



eSeis

“PDML” Pre-drill Mud Log (With Daily Updates)



“PDML” Pre-drill Mud Log

We believe the full power of “Seismic Petrophysics” should be utilized to provide the best possible basis of design for planning a well.



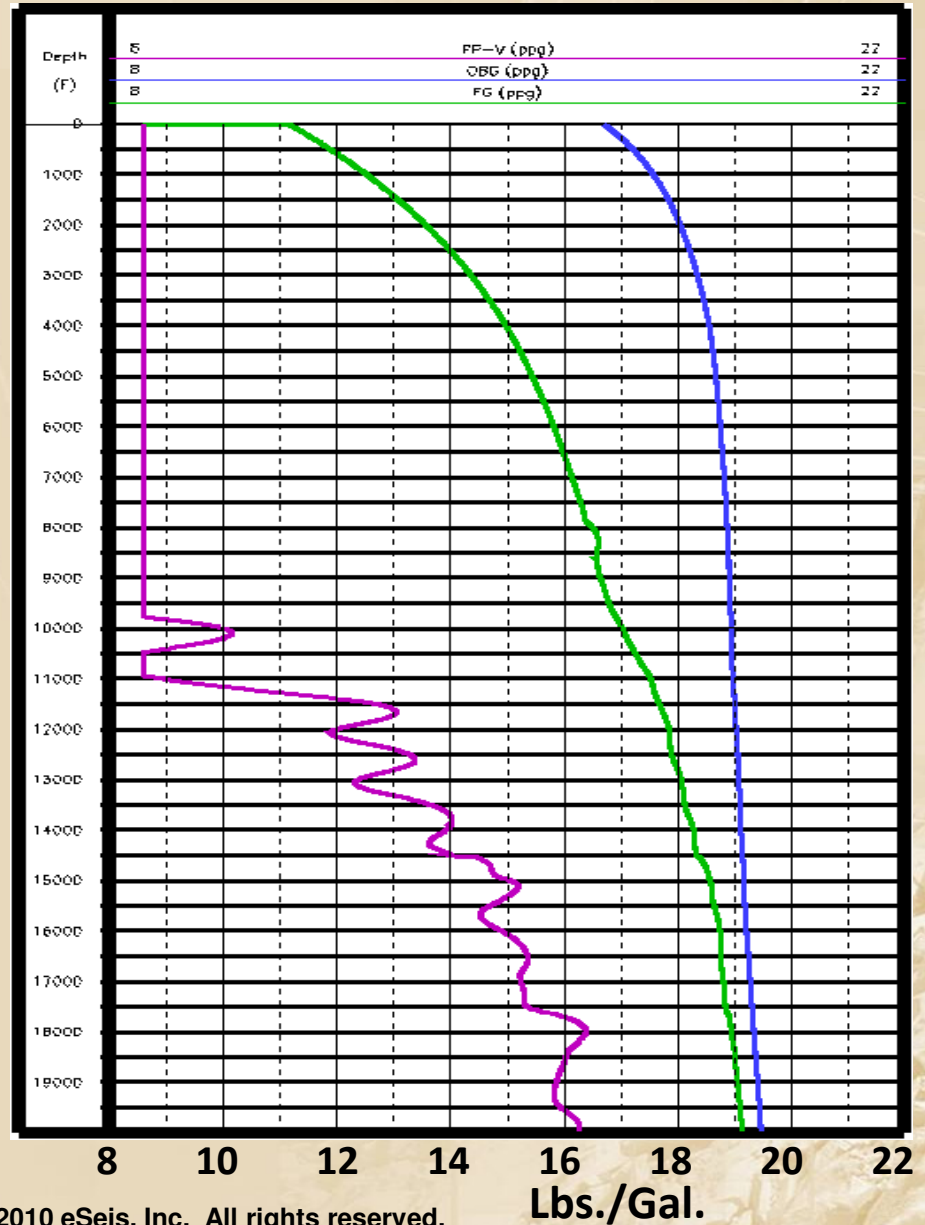
Typical Pore Pressure/Fracture Gradient (PPFG) Product

Typically pore pressure work results in a plot as shown here:
Curves shown represent:

PP-Velocity-based

Shale Fracture Gradient (FG)

Overburden Gradient (OBG)

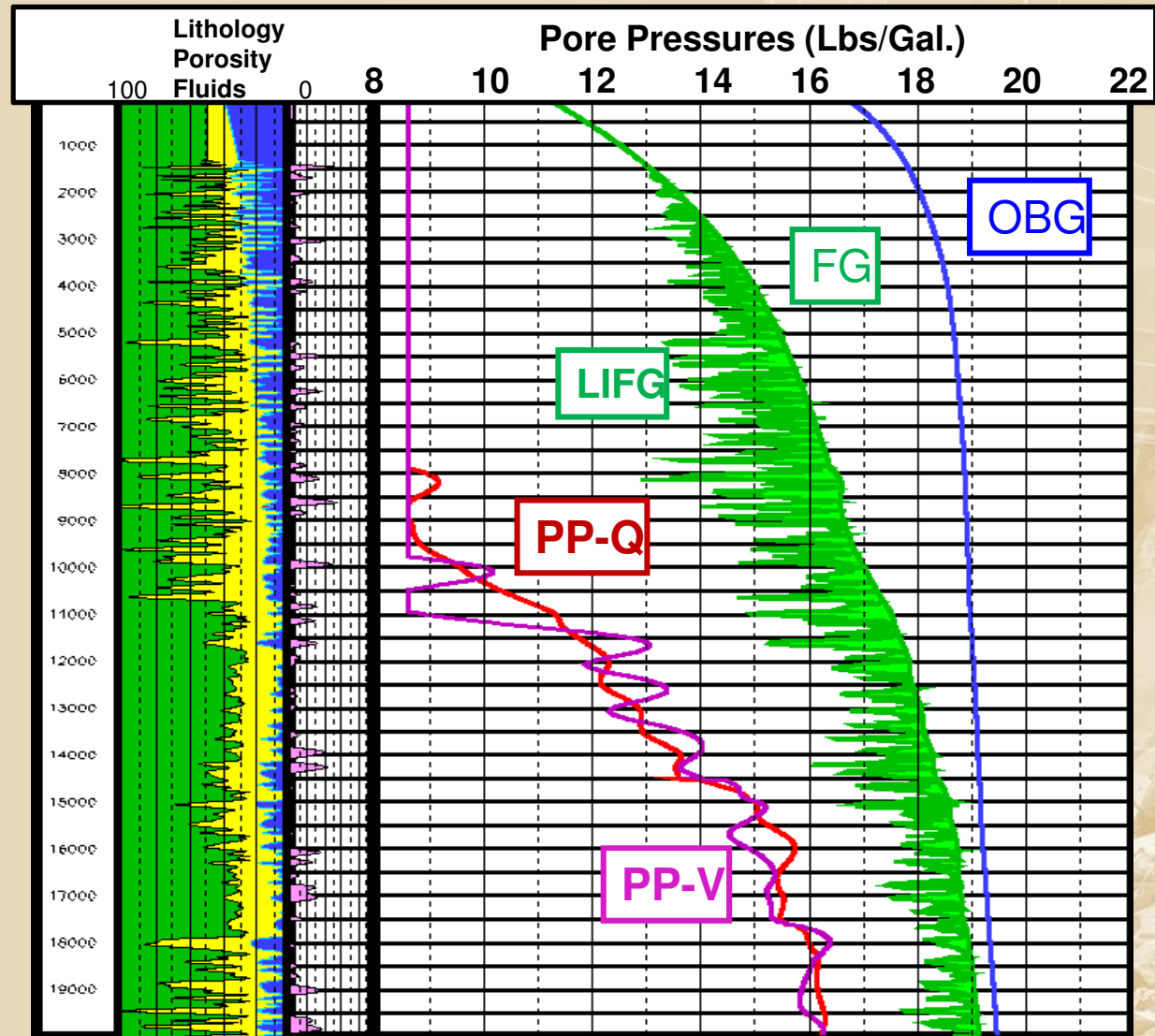




The "Pre-Drill Mud Log" (PDML)

The **PDML** contains predictions of:

- 1) **Pore pressure**
 - a) PP-Q (freq-based)
 - b) PP-V (vel-based)
 - c) centroids
- 2) **Fracture Gradient**
 - a) shale
 - b) sand (LIFG)
- 3) **Lithology**
 - a) shale/"not-shale"
 - b) porosity

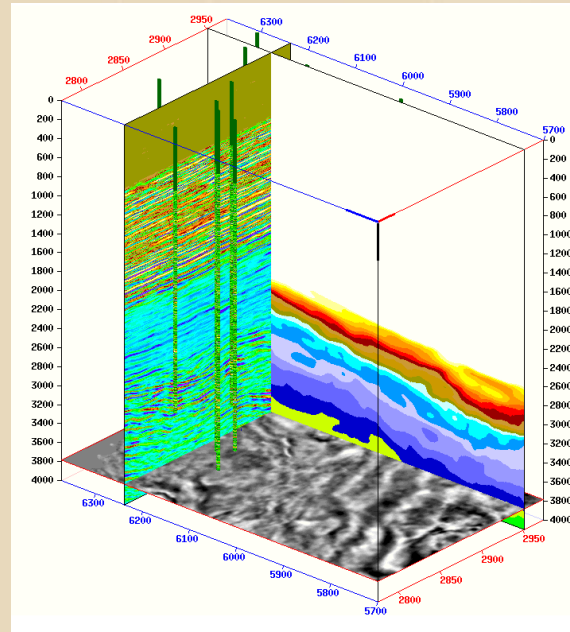




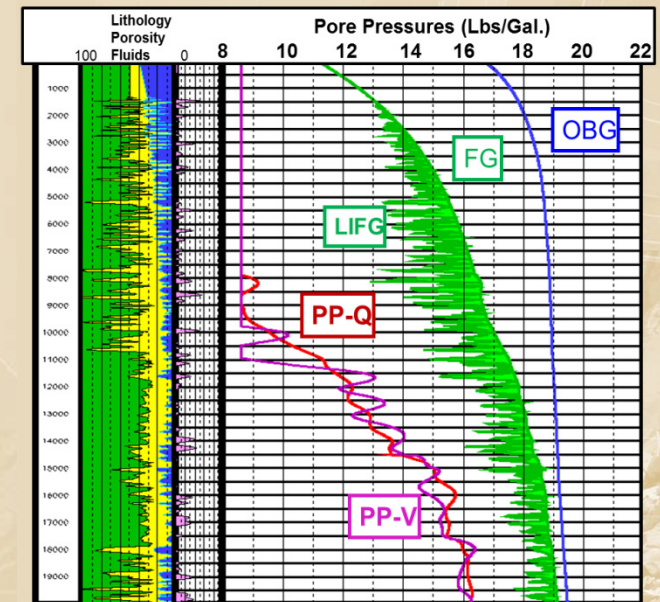
The “Pre-Drill Mud Log” (PDML)

3D Volumes Include:

- 1) **Pore pressure**
 - a) PP-Q (freq-based)
 - b) PP-V (vel-based)
 - c) centroids
- 2) **Fracture Gradient**
 - a) shale
 - b) sand (LIFG)
- 3) **Lithology**
 - a) shale/“not-shale”
 - b) porosity



PDML



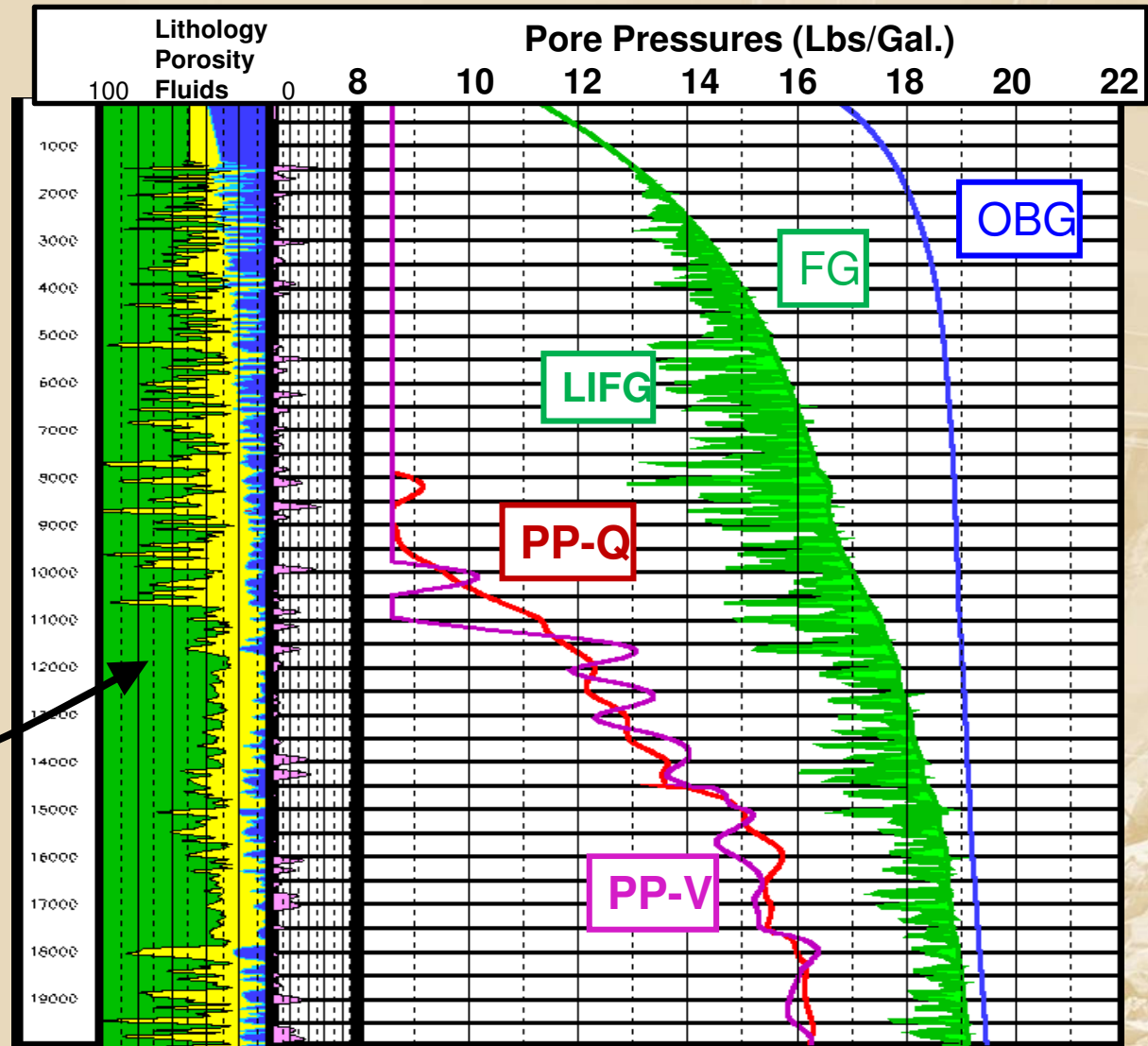
The PDML is an extraction of over 10 different inversions/calculations along a proposed well path.



The Elements of the PDML

The first column shows a prediction of lithology, porosity and fluids (from seismic). The source is "SAIL" (Spectral AVO Inversion for Lithology). This is a pre-stack spectral inversion that does not need well control.

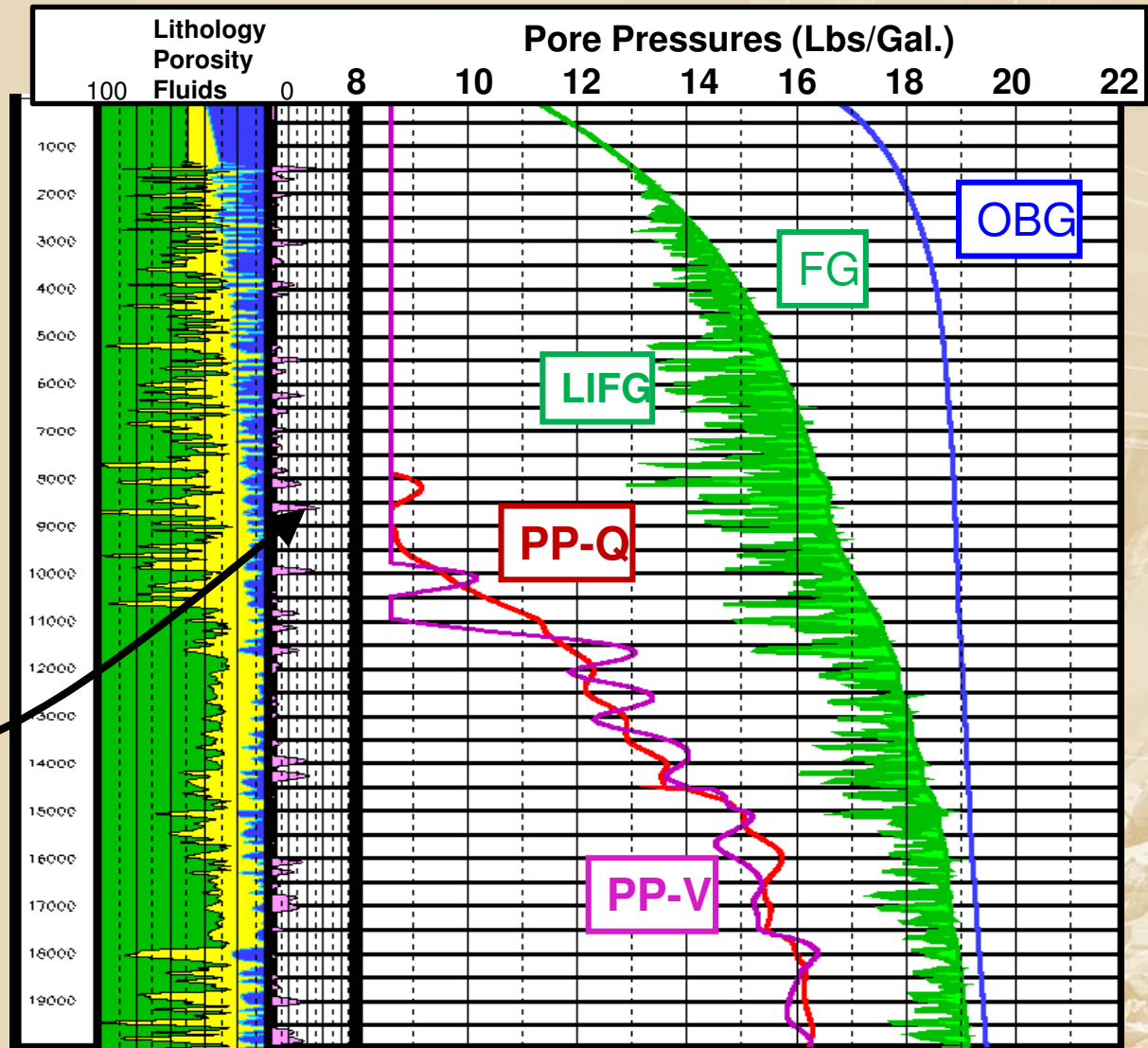
Green – Shale volume
 Yellow – Sand Volume
 Blue – Water
 Red – Light H/C's





The Elements of the PDML

Track 2 shows seismic "absorption" and can be a warning of gas.



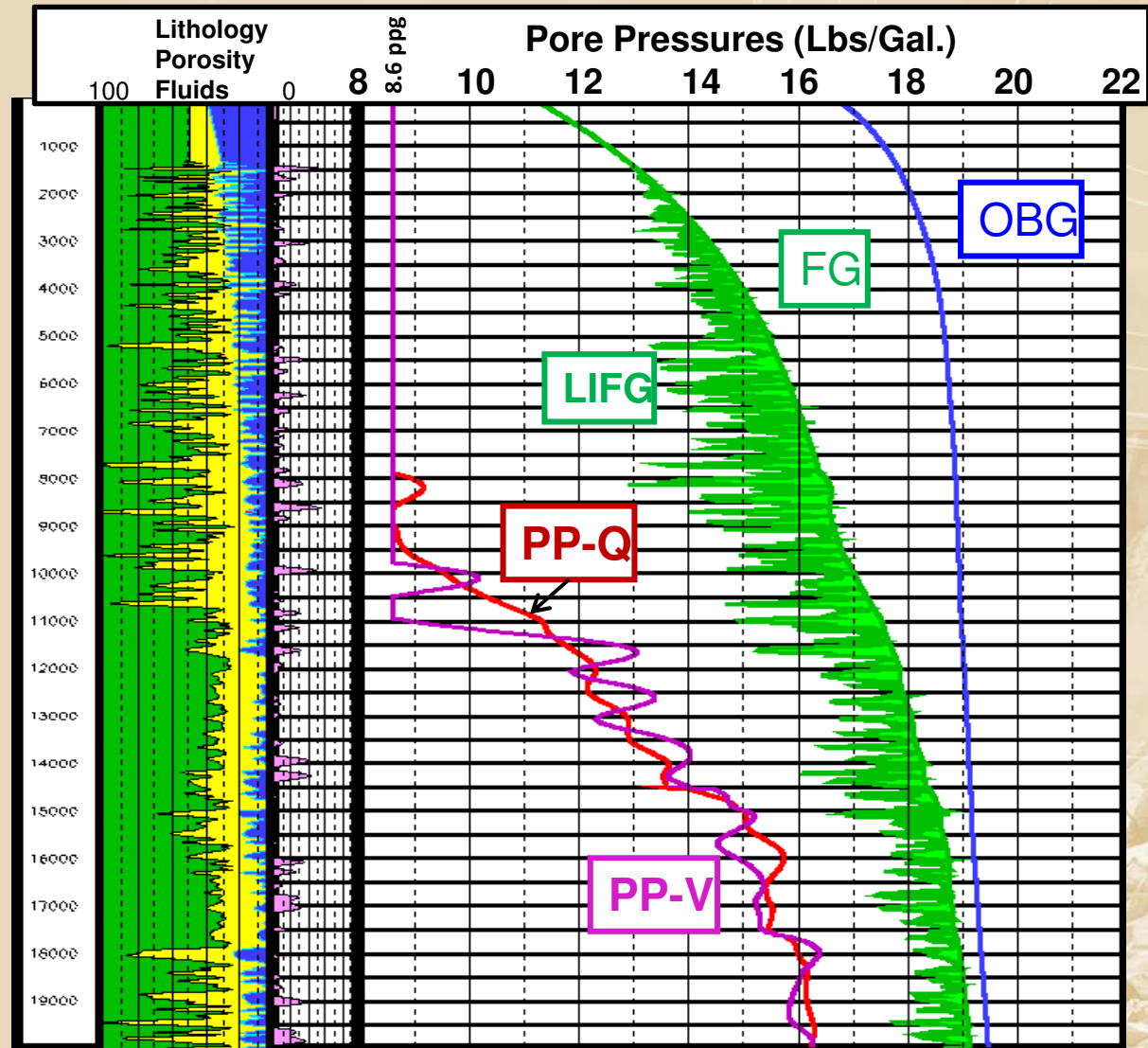


The Elements of the PDML

Track 3 contains:

- PP-V
- PP-Q
- LIFG
- FG
- OBG

Shale PP is calculated from seismic velocity, PP-V, and seismic frequency, PP-Q. Ten years of history using both indicates that **PP-Q is the better choice 95% of the time**. In this example they are in close agreement with each other.



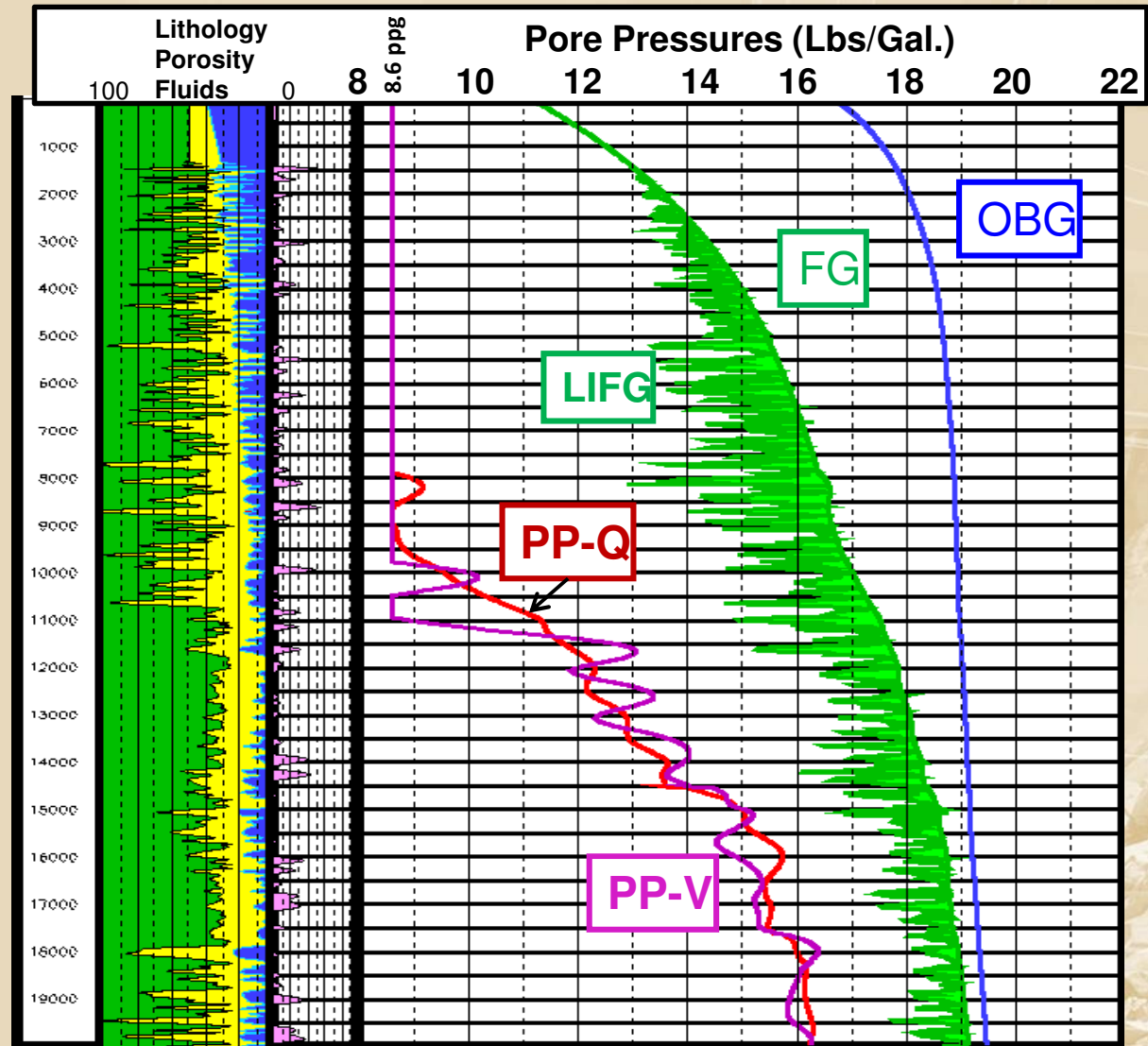


The Elements of the PDML

Track 3 contains:

- PP-V
- PP-Q
- LIFG
- FG
- OBG

PP only defines half of the drilling window. The other half is defined by the LIFG (lithology influenced fracture gradient). Displayed in green is the shale FG and sand LIFG indicating potential fluid loss sections in the lower pressure sands.



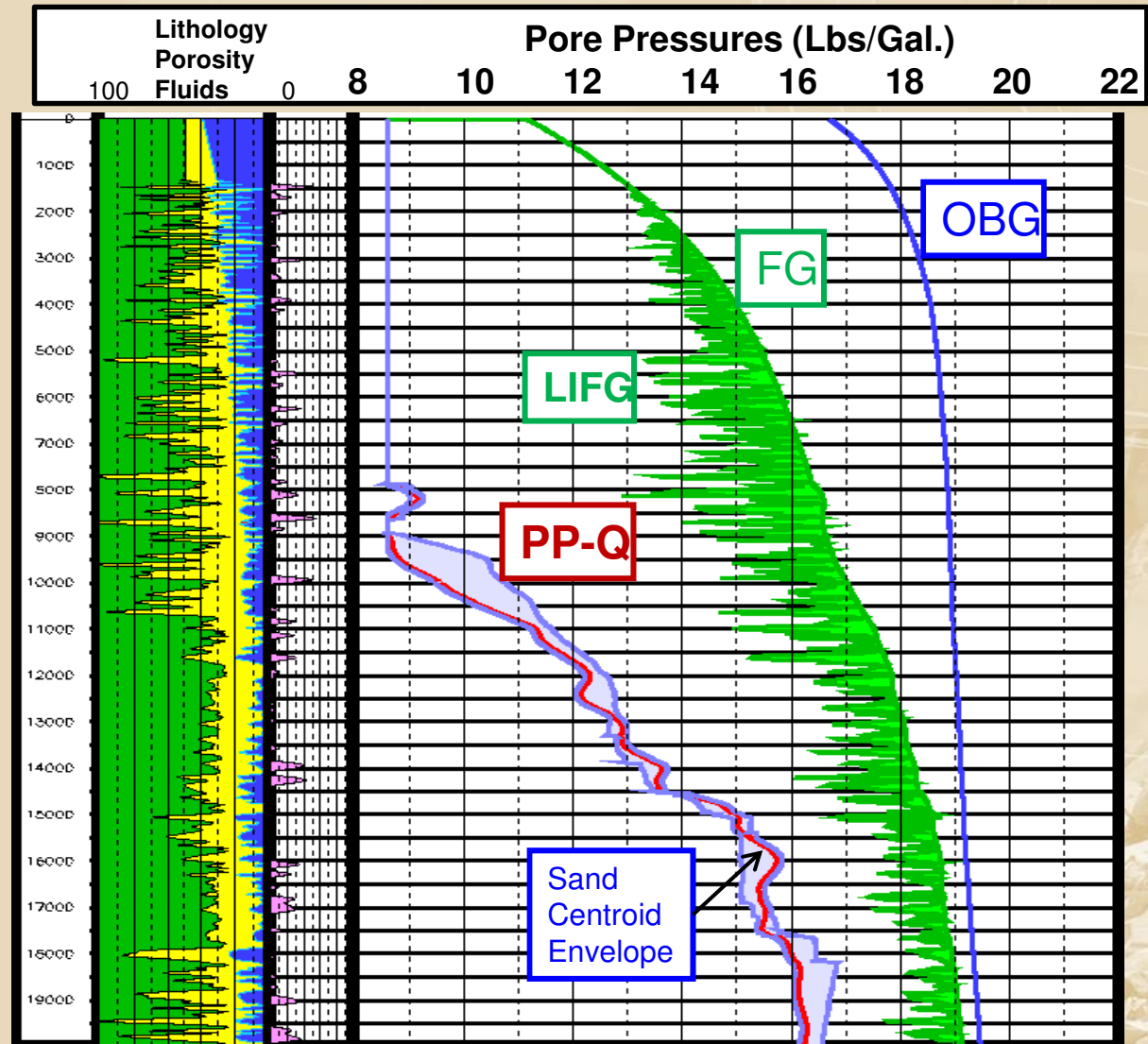


The Elements of the PDML

Track 3 contains:

- PP-Q
- Centroids (min,max)
- LIFG
- FG
- OBG

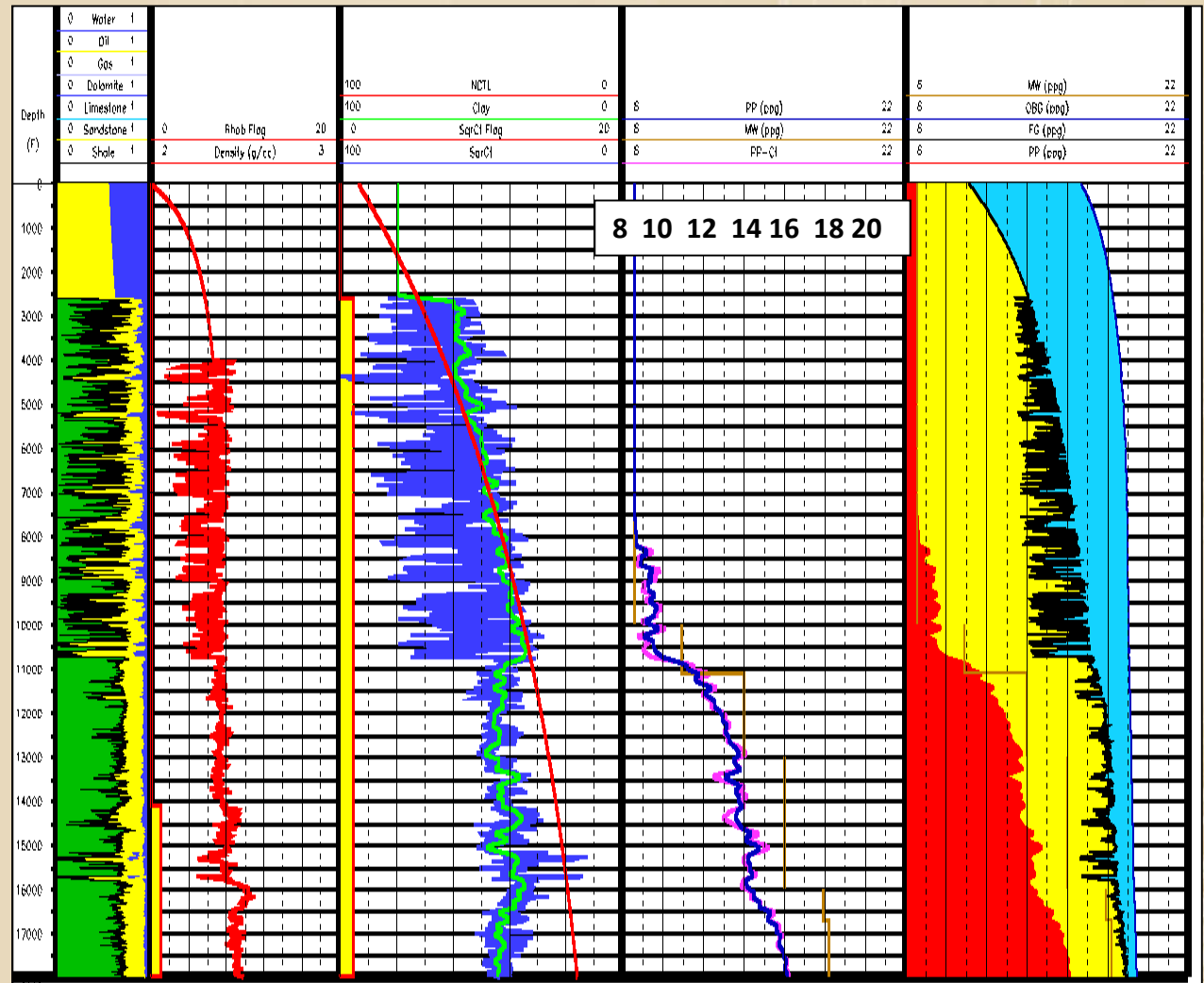
PP from seismic is PP of the **shales**. Sand PP must be calculated and has a range (depending on the amount of structure). The light blue envelope shows the range of sand centroid pressures.





The Daily Assessment of PP and FG

When the drilling starts. The shale pore pressure is assessed using info from LWD logs, wireline logs and other drilling parameters (such as mud weight, LOT's, MDT's, RFT's).

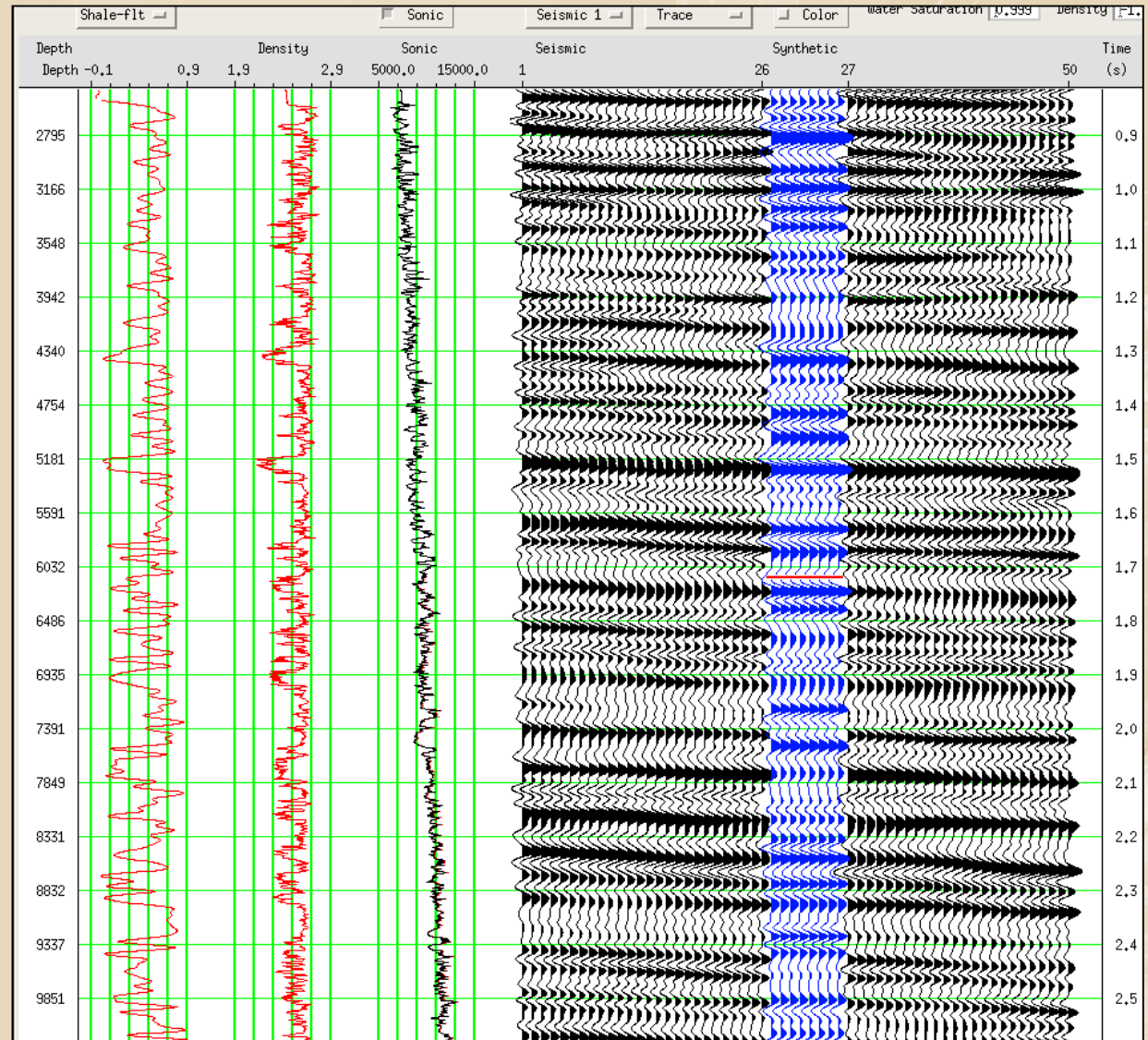


8 10 12 14 16 18 20 22
Lbs/Gal.



The Daily Update Of Time/Depth

The PDML is a prediction of rock properties for designing the well. These predictions are provided in depth, however the data source is seismic which is in time. The time/depth relationship for the well is assessed by re-tying the well synthetic (shown in blue) to the seismic, as drilling proceeds. This is done using a synthetic from LWD info. The new time/depth relationship is used to convert the PDML to depth.





The Daily Update of the Pre-Drill Mud Log

The latest drilling information is posted on the PDML. Predicted and actual pore pressures and mud weights are displayed, along with the well's GR curve. If required, the PDML can be recalibrated, therefore providing the best prediction of what lies ahead of the bit.

