



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
SECTOR BOND LOG

Latitude 39.479308

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

Run Number ONE

Service Order 5133-206669803

Type Log CRE

Depth Driller 8500.00 feet

Depth Logger 8411.25 feet

Top Log Interval 5035.00 feet

Bottom Log Interval 8411.25 feet

Hole Fluid Type WATER

Hole Fluid Level

Restriction ID 4.000 inches

Max Recorded Temp 216.00 deg F

Well Head Pressure 0.00

Well Head Equipment PackOff

Time Well Ready ROA

Time Logger Bottom 0815

Unit 14115/15108

Equipment Name CRE-SSB

Base CASPER, WY

Recorded By P. MAZURA, TAYLOR

Witnessed By M. SNOW

PERFORATION RECORD

Shot Number Depth From Depth To
Density of Shots feet feet

CASING / TUBING RECORD

Size Weight Depth From Depth To
inches pounds/ft feet feet

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.
- CRVVGN

Normalized measured burst curve.
- SGOUT

Cased Hole Gas saturation from burst.
- PHIOUT

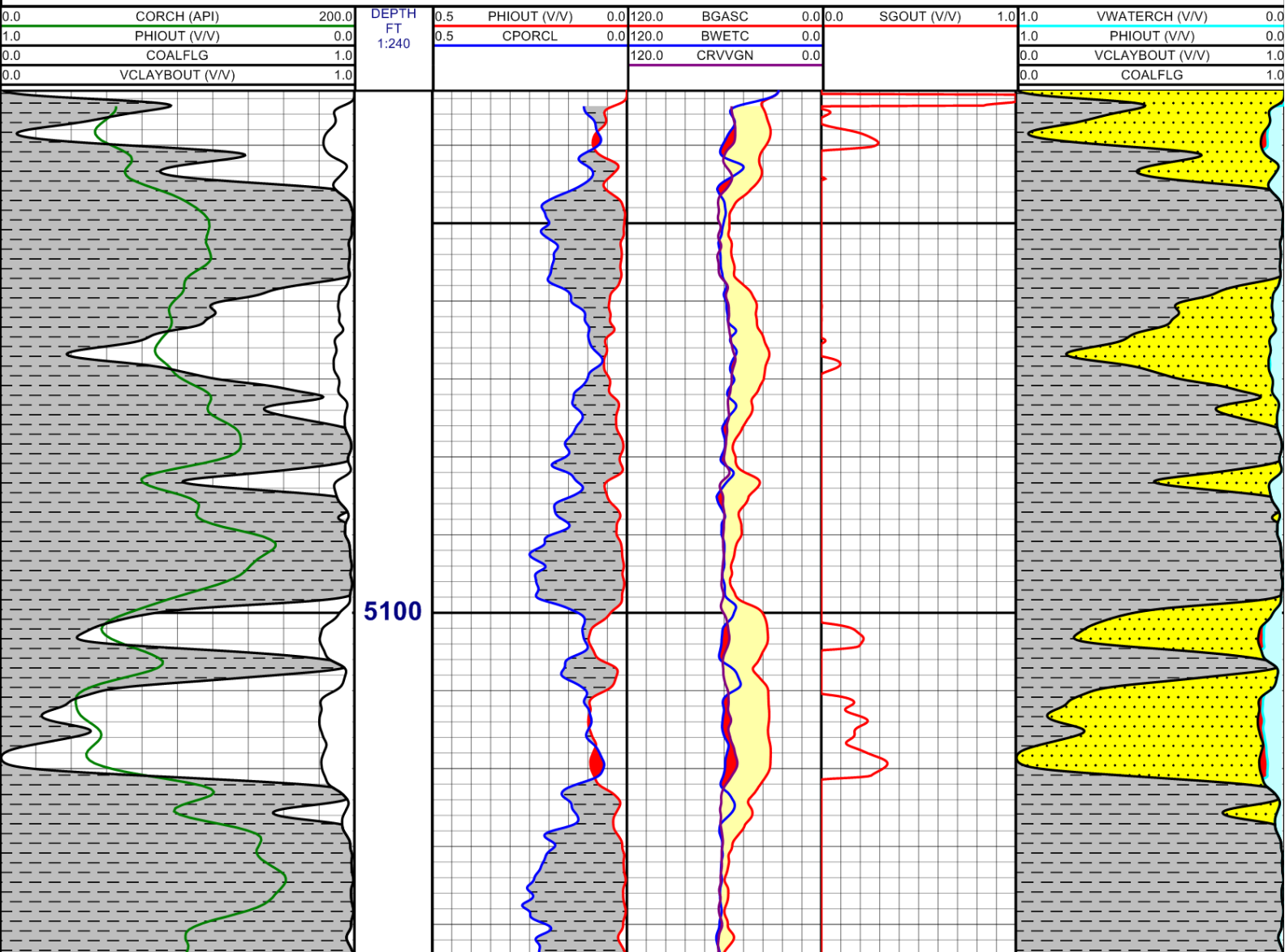
Porosity used in analysis.
- VCLAYBOUT

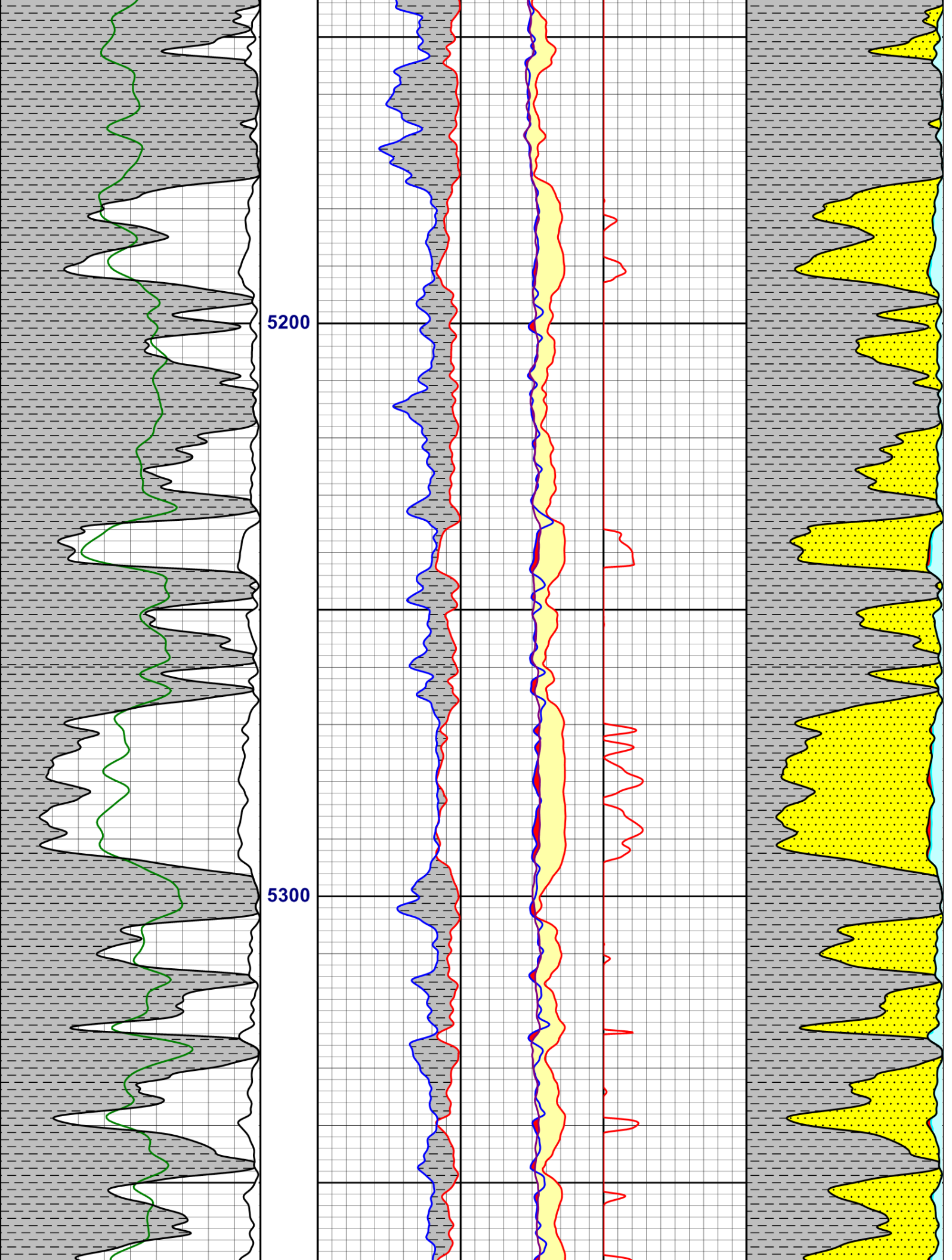
Shale volume used in analysis.
- COALFLG

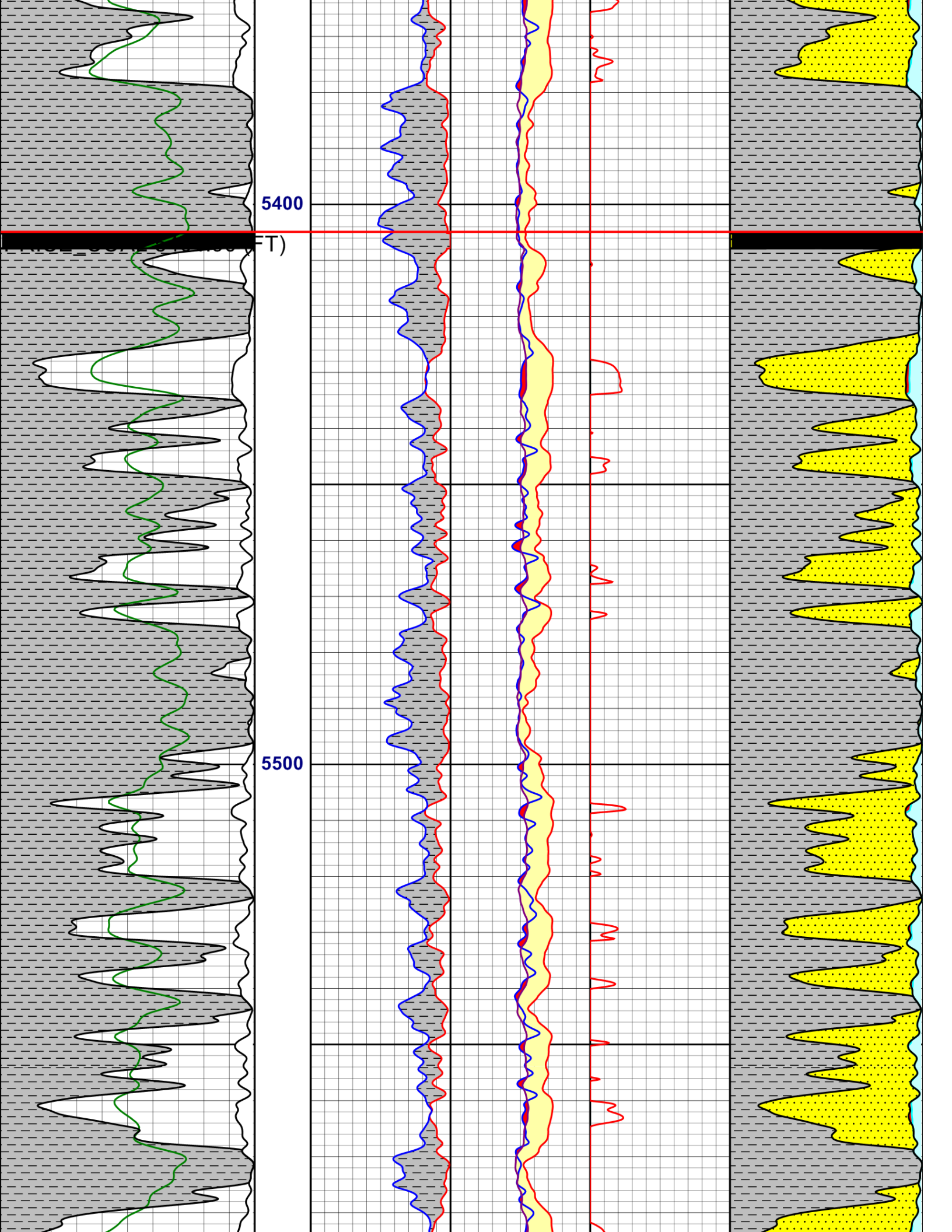
Coal Flag
- CPORCL

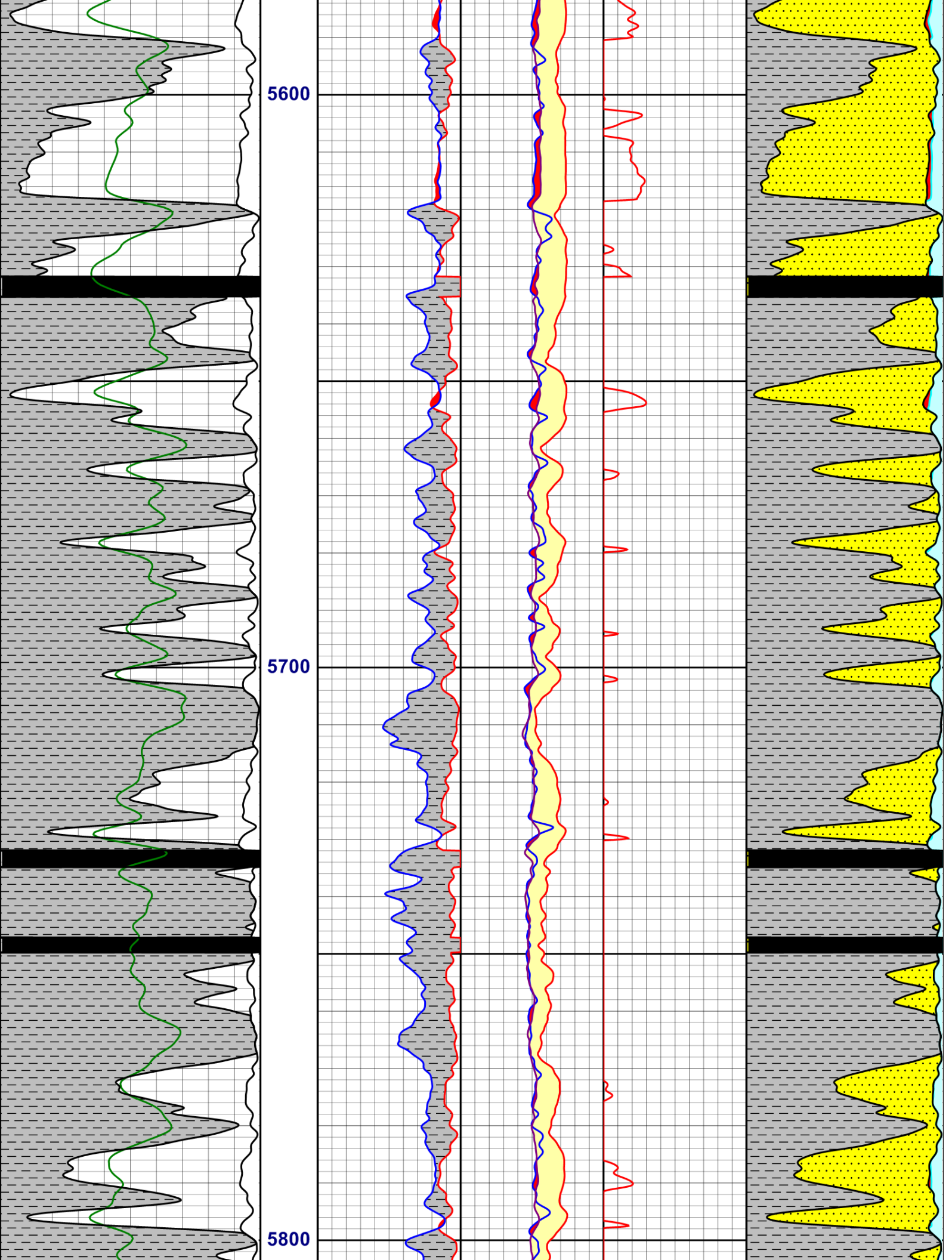
Cased Hole Neutron Porosity in LMS units
- CORCH

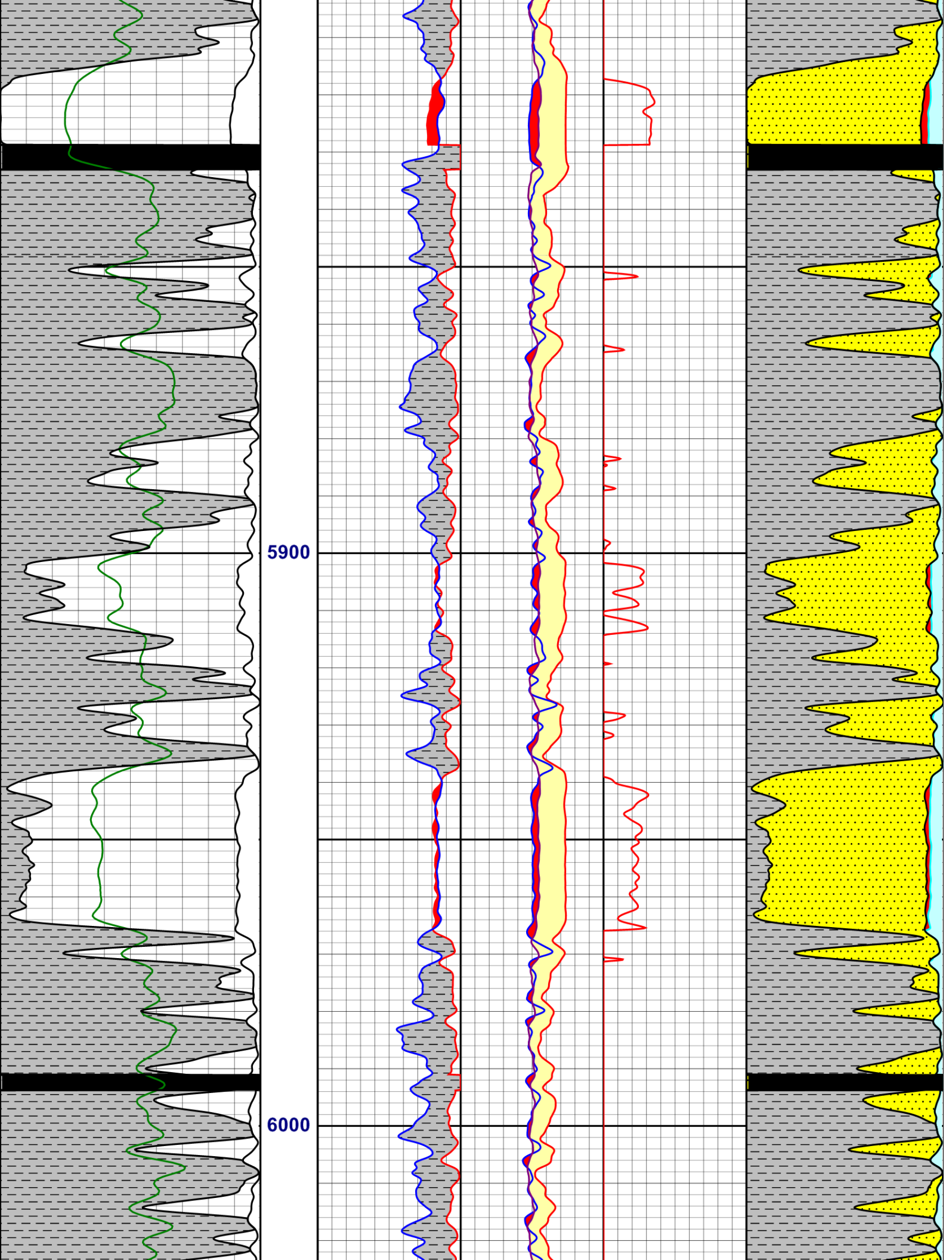
Cased hole gamma ray.

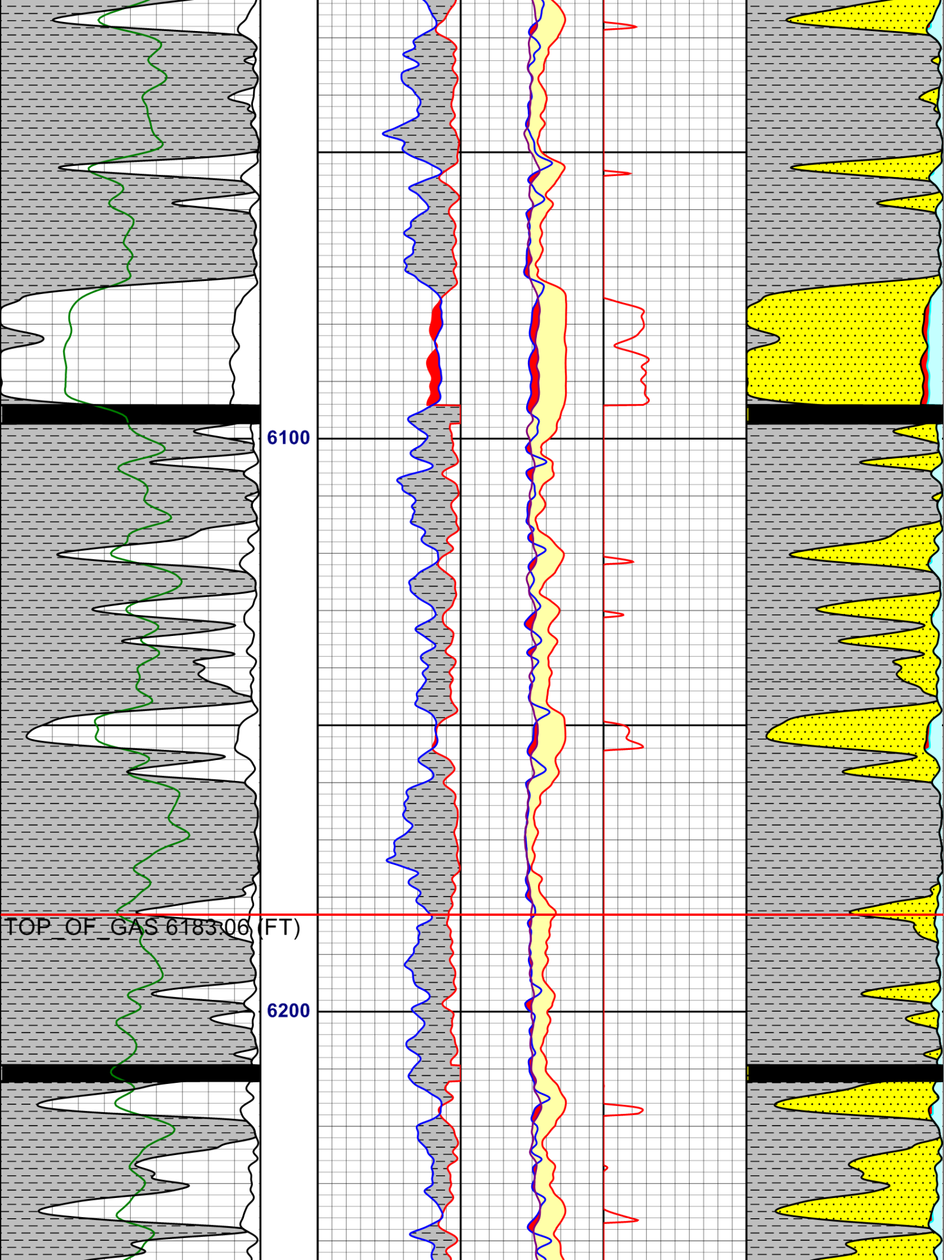


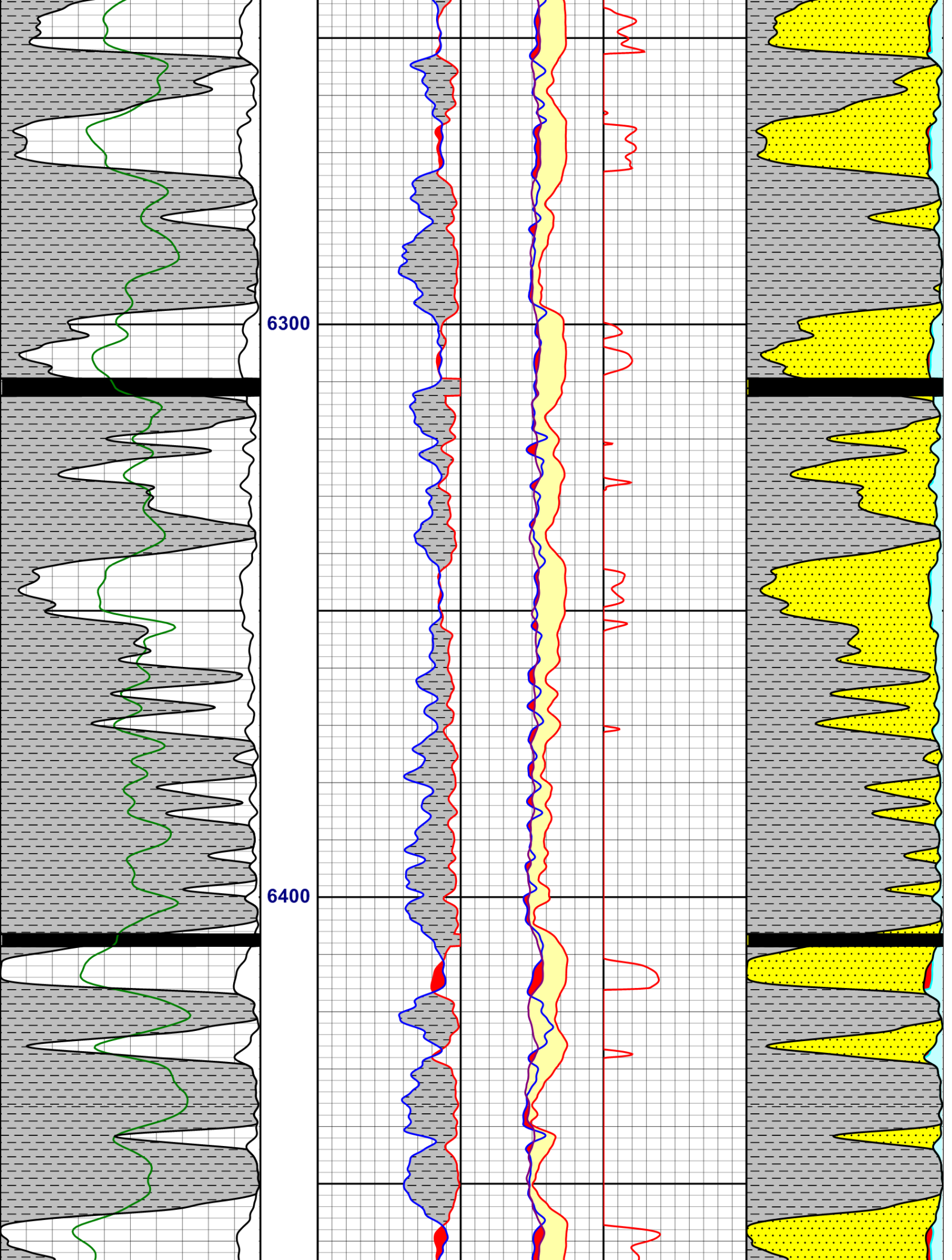


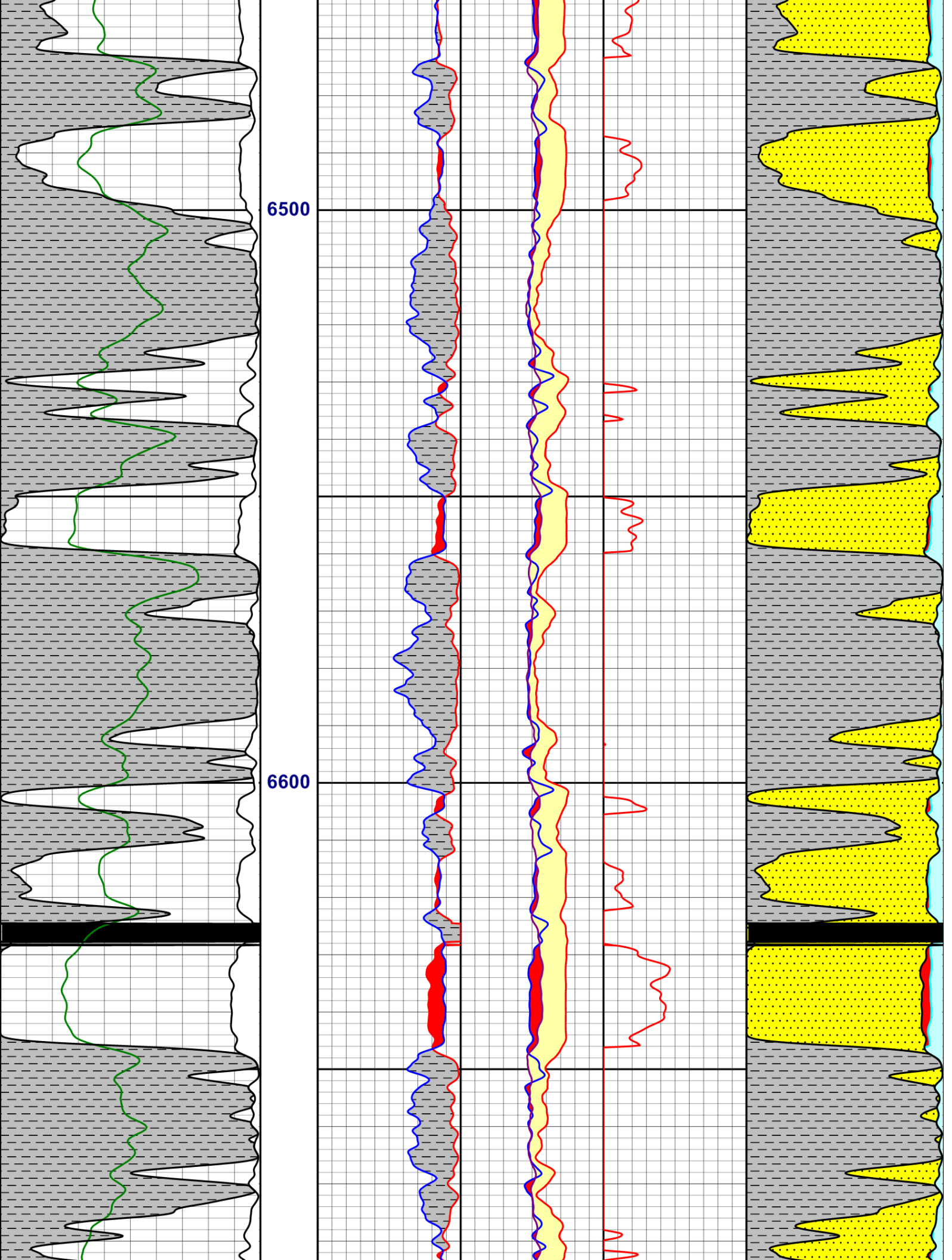


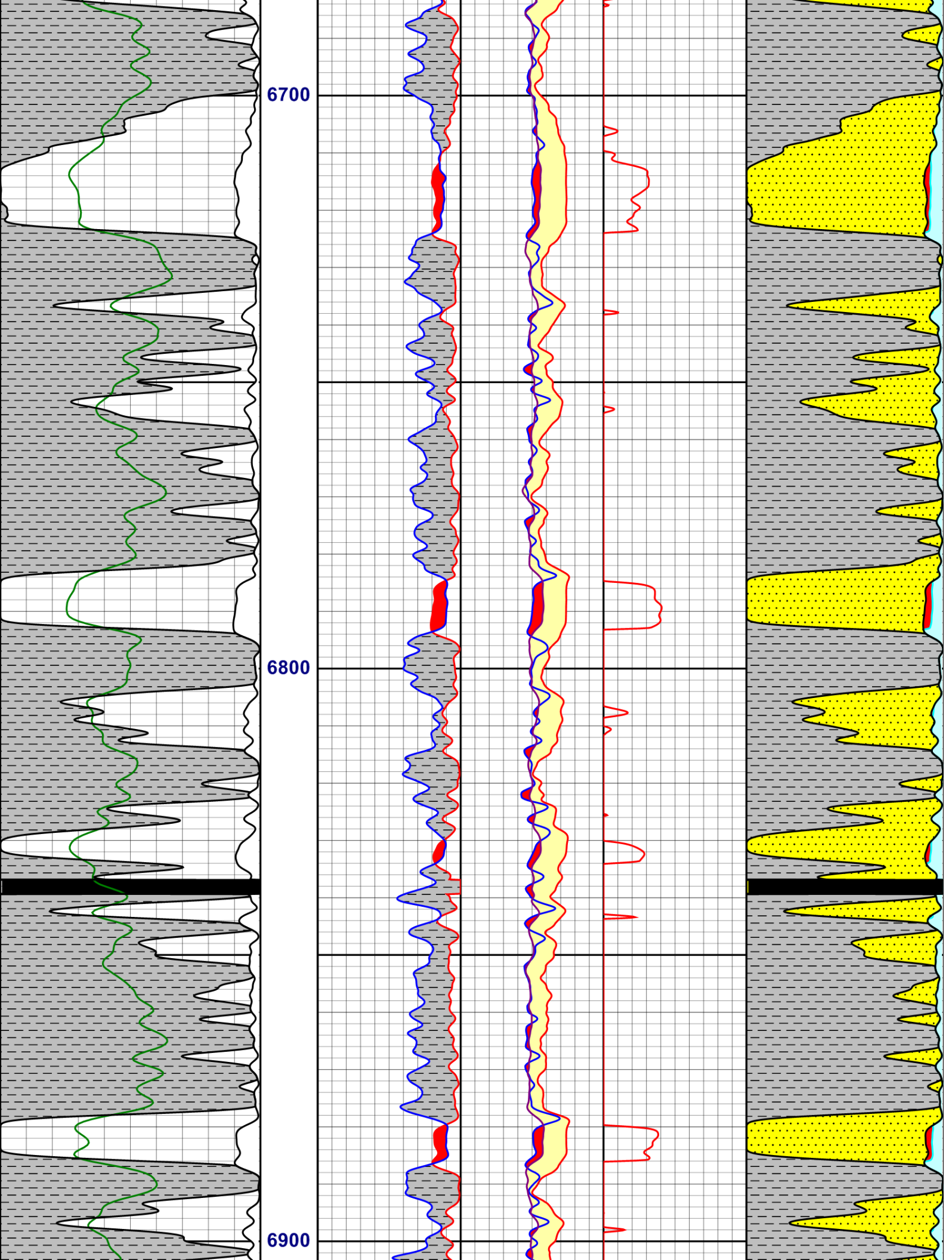


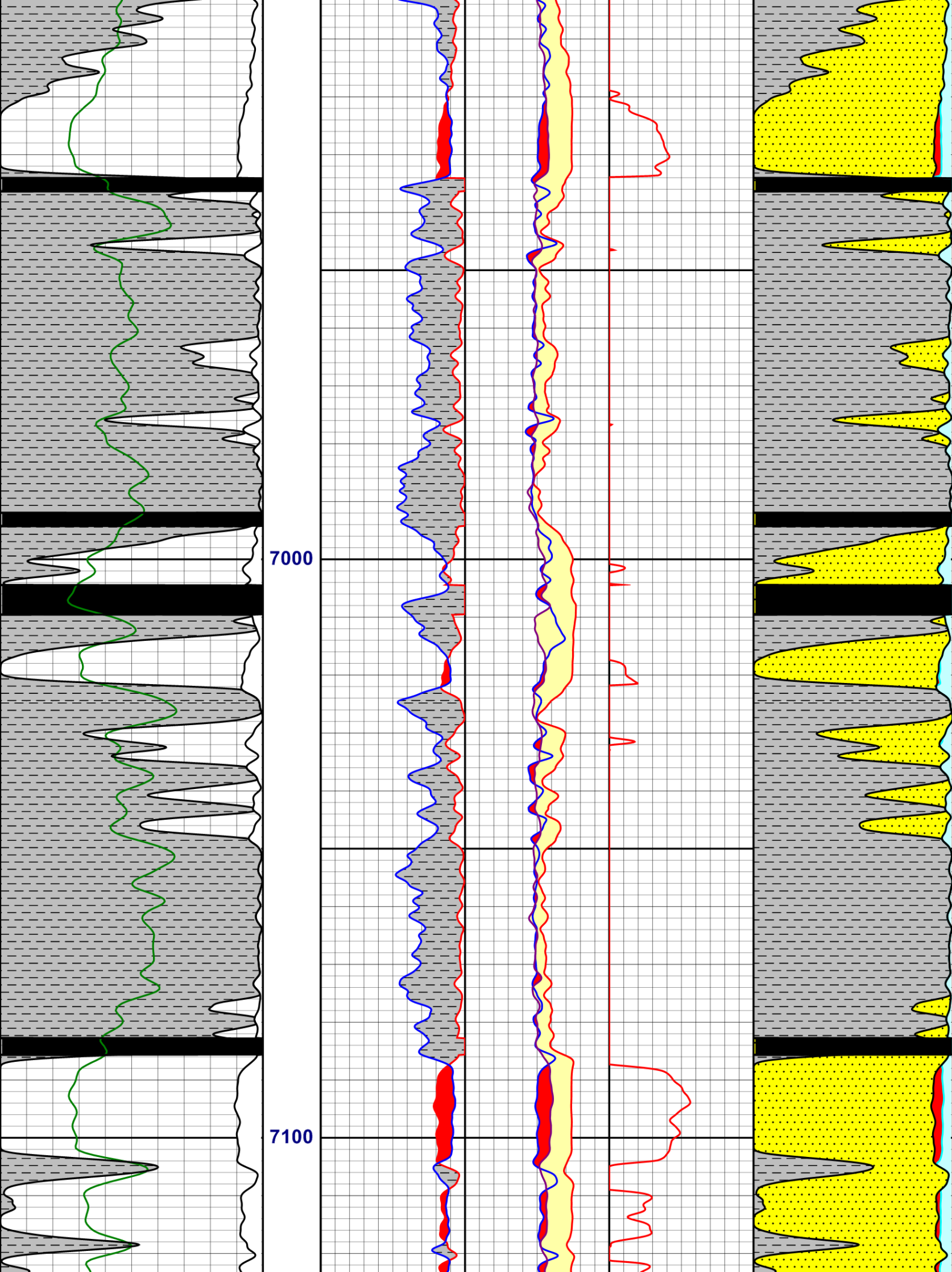


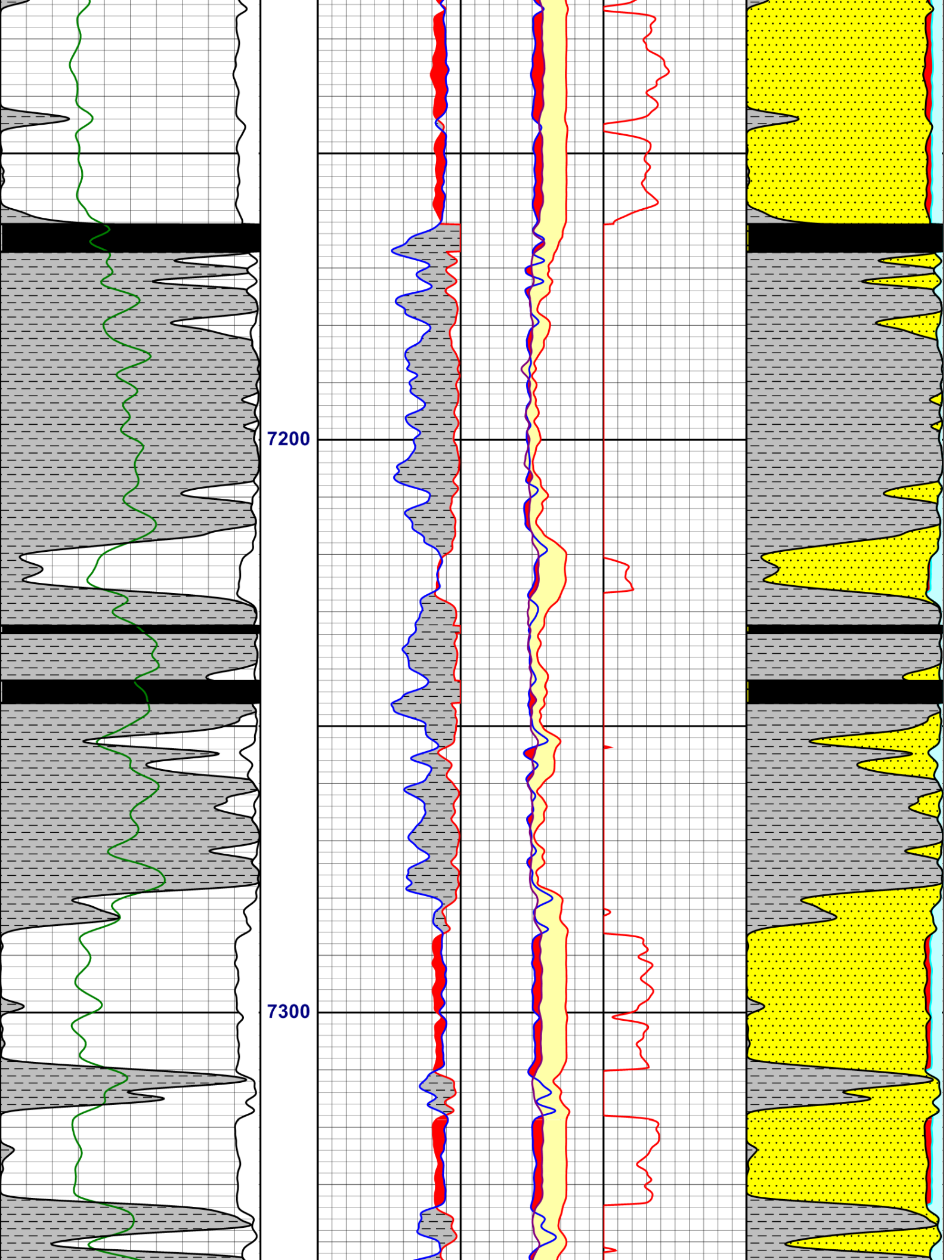


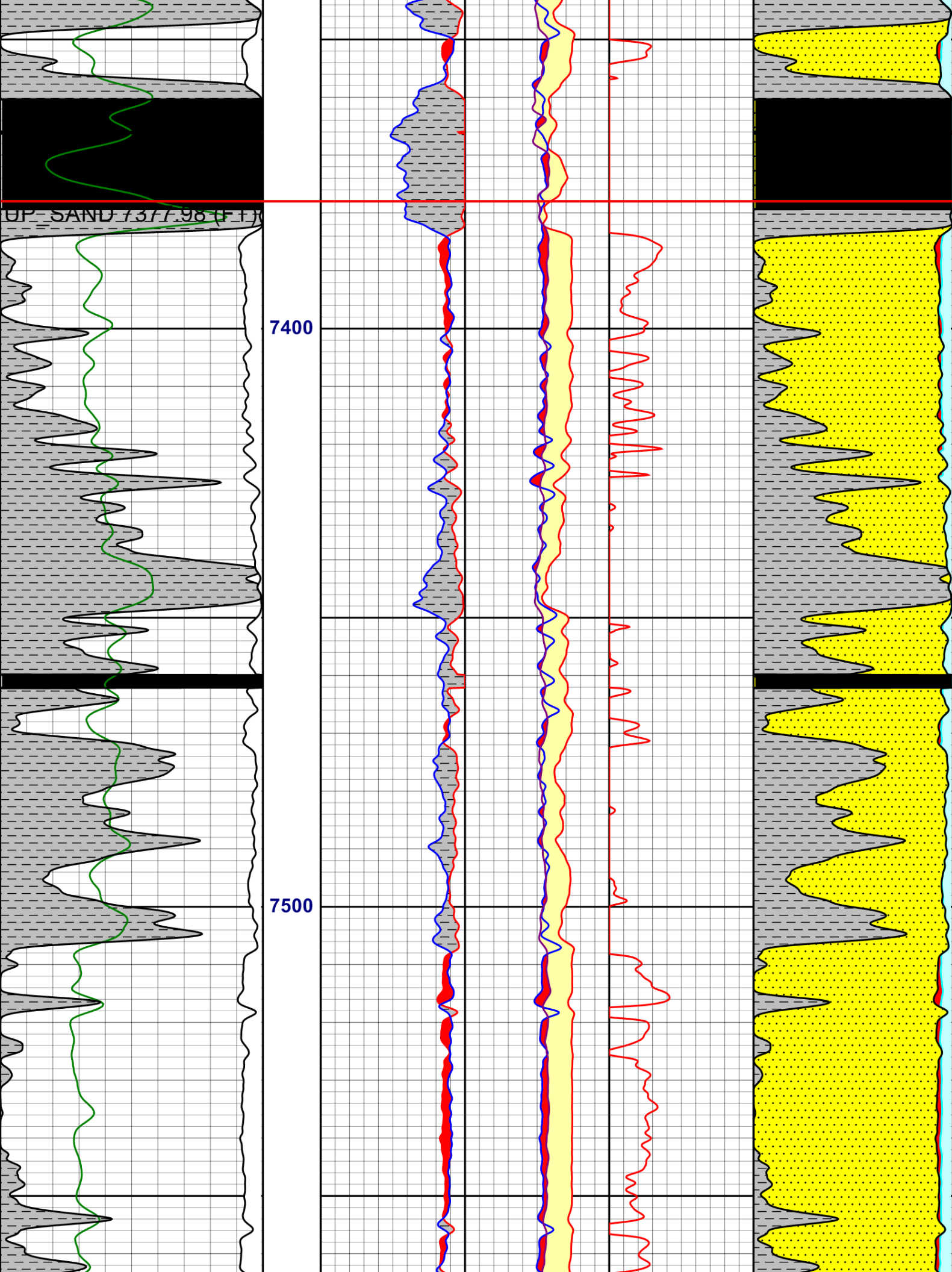


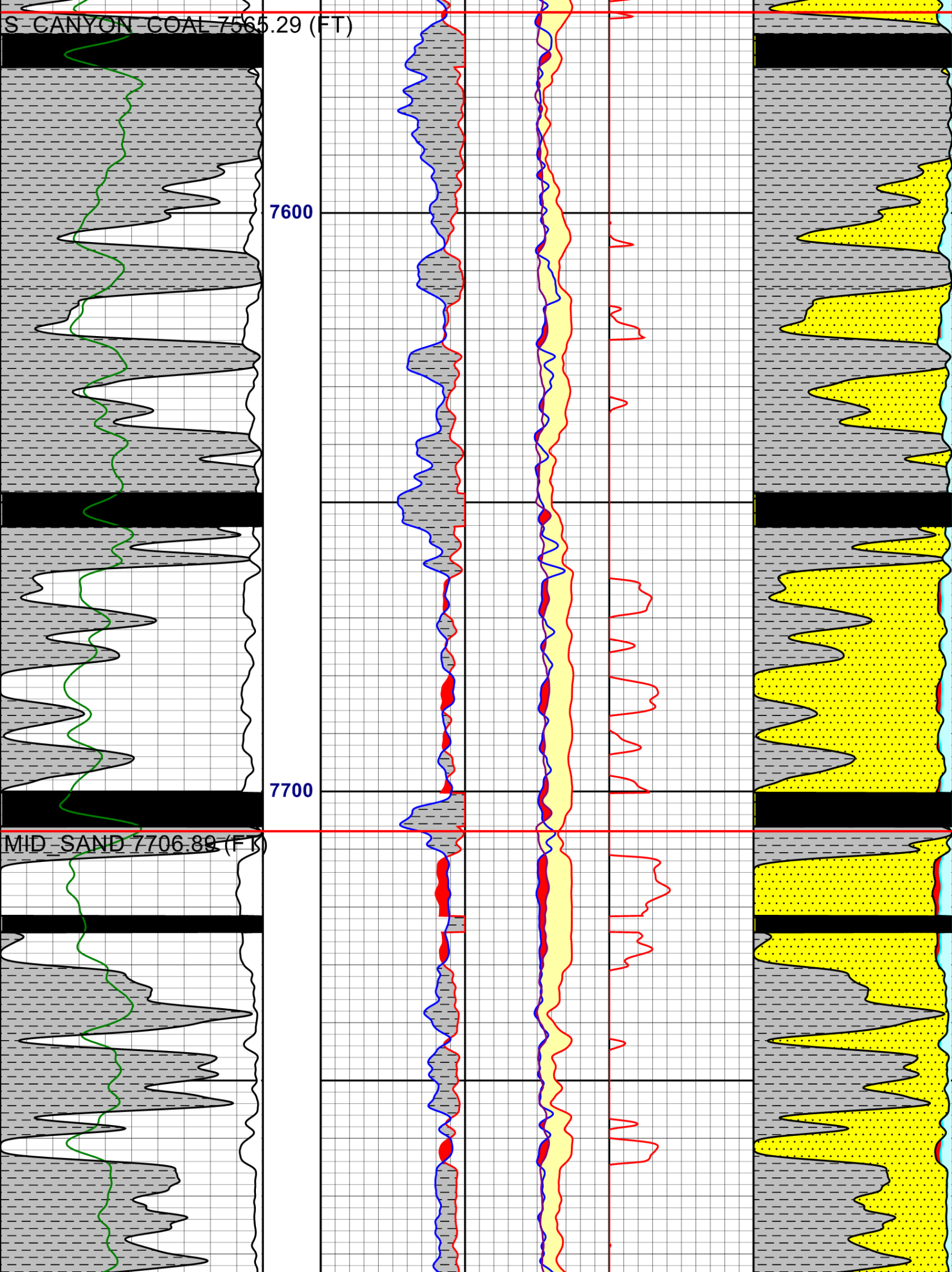


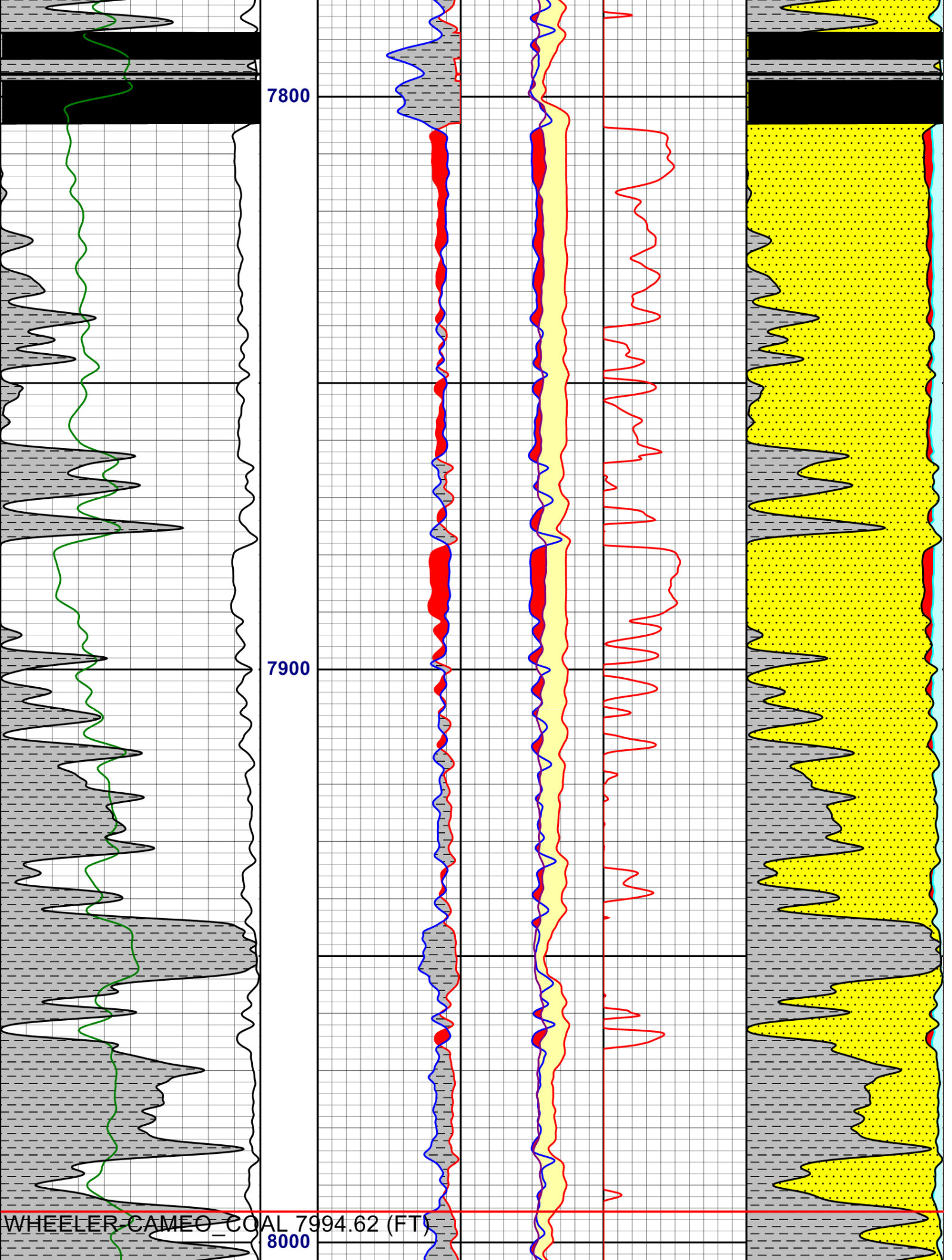


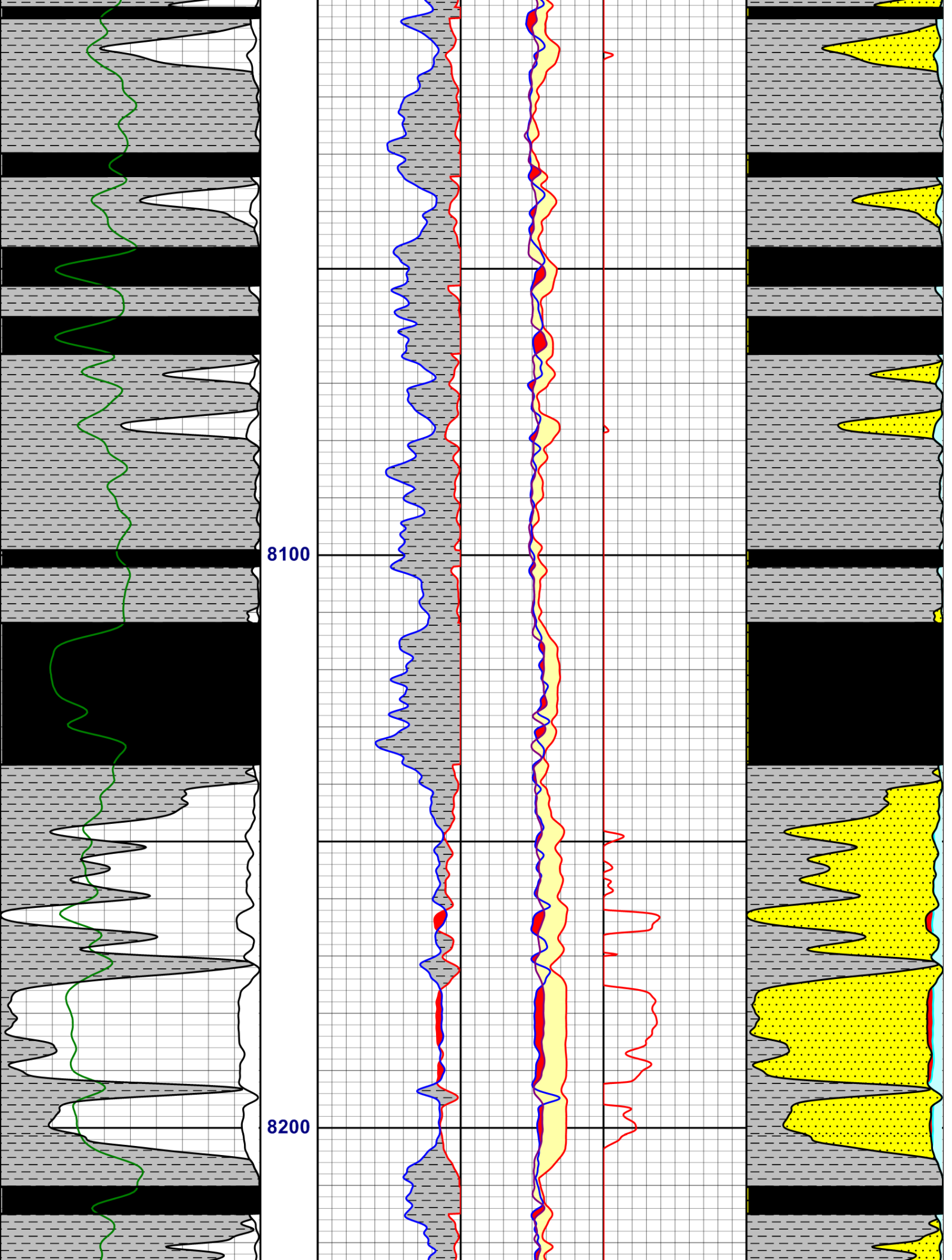


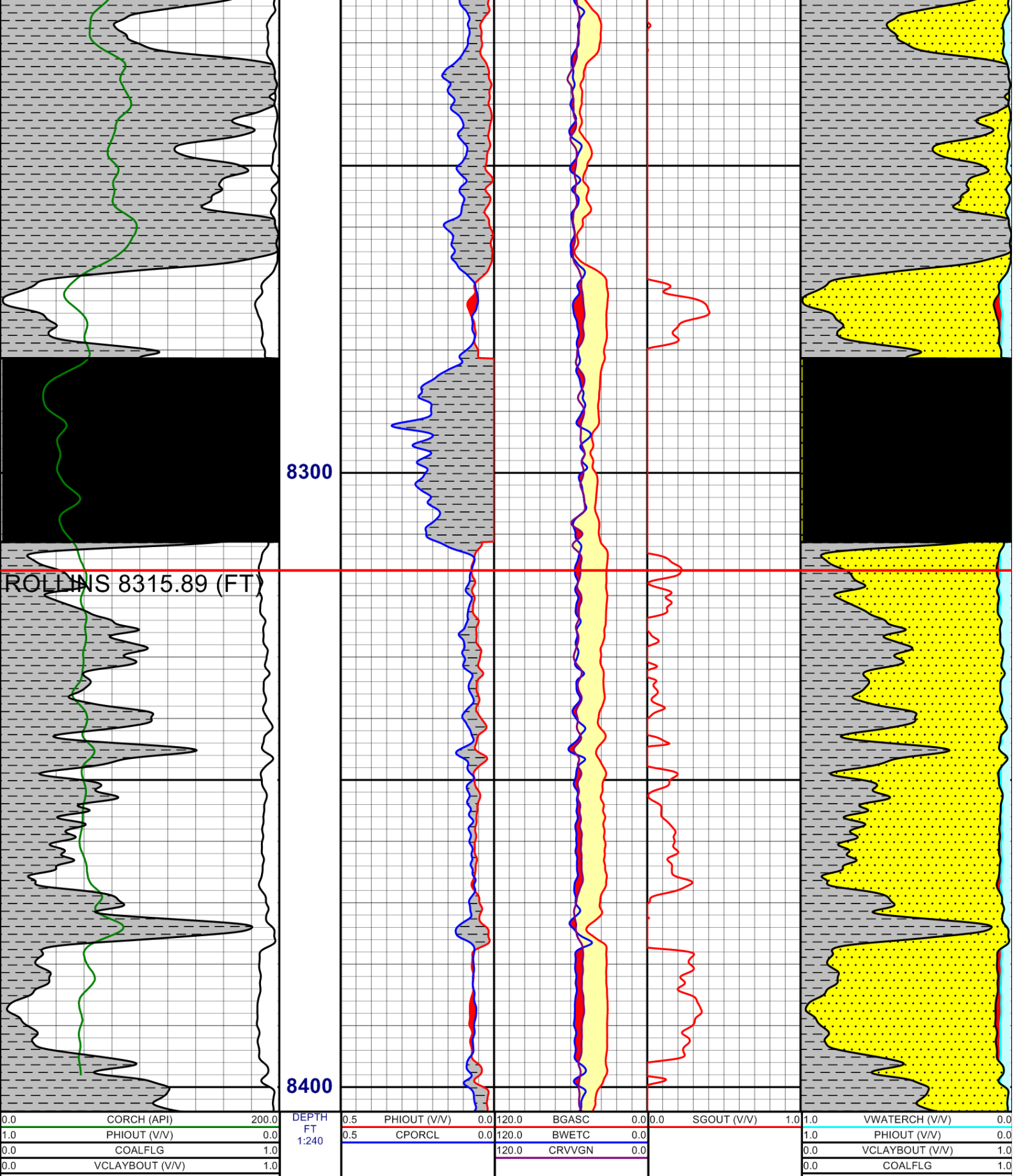












COMPANY
WELL
FIELD
PROVINCE/COUNTY

VANGUARD OPERATING LLC.
CSF 41B-4-791
MAMM CREEK
GARFIELD

COUNTRY/STATE

U.S.A./COLORADO

Elevation Kelly Bushing	6557.4	feet
Elevation Drill Floor		feet
Elevation Ground Level	6540.4	feet

Bottom Log Interval	8411.25	feet
Depth Driller	8500.00	feet
Depth Logger	8411.25	feet



Weatherford®

RAPTOR GAS ANALYSIS