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Bakersfield, CA
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New Iberia, LA
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(907) 561-2465

MUDLOG TVD

COMPANY ExxonMobil Corporation
WELL PCU 296-5A04
FIELD Piceance Creek
REGION Rockies
COORDINATES 39.911931000
108.198593000
ELEVATION 7295.8'
COUNTY, STATE Rio Blanco, CO
API INDEX 051031124500
SPUD DATE 11/09/2009
CONTRACTOR Helmerich and Payne
CO. REP. Candice Curtis/Mark Hudon
RIG/TYPE Flex 4/Rig 321
LOGGING UNIT 031
GEOLOGISTS Chad Record, Mike Franco,
Bart Smelser, Mark Gross
ADD. PERSONS Mickey Piper,
Robert McCane
CO. GEOLOGIST Chris Alba

LOG INTERVAL

CASING DATA

DEPTHS: 4705' TO 13757'
DATES: 10/31/2010 TO 12/08/2010
SCALE: 5" = 100'

16" AT 150'
10.75" AT 4616'
7.00" AT 9992'
4.50" AT 13735'

MUD TYPES

HOLE SIZE

Water Based TO 13757'
TO
TO
TO

14.75" TO 4704'
9.875" TO 10004'
6.125" TO 13757'
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	KAOLINIC	RECRYSTALLIZED CALCITE	VOLCANICS
CHALK	DIATOMITE	LIMESTONE	RHYOLITE	
CRYSTALLINE TUFF	DIORITE	LITHIC TUFF	SALT	
CHERT - ARGILL	DOLOSTONE	MARL - DOLO	SAND	

4600 MD

4600

4700 MD

4700

4800 MD

GAS CHROMATOGRAPHY EQUIPMENT CALIBRATED

TO A TEST GAS COMPOSED OF THE FOLLOWING:

METHANE = 10,000 PPM

ETHANE = 1,000 PPM

PROPANE = 1,000 PPM

I-BUTANE = 1,000 PPM

N-BUTANE = 1,000 PPM

I-PENTANE = 1,000 PPM

N-PENTANE = 1,000 PPM

EPOCH WELL SERVICES COMMENCED LOGGING

THE PCU 296-5A 04 WELL ON 11/01/2010

@ 4704' MD.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRA

Y TO VERY LIGHT BROWNISH GRAY TO OCCASI

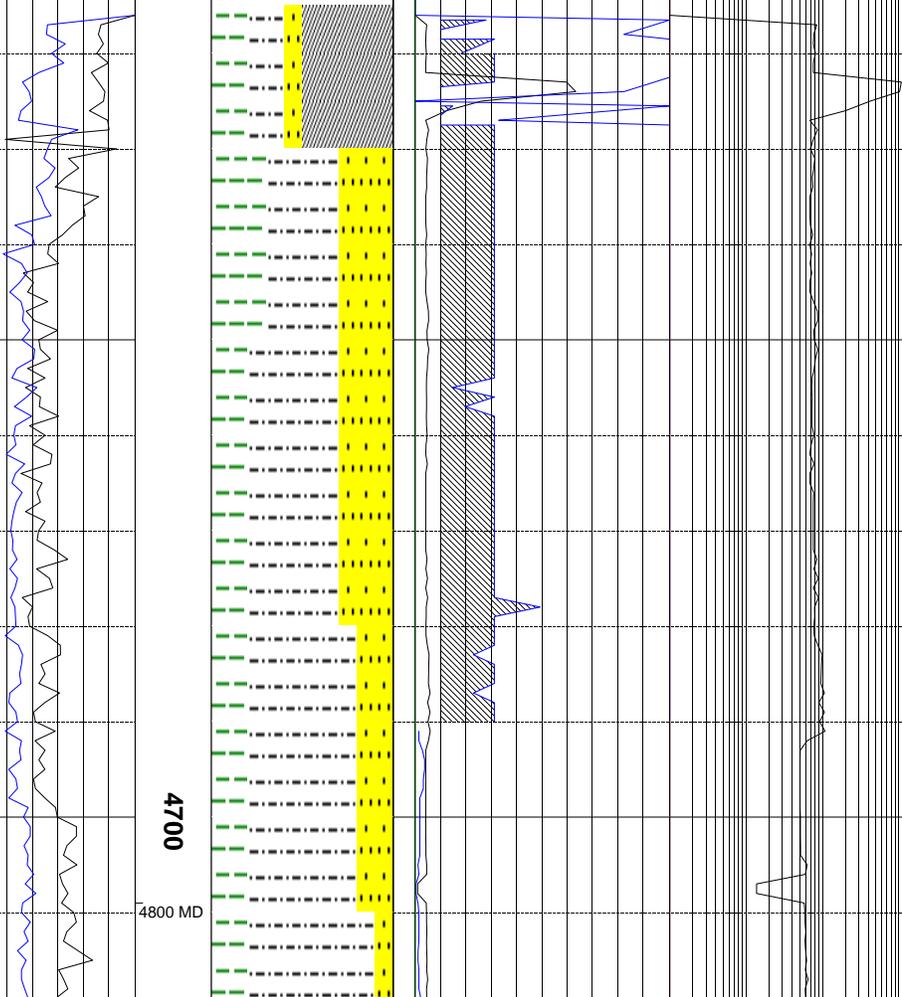
ONAL LIGHT PALE YELLOWISH ORANGE IN

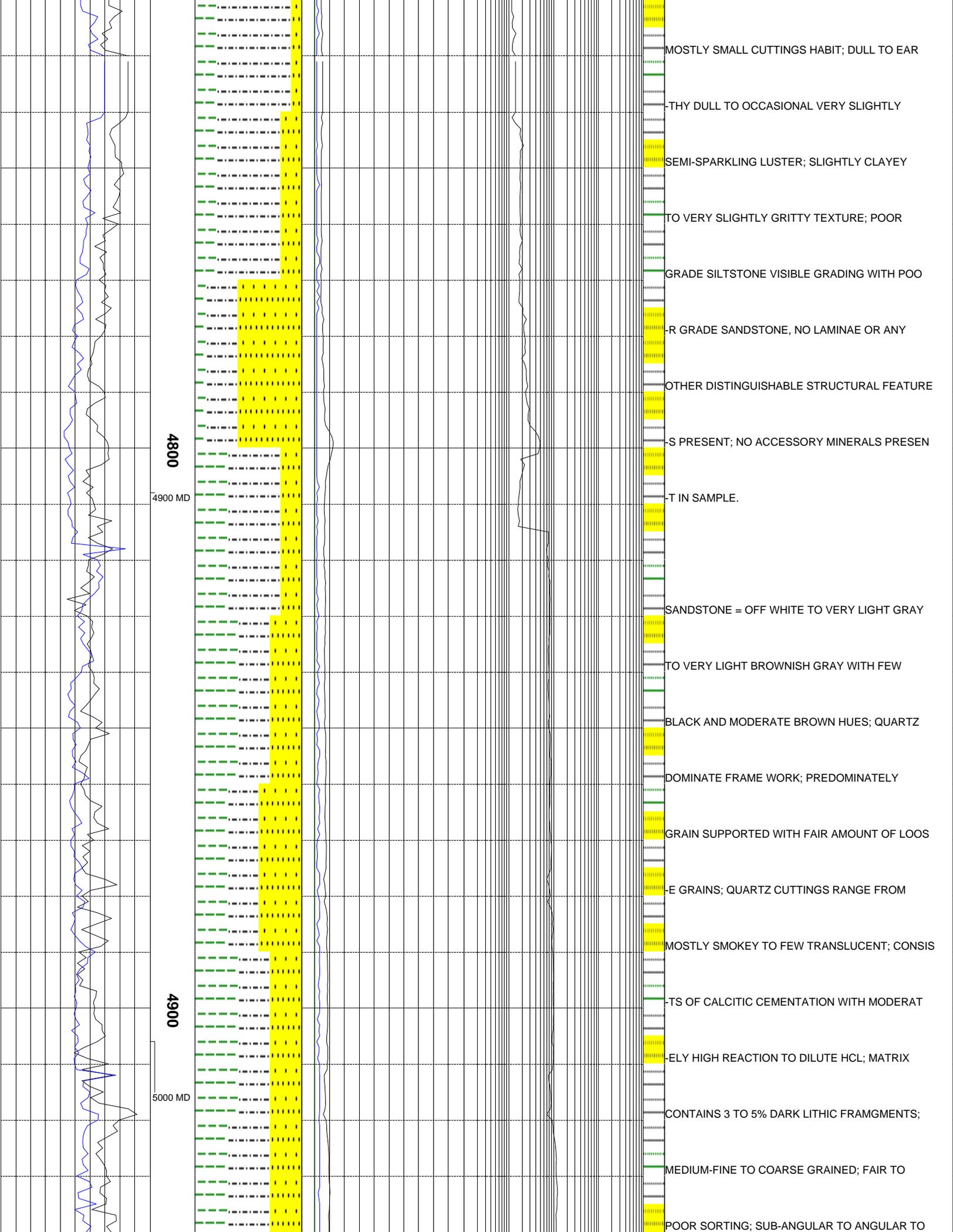
COLOR; VERY SLIGHTLY DENSE TO SLIGHTLY

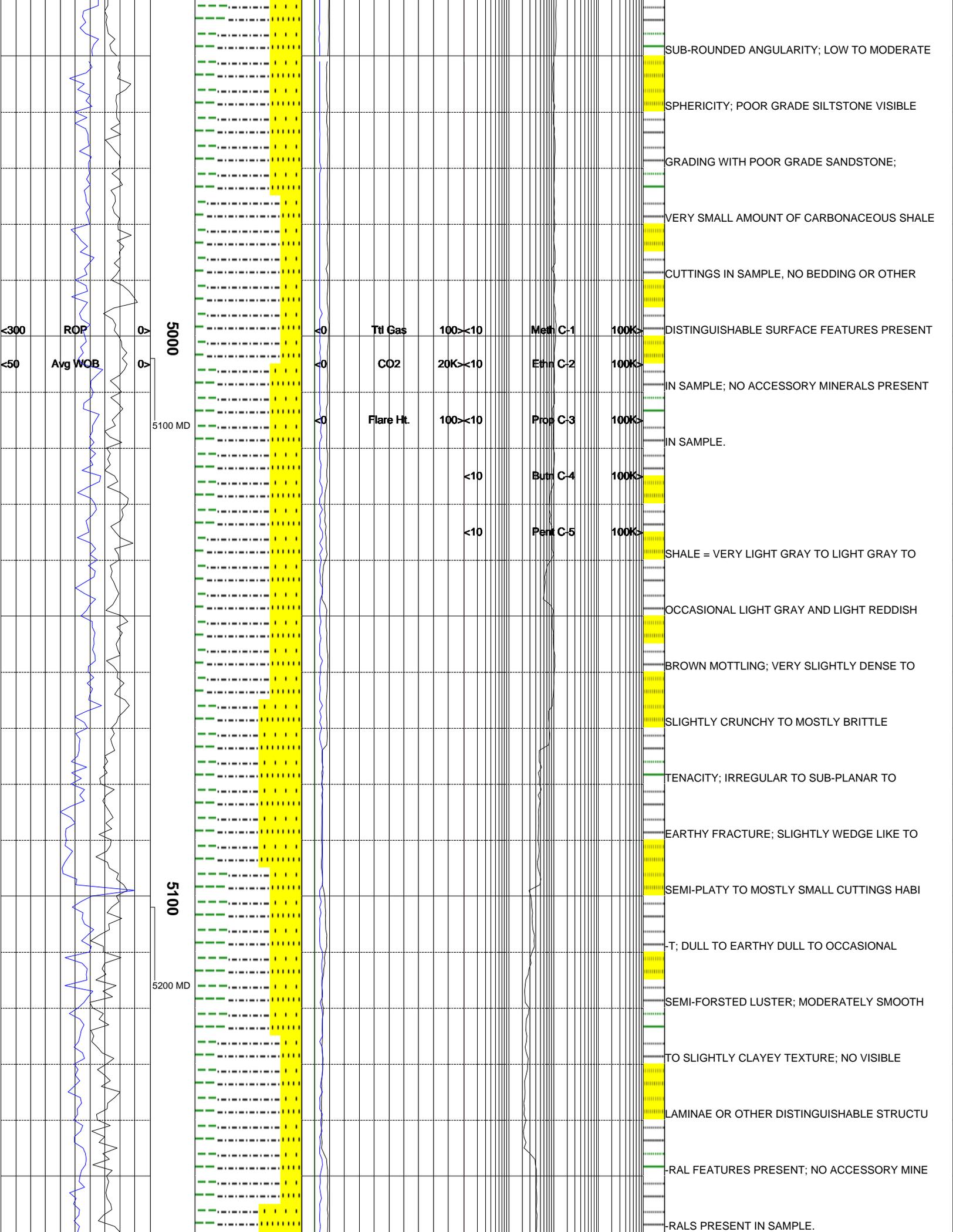
CRUMBLY TO SLIGHTLY BRITTLE TENACITY;

IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY

FRACTURE; SUB-TABULAR TO SUB-NODULAR TO







300 ROP
 50 Avg WOB

5000

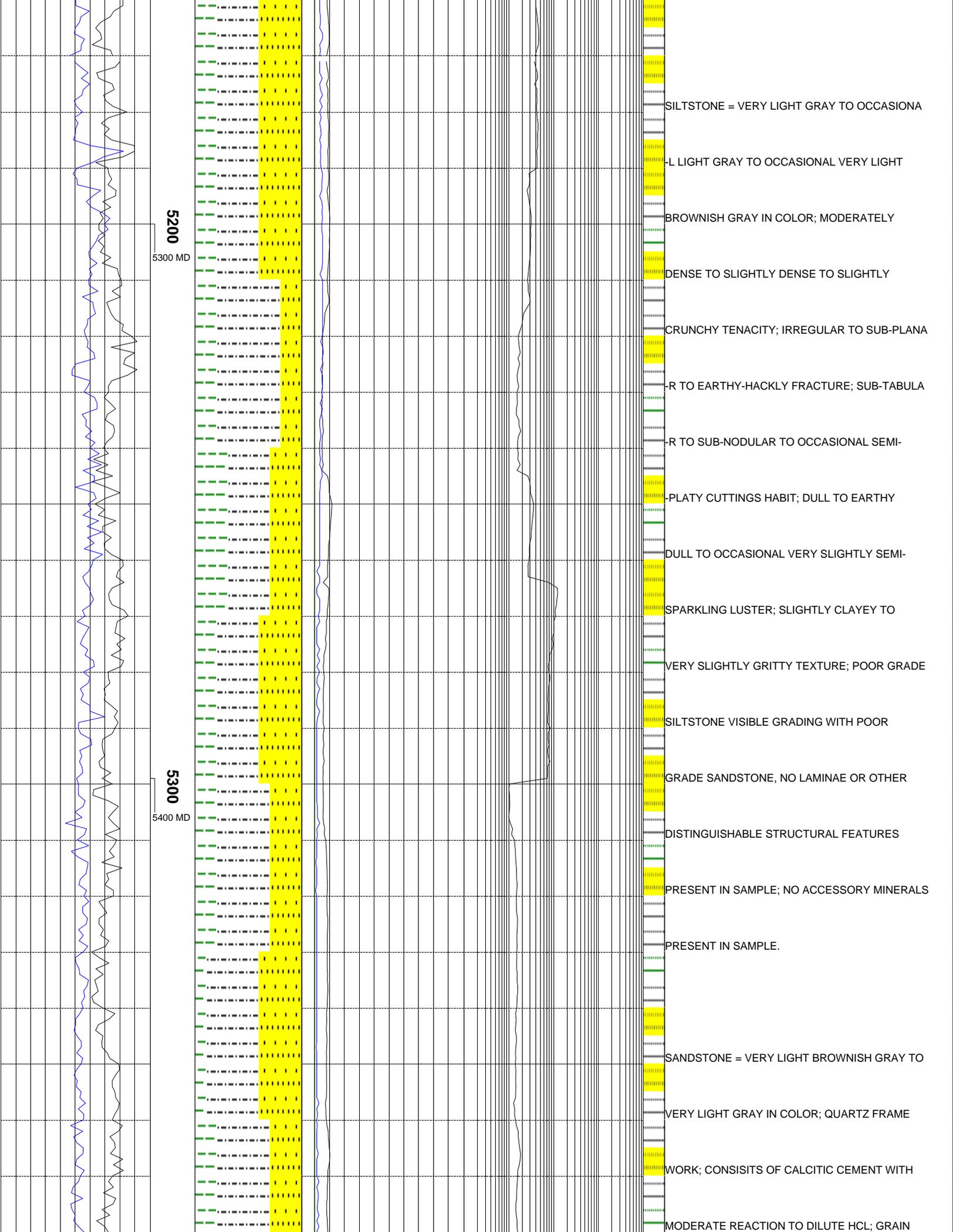
5100 MD

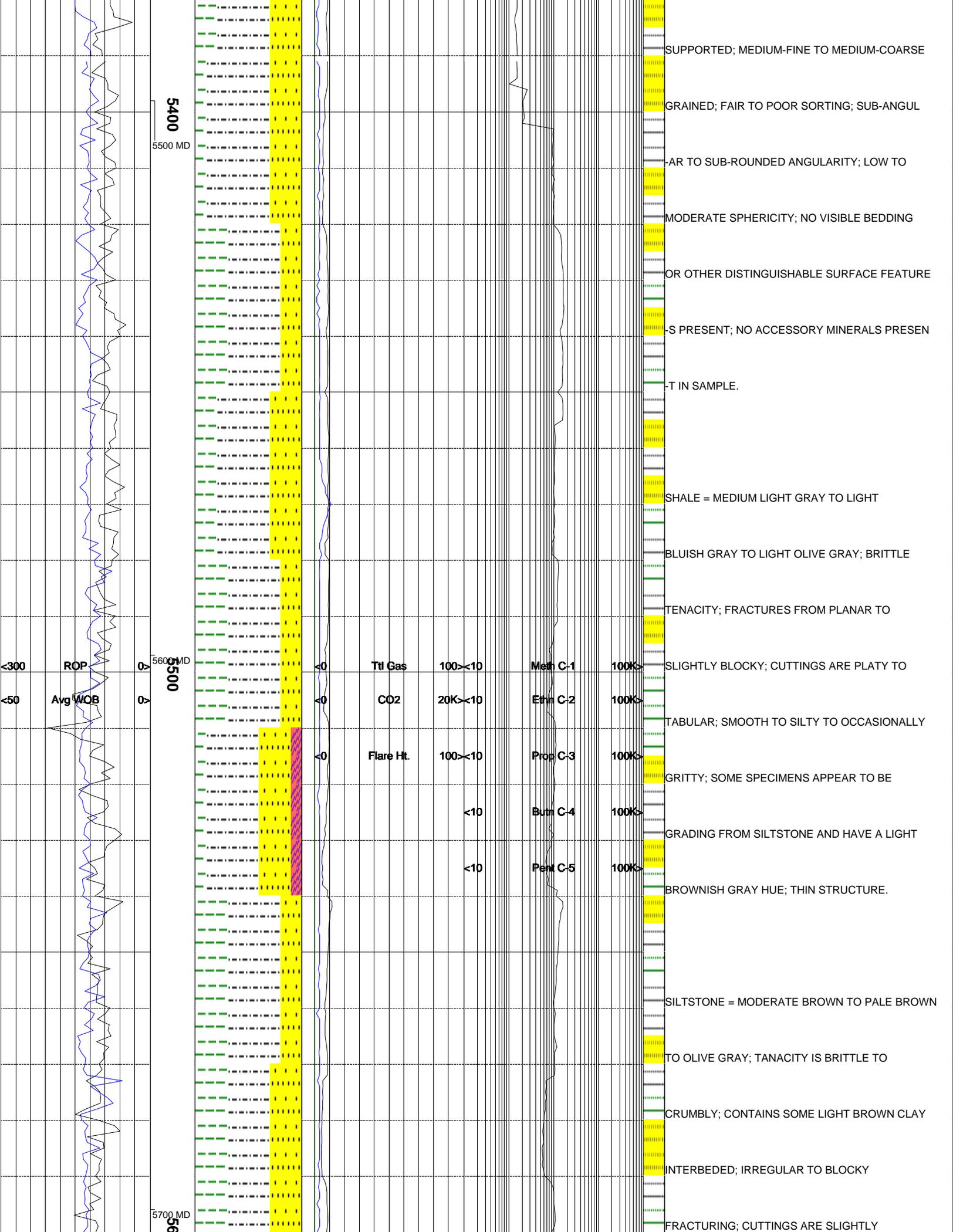
5100

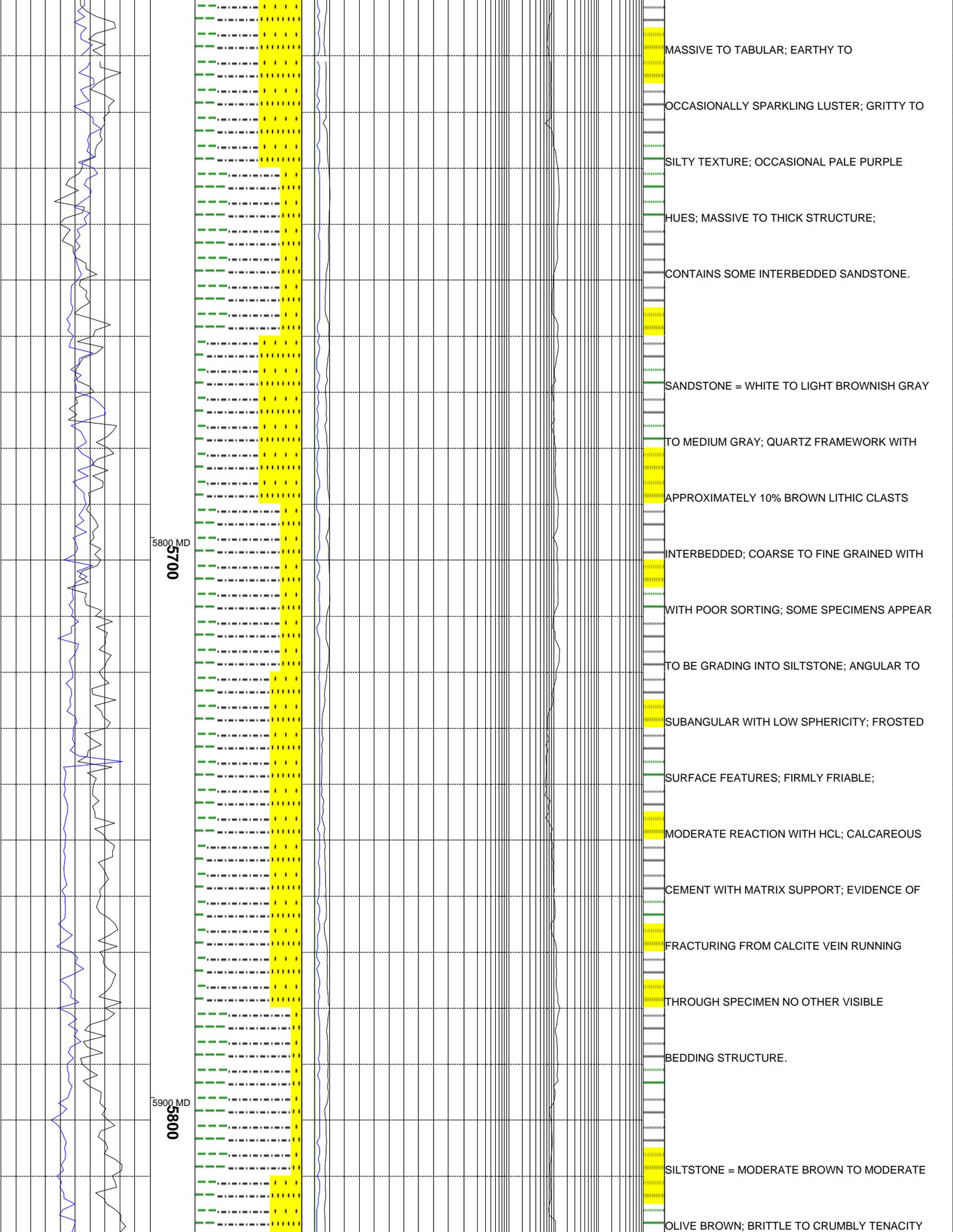
5200 MD

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<0	CO2	20	<10	Ethn C-2	100	>
<0	Flare Ht.	100	<10	Prop C-3	100	>
			<10	Butn C-4	100	>
			<10	Pent C-5	100	>

SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE
 GRADING WITH POOR GRADE SANDSTONE;
 VERY SMALL AMOUNT OF CARBONACEOUS SHALE
 CUTTINGS IN SAMPLE, NO BEDDING OR OTHER
 DISTINGUISHABLE SURFACE FEATURES PRESENT
 IN SAMPLE; NO ACCESSORY MINERALS PRESENT
 IN SAMPLE.
 SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO OCCASIONAL LIGHT GRAY AND LIGHT REDDISH
 BROWN MOTTLING; VERY SLIGHTLY DENSE TO SLIGHTLY CRUNCHY TO MOSTLY BRITTLE
 TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHLY FRACTURE; SLIGHTLY WEDGE LIKE TO SEMI-PLATY TO MOSTLY SMALL CUTTINGS HABI
 T; DULL TO EARTHLY DULL TO OCCASIONAL SEMI-FORSTED LUSTER; MODERATELY SMOOTH
 TO SLIGHTLY CLAYEY TEXTURE; NO VISIBLE LAMINAE OR OTHER DISTINGUISHABLE STRUCTU
 RAL FEATURES PRESENT; NO ACCESSORY MINE
 RALS PRESENT IN SAMPLE.



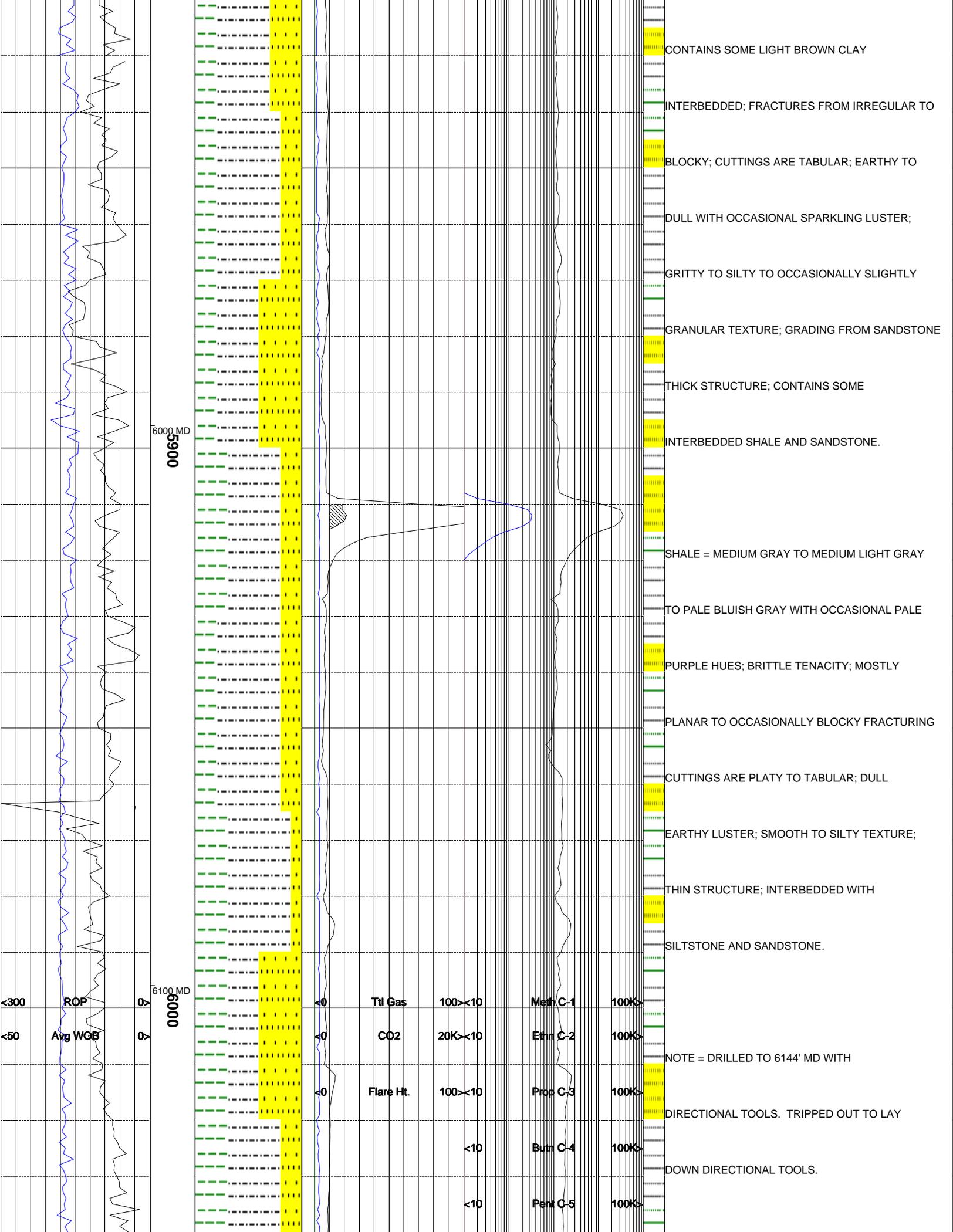




5800 MD
5700

5900 MD
5800

MASSIVE TO TABULAR; EARTHY TO
OCCASIONALLY SPARKLING LUSTER; GRITTY TO
SILTY TEXTURE; OCCASIONAL PALE PURPLE
HUES; MASSIVE TO THICK STRUCTURE;
CONTAINS SOME INTERBEDDED SANDSTONE.
SANDSTONE = WHITE TO LIGHT BROWNISH GRAY
TO MEDIUM GRAY; QUARTZ FRAMEWORK WITH
APPROXIMATELY 10% BROWN LITHIC CLASTS
INTERBEDDED; COARSE TO FINE GRAINED WITH
WITH POOR SORTING; SOME SPECIMENS APPEAR
TO BE GRADING INTO SILTSTONE; ANGULAR TO
SUBANGULAR WITH LOW SPHERICITY; FROSTED
SURFACE FEATURES; FIRMLY FRIABLE;
MODERATE REACTION WITH HCL; CALCAREOUS
CEMENT WITH MATRIX SUPPORT; EVIDENCE OF
FRACTURING FROM CALCITE VEIN RUNNING
THROUGH SPECIMEN NO OTHER VISIBLE
BEDDING STRUCTURE.
SILTSTONE = MODERATE BROWN TO MODERATE
OLIVE BROWN; BRITTLE TO CRUMBLY TENACITY



6000 MD
0069

6100 MD
0009

CONTAINS SOME LIGHT BROWN CLAY

INTERBEDDED; FRACTURES FROM IRREGULAR TO BLOCKY; CUTTINGS ARE TABULAR; EARTHY TO DULL WITH OCCASIONAL SPARKLING LUSTER; GRITTY TO SILTY TO OCCASIONALLY SLIGHTLY GRANULAR TEXTURE; GRADING FROM SANDSTONE THICK STRUCTURE; CONTAINS SOME INTERBEDDED SHALE AND SANDSTONE.

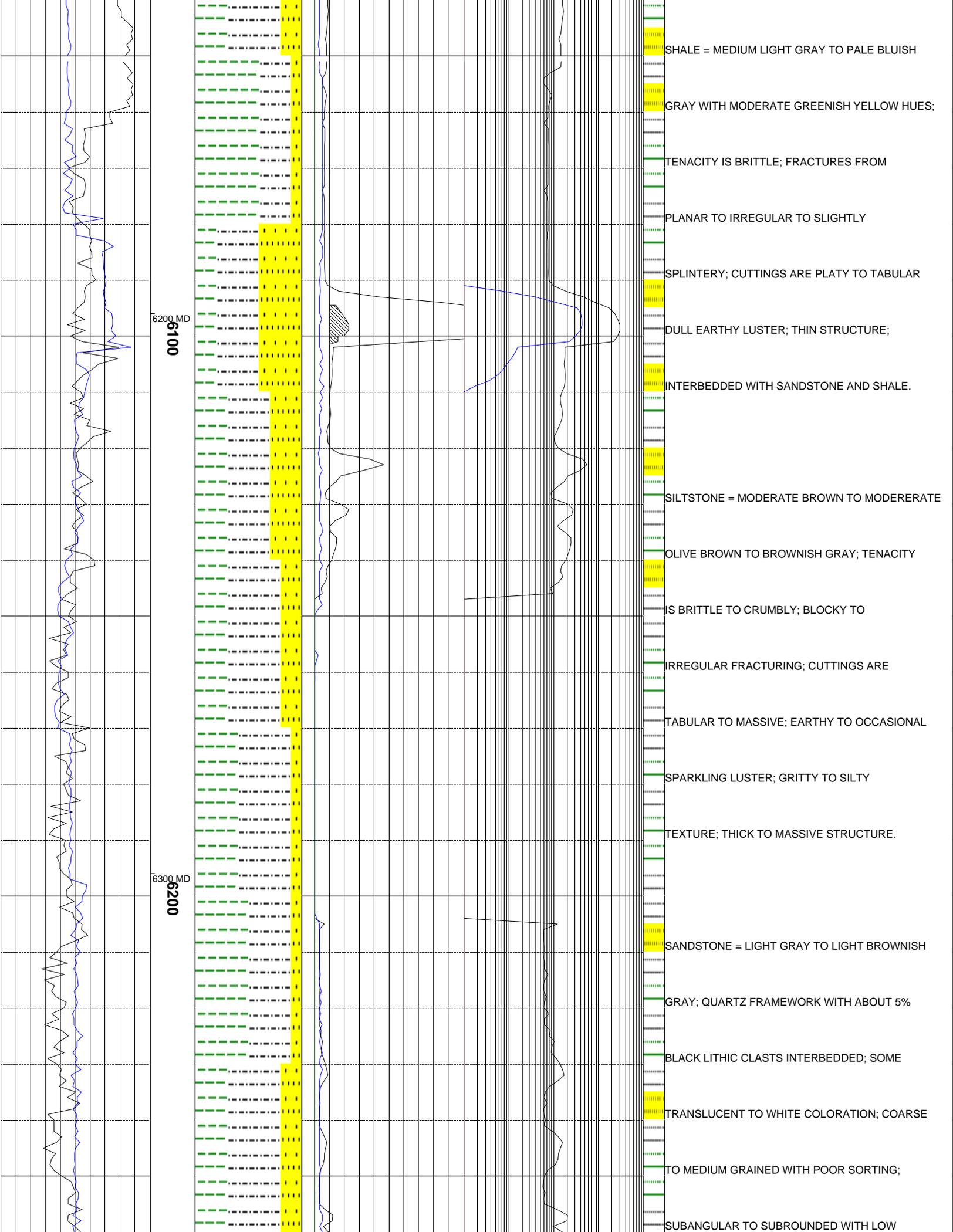
SHALE = MEDIUM GRAY TO MEDIUM LIGHT GRAY TO PALE BLUISH GRAY WITH OCCASIONAL PALE PURPLE HUES; BRITTLE TENACITY; MOSTLY PLANAR TO OCCASIONALLY BLOCKY FRACTURING CUTTINGS ARE PLATY TO TABULAR; DULL EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SILTSTONE AND SANDSTONE.

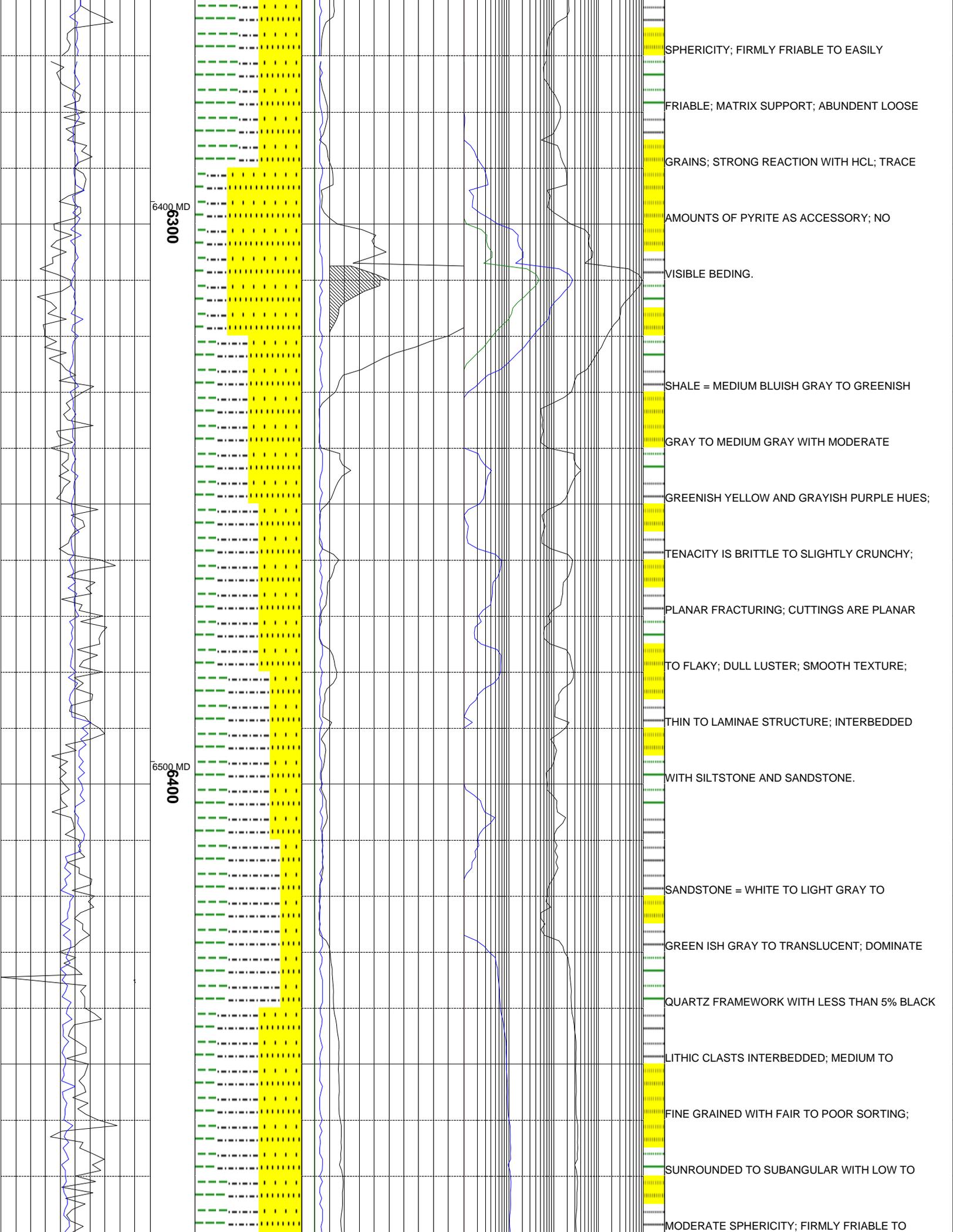
NOTE = DRILLED TO 6144' MD WITH DIRECTIONAL TOOLS. TRIPPED OUT TO LAY DOWN DIRECTIONAL TOOLS.

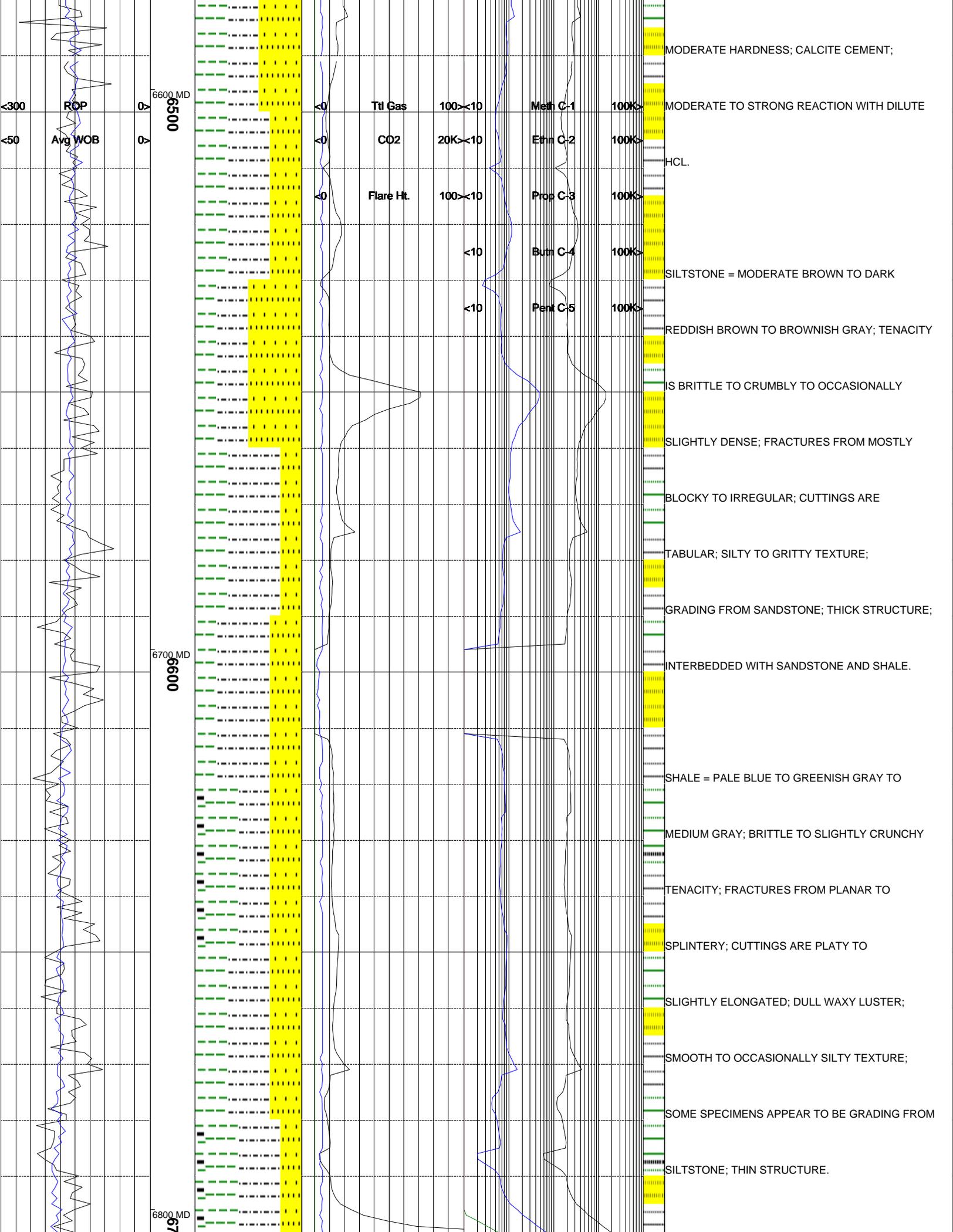
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<0	CO2	20K<10	Ethn C-2	100K>
<0	Flare Ht.	100<10	Prop C-3	100K>
		<10	Burn C-4	100K>
		<10	Pent C-5	100K>

<300 ROP

<50 Avg WGB







6600 MD
6500

6700 MD
0099

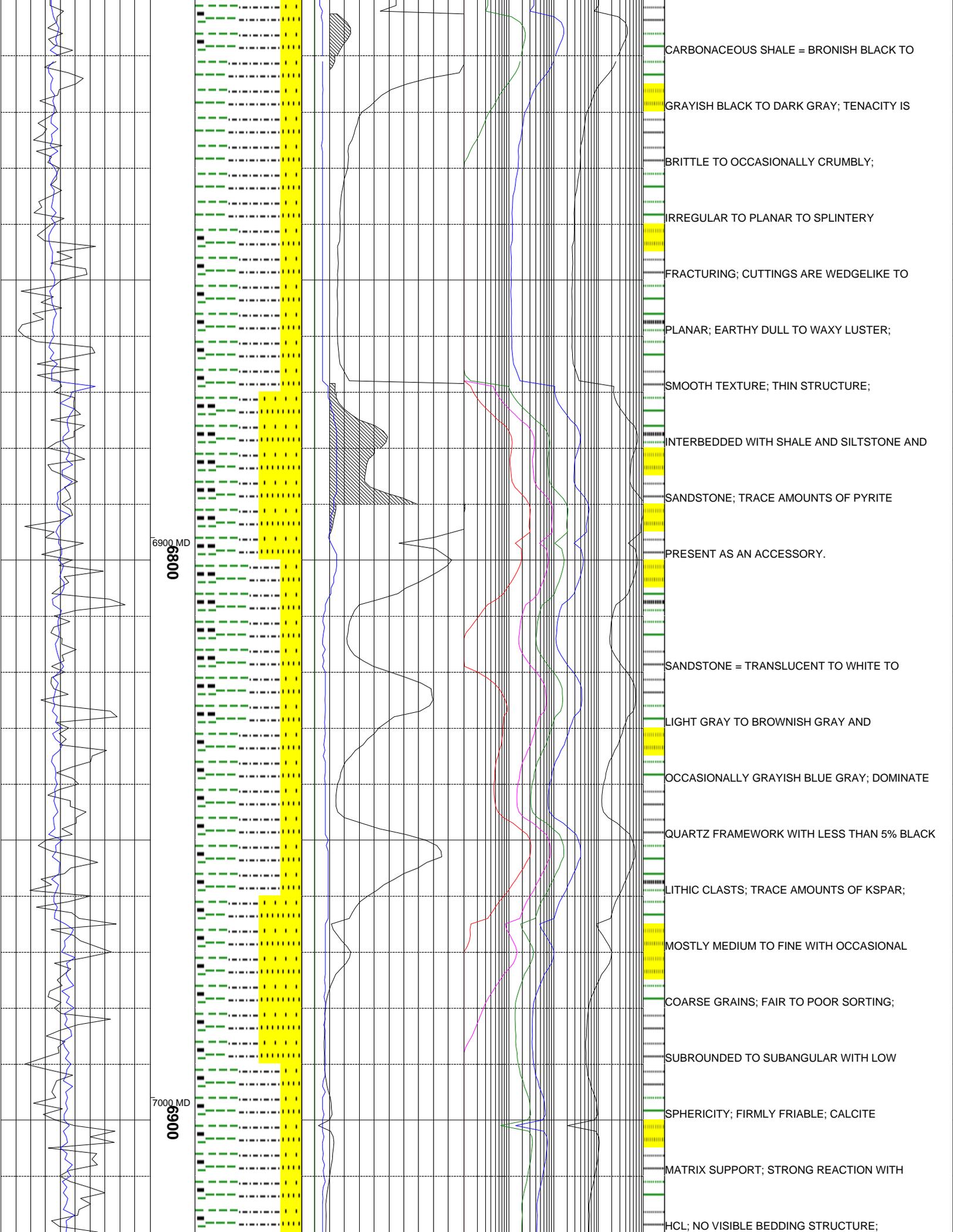
6800 MD
67

<300 ROP
<50 Avg WOB

Ttl Gas 100 < 10
CO2 20K < 10
Flare Ht. 100 < 10
< 10
< 10

Meth C-1 100K >
Ethn C-2 100K >
Prop C-3 100K >
Butn C-4 100K >
Pent C-5 100K >

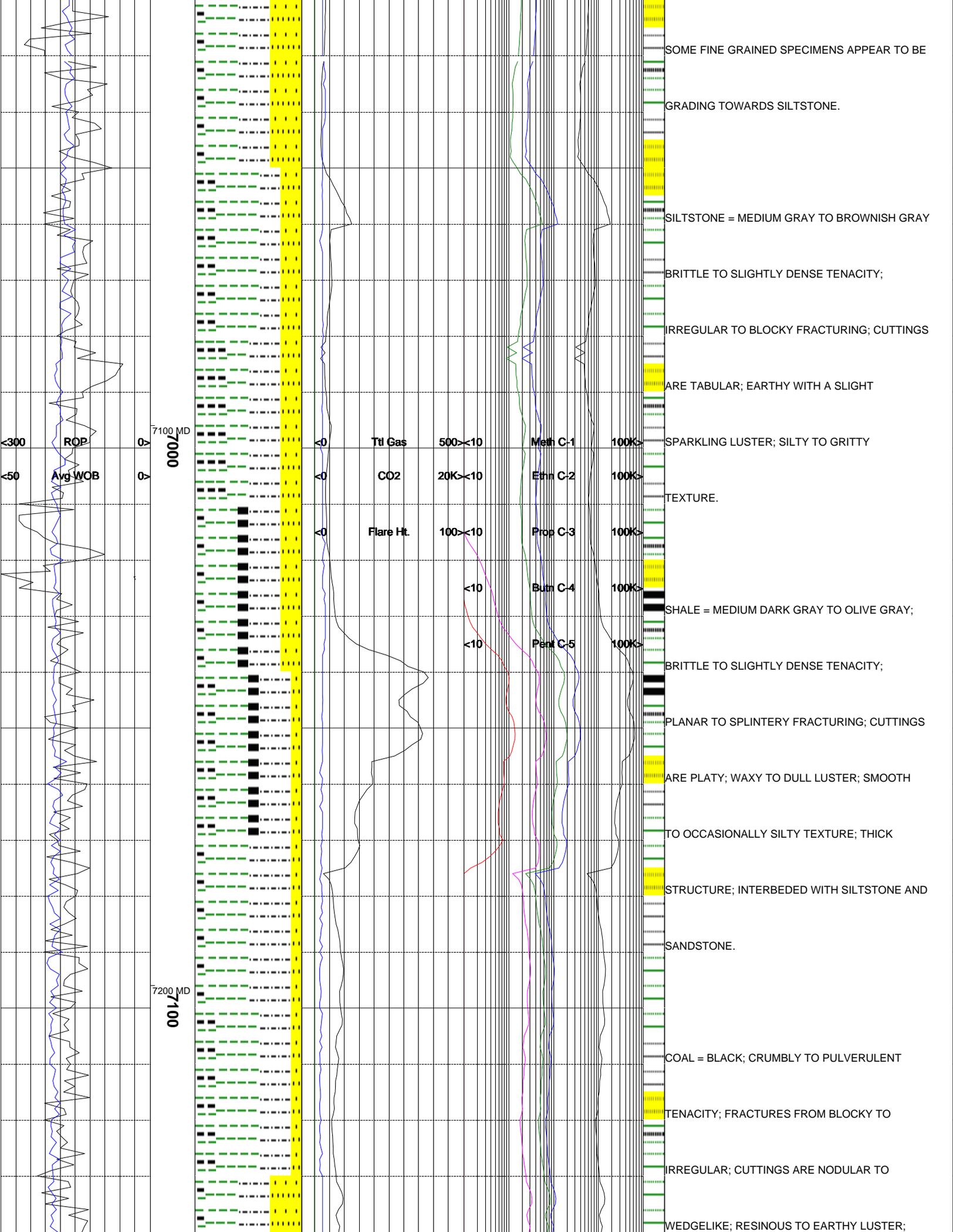
MODERATE HARDNESS; CALCITE CEMENT;
MODERATE TO STRONG REACTION WITH DILUTE
HCL.
SILTSTONE = MODERATE BROWN TO DARK
REDDISH BROWN TO BROWNISH GRAY; TENACITY
IS BRITTLE TO CRUMBLY TO OCCASIONALLY
SLIGHTLY DENSE; FRACTURES FROM MOSTLY
BLOCKY TO IRREGULAR; CUTTINGS ARE
TABULAR; SILTY TO GRITTY TEXTURE;
GRADING FROM SANDSTONE; THICK STRUCTURE;
INTERBEDDED WITH SANDSTONE AND SHALE.
SHALE = PALE BLUE TO GREENISH GRAY TO
MEDIUM GRAY; BRITTLE TO SLIGHTLY CRUNCHY
TENACITY; FRACTURES FROM PLANAR TO
SPLINTERY; CUTTINGS ARE PLATY TO
SLIGHTLY ELONGATED; DULL WAXY LUSTER;
SMOOTH TO OCCASIONALLY SILTY TEXTURE;
SOME SPECIMENS APPEAR TO BE GRADING FROM
SILTSTONE; THIN STRUCTURE.



6900 MD
0089

7000 MD
0069

CARBONACEOUS SHALE = BRONISH BLACK TO GRAYISH BLACK TO DARK GRAY; TENACITY IS BRITTLE TO OCCASIONALLY CRUMBLY; IRREGULAR TO PLANAR TO SPLINTERY FRACTURING; CUTTINGS ARE WEDGELIKE TO PLANAR; EARTHY DULL TO WAXY LUSTER; SMOOTH TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SHALE AND SILTSTONE AND SANDSTONE; TRACE AMOUNTS OF PYRITE PRESENT AS AN ACCESSORY. SANDSTONE = TRANSLUCENT TO WHITE TO LIGHT GRAY TO BROWNISH GRAY AND OCCASIONALLY GRAYISH BLUE GRAY; DOMINATE QUARTZ FRAMEWORK WITH LESS THAN 5% BLACK LITHIC CLASTS; TRACE AMOUNTS OF KSPAR; MOSTLY MEDIUM TO FINE WITH OCCASIONAL COARSE GRAINS; FAIR TO POOR SORTING; SUBROUNDED TO SUBANGULAR WITH LOW SPHERICITY; FIRMLY FRIABLE; CALCITE MATRIX SUPPORT; STRONG REACTION WITH HCL; NO VISIBLE BEDDING STRUCTURE;



SOME FINE GRAINED SPECIMENS APPEAR TO BE

GRADING TOWARDS SILTSTONE.

SILTSTONE = MEDIUM GRAY TO BROWNISH GRAY

BRITTLE TO SLIGHTLY DENSE TENACITY;

IRREGULAR TO BLOCKY FRACTURING; CUTTINGS

ARE TABULAR; EARTHY WITH A SLIGHT

SPARKLING LUSTER; SILTY TO GRITTY

TEXTURE.

SHALE = MEDIUM DARK GRAY TO OLIVE GRAY;

BRITTLE TO SLIGHTLY DENSE TENACITY;

PLANAR TO SPLINTERY FRACTURING; CUTTINGS

ARE PLATY; WAXY TO DULL LUSTER; SMOOTH

TO OCCASIONALLY SILTY TEXTURE; THICK

STRUCTURE; INTERBEDDED WITH SILTSTONE AND

SANDSTONE.

COAL = BLACK; CRUMBLY TO PULVERULENT

TENACITY; FRACTURES FROM BLOCKY TO

IRREGULAR; CUTTINGS ARE NODULAR TO

WEDGELIKE; RESINOUS TO EARTHY LUSTER;

7100 MD

7200 MD

<300 ROP

<50 Avg WOB

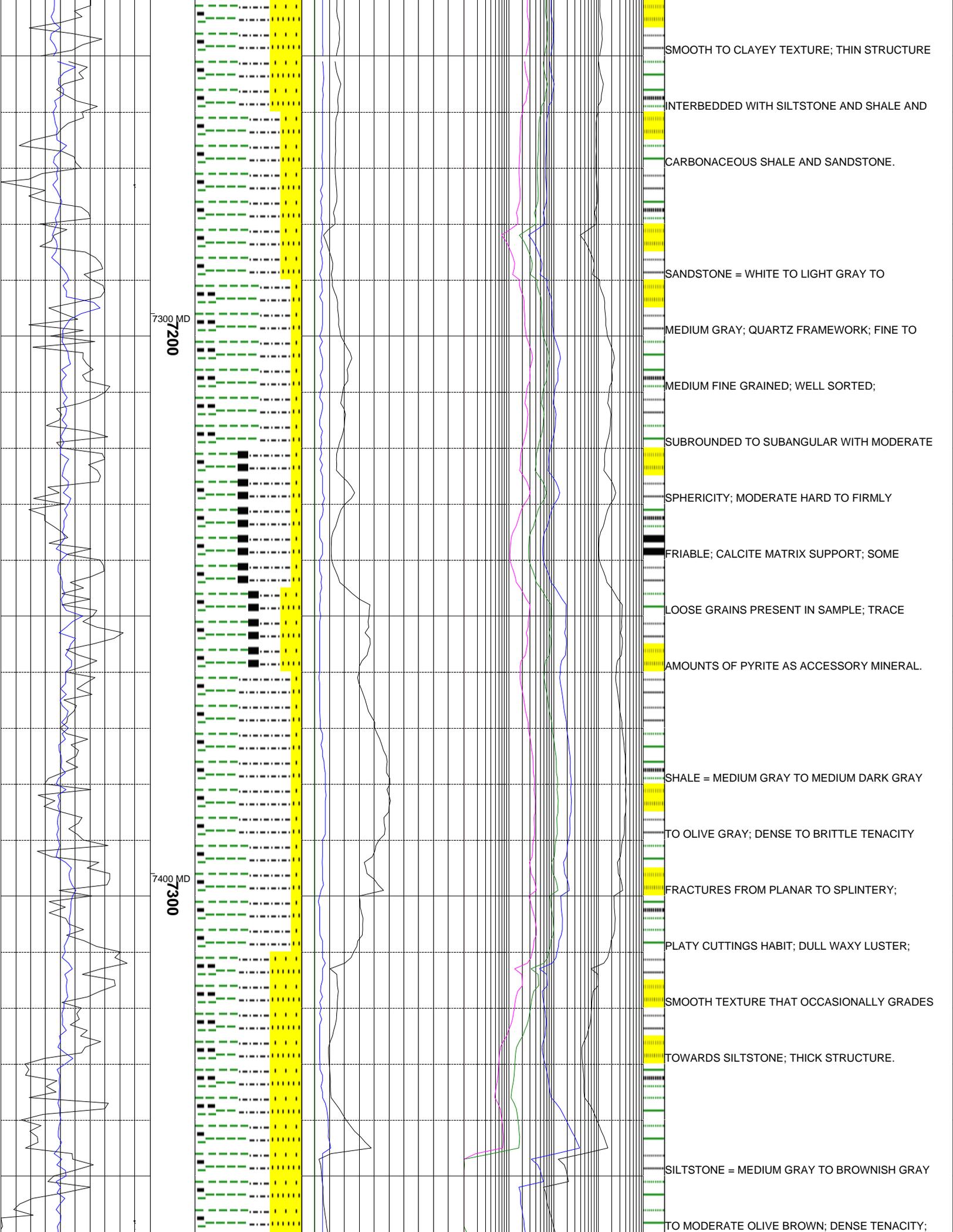
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CO2 20K <10 Ethn C-2 100K >

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

<10 Butn C-4 100K >

<10 Peat C-5 100K >



7300 MD
7200

7400 MD
7300

SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE

INTERBEDDED WITH SILTSTONE AND SHALE AND CARBONACEOUS SHALE AND SANDSTONE.

SANDSTONE = WHITE TO LIGHT GRAY TO MEDIUM GRAY; QUARTZ FRAMEWORK; FINE TO MEDIUM FINE GRAINED; WELL SORTED; SUBROUNDED TO SUBANGULAR WITH MODERATE SPHERICITY; MODERATE HARD TO FIRMLY FRIABLE; CALCITE MATRIX SUPPORT; SOME LOOSE GRAINS PRESENT IN SAMPLE; TRACE AMOUNTS OF PYRITE AS ACCESSORY MINERAL.

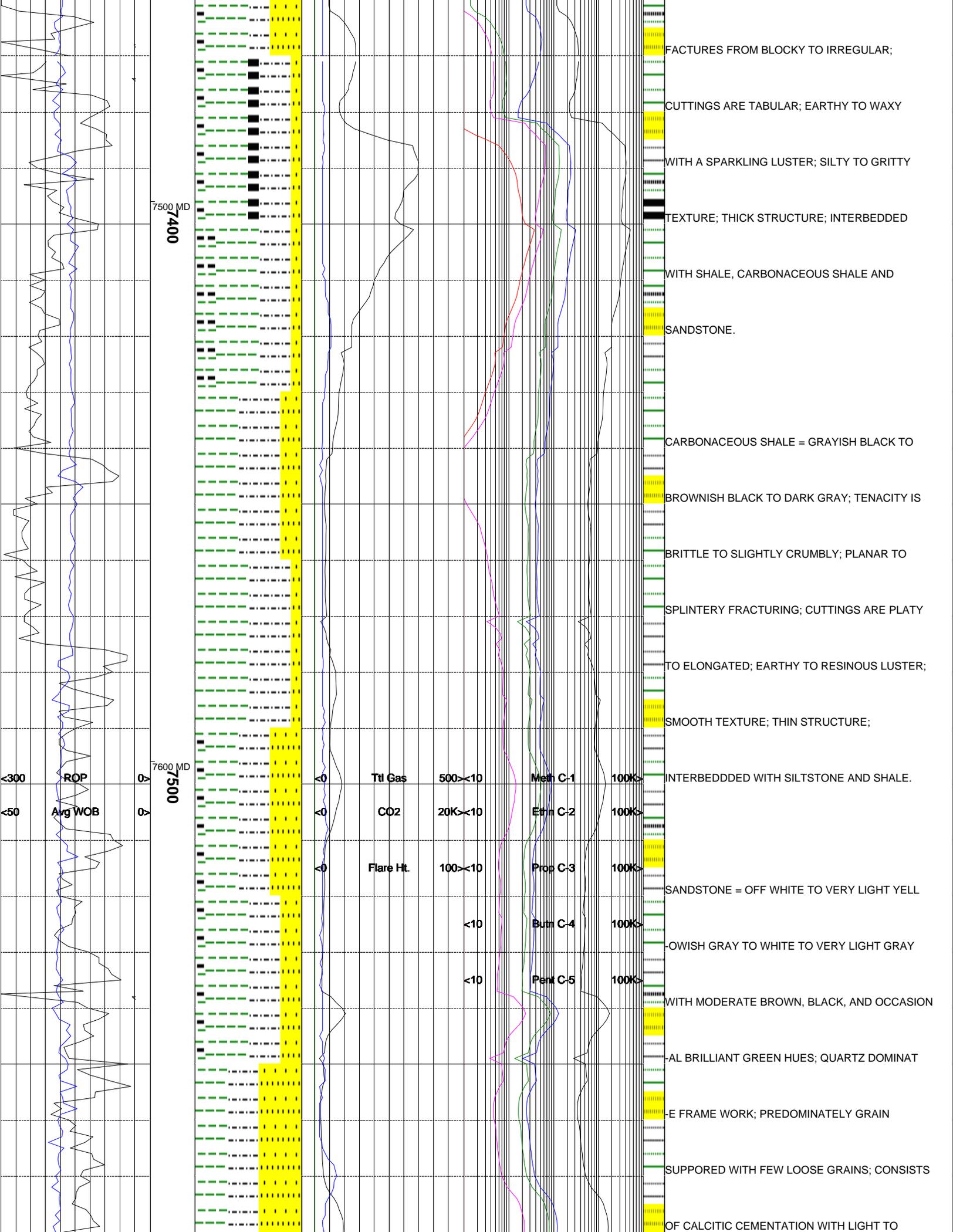
SHALE = MEDIUM GRAY TO MEDIUM DARK GRAY TO OLIVE GRAY; DENSE TO BRITTLE TENACITY

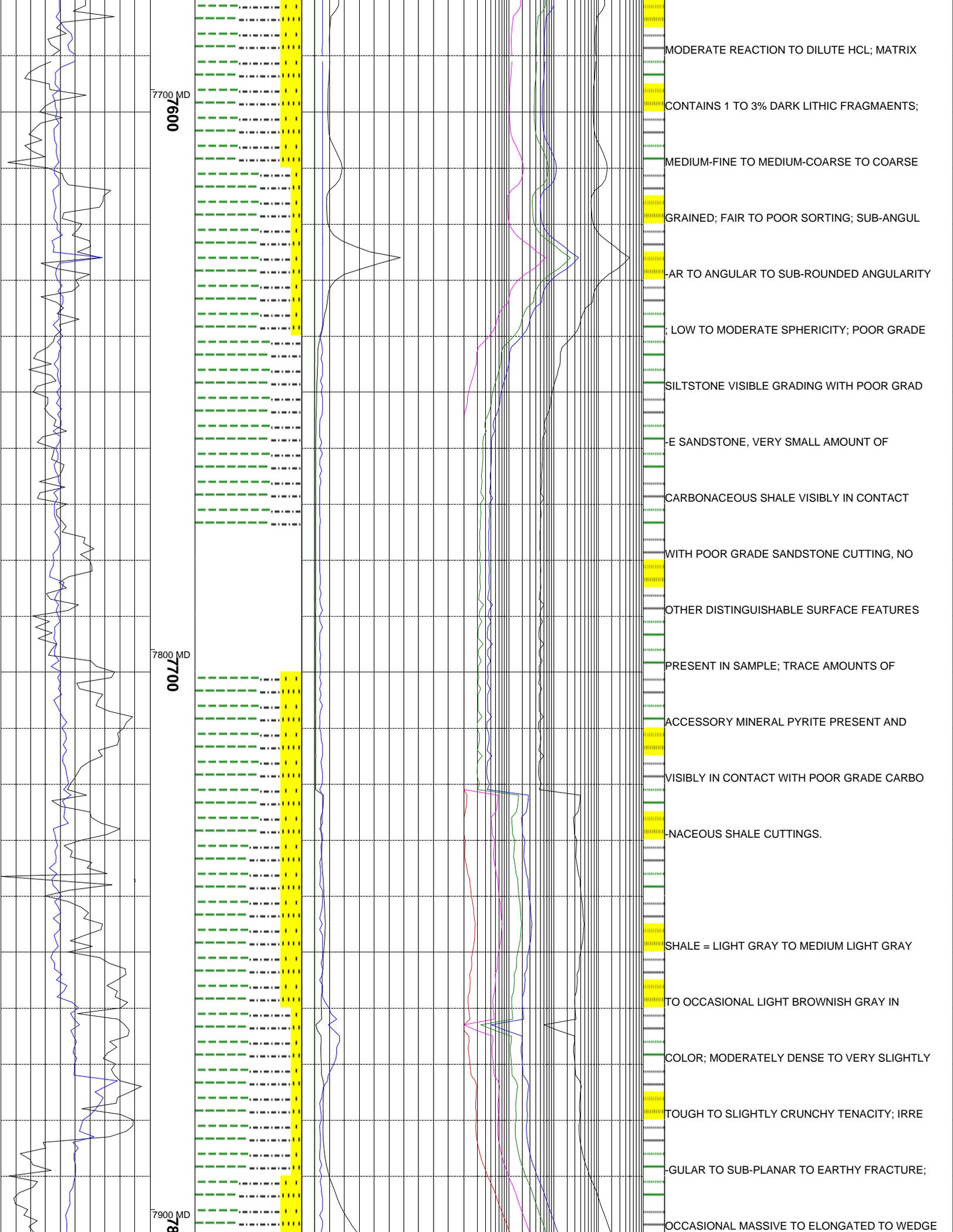
FRACTURES FROM PLANAR TO SPLINTERY;

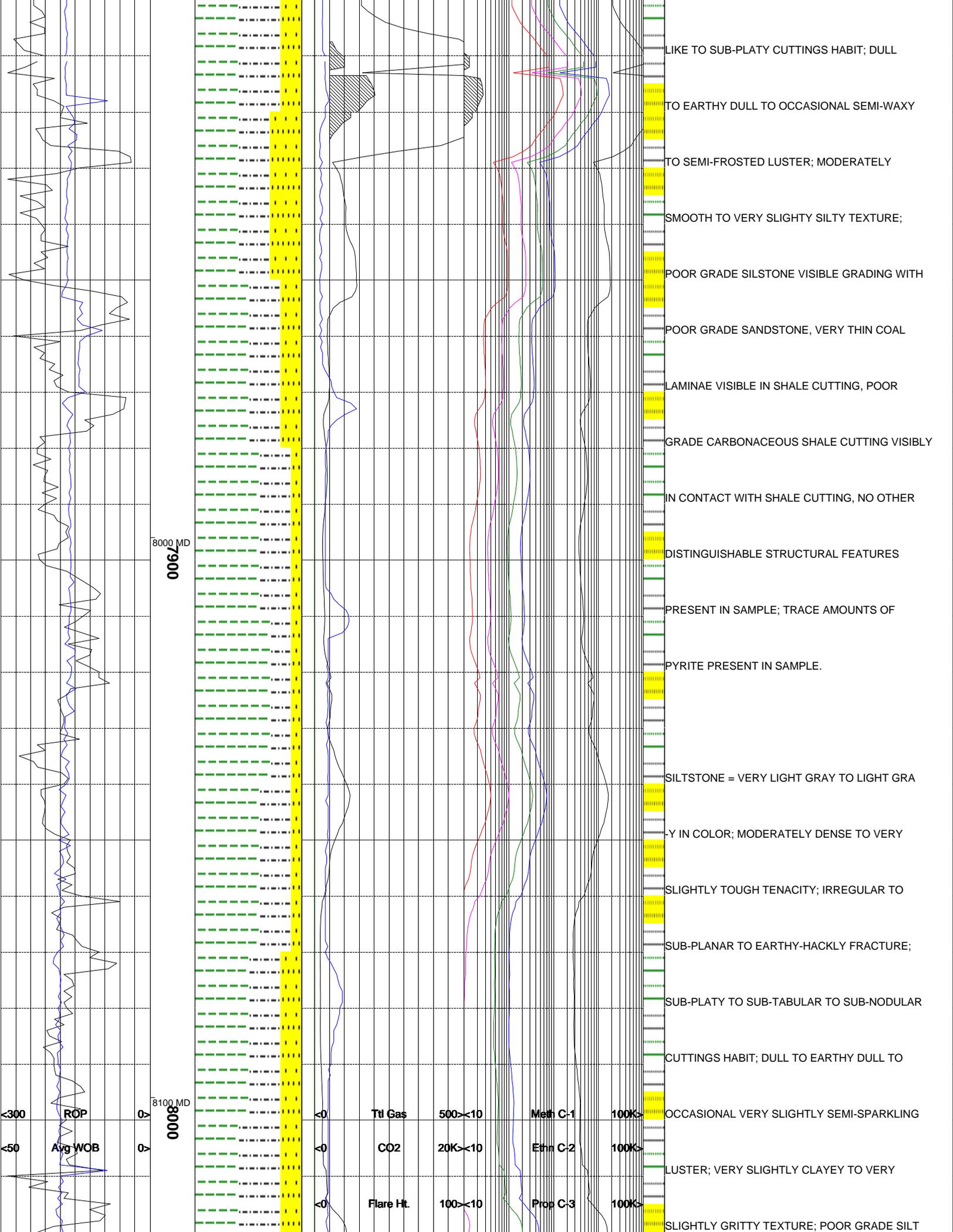
PLATY CUTTINGS HABIT; DULL WAXY LUSTER;

SMOOTH TEXTURE THAT OCCASIONALLY GRADES TOWARDS SILTSTONE; THICK STRUCTURE.

SILTSTONE = MEDIUM GRAY TO BROWNISH GRAY TO MODERATE OLIVE BROWN; DENSE TENACITY;







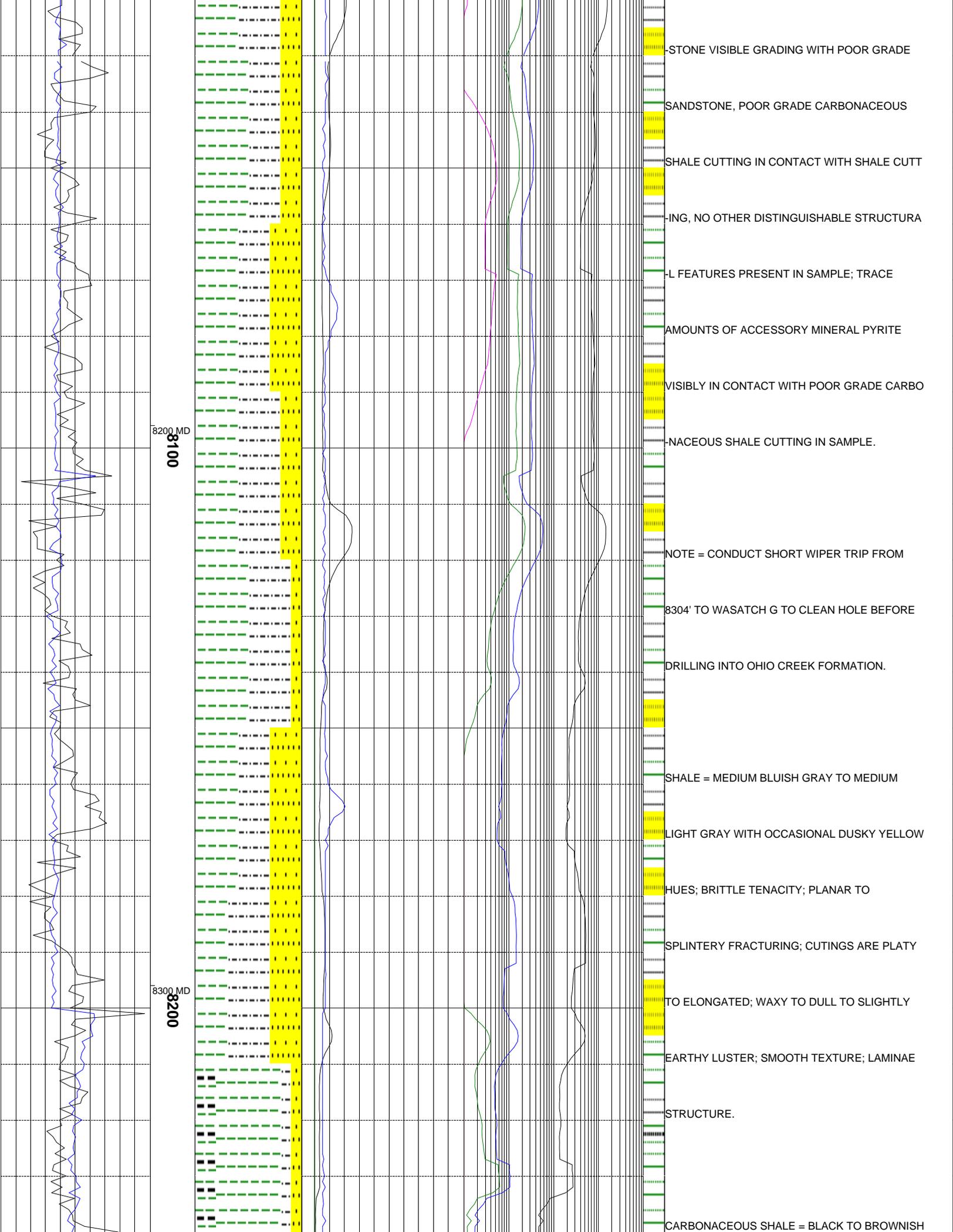
8000 MD
00600

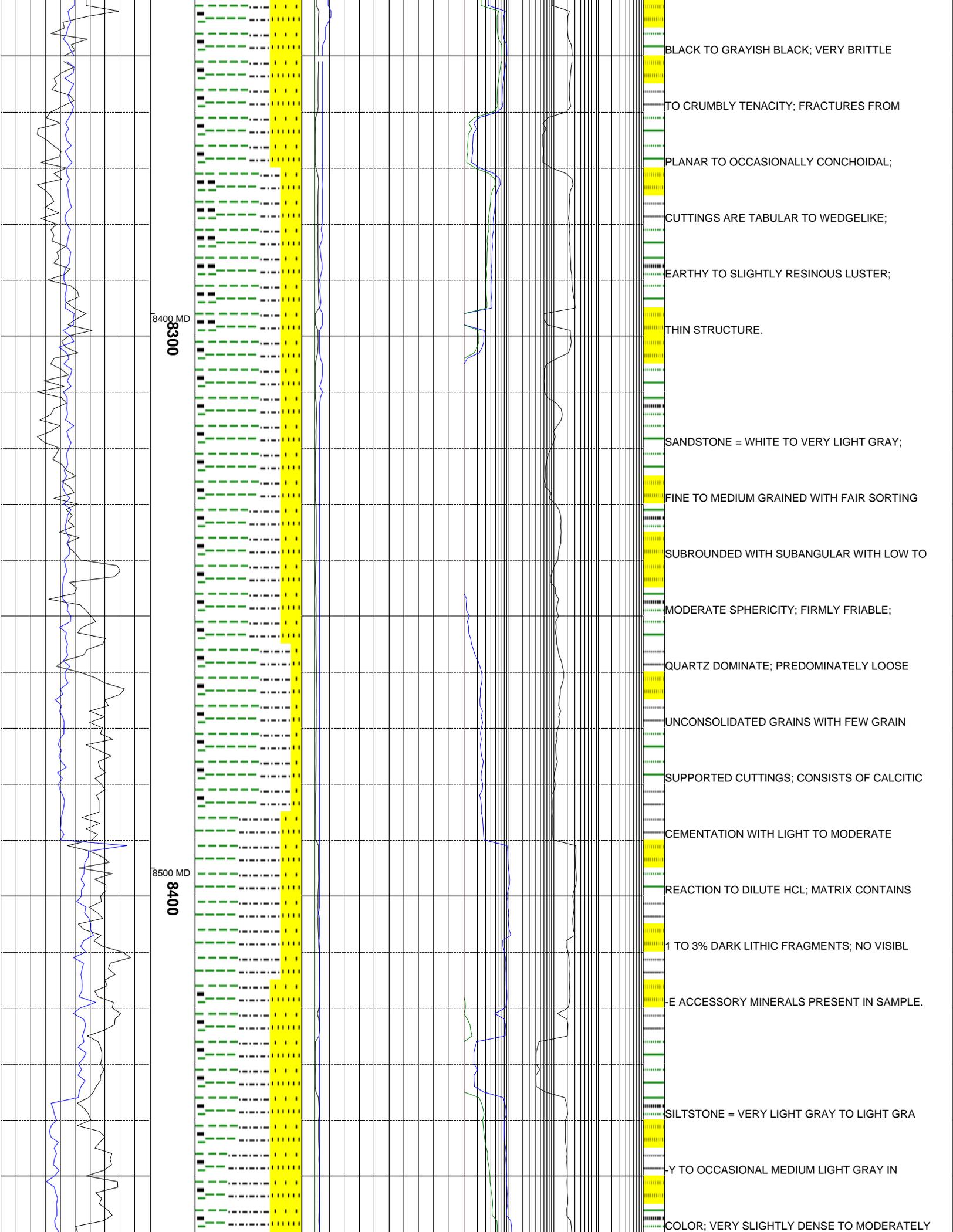
8100 MD
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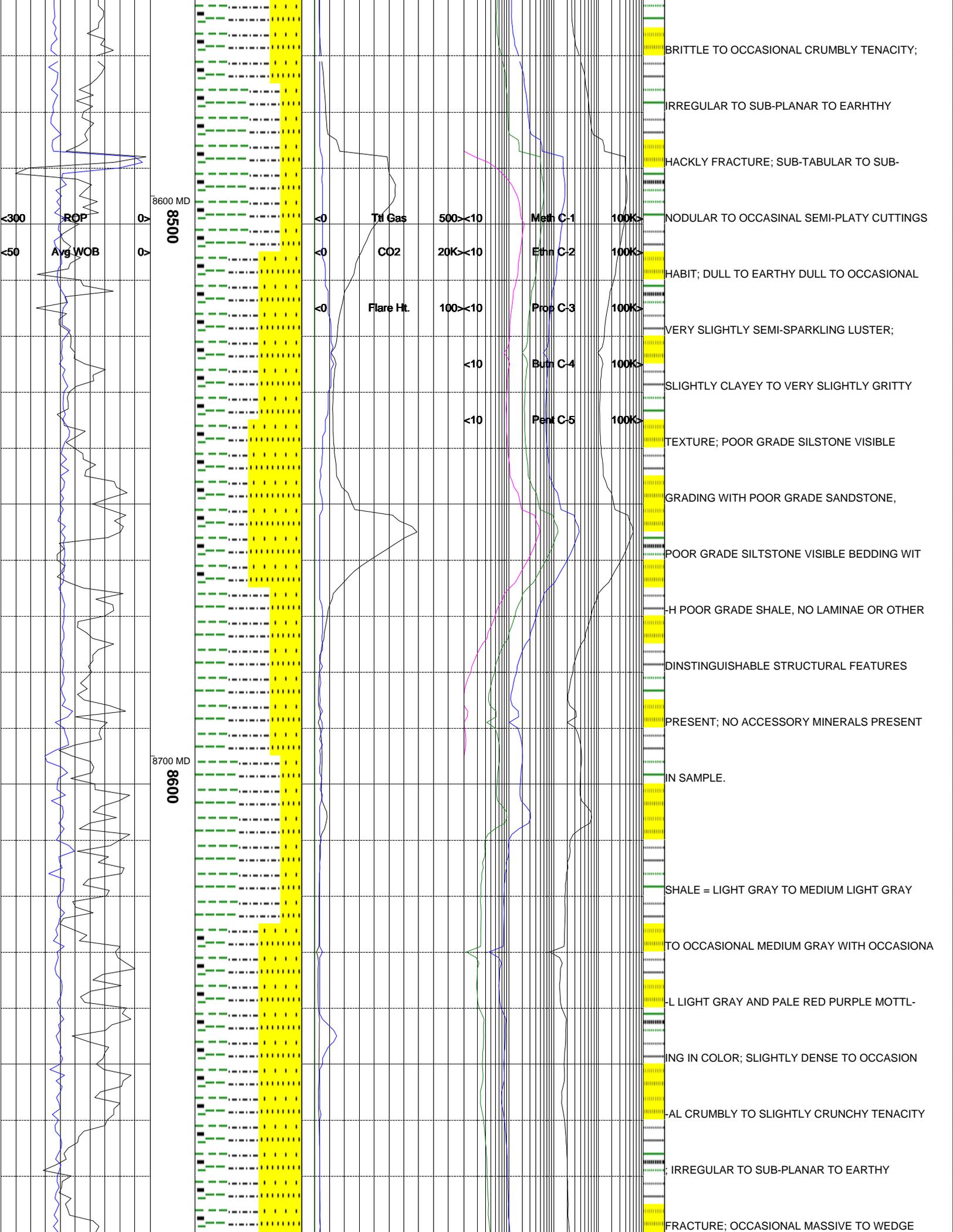
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<50 Avg WOB

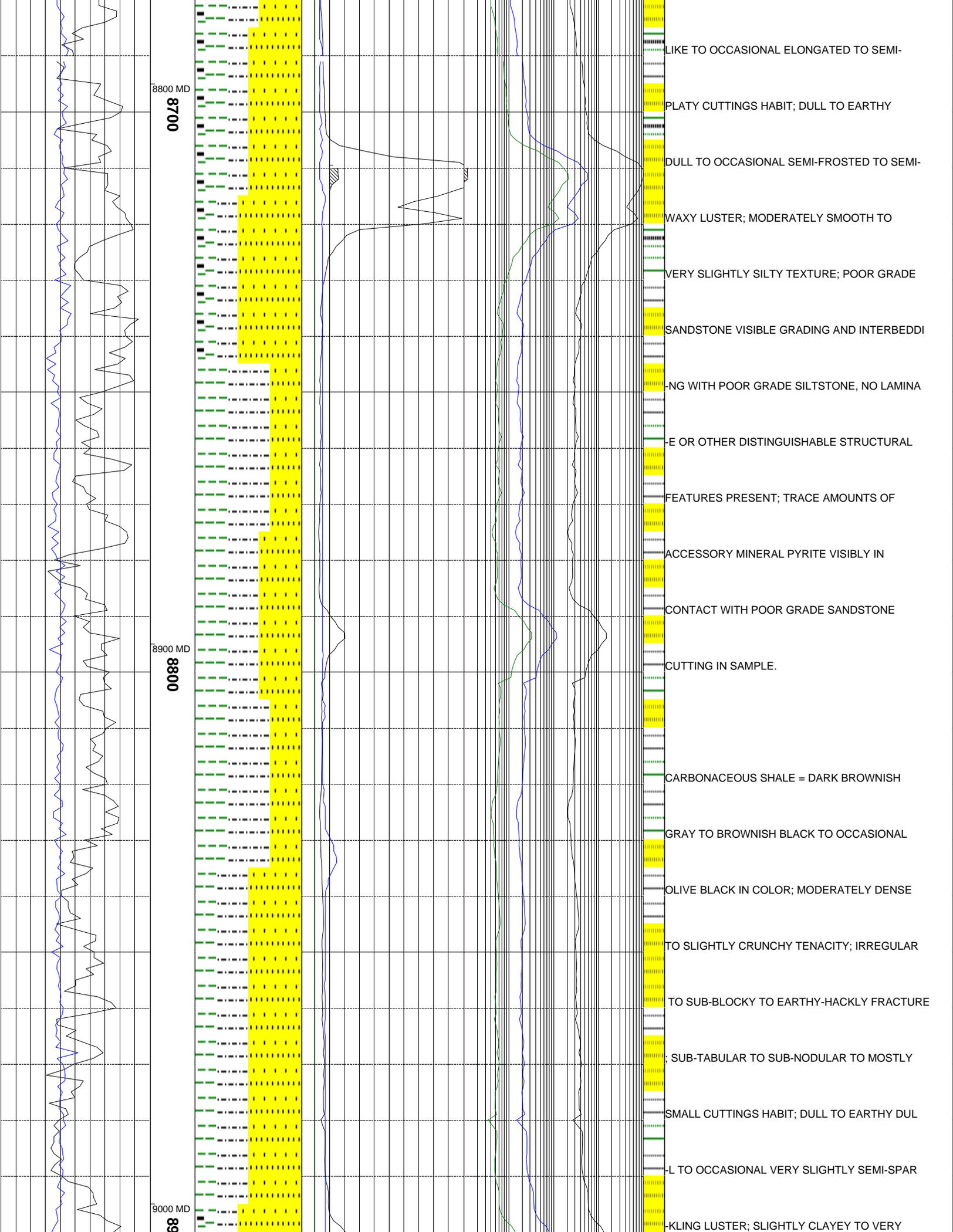
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<0	CO2	20K<10	Ethn C-2	100K>
<0	Flare Ht.	100<10	Prop C-3	100K>

LIKE TO SUB-PLATY CUTTINGS HABIT; DULL
 TO EARTHY DULL TO OCCASIONAL SEMI-WAXY
 TO SEMI-FROSTED LUSTER; MODERATELY
 SMOOTH TO VERY SLIGHTY SILTY TEXTURE;
 POOR GRADE SILSTONE VISIBLE GRADING WITH
 POOR GRADE SANDSTONE, VERY THIN COAL
 LAMINAE VISIBLE IN SHALE CUTTING, POOR
 GRADE CARBONACEOUS SHALE CUTTING VISIBLY
 IN CONTACT WITH SHALE CUTTING, NO OTHER
 DISTINGUISHABLE STRUCTURAL FEATURES
 PRESENT IN SAMPLE; TRACE AMOUNTS OF
 PYRITE PRESENT IN SAMPLE.
 SILSTONE = VERY LIGHT GRAY TO LIGHT GRA
 Y IN COLOR; MODERATELY DENSE TO VERY
 SLIGHTLY TOUGH TENACITY; IRREGULAR TO
 SUB-PLANAR TO EARTHY-HACKLY FRACTURE;
 SUB-PLATY TO SUB-TABULAR TO SUB-NODULAR
 CUTTINGS HABIT; DULL TO EARTHY DULL TO
 OCCASIONAL VERY SLIGHTLY SEMI-SPARKLING
 LUSTER; VERY SLIGHTLY CLAYEY TO VERY
 SLIGHTLY GRITTY TEXTURE; POOR GRADE SILT







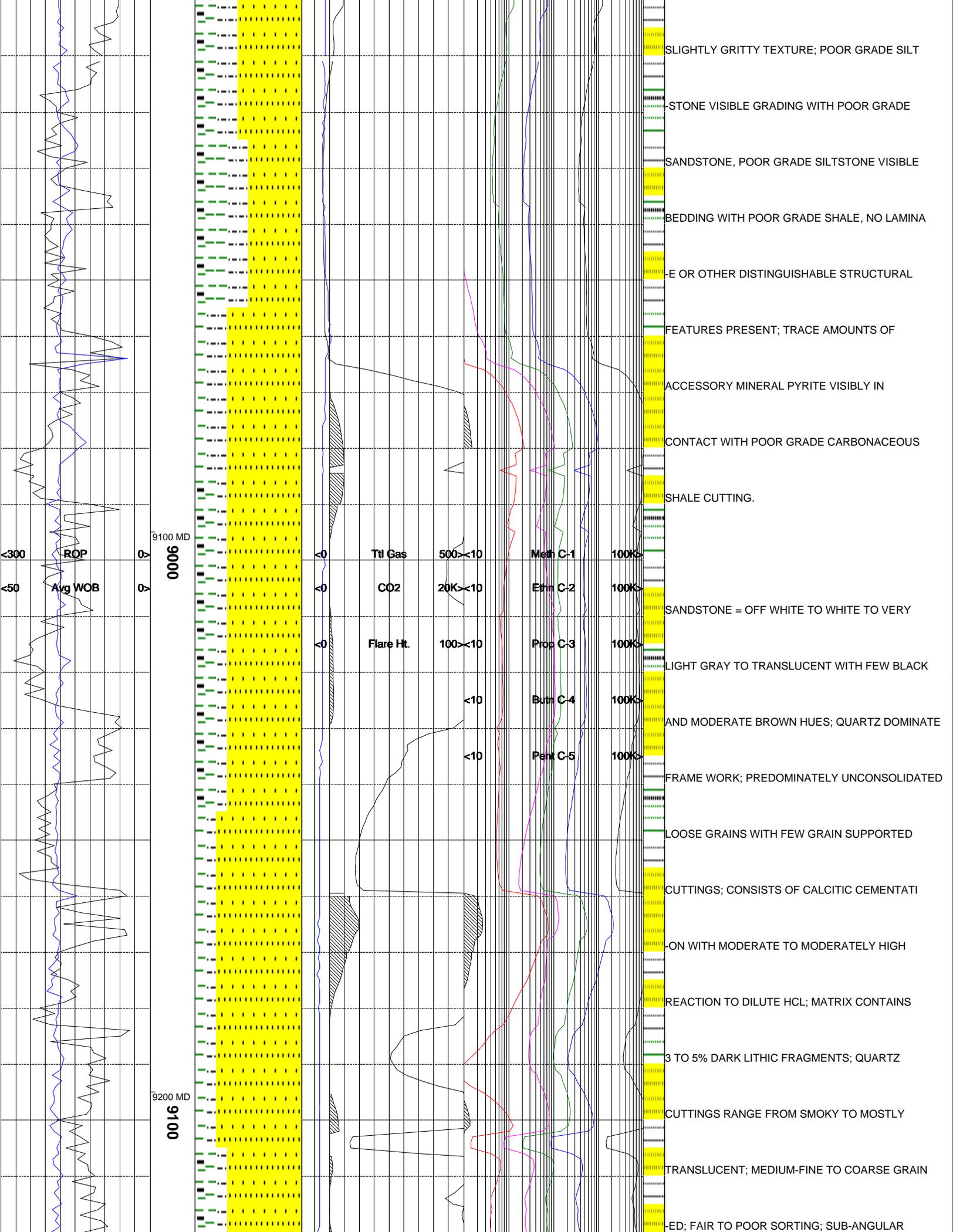


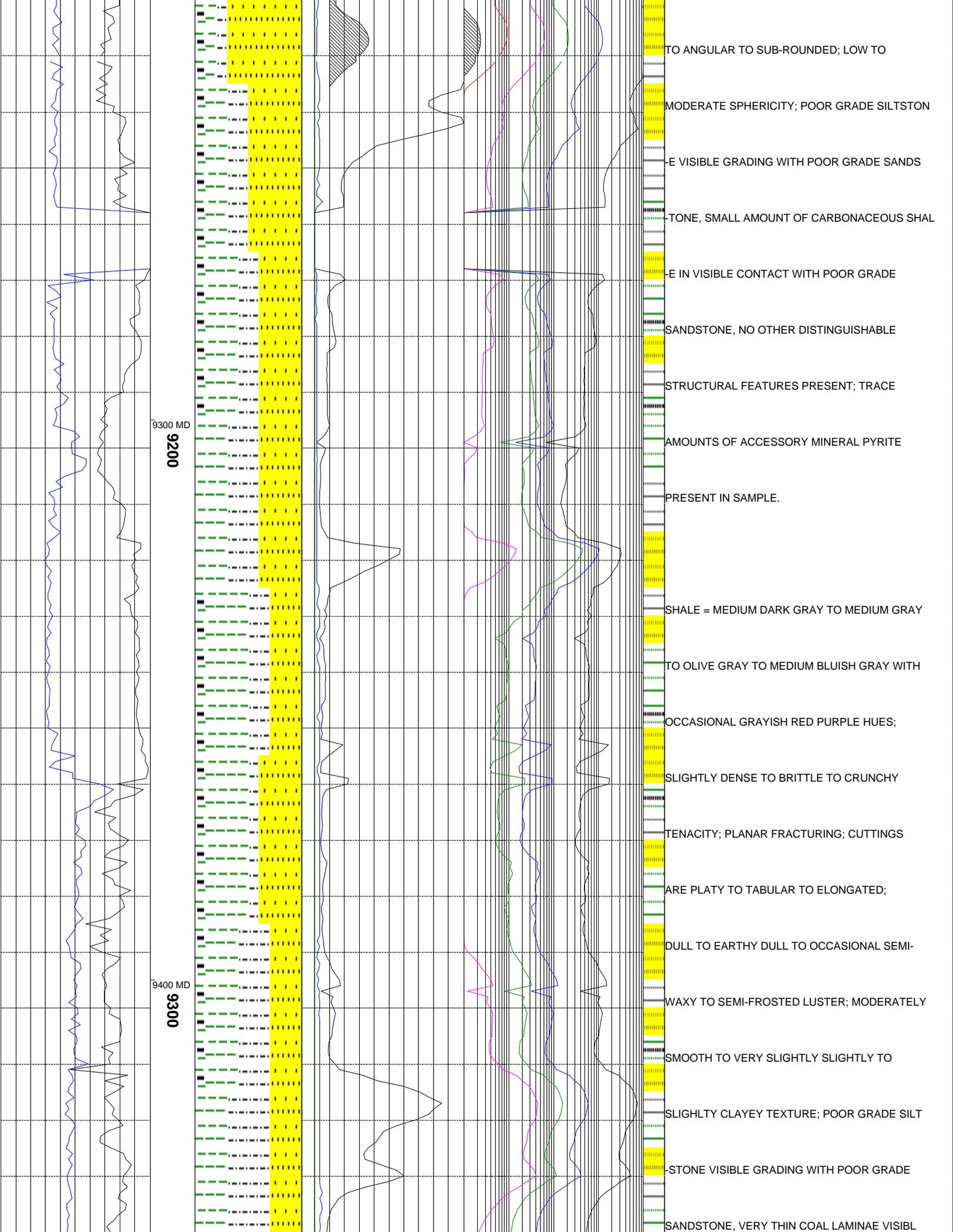
8800 MD
8700

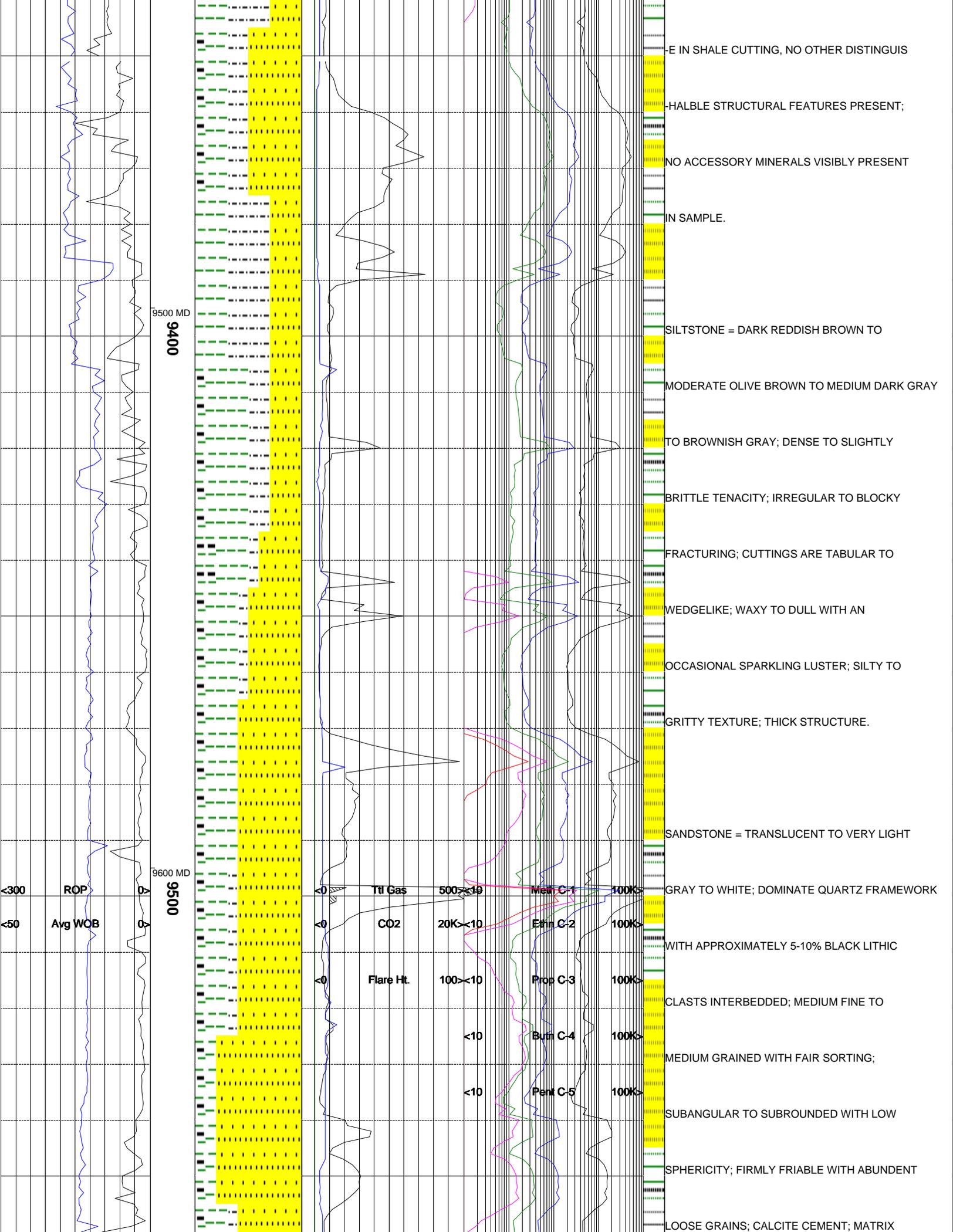
8900 MD
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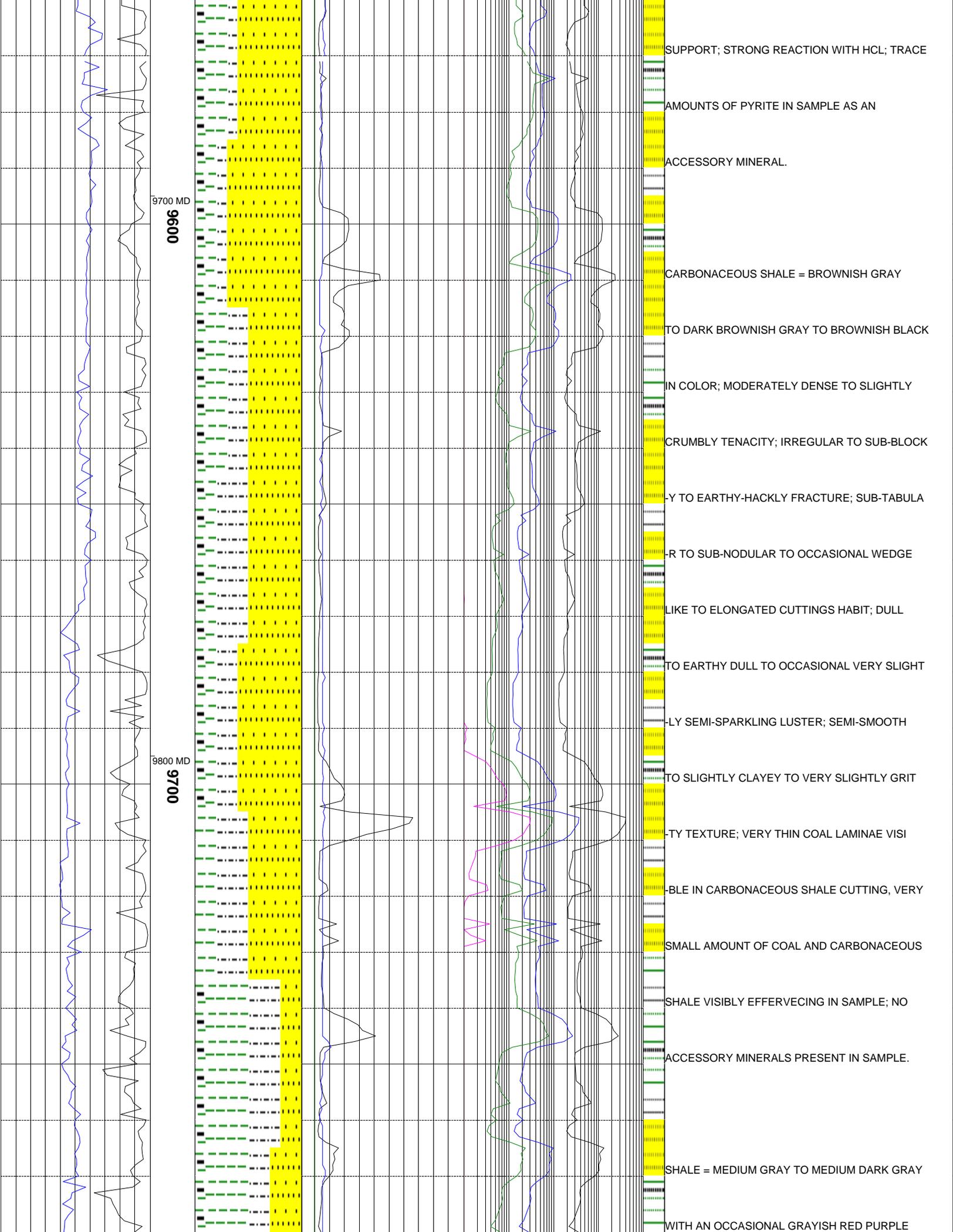
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89

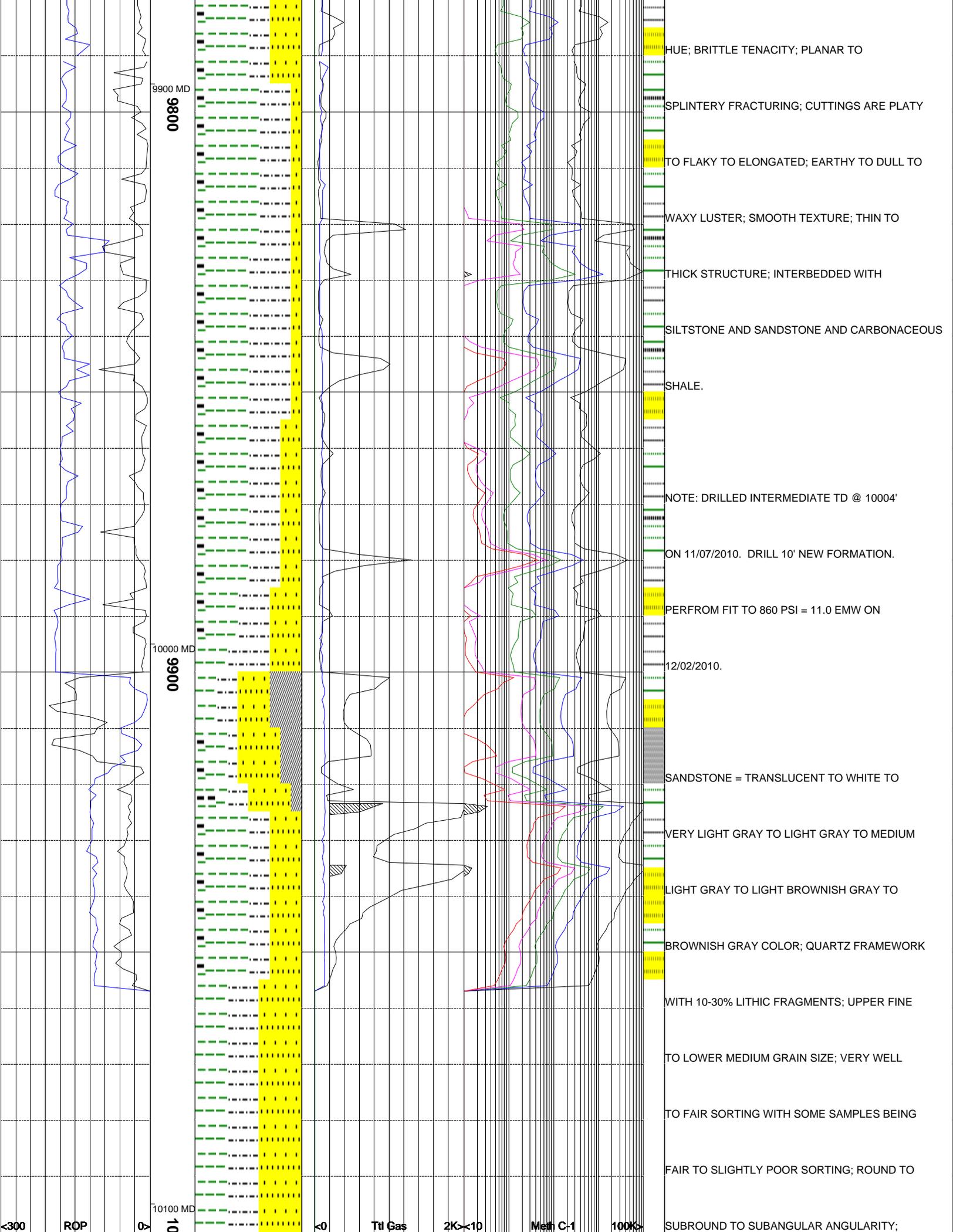
LIKE TO OCCASIONAL ELONGATED TO SEMI-
 PLATY CUTTINGS HABIT; DULL TO EARTHY
 DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-
 WAXY LUSTER; MODERATELY SMOOTH TO
 VERY SLIGHTLY SILTY TEXTURE; POOR GRADE
 SANDSTONE VISIBLE GRADING AND INTERBEDDI
 NG WITH POOR GRADE SILTSTONE, NO LAMINA
 E OR OTHER DISTINGUISHABLE STRUCTURAL
 FEATURES PRESENT; TRACE AMOUNTS OF
 ACCESSORY MINERAL PYRITE VISIBLY IN
 CONTACT WITH POOR GRADE SANDSTONE
 CUTTING IN SAMPLE.
 CARBONACEOUS SHALE = DARK BROWNISH
 GRAY TO BROWNISH BLACK TO OCCASIONAL
 OLIVE BLACK IN COLOR; MODERATELY DENSE
 TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR
 TO SUB-BLOCKY TO EARTHY-HACKLY FRACTURE
 ; SUB-TABULAR TO SUB-NODULAR TO MOSTLY
 SMALL CUTTINGS HABIT; DULL TO EARTHY DUL
 L TO OCCASIONAL VERY SLIGHTLY SEMI-SPAR
 KLING LUSTER; SLIGHTLY CLAYEY TO VERY

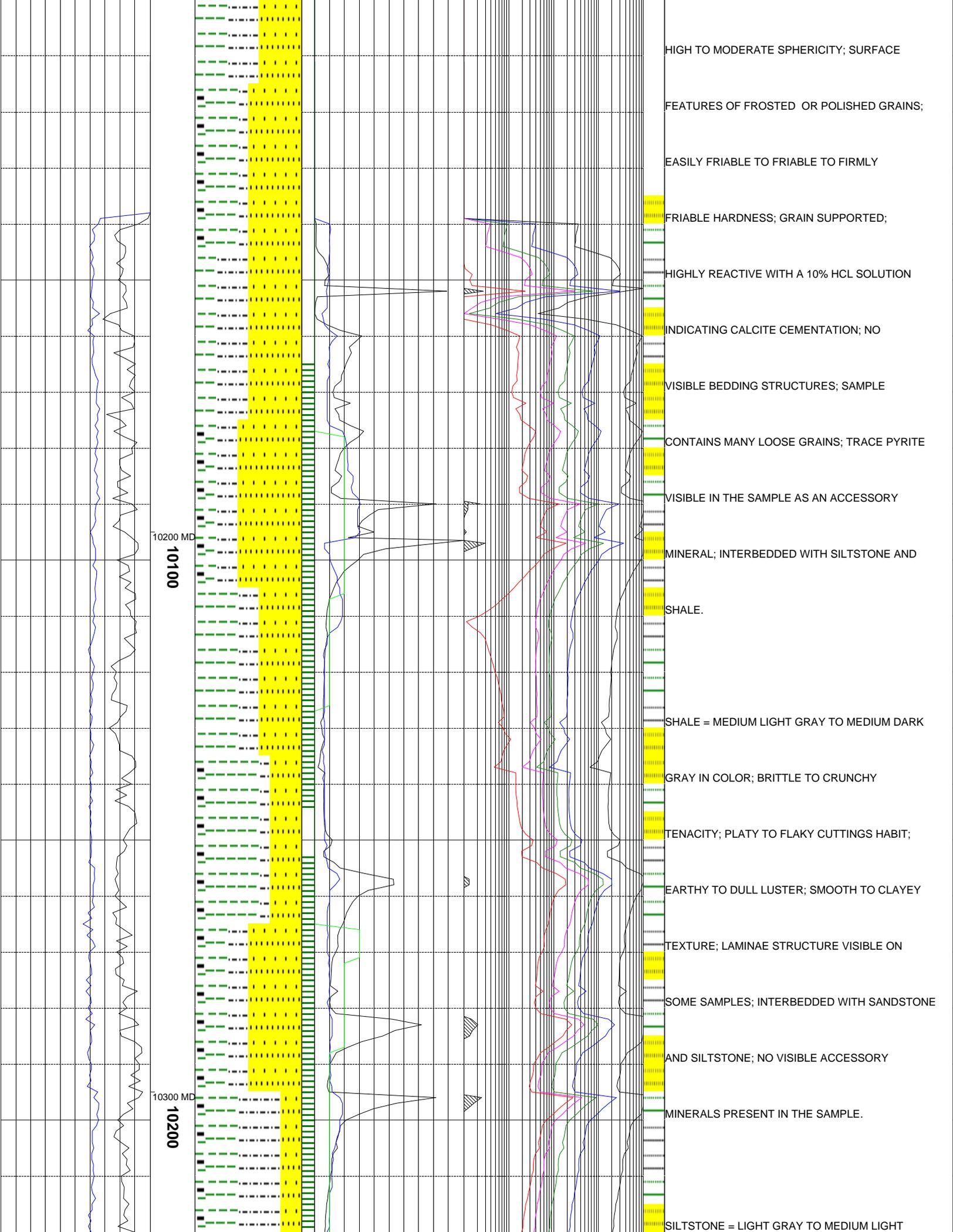


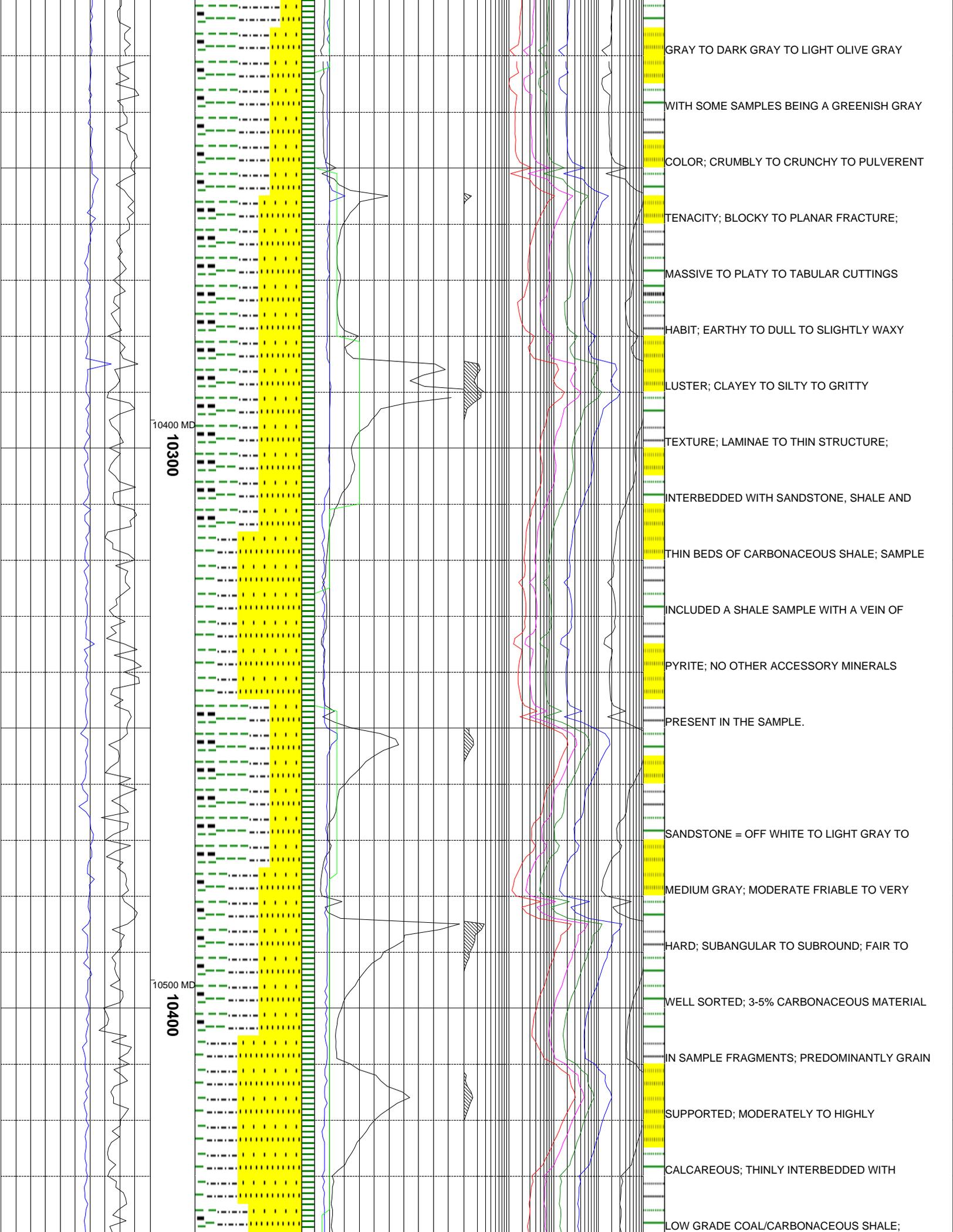








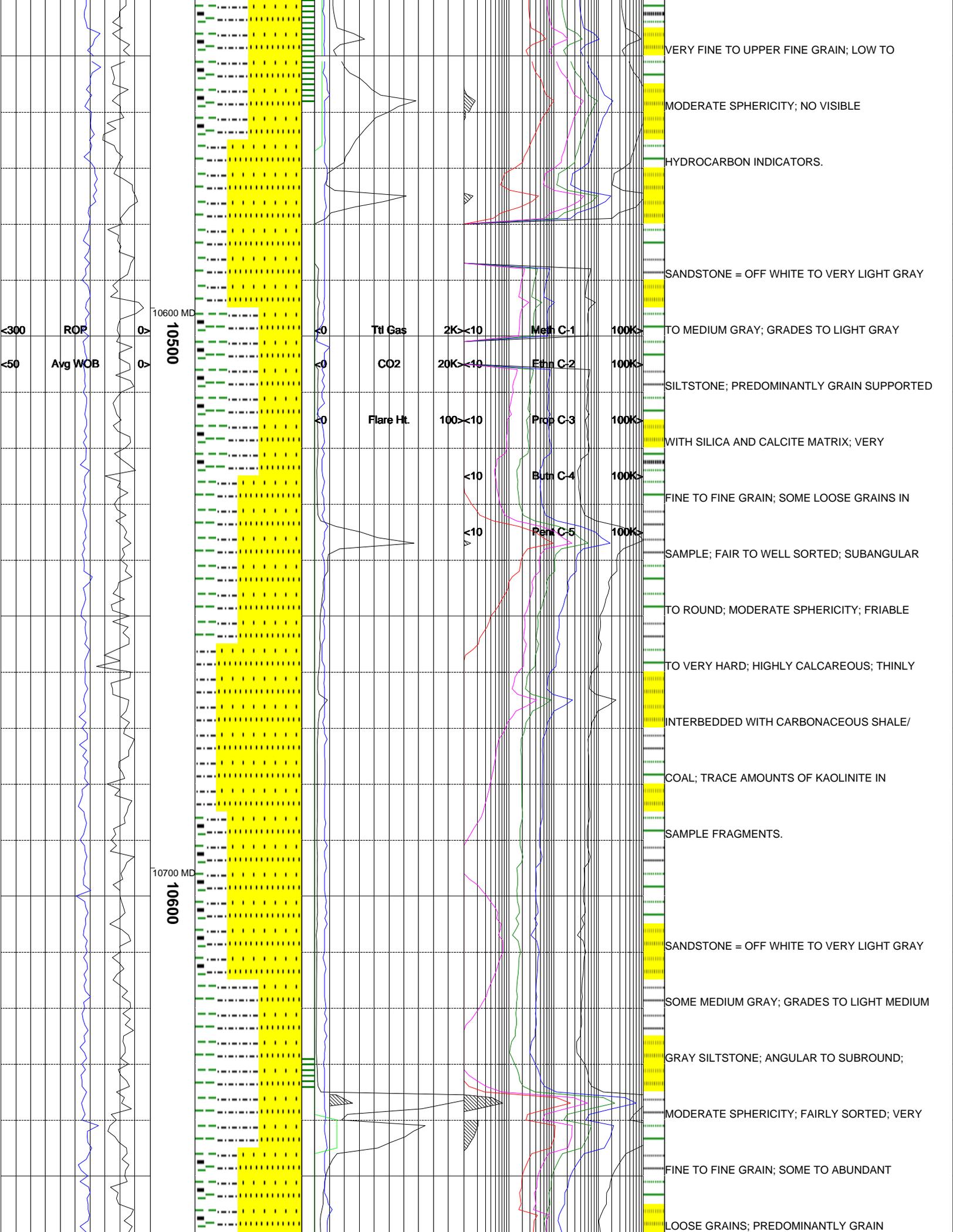


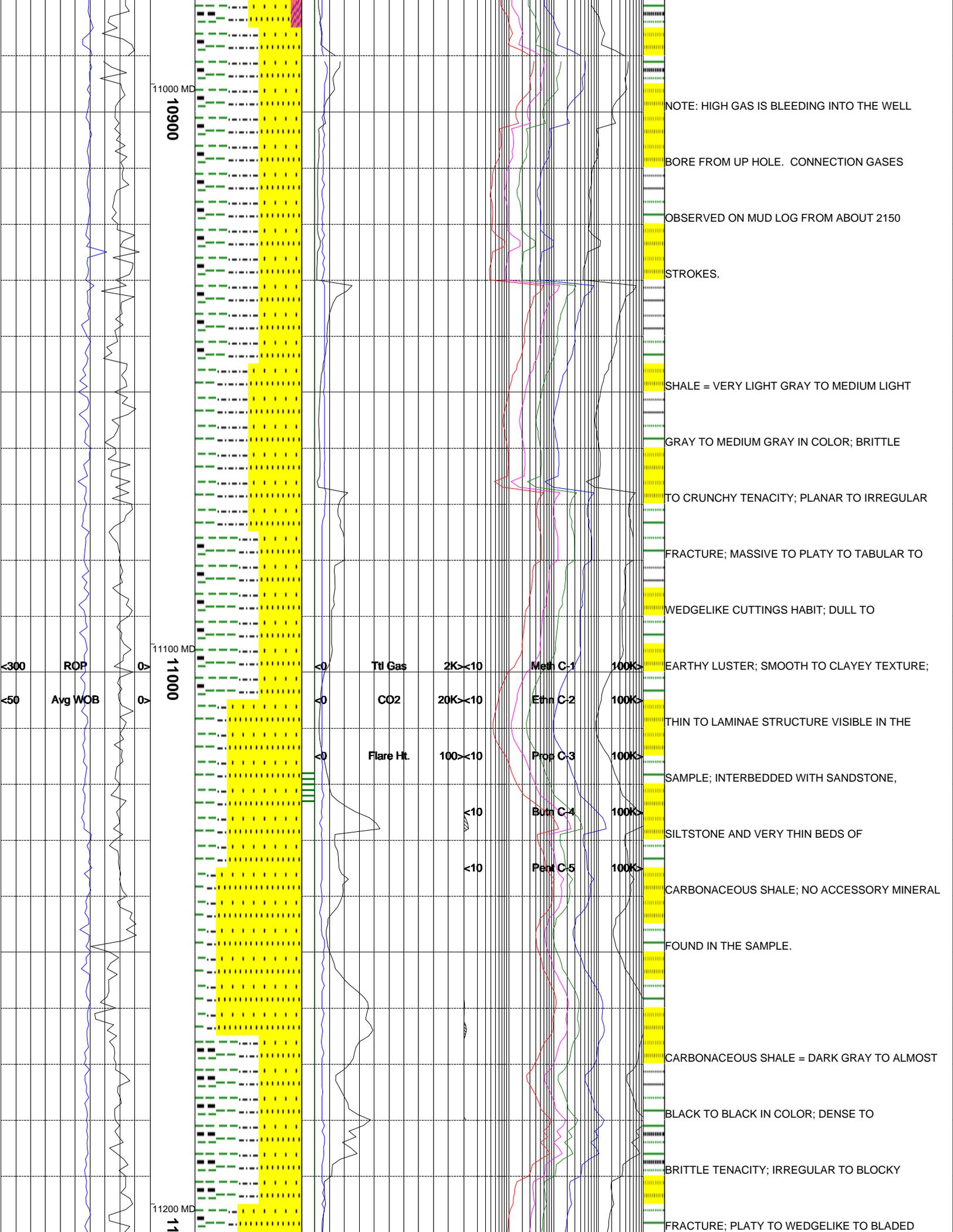


10400 MD
10300

10500 MD
10400

GRAY TO DARK GRAY TO LIGHT OLIVE GRAY
WITH SOME SAMPLES BEING A GREENISH GRAY
COLOR; CRUMBLY TO CRUNCHY TO PULVERENT
TENACITY; BLOCKY TO PLANAR FRACTURE;
MASSIVE TO PLATY TO TABULAR CUTTINGS
HABIT; EARTHY TO DULL TO SLIGHTLY WAXY
LUSTER; CLAYEY TO SILTY TO GRITTY
TEXTURE; LAMINAE TO THIN STRUCTURE;
INTERBEDDED WITH SANDSTONE, SHALE AND
THIN BEDS OF CARBONACEOUS SHALE; SAMPLE
INCLUDED A SHALE SAMPLE WITH A VEIN OF
PYRITE; NO OTHER ACCESSORY MINERALS
PRESENT IN THE SAMPLE.
SANDSTONE = OFF WHITE TO LIGHT GRAY TO
MEDIUM GRAY; MODERATE FRIABLE TO VERY
HARD; SUBANGULAR TO SUBROUND; FAIR TO
WELL SORTED; 3-5% CARBONACEOUS MATERIAL
IN SAMPLE FRAGMENTS; PREDOMINANTLY GRAIN
SUPPORTED; MODERATELY TO HIGHLY
CALCAREOUS; THINLY INTERBEDDED WITH
LOW GRADE COAL/CARBONACEOUS SHALE;





11000 MD
10900

NOTE: HIGH GAS IS BLEEDING INTO THE WELL
BORE FROM UP HOLE. CONNECTION GASES
OBSERVED ON MUD LOG FROM ABOUT 2150
STROKES.

SHALE = VERY LIGHT GRAY TO MEDIUM LIGHT
GRAY TO MEDIUM GRAY IN COLOR; BRITTLE
TO CRUNCHY TENACITY; PLANAR TO IRREGULAR
FRACTURE; MASSIVE TO PLATY TO TABULAR TO
WEDGELIKE CUTTINGS HABIT; DULL TO

11100 MD
11000

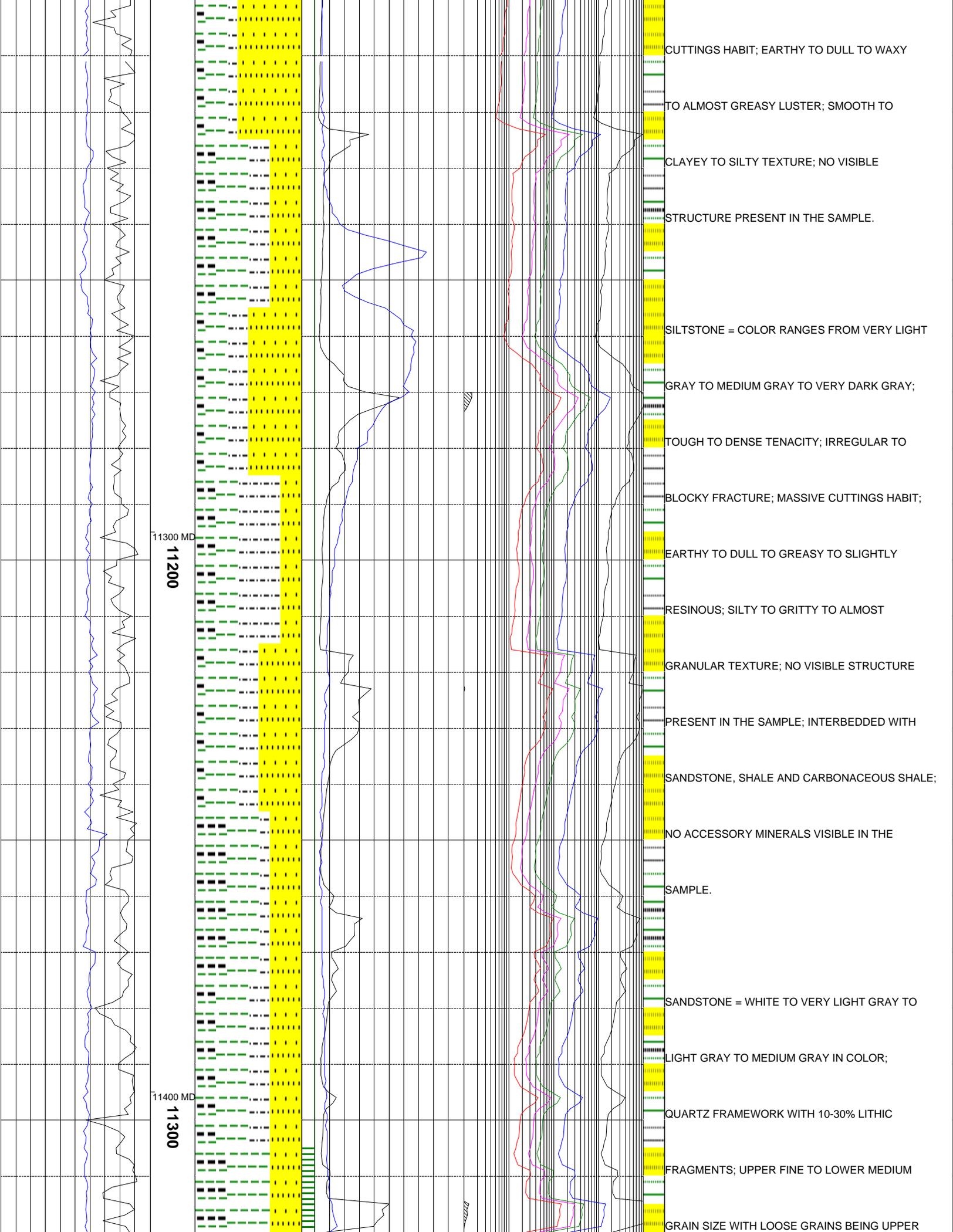
<300 ROP
<50 Avg WOB

Ttl Gas	2K < 10	Meth C-1	100K >
CO2	20K < 10	Ethn C-2	100K >
Flare Ht.	100 < 10	Prop C-3	100K >
	< 10	Butn C-4	100K >
	< 10	Pent C-5	100K >

EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE;
THIN TO LAMINAE STRUCTURE VISIBLE IN THE
SAMPLE; INTERBEDDED WITH SANDSTONE,
SILTSTONE AND VERY THIN BEDS OF
CARBONACEOUS SHALE; NO ACCESSORY MINERAL
FOUND IN THE SAMPLE.

11200 MD
11

CARBONACEOUS SHALE = DARK GRAY TO ALMOST
BLACK TO BLACK IN COLOR; DENSE TO
BRITTLE TENACITY; IRREGULAR TO BLOCKY
FRACTURE; PLATY TO WEDGELIKE TO BLADED



CUTTINGS HABIT; EARTHY TO DULL TO WAXY

TO ALMOST GREASY LUSTER; SMOOTH TO

CLAYEY TO SILTY TEXTURE; NO VISIBLE

STRUCTURE PRESENT IN THE SAMPLE.

SILTSTONE = COLOR RANGES FROM VERY LIGHT

GRAY TO MEDIUM GRAY TO VERY DARK GRAY;

TOUGH TO DENSE TENACITY; IRREGULAR TO

BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT;

EARTHY TO DULL TO GREASY TO SLIGHTLY

RESINOUS; SILTY TO GRITTY TO ALMOST

GRANULAR TEXTURE; NO VISIBLE STRUCTURE

PRESENT IN THE SAMPLE; INTERBEDDED WITH

SANDSTONE, SHALE AND CARBONACEOUS SHALE;

NO ACCESSORY MINERALS VISIBLE IN THE

SAMPLE.

SANDSTONE = WHITE TO VERY LIGHT GRAY TO

LIGHT GRAY TO MEDIUM GRAY IN COLOR;

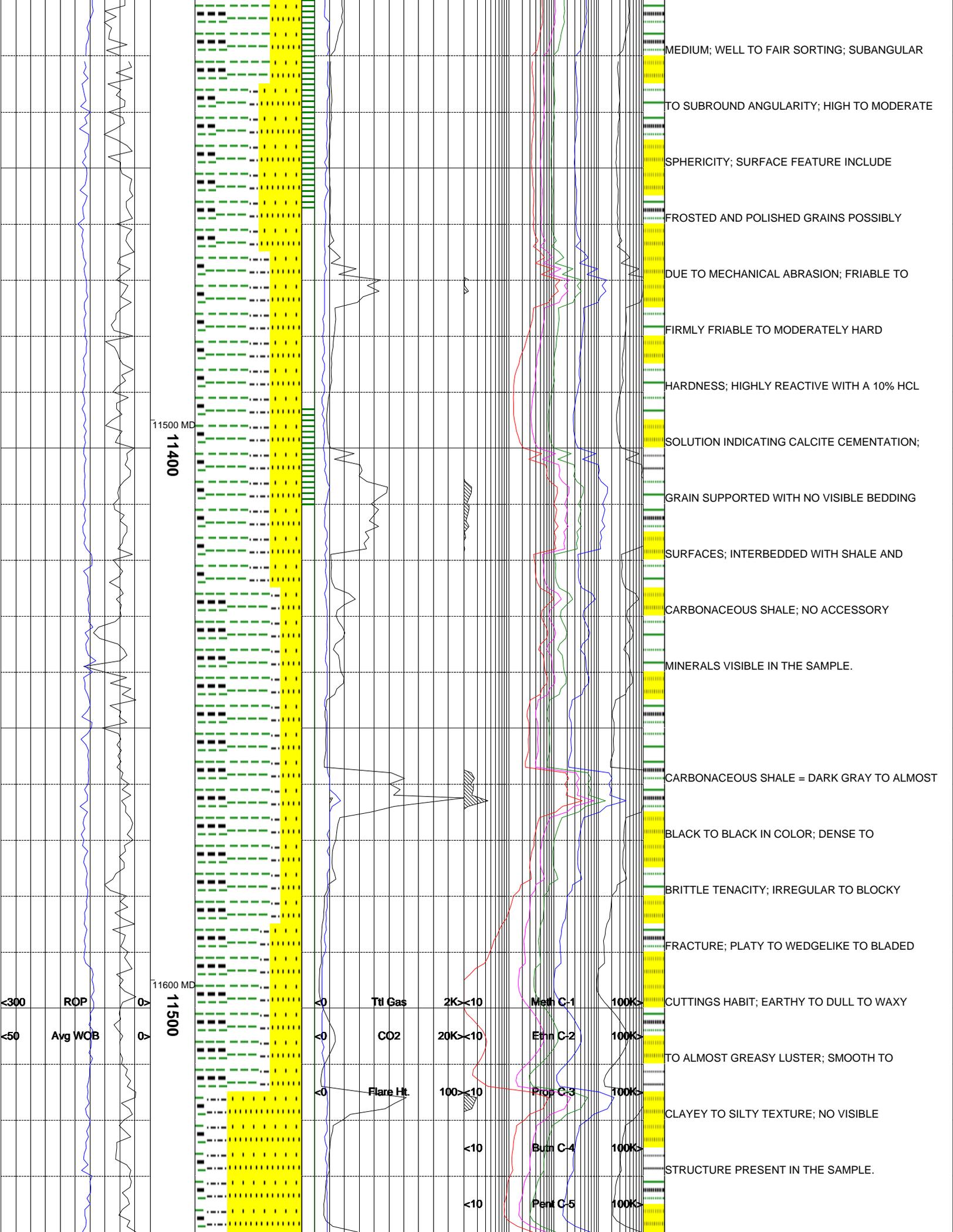
QUARTZ FRAMEWORK WITH 10-30% LITHIC

FRAGMENTS; UPPER FINE TO LOWER MEDIUM

GRAIN SIZE WITH LOOSE GRAINS BEING UPPER

11300 MD
11200

11400 MD
11300



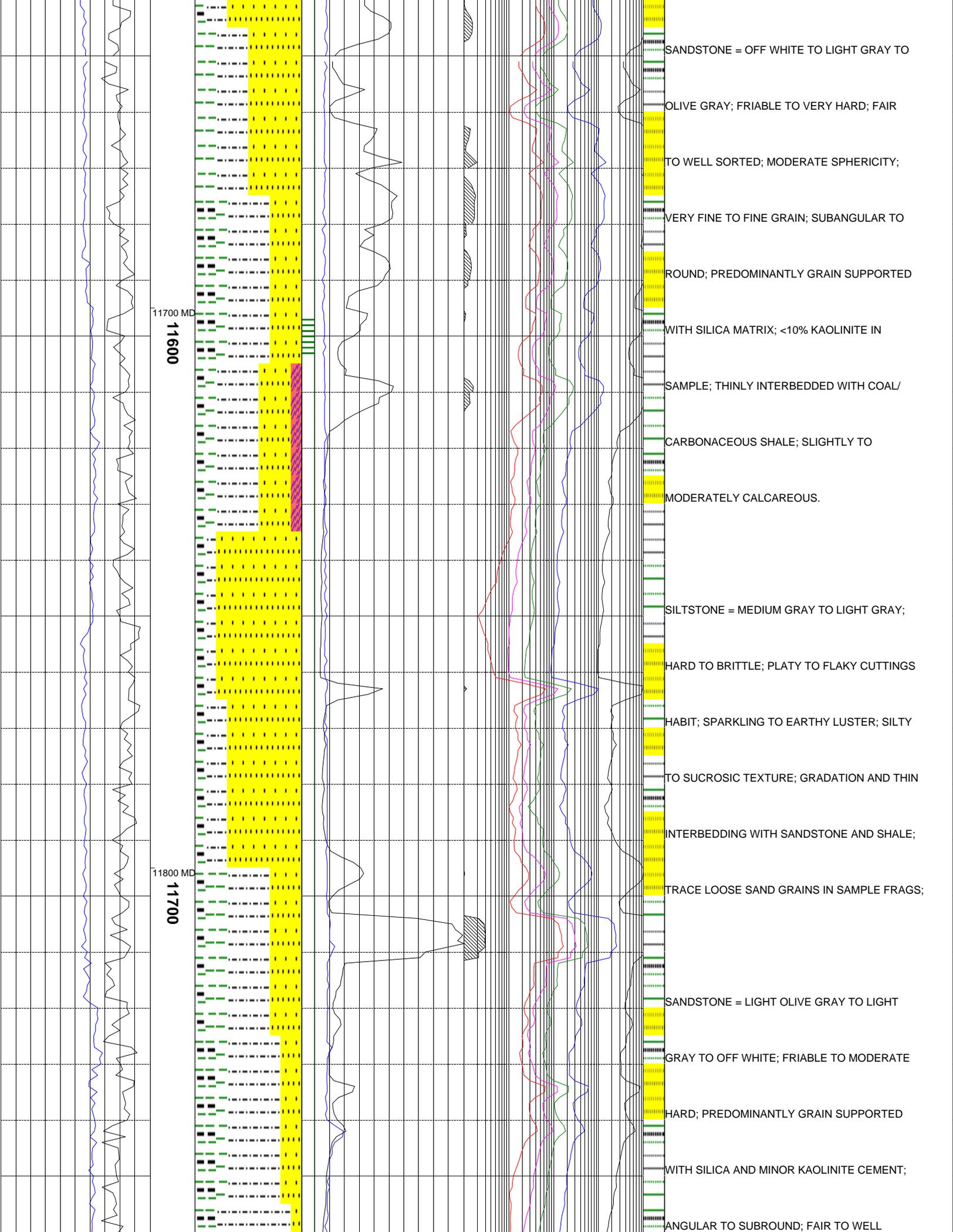
11500 MD
11400

11600 MD
11500

<300 ROP
<50 Avg WOB

Ttl Gas 2K < 10
CO2 20K < 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 >

MEDIUM; WELL TO FAIR SORTING; SUBANGULAR
TO SUBROUND ANGULARITY; HIGH TO MODERATE
SPHERICITY; SURFACE FEATURE INCLUDE
FROSTED AND POLISHED GRAINS POSSIBLY
DUE TO MECHANICAL ABRASION; FRIABLE TO
FIRMLY FRIABLE TO MODERATELY HARD
HARDNESS; HIGHLY REACTIVE WITH A 10% HCL
SOLUTION INDICATING CALCITE CEMENTATION;
GRAIN SUPPORTED WITH NO VISIBLE BEDDING
SURFACES; INTERBEDDED WITH SHALE AND
CARBONACEOUS SHALE; NO ACCESSORY
MINERALS VISIBLE IN THE SAMPLE.
CARBONACEOUS SHALE = DARK GRAY TO ALMOST
BLACK TO BLACK IN COLOR; DENSE TO
BRITTLE TENACITY; IRREGULAR TO BLOCKY
FRACTURE; PLATY TO WEDGELIKE TO BLADED
CUTTINGS HABIT; EARTHY TO DULL TO WAXY
TO ALMOST GREASY LUSTER; SMOOTH TO
CLAYEY TO SILTY TEXTURE; NO VISIBLE
STRUCTURE PRESENT IN THE SAMPLE.



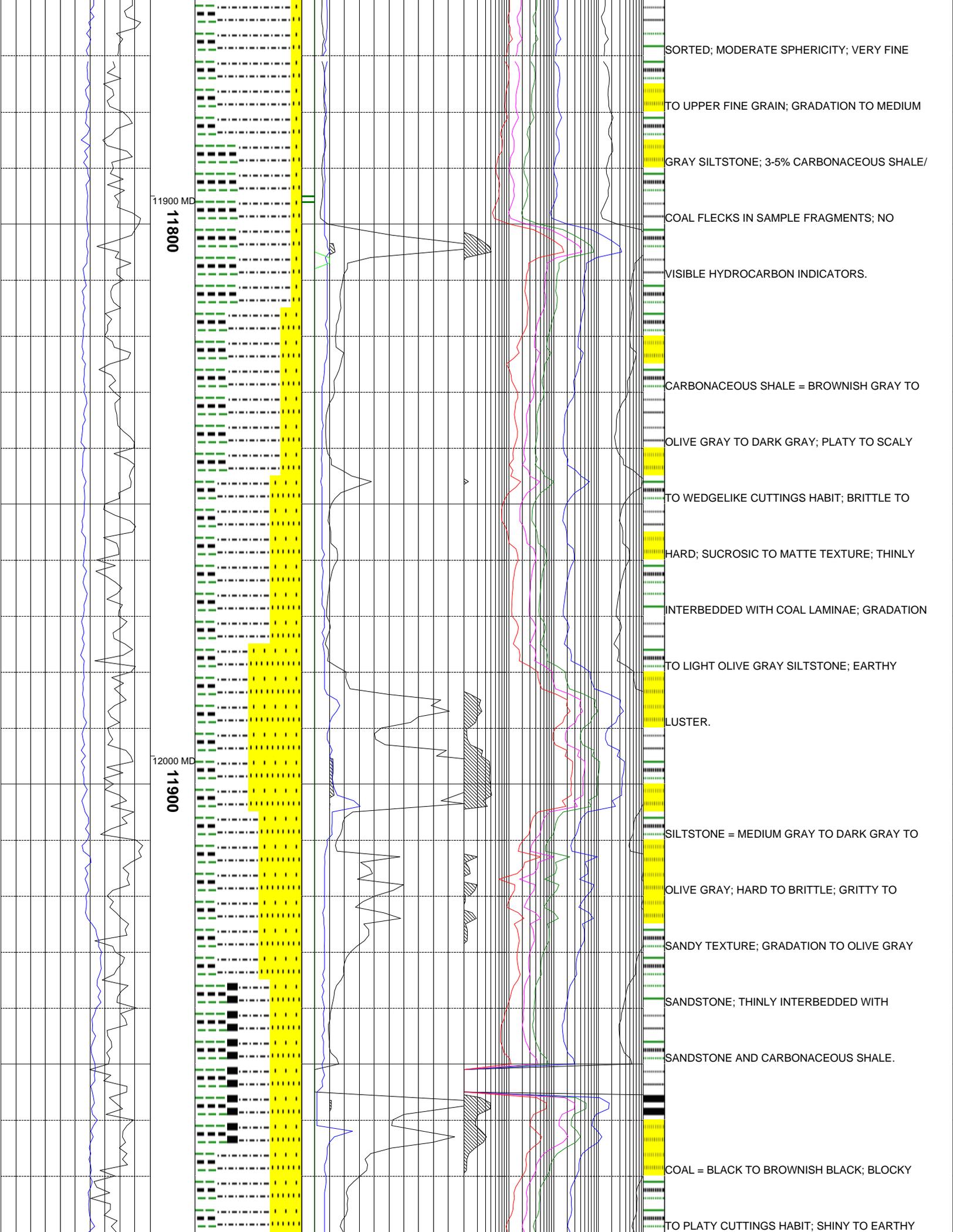
11700 MD
11600

11800 MD
11700

SANDSTONE = OFF WHITE TO LIGHT GRAY TO OLIVE GRAY; FRIABLE TO VERY HARD; FAIR TO WELL SORTED; MODERATE SPHERICITY; VERY FINE TO FINE GRAIN; SUBANGULAR TO ROUND; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA MATRIX; <10% KAOLINITE IN SAMPLE; THINLY INTERBEDDED WITH COAL/ CARBONACEOUS SHALE; SLIGHTLY TO MODERATELY CALCAREOUS.

SILTSTONE = MEDIUM GRAY TO LIGHT GRAY; HARD TO BRITTLE; PLATY TO FLAKY CUTTINGS HABIT; SPARKLING TO EARTHY LUSTER; SILTY TO SUCROSIC TEXTURE; GRADATION AND THIN INTERBEDDING WITH SANDSTONE AND SHALE; TRACE LOOSE SAND GRAINS IN SAMPLE FRAGS;

SANDSTONE = LIGHT OLIVE GRAY TO LIGHT GRAY TO OFF WHITE; FRIABLE TO MODERATE HARD; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND MINOR KAOLINITE CEMENT; ANGULAR TO SUBROUND; FAIR TO WELL



SORTED; MODERATE SPHERICITY; VERY FINE

TO UPPER FINE GRAIN; GRADATION TO MEDIUM

GRAY SILTSTONE; 3-5% CARBONACEOUS SHALE/

11900 MD

11800

COAL FLECKS IN SAMPLE FRAGMENTS; NO

VISIBLE HYDROCARBON INDICATORS.

CARBONACEOUS SHALE = BROWNISH GRAY TO

OLIVE GRAY TO DARK GRAY; PLATY TO SCALY

TO WEDGELIKE CUTTINGS HABIT; BRITTLE TO

HARD; SUCROSIC TO MATTE TEXTURE; THINLY

INTERBEDDED WITH COAL LAMINAE; GRADATION

TO LIGHT OLIVE GRAY SILTSTONE; EARTHY

LUSTER.

12000 MD

11900

SILTSTONE = MEDIUM GRAY TO DARK GRAY TO

OLIVE GRAY; HARD TO BRITTLE; GRITTY TO

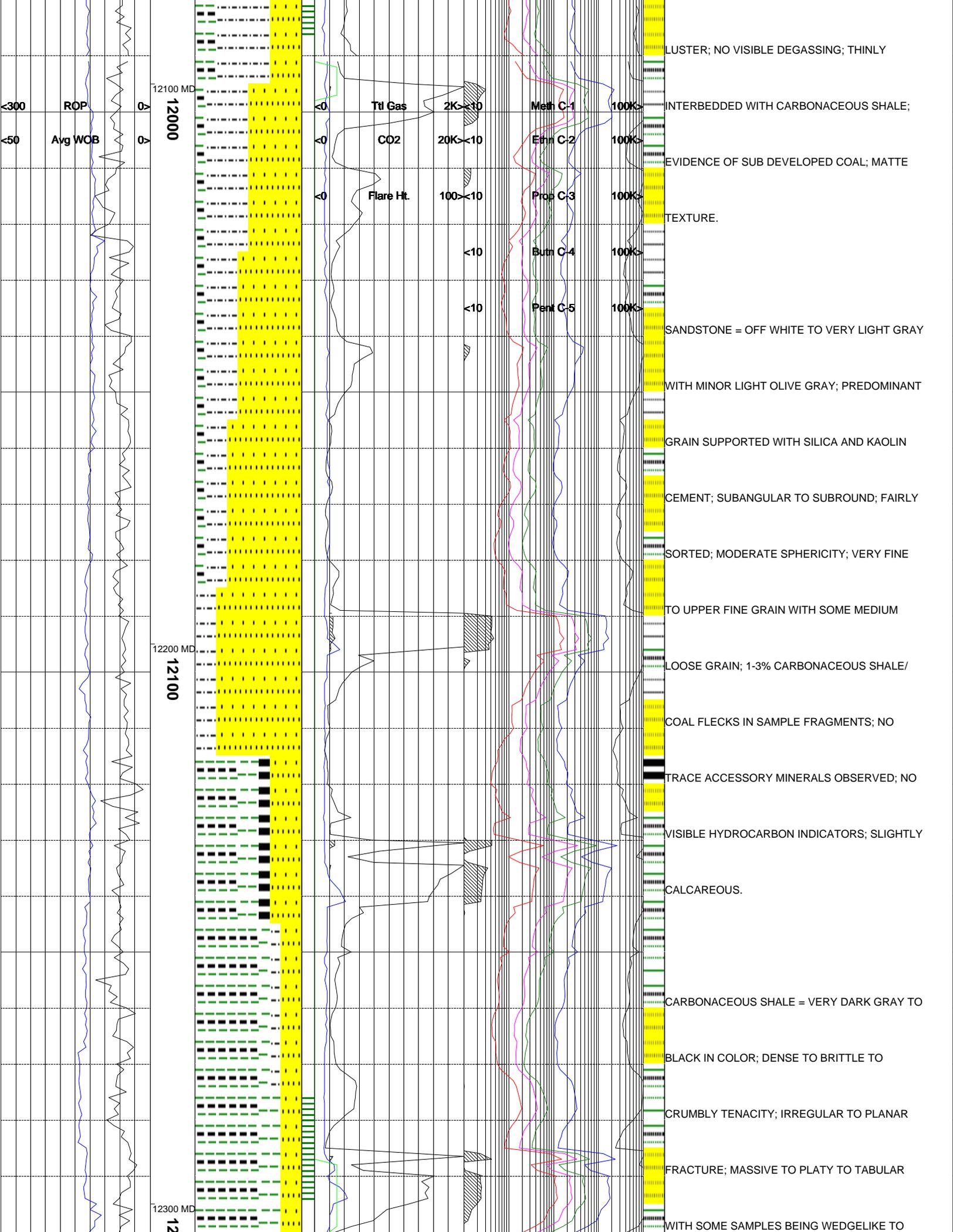
SANDY TEXTURE; GRADATION TO OLIVE GRAY

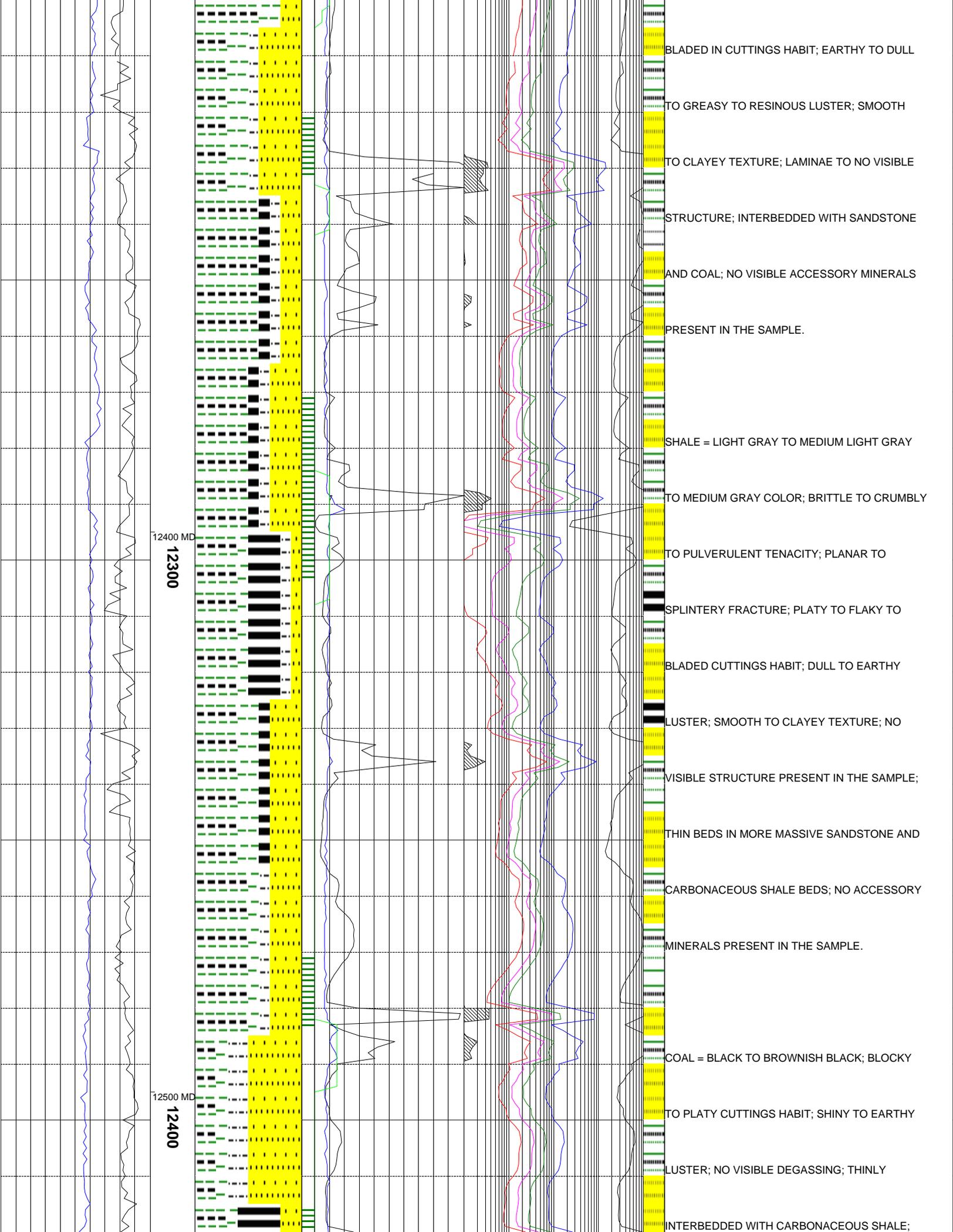
SANDSTONE; THINLY INTERBEDDED WITH

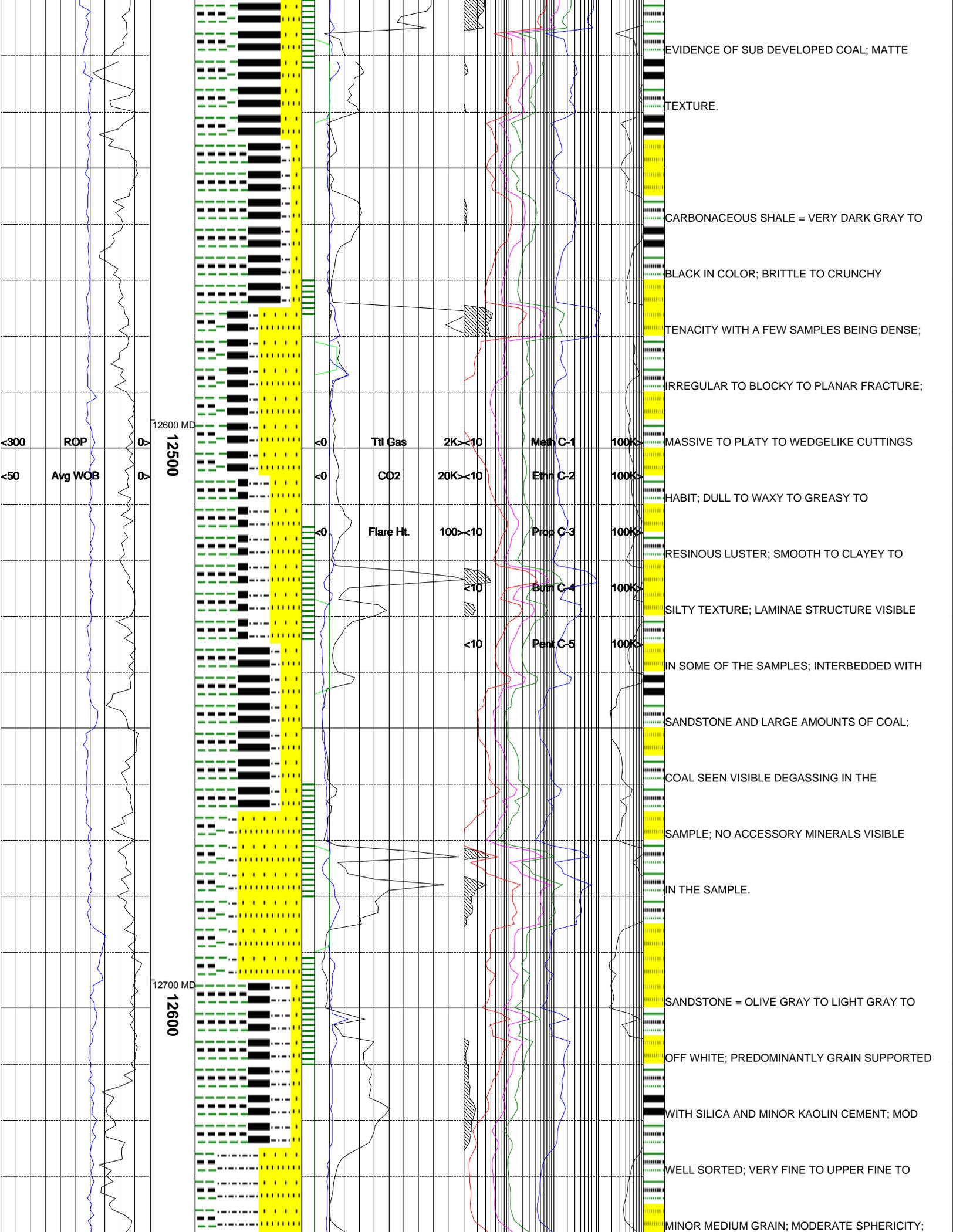
SANDSTONE AND CARBONACEOUS SHALE.

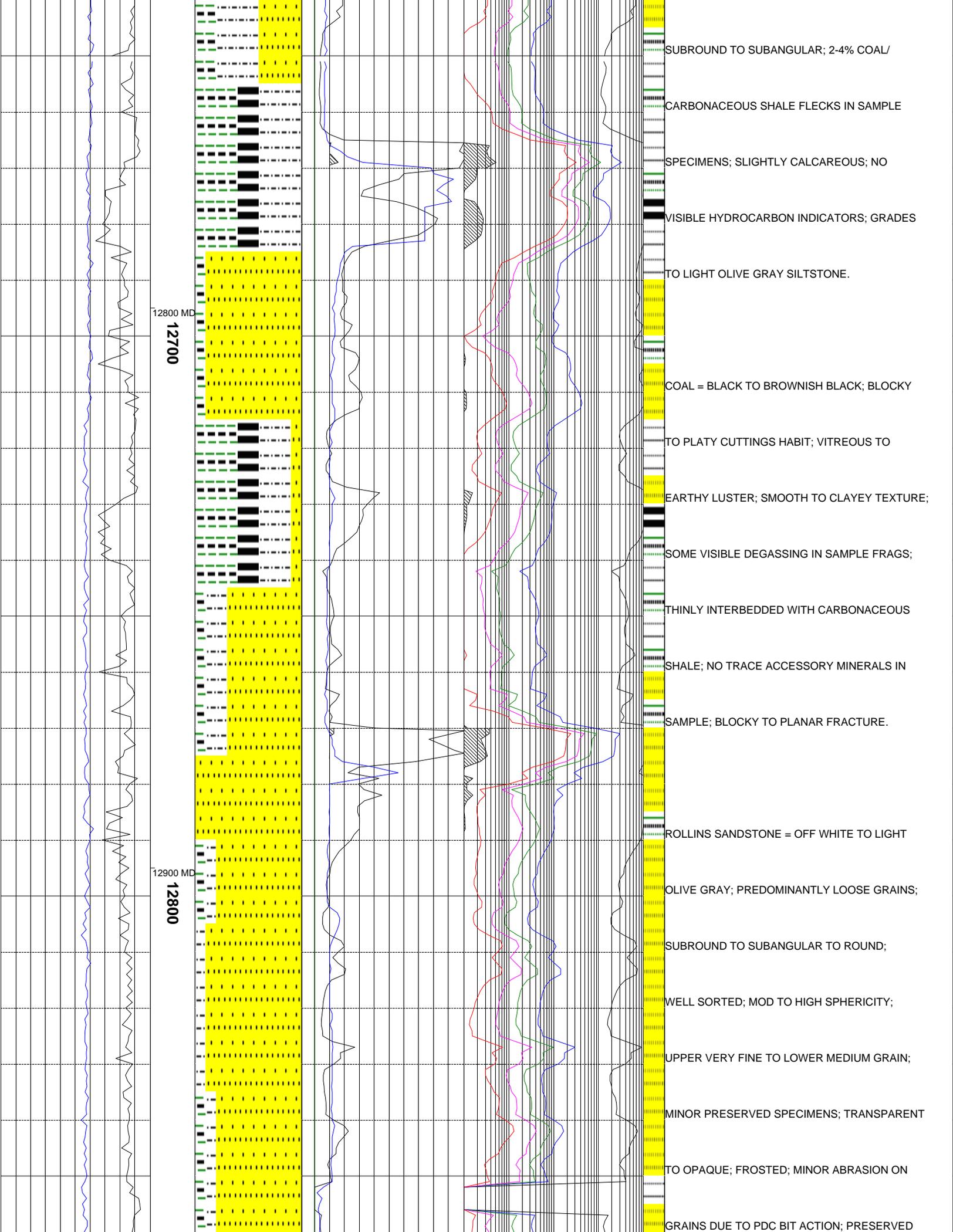
COAL = BLACK TO BROWNISH BLACK; BLOCKY

TO PLATY CUTTINGS HABIT; SHINY TO EARTHY









SUBROUND TO SUBANGULAR; 2-4% COAL/

CARBONACEOUS SHALE FLECKS IN SAMPLE

SPECIMENS; SLIGHTLY CALCAREOUS; NO

VISIBLE HYDROCARBON INDICATORS; GRADES

TO LIGHT OLIVE GRAY SILTSTONE.

12800 MD
12700

COAL = BLACK TO BROWNISH BLACK; BLOCKY

TO PLATY CUTTINGS HABIT; VITREOUS TO

EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE;

SOME VISIBLE DEGASSING IN SAMPLE FRAGS;

THINLY INTERBEDDED WITH CARBONACEOUS

SHALE; NO TRACE ACCESSORY MINERALS IN

SAMPLE; BLOCKY TO PLANAR FRACTURE.

12900 MD
12800

ROLLINS SANDSTONE = OFF WHITE TO LIGHT

OLIVE GRAY; PREDOMINANTLY LOOSE GRAINS;

SUBROUND TO SUBANGULAR TO ROUND;

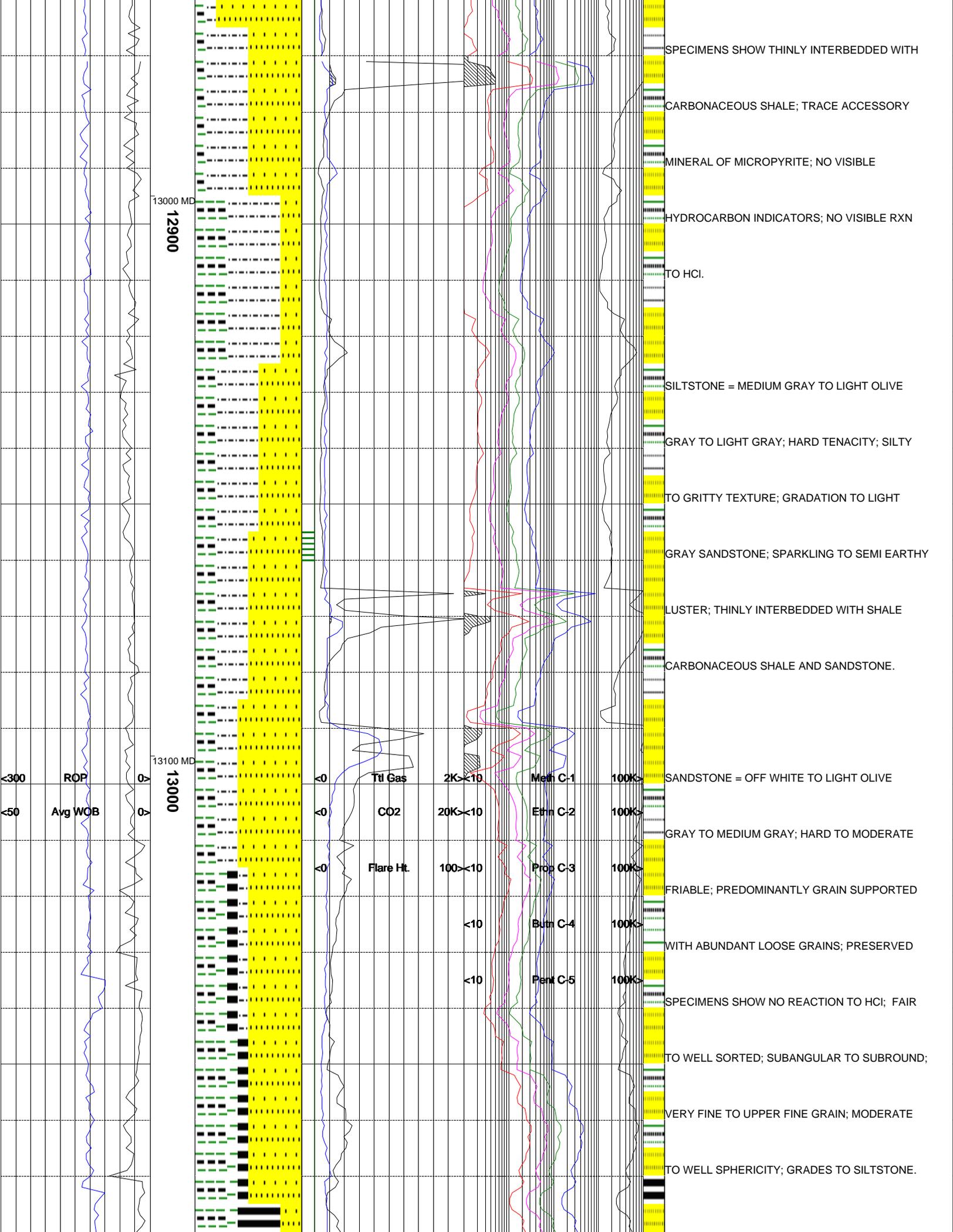
WELL SORTED; MOD TO HIGH SPHERICITY;

UPPER VERY FINE TO LOWER MEDIUM GRAIN;

MINOR PRESERVED SPECIMENS; TRANSPARENT

TO OPAQUE; FROSTED; MINOR ABRASION ON

GRAINS DUE TO PDC BIT ACTION; PRESERVED



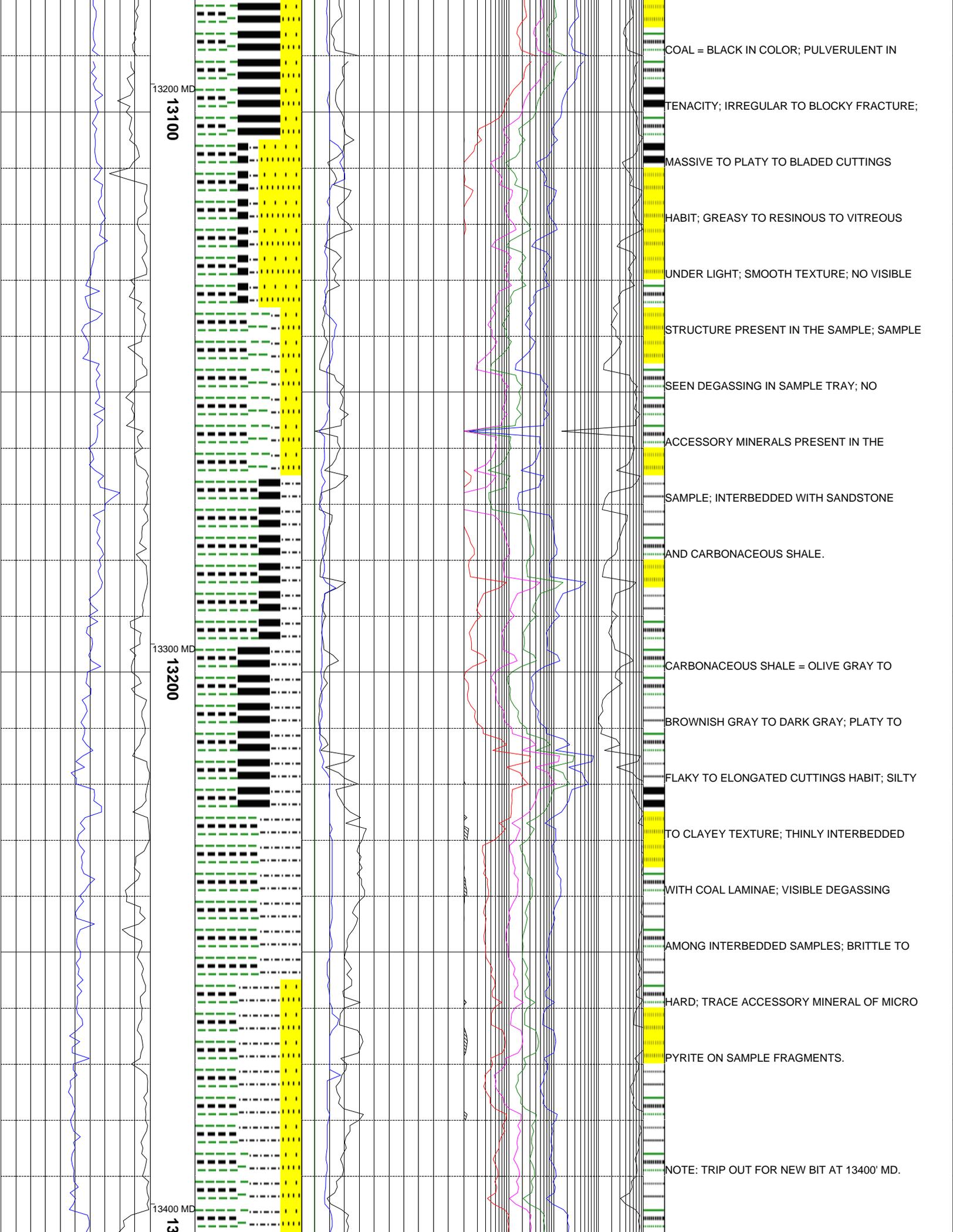
13000 MD
12900

13100 MD
13000

<300 ROP
<50 Avg WOB

Ttl Gas 2K<10 Meth C-1 100K<
CO2 20K<10 Ethn C-2 100K<
Flare Ht. 100<10 Prop C-3 100K<
<10 Butn C-4 100K<
<10 Pent C-5 100K<

SPECIMENS SHOW THINLY INTERBEDDED WITH
CARBONACEOUS SHALE; TRACE ACCESSORY
MINERAL OF MICROPYRITE; NO VISIBLE
HYDROCARBON INDICATORS; NO VISIBLE RXN
TO HCl.
SILTSTONE = MEDIUM GRAY TO LIGHT OLIVE
GRAY TO LIGHT GRAY; HARD TENACITY; SILTY
TO GRITTY TEXTURE; GRADATION TO LIGHT
GRAY SANDSTONE; SPARKLING TO SEMI EARTHY
LUSTER; THINLY INTERBEDDED WITH SHALE
CARBONACEOUS SHALE AND SANDSTONE.
SANDSTONE = OFF WHITE TO LIGHT OLIVE
GRAY TO MEDIUM GRAY; HARD TO MODERATE
FRIABLE; PREDOMINANTLY GRAIN SUPPORTED
WITH ABUNDANT LOOSE GRAINS; PRESERVED
SPECIMENS SHOW NO REACTION TO HCl; FAIR
TO WELL SORTED; SUBANGULAR TO SUBROUND;
VERY FINE TO UPPER FINE GRAIN; MODERATE
TO WELL SPHERICITY; GRADES TO SILTSTONE.

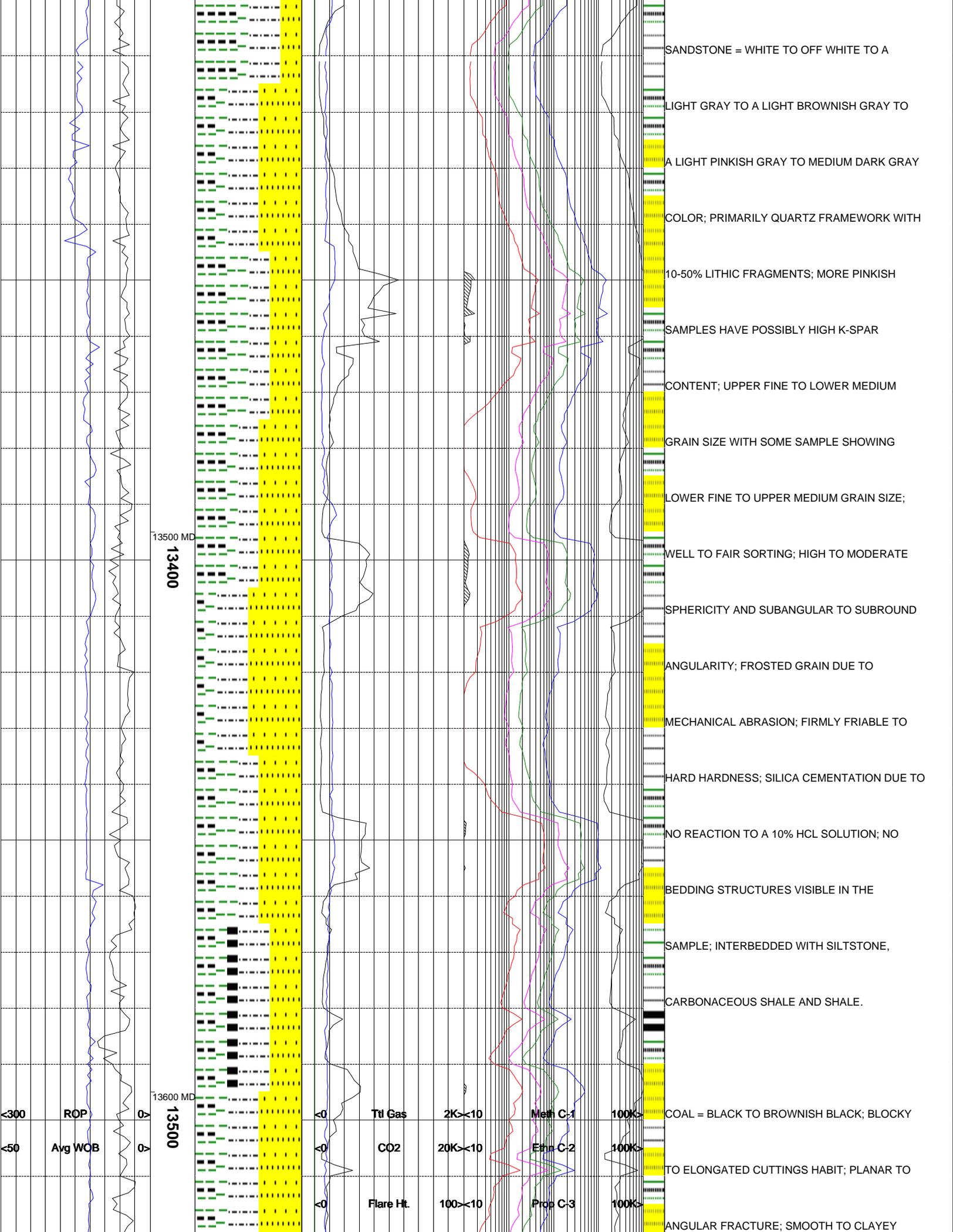


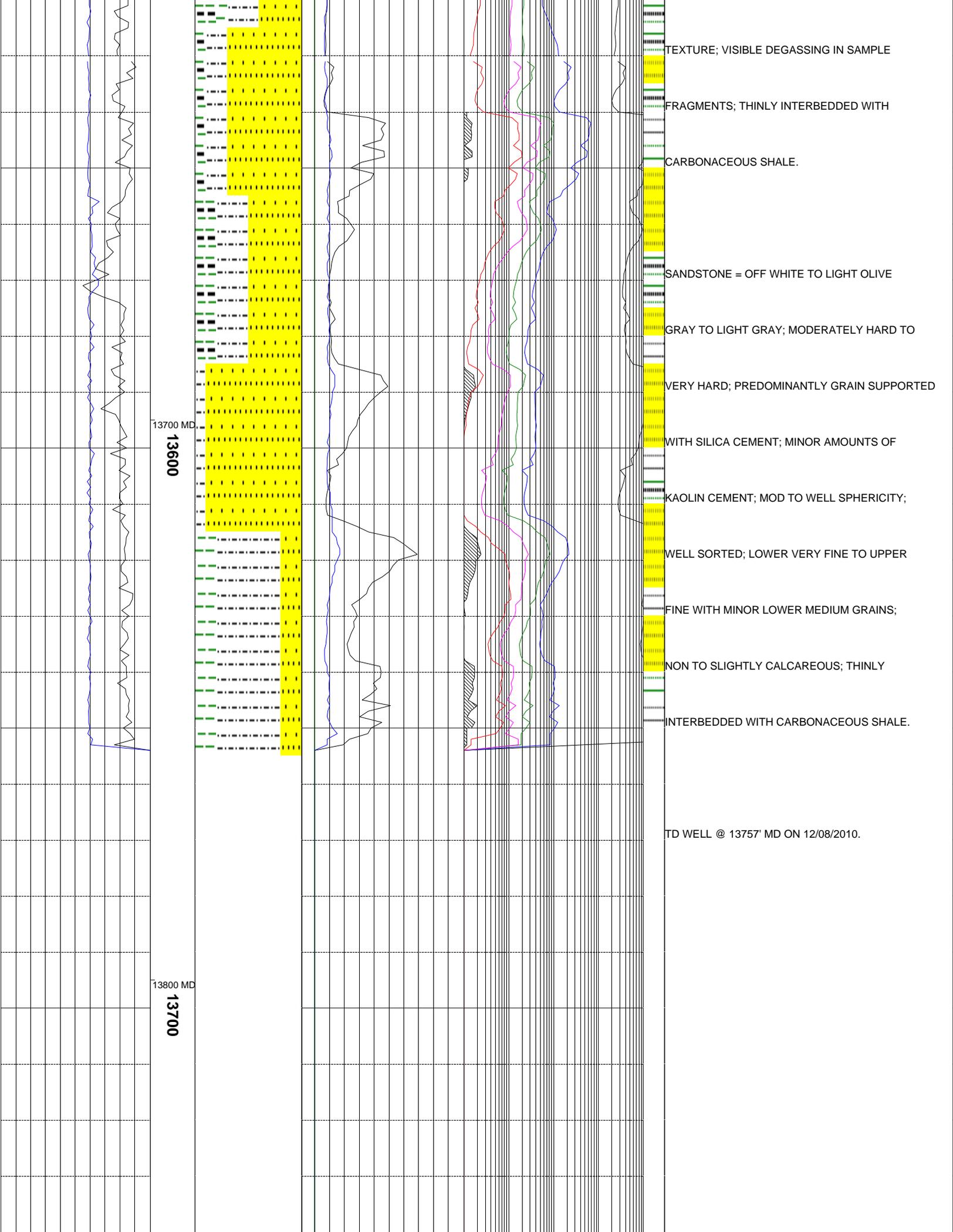
13200 MD
13100

13300 MD
13200

13400 MD
13

COAL = BLACK IN COLOR; PULVERULENT IN
 TENACITY; IRREGULAR TO BLOCKY FRACTURE;
 MASSIVE TO PLATY TO BLADED CUTTINGS
 HABIT; GREASY TO RESINOUS TO VITREOUS
 UNDER LIGHT; SMOOTH TEXTURE; NO VISIBLE
 STRUCTURE PRESENT IN THE SAMPLE; SAMPLE
 SEEN DEGASSING IN SAMPLE TRAY; NO
 ACCESSORY MINERALS PRESENT IN THE
 SAMPLE; INTERBEDDED WITH SANDSTONE
 AND CARBONACEOUS SHALE.
 CARBONACEOUS SHALE = OLIVE GRAY TO
 BROWNISH GRAY TO DARK GRAY; PLATY TO
 FLAKY TO ELONGATED CUTTINGS HABIT; SILTY
 TO CLAYEY TEXTURE; THINLY INTERBEDDED
 WITH COAL LAMINAE; VISIBLE DEGASSING
 AMONG INTERBEDDED SAMPLES; BRITTLE TO
 HARD; TRACE ACCESSORY MINERAL OF MICRO
 PYRITE ON SAMPLE FRAGMENTS.
 NOTE: TRIP OUT FOR NEW BIT AT 13400' MD.





TEXTURE; VISIBLE DEGASSING IN SAMPLE

FRAGMENTS; THINLY INTERBEDDED WITH

CARBONACEOUS SHALE.

SANDSTONE = OFF WHITE TO LIGHT OLIVE

GRAY TO LIGHT GRAY; MODERATELY HARD TO

VERY HARD; PREDOMINANTLY GRAIN SUPPORTED

WITH SILICA CEMENT; MINOR AMOUNTS OF

KAOLIN CEMENT; MOD TO WELL SPHERICITY;

WELL SORTED; LOWER VERY FINE TO UPPER

FINE WITH MINOR LOWER MEDIUM GRAINS;

NON TO SLIGHTLY CALCAREOUS; THINLY

INTERBEDDED WITH CARBONACEOUS SHALE.

13700 MD

13600

13800 MD

13700

TD WELL @ 13757' MD ON 12/08/2010.

