the Endeavor Goldeneye landing and fraced the WFMP A Detritus outperforming all WFMP A producers offsetting to the west.**




**WFMP A Detritus Isopach Map – *Southern Dawson Co.***

42115332200000
ROBERTSON RESCS INC
DEATHERAGE TRUST
1
ELEV_KB : 2,930
ELEV_GR : 2,912
: 8,555
Twn-Rge-Sec : T5N B35 S34
Footage Calls : 1830 FNL 2510 FEL
TD : 8,875



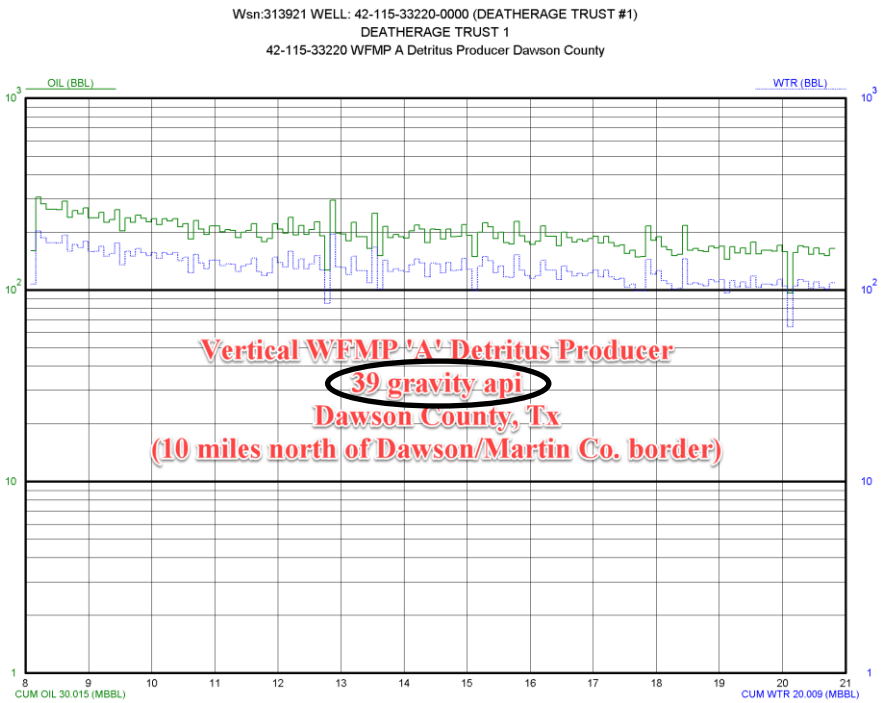

CUMOIL : 30,015 BBLS
CUMGAS : 0 MCF
COMP DATE : 2/27/2008

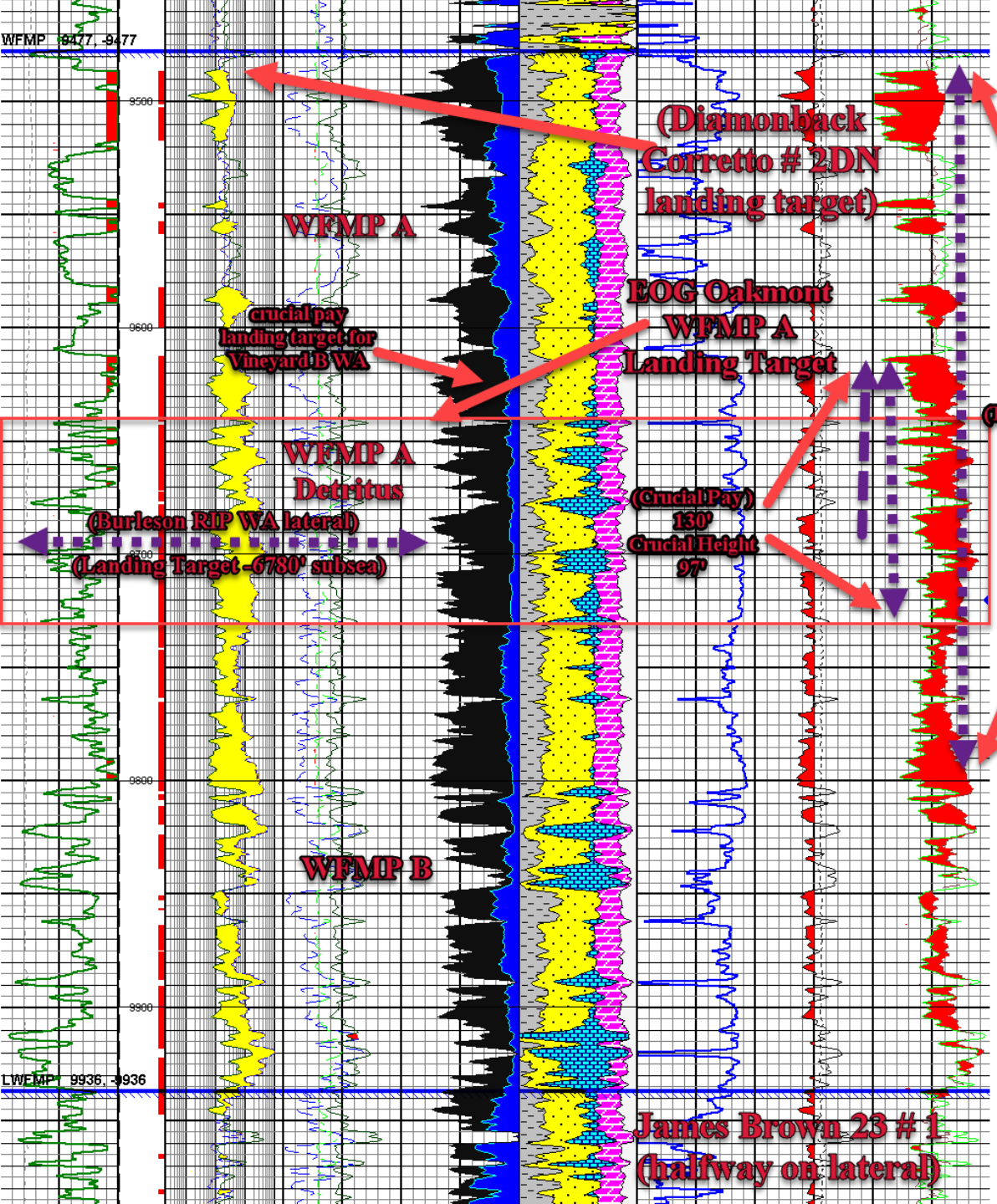
# Observations:

- 39º gravity oil produced from 20 ohm interbedded organic WFMP A shales
- Very limited detritus porosity (i.e. given their thin size of < 6' and ratty GR they are at the depth margins of preservation of porosity)
- Frac with 80,000 #'s sand is large enough for vertical growth exposing the 20 ohm organic shales to production pathways
- Current EUR projections >50mbo greater than 40 acre drainage of possible lime reservoir capacity
- Some hydrocarbon dampening of SP seen throughout the WFMP A sequence

**WFMP 'A' Detritus Production Liberty Field Dawson Co., Tx**

***(10 miles north of Martin/Dawson County Line)***



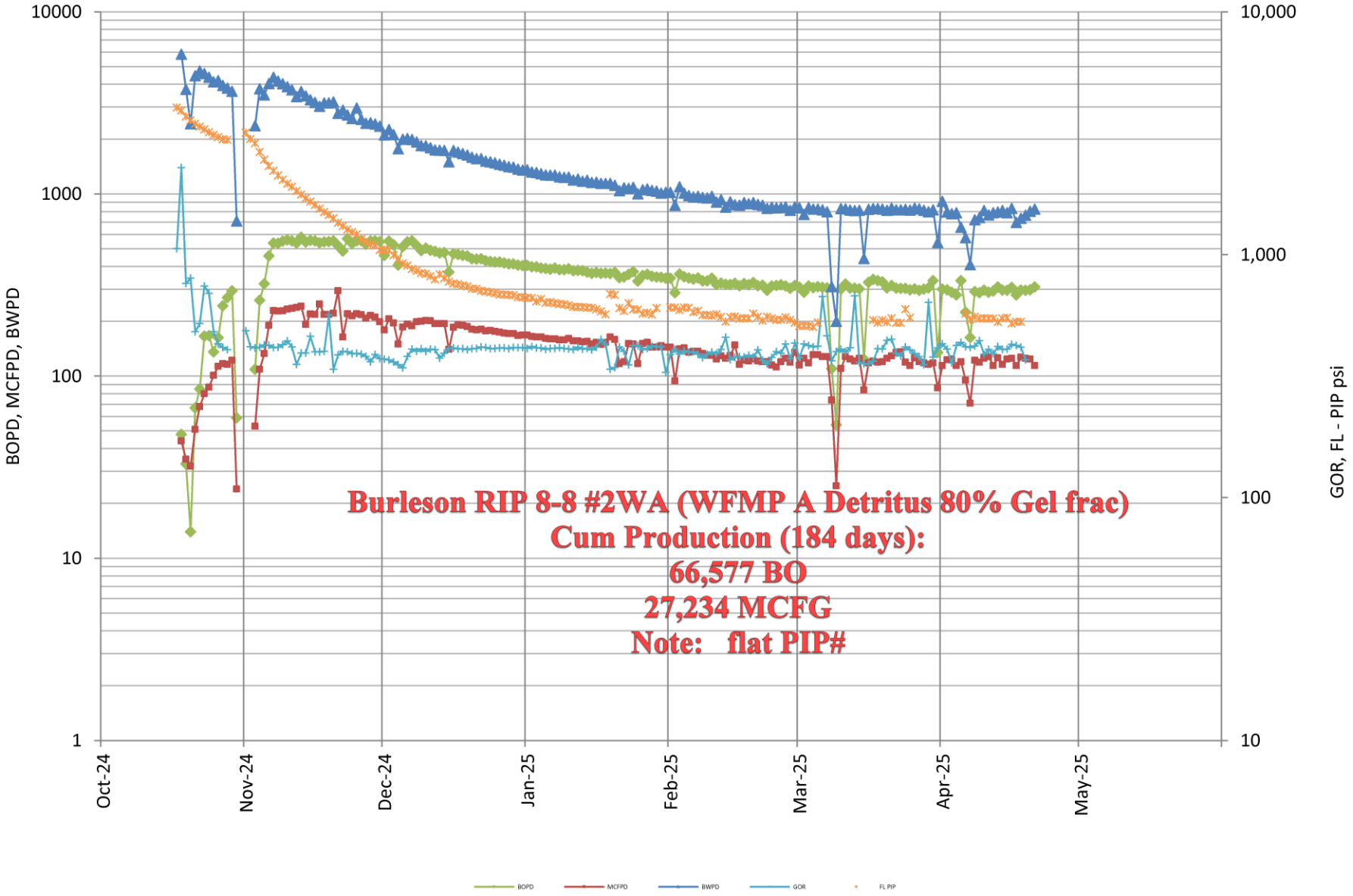


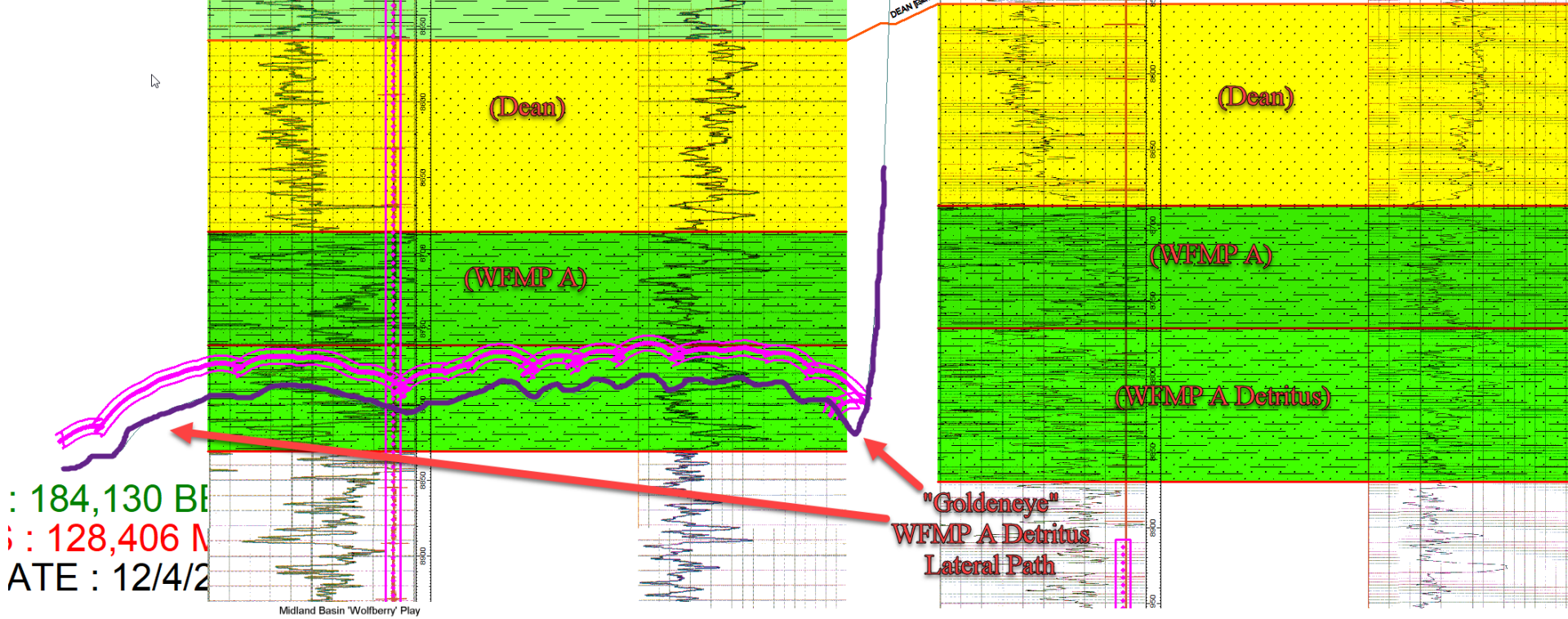

# Burleson RIP II WA "Type Log" (1/2 way down lateral)

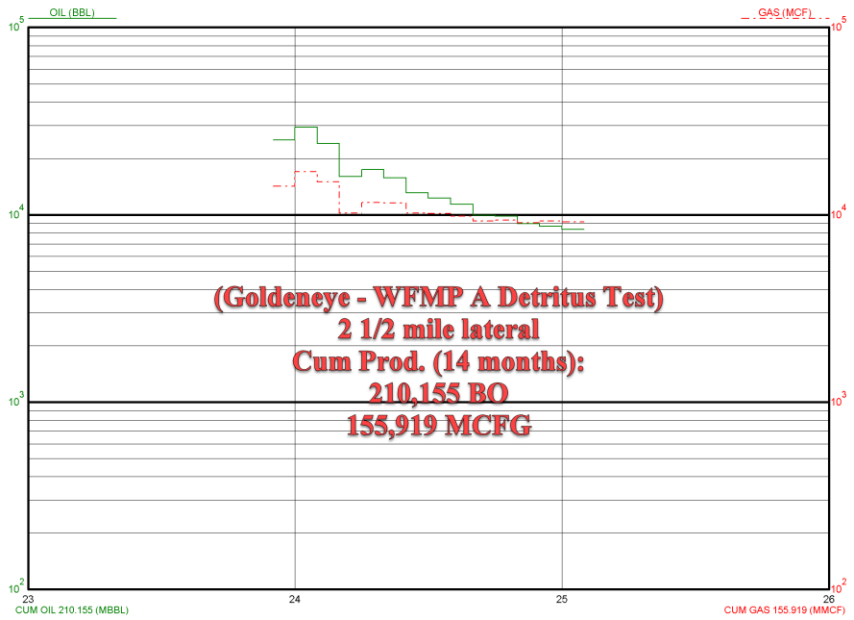
## Notes:

- Targeted landing in the lowest Sw with organic pay above and below landing target (280' total pay height)
- Couldn't complete per design on 5 of 1st 21 slick water frac stages. Constantly fighting max pressure.
- Used 40' perf spacings in limited entry for height growth
- Used Gel system to complete remaining frac
- Intial load returns were 4.6 cP (fresh water is 1cP). All load tested since then has been 3cP (broken/spent gel)

# RIP VW 8-8 # 2WA (WFMP A Detritus Test)

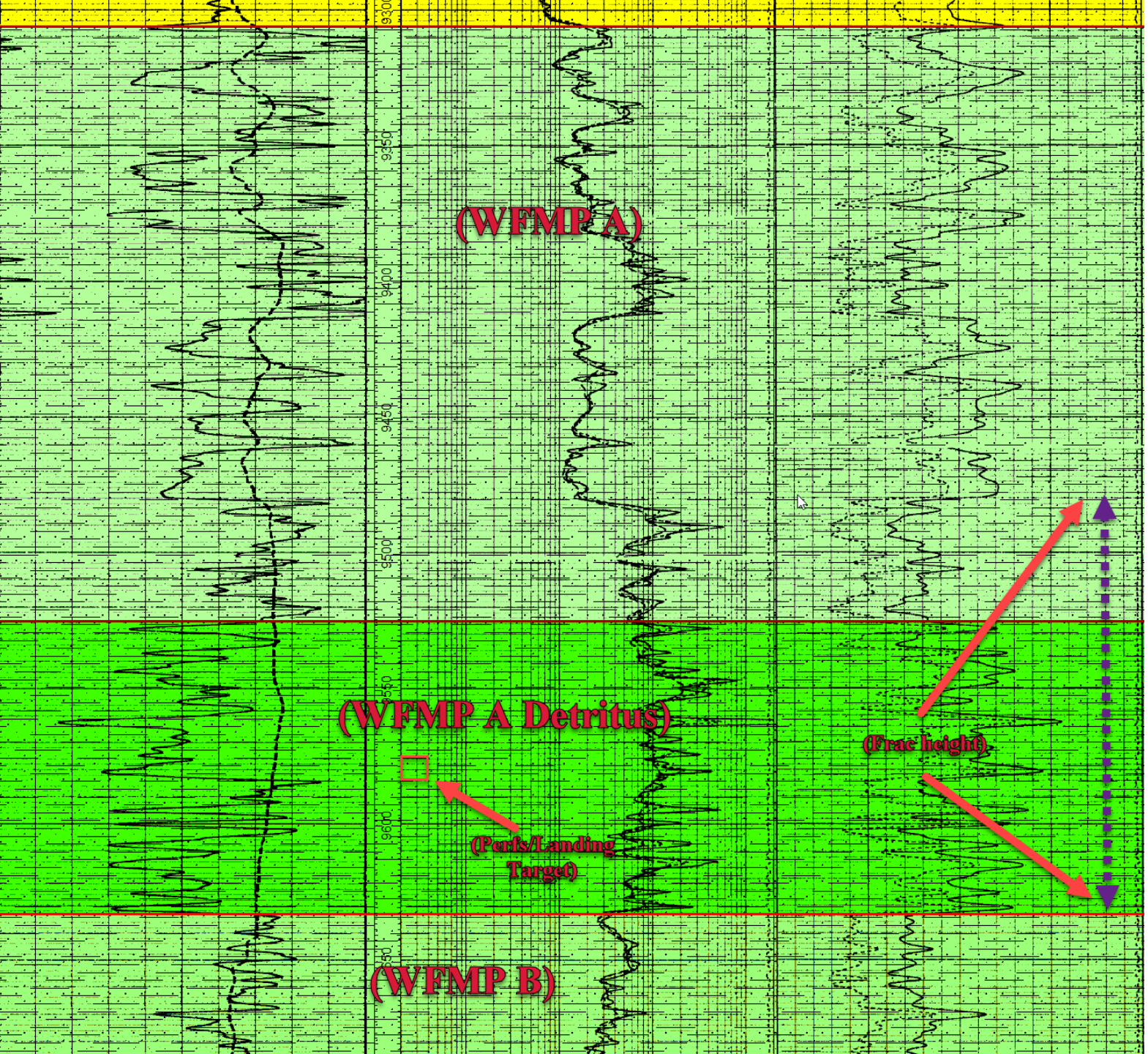





## Notes:

- Located east of our acreage blocks right on the Martin/Dawson County line
- Outperforms all the WFMP A horizontals which landed in the WFMP A organics overlying the WFMP A detritus (too much clays????)
- Target is omnipresent to the west and should be a resource play for Southern Dawson County




# Notes:

- Landing in the high deposition WFMP A Detritus should limit frac height to keep the frac focused on this high ohm hydrocarbon saturated shales

**Cal Farley/Brown acreage block "type log"**

# (Conclusions)

- **The WFMP A Detritus is a high energy deposit of interbedded turbiditic limes and hydrocarbon saturated brittle organic shales which is omnipresent throughout southern Dawson County.**

- **The WFMP A Detritus is a prolific producer and lateral target in NW and NE Howard Counties as well as northern Martin County right up to the County line.**

- **The overlying 20-50' hydrocarbon saturated organic shale was the lateral target in the prolific Vineyard B WA well. EOG Oakmont # 1WA landed in that shale just above the WFMP A Detritus and made a commercial well in southern Dawson County.**

- **It may be something as "simple" as a change into a tighter perf scheme (irreducible complexity) which will allow fracs to be staged out of the brittle WFMP A Detritus and still exploit all reserves of the overlying hydrocarbon saturated organic shales.**

# (Project Conclusions)

- **Landing/Fracing in the most brittle rock in Unconventional Hybrid Plays provides sustainable open fractures at the wellbore for efficient ΔP to obtain maximum long term recoveries of commercial reserves.**

- **The Dean "Halo" as defined by historical offset under-stimulated production and isopach thickness indicative of higher energy deposition is proven ready for exploitation.**

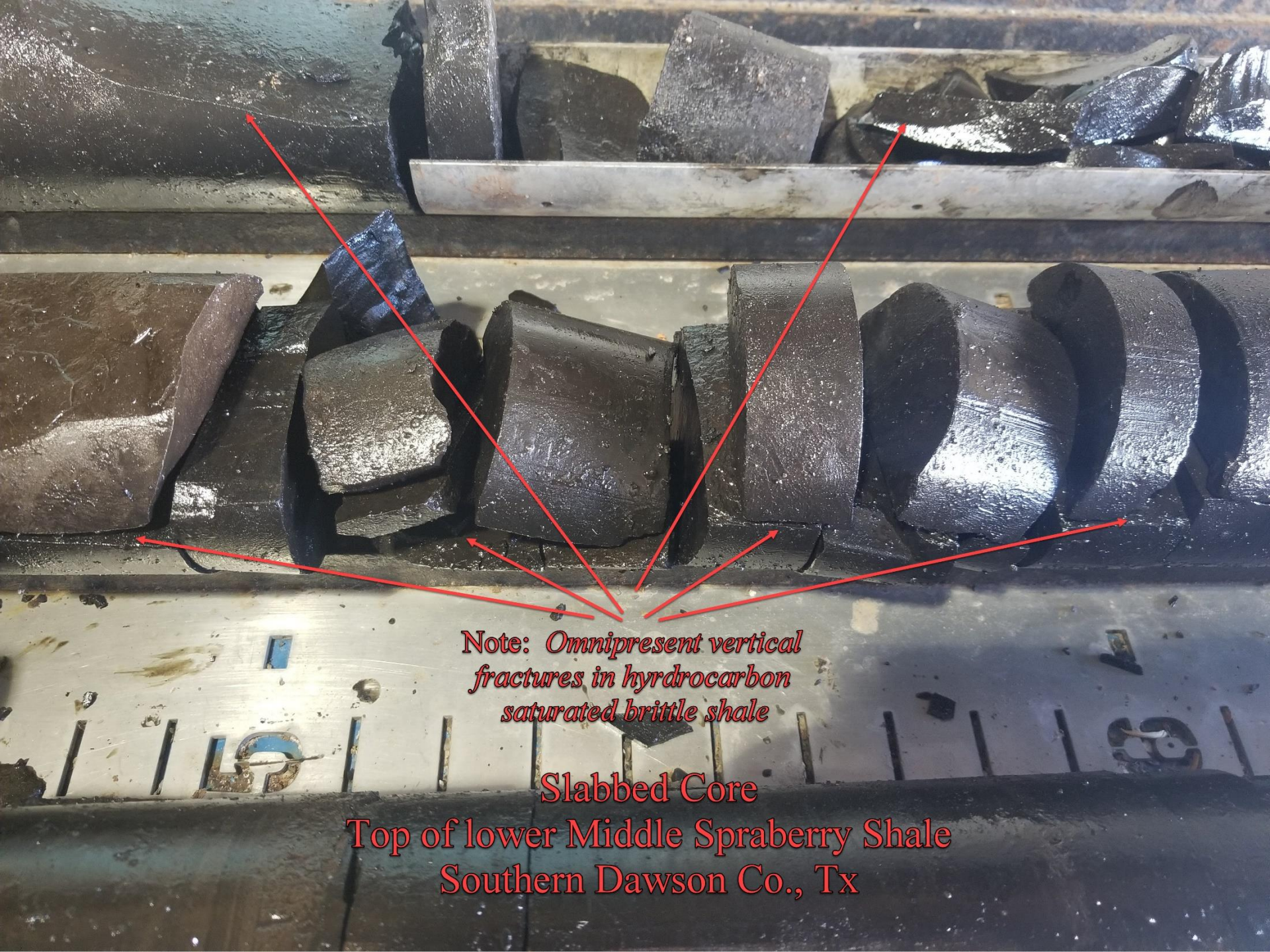
- **The WFMP A Detritus Bench is another untested brittle high energy deposition hybrid bench with some historical production in Dawson County but newer completions are now right up to the Martin/Dawson County line.**

- **In the "Wolfberry Play" there are no frac barriers so therefore vertical growth out of targeted zone is always a concern and has to be considered in frac design and landing targets.**

- **Despite some commercial wells, the landing target for the Middle Spraberry bench has not been established. Regional core and petrophysics still show this bench to have the most potential as an area resource play. Correct landing targets and frac designs in other areas nearby support the idea that improvements can be made up to 10x over economic failures.**

# Addendum: Southern Dawson Core Review With Jarvie/Sonnenfeld Observations

**(See URTeC # 2461914 - Migration Happens**: Geochemical Evidence for Movement of Hydrocarbons in Unconventional Petroleum Systems (*Sonnenfeld et al*)**)**




Slabbed Core
Top of lower Middle Spraberry Shale
Southern Dawson Co., Tx


8153
8155
8161
8163
8175
8154
8158
8160
8162
8164
Note: *Omnipresent vertical fractures in hyrdrocarbon saturated brittle shale*
Slabbed Core
Top of lower Middle Spraberry Shale
Southern Dawson Co., Tx

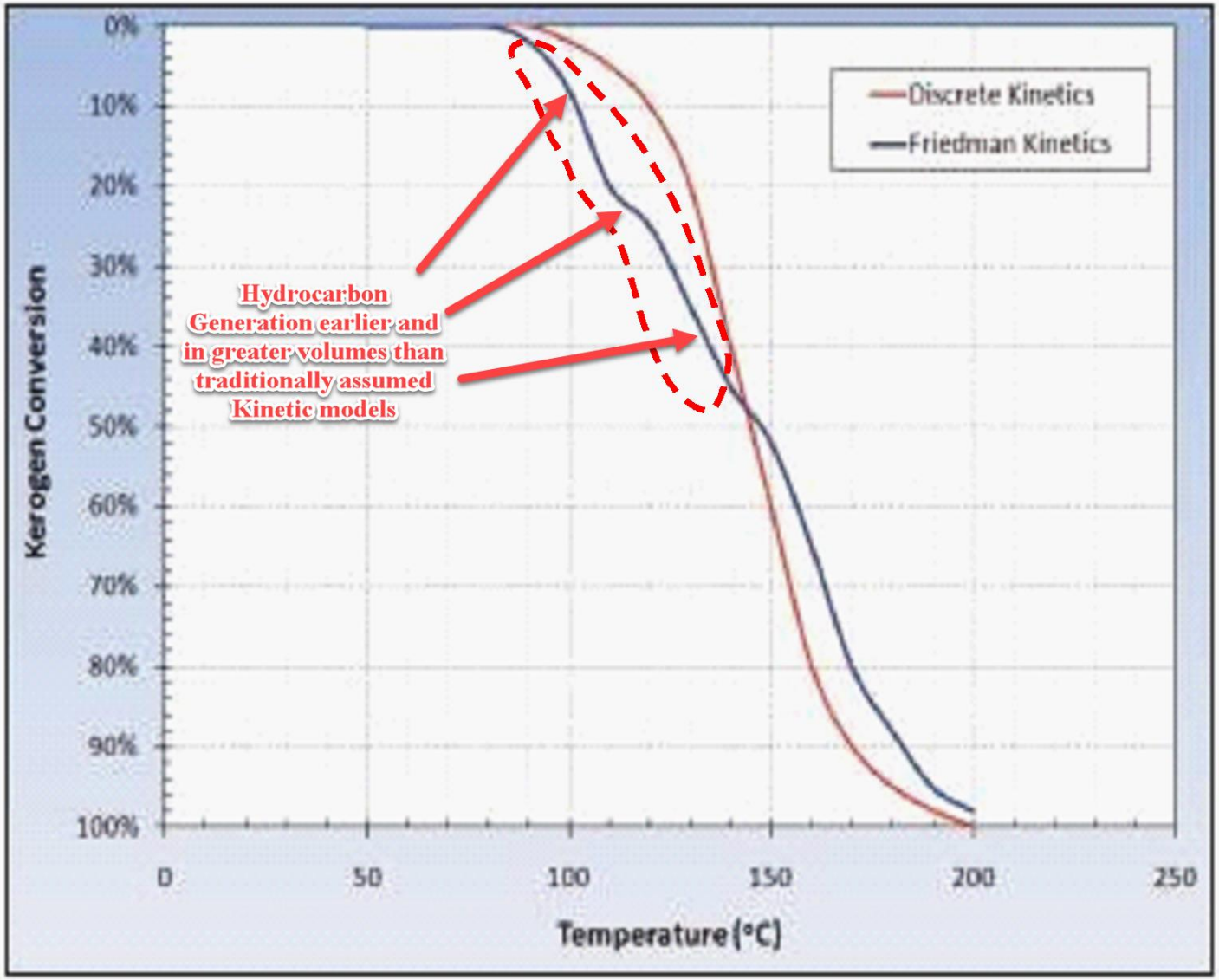



**Figure 38.** Comparison of discrete and Friedman kinetic parameters used to predict the temperature of conversion of Bakken Shale using an arbitrary and constant heating rate of 0.75°C/Ma. Discrete kinetic models use a single Arrhenius factor (probability factor) with a distribution of activation energies, whereas the Friedman model utilizes a different Arrhenius factor for all activation energies over each 10% of conversion from 0 to 100%. This affects both the earliest and latest computed generation temperatures and suggests earlier generation for the Bakken shale compared to the discrete model. Both mathematical models agree on peak or near 50% transformation ratio.

**Friedman Kinetic model used in Bakken Shale Study supports earlier hydrocarbon generation in diagenesis**

**Note: Friedman Kinetics fits best with modern diagenetic models explaining production factors in unconventional source rock reservoirs – *i.e. unconventional source rock reservoirs produce by hydrocarbon expulsion across the microfracture face in response to a ΔP.***

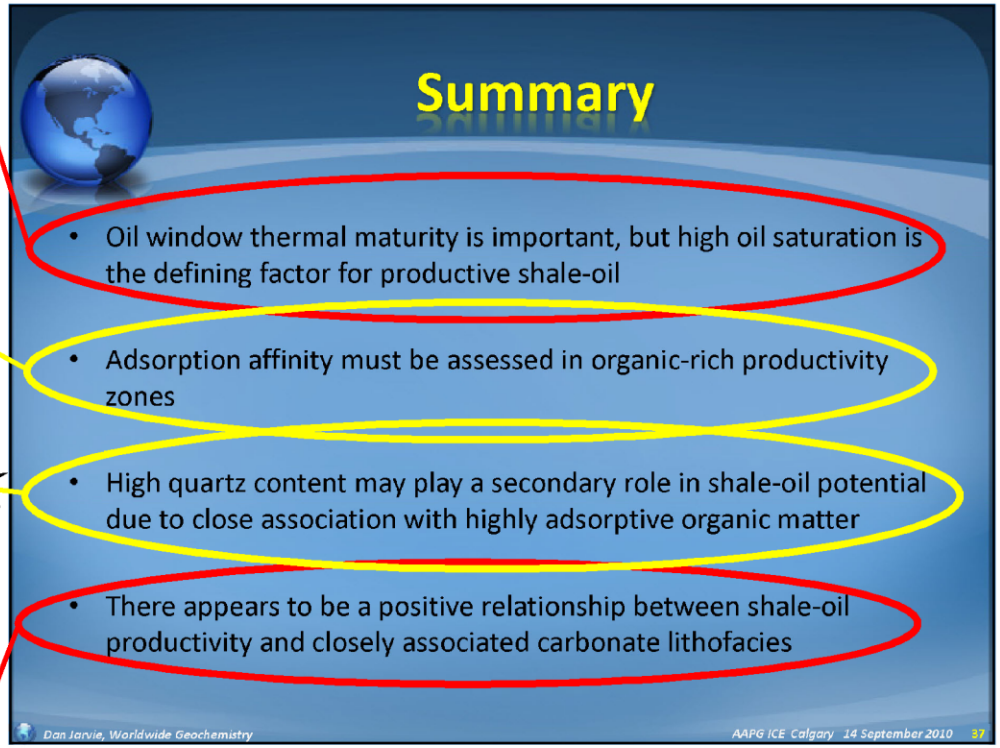
# "Geo-Chem Conclusions"

**Note: Not only captured S1 (volatile hydrocarbons/*free oil*) but also lost S1 during core acquisition due to evaporation of volitiles. S1 lost is 35% for 1 hr exposure of 38 gravity oil at 100° F - *i.e. Trip out time for sidewall cores*. Lost S1 can range from 10% to over 200%. Obviously, the more brittle the source rock the higher the S1-*lost* - *Jarvie***

**The first or very early light end migrated oils can be adsorbed with in-Situ S2 kerogens until saturation. These early 'adsorbed' migrated oils may be more readily produced when exposed to expulsion from maximum Delta Pressure when the exposure to the movement of the long chain hydrocarbon S1 overcomes the adsorptive bond on the S2 kerogens.**

**The primary organic content of the deep water facies for Permian Wolfcampian/Leonardian is siliceous shelled Radiolarins (- *i.e. plankton*). The WFMP B and lower Spraberry Shale facies is dominated by silicates and organic silicates. While most of the poor "commerciality" of the WFMP B and lower Spraberry Shale can be explained by the high heavy clay content found in the illite/smectite % of these formations, the adsorptive bond of the heavy silicate organics may also play a significant roll particularly in the long term production curve.**

**Note: The dominate facies of both the WFMP A and the Middle Spraberry Shale is carbonate heavy brittle shales interbedded with thin detritus micritic limes and basinal hydrocarbon saturated turbiditic sands - (*i.e. conventional/unconventional "hybrid" systems*).**




**Conclusions from: "*Unconventional Oil Petroleum Systems: Shales and Shale Hybrids*" - Dan Jarvie - 2011**