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Houston, TX  
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Bakersfield, CA  
(661) 328-1595  
New Iberia, LA  
(337) 364-2322  
Anchorage, AK  
(907) 561-2465

# MUDLOG TVD

**COMPANY** Exxon Mobil  
**WELL** FRU197-33B9  
**FIELD** Piceance Creek  
**REGION** Rockies  
**COORDINATES** 39.921322000  
-108.282561000  
**ELEVATION** GL: 6459.3'  
RKB: 30.2'  
**COUNTY, STATE** RIO BLANCO, CO  
**API INDEX** 051031142200  
**SPUD DATE** 04/08/2010  
**CONTRACTOR** HE  
**CO. REP.** C. CURTIS  
**RIG/TYPE** HP321  
**LOGGING UNIT** MLU#31  
**GEOLOGISTS** B.DELANEY; C.RECORD  
M.FRANCO  
**ADD. PERSONS** M.PIPER; K.WALLANDER  
**CO. GEOLOGIST** C.ALBA / N. ROOSMAWATI

## LOG INTERVAL

## CASING DATA

**DEPTHS:** 3950' TO 12300'  
**DATES:** 07/21/2010 TO 08/02/2010  
**SCALE:** 5"=100'

16.00" AT 150'  
10.75" AT 3940'  
4.5" AT 12285'  
AT

## MUD TYPES

## HOLE SIZE

WATER-BASED TO 3950'  
LSND TO 12300'  
TO  
TO

14.75" TO 3950'  
8.75" TO 12300'  
TO  
TO

## ABBREVIATIONS

<i>NB</i> NEWBIT	<i>PV</i> PLASTIC VISCOSITY	<i>LC</i> LOST CIRCULATION
<i>RRB</i> RERUN BIT	<i>YP</i> YIELD POINT	<i>CO</i> CIRCULATE OUT
<i>CB</i> CORE BIT	<i>FL</i> FLUID LOSS	<i>NR</i> NO RETURNS
<i>WOB</i> WEIGHT ON BIT	<i>CL</i> PPM CLORIDE ION	<i>TG</i> TRIP GAS
<i>RPM</i> ROTARY REV/MIN	<i>Rm</i> MUD RESISTIVITY	<i>SG</i> SURVEY GAS
<i>PP</i> PUMP PRESSURE	<i>Rmf</i> FILTRATE RESISTIVITY	<i>WG</i> WIPER GAS
<i>SPM</i> STROKES/MIN	<i>PR</i> POOR RETURNS	<i>CG</i> CONNECTION GAS
<i>MW</i> MUD WEIGHT	<i>LAT</i> LOGGED AFTER TRIP	
<i>VIS</i> FUNNEL VISCOSITY	<i>LAS</i> LOGGED AFTER SURVEY	

ALTERED ZONE	CHERT - GLASSY	FELSIC SILIC DIKE	MARL - CALC	SANDSTONE
ANDESITE	CHERT - PORCEL	FOSSIL	METAMORPHICS	SANDSTONE-TUFFACEOUS
ANHYDRITE	CHERT - TIGER STRIPE	GABBRO	MUDSTONE	SERICITIZATION
BASALT	CHERT - UNDIFF	GLASSY TUFF	OBSIDIAN	SERPENTINE
BENTONITE	CLAY	GRANITE	PALEOSOL	SHALE
BIOTITIZATION	CLAY-MUDSTONE	GRANITE WASH	PHOSPHATE	SHALE TUFFACEOUS
BRECCIA	CLYST-TUFFACEOUS	GRANODIORITE	PORCELANITE	SHELL FRAGMENTS
CALCARENITE	CHLORITIZATION	GYPSUM	PORCELANEOUS CLYST	SIDERITE
CALCAREOUS TUFF	COAL	HALITE	PYRITE	SILICIFICATION
CALCILUTITE	CONGLOMERATE	HORNBL-QTZ-DIO	PYROCLASTICS	SILTSTONE
CARBONATES	CONGL. SAND	IGNEOUS (ACIDIC)	QUARTZ DIORITE	SILTST-TUFFACEOUS
CARBONACEOUS MAT	CONGL. SANDSTONE	IGNEOUS (BASIC)	QUARTZ LATITE	TUFF
CARBONACEOUS SH	COQUINA	INTRUSIVES	QUARTZ MONZONITE	VOLCANICLASTICS SEDS
CEMENT CONTAM.	DACITE	KAOLINITIC	RECRYSTALLIZED CALCITE	VOLCANICS
CHALK	DIATOMITE	LIMESTONE	RHYOLITE	
CRYSTALLINE TUFF	DIORITE	LITHIC TUFF	SALT	
CHERT - ARGILL	DOLOSTONE	MARL - DOLO	SAND	

<100 ROP 0>  
ft/hr  
<50 Avg WOB 0>  
klbs

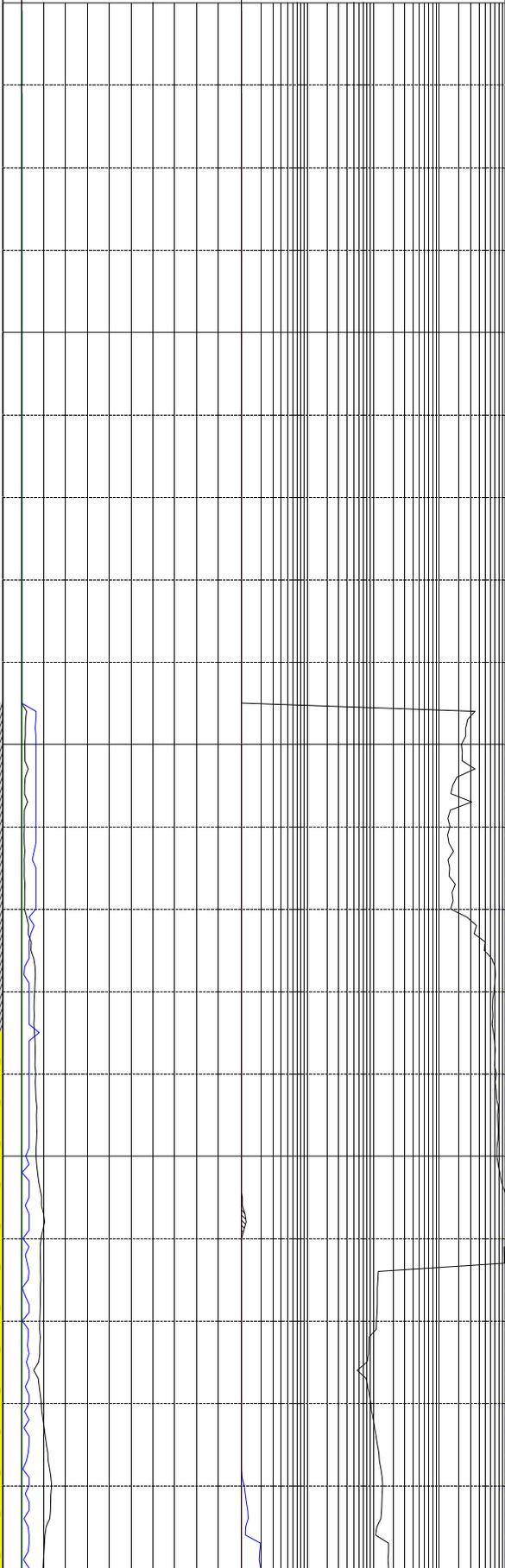
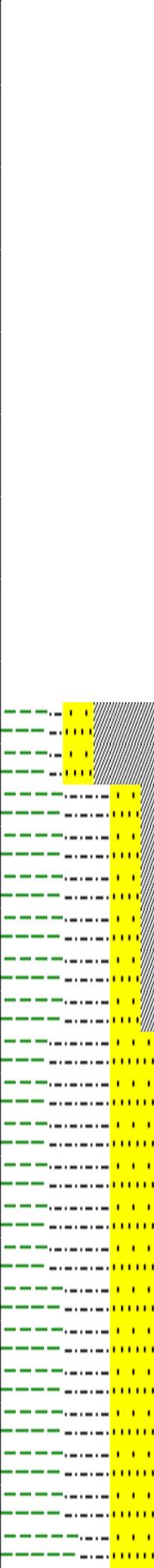
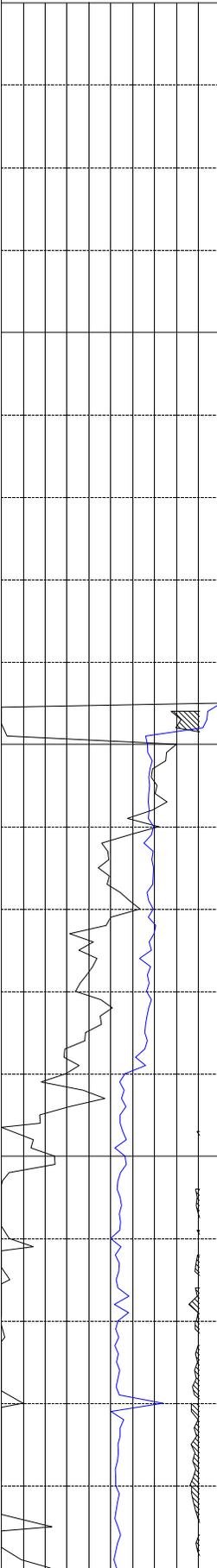
**TVD Depth**  
3900 MD  
**3800**

**Lithology**

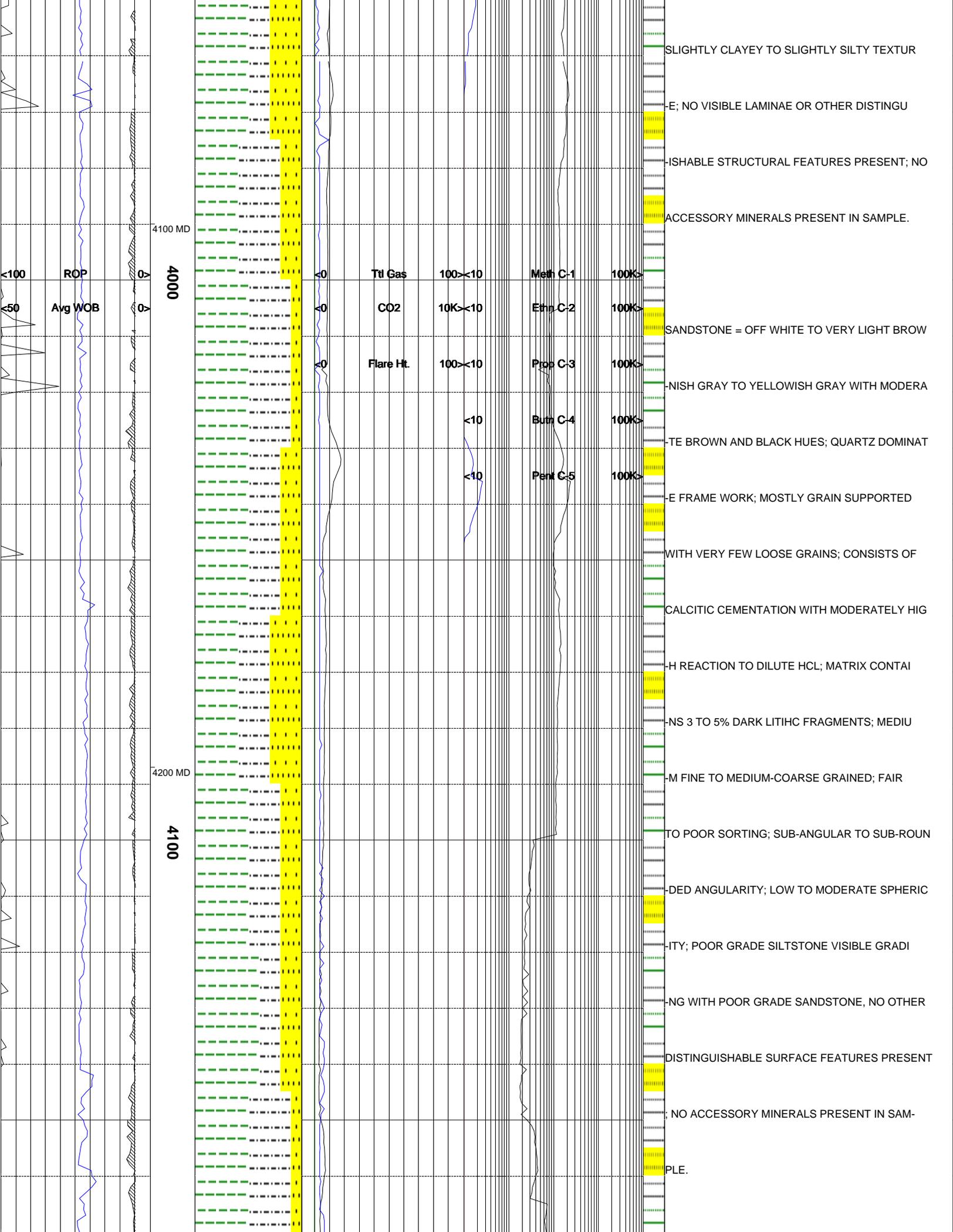
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units ppm  
<10 Ethn C-2 100K>  
<0 CO2 10K> <10 Prop C-3 100K>  
ppm  
<0 Flare Ht. 100> <10 Butn C-4 100K>  
ft <10 Pent C-5 100K>

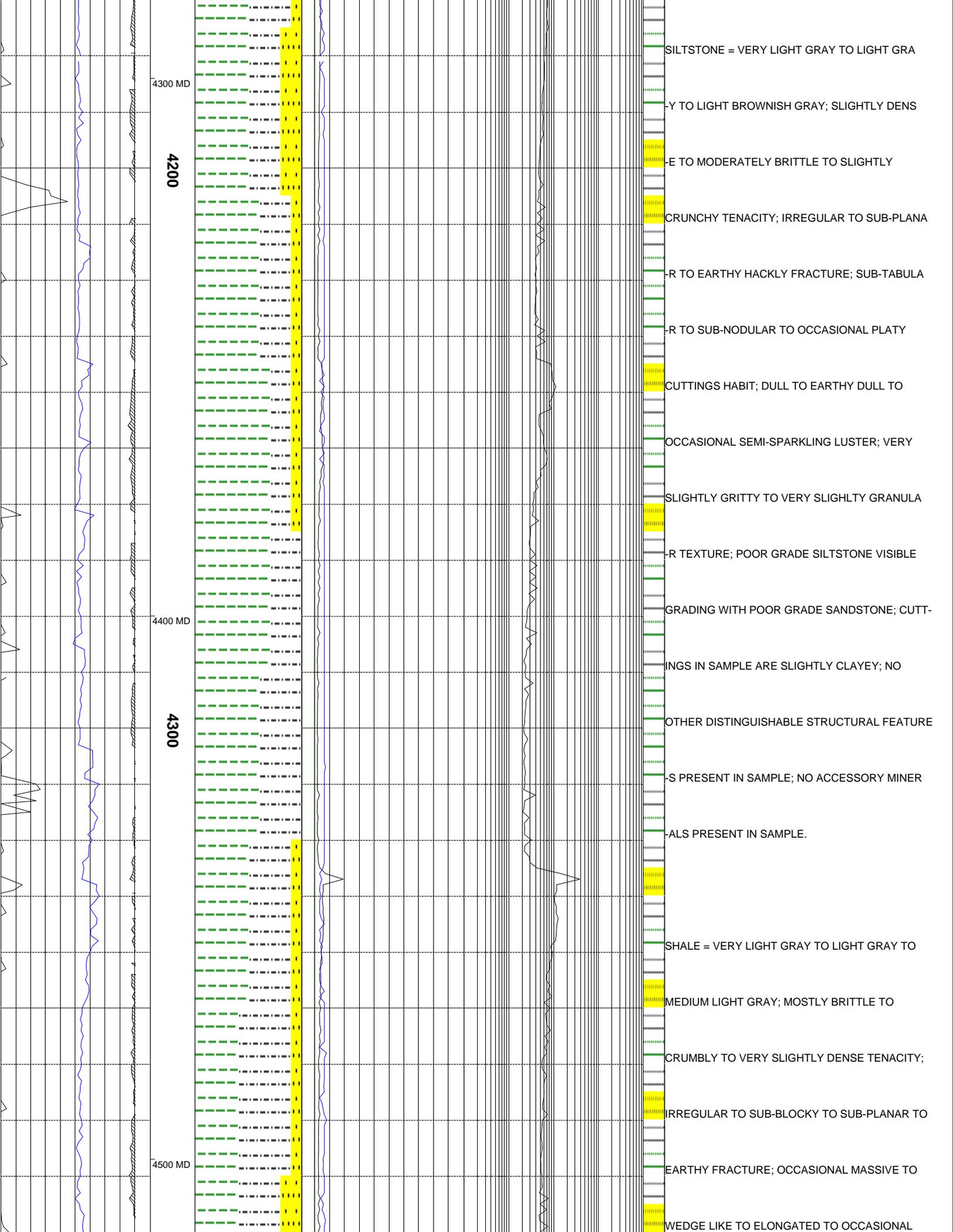
Interp. Lith

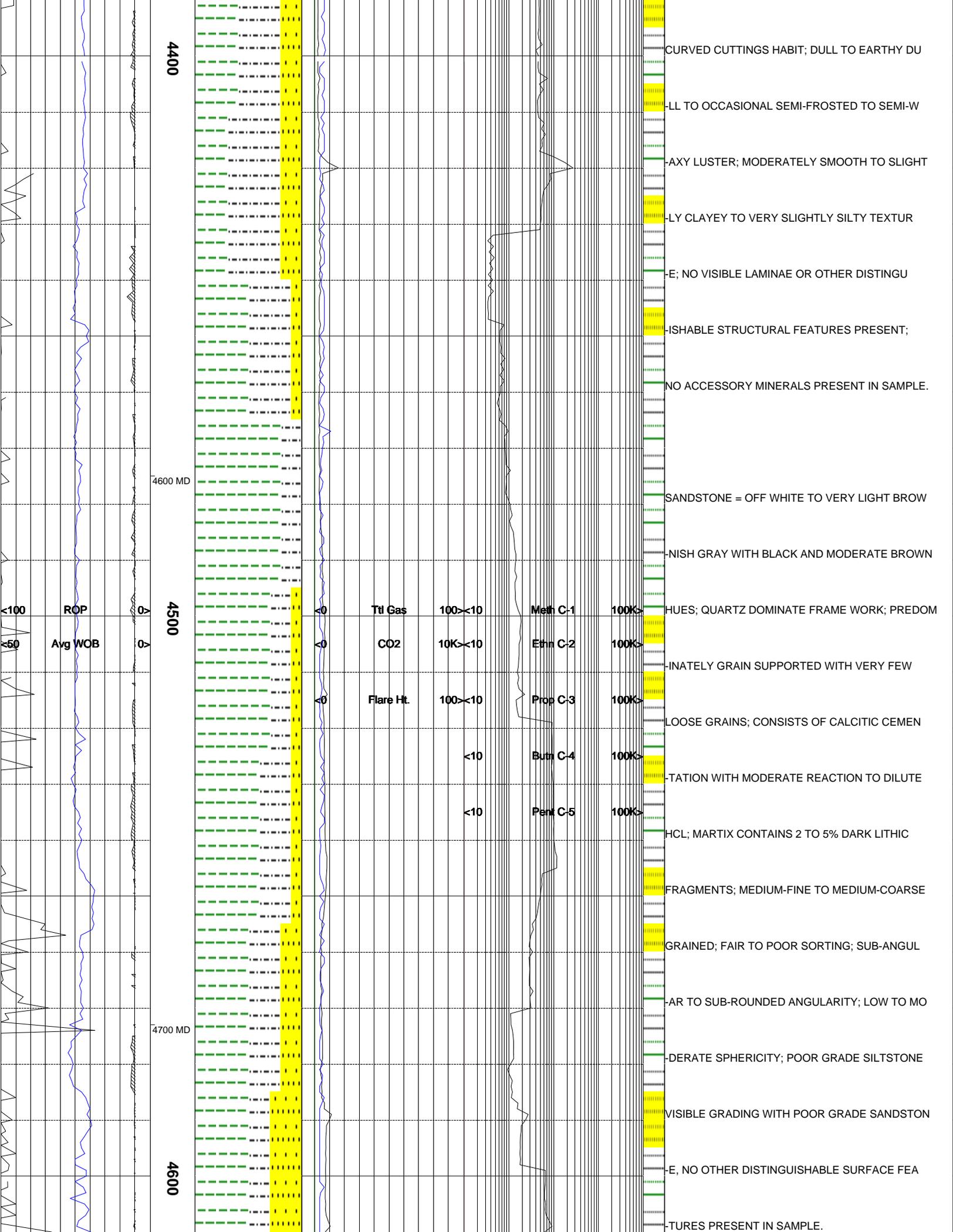
**Remarks**  
Survey Data, Mud Reports, Other Info.

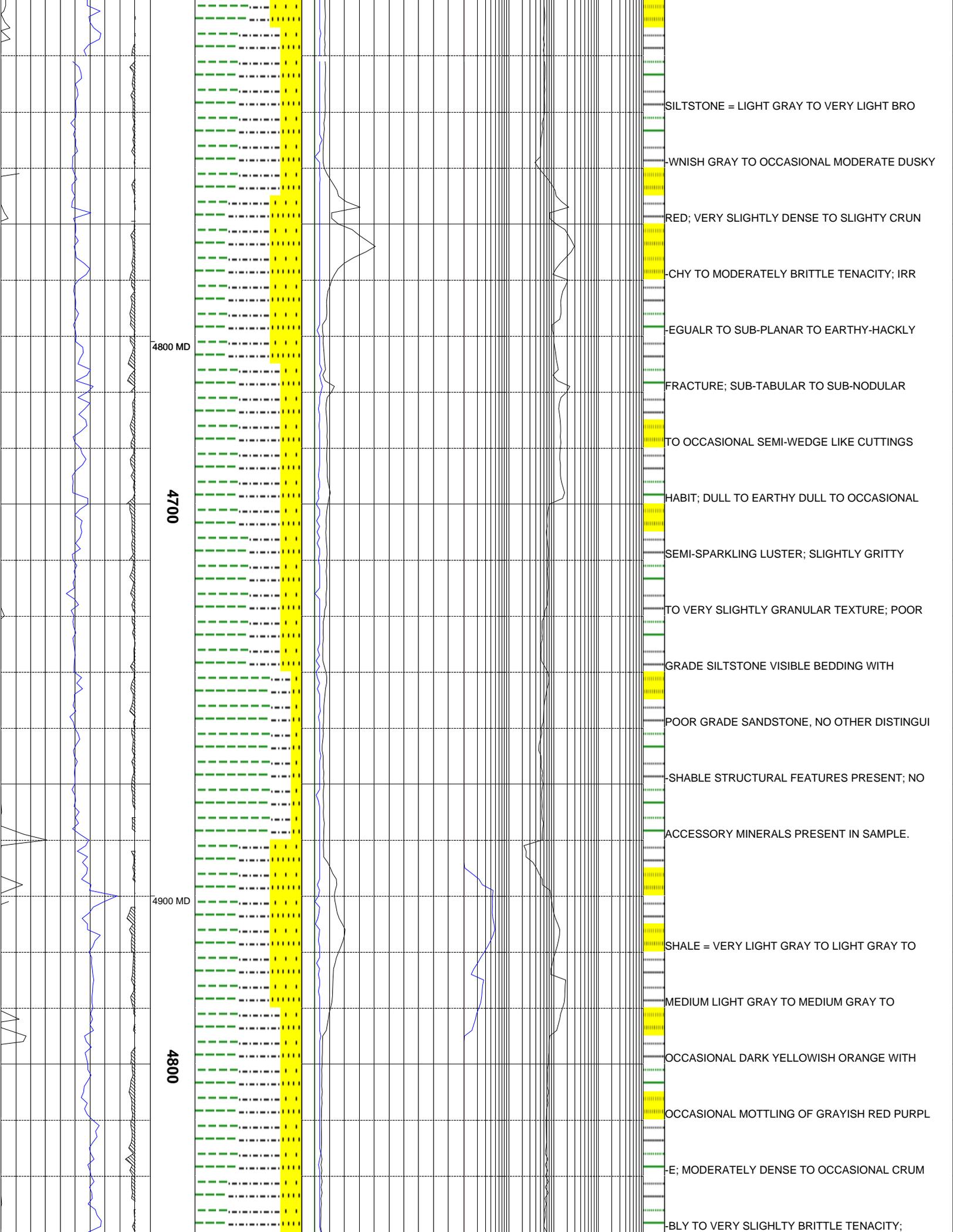


EPOCH WELL SERVICES COMMENCED LOGGING  
ON 7/21/2010 @ 3950'.  
SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO  
OCCASIONAL MEDIUM LIGHT GRAY; VERY SLIGH  
TLY DENSE TO MOSTLY BRITTLE TO CRUMBLY  
TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB  
PLANAR TO EARTHY HACKLY FRACTURE; OCCAS  
TIONAL MASSIVE TO WEGE LIKE TO OCCASIONA  
L ELONGATED CUTTINGS HABIT; DULL TO EAR  
THY DULL TO OCCASIONAL SEMI-FROSTED TO  
SEMI-WAXY LUSTER; MODERATELY SMOOTH TO









4800 MD

4700

4900 MD

4800

SILTSTONE = LIGHT GRAY TO VERY LIGHT BRO

WNISH GRAY TO OCCASIONAL MODERATE DUSKY

RED; VERY SLIGHTLY DENSE TO SLIGHTY CRUN

CHY TO MODERATELY BRITTLE TENACITY; IRR

EGUALR TO SUB-PLANAR TO EARTHY-HACKLY

FRACTURE; SUB-TABULAR TO SUB-NODULAR

TO OCCASIONAL SEMI-WEDGE LIKE CUTTINGS

HABIT; DULL TO EARTHY DULL TO OCCASIONAL

SEMI-SPARKLING LUSTER; SLIGHTLY GRITTY

TO VERY SLIGHTLY GRANULAR TEXTURE; POOR

GRADE SILTSTONE VISIBLE BEDDING WITH

POOR GRADE SANDSTONE, NO OTHER DISTINGUI

SHABLE STRUCTURAL FEATURES PRESENT; NO

ACCESSORY MINERALS PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO

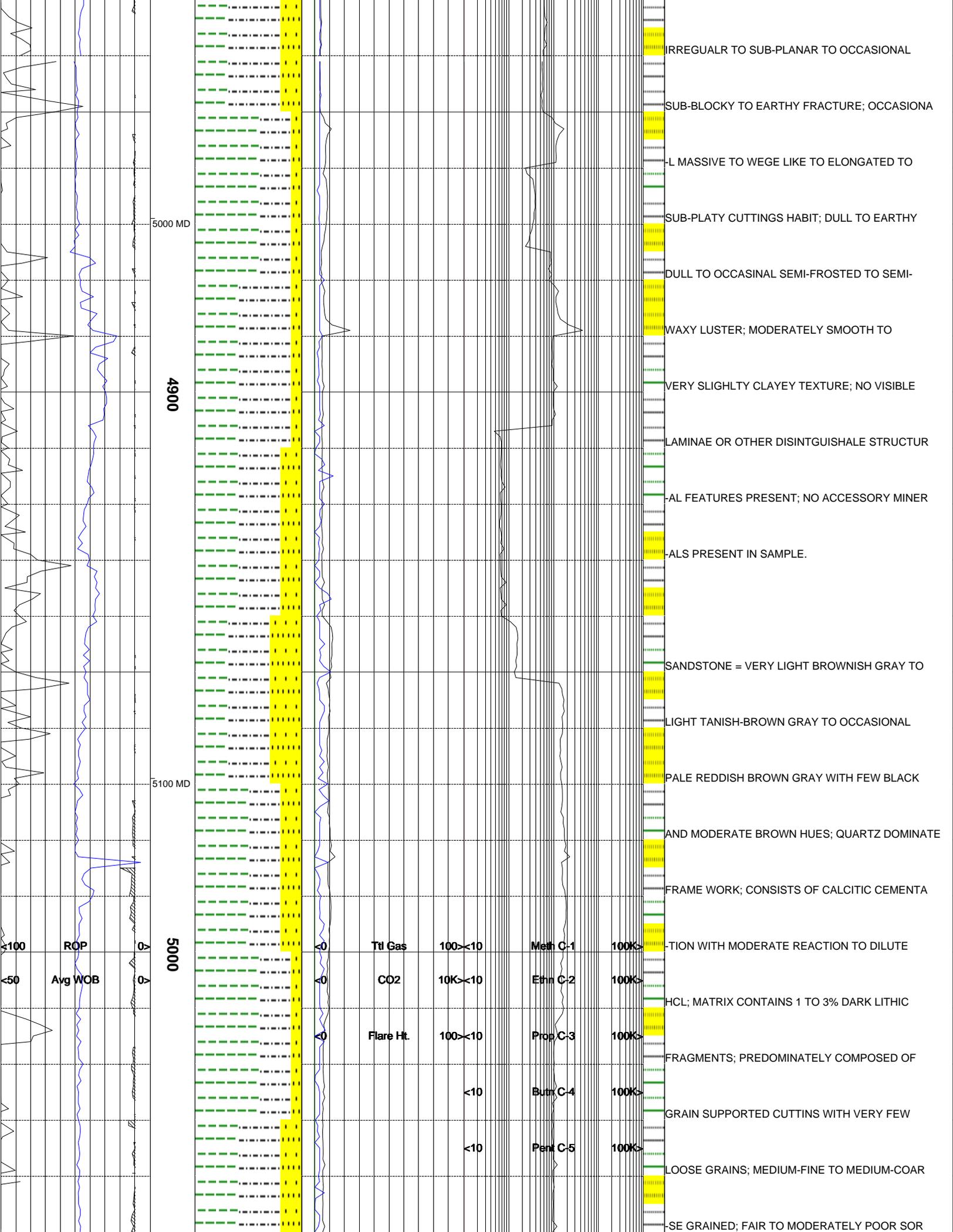
MEDIUM LIGHT GRAY TO MEDIUM GRAY TO

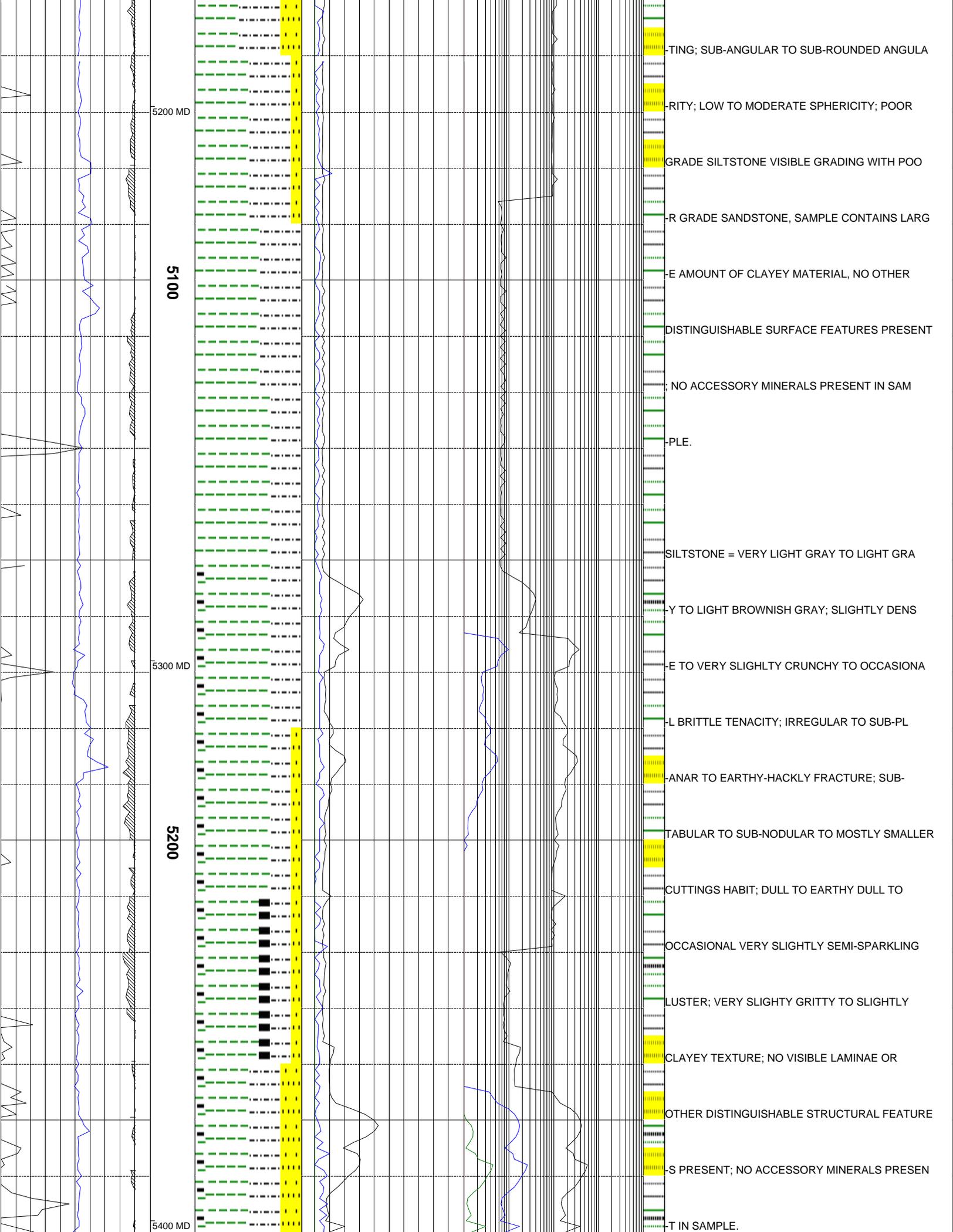
OCCASIONAL DARK YELLOWISH ORANGE WITH

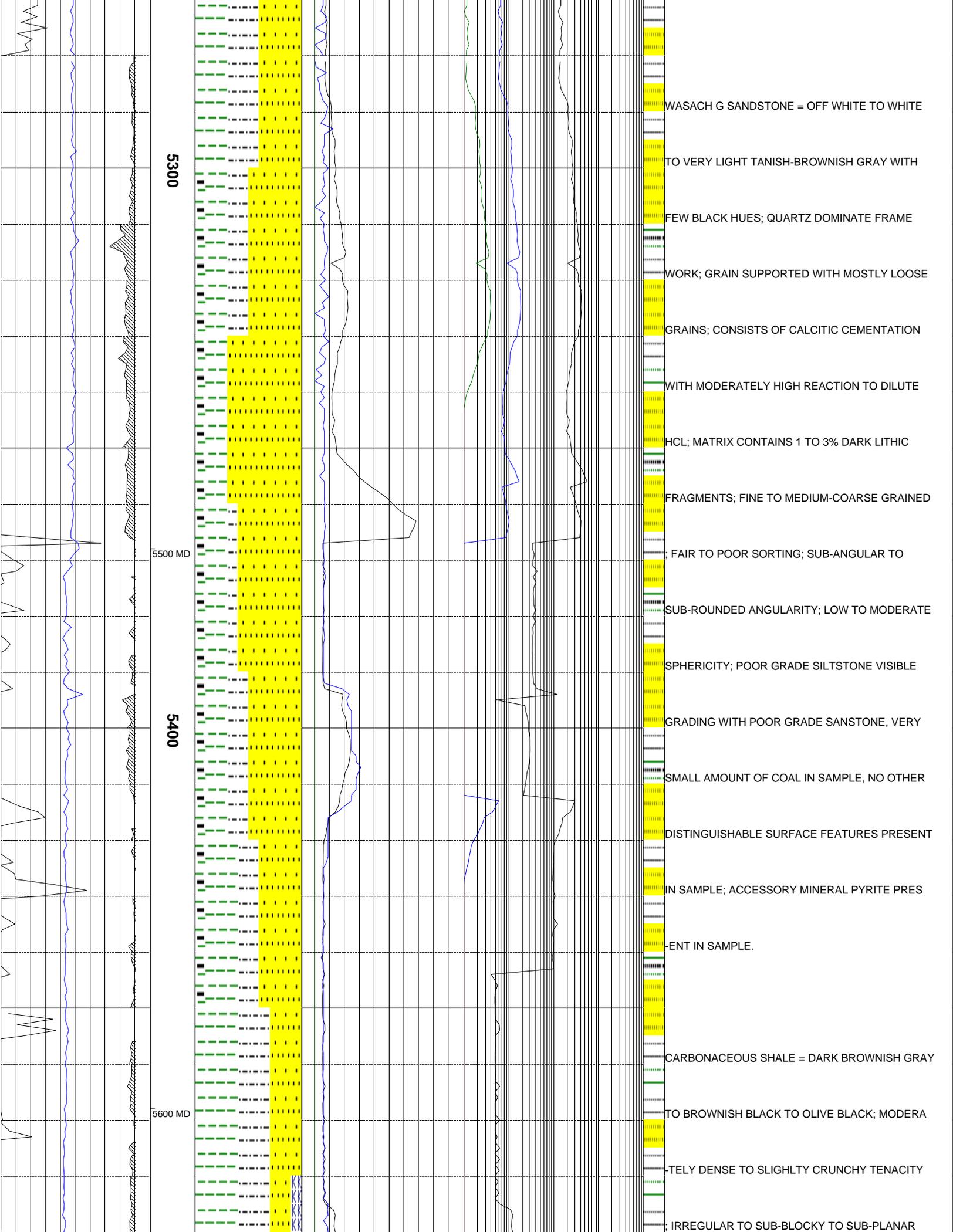
OCCASIONAL MOTTLING OF GRAYISH RED PURPL

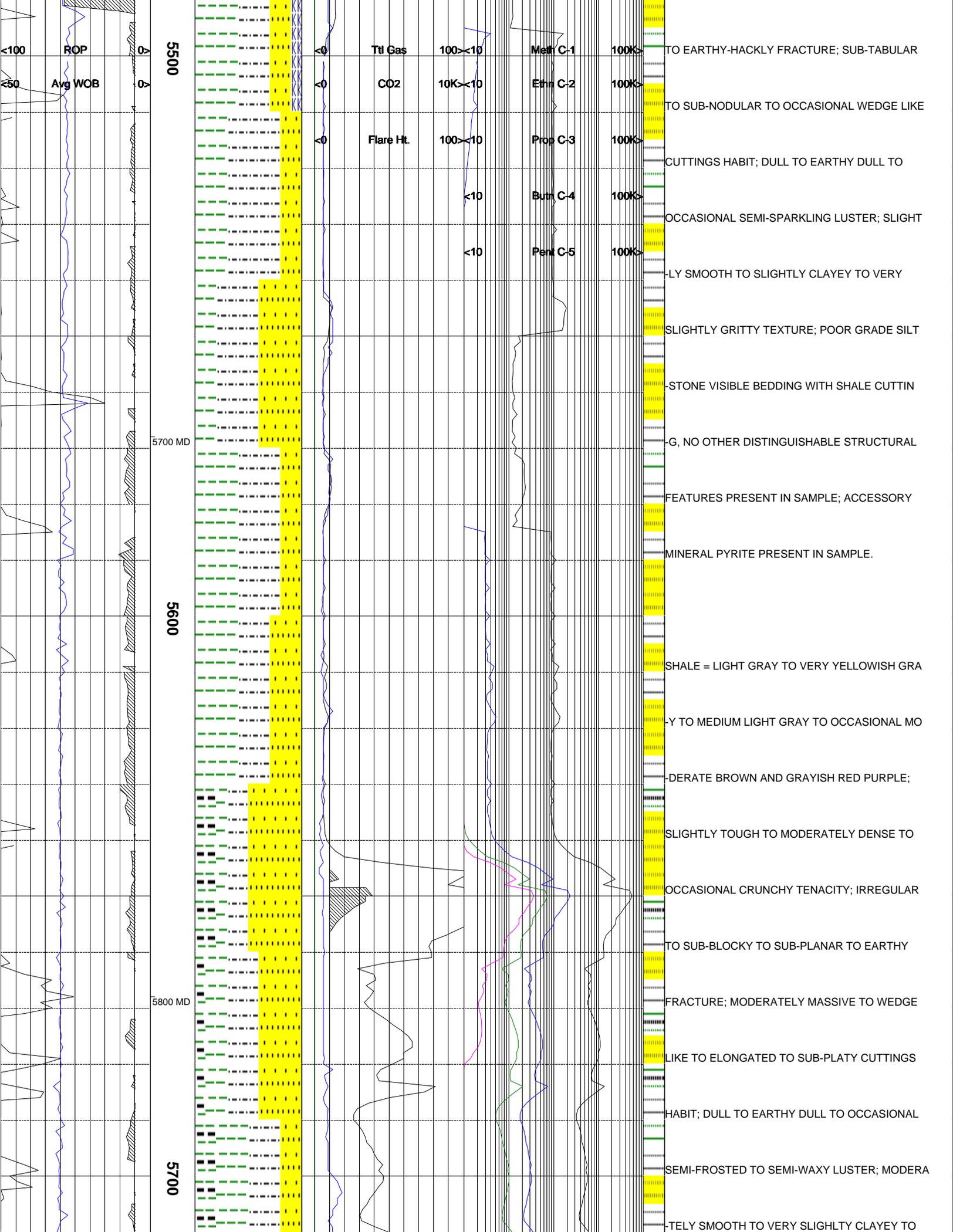
E; MODERATELY DENSE TO OCCASIONAL CRUM

BLY TO VERY SLIGHTLY BRITTLE TENACITY;









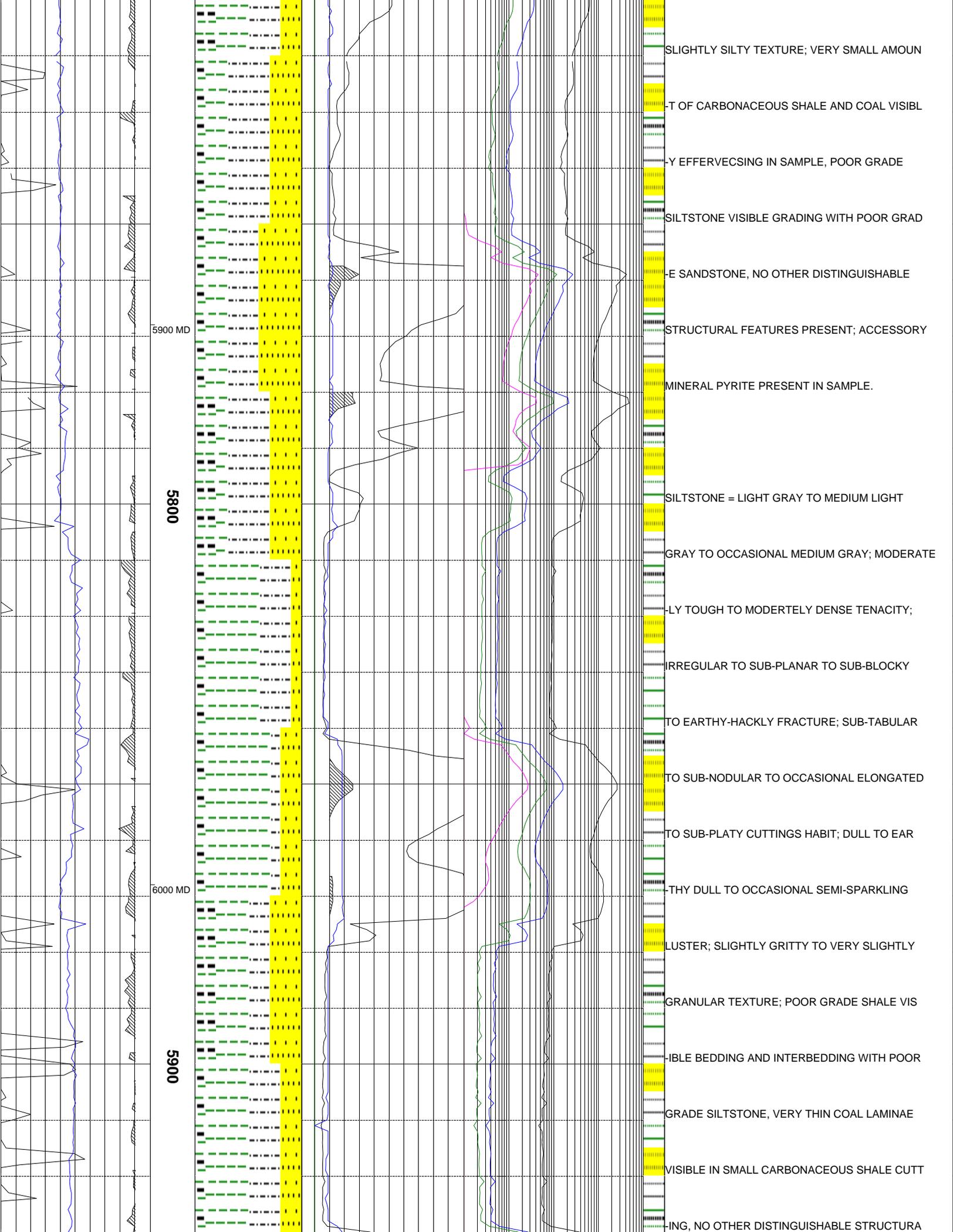
5500  
5700 MD  
5600  
5800 MD  
5700

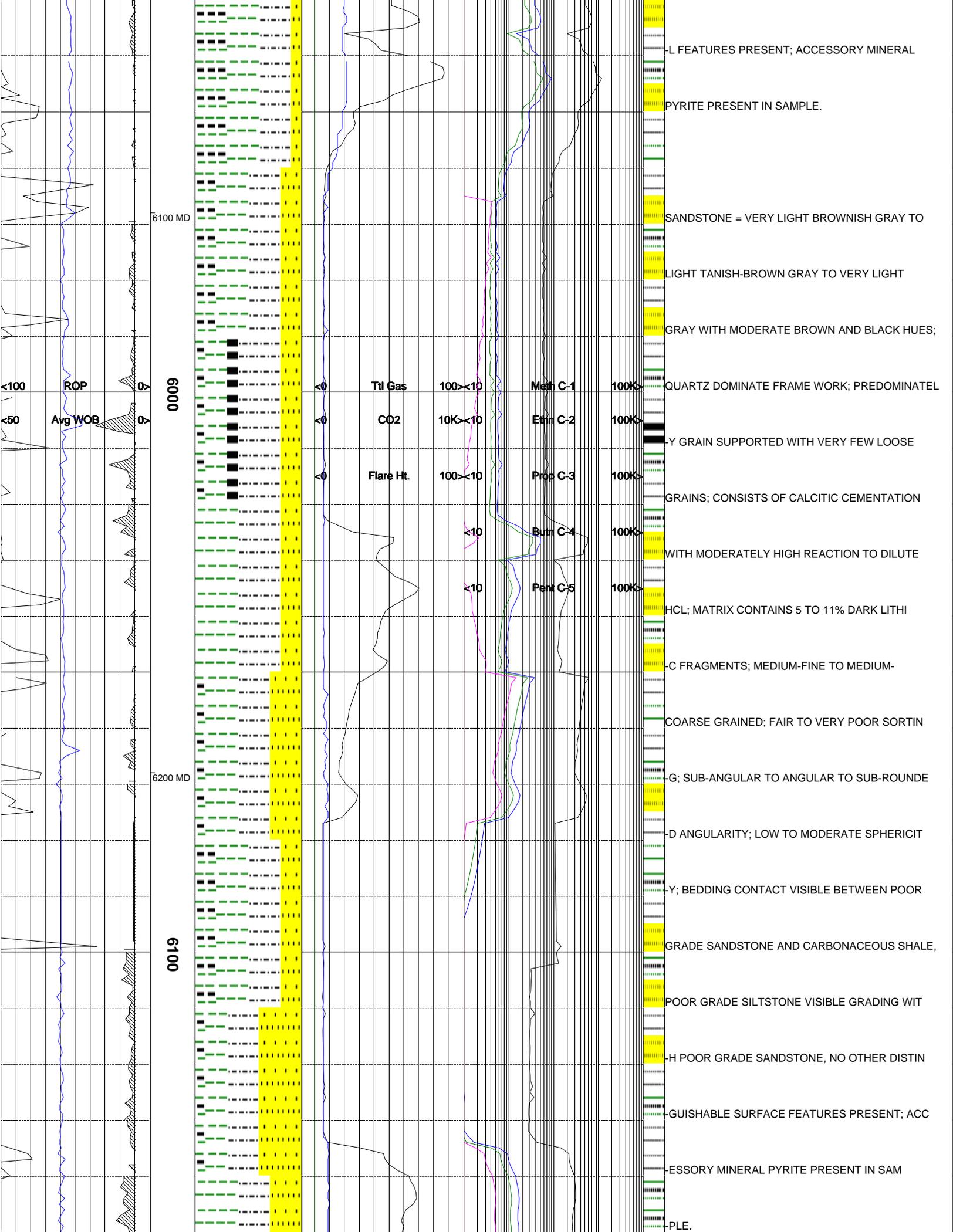
ROP  
Avg WOB

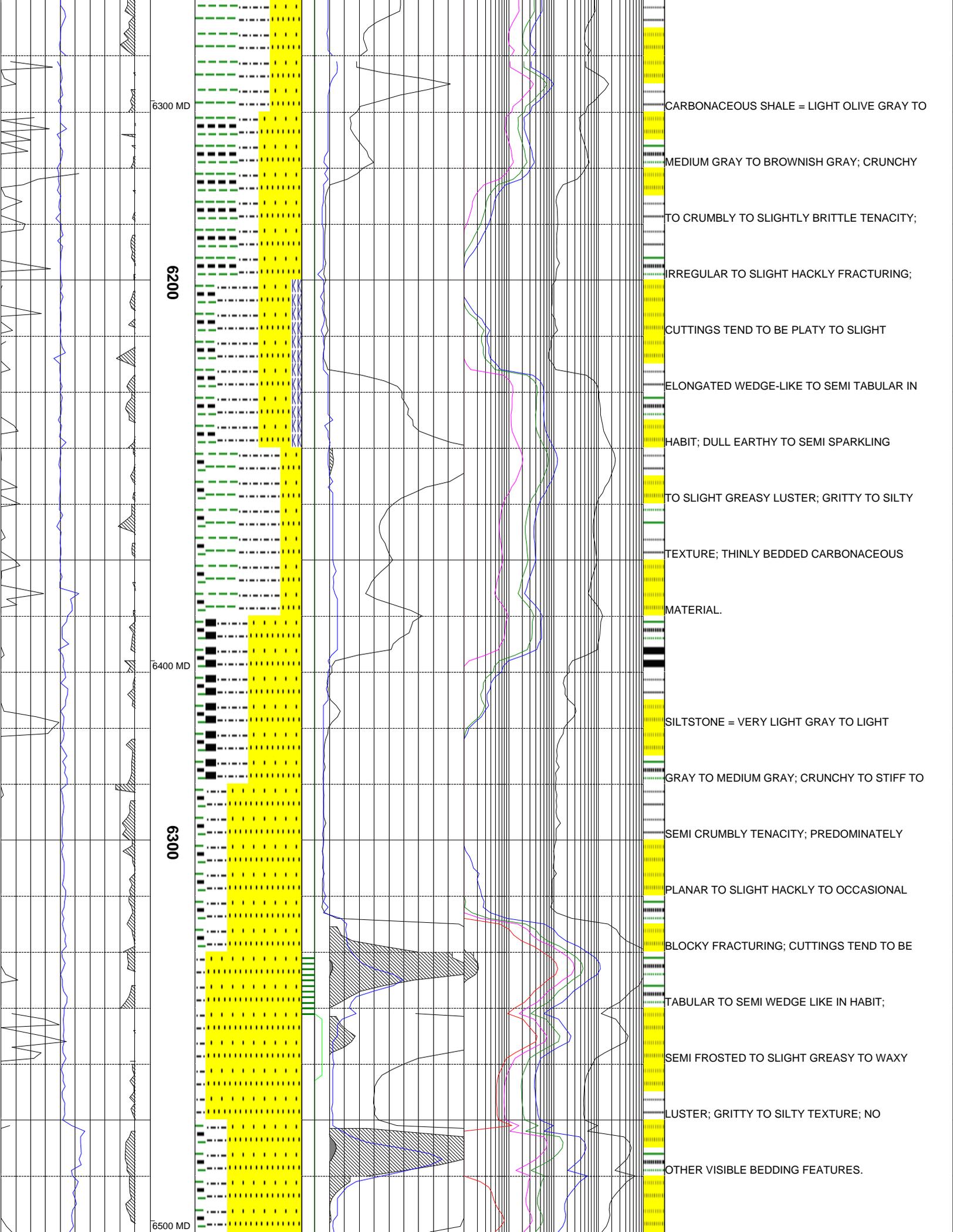
Ttl Gas 100 < 10  
CO2 10K < 10  
Flare Ht. 100 < 10  
< 10  
< 10

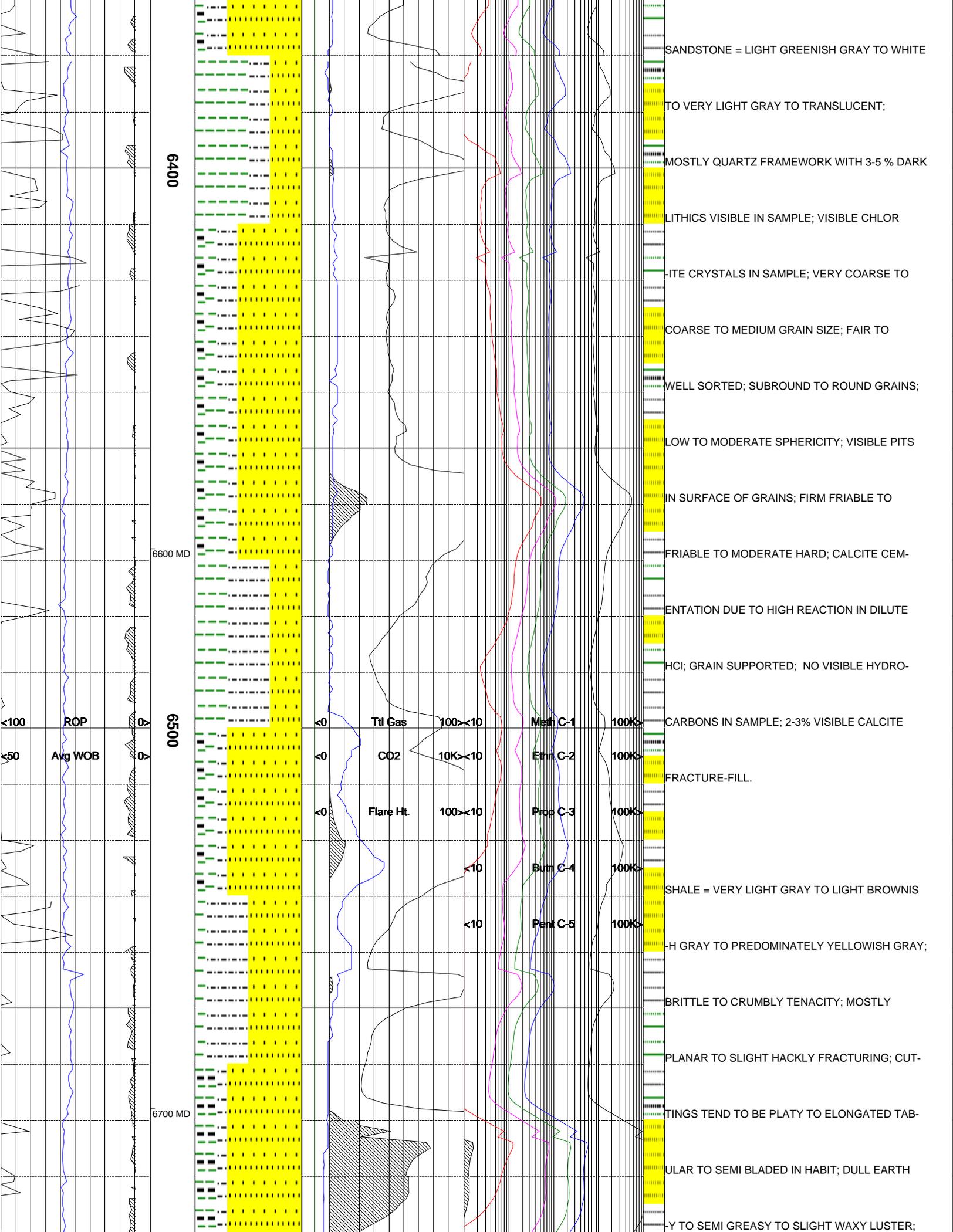
Meth C-1  
Ethn C-2  
Prop C-3  
Butn C-4  
Pent C-5

TO EARTHY-HACKLY FRACTURE; SUB-TABULAR  
TO SUB-NODULAR TO OCCASIONAL WEDGE LIKE  
CUTTINGS HABIT; DULL TO EARTHY DULL TO  
OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHT  
LY SMOOTH TO SLIGHTLY CLAYEY TO VERY  
SLIGHTLY GRITTY TEXTURE; POOR GRADE SILT  
STONE VISIBLE BEDDING WITH SHALE CUTTIN  
G, NO OTHER DISTINGUISHABLE STRUCTURAL  
FEATURES PRESENT IN SAMPLE; ACCESSORY  
MINERAL PYRITE PRESENT IN SAMPLE.  
SHALE = LIGHT GRAY TO VERY YELLOWISH GRA  
Y TO MEDIUM LIGHT GRAY TO OCCASIONAL MO  
DERATE BROWN AND GRAYISH RED PURPLE;  
SLIGHTLY TOUGH TO MODERATELY DENSE TO  
OCCASIONAL CRUNCHY TENACITY; IRREGULAR  
TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY  
FRACTURE; MODERATELY MASSIVE TO WEDGE  
LIKE TO ELONGATED TO SUB-PLATY CUTTINGS  
HABIT; DULL TO EARTHY DULL TO OCCASIONAL  
SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERA  
TELY SMOOTH TO VERY SLIGHTLY CLAYEY TO









6400

6600 MD

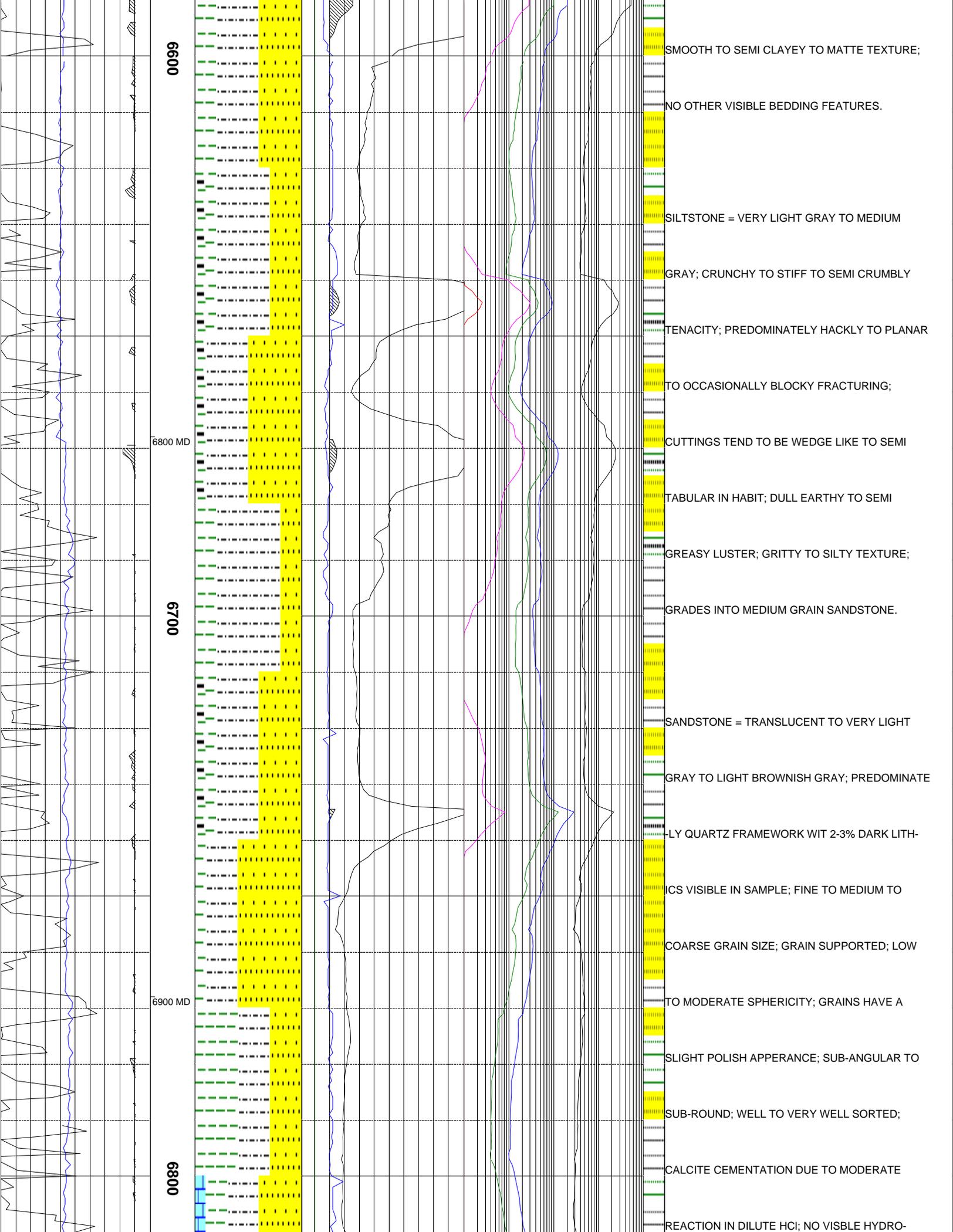
6500

6700 MD

SANDSTONE = LIGHT GREENISH GRAY TO WHITE  
 TO VERY LIGHT GRAY TO TRANSLUCENT;  
 MOSTLY QUARTZ FRAMEWORK WITH 3-5 % DARK  
 LITHICS VISIBLE IN SAMPLE; VISIBLE CHLOR  
 ITE CRYSTALS IN SAMPLE; VERY COARSE TO  
 COARSE TO MEDIUM GRAIN SIZE; FAIR TO  
 WELL SORTED; SUBROUND TO ROUND GRAINS;  
 LOW TO MODERATE SPHERICITY; VISIBLE PITS  
 IN SURFACE OF GRAINS; FIRM FRIABLE TO  
 FRIABLE TO MODERATE HARD; CALCITE CEM-  
 ENTATION DUE TO HIGH REACTION IN DILUTE  
 HCI; GRAIN SUPPORTED; NO VISIBLE HYDRO-  
 CARBONS IN SAMPLE; 2-3% VISIBLE CALCITE  
 FRACTURE-FILL.  
 SHALE = VERY LIGHT GRAY TO LIGHT BROWNIS  
 H GRAY TO PREDOMINATELY YELLOWISH GRAY;  
 BRITTLE TO CRUMBLY TENACITY; MOSTLY  
 PLANAR TO SLIGHT HACKLY FRACTURING; CUT-  
 TINGS TEND TO BE PLATY TO ELONGATED TAB-  
 ULAR TO SEMI BLADED IN HABIT; DULL EARTH  
 Y TO SEMI GREASY TO SLIGHT WAXY LUSTER;

<100 ROP  
 <50 Avg WOB

Ttl Gas 100 <10 Meth C-1 100K <  
 CO2 10K <10 Ethn C-2 100K <  
 Flare Ht. 100 <10 Prop C-3 100K <  
 <10 Butn C-4 100K <  
 <10 Pent C-5 100K <



6600

SMOOTH TO SEMI CLAYEY TO MATTE TEXTURE;  
NO OTHER VISIBLE BEDDING FEATURES.

6800 MD

SILTSTONE = VERY LIGHT GRAY TO MEDIUM  
GRAY; CRUNCHY TO STIFF TO SEMI CRUMBLY  
TENACITY; PREDOMINATELY HACKLY TO PLANAR

6700

TO OCCASIONALLY BLOCKY FRACTURING;  
CUTTINGS TEND TO BE WEDGE LIKE TO SEMI  
TABULAR IN HABIT; DULL EARTHY TO SEMI  
GREASY LUSTER; GRITTY TO SILTY TEXTURE;

GRADES INTO MEDIUM GRAIN SANDSTONE.

6900 MD

SANDSTONE = TRANSLUCENT TO VERY LIGHT  
GRAY TO LIGHT BROWNISH GRAY; PREDOMINATE  
LY QUARTZ FRAMEWORK WIT 2-3% DARK LITH-

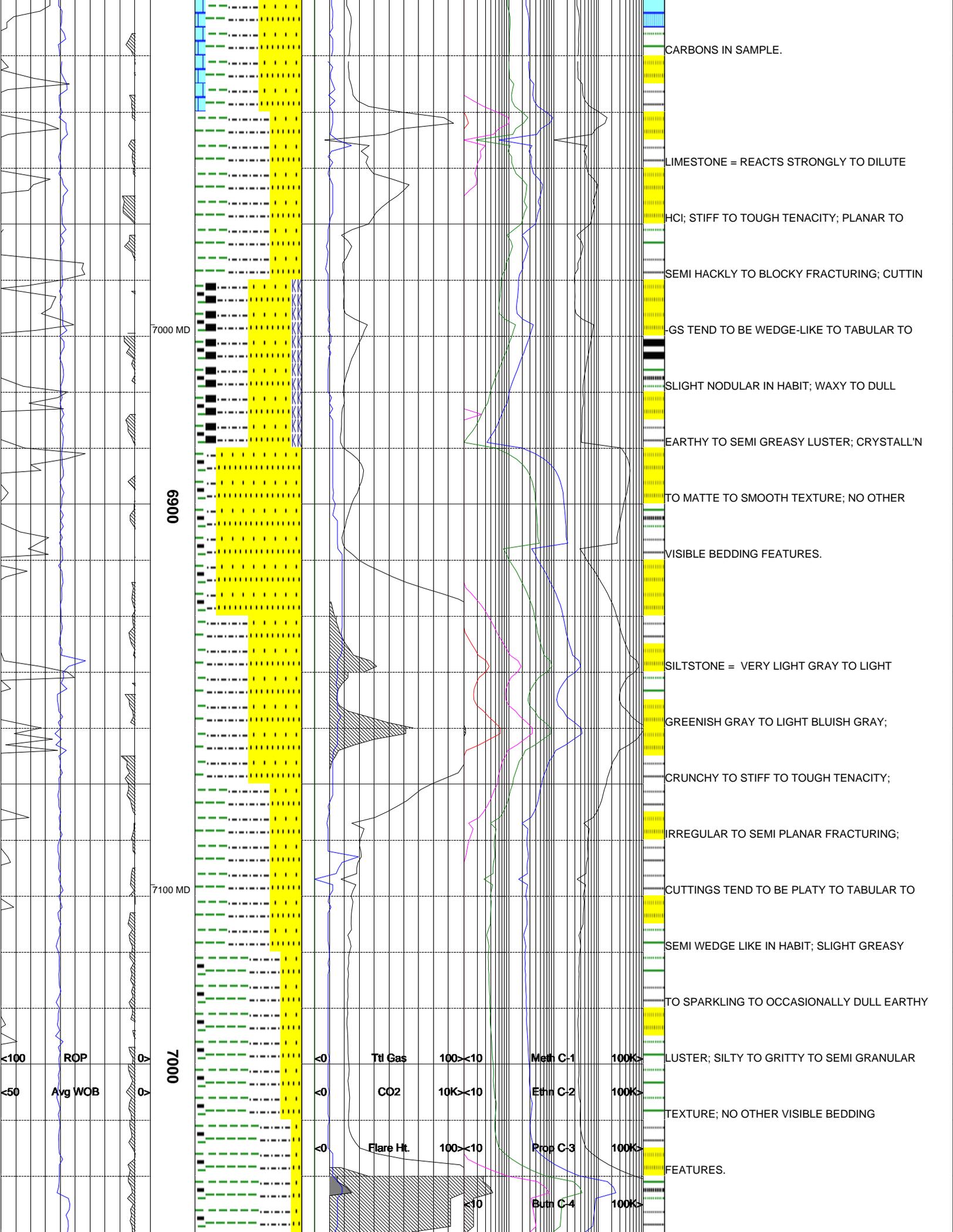
6800

ICS VISIBLE IN SAMPLE; FINE TO MEDIUM TO  
COARSE GRAIN SIZE; GRAIN SUPPORTED; LOW  
TO MODERATE SPHERICITY; GRAINS HAVE A  
SLIGHT POLISH APPERANCE; SUB-ANGULAR TO

SUB-ROUND; WELL TO VERY WELL SORTED;

CALCITE CEMENTATION DUE TO MODERATE

REACTION IN DILUTE HCl; NO VISBLE HYDRO-



7000 MD

6900

7100 MD

7000

CARBONS IN SAMPLE.

LIMESTONE = REACTS STRONGLY TO DILUTE

HCI; STIFF TO TOUGH TENACITY; PLANAR TO

SEMI HACKLY TO BLOCKY FRACTURING; CUTTING

FRACINGS TEND TO BE WEDGE-LIKE TO TABULAR TO

SLIGHT NODULAR IN HABIT; WAXY TO DULL

EARTHY TO SEMI GREASY LUSTER; CRYSTALLINE

TO MATTE TO SMOOTH TEXTURE; NO OTHER

VISIBLE BEDDING FEATURES.

SILTSTONE = VERY LIGHT GRAY TO LIGHT

GREENISH GRAY TO LIGHT BLUISH GRAY;

CRUNCHY TO STIFF TO TOUGH TENACITY;

IRREGULAR TO SEMI PLANAR FRACTURING;

CUTTINGS TEND TO BE PLATY TO TABULAR TO

SEMI WEDGE LIKE IN HABIT; SLIGHT GREASY

TO SPARKLING TO OCCASIONALLY DULL EARTHY

LUSTER; SILTY TO GRITTY TO SEMI GRANULAR

TEXTURE; NO OTHER VISIBLE BEDDING

FEATURES.

ROP

Avg WOB

Ttl Gas

CO2

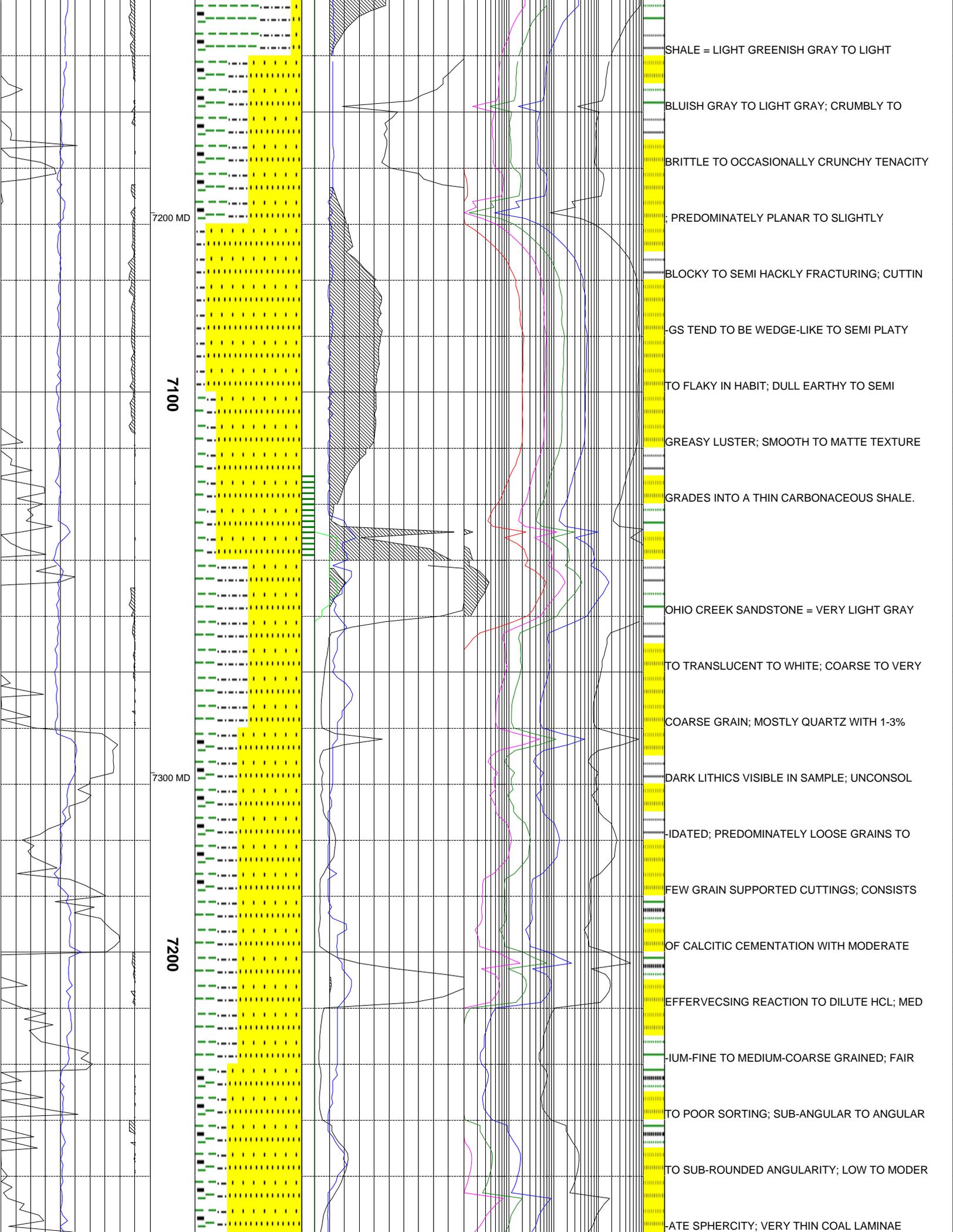
Flare Ht.

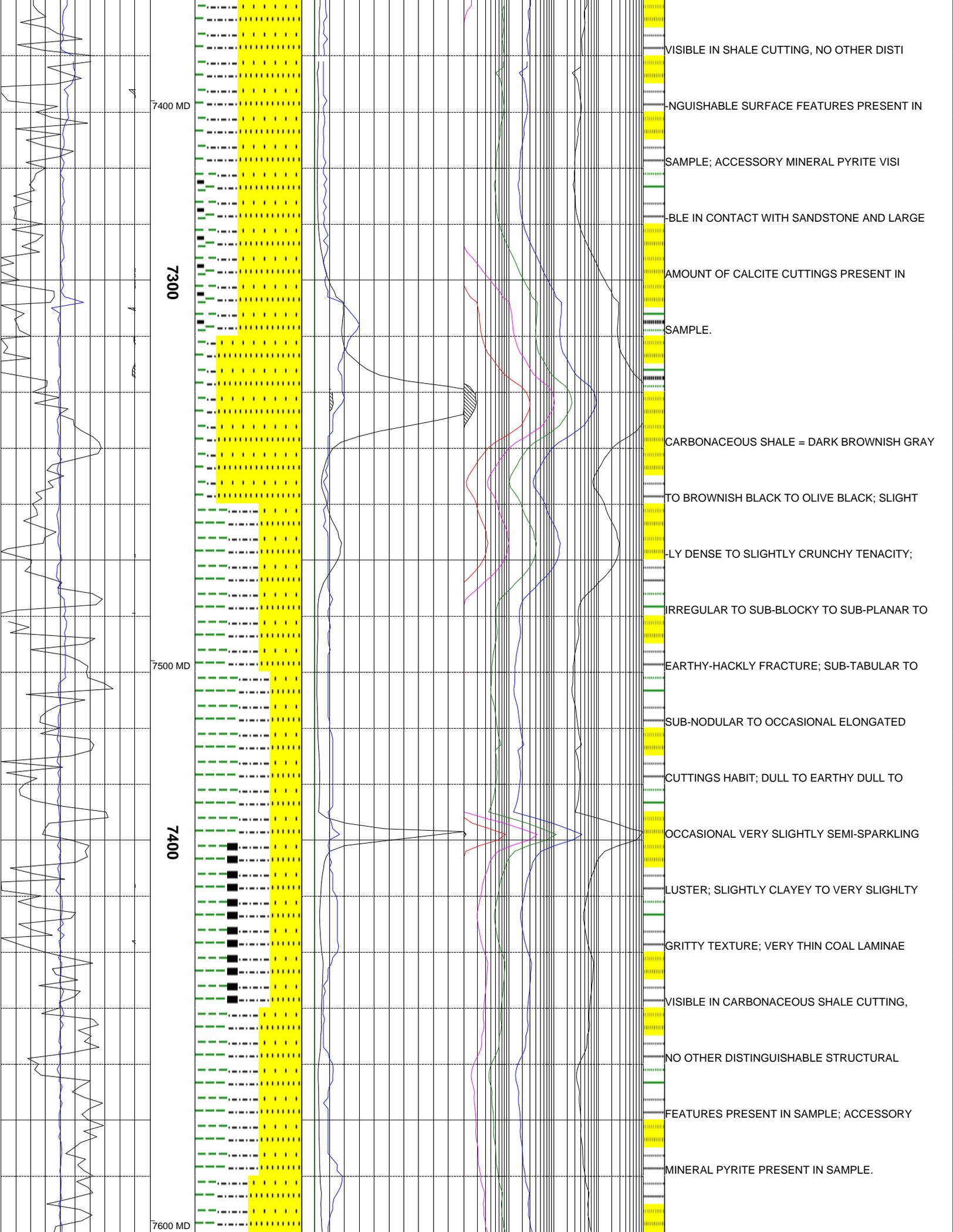
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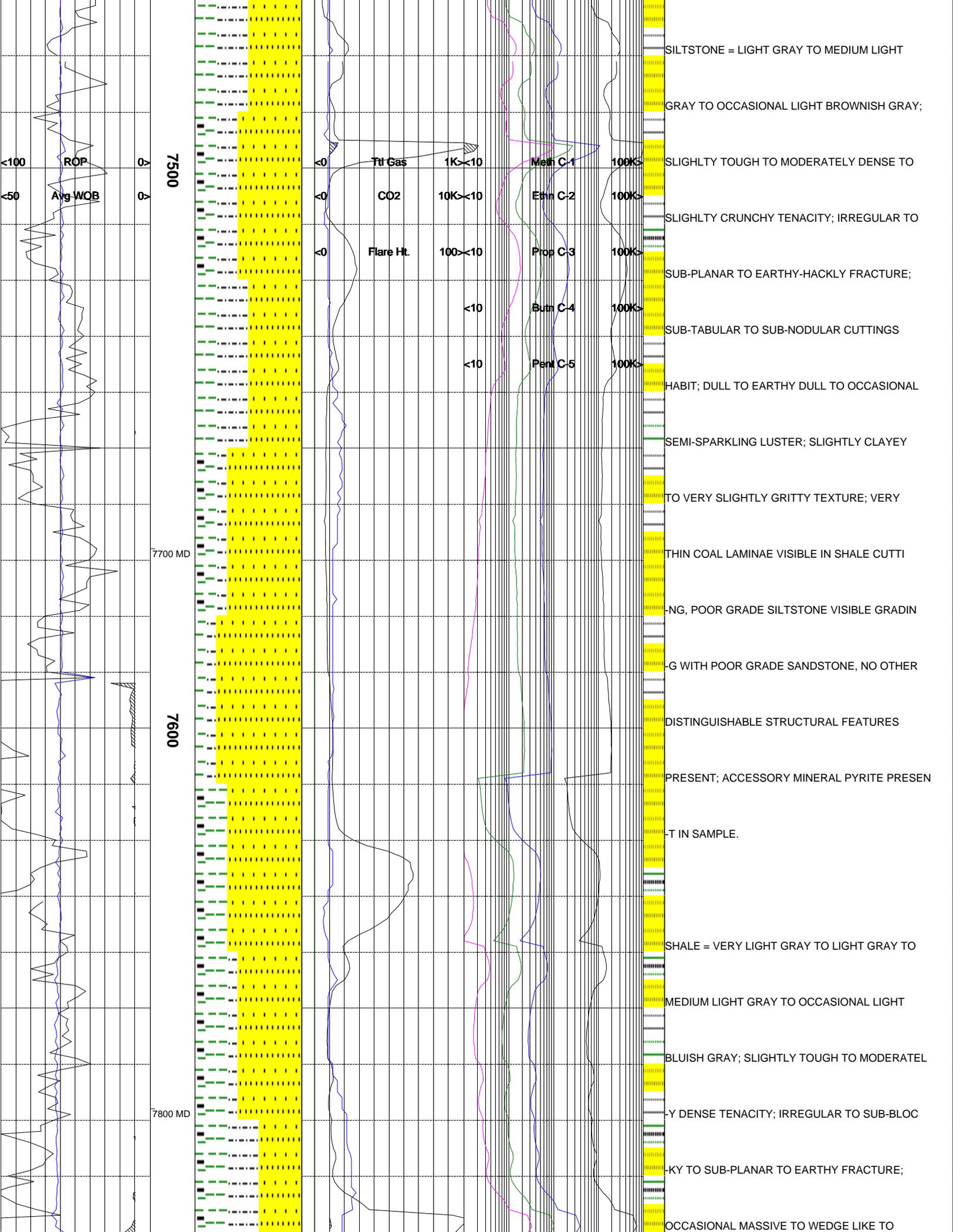
Ethn C-2

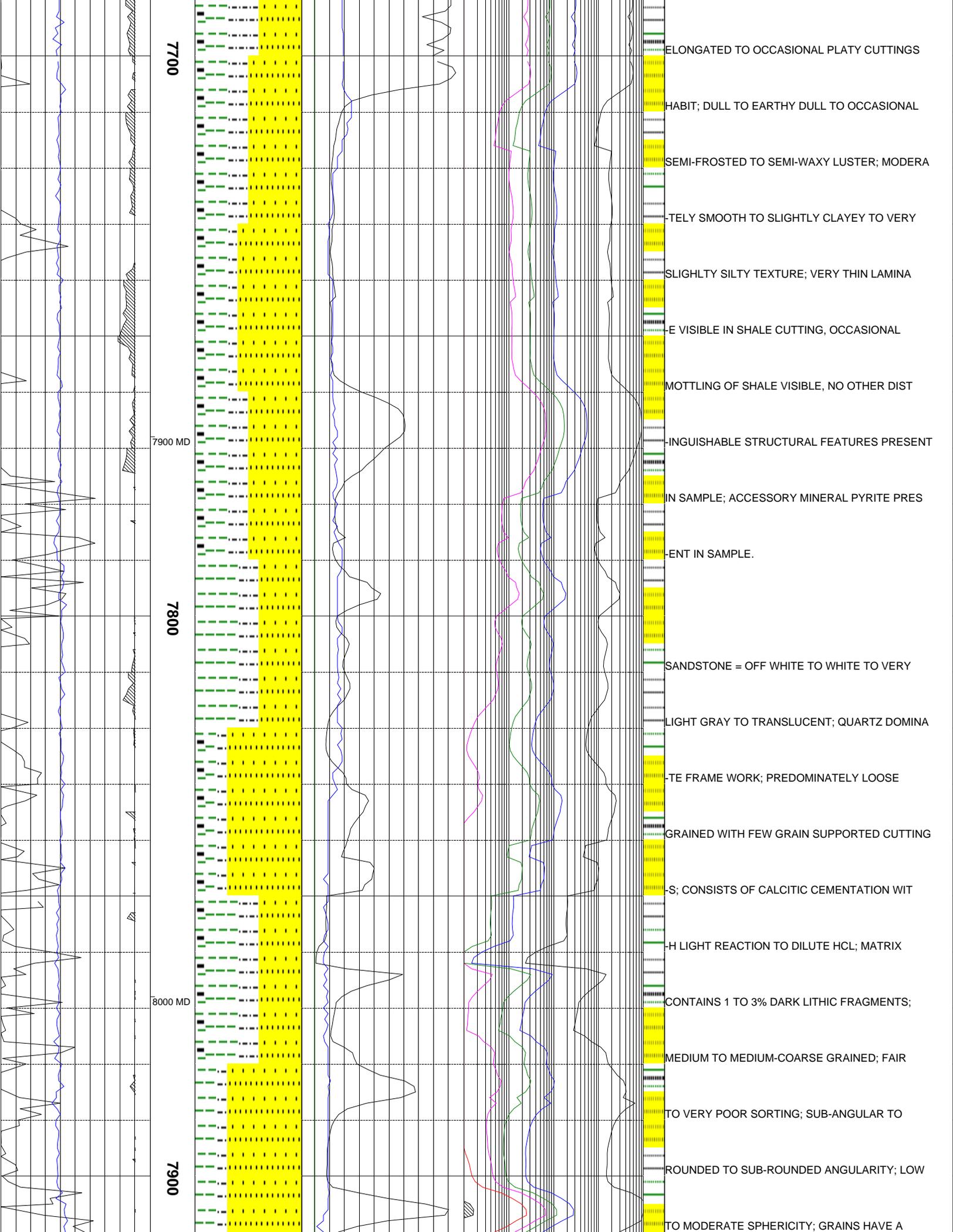
Prop C-3

Btm C-4









7700

ELONGATED TO OCCASIONAL PLATY CUTTINGS

HABIT; DULL TO EARTHY DULL TO OCCASIONAL

SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERA

TELY SMOOTH TO SLIGHTLY CLAYEY TO VERY

SLIGHTLY SILTY TEXTURE; VERY THIN LAMINA

E VISIBLE IN SHALE CUTTING, OCCASIONAL

MOTTLING OF SHALE VISIBLE, NO OTHER DIST

7900 MD

INGUISHABLE STRUCTURAL FEATURES PRESENT

IN SAMPLE; ACCESSORY MINERAL PYRITE PRES

ENT IN SAMPLE.

7800

SANDSTONE = OFF WHITE TO WHITE TO VERY

LIGHT GRAY TO TRANSLUCENT; QUARTZ DOMINA

TE FRAME WORK; PREDOMINATELY LOOSE

GRAINED WITH FEW GRAIN SUPPORTED CUTTING

S; CONSISTS OF CALCITIC CEMENTATION WIT

H LIGHT REACTION TO DILUTE HCL; MATRIX

8000 MD

CONTAINS 1 TO 3% DARK LITHIC FRAGMENTS;

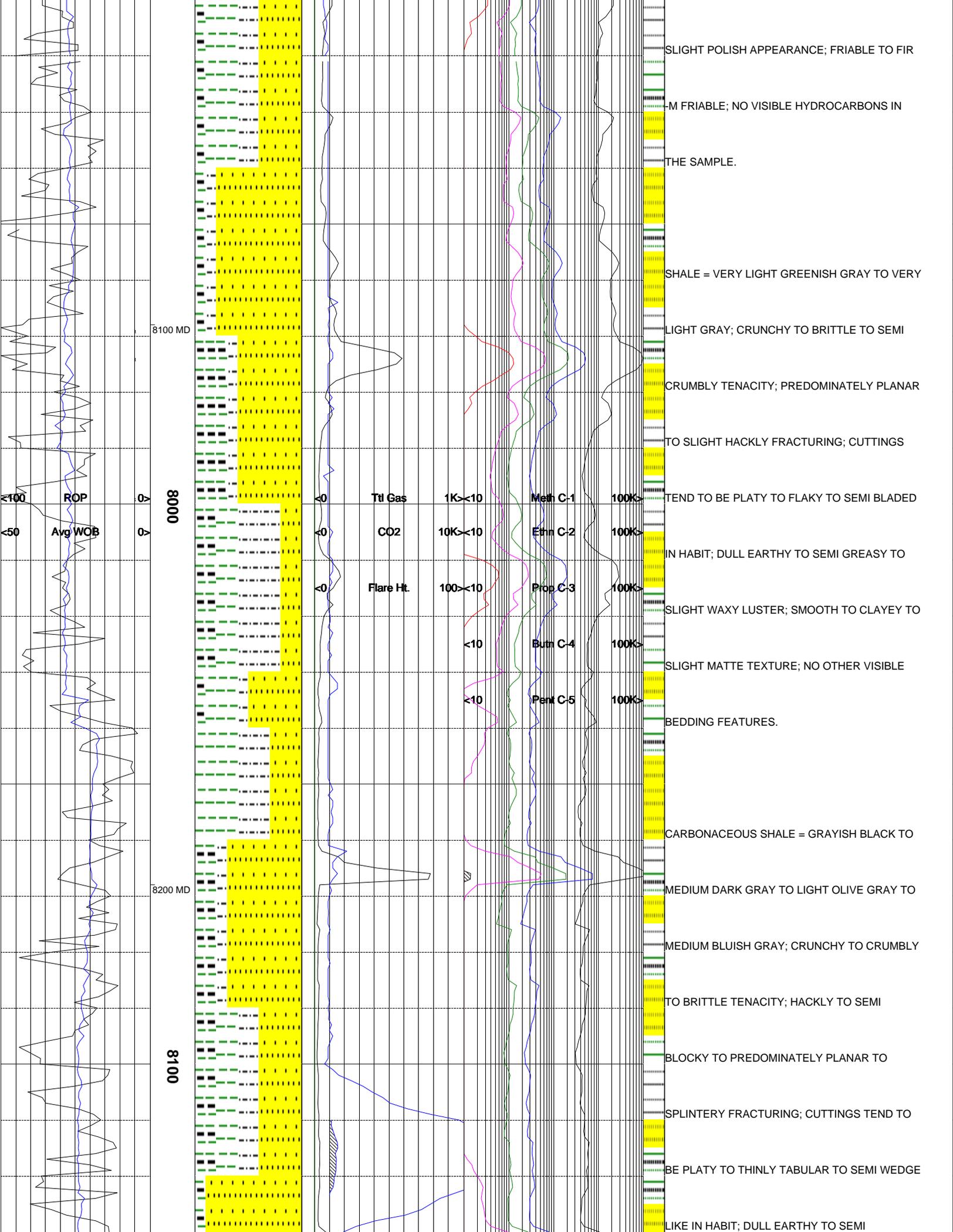
MEDIUM TO MEDIUM-COARSE GRAINED; FAIR

TO VERY POOR SORTING; SUB-ANGULAR TO

7900

ROUNDED TO SUB-ROUNDED ANGULARITY; LOW

TO MODERATE SPHERICITY; GRAINS HAVE A



8100 MD

8000

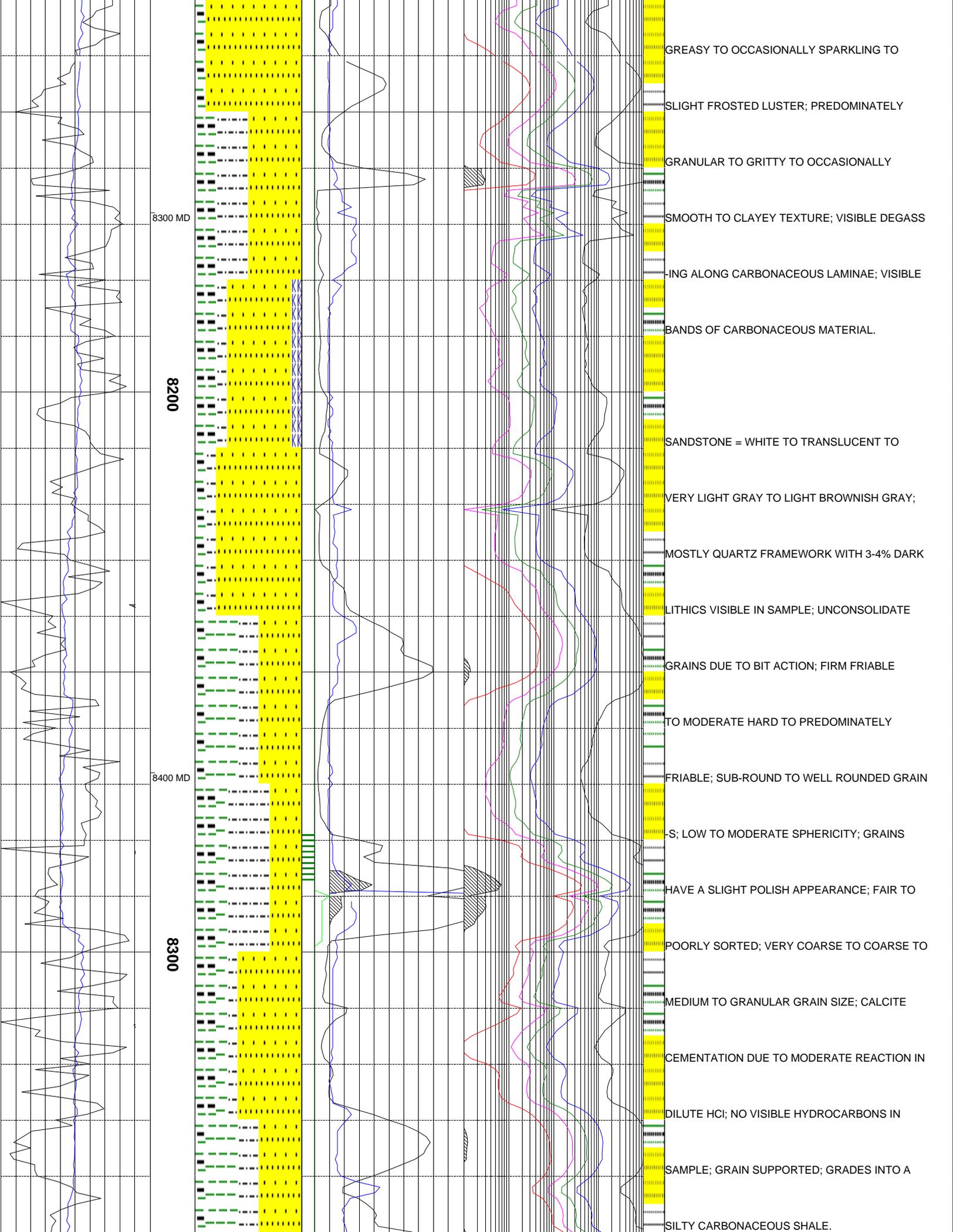
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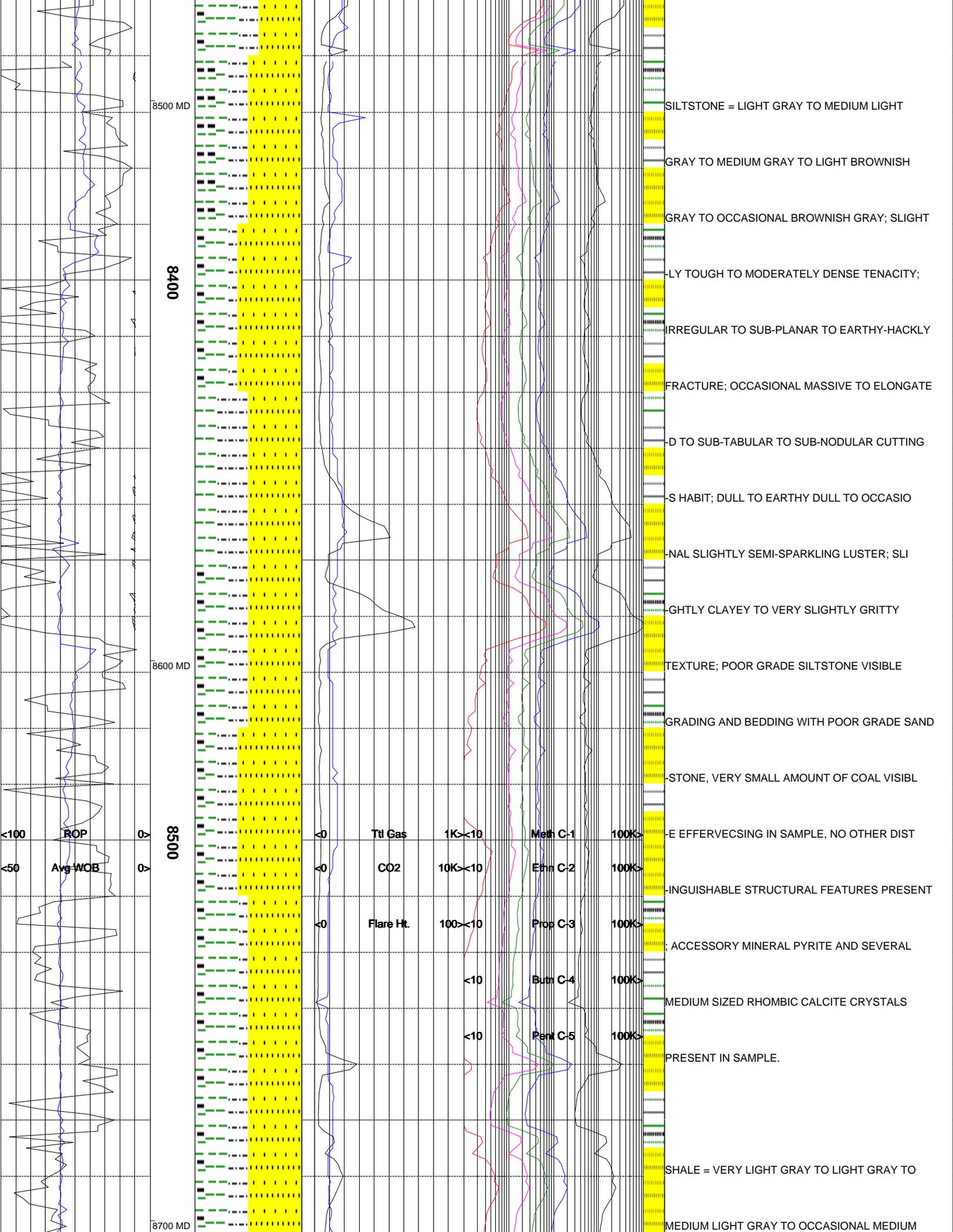
8100

<100 ROP  
<50 Avg WOB

Ttl Gas 1K<10  
CO2 10K<10  
Flare Ht. 100<10  
Meth C-1 100K<  
Ethn C-2 100K<  
Prop C-3 100K<  
Butn C-4 100K<  
Pent C-5 100K<

SLIGHT POLISH APPEARANCE; FRIABLE TO FIR  
M FRIABLE; NO VISIBLE HYDROCARBONS IN THE SAMPLE.  
SHALE = VERY LIGHT GREENISH GRAY TO VERY LIGHT GRAY; CRUNCHY TO BRITTLE TO SEMI CRUMBLY TENACITY; PREDOMINATELY PLANAR TO SLIGHT HACKLY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO SEMI BLADED  
FIN HABIT; DULL EARTHY TO SEMI GREASY TO SLIGHT WAXY LUSTER; SMOOTH TO CLAYEY TO SLIGHT MATTE TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.  
CARBONACEOUS SHALE = GRAYISH BLACK TO MEDIUM DARK GRAY TO LIGHT OLIVE GRAY TO MEDIUM BLUISH GRAY; CRUNCHY TO CRUMBLY TO BRITTLE TENACITY; HACKLY TO SEMI BLOCKY TO PREDOMINATELY PLANAR TO SPLINTERY FRACTURING; CUTTINGS TEND TO BE PLATY TO THINLY TABULAR TO SEMI WEDGE LIKE IN HABIT; DULL EARTHY TO SEMI





8500 MD

8400

8600 MD

8500

8700 MD

SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT

GRAY TO MEDIUM GRAY TO LIGHT BROWNISH

GRAY TO OCCASIONAL BROWNISH GRAY; SLIGHT

LY TOUGH TO MODERATELY DENSE TENACITY;

IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY

FRACTURE; OCCASIONAL MASSIVE TO ELONGATE

D TO SUB-TABULAR TO SUB-NODULAR CUTTING

S HABIT; DULL TO EARTHY DULL TO OCCASIO

NAL SLIGHTLY SEMI-SPARKLING LUSTER; SLI

GHTLY CLAYEY TO VERY SLIGHTLY GRITTY

TEXTURE; POOR GRADE SILTSTONE VISIBLE

GRADING AND BEDDING WITH POOR GRADE SAND

STONE, VERY SMALL AMOUNT OF COAL VISIBL

E EFFERVECSING IN SAMPLE, NO OTHER DIST

INGUISHABLE STRUCTURAL FEATURES PRESENT

; ACCESSORY MINERAL PYRITE AND SEVERAL

MEDIUM SIZED RHOMBIC CALCITE CRYSTALS

PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO

MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM

<100 ROP

<50 Avg WOB

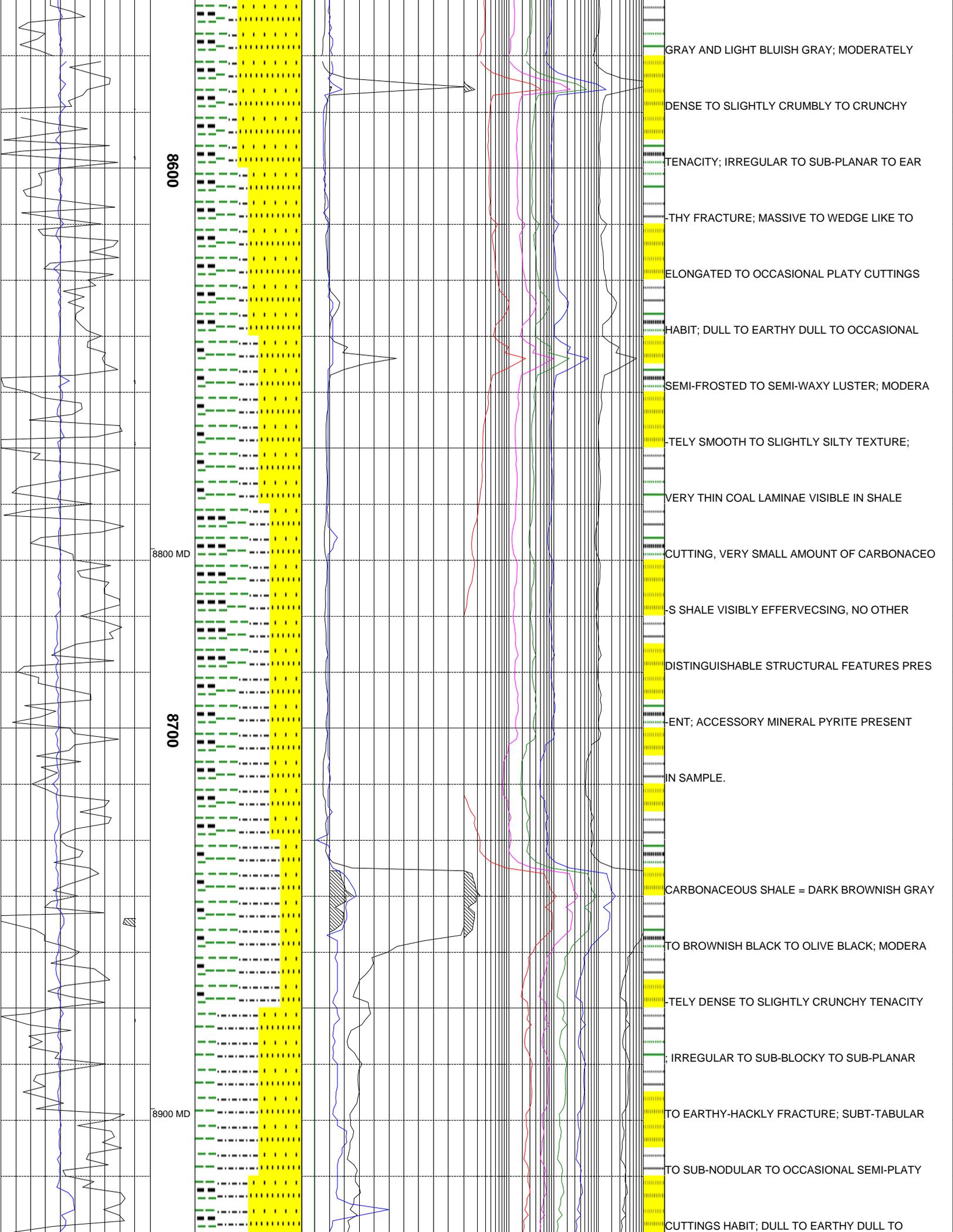
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<0 CO2 10K<10 Ethn C-2 100K>

<0 Flare Ht. 100<10 Prop C-3 100K>

<10 Butn C-4 100K>

<10 Pent C-5 100K>



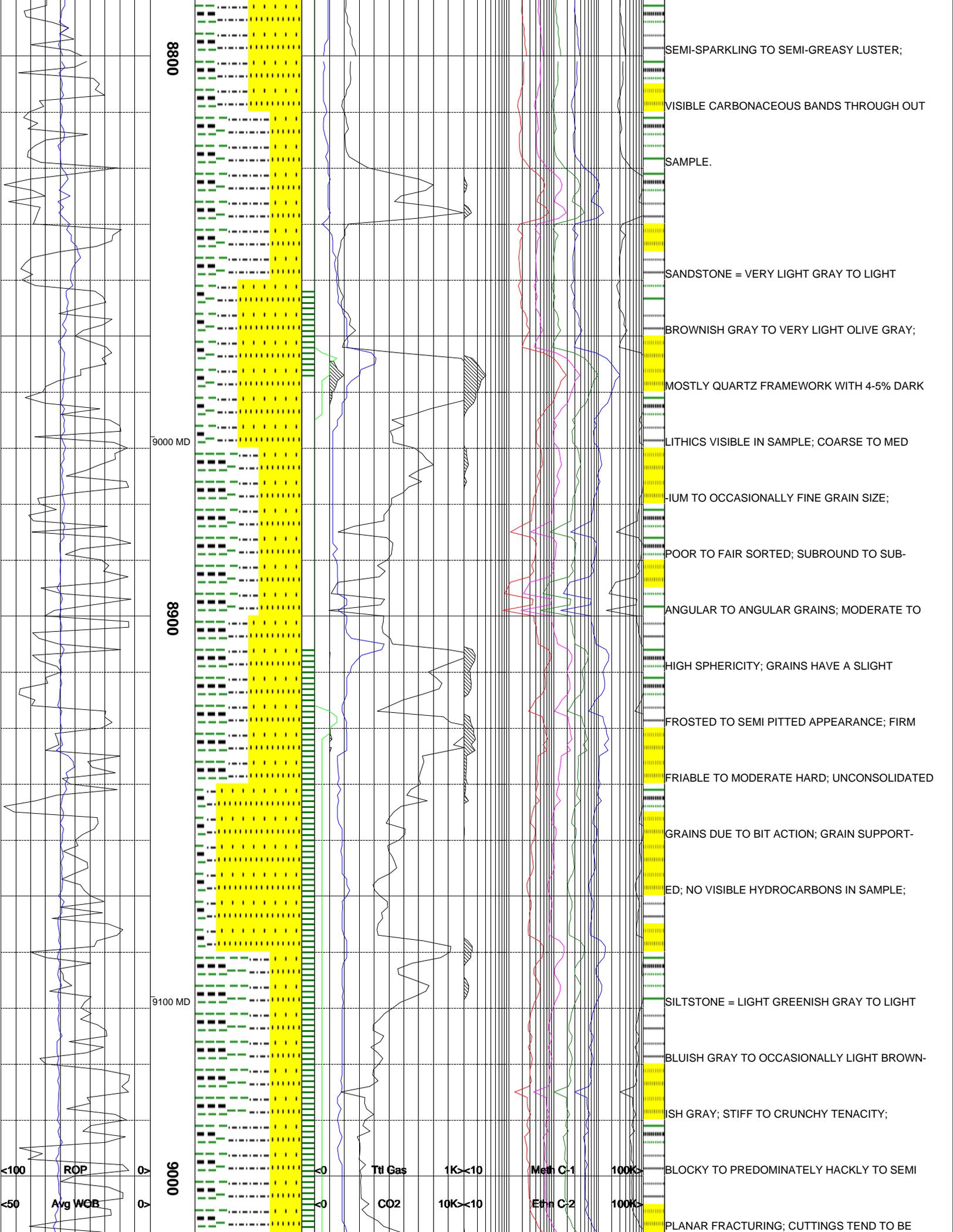
8600

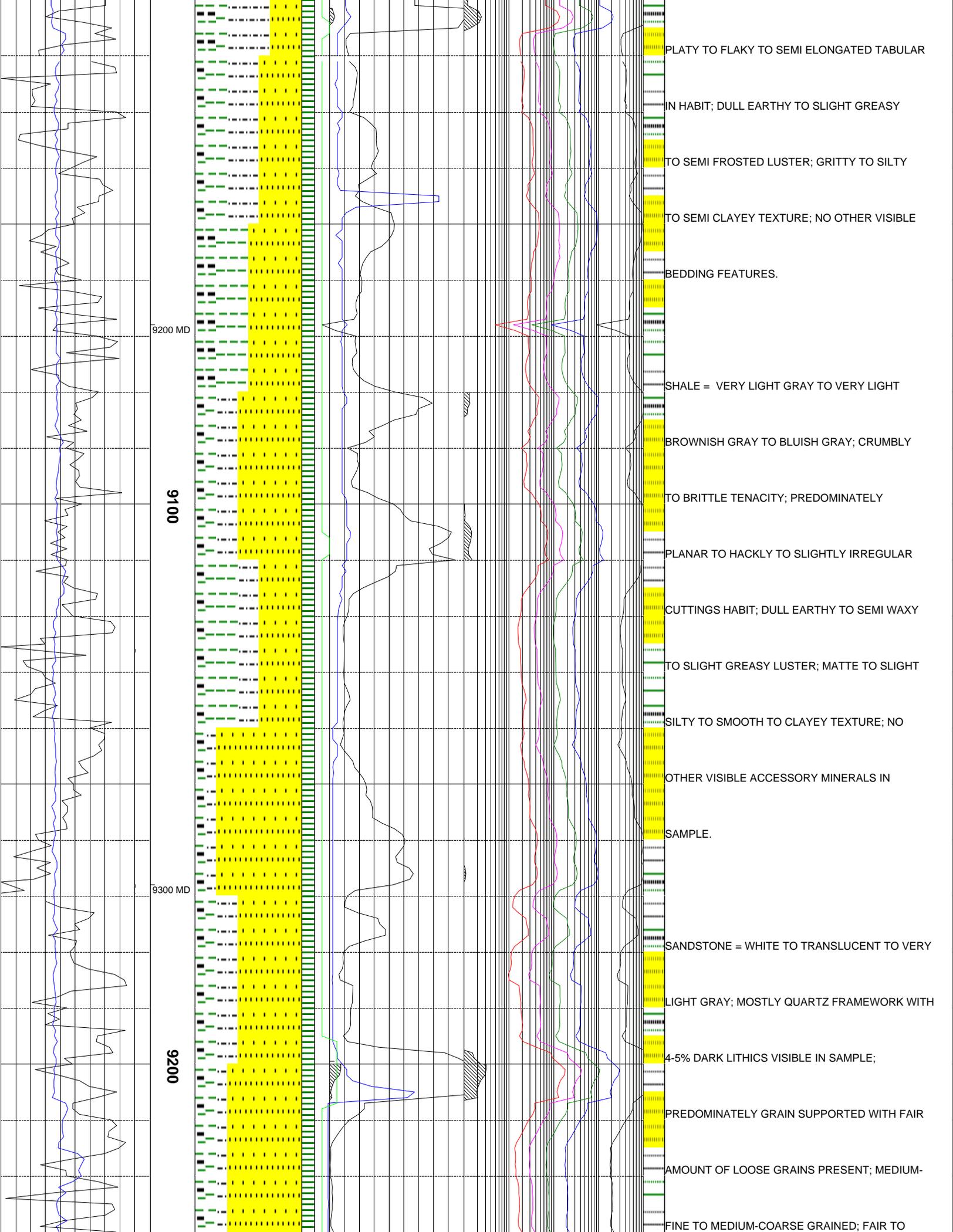
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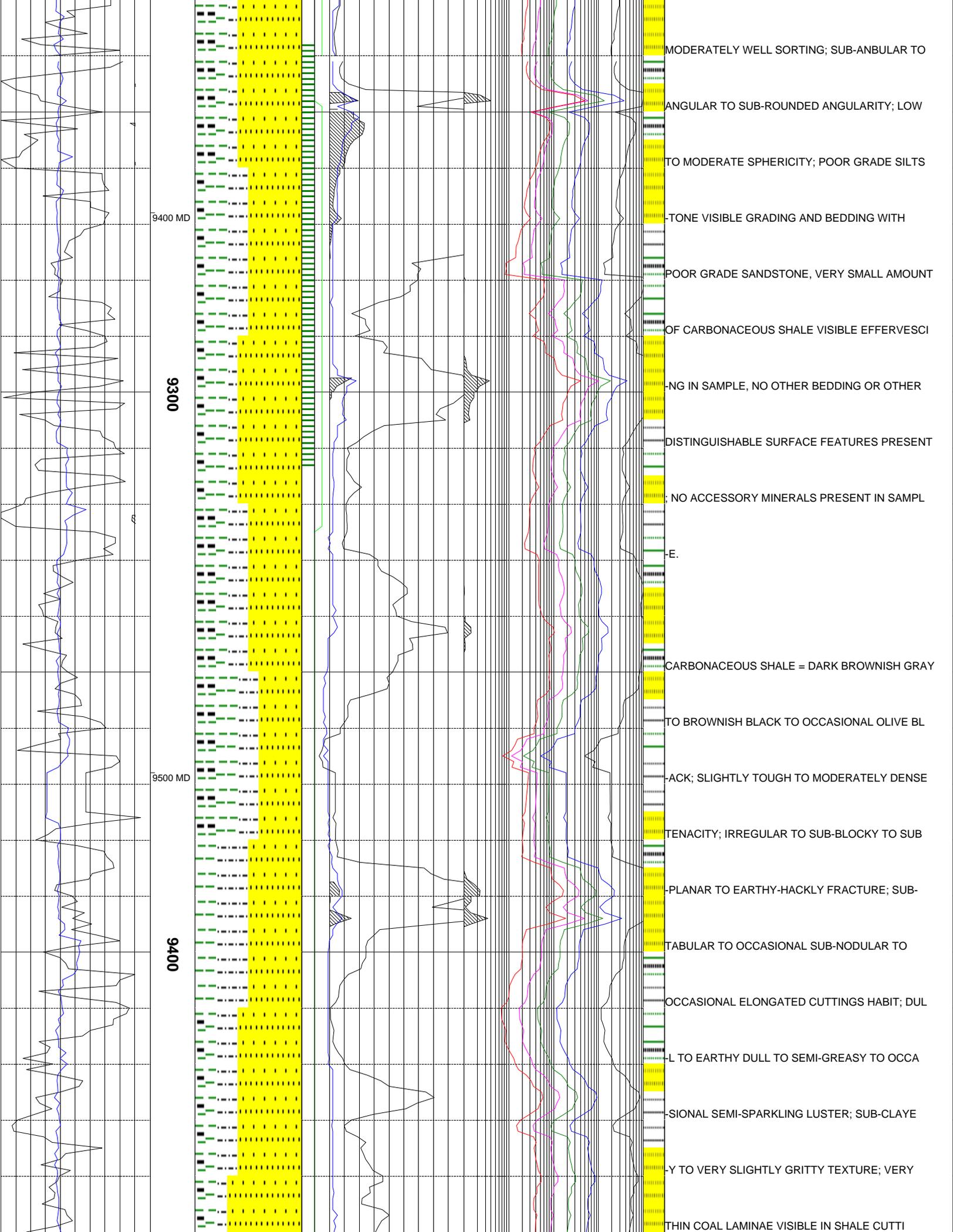
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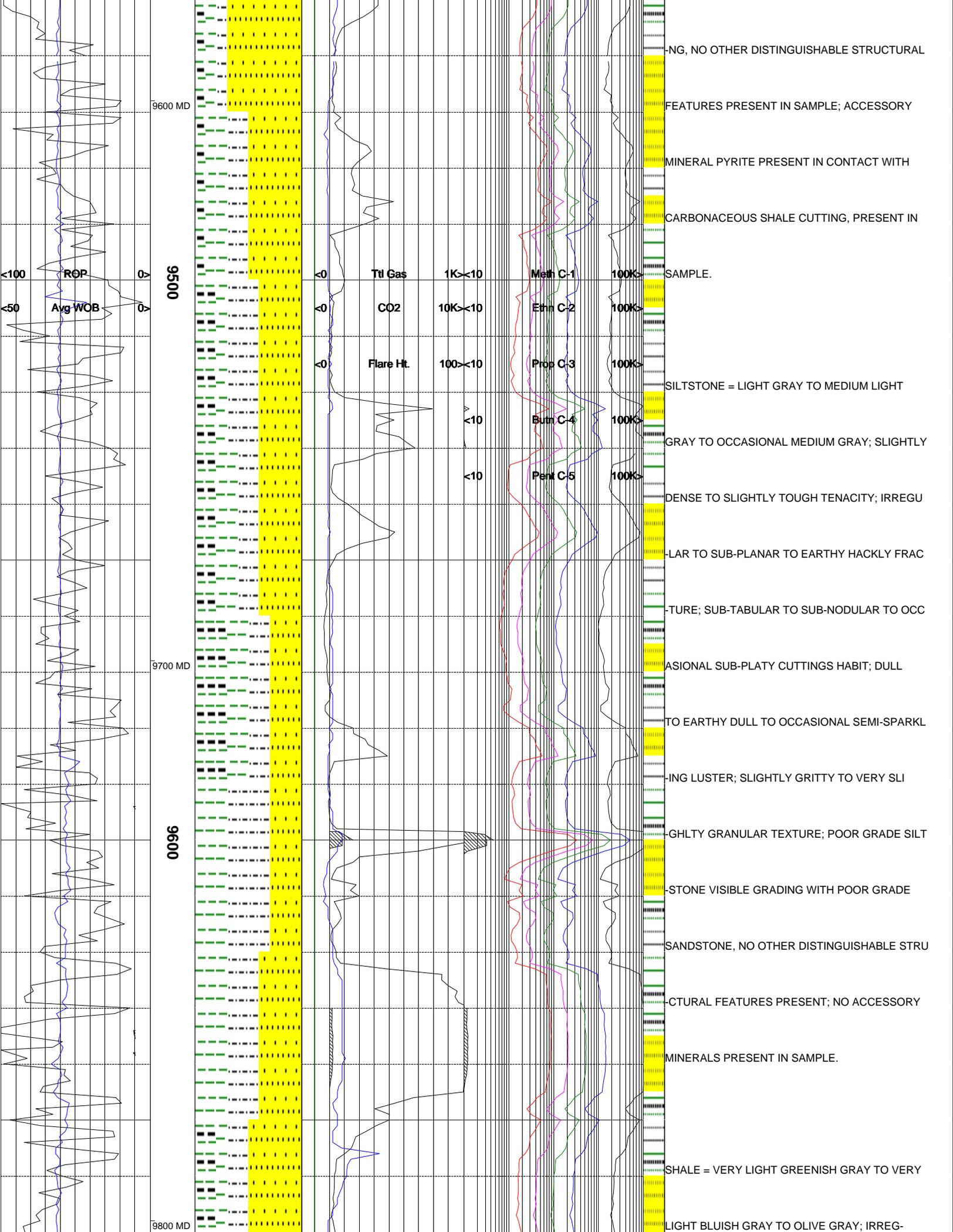
8900 MD

GRAY AND LIGHT BLUISH GRAY; MODERATELY  
 DENSE TO SLIGHTLY CRUMBLY TO CRUNCHY  
 TENACITY; IRREGULAR TO SUB-PLANAR TO EARTH  
 WAXY FRACTURE; MASSIVE TO WEDGE LIKE TO  
 CRACKS ELONGATED TO OCCASIONAL PLATY CUTTINGS  
 HABIT; DULL TO EARTH DULL TO OCCASIONAL  
 SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERA  
 TELY SMOOTH TO SLIGHTLY SILTY TEXTURE;  
 VERY THIN COAL LAMINAE VISIBLE IN SHALE  
 CUTTING, VERY SMALL AMOUNT OF CARBONACEO  
 US SHALE VISIBLY EFFERVECSING, NO OTHER  
 DISTINGUISHABLE STRUCTURAL FEATURES PRES  
 ENT; ACCESSORY MINERAL PYRITE PRESENT  
 IN SAMPLE.  
 CARBONACEOUS SHALE = DARK BROWNISH GRAY  
 TO BROWNISH BLACK TO OLIVE BLACK; MODERA  
 TELY DENSE TO SLIGHTLY CRUNCHY TENACITY  
 ; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR  
 TO EARTHY-HACKLY FRACTURE; SUBT-TABULAR  
 TO SUB-NODULAR TO OCCASIONAL SEMI-PLATY  
 CUTTINGS HABIT; DULL TO EARTH DULL TO









9600 MD

9500

9700 MD

0096

9800 MD

ROP

Avg WOB

Ttl Gas

CO2

Flare Ht.

Meth C-1

Ethn C-2

Prop C-3

Butn C-4

Pent C-5

1K<10

10K<10

100<10

<10

<10

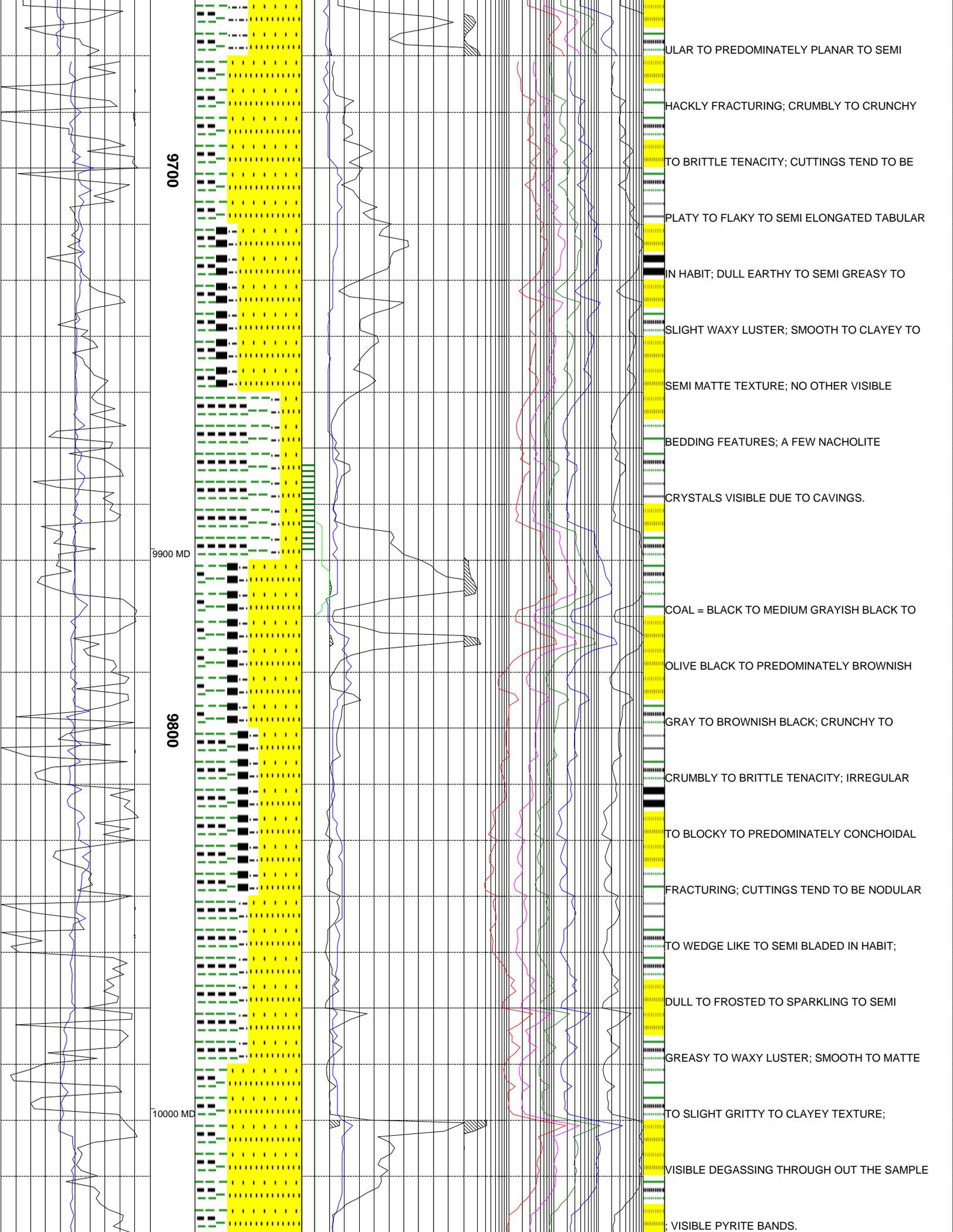
100K>

100K>

100K>

100K>

100K>



9700

9900 MD

9800

10000 MD

ULAR TO PREDOMINATELY PLANAR TO SEMI

HACKLY FRACTURING; CRUMBLY TO CRUNCHY

TO BRITTLE TENACITY; CUTTINGS TEND TO BE

PLATY TO FLAKY TO SEMI ELONGATED TABULAR

IN HABIT; DULL EARTHY TO SEMI GREASY TO

SLIGHT WAXY LUSTER; SMOOTH TO CLAYEY TO

SEMI MATTE TEXTURE; NO OTHER VISIBLE

BEDDING FEATURES; A FEW NACHOLITE

CRYSTALS VISIBLE DUE TO CAVINGS.

COAL = BLACK TO MEDIUM GRAYISH BLACK TO

OLIVE BLACK TO PREDOMINATELY BROWNISH

GRAY TO BROWNISH BLACK; CRUNCHY TO

CRUMBLY TO BRITTLE TENACITY; IRREGULAR

TO BLOCKY TO PREDOMINATELY CONCHOIDAL

FRACTURING; CUTTINGS TEND TO BE NODULAR

TO WEDGE LIKE TO SEMI BLADED IN HABIT;

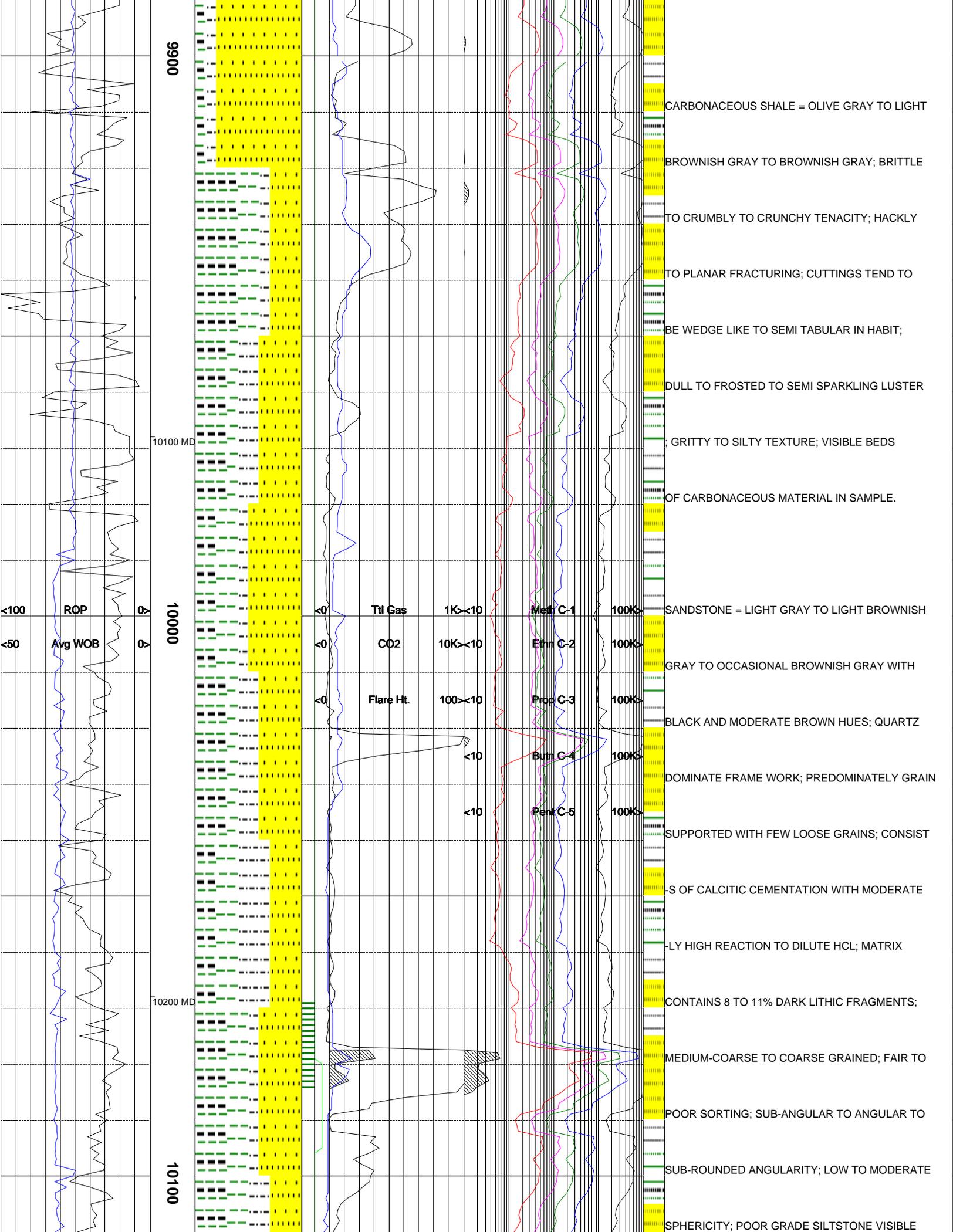
DULL TO FROSTED TO SPARKLING TO SEMI

GREASY TO WAXY LUSTER; SMOOTH TO MATTE

TO SLIGHT GRITTY TO CLAYEY TEXTURE;

VISIBLE DEGASSING THROUGH OUT THE SAMPLE

; VISIBLE PYRITE BANDS.



9900

10100 MD

10000

10200 MD

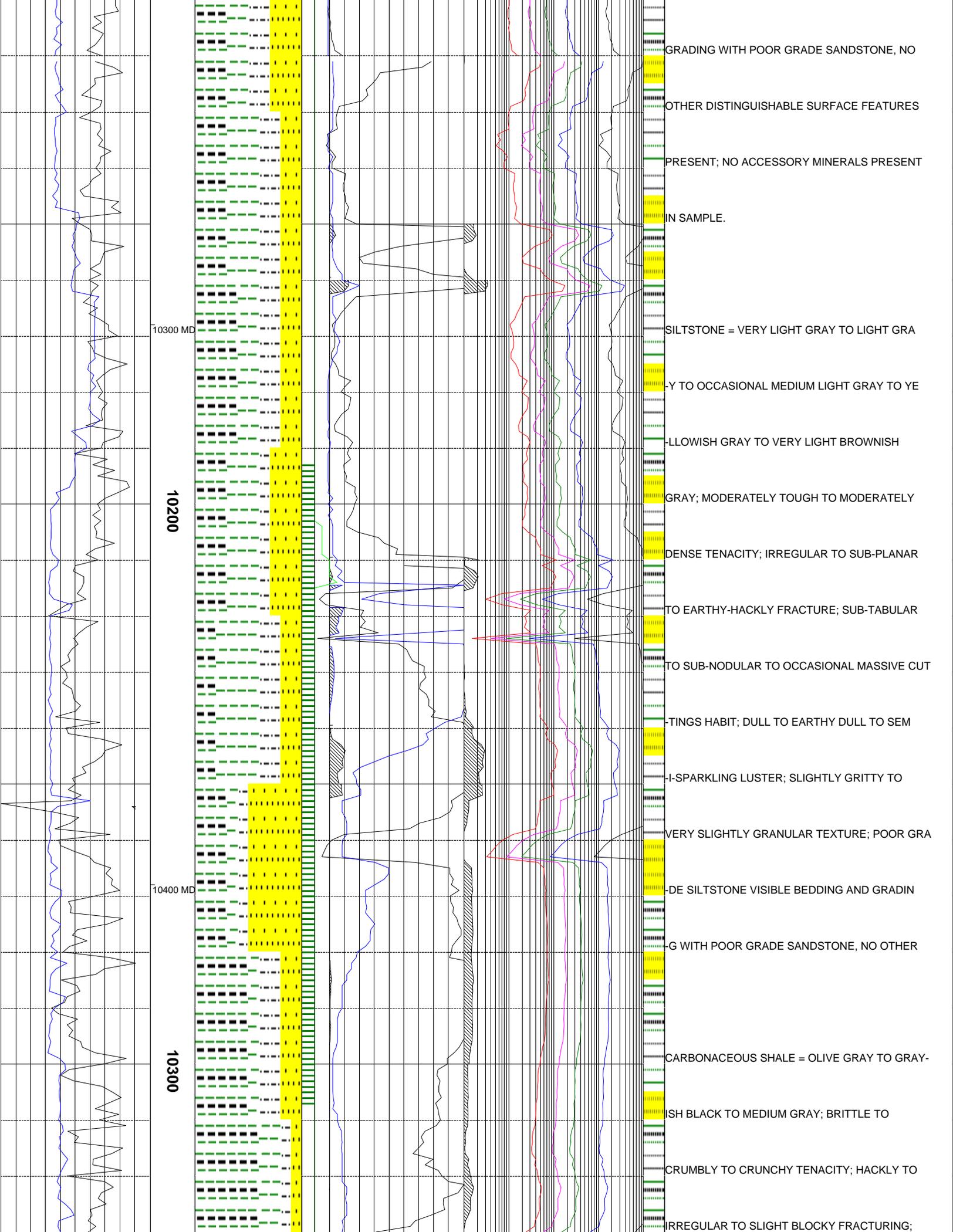
10100

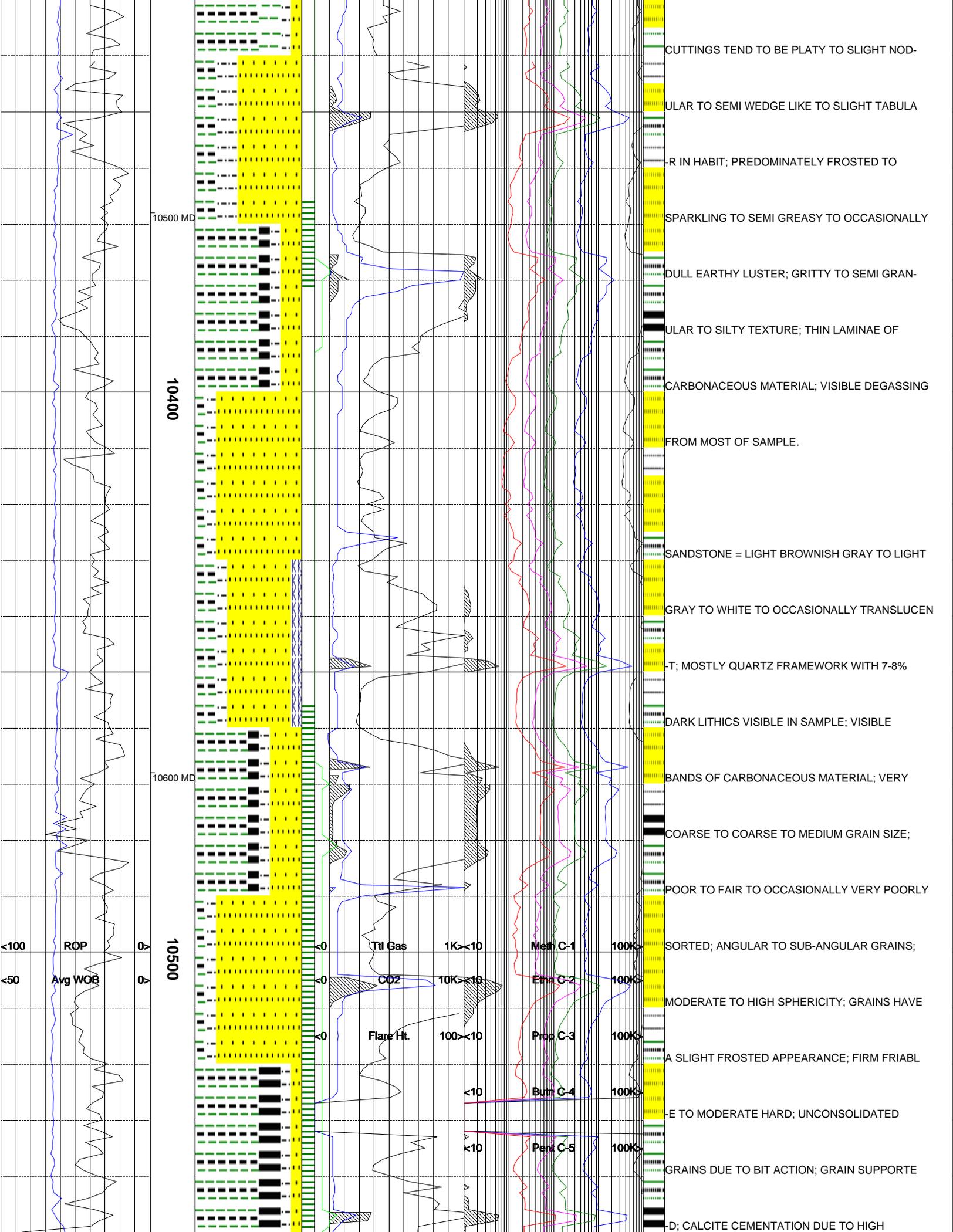
CARBONACEOUS SHALE = OLIVE GRAY TO LIGHT BROWNISH GRAY TO OCCASIONAL BROWNISH GRAY WITH BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; PREDOMINATELY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; CONSIST OF CALCITIC CEMENTATION WITH MODERATE TO HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 8 TO 11% DARK LITHIC FRAGMENTS; MEDIUM-COARSE TO COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE

SANDSTONE = LIGHT GRAY TO LIGHT BROWNISH GRAY TO OCCASIONAL BROWNISH GRAY WITH BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; PREDOMINATELY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; CONSIST OF CALCITIC CEMENTATION WITH MODERATE TO HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 8 TO 11% DARK LITHIC FRAGMENTS; MEDIUM-COARSE TO COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE

<100 ROP  
<50 Avg WOB

Ttl Gas 1K<10  
CO2 10K<10  
Flare Ht. 100<10  
Met C-1 100K<  
Eth C-2 100K<  
Prop C-3 100K<  
Bum C-4 100K<  
Pen C-5 100K<





CUTTINGS TEND TO BE PLATY TO SLIGHT NOD-

ULAR TO SEMI WEDGE LIKE TO SLIGHT TABULA

R IN HABIT; PREDOMINATELY FROSTED TO

10500 MD

SPARKLING TO SEMI GREASY TO OCCASIONALLY

DULL EARTHY LUSTER; GRITTY TO SEMI GRAN-

10400

ULAR TO SILTY TEXTURE; THIN LAMINAE OF

CARBONACEOUS MATERIAL; VISIBLE DEGASSING

FROM MOST OF SAMPLE.

SANDSTONE = LIGHT BROWNISH GRAY TO LIGHT

GRAY TO WHITE TO OCCASIONALLY TRANSLUCEN

T; MOSTLY QUARTZ FRAMEWORK WITH 7-8%

DARK LITHICS VISIBLE IN SAMPLE; VISIBLE

10600 MD

BANDS OF CARBONACEOUS MATERIAL; VERY

COARSE TO COARSE TO MEDIUM GRAIN SIZE;

POOR TO FAIR TO OCCASIONALLY VERY POORLY

10500

SORTED; ANGULAR TO SUB-ANGULAR GRAINS;

MODERATE TO HIGH SPHERICITY; GRAINS HAVE

A SLIGHT FROSTED APPEARANCE; FIRM FRIABL

E TO MODERATE HARD; UNCONSOLIDATED

GRAINS DUE TO BIT ACTION; GRAIN SUPPORTE

D; CALCITE CEMENTATION DUE TO HIGH

<100

ROP

Δ

<50

Avg WCB

Δ

Ttl Gas

1K<10

Meth C-1

100K>

CO2

10K>10

Ethn C-2

100K>

Flare Ht.

100><10

Prop C-3

100K>

<10

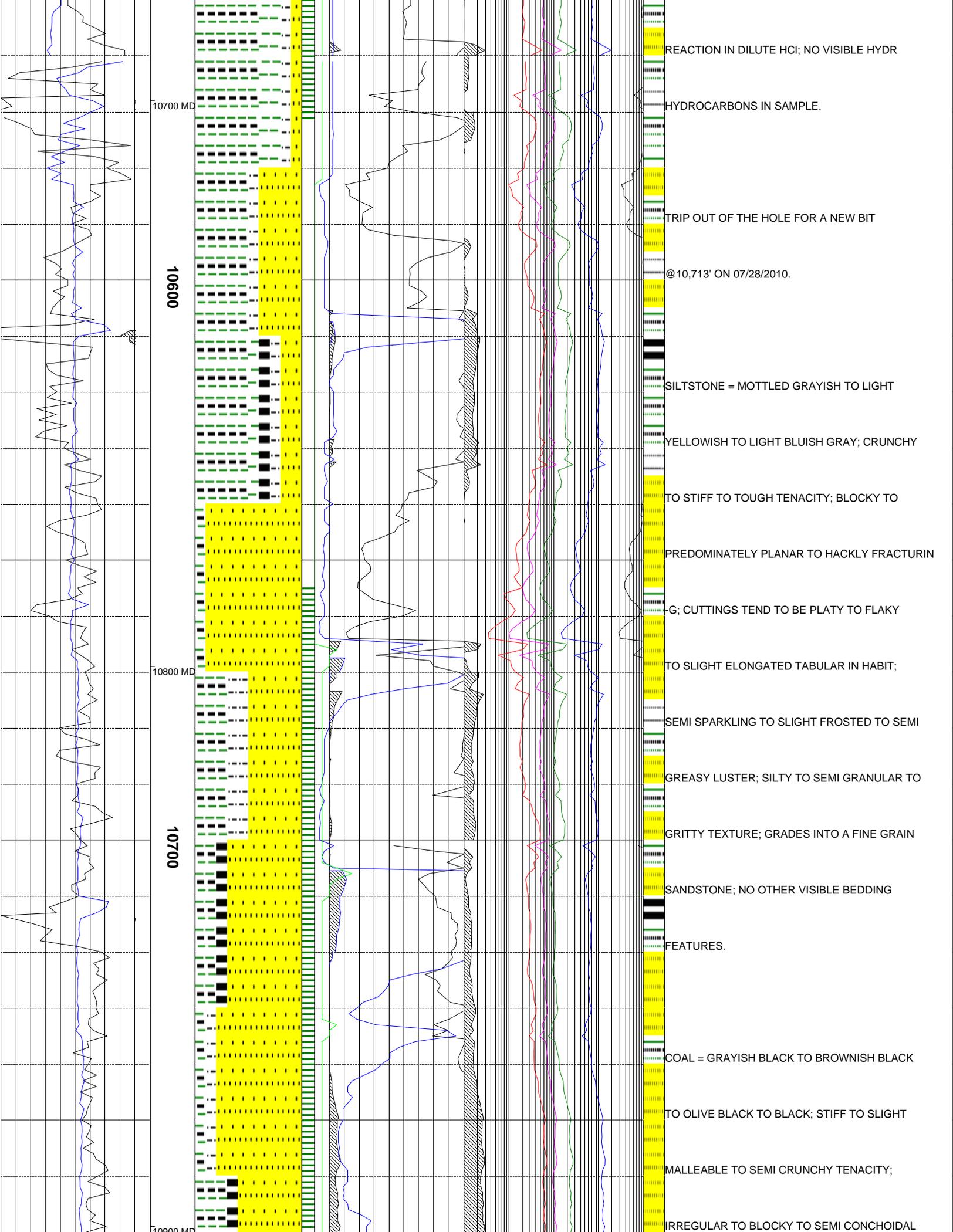
Butn C-4

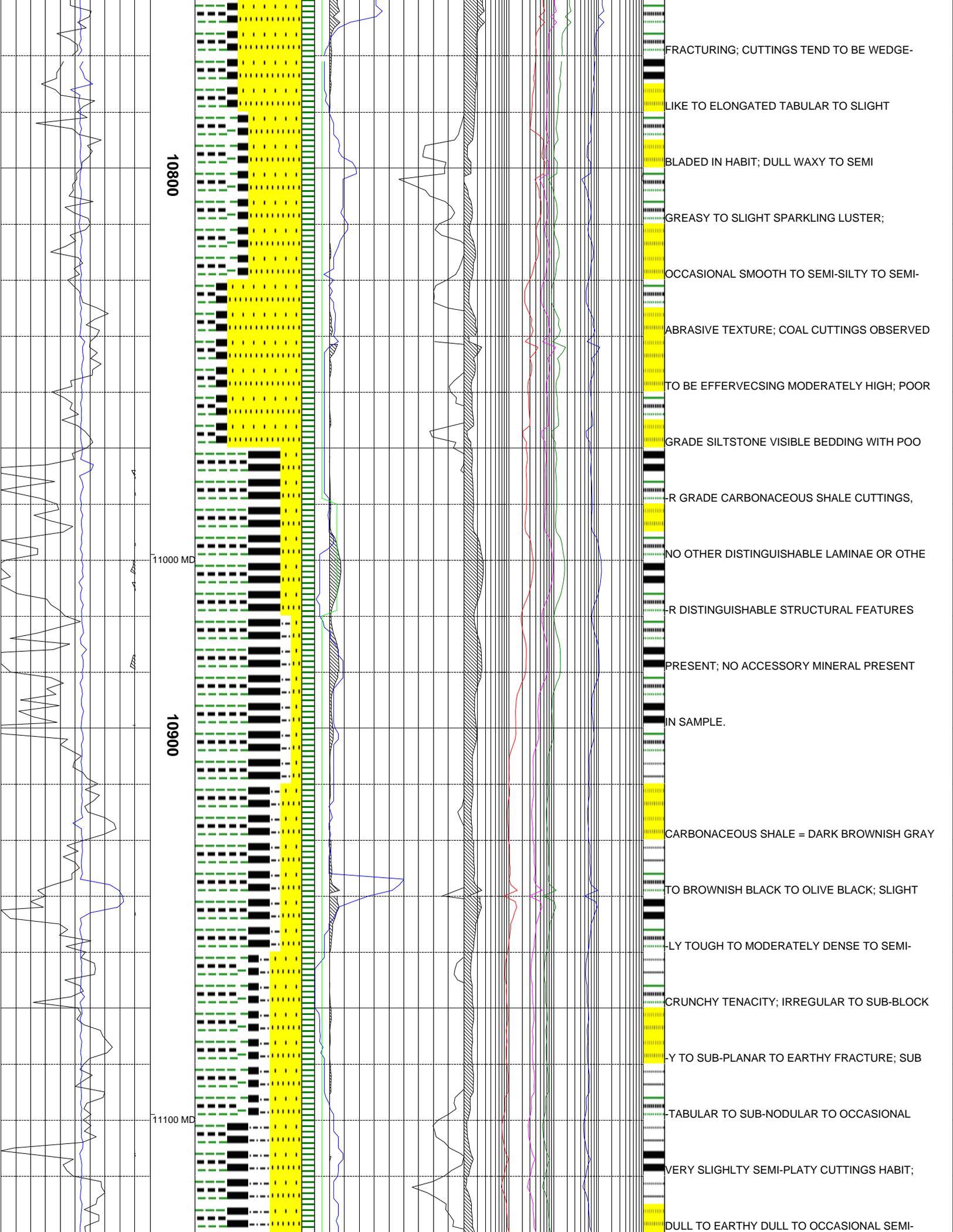
100K>

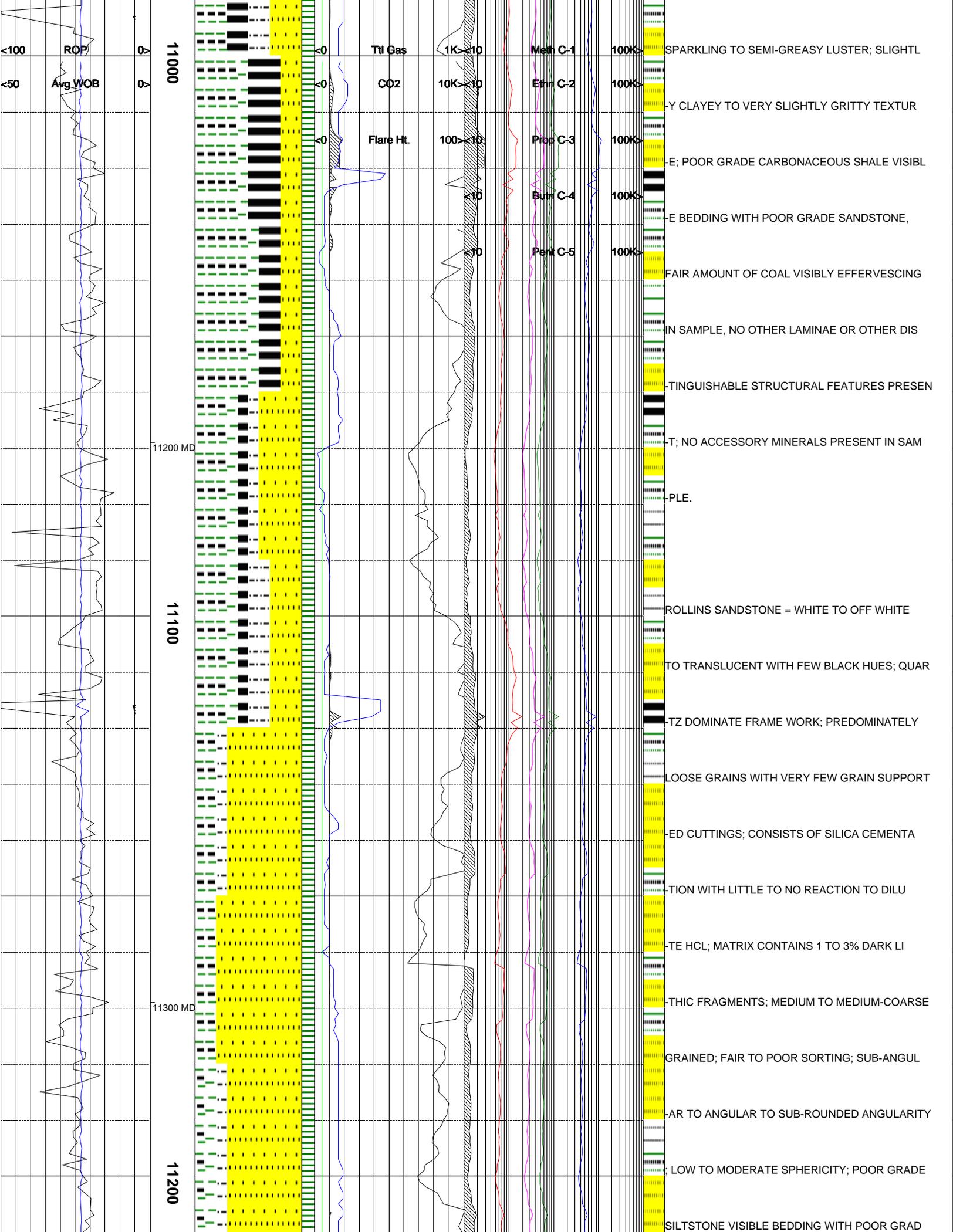
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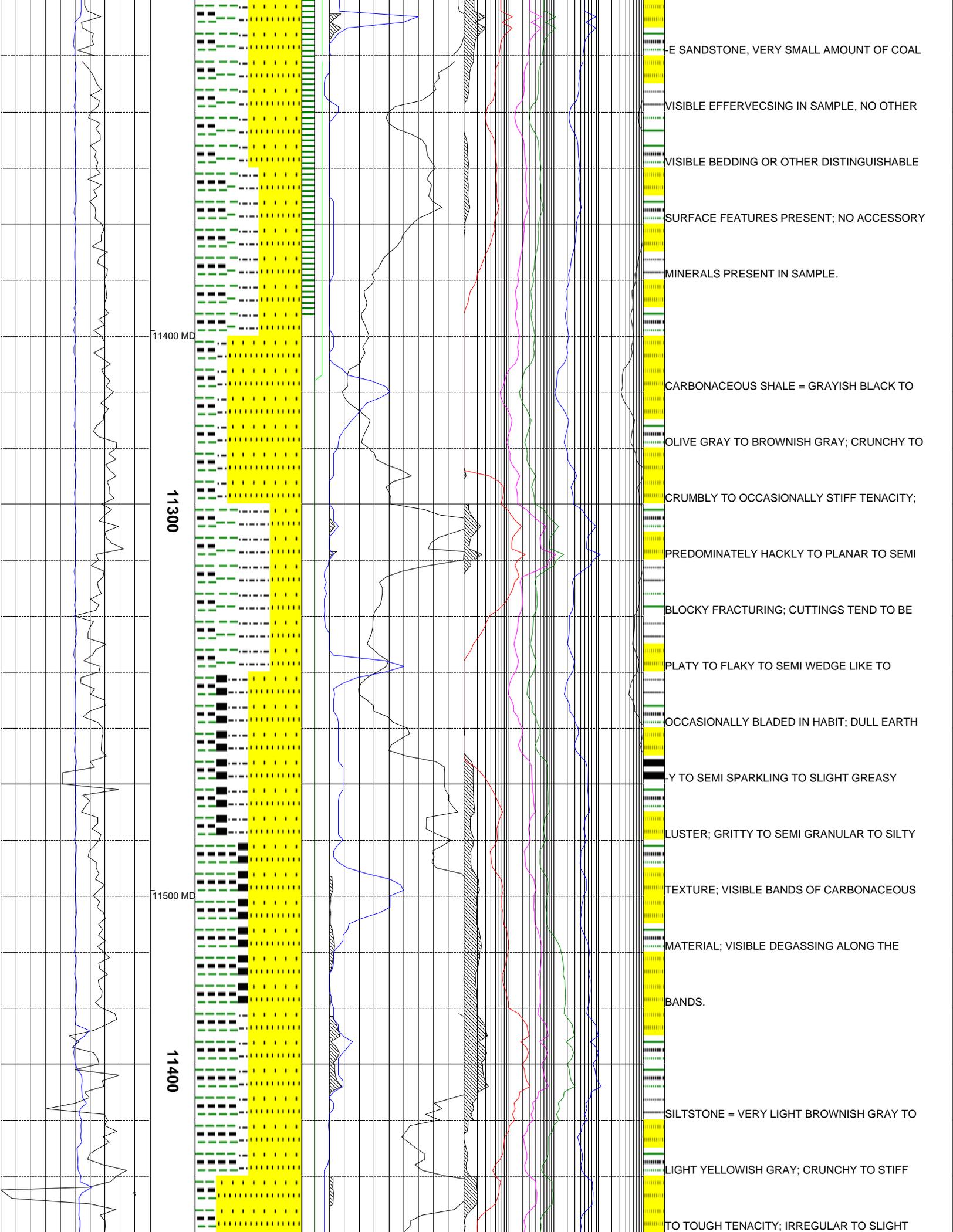
Pent C-5

100K>









11400 MD

11300

11500 MD

11400

FINE SANDSTONE, VERY SMALL AMOUNT OF COAL

VISIBLE EFFERVECSING IN SAMPLE, NO OTHER

VISIBLE BEDDING OR OTHER DISTINGUISHABLE

SURFACE FEATURES PRESENT; NO ACCESSORY

MINERALS PRESENT IN SAMPLE.

CARBONACEOUS SHALE = GRAYISH BLACK TO

OLIVE GRAY TO BROWNISH GRAY; CRUNCHY TO

CRUMBLY TO OCCASIONALLY STIFF TENACITY;

PREDOMINATELY HACKLY TO PLANAR TO SEMI

BLOCKY FRACTURING; CUTTINGS TEND TO BE

PLATY TO FLAKY TO SEMI WEDGE LIKE TO

OCCASIONALLY BLADED IN HABIT; DULL EARTH

LUSTER; GRITTY TO SEMI GRANULAR TO SILTY

TEXTURE; VISIBLE BANDS OF CARBONACEOUS

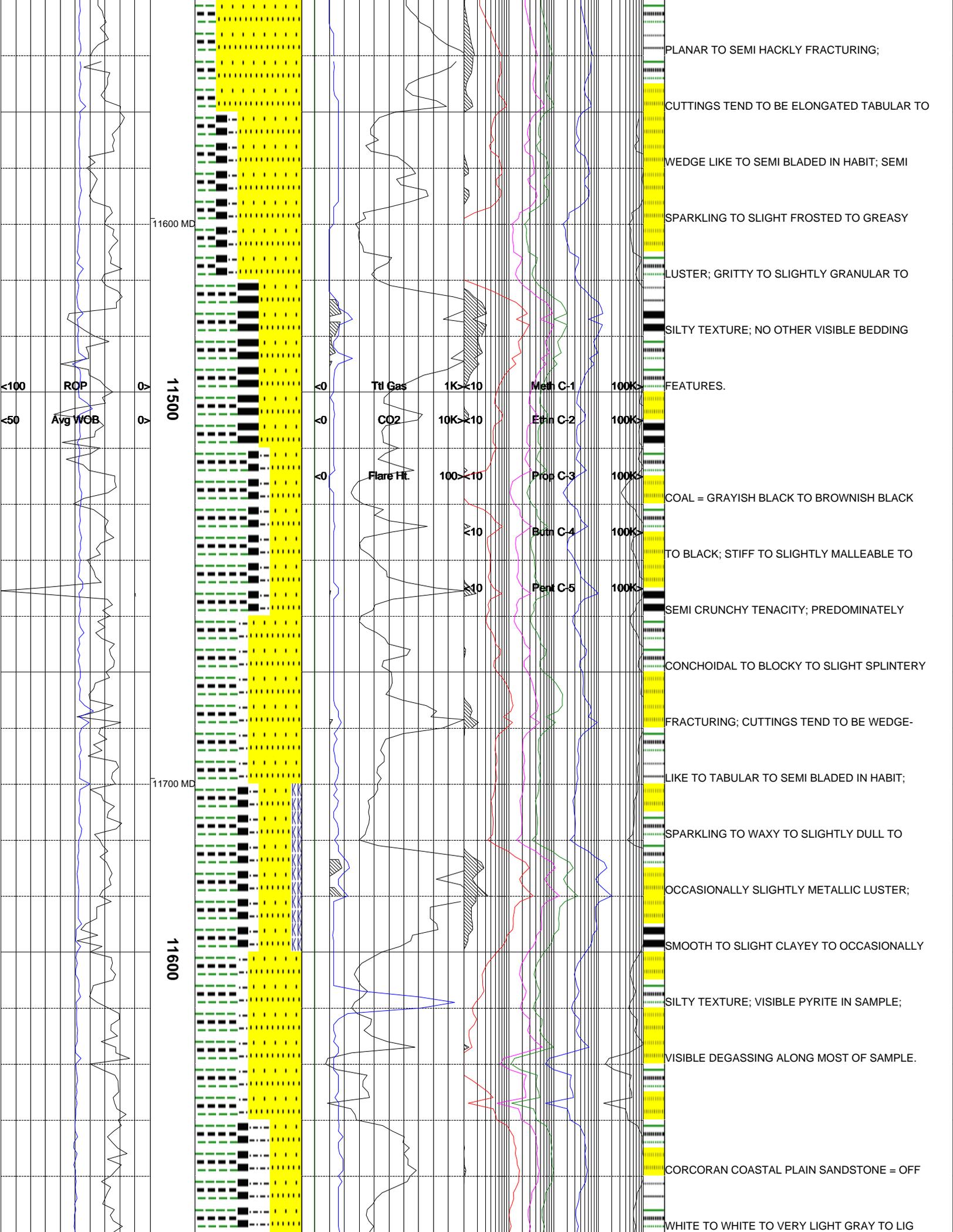
MATERIAL; VISIBLE DEGASSING ALONG THE

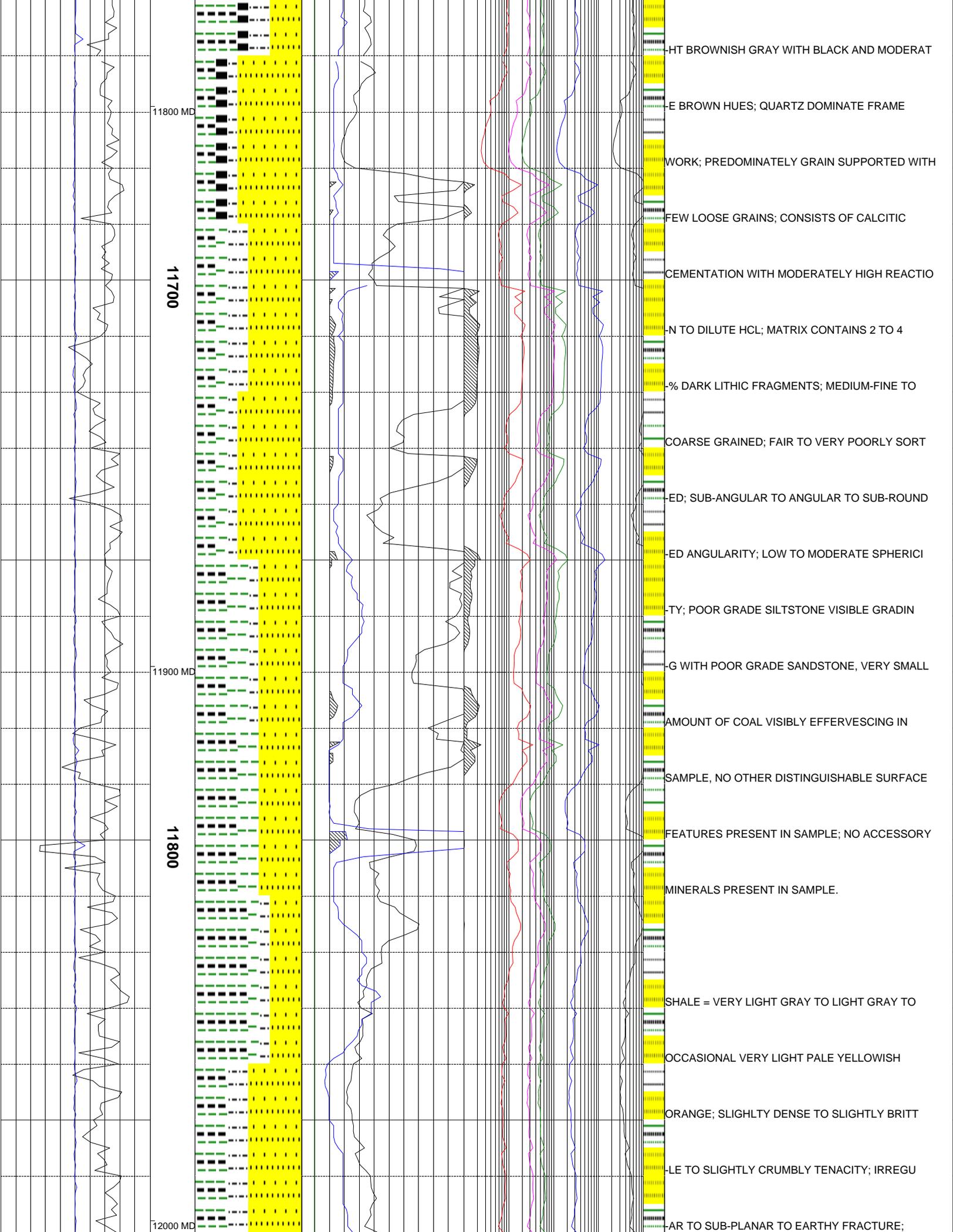
BANDS.

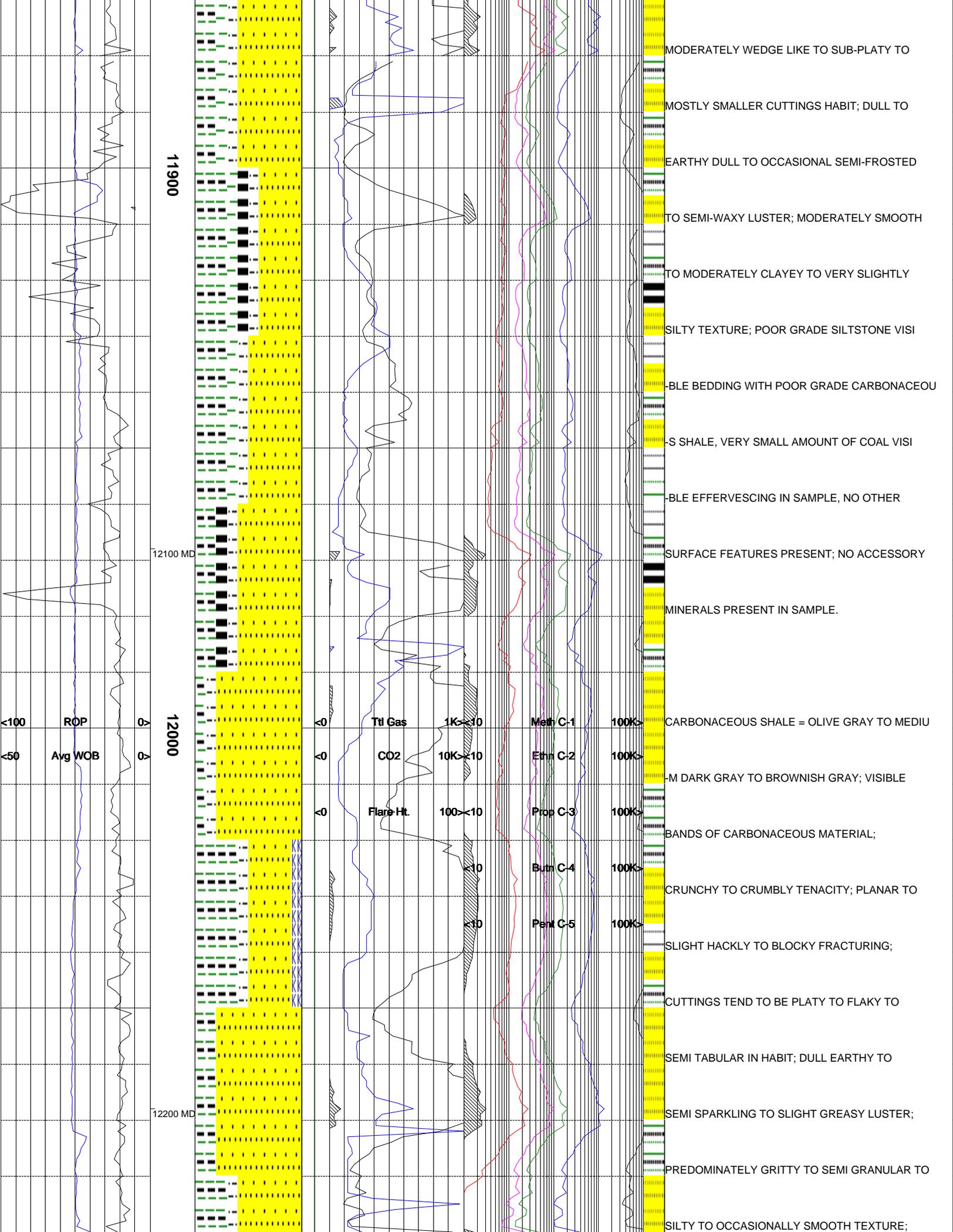
SILTSTONE = VERY LIGHT BROWNISH GRAY TO

LIGHT YELLOWISH GRAY; CRUNCHY TO STIFF

TO TOUGH TENACITY; IRREGULAR TO SLIGHT







11900

12100 MD

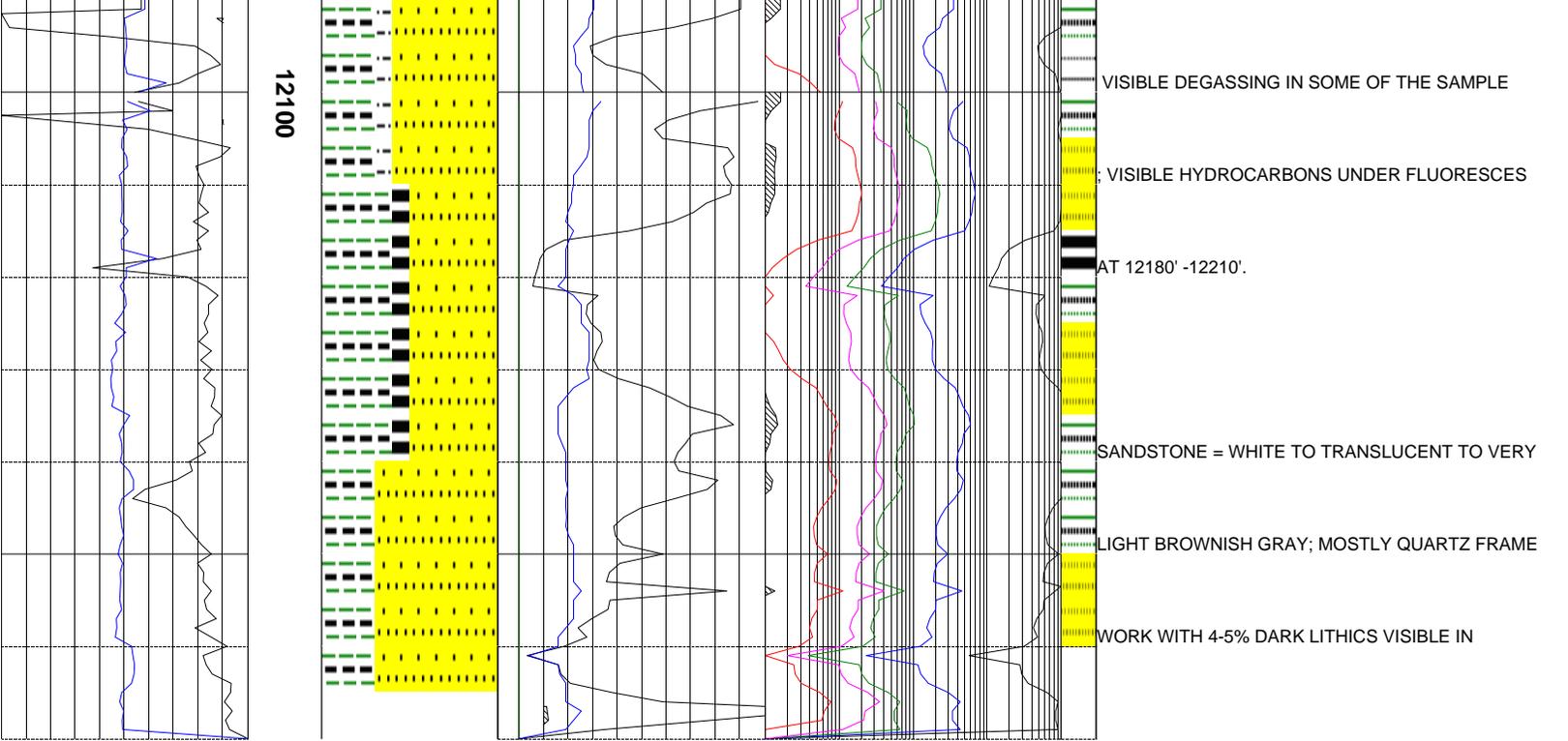
12000

12200 MD

>100 ROP  
<50 Avg WOB

Ttl Gas 1K > 10  
CO2 10K > 10  
Flare Ht. 100 > 10  
Meth C-1 100K >  
Ethn C-2 100K >  
Prop C-3 100K >  
Butn C-4 100K >  
Pent C-5 100K >

MODERATELY WEDGE LIKE TO SUB-PLATY TO  
MOSTLY SMALLER CUTTINGS HABIT; DULL TO  
EARTHY DULL TO OCCASIONAL SEMI-FROSTED  
TO SEMI-WAXY LUSTER; MODERATELY SMOOTH  
TO MODERATELY CLAYEY TO VERY SLIGHTLY  
SILTY TEXTURE; POOR GRADE SILTSTONE VISI  
BLE BEDDING WITH POOR GRADE CARBONACEOU  
S SHALE, VERY SMALL AMOUNT OF COAL VISI  
BLE EFFERVESCING IN SAMPLE, NO OTHER  
SURFACE FEATURES PRESENT; NO ACCESSORY  
MINERALS PRESENT IN SAMPLE.  
CARBONACEOUS SHALE = OLIVE GRAY TO MEDIU  
M DARK GRAY TO BROWNISH GRAY; VISIBLE  
BANDS OF CARBONACEOUS MATERIAL;  
CRUNCHY TO CRUMBLY TENACITY; PLANAR TO  
SLIGHT HACKLY TO BLOCKY FRACTURING;  
CUTTINGS TEND TO BE PLATY TO FLAKY TO  
SEMI TABULAR IN HABIT; DULL EARTHY TO  
SEMI SPARKLING TO SLIGHT GREASY LUSTER;  
PREDOMINATELY GRITTY TO SEMI GRANULAR TO  
SILTY TO OCCASIONALLY SMOOTH TEXTURE;



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