



# Weatherford®

## RAPTOR GAS ANALYSIS

COMPANY VANGUARD OPERATING LLC.  
 WELL CSF 41B-4-791  
 FIELD MAMM CREEK  
 PROVINCE/COUNTY GARFIELD  
 COUNTRY/STATE U.S.A./COLORADO  
 LOCATION

SEC 4 TWP 7S RGE 91W Other Services  
 Latitude 39.479308 SECTOR BOND LOG  
 Longitude -107.559985  
 API Number 05-045-23497

Permanent Datum : Ground Level, Elevation 6540.4 feet  
 Log Measured From KB, 17.00 feet above Permanent Datum  
 Drilling Measured From KB

Elevations:  
 KB 6557.40  
 DF  
 GL 6540.40

Date	24-Feb-2018	PERFORATION RECORD			
Run Number	ONE	Shot	Number	Depth From	Depth To
Service Order	5133-206669803	Density	of Shots	feet	feet
Type Log	CRE				
Depth Driller	8500.00				
Depth Logger	8411.25				
Top Log Interval	5035.00				
Bottom Log Interval	8411.25				
Hole Fluid Type	WATER				
Hole Fluid Level					
Restriction ID	4.000	Gun Type			
Max Recorded Temp	216.00	Gun Size			
Well Head Pressure	0.00	CASING / TUBING RECORD			
Well Head Equipment	PackOff	Size	Weight	Depth From	Depth To
Time Well Ready	ROA	inches	pounds/ft	feet	feet
Time Logger Bottom	0815	8.625	32.00	0.00	912.00
Unit	14115/15108	4.500	11.60	0.00	8477.00
Equipment Name	CRE-SSB				
Base	CASPER, WY				
Recorded By	P. MAZURIA TAYLOR				
Witnessed By	M. SNOW				

### BOREHOLE RECORD

Last Edited: 24-FEB-2018 06:50

Bit Size inches	Depth From feet	Depth To feet
7.875	912.00	8500.00

### CASING / TUBING RECORD

Type	Grade	TypeJoint	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
Surface	J-55	LTC	8.625	0.00	912.00	32.00
Production	P-110	LTC	4.500	0.00	8477.00	11.60

### REMARKS

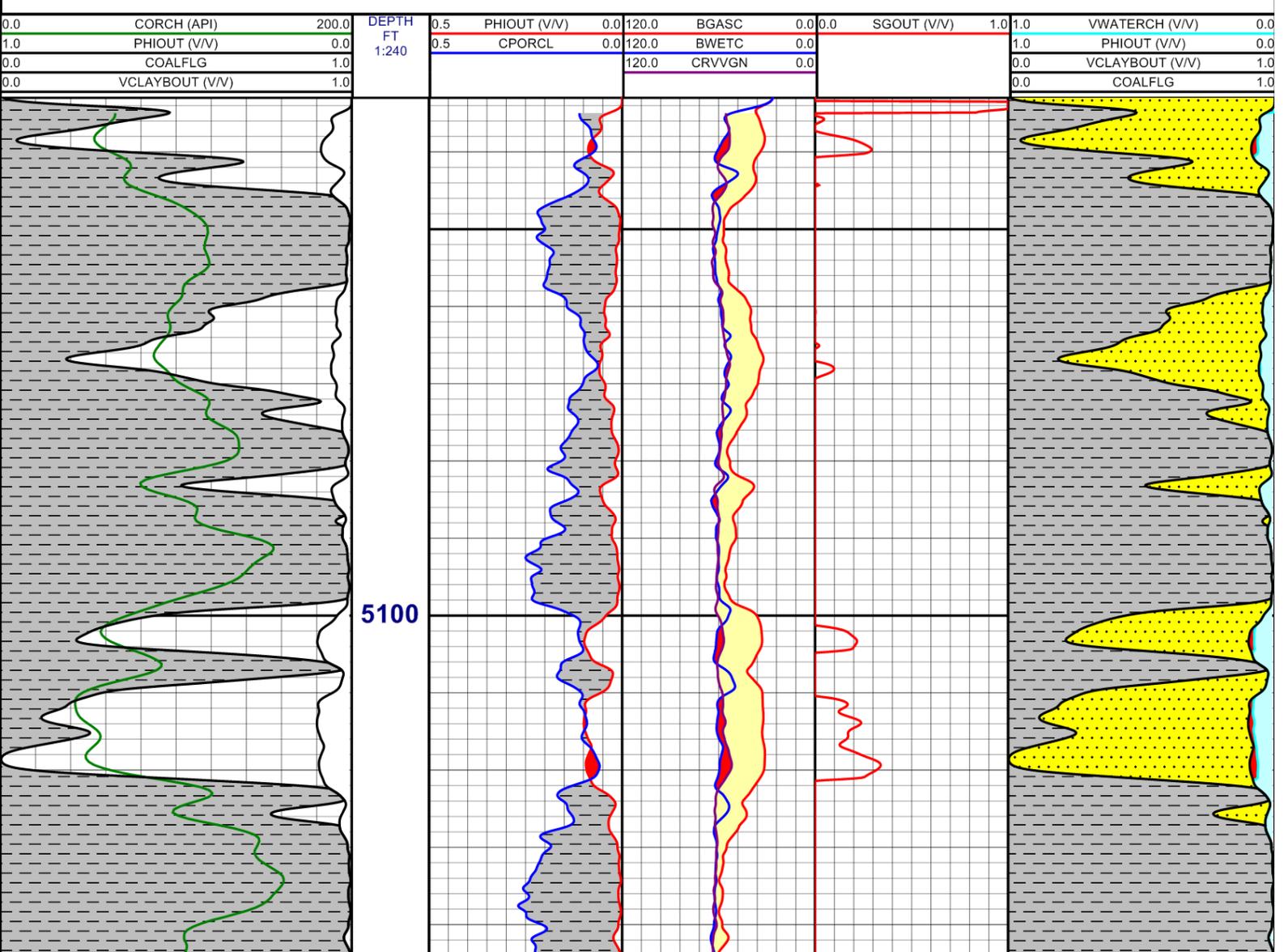
Logged with WLS v 17.05.6573 via WSS-E  
 WISE Reference number: 113029  
 Intervals logged and presented at clients request.  
 Depth correlated to marker joint at 8235' from Temperature GR/CCL log (RMWS; 02-01-2018) supplied on site by client representative; 18.1' added to correlate.  
 Gamma Ray measurements and repeatability adversely affected by presence of operational pulsed neutron tool (CRE/Raptor). This is not indicative of a malfunctioning tool. Please interpret accordingly.  
 CRE Hour meter start time: 9018 minutes. CRE Hour meter end time: 9511 minutes.

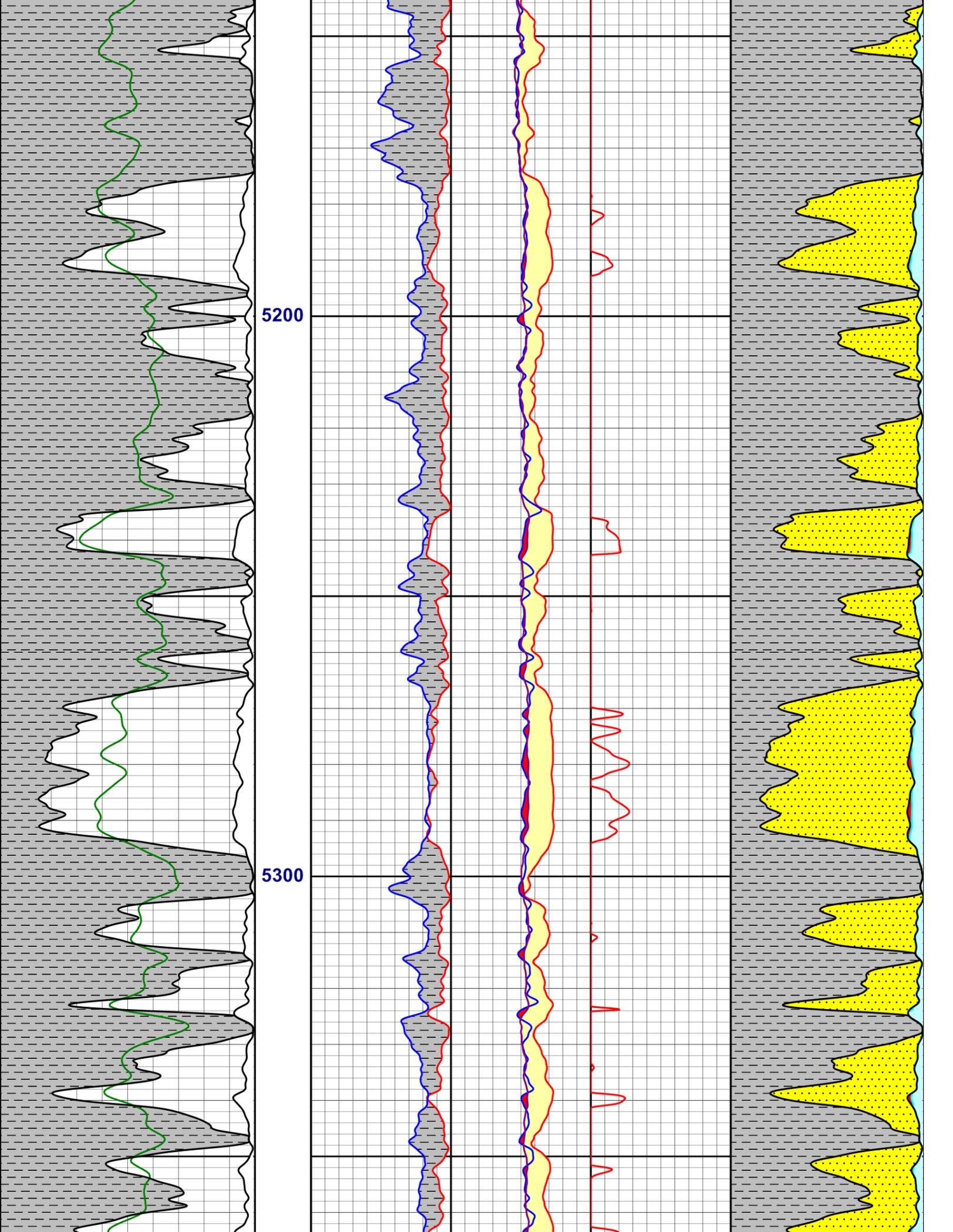
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data.

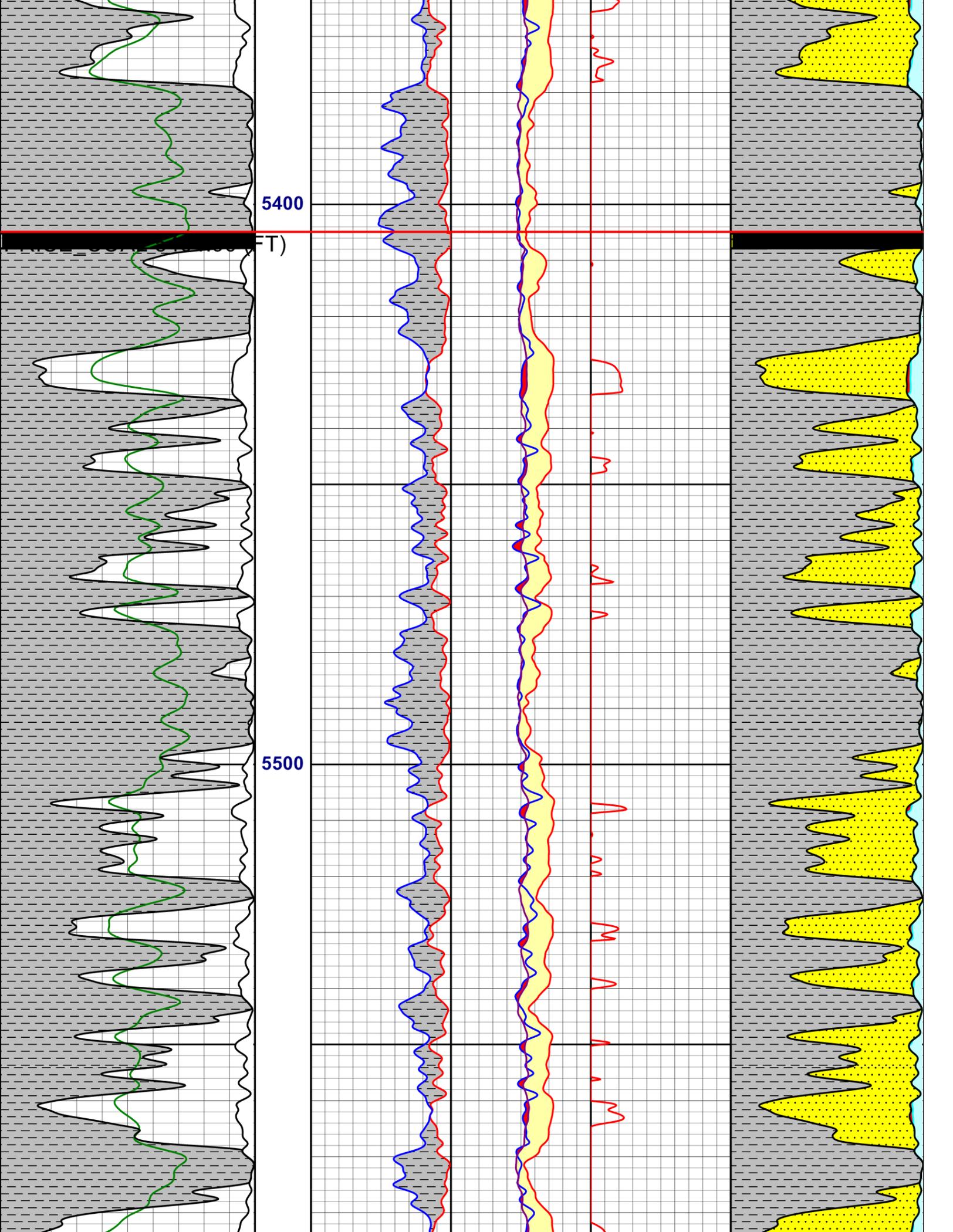
type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will give the Company the benefit of the Contractor's best judgment based on its experience and will perform all such Work in a good and workmanlike manner. Any interpretation of test or other data, and any recommendation or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional engineers and analysts may differ. ACCORDINGLY ANY INTERPRETATION OR RECOMMENDATION RESULTING FROM THE SERVICES WILL BE AT THE SOLE RISK OF THE COMPANY, AND THE CONTRACTOR CANNOT AND DOES NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION OR RECOMMENDATION, WHICH INTERPRETATIONS AND RECOMMENDATIONS SHOULD NOT, THEREFORE, UNDER ANY CIRCUMSTANCES BE RELIED UPON AS THE SOLE OR MAIN BASIS FOR ANY DRILLING, COMPLETION, WELL TREATMENT, PRODUCTION OR FINANCIAL DECISION, OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING ACTIVITY, DRILLING RIG OR ITS CREW OR ANY OTHER INDIVIDUAL. THE COMPANY HAS FULL RESPONSIBILITY FOR ALL DECISIONS CONCERNING THE SERVICES.

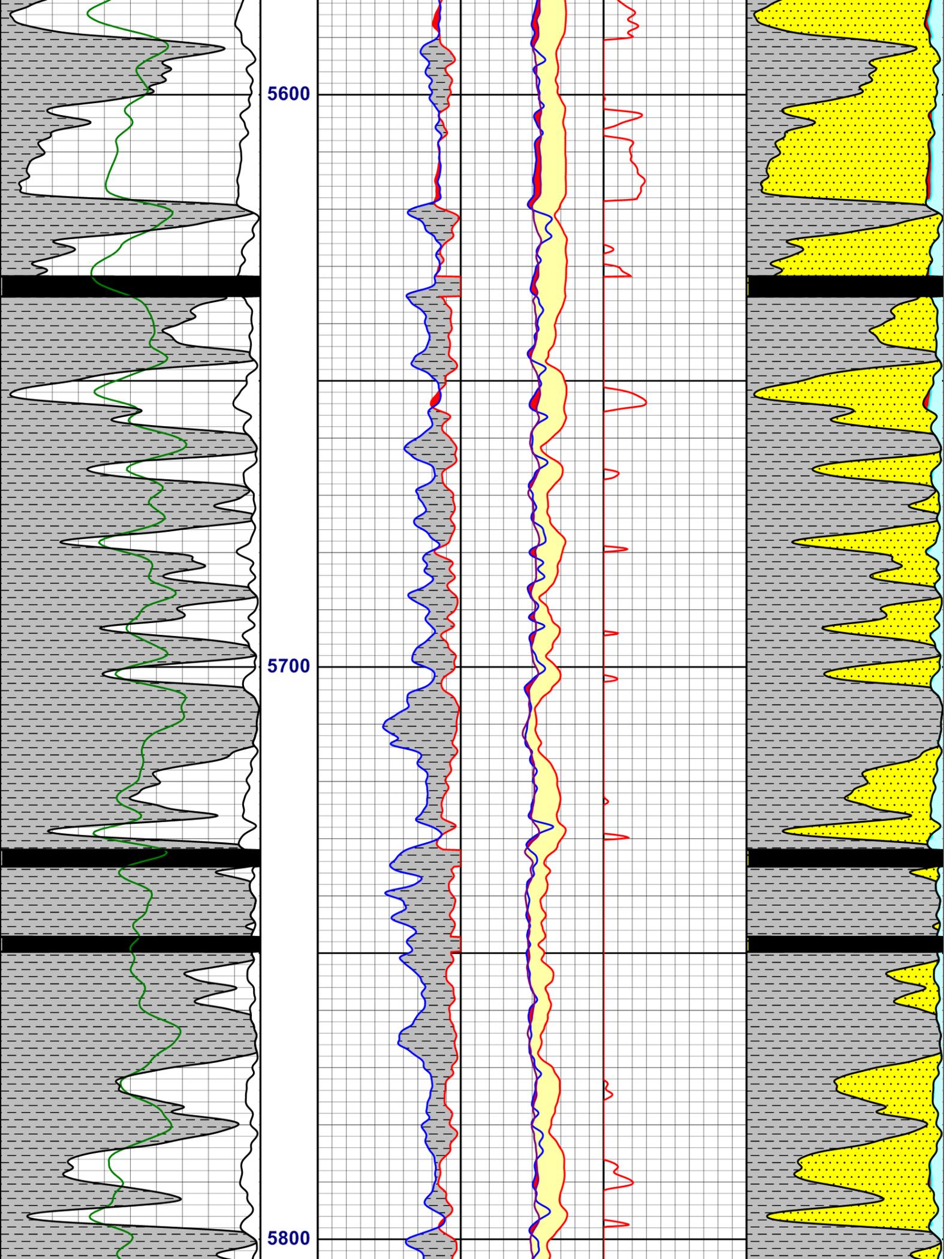
## Log Description

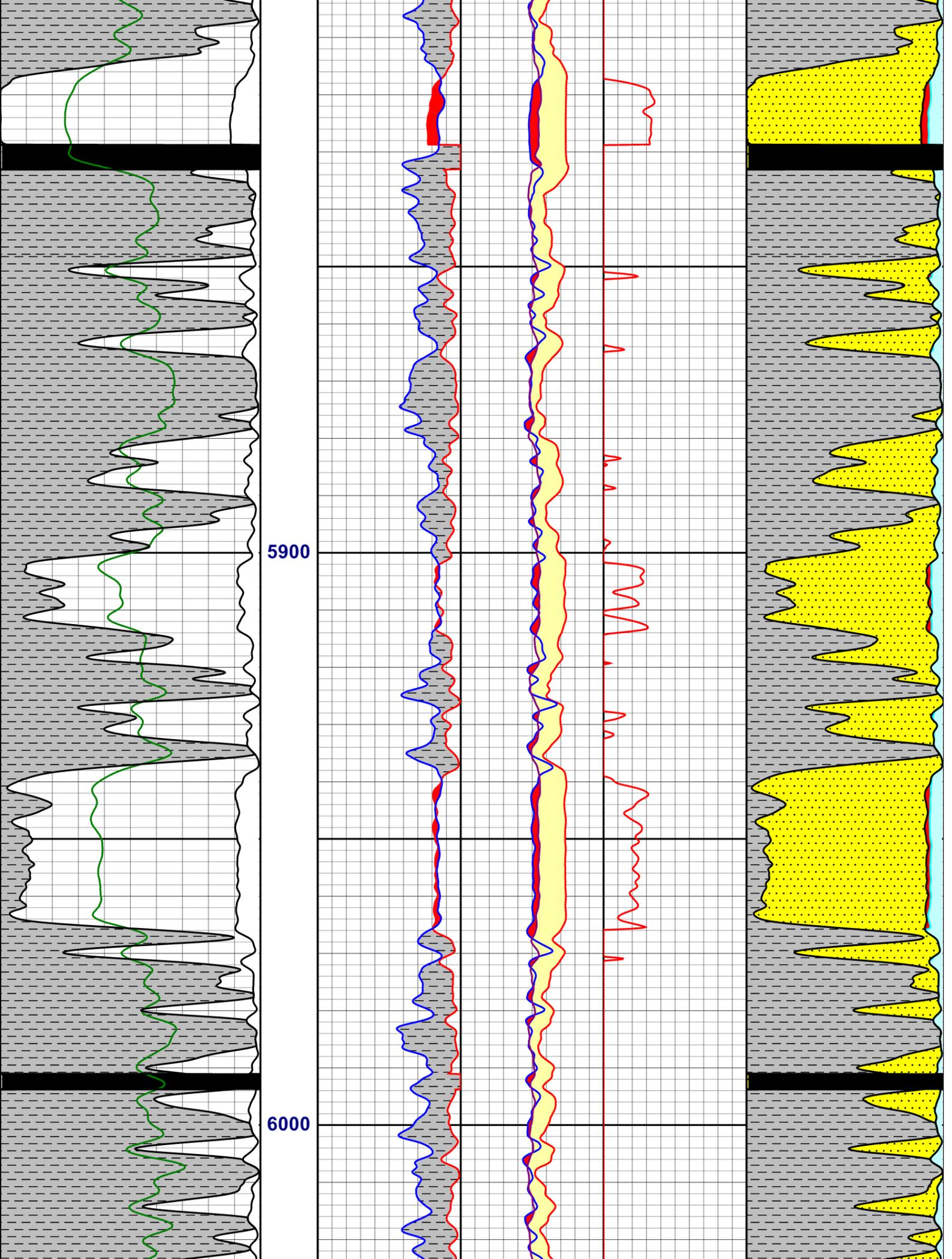
- VWATERCH      Water pore volume for cased hole.
- BGASC          Burst envelope for gas shale corrected.
- BWETC          Burst envelope for wet shale corrected.
- CRVVG          Normalized measured burst curve.
- SGOUT          Cased Hole Gas saturation from burst.
- PHIOUT          Porosity used in analysis.
- VCLAYBOUT      Shale volume used in analysis.
- COALFLG        Coal Flag
- CPORCL         Cased Hole Neutron Porosity in LMS units
- CORCH          Cased hole gamma ray.

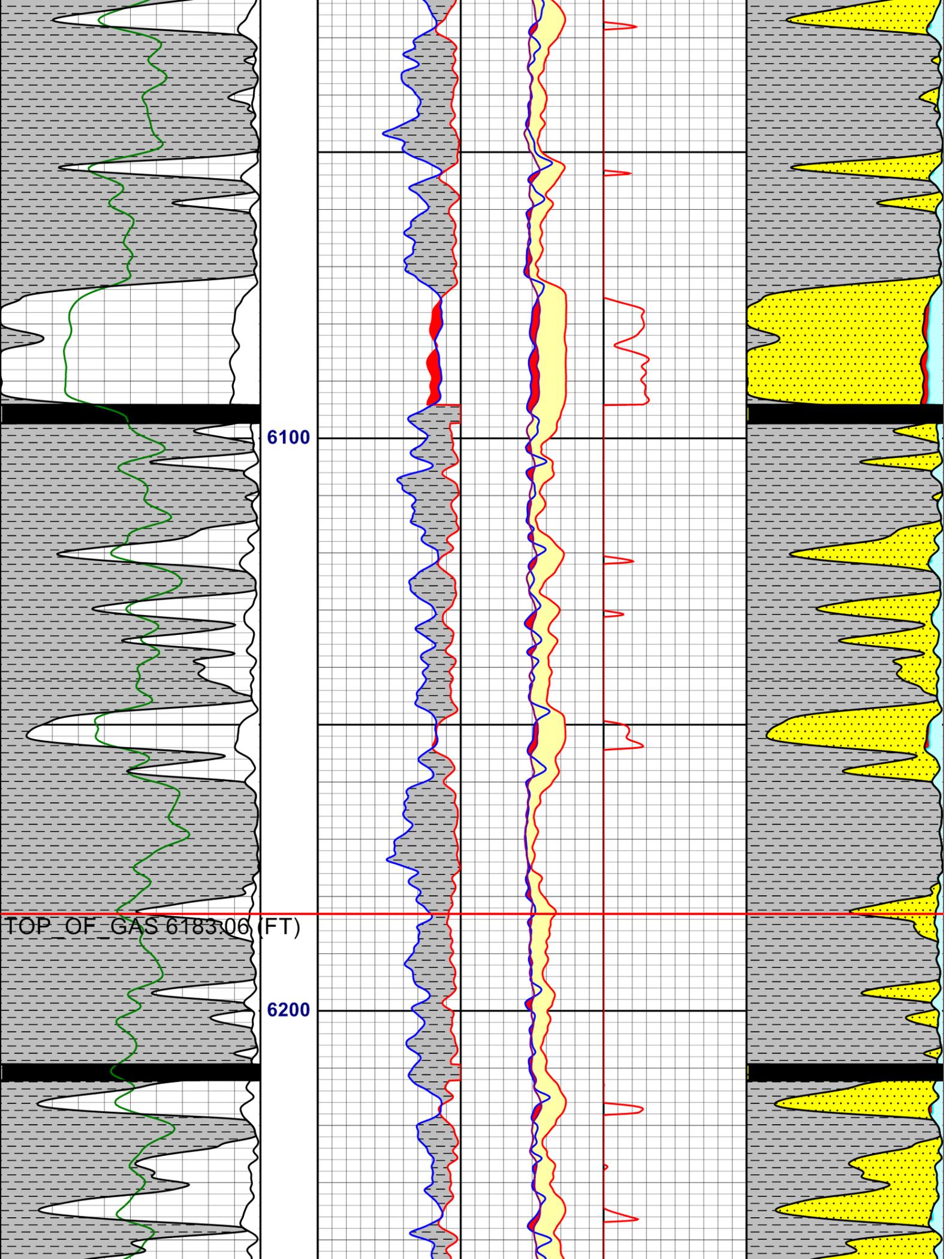


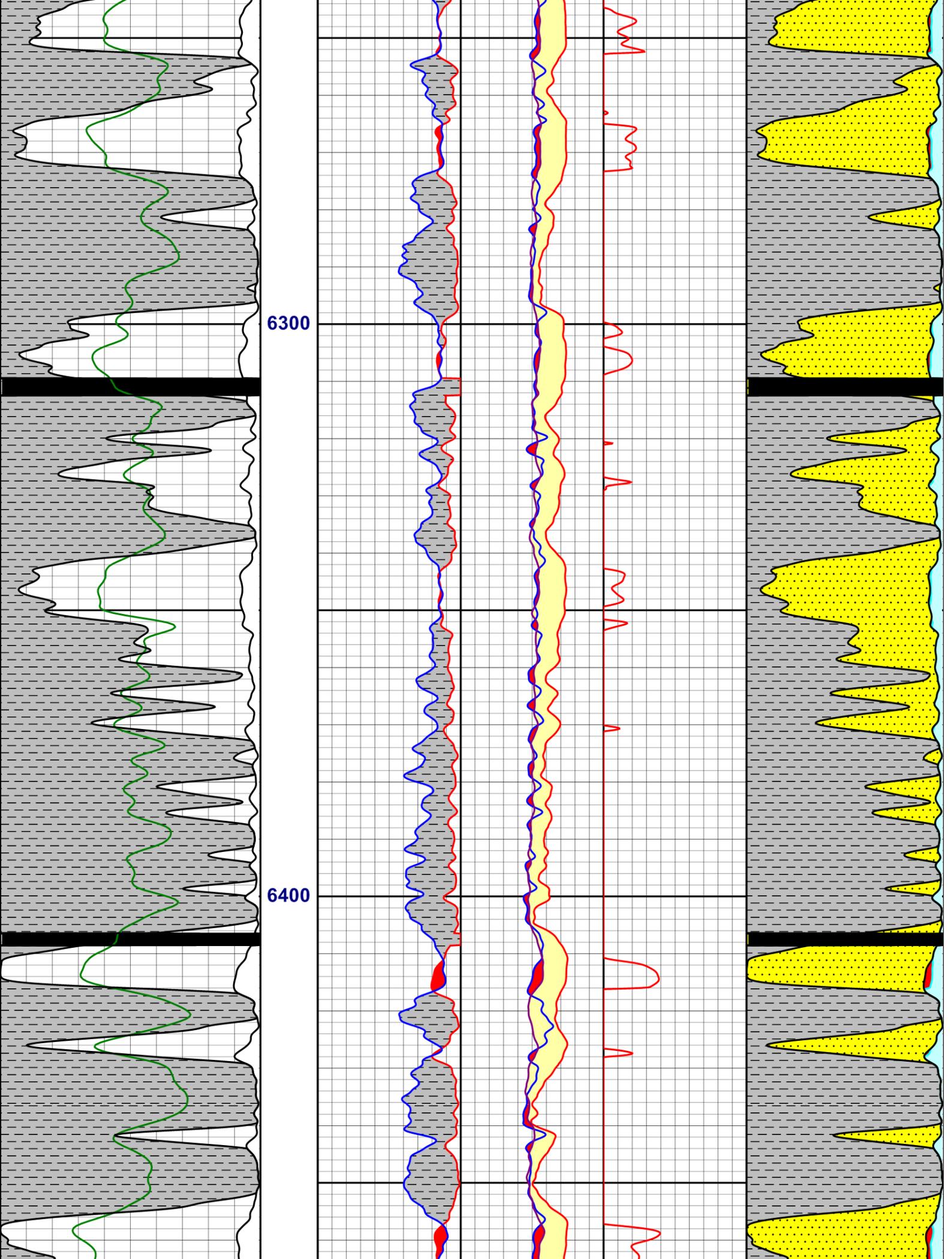


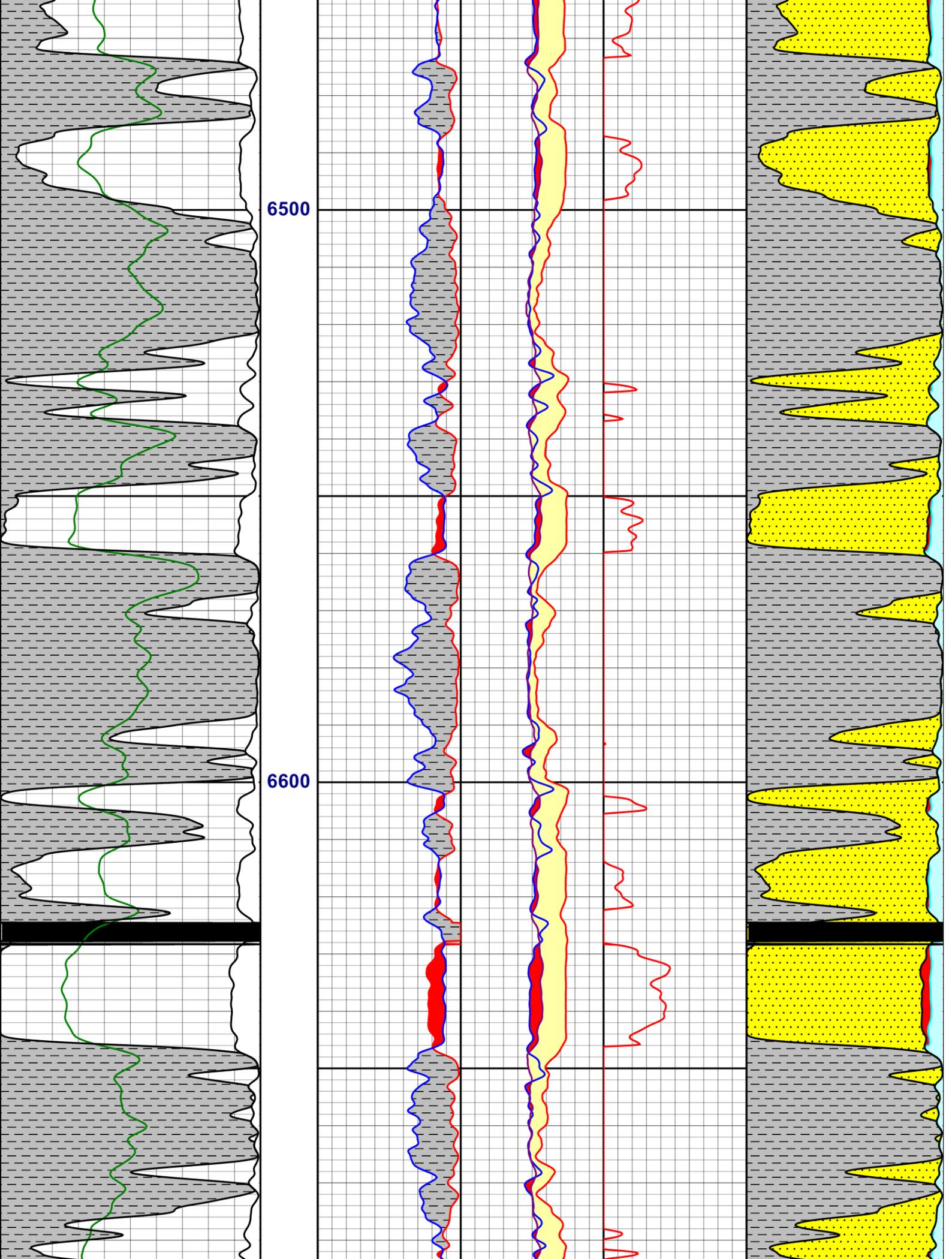


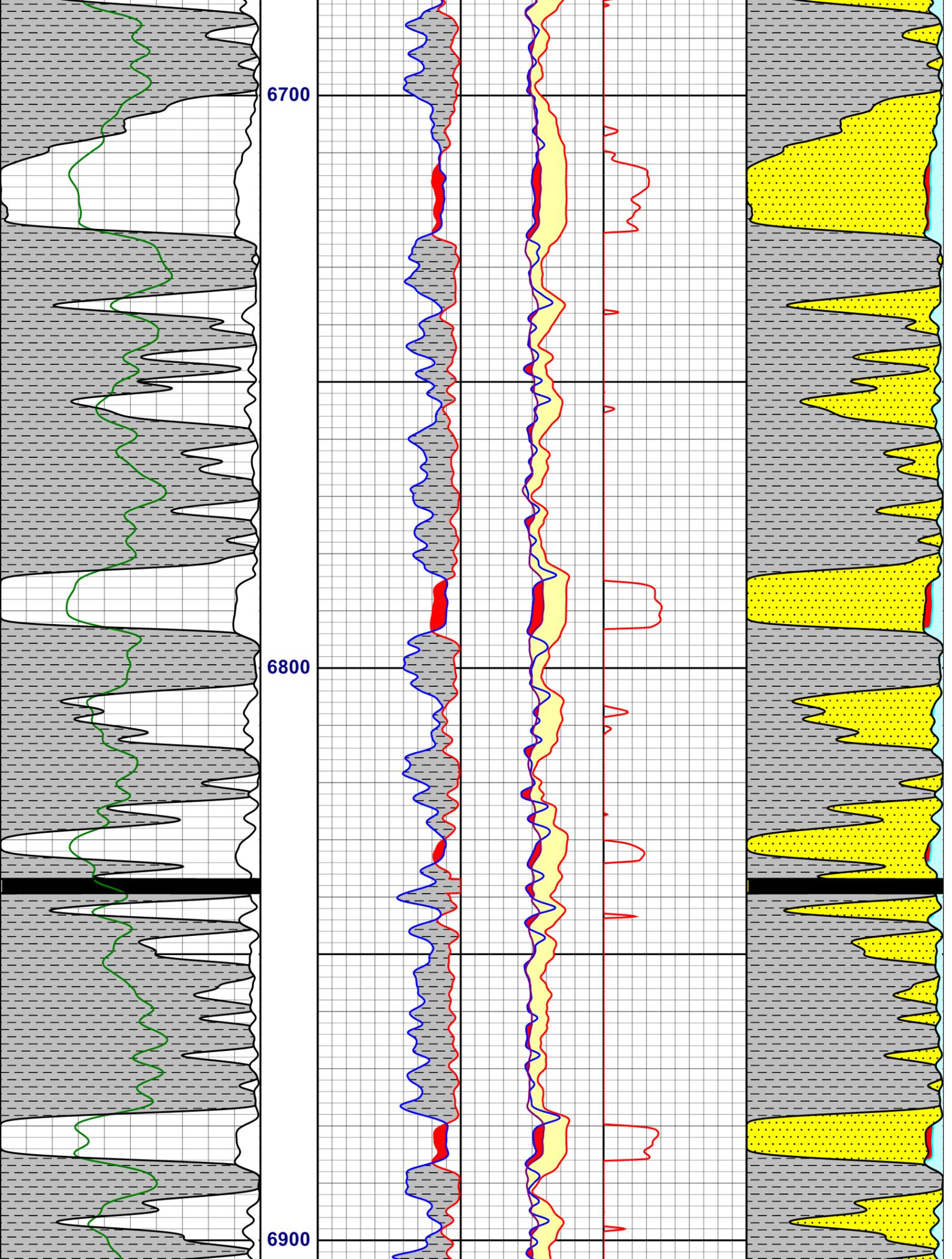


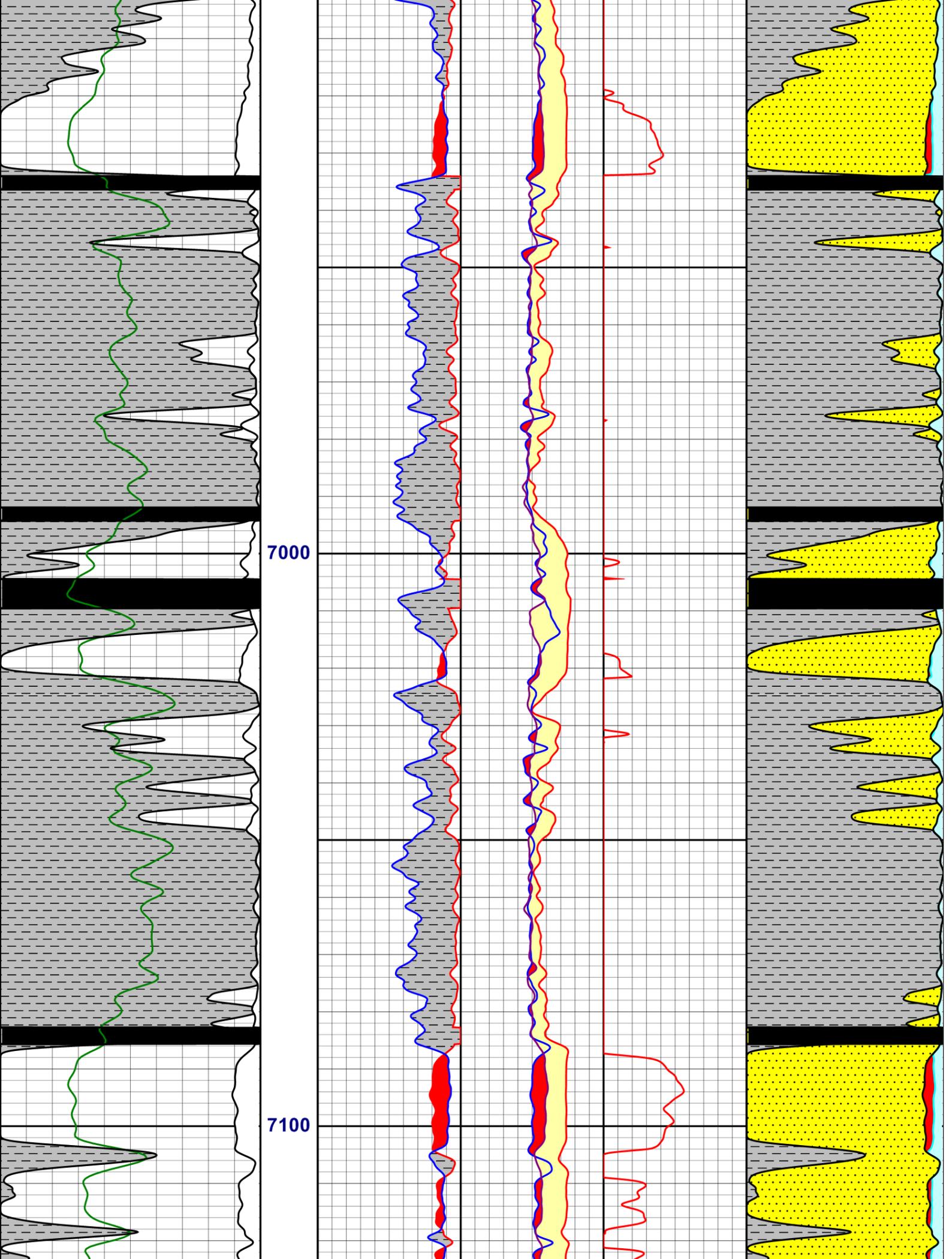


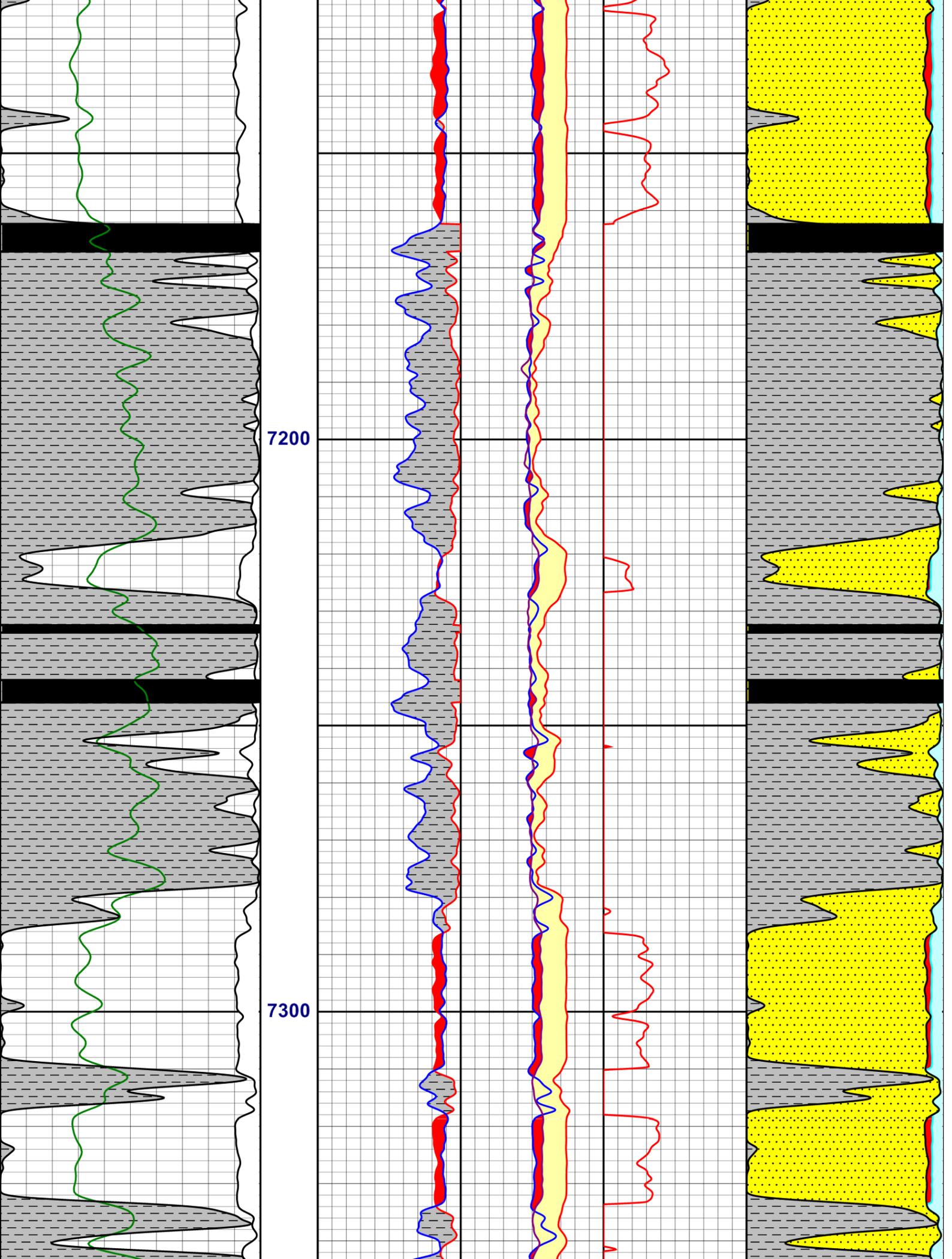






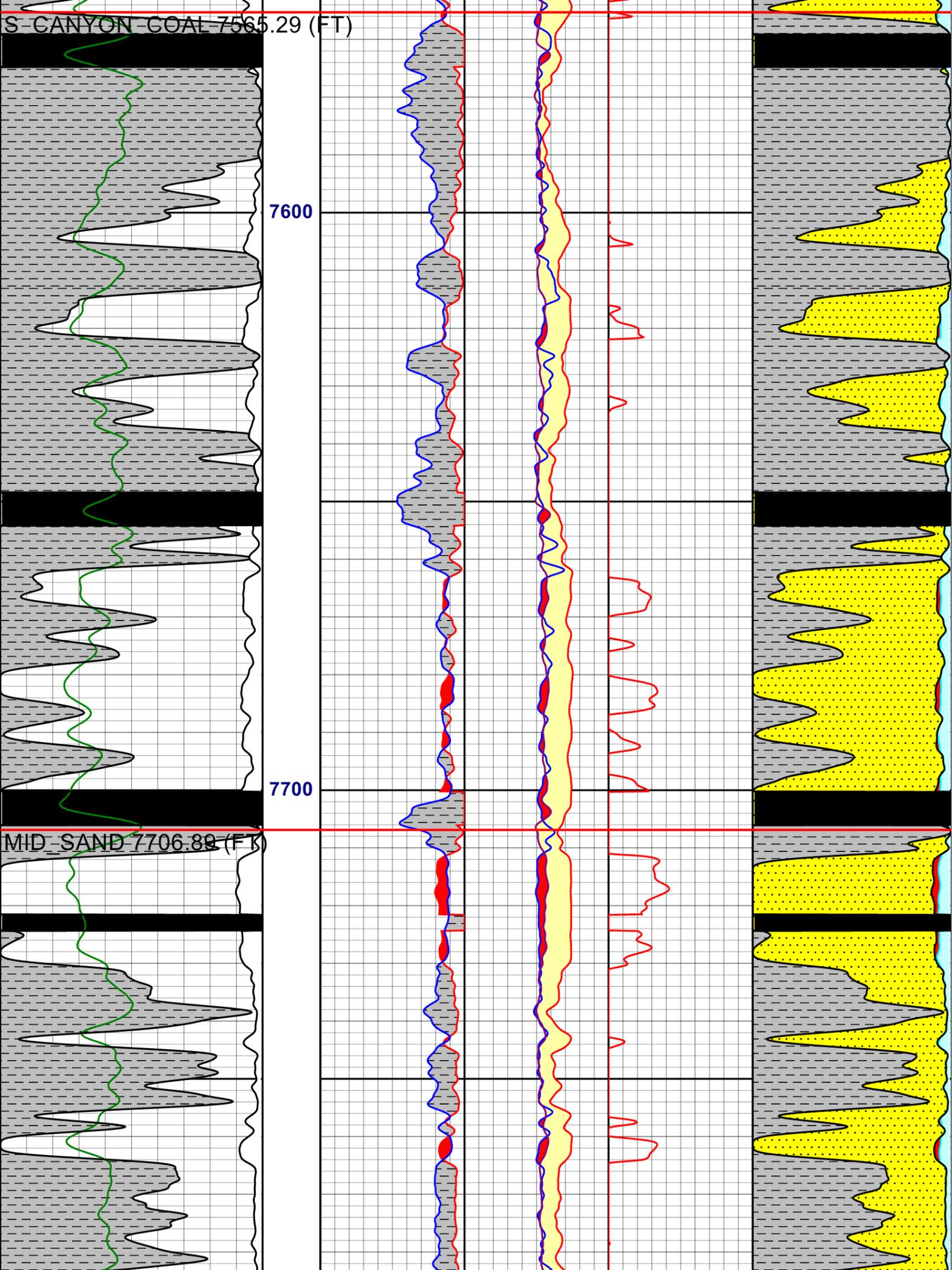








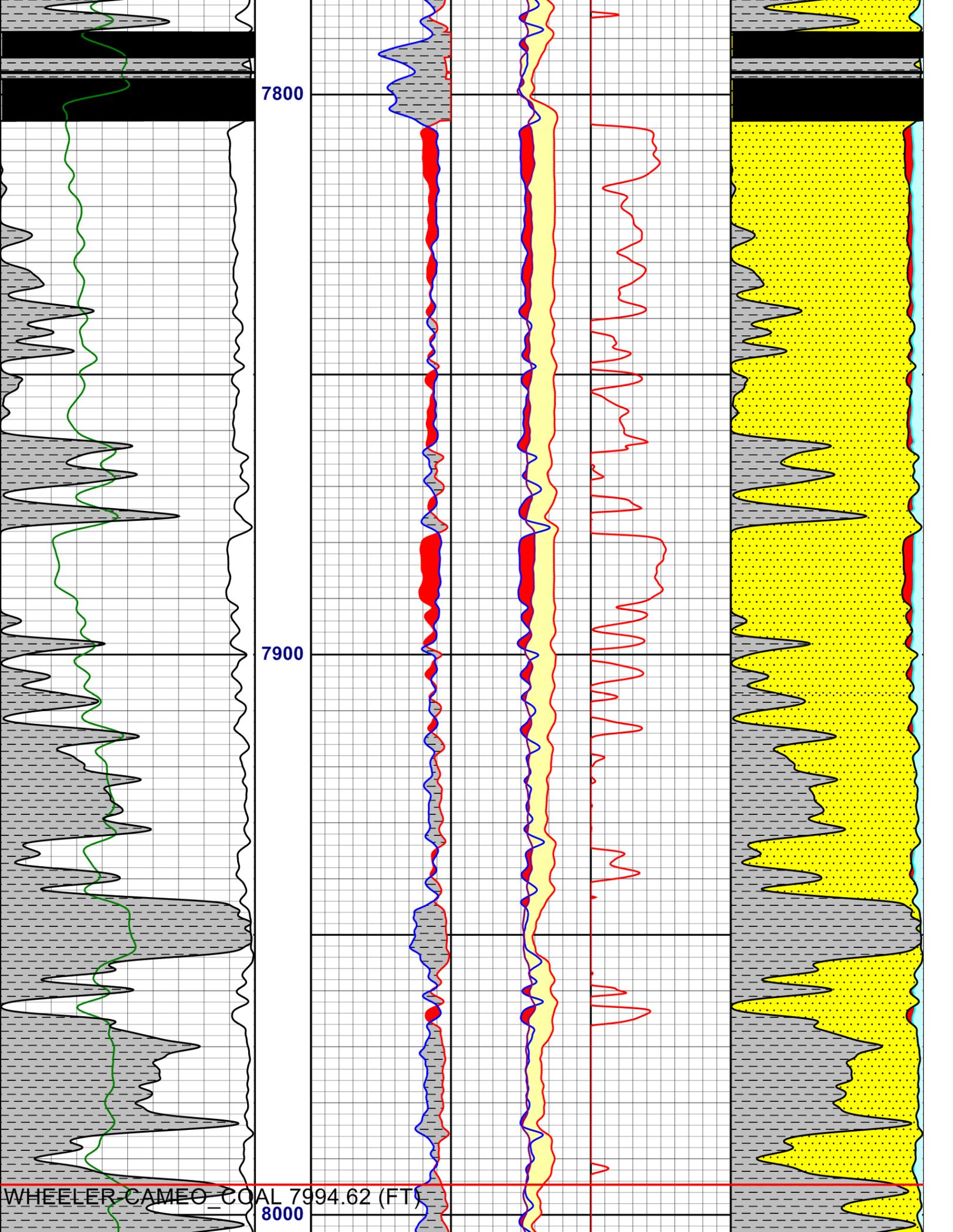
S-CANYON COAL 7565.29 (FT)



7600

7700

MID-SAND 7706.89 (FT)

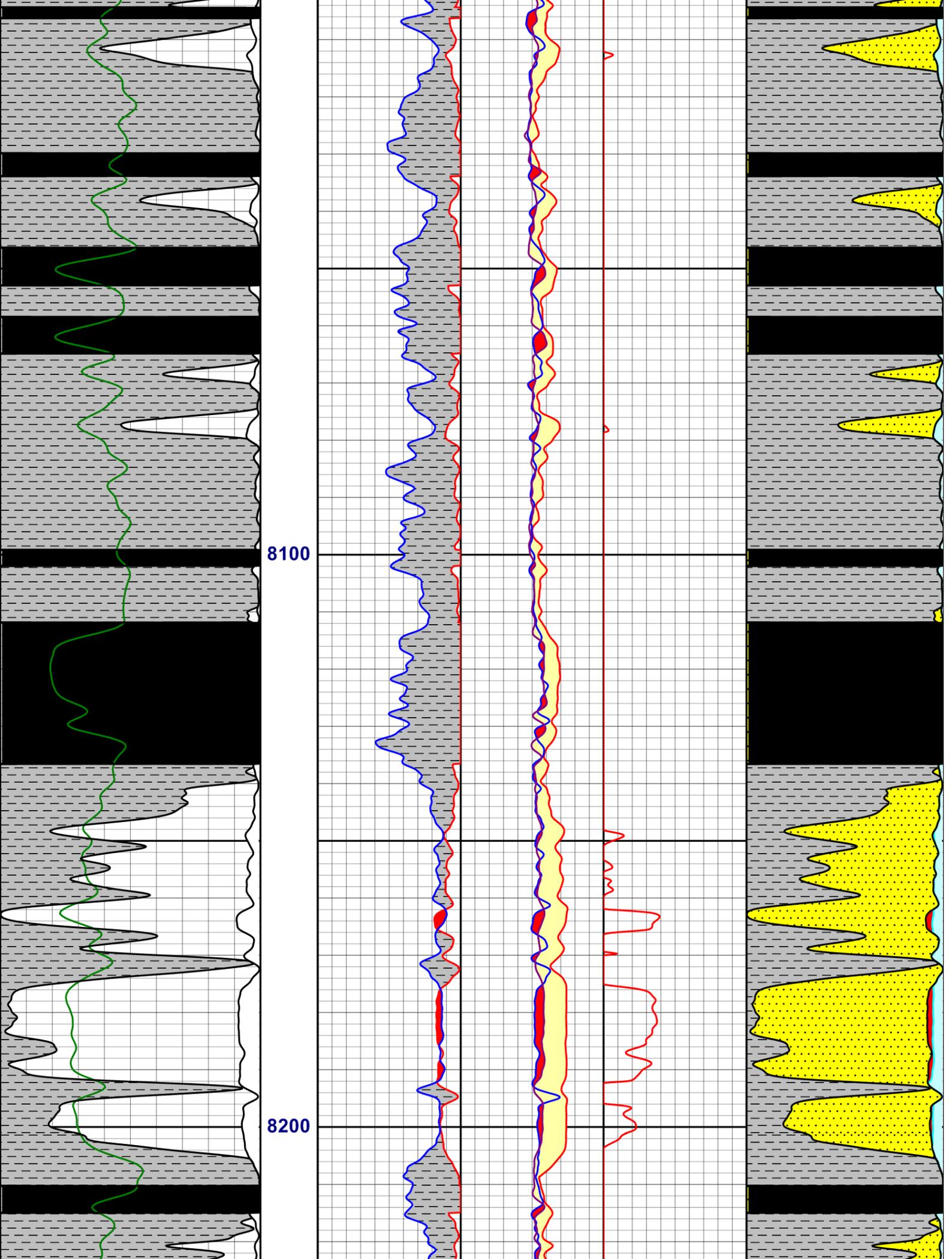


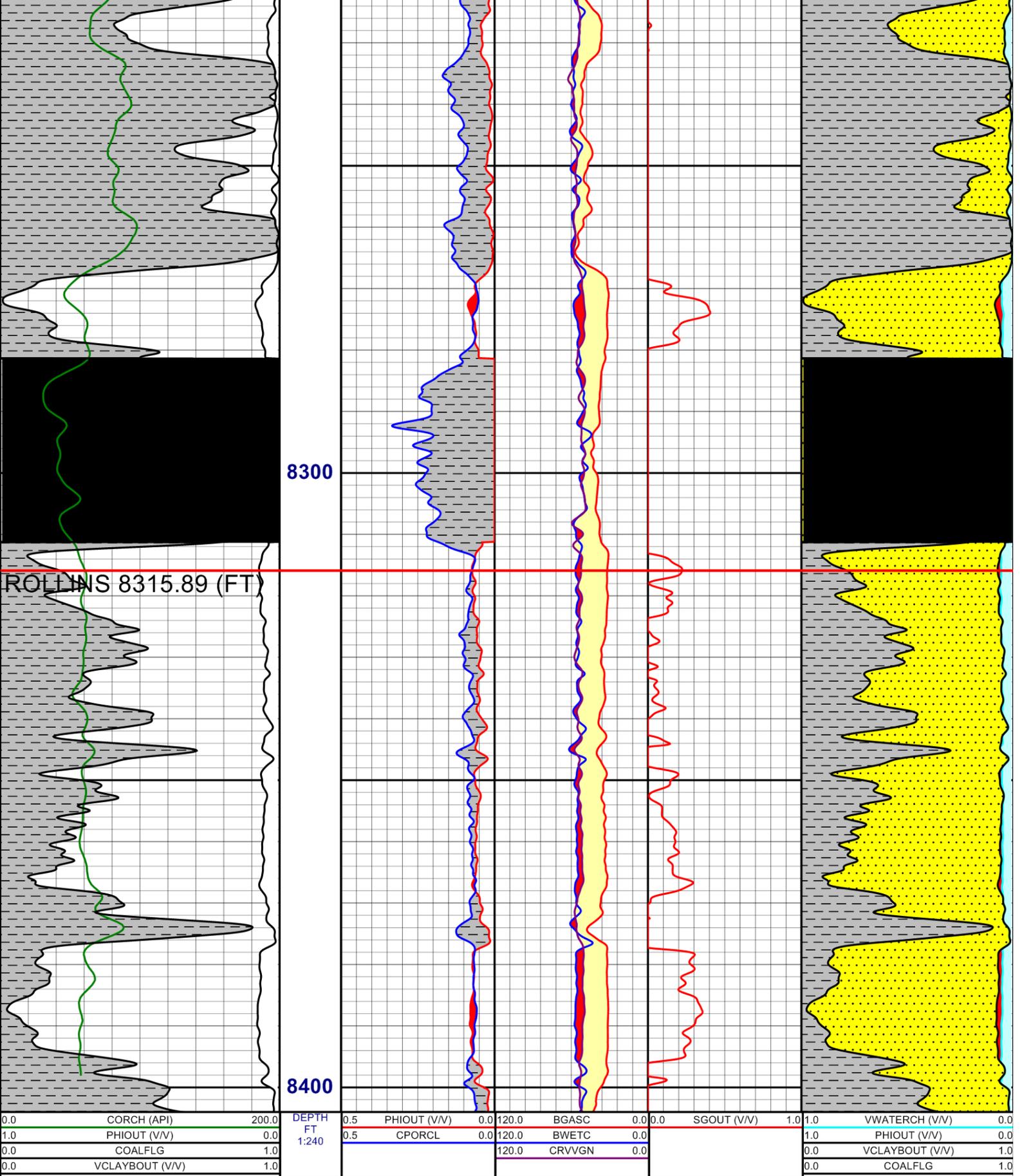
7800

7900

WHEELER-CAMEO\_COAL 7994.62 (FT)

8000





COMPANY	VANGUARD OPERATING LLC.
WELL	CSF 41B-4-791
FIELD	MAMM CREEK
PROVINCE/COUNTY	GARFIELD

COUNTRY/STATE

U.S.A./COLORADO

Elevation Kelly Bushing	6557.4	feet	Bottom Log Interval	8411.25	feet
Elevation Drill Floor		feet	Depth Driller	8500.00	feet
Elevation Ground Level	6540.4	feet	Depth Logger	8411.25	feet



**Weatherford**<sup>®</sup>

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