

Successful Mature Field Re-Development at Mount Poso Oil Field, Kern County, California*

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Abstract

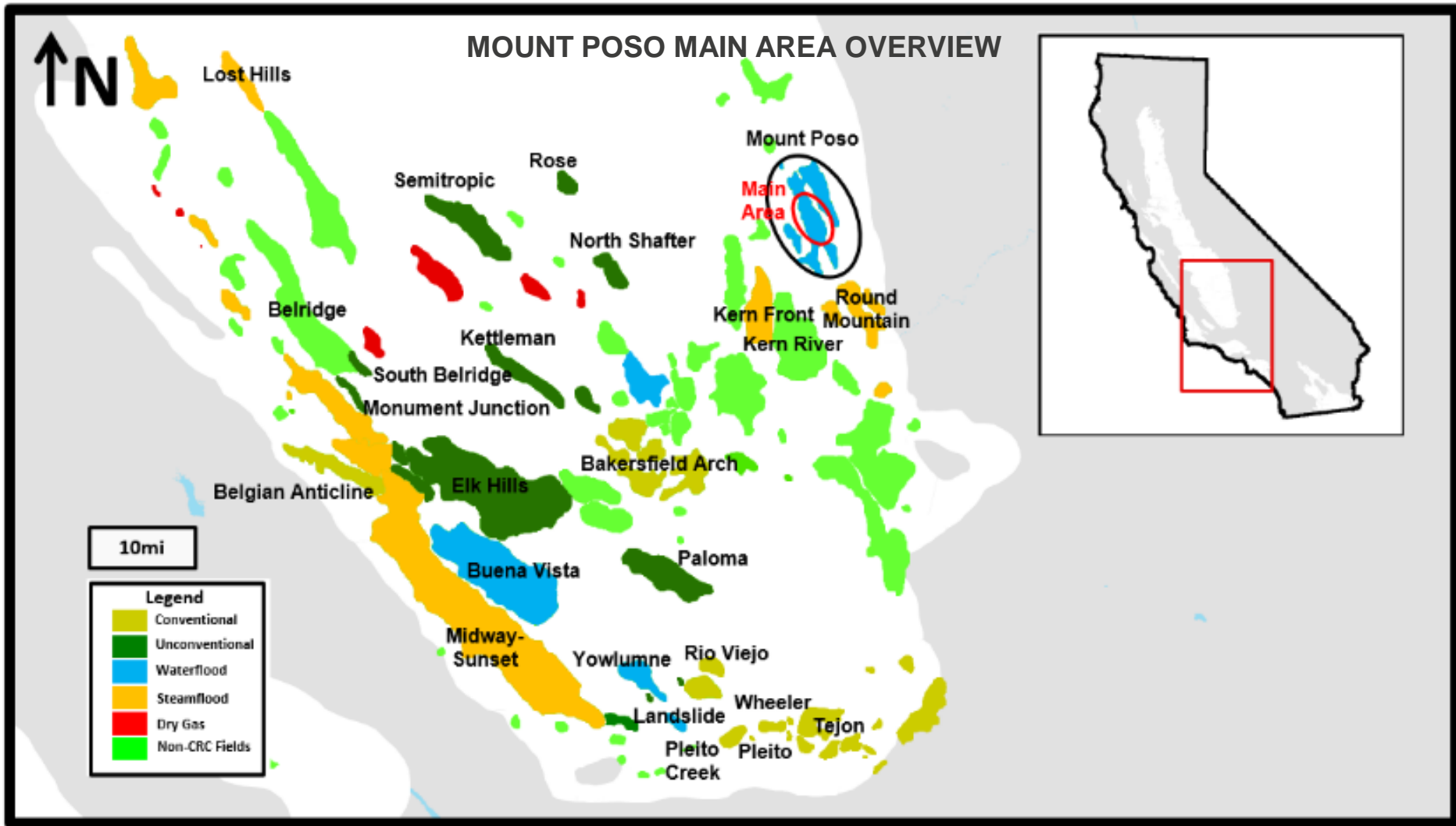
The Mount Poso Oil Field was discovered in 1926 and has produced over 300 mmbo from a three way closure against an east dipping normal fault situated along the eastern flank of the San Joaquin Valley in Kern County, California. The field was on decline in January, 2012, producing 800 bopd from 300 wells in the Miocene Pyramid Hills Formation. A combination of sixty new horizontal wells, a waterflood project, and re-development of the Oligocene Vedder Formation have since increased production to over 3,000 bopd. Production is expected to increase further with a full field expansion of the waterflood and continued re-development of the lower Vedder Formation. The Vedder Formation was under primary production from its discovery in 1926, then steam flooded from 1973-1998 with a focus on the Upper Vedder, and finally shut-in from 1998-2012. The shallower clay-rich Pyramid Hills Formation was largely bypassed until the mid-1980's, followed by workover appraisal, and then became the focus of development with vertical new drills in 1999 with the first laterals in 2005. From 2005-2012 the average well rates decreased from 4 to 2.5 bopd. In 2012 a successful horizontal well program built off the lessons learned from earlier development increasing production to 2,000 bopd by the end of the year with many 50-125 bopd IP wells. A successful Pyramid Hills waterflood was implemented by incorporating an updated geomodel, testing fluid compatibility with swelling clays, and utilizing the large inventory of existing wellbores to minimize costs. Reappraisal of the previously abandoned lower Vedder Formation since 2013 has led to thirteen new drill wells and five workovers with rates ranging from 10-280 bopd. Renewed focus and shallow reservoirs with attendant low costs have allowed multiple development techniques to be tested successfully in a short period of time at the Mount Poso Field, realizing significant production growth in a mature field.

2015 PSAAPG Annual Conference | Oxnard, CA | May 5th, 2015

Successful Mature Field Redevelopment at Mount Poso Oil Field, Kern County, California

Marc Cooper (Geologist) | Eddie Behm (Reservoir Engineer) | Michael
Lebaron (Production Engineer) | Katy Jensen-Doescher
(Petrophysicist)



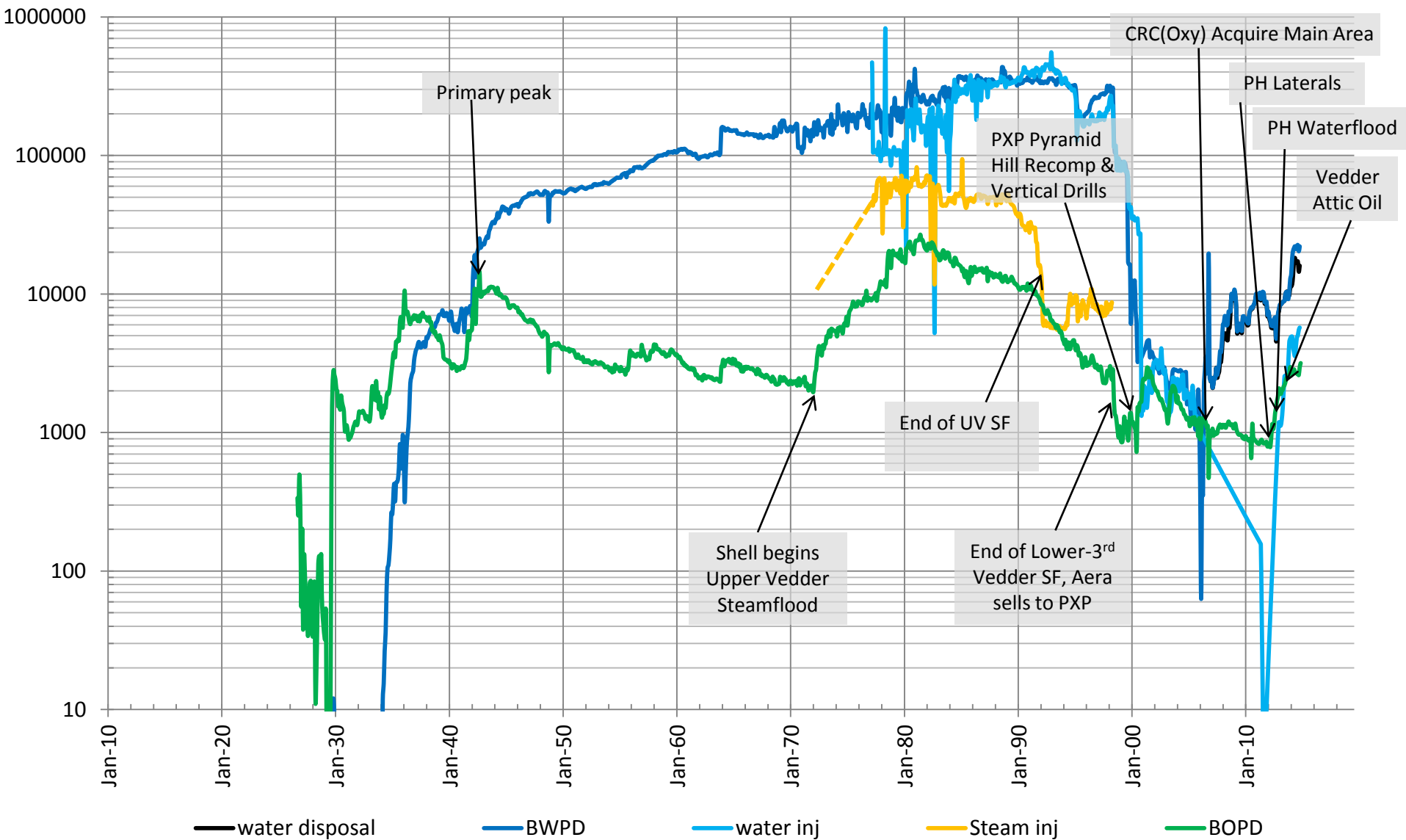


Field discovered by Shell in 1926 | CRC (Oxy, 2014 spinoff) acquired in 2007

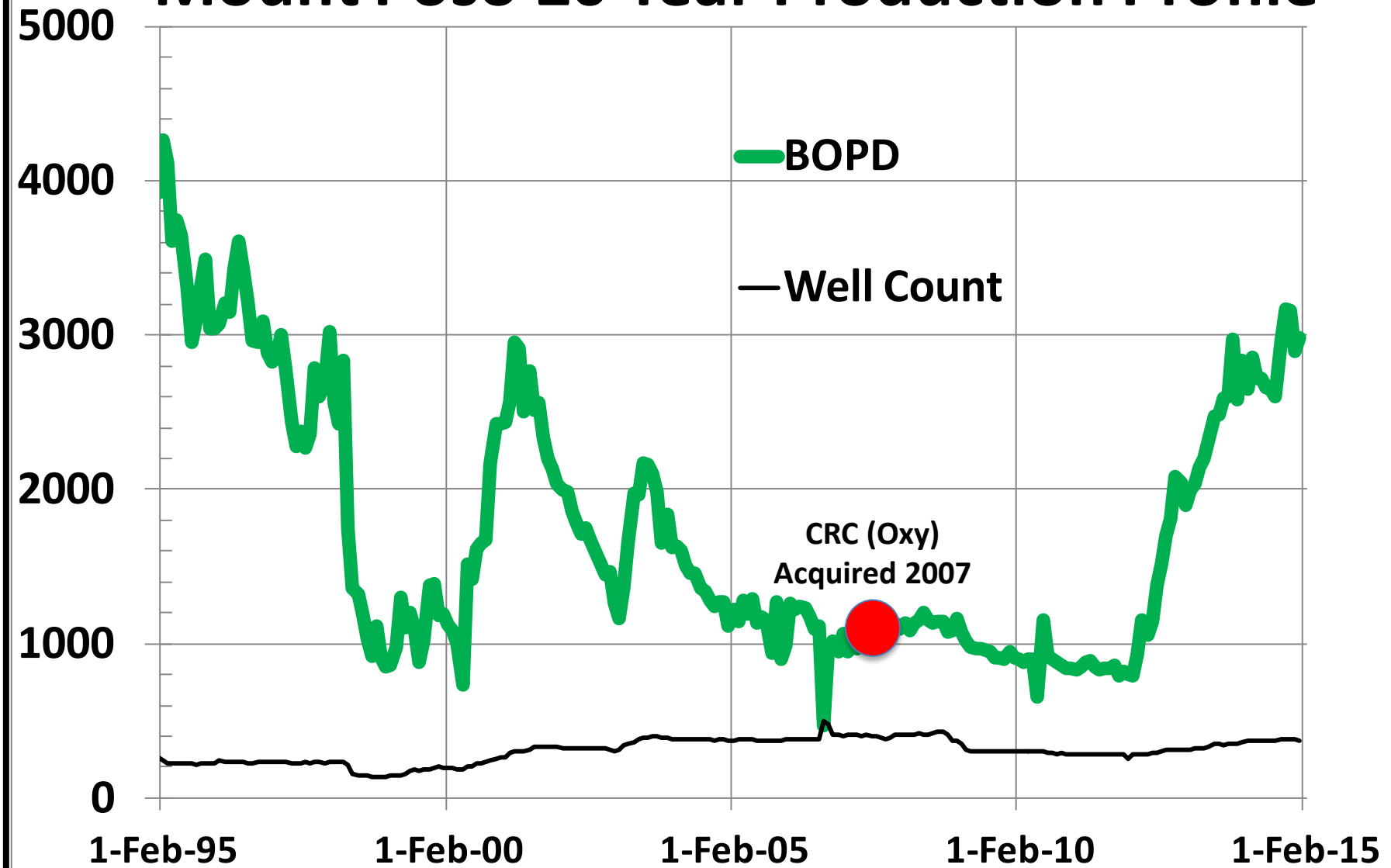
Formations: Pyramid Hill and Vedder | Depths: 1,300'-2,000'

Oil Gravity: 15-18° API | Current production: 3,000 bopd

Mount Poso Main Area Production History



Mount Poso 20 Year Production Profile



MAP OF
MT. POSO OIL FIELD
KERN COUNTY, CALIFORNIA
• DEPARTMENT OF NATURAL RESOURCES •
• DIVISION OF OIL & GAS •
E.H. MUSSER, STATE OIL & GAS SUPERVISOR

ACCOMPANYING REPORT ON MT. POSO OIL FIELD
BY
M.B. ALBRIGHT, A.G. HLUZA, & J.C. SULLIVAN

SHOWING CONTOURS ON
TOP OF VEDDER SAND
SCALE
0 1000 2000 3000 4000 5000 6000 7000 8000 FT.
MARCH, 1955.

LEGEND

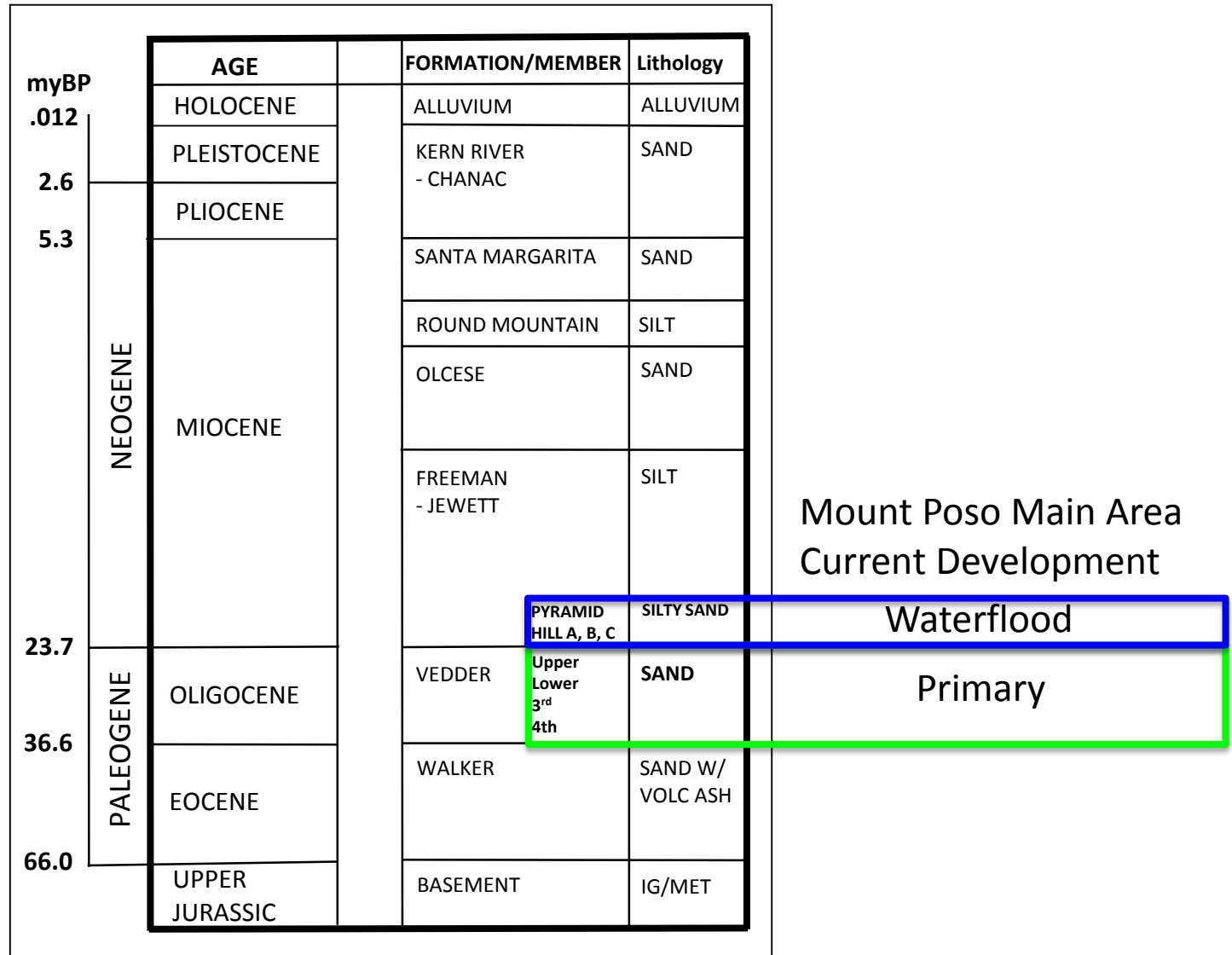
- Uncompleted drilling
- Uncompleted rigs
- Uncompleted abandoned
- Completed producing
- Completed idle
- Completed abandoned
- Water
- Uncompleted abandoned converted to water
- Completed abandoned converted to water
- Main production fault

Main Area

MOUNT POSO STRUCTURE & STRATIGRAPHY

- 7° WSW Regional Dip
- Normal Faults along strike
- Basement is granitic at ~3,000'
- Main Area is 3-way fault closure w/ ~400ft throw vs ~100ft in other Areas
- Only Upper Vedder pays outside Main Area
- Main Area is operated 100% by CRC and currently has >90% of production rate
- This presentation focuses on the Main Area of Mt Poso

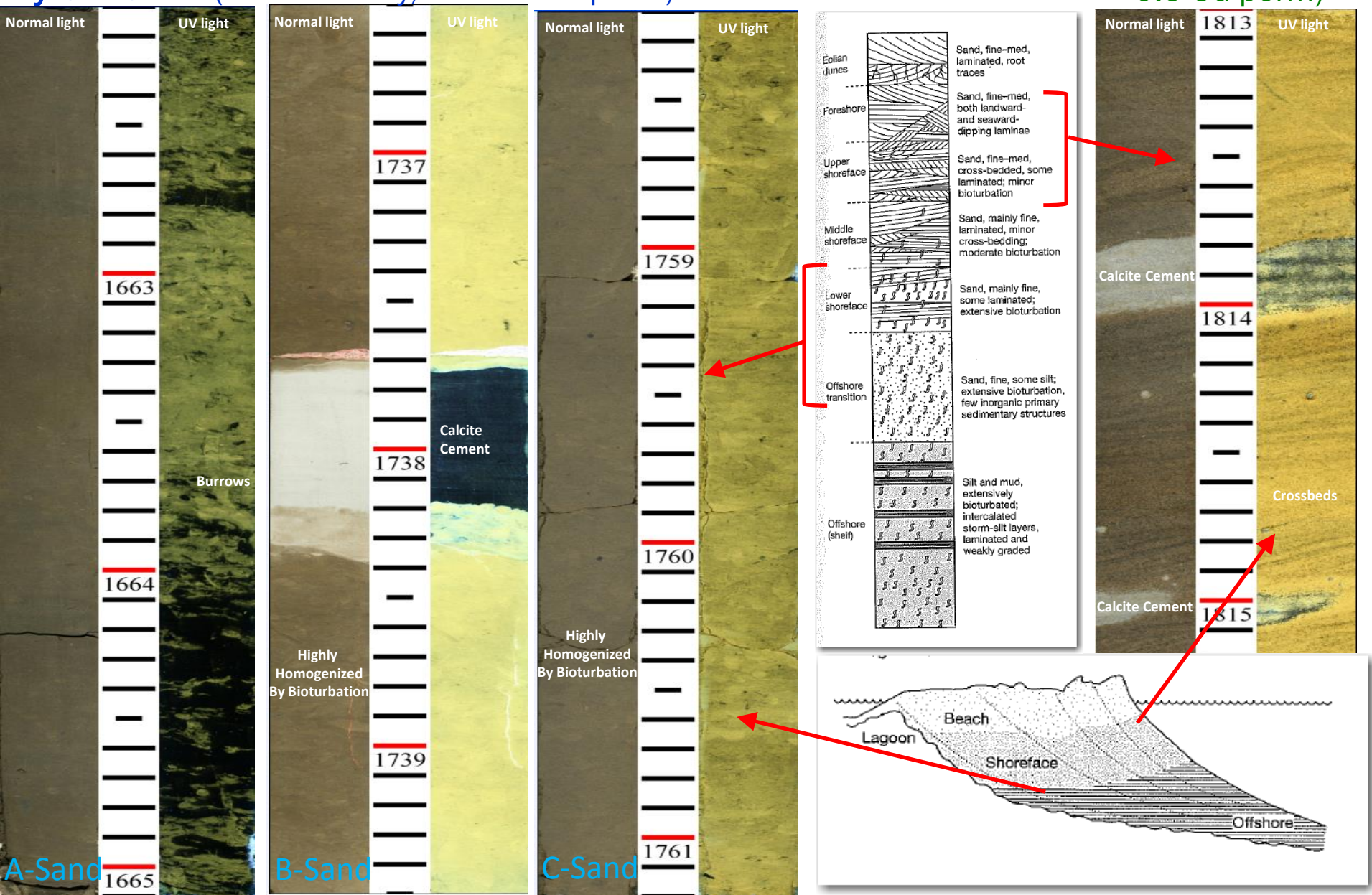
EAST SIDE SAN JOAQUIN VALLEY STRATIGRAPHIC COLUMN



Mount Poso Upper & Lower Shoreface Depositional Environments - Security 2BH Pilot Hole Core Photos

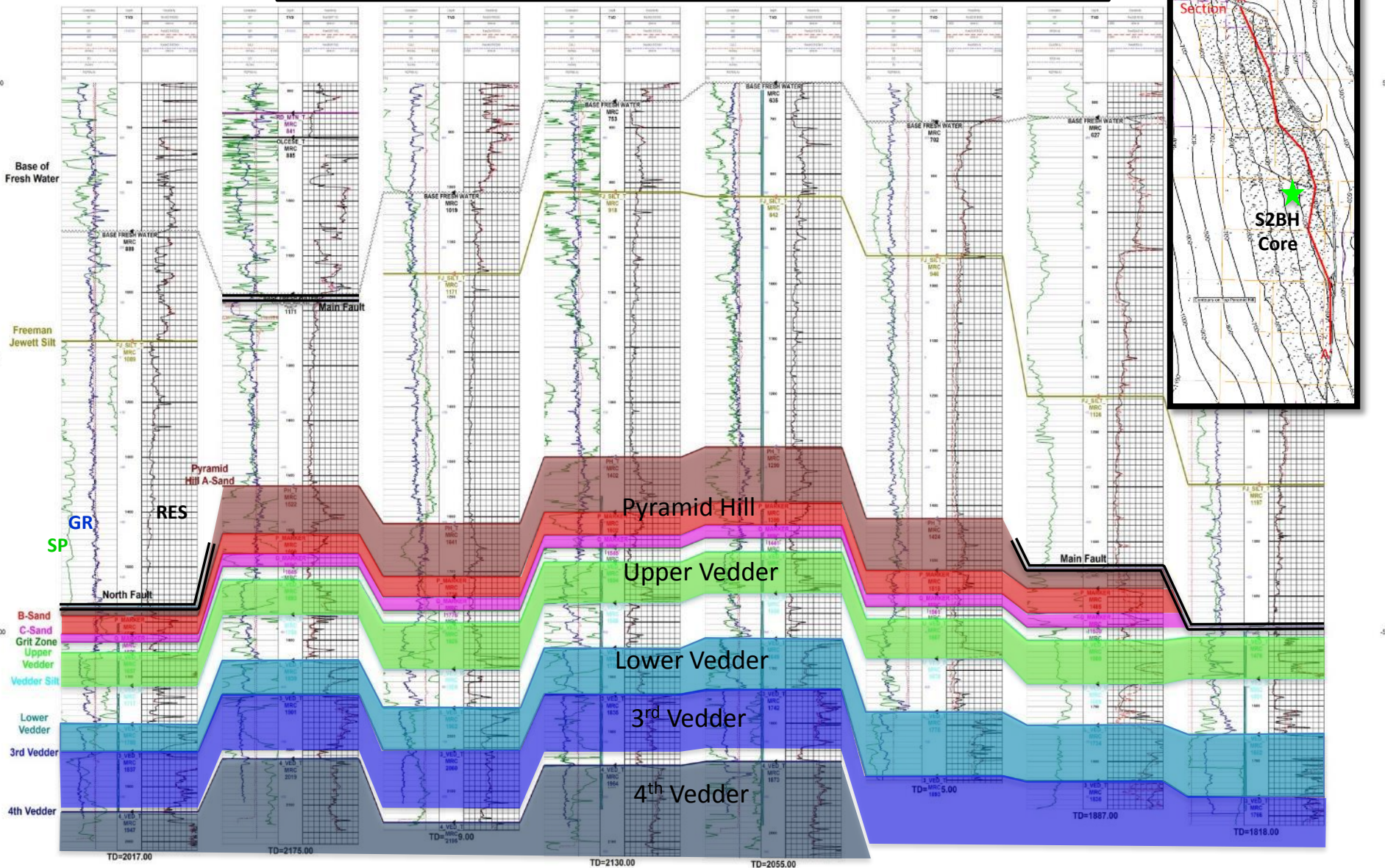
Pyramid Hill (36% Porosity, 10-100md perm)

Vedder
(36% Porosity
0.5-5d perm)



04030531560000	3574 ft	04030541910000	2752 ft	04030554790000	2217 ft	04030538350000	1883 ft	04030538340000	2285 ft	04030010150000	3207 ft	04029121760000	2917 ft	04029749670000
VPC LLC MATTHEW_FEE_D8 D8 TWP: - Range: - Sec. Datum=-1117.80		VINTAGE PRODUCTION CA LLC SARRETT_FEE 1004WI TWP: - Range: - Sec. Datum=-1294.50		VINTAGE PRODUCTION CALIFORNIA LLC VEDDER_RALL 2003V TWP: - Range: - Sec. Datum=-1309.40		VINTAGE PRODUCTION CA LLC VEDDER 2000V TWP: - Range: - Sec. Datum=-1217.90		VINTAGE PRODUCTION CA LLC SECURITY 1500V TWP: - Range: - Sec. Datum=-1133.60		VPC LLC SECURITY_568L 568L TWP: 27 S - Range: 28 E - Sec. 16 Datum=-1130.00		VPC LLC KING_8 8 TWP: 27 S - Range: 28 E - Sec. 22 Datum=-1064.00		VPC LLC RENC_H 731 731 TWP: 27 S - Range: 28 E - Sec. 22 Datum=-965.00

Mt Poso North – South Cross Section - Stratigraphy



1926-1971: Vedder Formation Primary Production

VPC LLC
VEDDER_RALL_W_D_314 314
TWP: 27 S - Range: 28 E - Sec. 9
Datum=1223.00

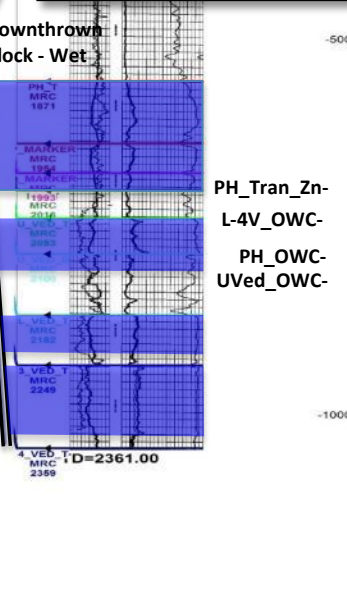
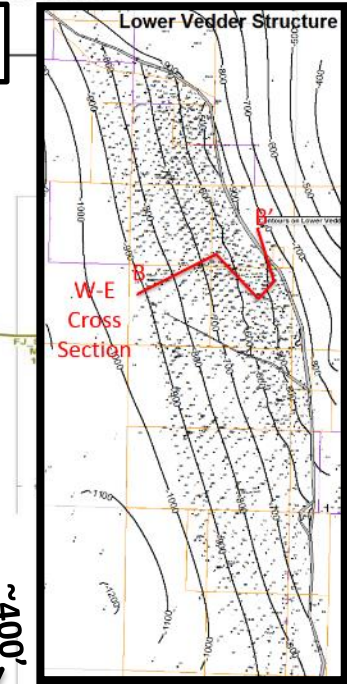
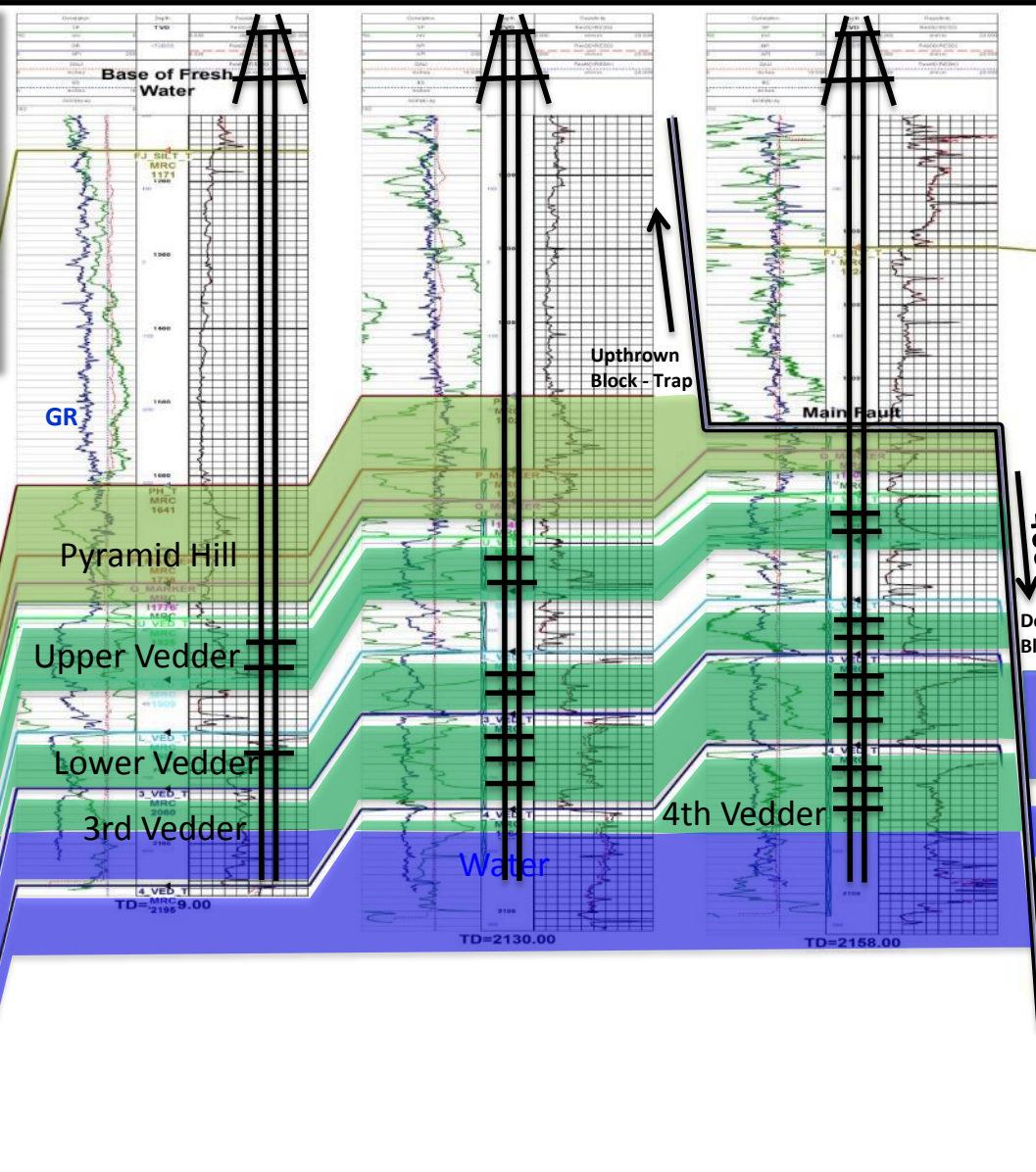
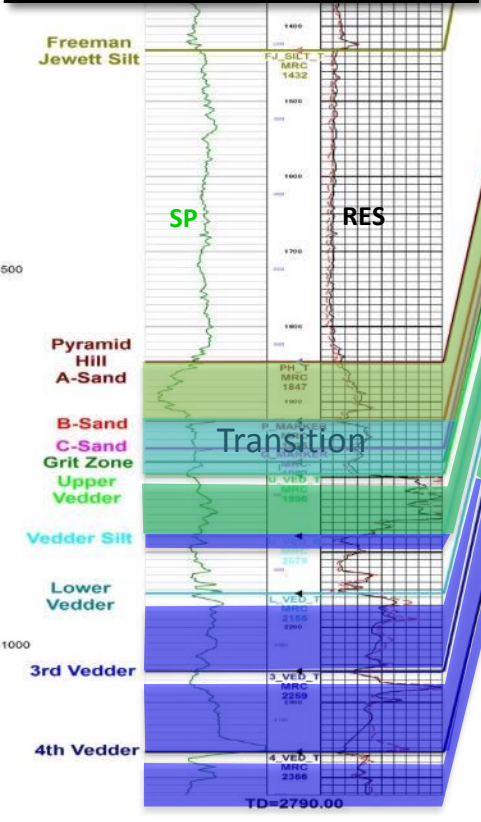
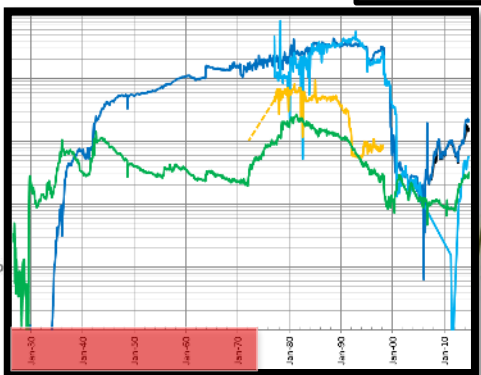
VINTAGE PRODUCTION CALIFORNIA LLC
VEDDER_RALL 2003V
TWP: - Range: - Sec.
Datum=1309.40

VINTAGE PRODUCTION CA LLC
VEDDER 2000V
TWP: - Range: - Sec.
Datum=1217.90

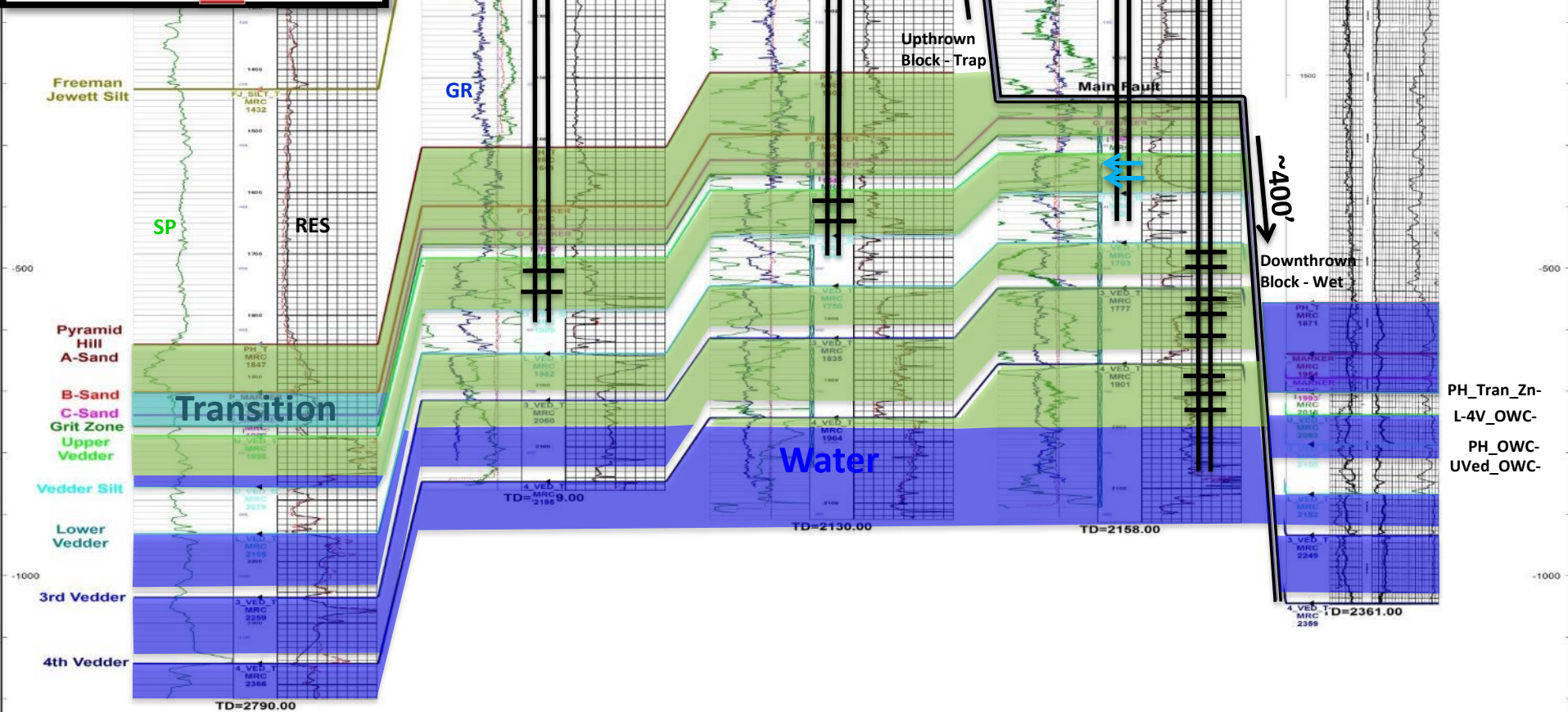
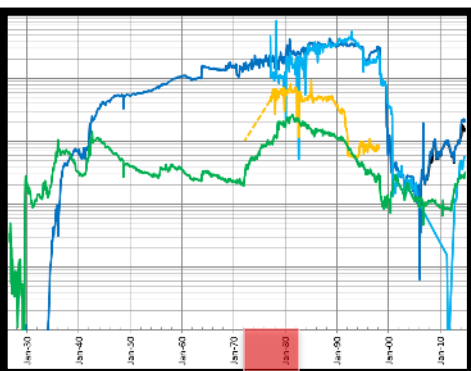
VINTAGE PRODUCTION CA LLC
VEDDER 1001V
TWP: - Range: - Sec./P: 27 S - Range: 28 E - Sec.
Datum=1242.10

VPC LLC
VEDDER_RALL_W_D_155 155
TWP: 27 S - Range: 28 E - Sec.
Datum=1314.00

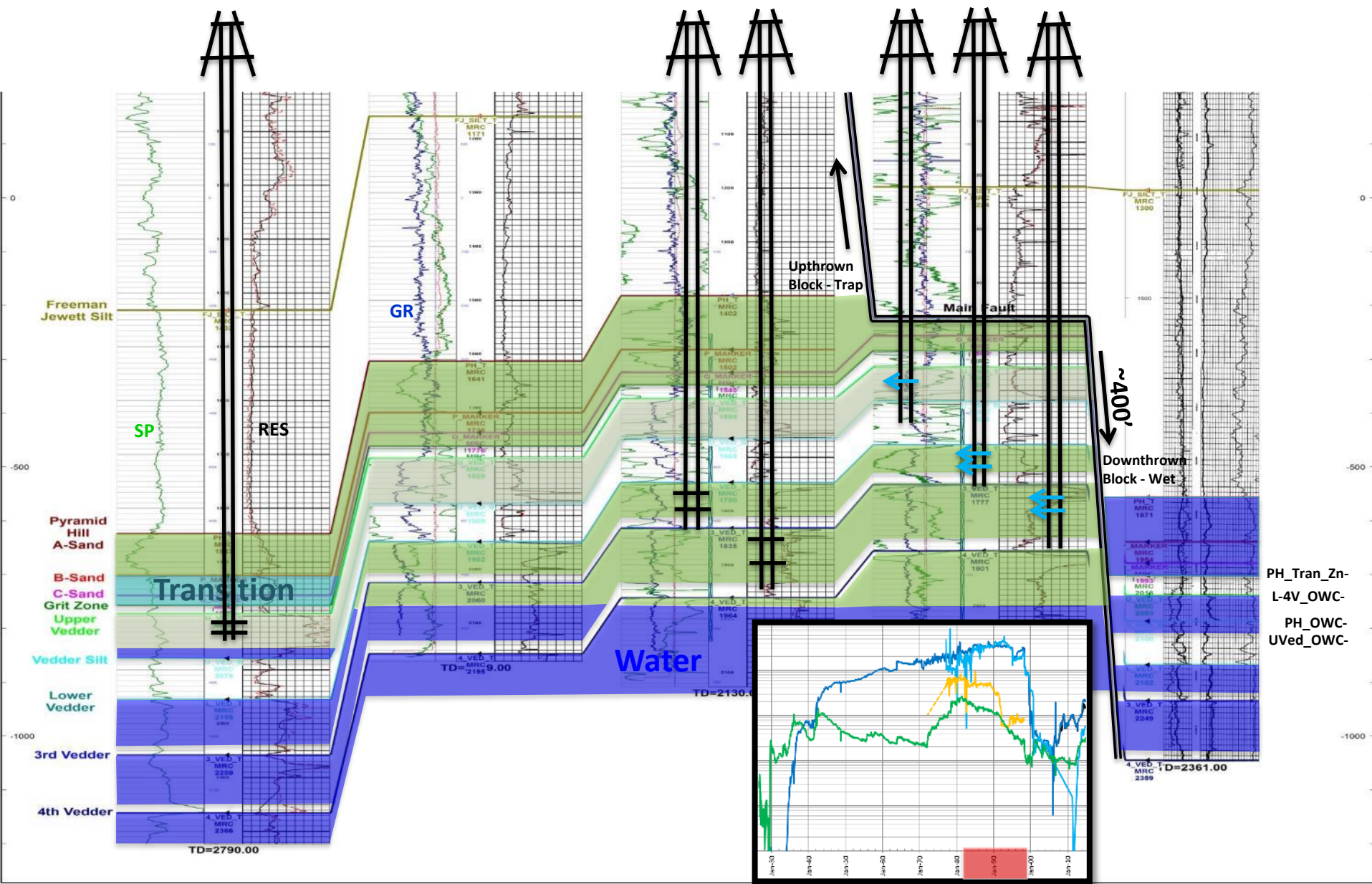
Mt Poso West – East Cross Section – Original Oil Zones



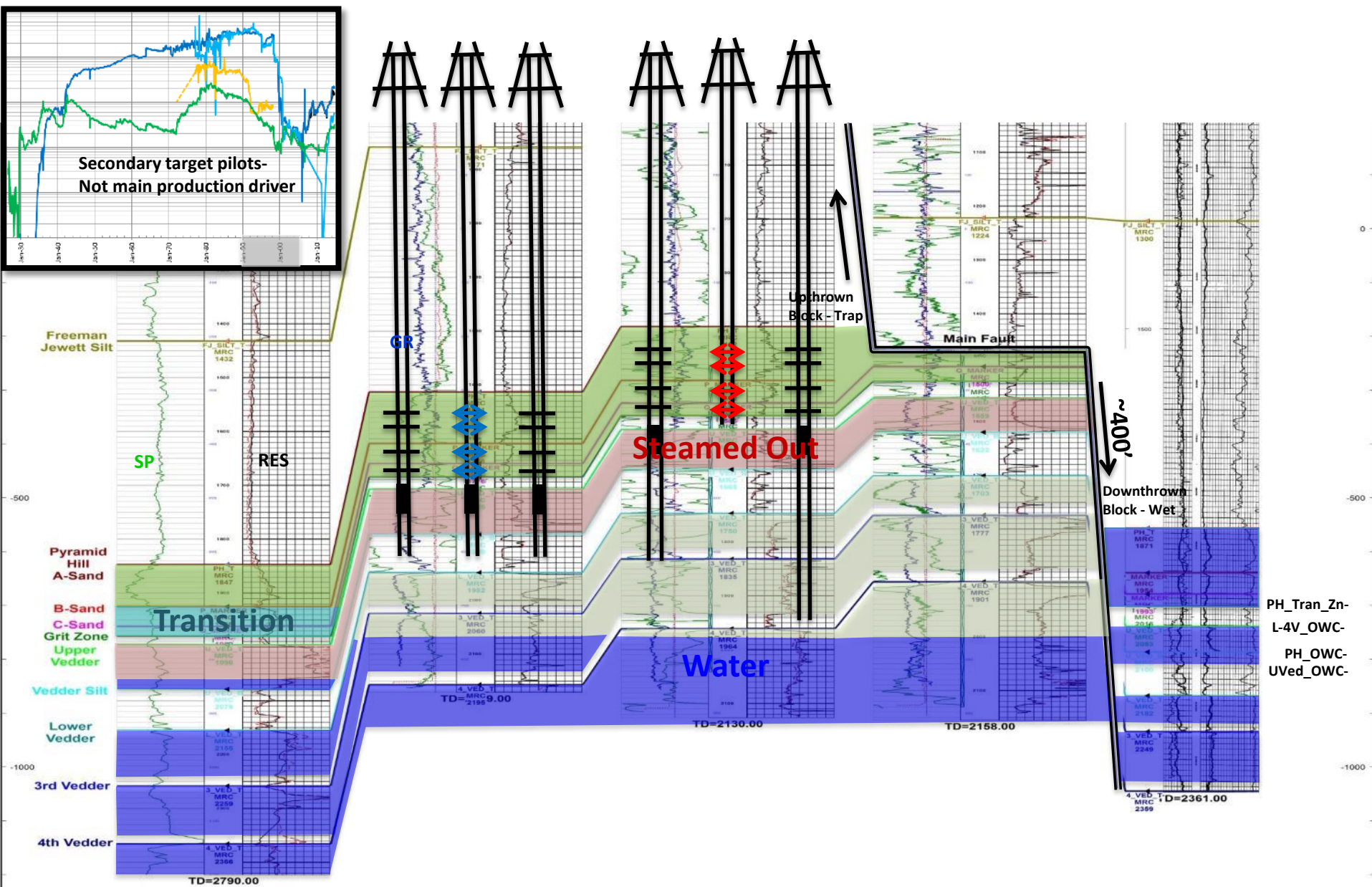
1970-80's: Upper Vedder Line Drive Steam Flood Incline to Peak



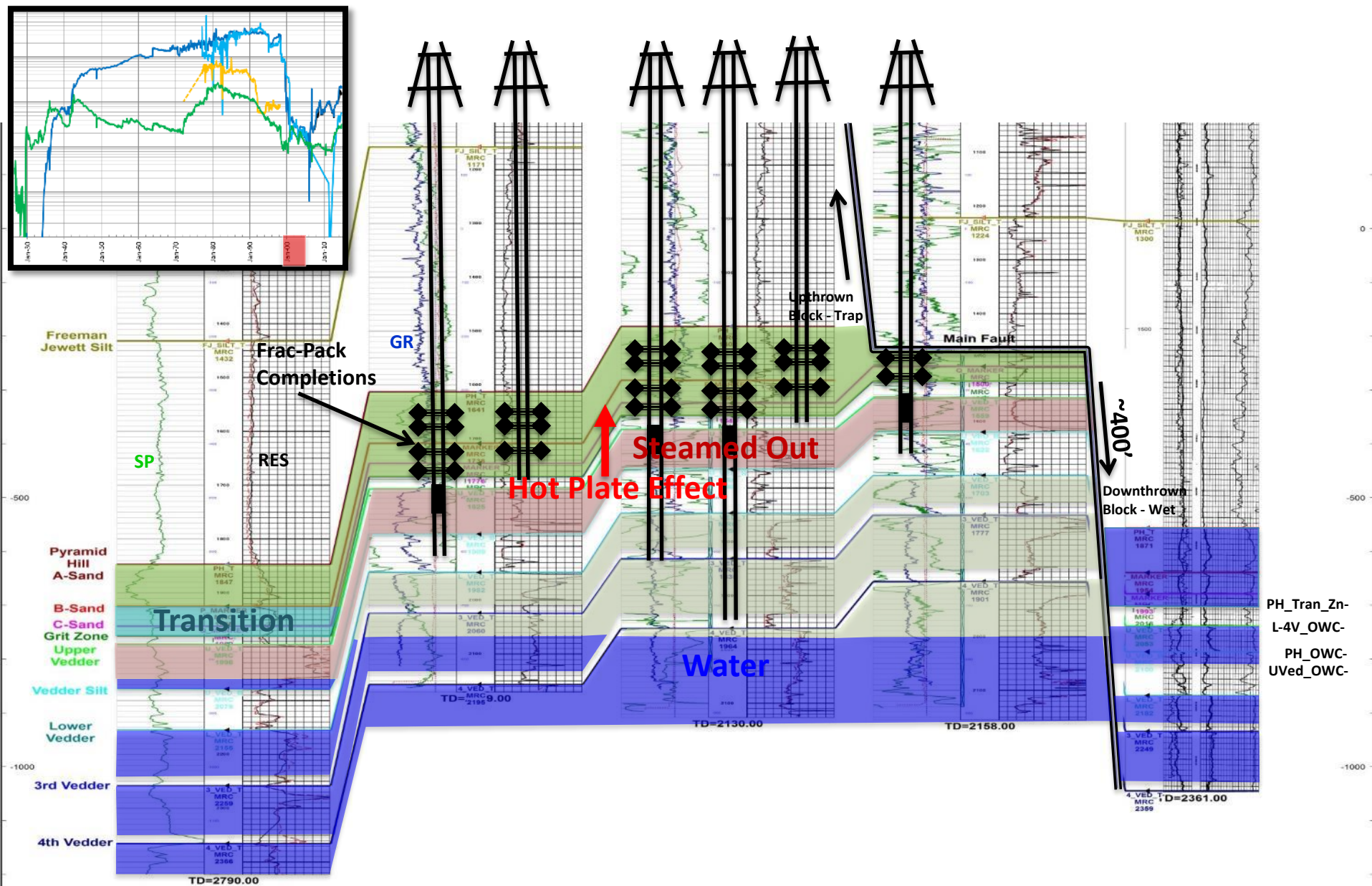
1982-1998: Vedder Steamflood Decline - DOWNDIP Expansion & Deepening



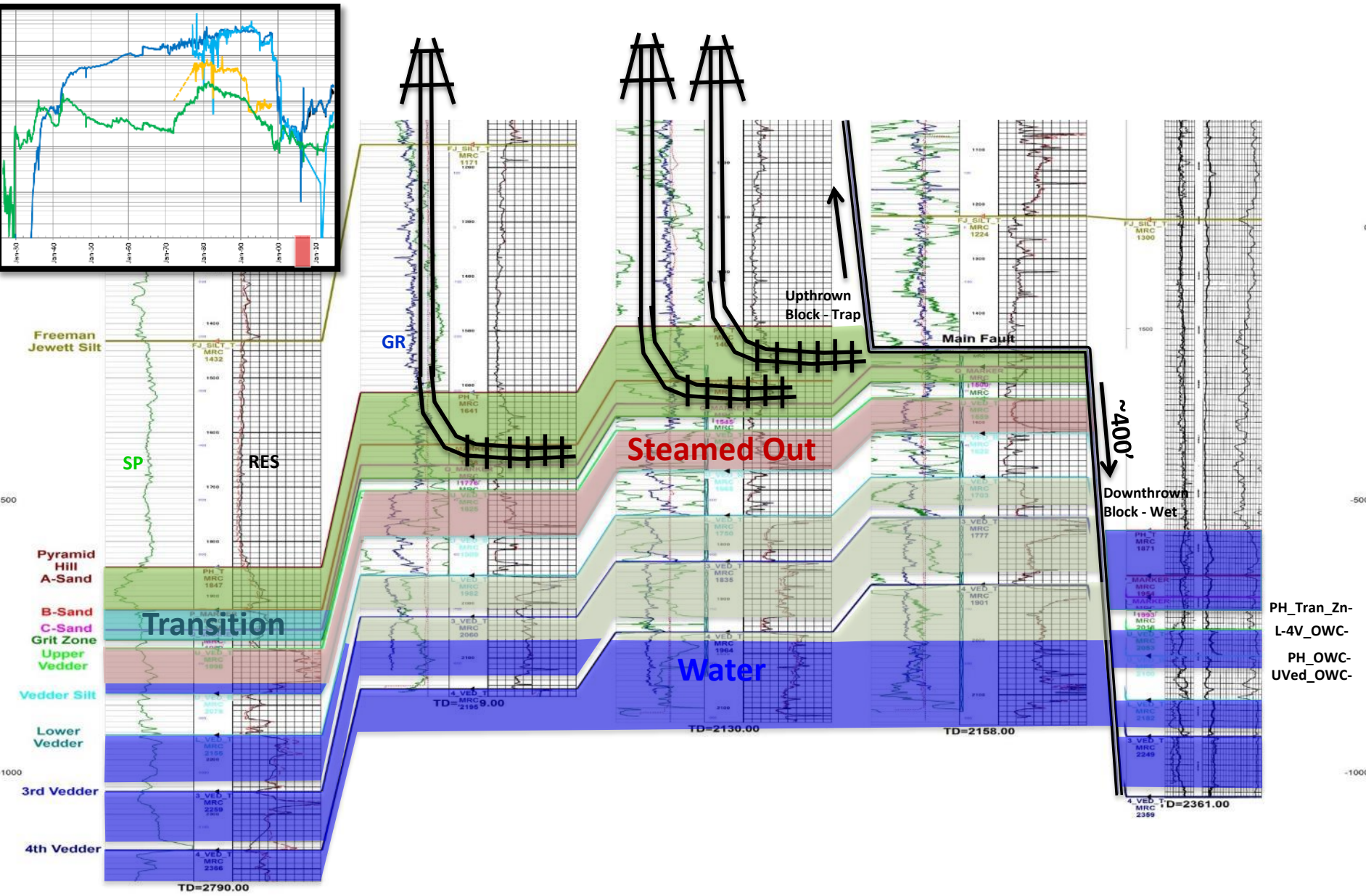
1990's: Pyramid Hill Waterflood and Fireflood Pilots

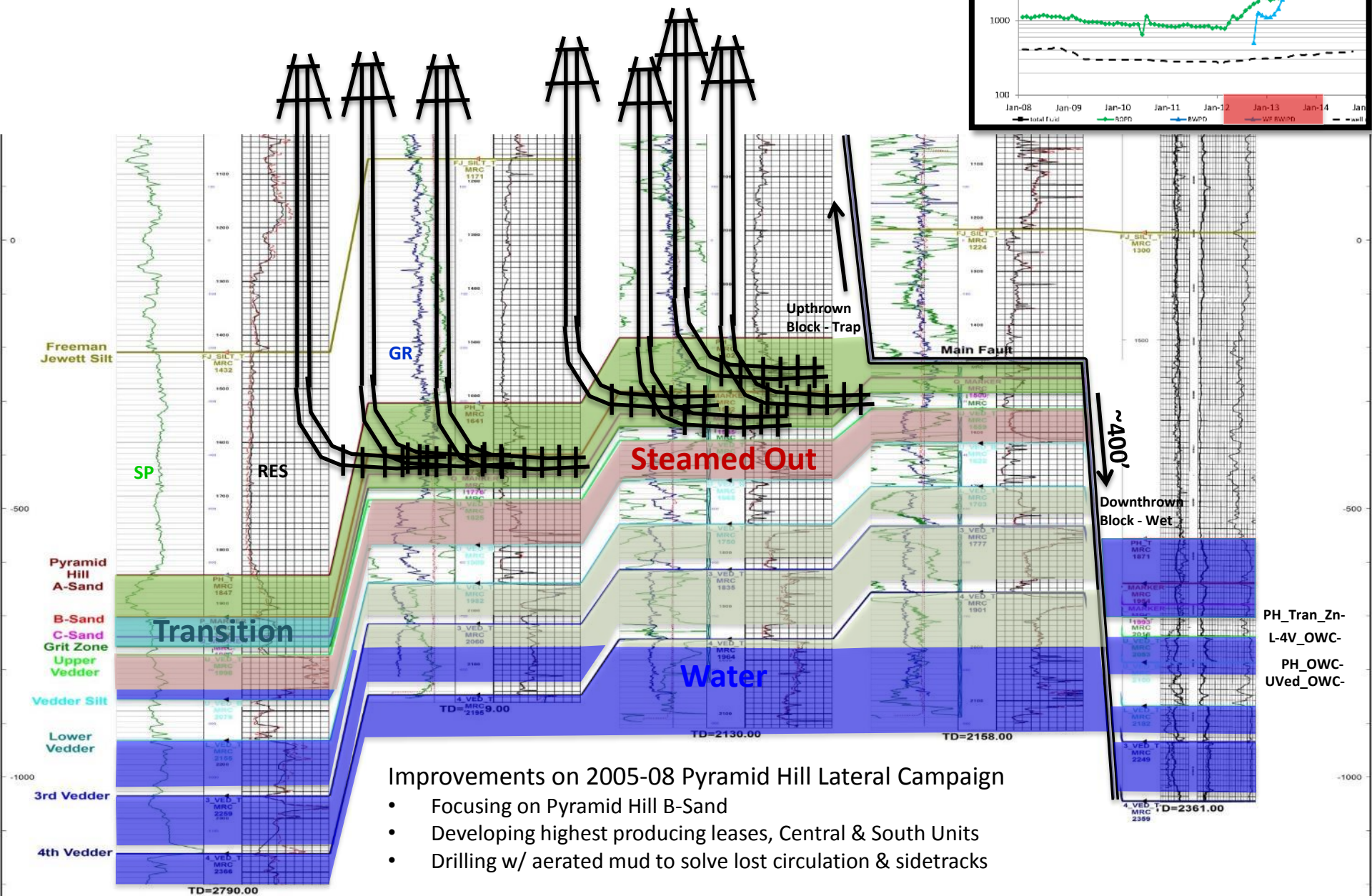


1999-2005: Pyramid Hill Formation Recompletions & New Drills



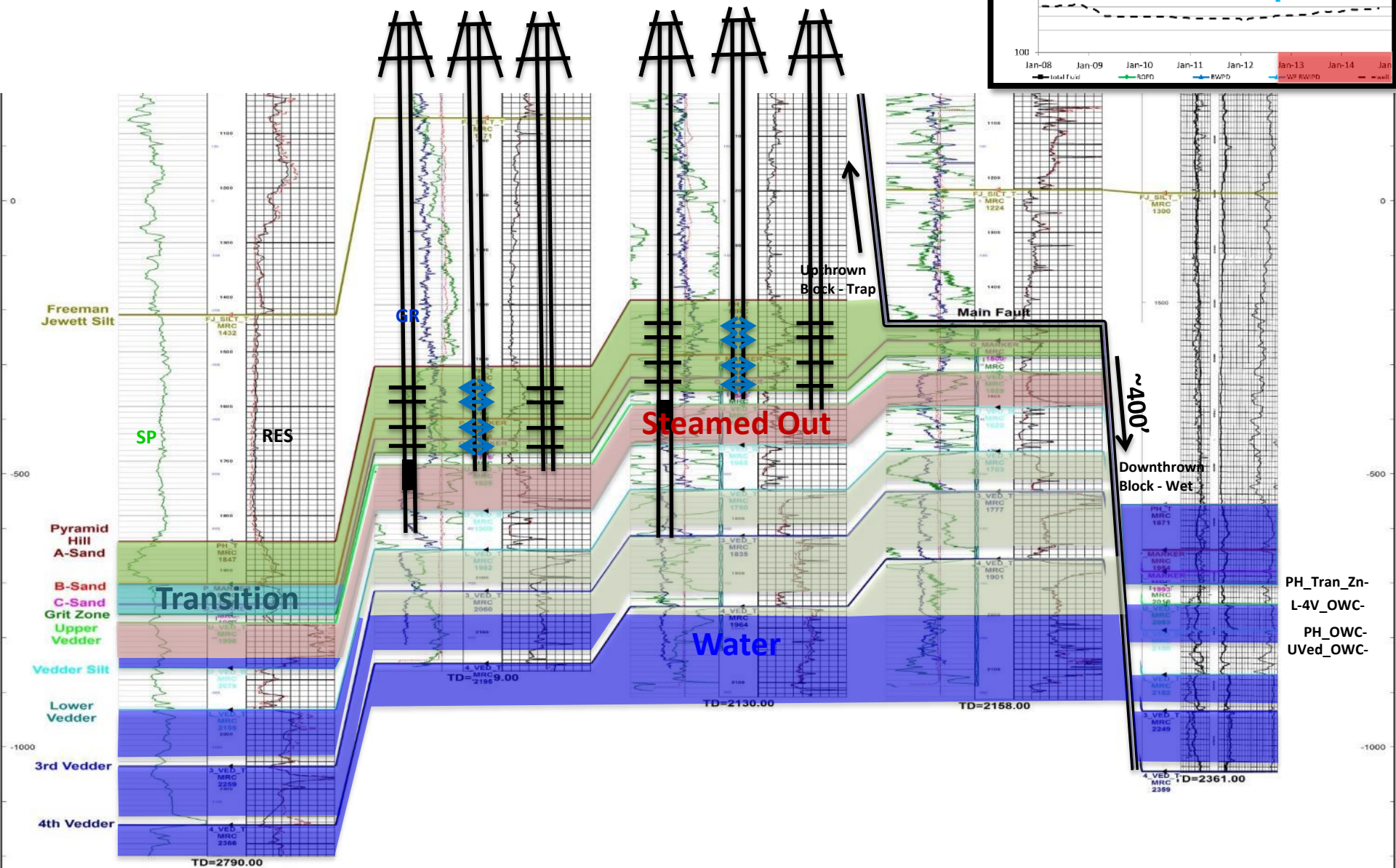
2005-2008: Pyramid Hill Lateral Drilling

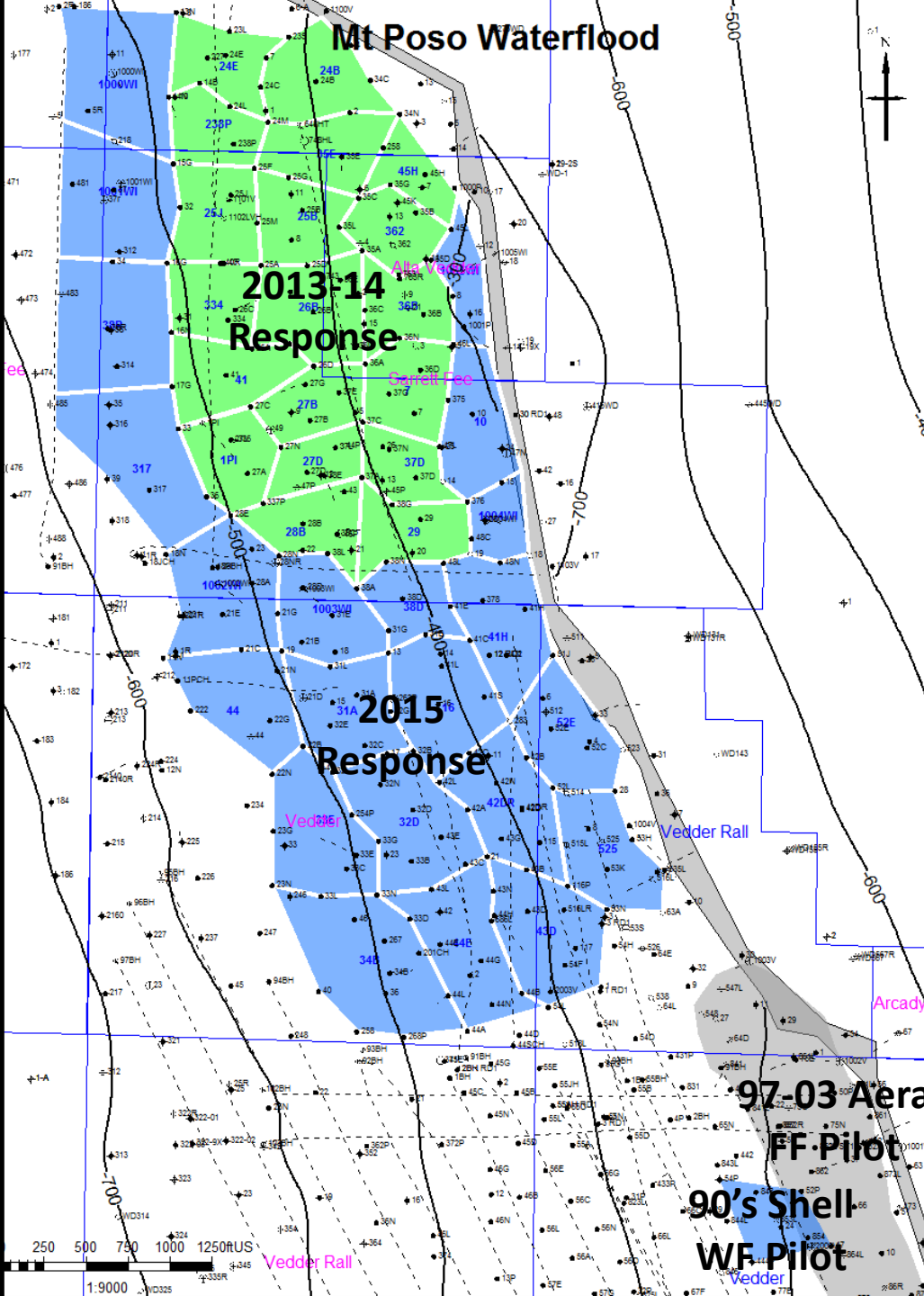




- ### Improvements on 2005-08 Pyramid Hill Lateral Campaign
- Focusing on Pyramid Hill B-Sand
 - Developing highest producing leases, Central & South Units
 - Drilling w/ aerated mud to solve lost circulation & sidetracks

Figure 1 is a line graph showing the number of BFPD (Beats per 100,000 population) for various law enforcement agencies from January 2008 to January 2015. The Y-axis is logarithmic, ranging from 100 to 10,000. The X-axis shows time in years. The legend includes: Total Fatal (black line with dots), ADPR (green line with dots), RWPD (blue line with dots), WY RWPD (light blue line with dots), and WY ADPR (dashed black line). The Total Fatal and RWPD lines are the highest, fluctuating between 5,000 and 15,000. The ADPR line is lower, around 1,000. The WY RWPD line shows a significant increase starting in 2013, reaching nearly 10,000 by 2015. The WY ADPR line is the lowest, around 300-400.

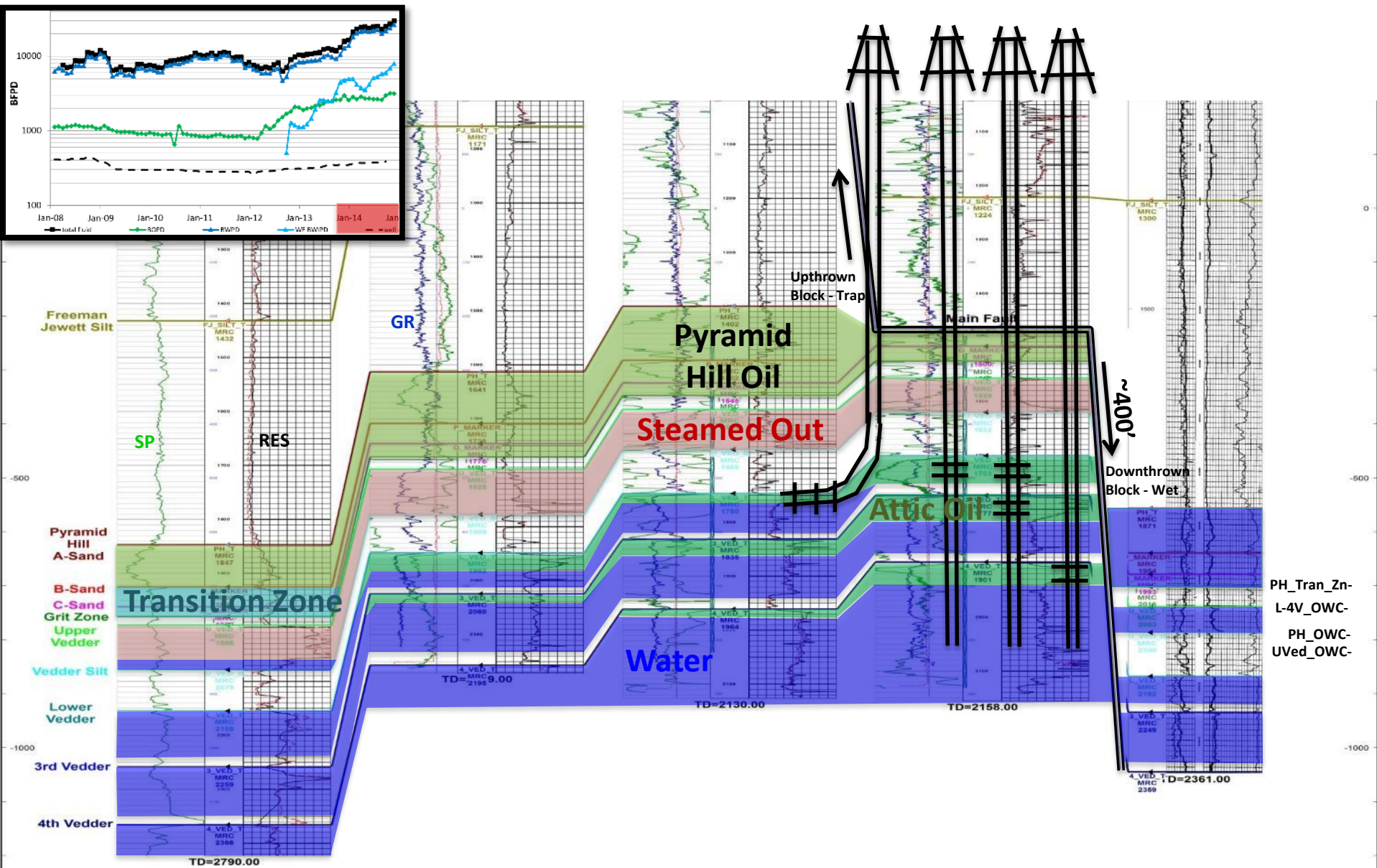




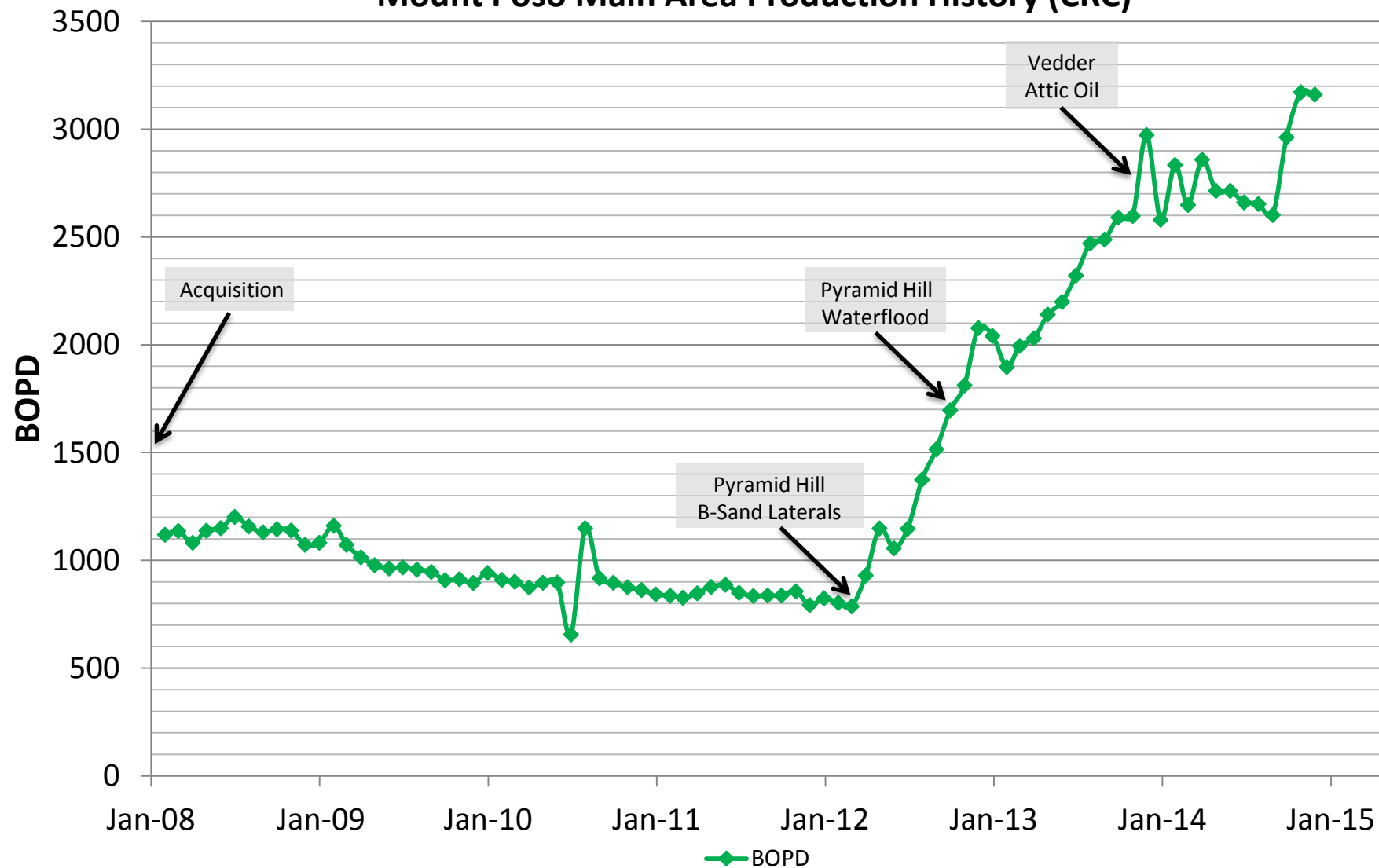
MOUNT POSO WATERFLOOD

- 41 Pattern Development
 - Mostly CTI/RTP, only 9 new drills
 - Initiated 4Q12 w/ strong response within 6mo
 - First 19 patterns responded
 - Subsequent 22 patterns recently developed & filling up
- Enhanced facilities allowed re-appraisal of Lower – 4th Vedder Formation Sands beginning in 2013

2013 – Present (CRC): Attic Oil Play in lower Vedder Sands



Mount Poso Main Area Production History (CRC)



CONCLUSIONS

- After over 80 years of production at Mount Poso, redevelopment increased production from 800bopd in 2012 to 3,000bopd in 2015
- Multiple opportunities successfully incorporated in redevelopment
 - Pyramid Hill B-Sand Laterals
 - Pyramid Hill Waterflood
 - Vedder Formation Attic Oil Play
- Shallow Reservoirs with low development cost benefitted rapid redevelopment strategy
- Multi-use wellbores (waterflood + attic oil targets) & facilities synergies allowed for multiple opportunities to be pursued simultaneously
- Thank you to our Mount Poso Team + CRC Leadership & for your interest

OUR VALUES

CHARACTER

Acting with integrity and honor, without exception



RESPONSIBILITY

Achieving California's high standards for safety and environmental protection



COMMITMENT

Empowering workers and promoting communities where we live and work

THANK YOU
&
QUESTIONS?