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(281) 784-5500
Bakersfield, CA
(661) 328-1595
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Anchorage, AK
(907) 561-2465

MUDLOG TVD

COMPANY ExxonMobil Production
WELL FRU197-33B1
FIELD PICEANCE CREEK
REGION ROCKIES
COORDINATES 39.921453000
-108.282474000
ELEVATION GL: 6459.5'
RKB: 30.2'
COUNTY, STATE RIO BLANCO, CO
API INDEX 051031142800
SPUD DATE 06/19/2010
CONTRACTOR HP
CO. REP. CANDANCE CURTIS
RIG/TYPE HP321
LOGGING UNIT MLU#31
GEOLOGISTS B.DELANEY
C.RECORD
ADD. PERSONS M.FRANCO
CO. GEOLOGIST CHRIS ALBA

LOG INTERVAL

CASING DATA

DEPTHS: 4083' TO 12912'
DATES: 06/19/2010 TO 07/01/2010
SCALE: 5" = 100'

16" AT 150'
10.75" AT 4077'
5" AT 12890'
AT

MUD TYPES

HOLE SIZE

WATER-BASED TO 4083'
LSND TO 12912'
TO
TO

14.75" TO 3934'
8.75" TO 11147'
7.875" TO 12912'
TO

ABBREVIATIONS

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

<200	ROP	0>
ft/hr		
<50	Avg WOB	0>
klbs		

TVD Depth

Lithology

MGS	<0	Ttl Gas units	1.5K>	<10	Meth C-1 ppm	100K>
	<0	CO2 ppm	40K>	<10	Ethn C-2	100K>
	<0	Flare Ht. ft	100>	<10	Prop C-3	100K>
	<0			<10	Butn C-4	100K>
				<10	Pent C-5	100K>

Interp. Lith

Remarks
Survey Data, Mud Reports, Other Info.

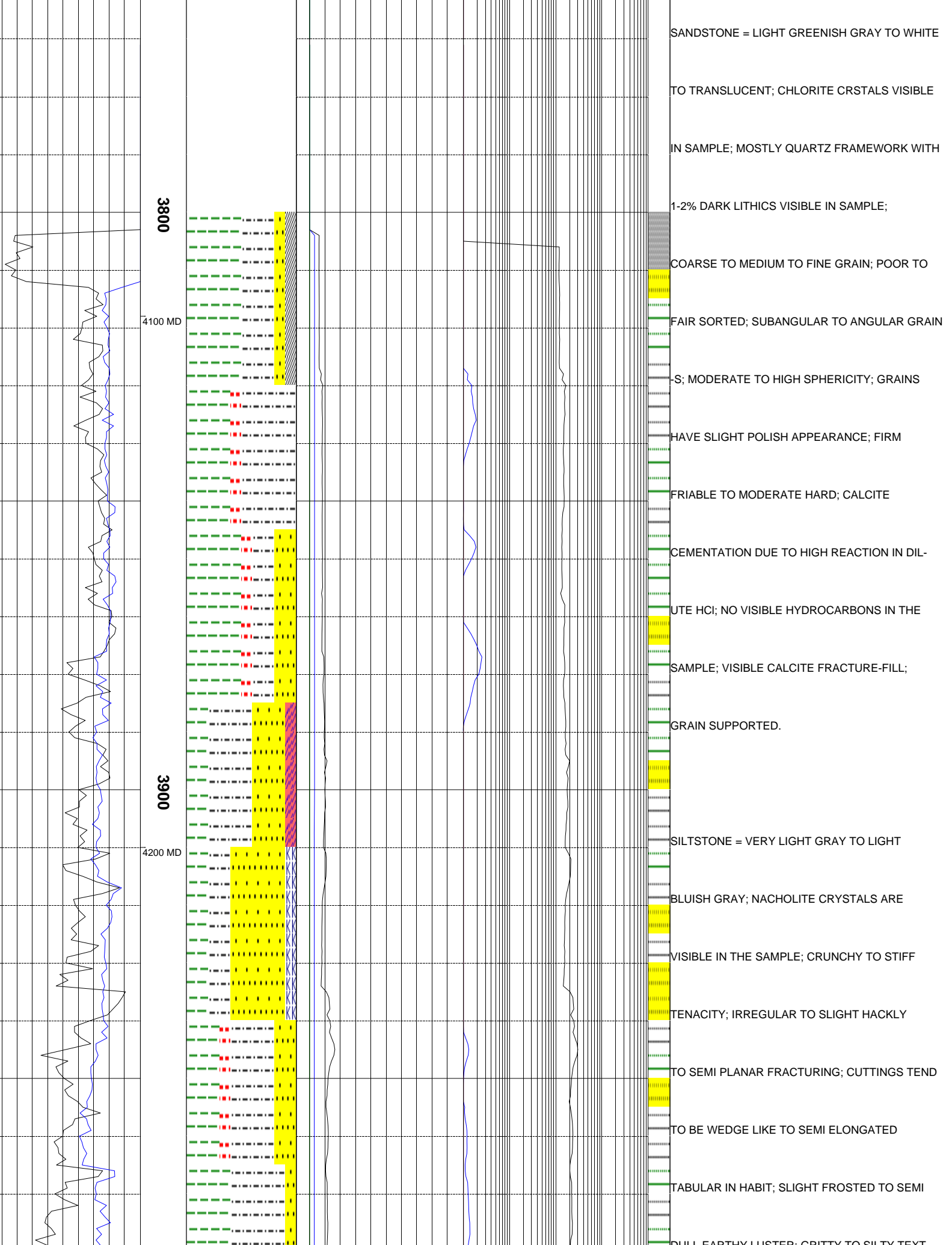
3600

3900 MD

3700

4000 MD

SHALE = VERY LIGHT GREENISH GRAY TO LIGHT BLUISH GRAY TO YELLOWISH MOTTLED APPEARANCE ON MOST OF SAMPLE; BRITTLE TO CRUMBLY TENACITY; PREDOMINATELY PLANAR TO SLIGHT HACKLY TO SEMI BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY IN HABIT; DULL EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.



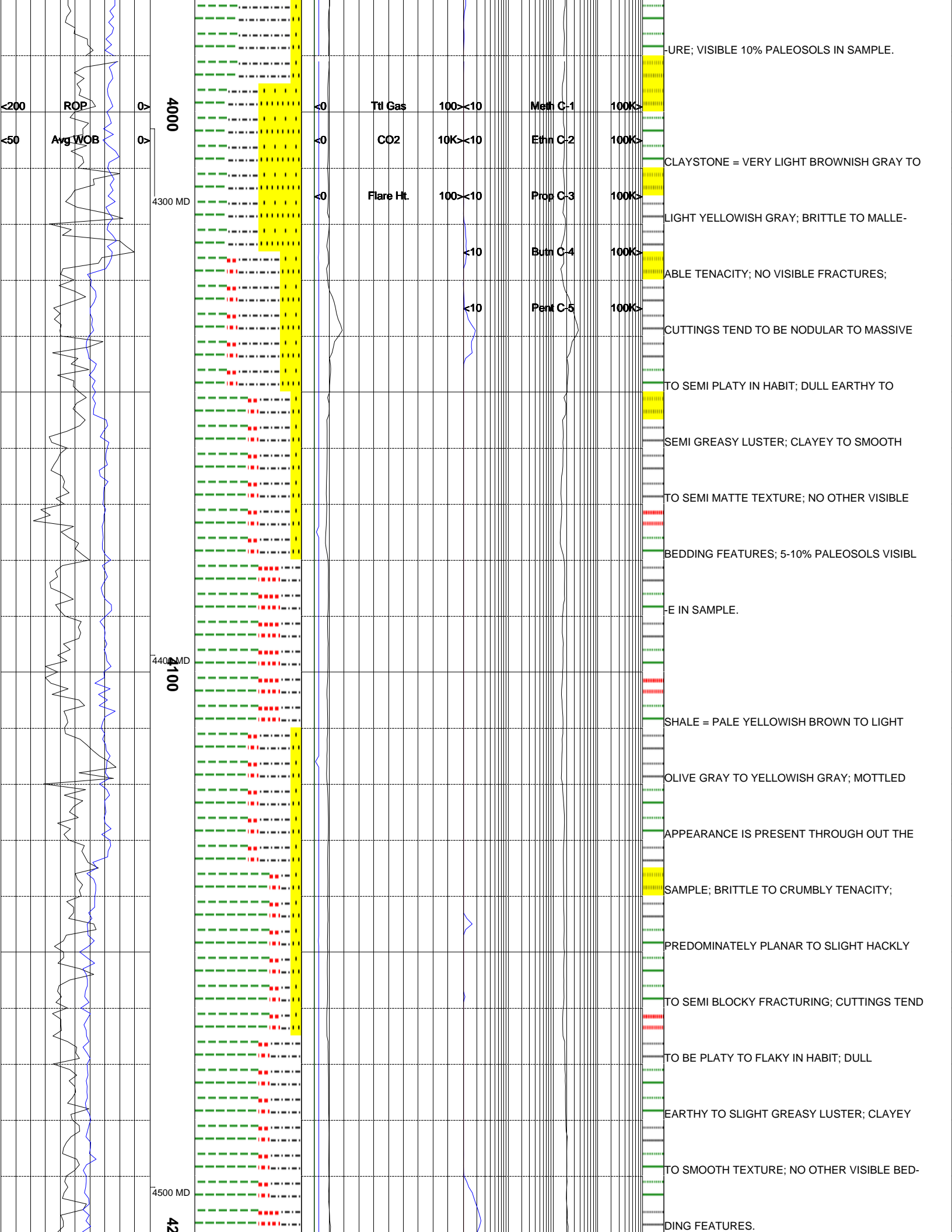
3800

4100 MD

3900

4200 MD

SANDSTONE = LIGHT GREENISH GRAY TO WHITE
 TO TRANSLUCENT; CHLORITE CRSTALS VISIBLE
 IN SAMPLE; MOSTLY QUARTZ FRAMEWORK WITH
 1-2% DARK LITHICS VISIBLE IN SAMPLE;
 COARSE TO MEDIUM TO FINE GRAIN; POOR TO
 FAIR SORTED; SUBANGULAR TO ANGULAR GRAIN
 S; MODERATE TO HIGH SPHERICITY; GRAINS
 HAVE SLIGHT POLISH APPEARANCE; FIRM
 FRIABLE TO MODERATE HARD; CALCITE
 CEMENTATION DUE TO HIGH REACTION IN DIL-
 UTE HCl; NO VISIBLE HYDROCARBONS IN THE
 SAMPLE; VISIBLE CALCITE FRACTURE-FILL;
 GRAIN SUPPORTED.
 SILTSTONE = VERY LIGHT GRAY TO LIGHT
 BLUISH GRAY; NACHOLITE CRYSTALS ARE
 VISIBLE IN THE SAMPLE; CRUNCHY TO STIFF
 TENACITY; IRREGULAR TO SLIGHT HACKLY
 TO SEMI PLANAR FRACTURING; CUTTINGS TEND
 TO BE WEDGE LIKE TO SEMI ELONGATED
 TABULAR IN HABIT; SLIGHT FROSTED TO SEMI
 DULL EARTHY LUSTER; GRITTY TO SILTY TEXT



200 ROP
50 Avg WOB

4000

4300 MD

4400 MD

4100

4500 MD

42

Ttl Gas 100 <> 10
CO2 10K <> 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 <>

URE; VISIBLE 10% PALEOSOLS IN SAMPLE.

CLAYSTONE = VERY LIGHT BROWNISH GRAY TO

LIGHT YELLOWISH GRAY; BRITTLE TO MALLE-

ABLE TENACITY; NO VISIBLE FRACTURES;

CUTTINGS TEND TO BE NODULAR TO MASSIVE

TO SEMI PLATY IN HABIT; DULL EARTHY TO

SEMI GREASY LUSTER; CLAYEY TO SMOOTH

TO SEMI MATTE TEXTURE; NO OTHER VISIBLE

BEDDING FEATURES; 5-10% PALEOSOLS VISIBL

E IN SAMPLE.

SHALE = PALE YELLOWISH BROWN TO LIGHT

OLIVE GRAY TO YELLOWISH GRAY; MOTTLED

APPEARANCE IS PRESENT THROUGH OUT THE

SAMPLE; BRITTLE TO CRUMBLY TENACITY;

PREDOMINATELY PLANAR TO SLIGHT HACKLY

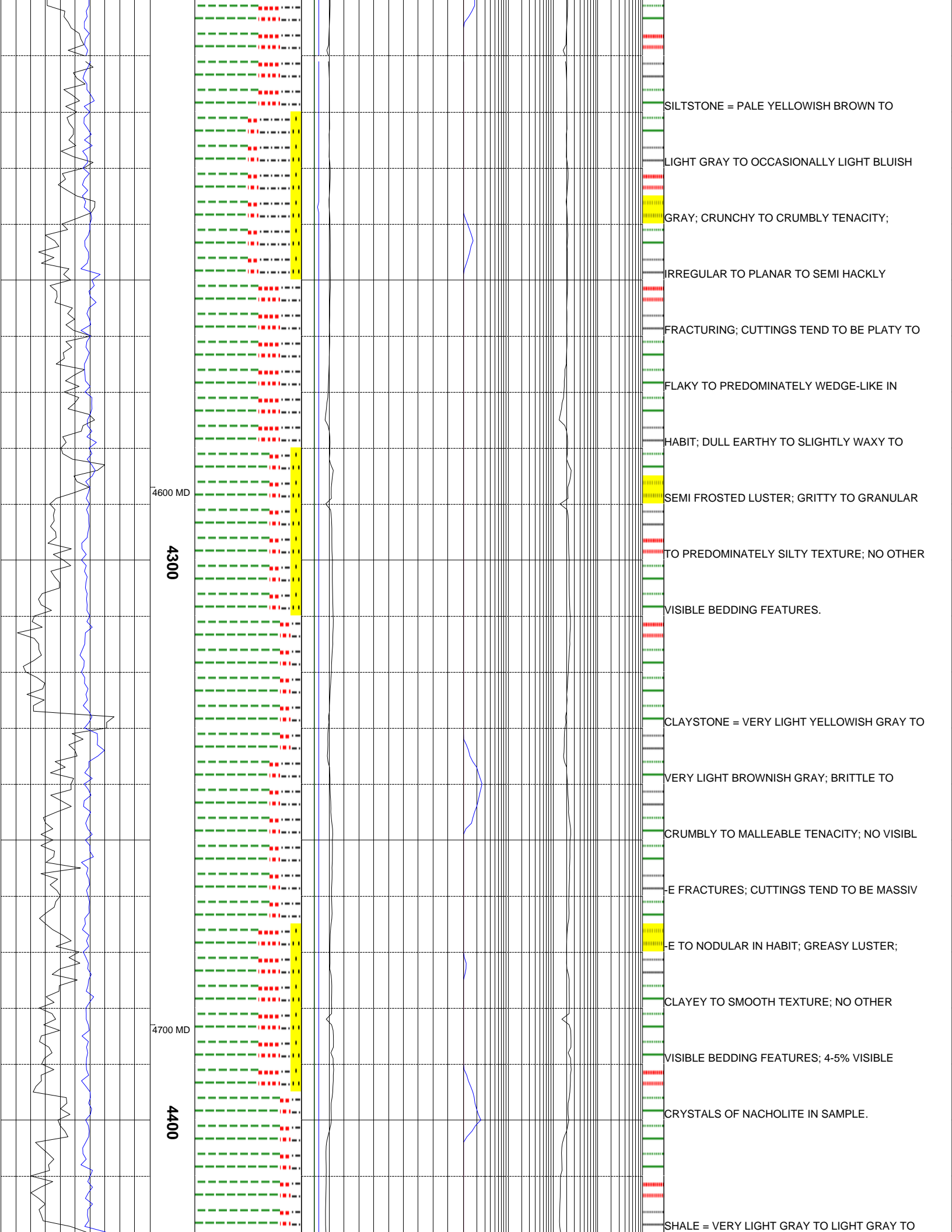
TO SEMI BLOCKY FRACTURING; CUTTINGS TEND

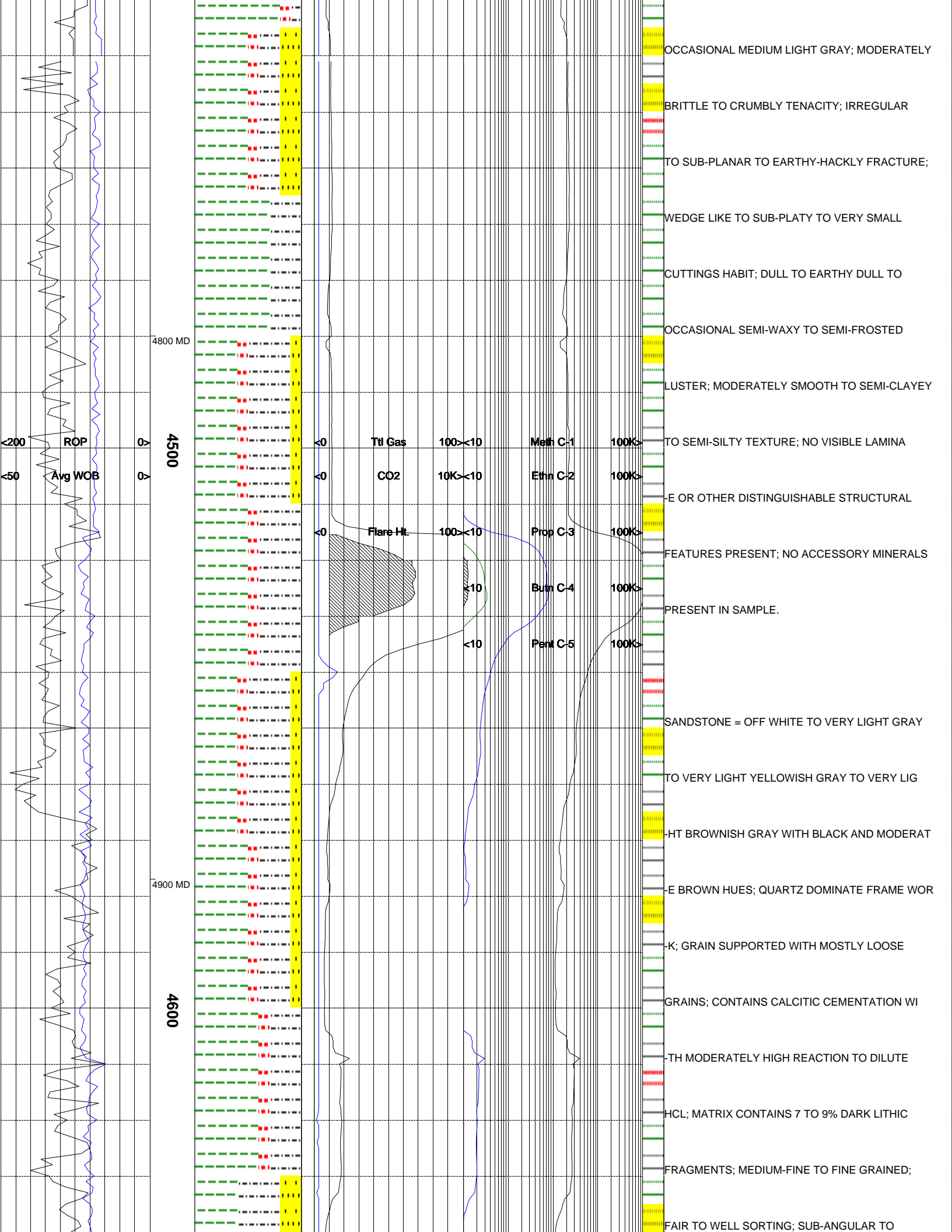
TO BE PLATY TO FLAKY IN HABIT; DULL

EARTHY TO SLIGHT GREASY LUSTER; CLAYEY

TO SMOOTH TEXTURE; NO OTHER VISIBLE BED-

DING FEATURES.



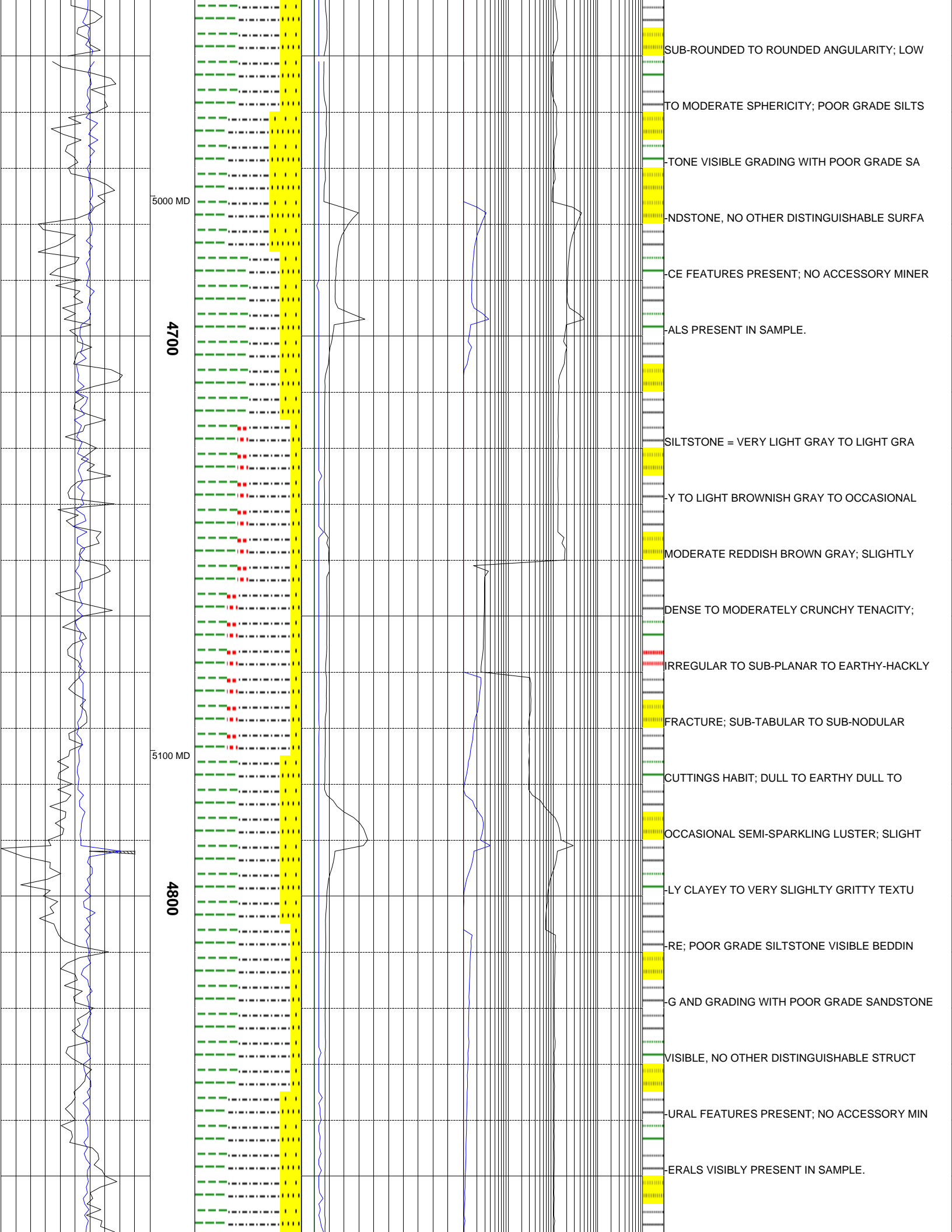


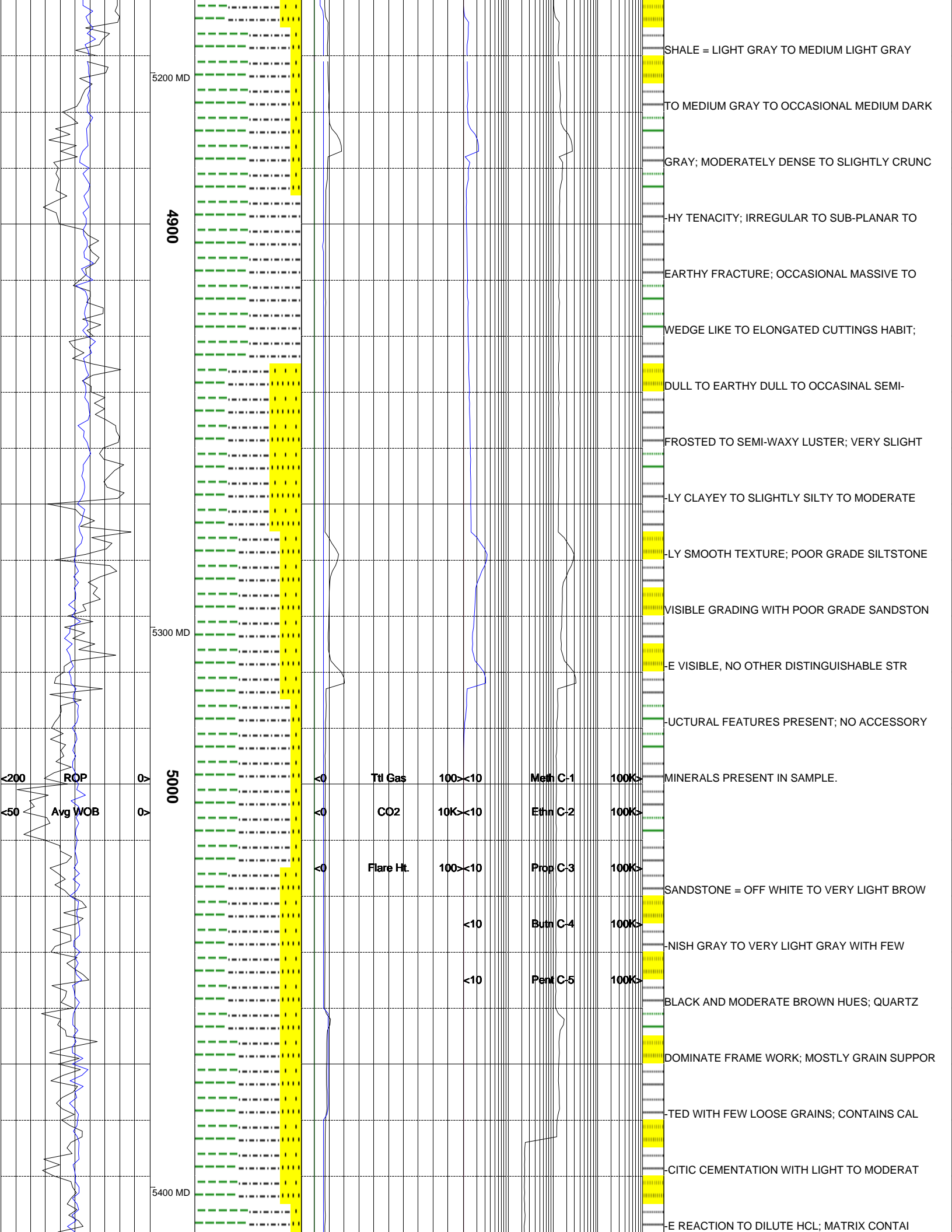
4800 MD
4500
4900 MD
4600

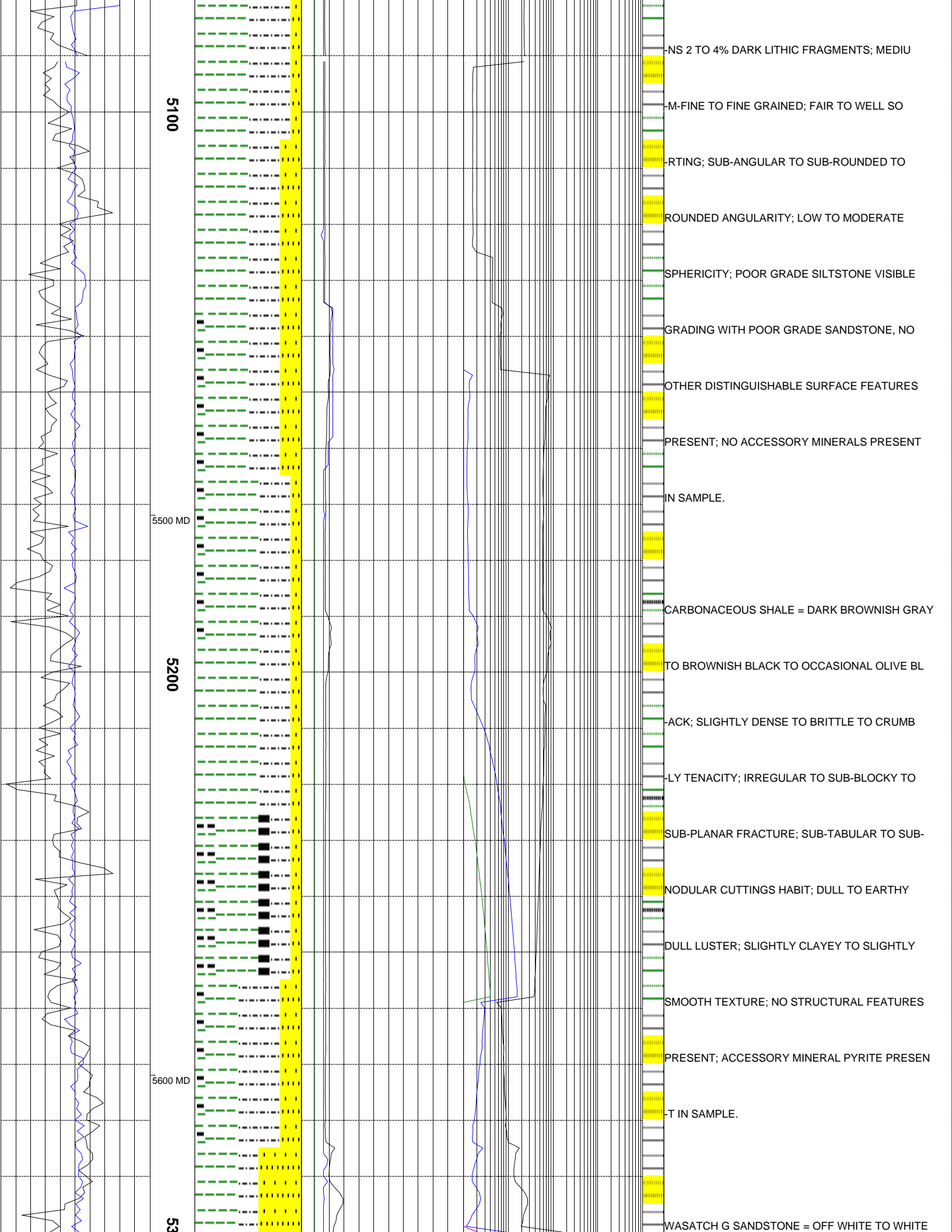
200 ROP
50 Avg WOB

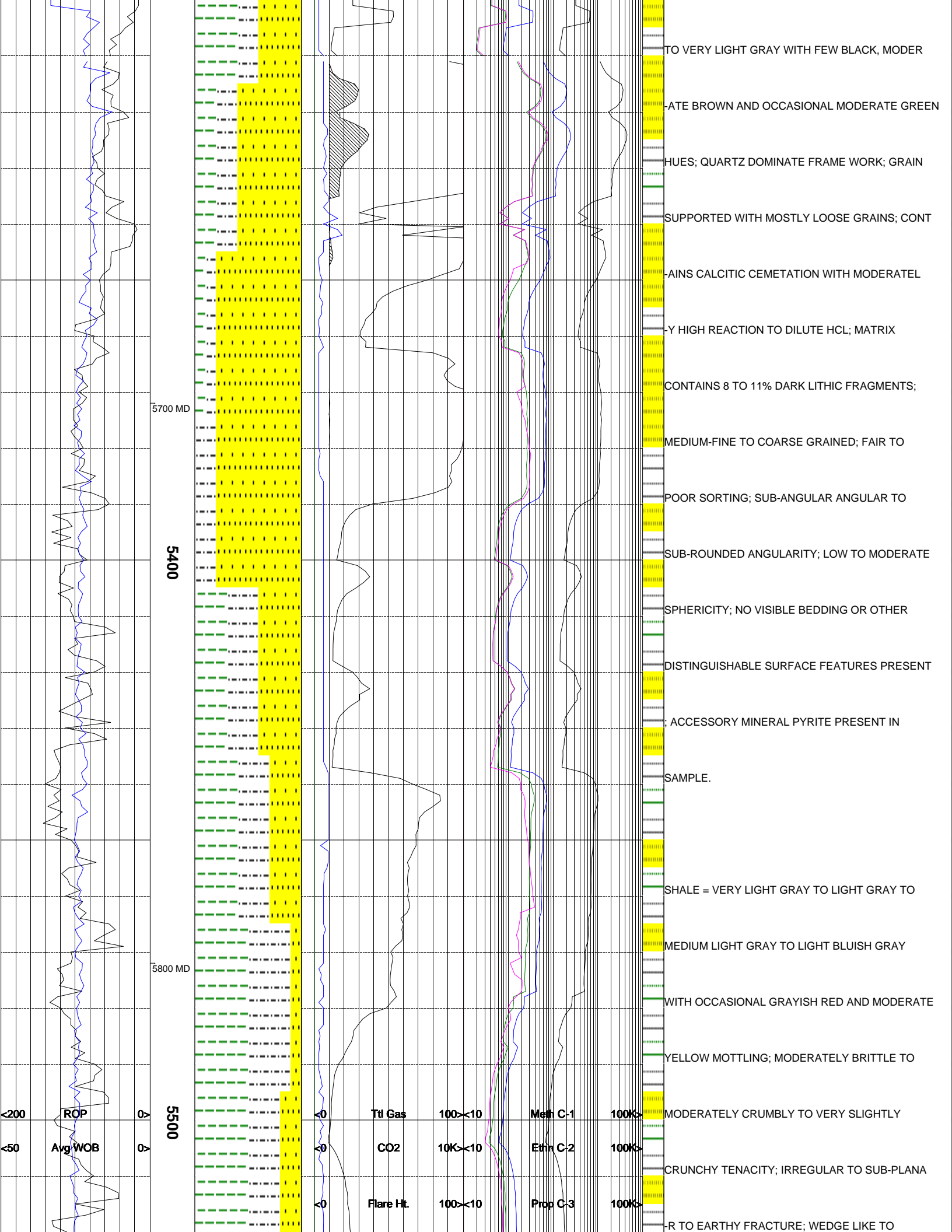
Ttl Gas 100 < 10
CO2 10K < 10
Flare Ht. 100 < 10
Meth C-1 100K >
Ethn C-2 100K >
Prop C-3 100K >
Burn C-4 100K >
Pent C-5 100K >

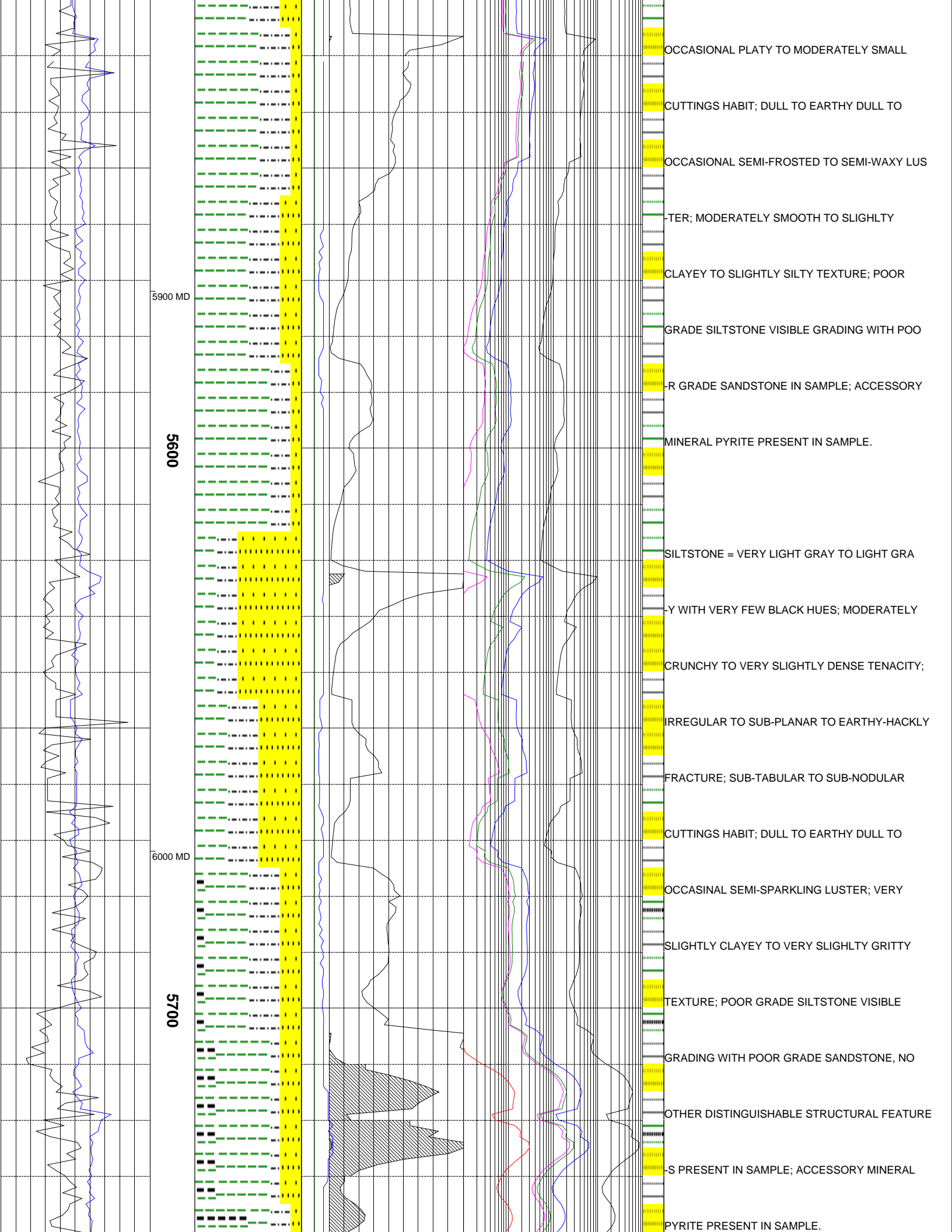
OCCASIONAL MEDIUM LIGHT GRAY; MODERATELY
BRITTLE TO CRUMBLY TENACITY; IRREGULAR
TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE;
WEDGE LIKE TO SUB-PLATY TO VERY SMALL
CUTTINGS HABIT; DULL TO EARTHY DULL TO
OCCASIONAL SEMI-WAXY TO SEMI-FROSTED
LUSTER; MODERATELY SMOOTH TO SEMI-CLAYEY
TO SEMI-SILTY TEXTURE; NO VISIBLE LAMINA
E OR OTHER DISTINGUISHABLE STRUCTURAL
FEATURES PRESENT; NO ACCESSORY MINERALS
PRESENT IN SAMPLE.
SANDSTONE = OFF WHITE TO VERY LIGHT GRAY
TO VERY LIGHT YELLOWISH GRAY TO VERY LIG
HT BROWNISH GRAY WITH BLACK AND MODERAT
E BROWN HUES; QUARTZ DOMINATE FRAME WOR
K; GRAIN SUPPORTED WITH MOSTLY LOOSE
GRAINS; CONTAINS CALCITIC CEMENTATION WI
TH MODERATELY HIGH REACTION TO DILUTE
HCL; MATRIX CONTAINS 7 TO 9% DARK LITHIC
FRAGMENTS; MEDIUM-FINE TO FINE GRAINED;
FAIR TO WELL SORTING; SUB-ANGULAR TO











5900 MD

5600

6000 MD

5700

OCCASIONAL PLATY TO MODERATELY SMALL

CUTTINGS HABIT; DULL TO EARTHY DULL TO

OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUS

TER; MODERATELY SMOOTH TO SLIGHTLY

CLAYEY TO SLIGHTLY SILTY TEXTURE; POOR

GRADE SILTSTONE VISIBLE GRADING WITH POO

R GRADE SANDSTONE IN SAMPLE; ACCESSORY

MINERAL PYRITE PRESENT IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRA

Y WITH VERY FEW BLACK HUES; MODERATELY

CRUNCHY TO VERY SLIGHTLY DENSE TENACITY;

IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY

FRACTURE; SUB-TABULAR TO SUB-NODULAR

CUTTINGS HABIT; DULL TO EARTHY DULL TO

OCCASINAL SEMI-SPARKLING LUSTER; VERY

SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY

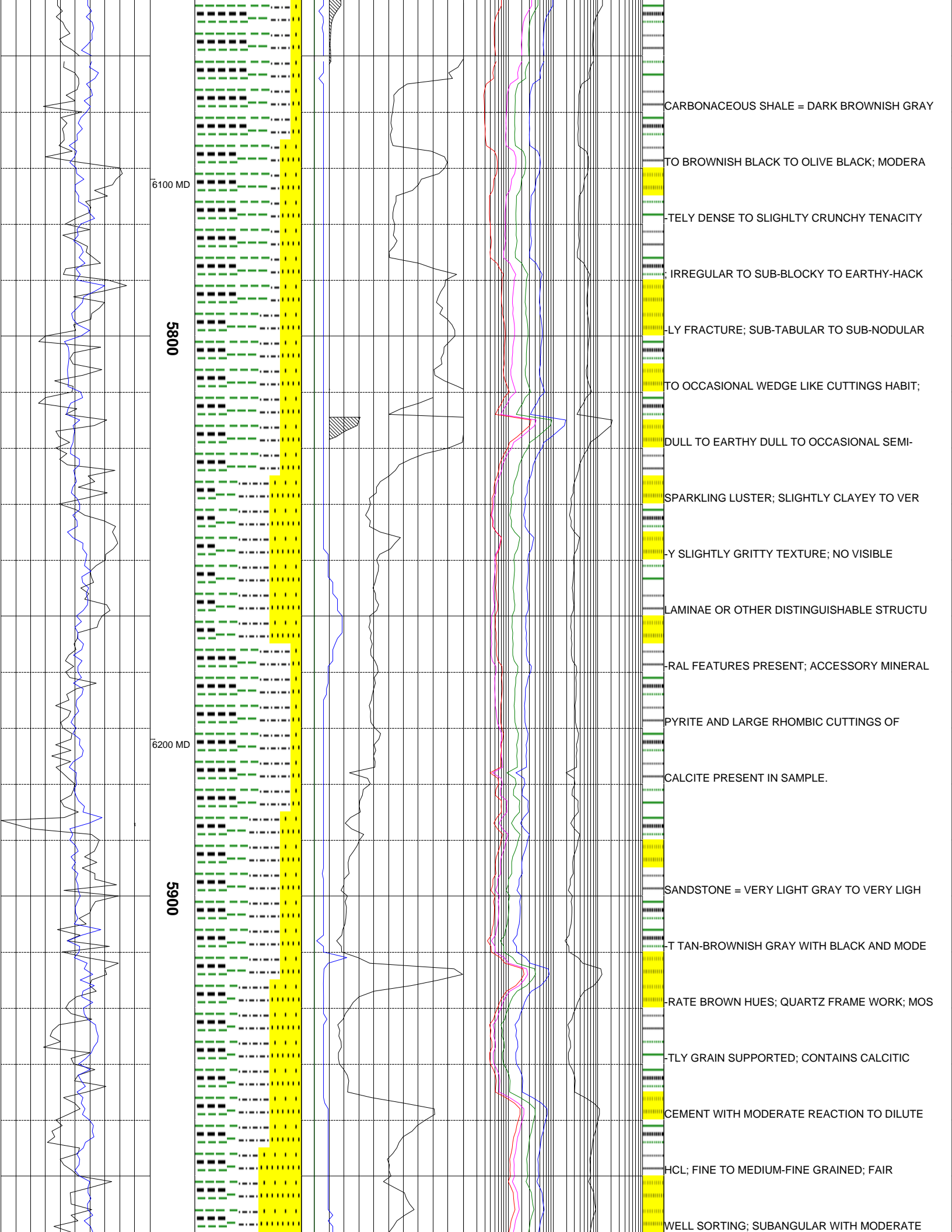
TEXTURE; POOR GRADE SILTSTONE VISIBLE

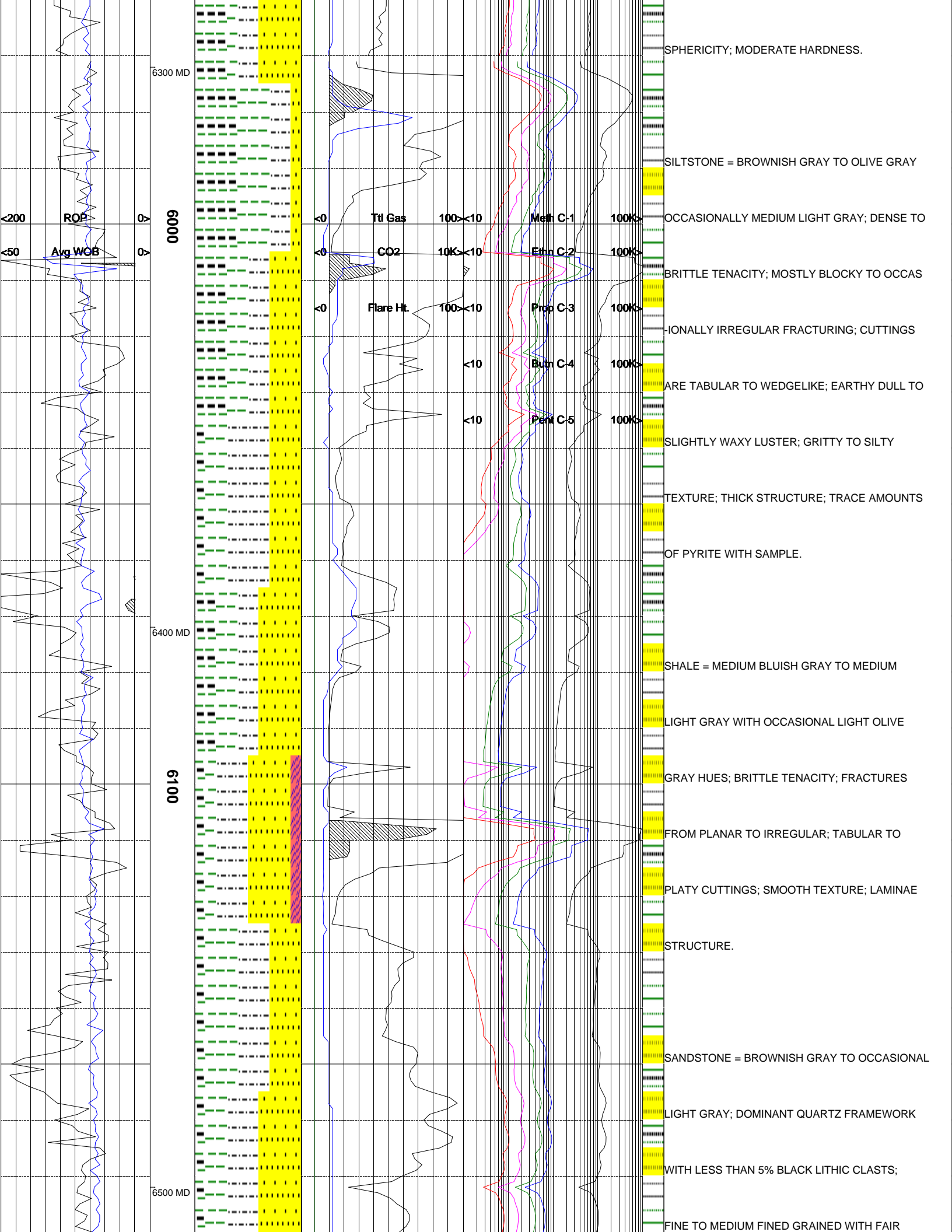
GRADING WITH POOR GRADE SANDSTONE, NO

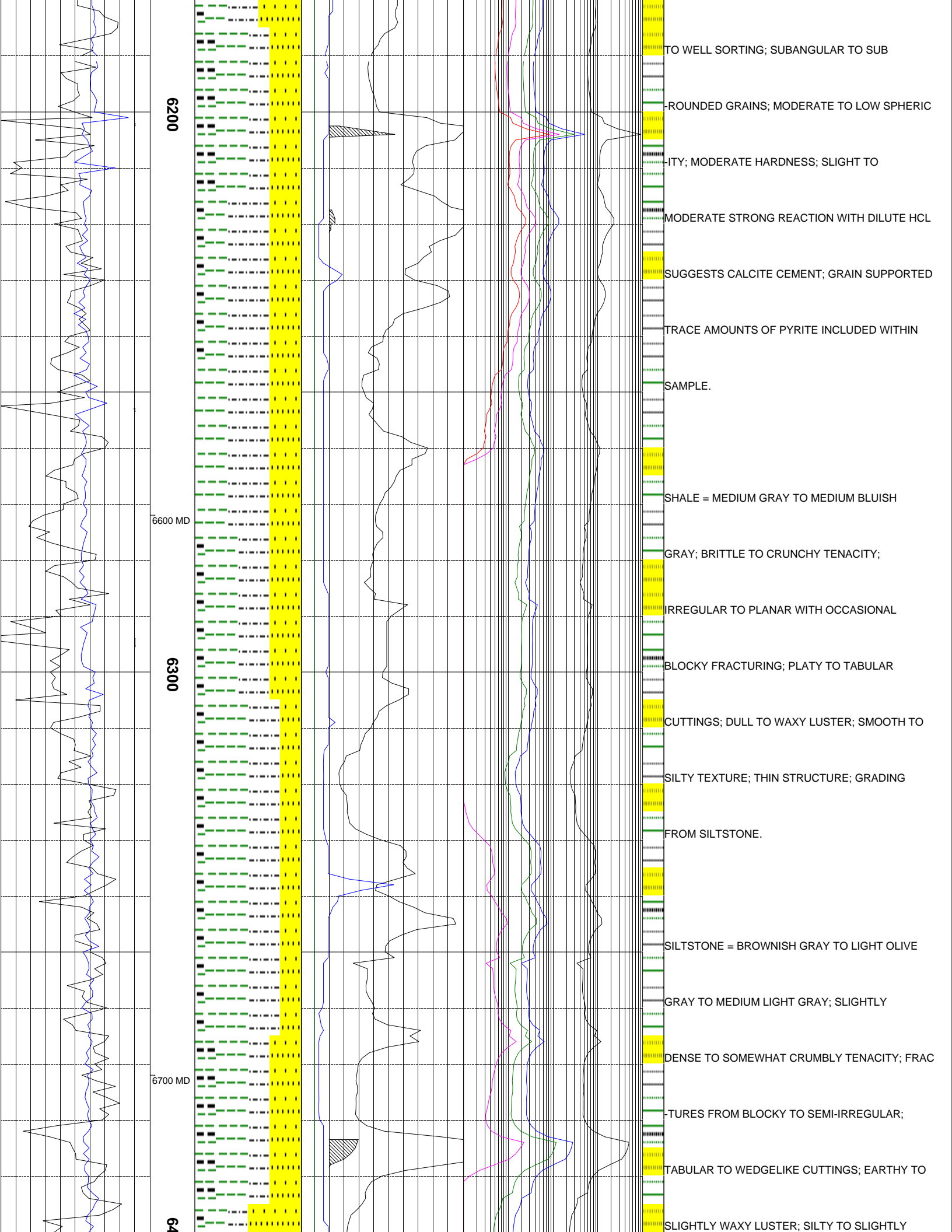
OTHER DISTINGUISHABLE STRUCTURAL FEATURE

S PRESENT IN SAMPLE; ACCESSORY MINERAL

PYRITE PRESENT IN SAMPLE.







6200

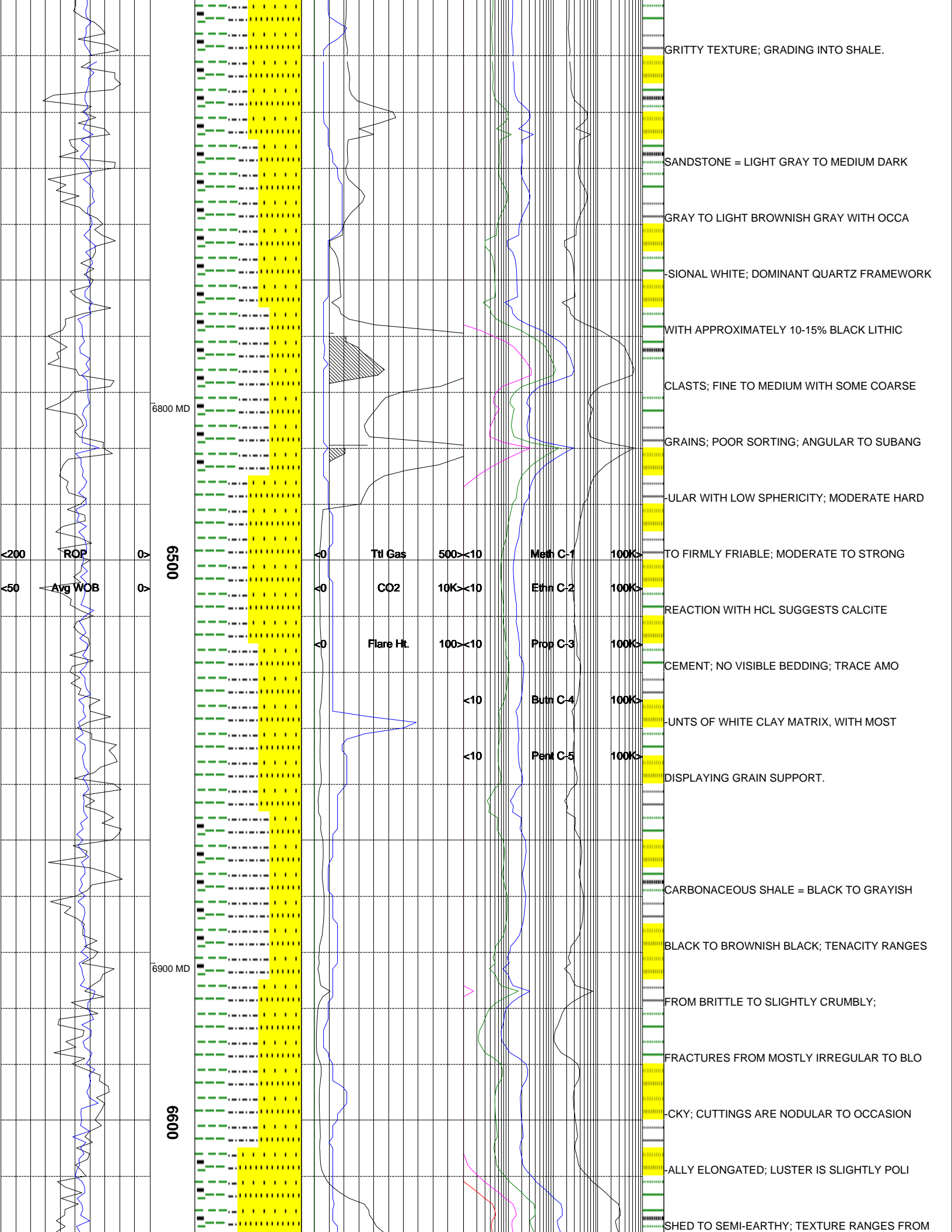
6600 MD

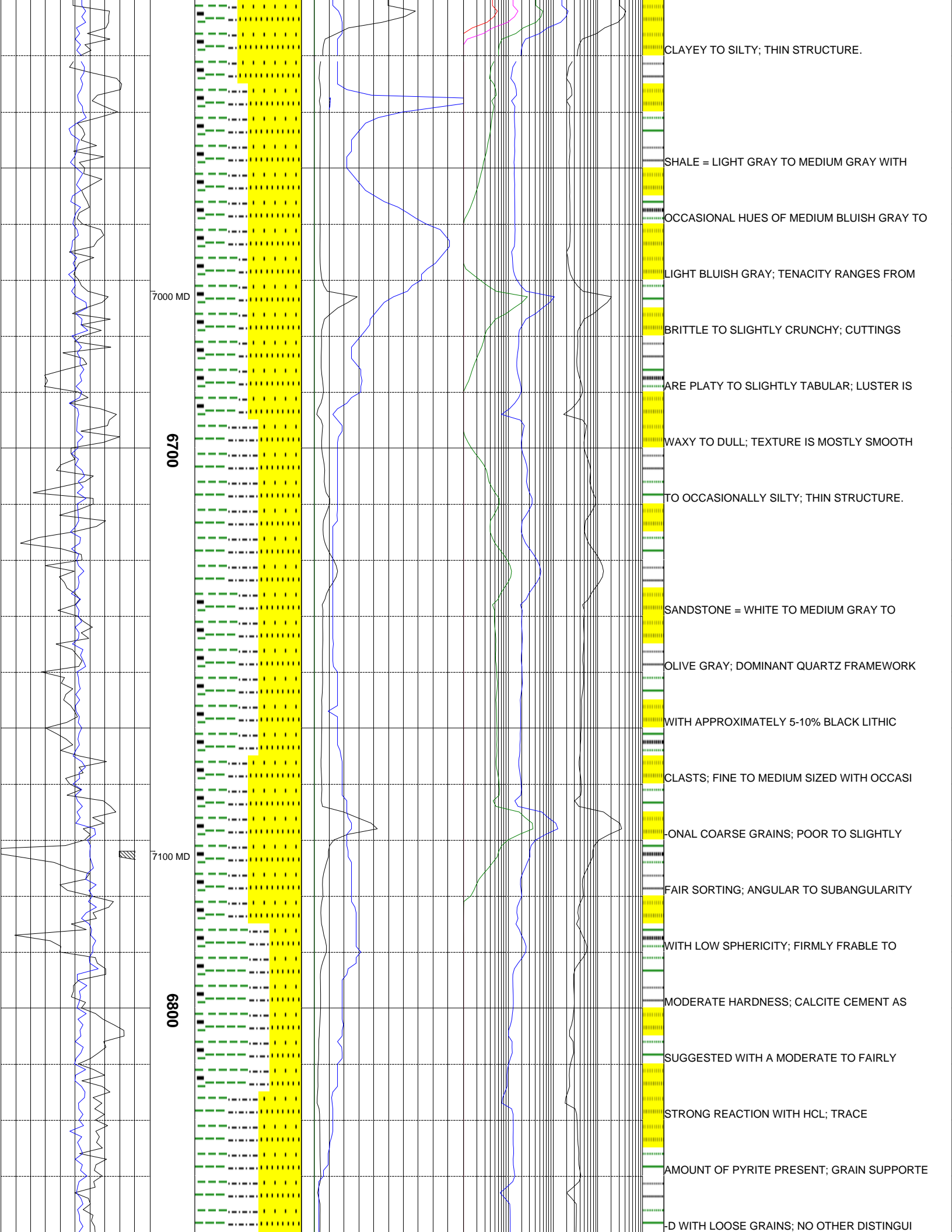
6300

6700 MD

6400

TO WELL SORTING; SUBANGULAR TO SUB
-ROUNDED GRAINS; MODERATE TO LOW SPHERIC
ITY; MODERATE HARDNESS; SLIGHT TO
MODERATE STRONG REACTION WITH DILUTE HCL
SUGGESTS CALCITE CEMENT; GRAIN SUPPORTED
TRACE AMOUNTS OF PYRITE INCLUDED WITHIN
SAMPLE.
SHALE = MEDIUM GRAY TO MEDIUM BLUISH
GRAY; BRITTLE TO CRUNCHY TENACITY;
IRREGULAR TO PLANAR WITH OCCASIONAL
BLOCKY FRACTURING; PLATY TO TABULAR
CUTTINGS; DULL TO WAXY LUSTER; SMOOTH TO
SILTY TEXTURE; THIN STRUCTURE; GRADING
FROM SILTSTONE.
SILTSTONE = BROWNISH GRAY TO LIGHT OLIVE
GRAY TO MEDIUM LIGHT GRAY; SLIGHTLY
DENSE TO SOMEWHAT CRUMBLY TENACITY; FRAC
TURES FROM BLOCKY TO SEMI-IRREGULAR;
TABULAR TO WEDGELIKE CUTTINGS; EARTHY TO
SLIGHTLY WAXY LUSTER; SILTY TO SLIGHTLY





7000 MD

6700

7100 MD

6800

CLAYEY TO SILTY; THIN STRUCTURE.

SHALE = LIGHT GRAY TO MEDIUM GRAY WITH

OCCASIONAL HUES OF MEDIUM BLuish GRAY TO

LIGHT BLuish GRAY; TENACITY RANGES FROM

BRITTLE TO SLIGHTLY CRUNCHY; CUTTINGS

ARE PLATY TO SLIGHTLY TABULAR; LUSTER IS

WAXY TO DULL; TEXTURE IS MOSTLY SMOOTH

TO OCCASIONALLY SILTY; THIN STRUCTURE.

SANDSTONE = WHITE TO MEDIUM GRAY TO

OLIVE GRAY; DOMINANT QUARTZ FRAMEWORK

WITH APPROXIMATELY 5-10% BLACK LITHIC

CLASTS; FINE TO MEDIUM SIZED WITH OCCASI

ONAL COARSE GRAINS; POOR TO SLIGHTLY

FAIR SORTING; ANGULAR TO SUBANGULARITY

WITH LOW SPHERICITY; FIRMLY FRABLE TO

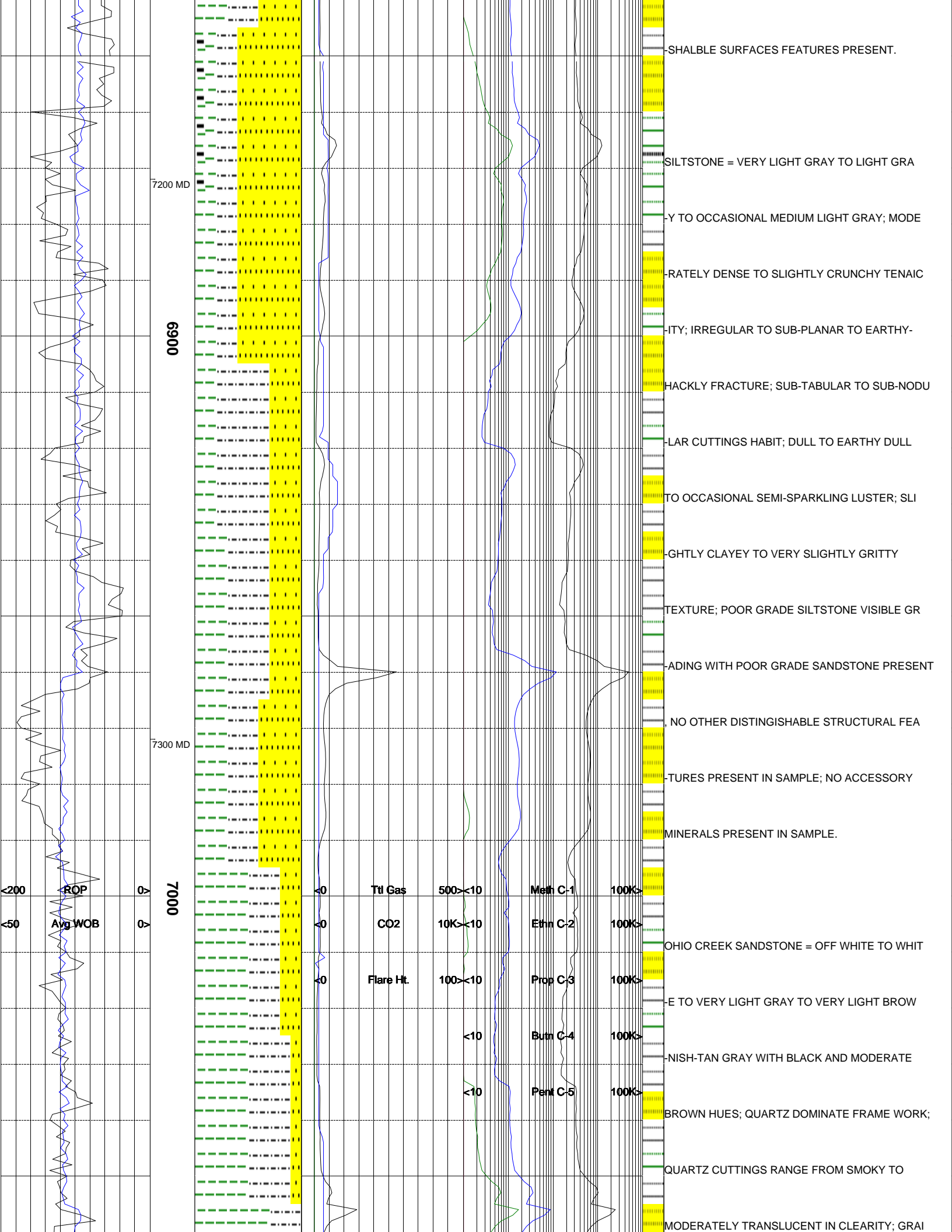
MODERATE HARDNESS; CALCITE CEMENT AS

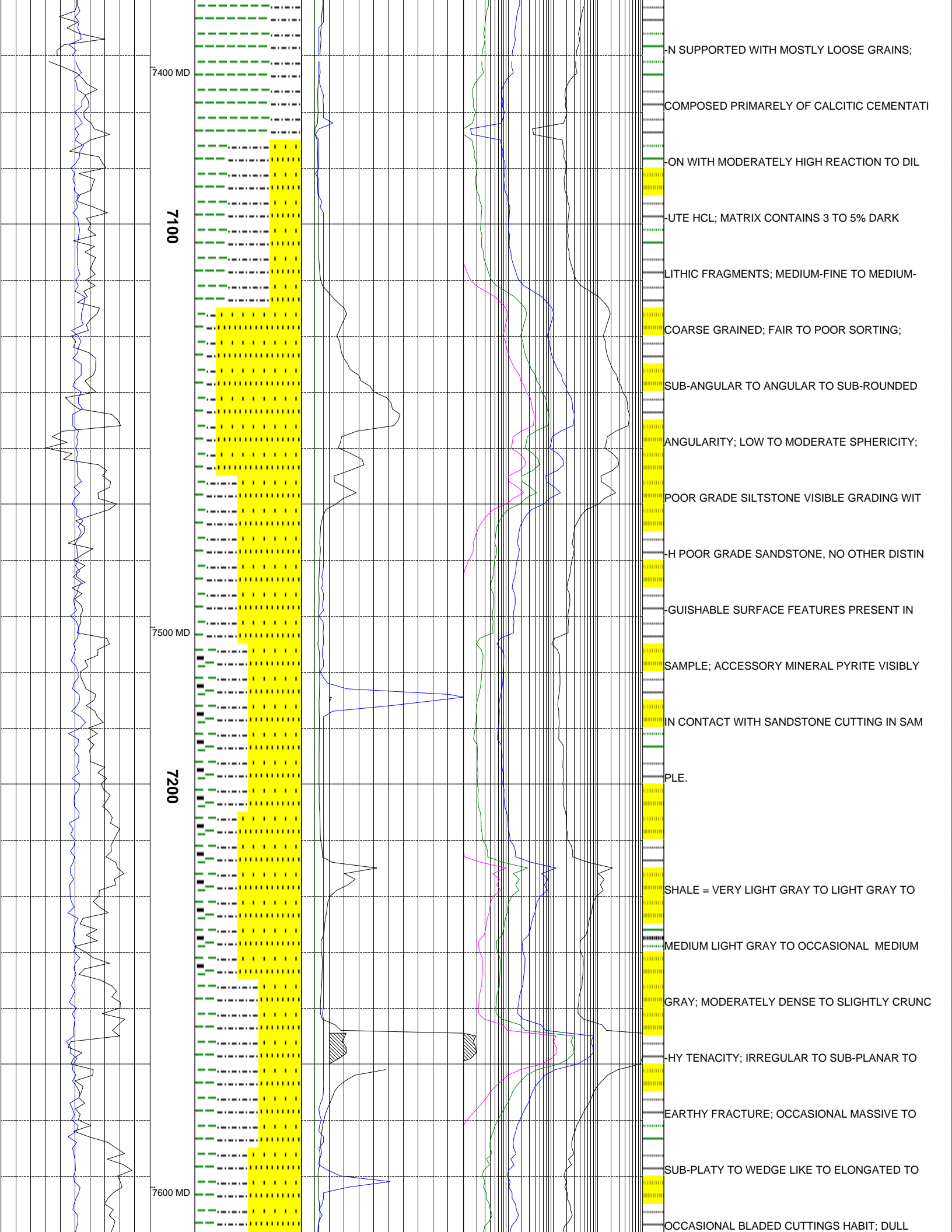
SUGGESTED WITH A MODERATE TO FAIRLY

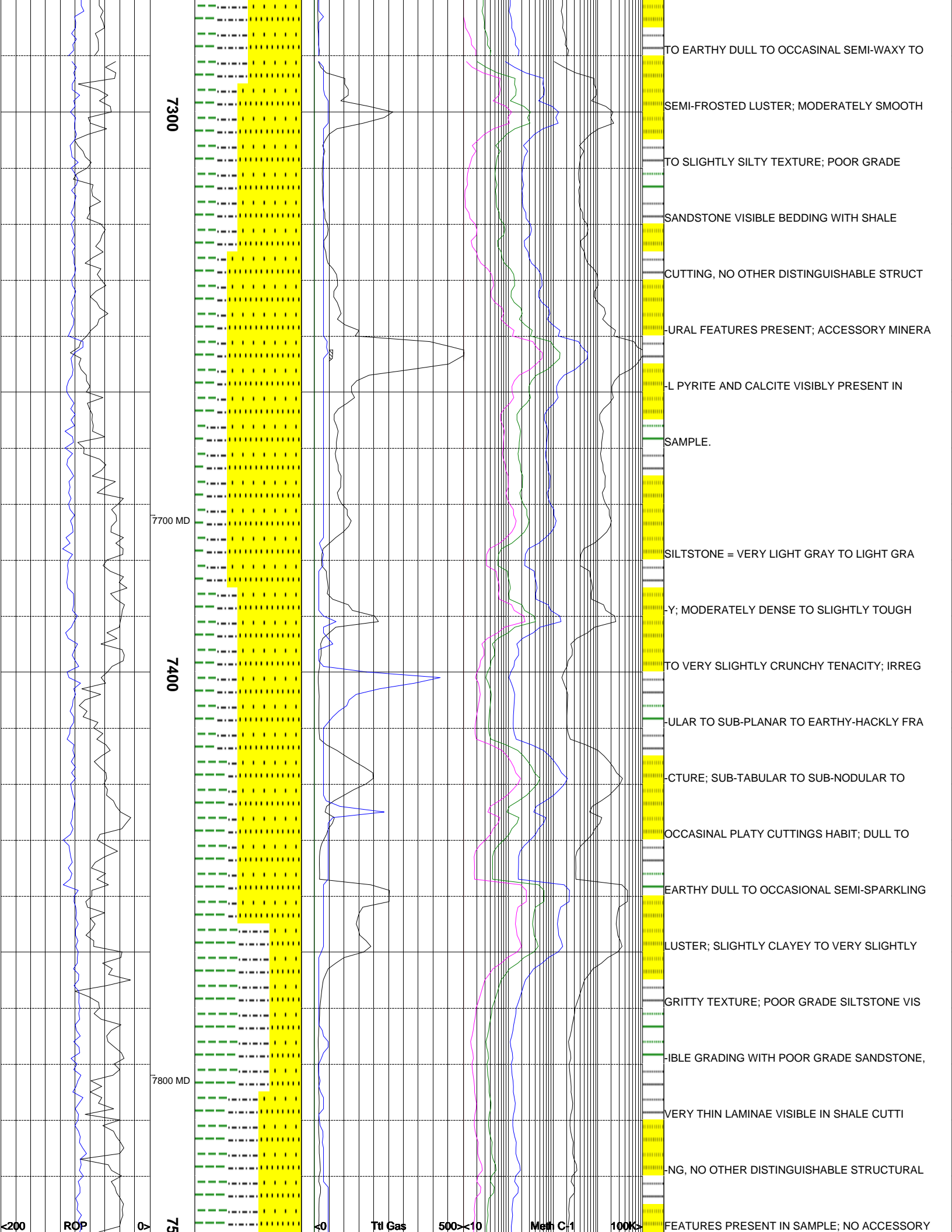
STRONG REACTION WITH HCL; TRACE

AMOUNT OF PYRITE PRESENT; GRAIN SUPPORTE

D WITH LOOSE GRAINS; NO OTHER DISTINGUI







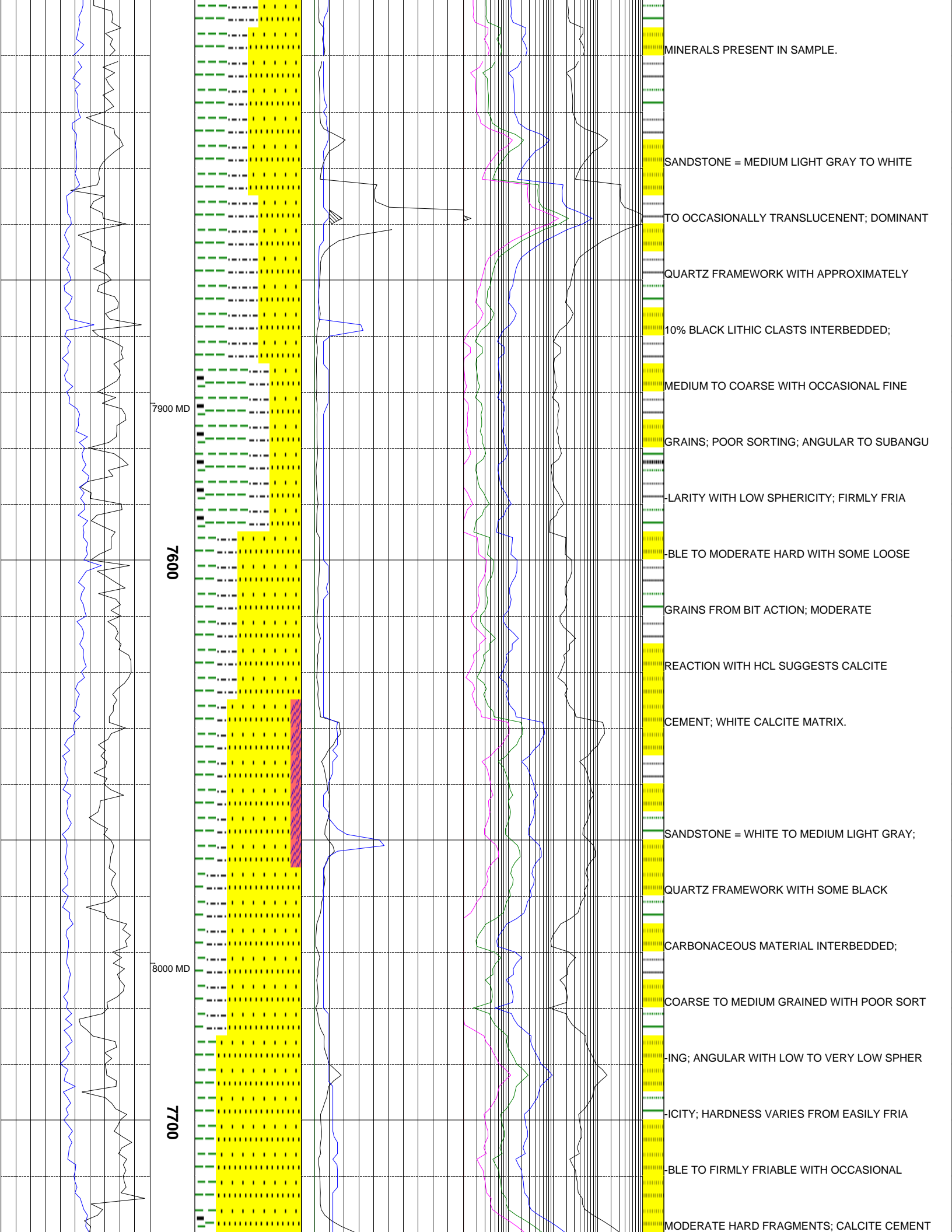
7300

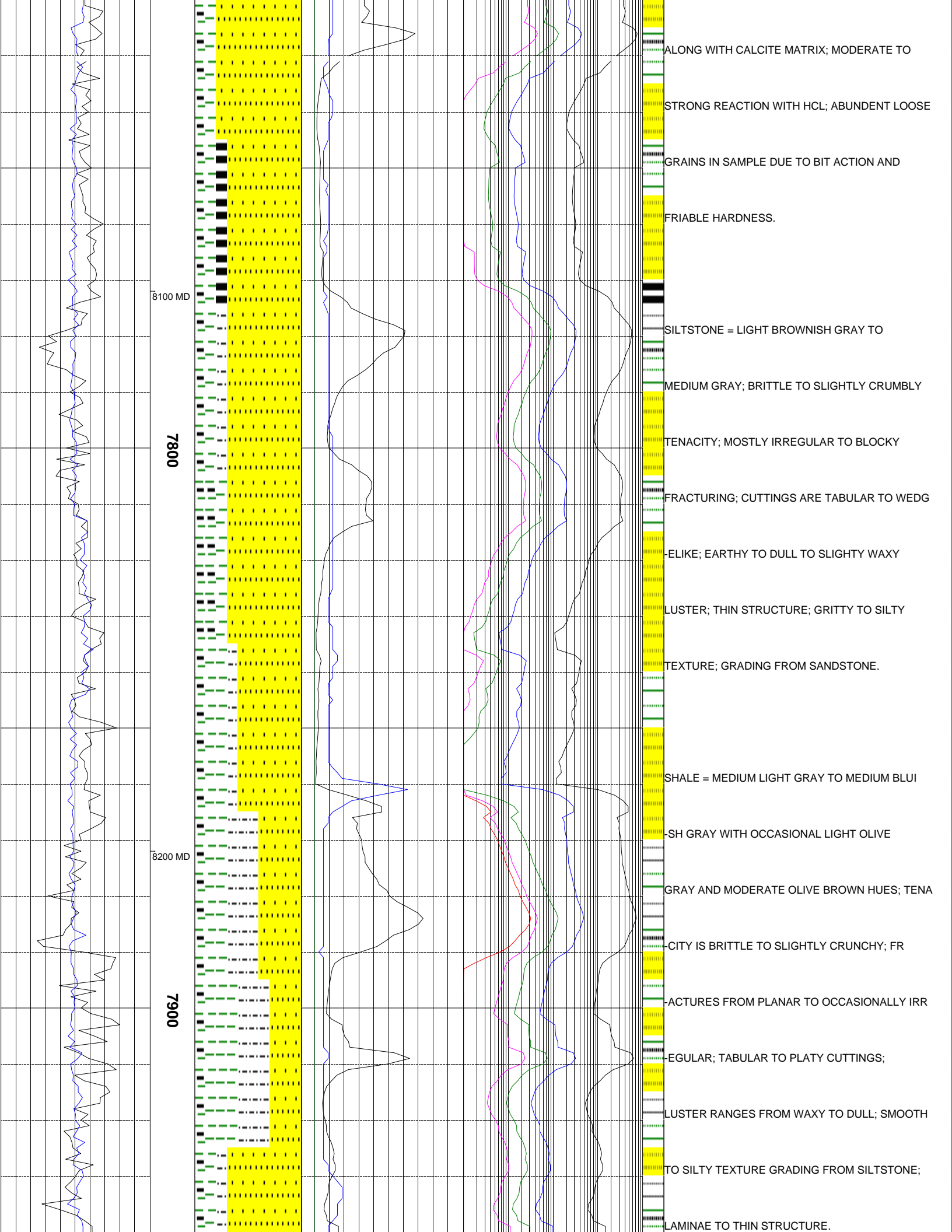
7700 MD

7400

7800 MD

200 ROP 75 40 Ttl Gas 500x10 Meth C-1 100K





8100 MD

7800

8200 MD

7900

ALONG WITH CALCITE MATRIX; MODERATE TO

STRONG REACTION WITH HCL; ABUNDENT LOOSE

GRAINS IN SAMPLE DUE TO BIT ACTION AND

FRIABLE HARDNESS.

SILTSTONE = LIGHT BROWNISH GRAY TO

MEDIUM GRAY; BRITTLE TO SLIGHTLY CRUMBLY

TENACITY; MOSTLY IRREGULAR TO BLOCKY

FRACTURING; CUTTINGS ARE TABULAR TO WEDG

ELIKE; EARTHY TO DULL TO SLIGHTY WAXY

LUSTER; THIN STRUCTURE; GRITTY TO SILTY

TEXTURE; GRADING FROM SANDSTONE.

SHALE = MEDIUM LIGHT GRAY TO MEDIUM BLUE

SH GRAY WITH OCCASIONAL LIGHT OLIVE

GRAY AND MODERATE OLIVE BROWN HUES; TENA

CITY IS BRITTLE TO SLIGHTLY CRUNCHY; FR

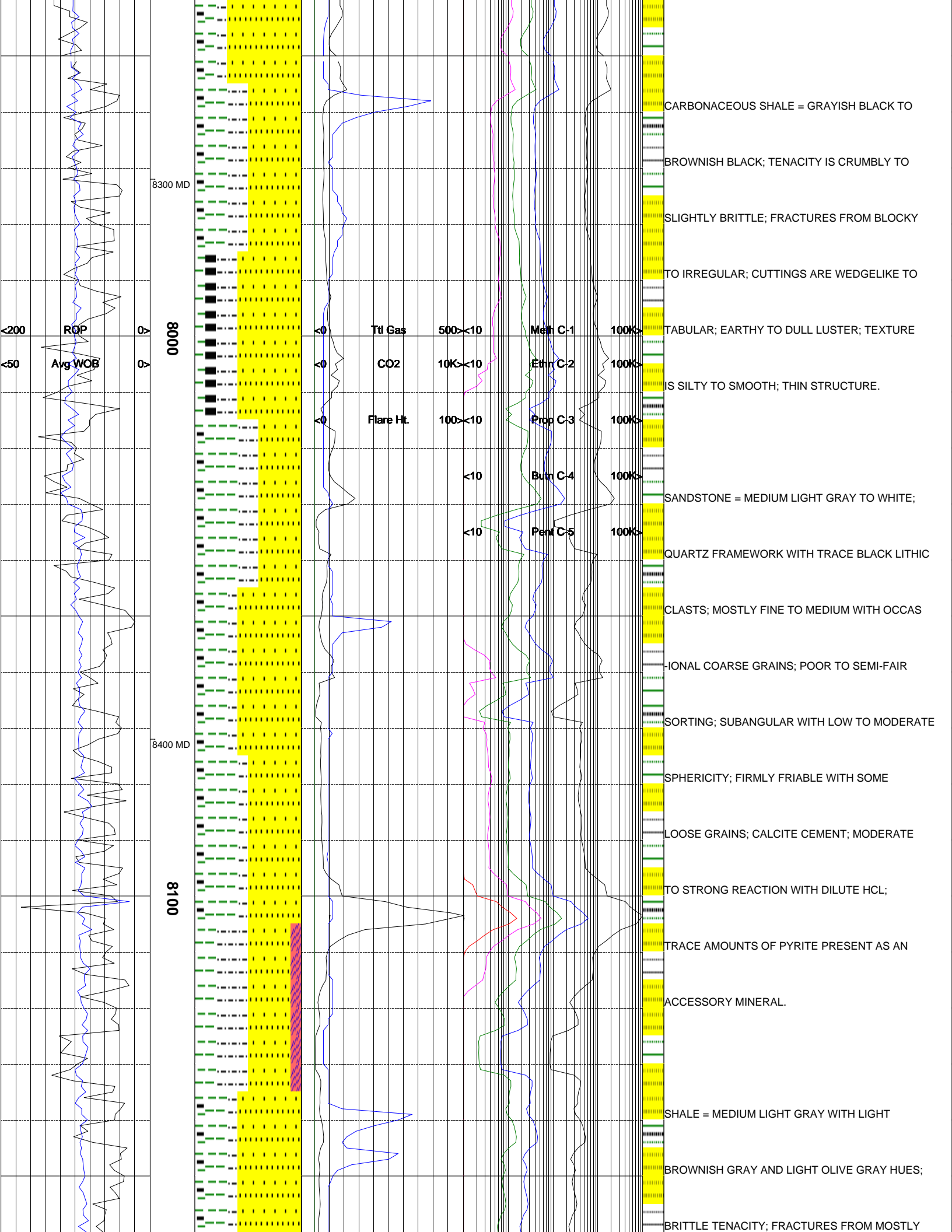
ACTURES FROM PLANAR TO OCCASIONALLY IRR

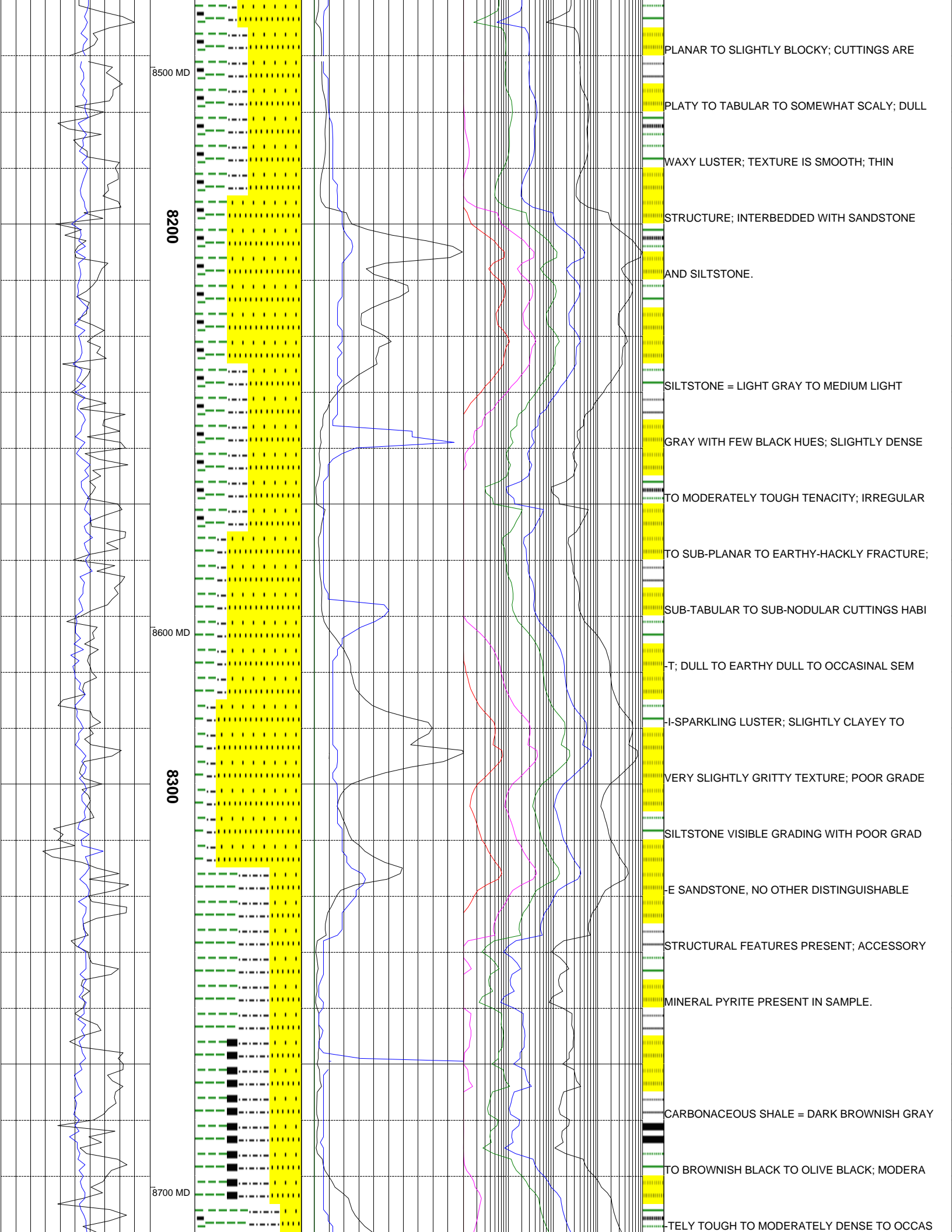
REGULAR; TABULAR TO PLATY CUTTINGS;

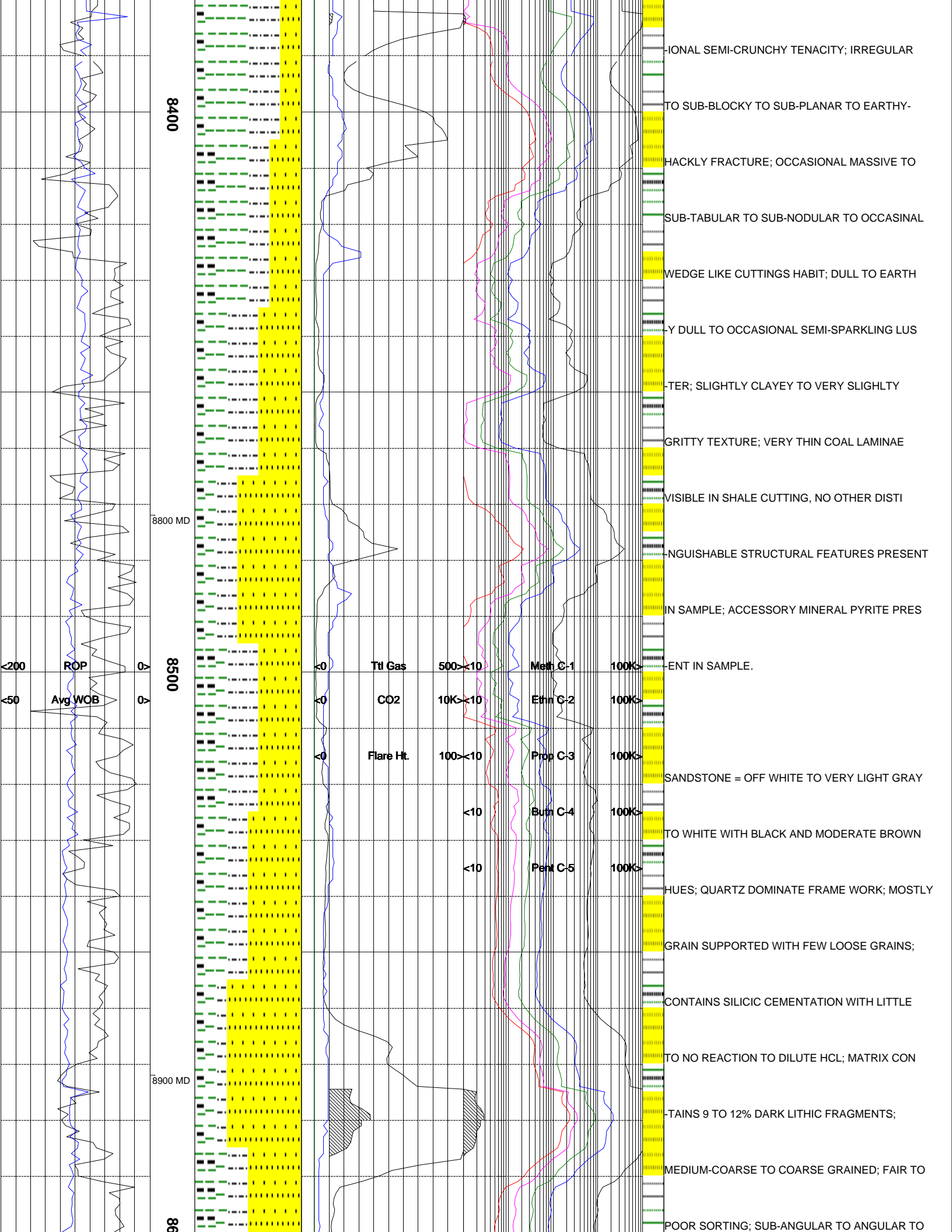
LUSTER RANGES FROM WAXY TO DULL; SMOOTH

TO SILTY TEXTURE GRADING FROM SILTSTONE;

LAMINAE TO THIN STRUCTURE.







8400

8800 MD

8500

8900 MD

8600

IONAL SEMI-CRUNCHY TENACITY; IRREGULAR

TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY-

HACKLY FRACTURE; OCCASIONAL MASSIVE TO

SUB-TABULAR TO SUB-NODULAR TO OCCASINAL

WEDGE LIKE CUTTINGS HABIT; DULL TO EARTH

Y DULL TO OCCASIONAL SEMI-SPARKLING LUS

TER; SLIGHTLY CLAYEY TO VERY SLIGHTLY

GRITTY TEXTURE; VERY THIN COAL LAMINAE

VISIBLE IN SHALE CUTTING, NO OTHER DISTI

NGUISHABLE STRUCTURAL FEATURES PRESENT

IN SAMPLE; ACCESSORY MINERAL PYRITE PRES

ENT IN SAMPLE.

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY

TO WHITE WITH BLACK AND MODERATE BROWN

HUES; QUARTZ DOMINATE FRAME WORK; MOSTLY

GRAIN SUPPORTED WITH FEW LOOSE GRAINS;

CONTAINS SILICIC CEMENTATION WITH LITTLE

TO NO REACTION TO DILUTE HCL; MATRIX CON

TAINS 9 TO 12% DARK LITHIC FRAGMENTS;

MEDIUM-COARSE TO COARSE GRAINED; FAIR TO

POOR SORTING; SUB-ANGULAR TO ANGULAR TO

ROP

Avg WOB

Ttl Gas

CO2

Flare Ht.

Meth C-1

Ethin C-2

Prop C-3

Burn C-4

Pent C-5

500 < 10

10K < 10

100 < 10

< 10

< 10

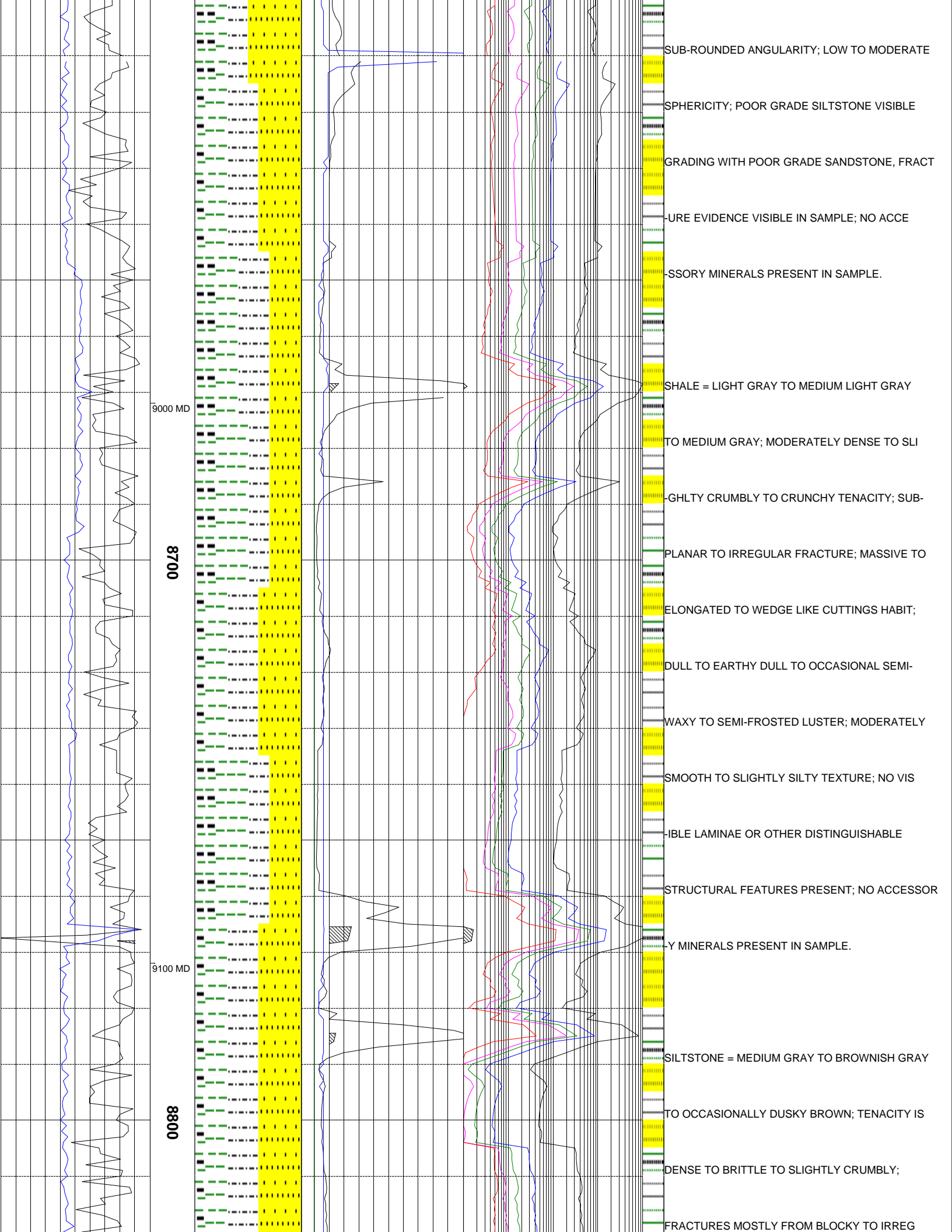
100K >

100K >

100K >

100K >

100K >

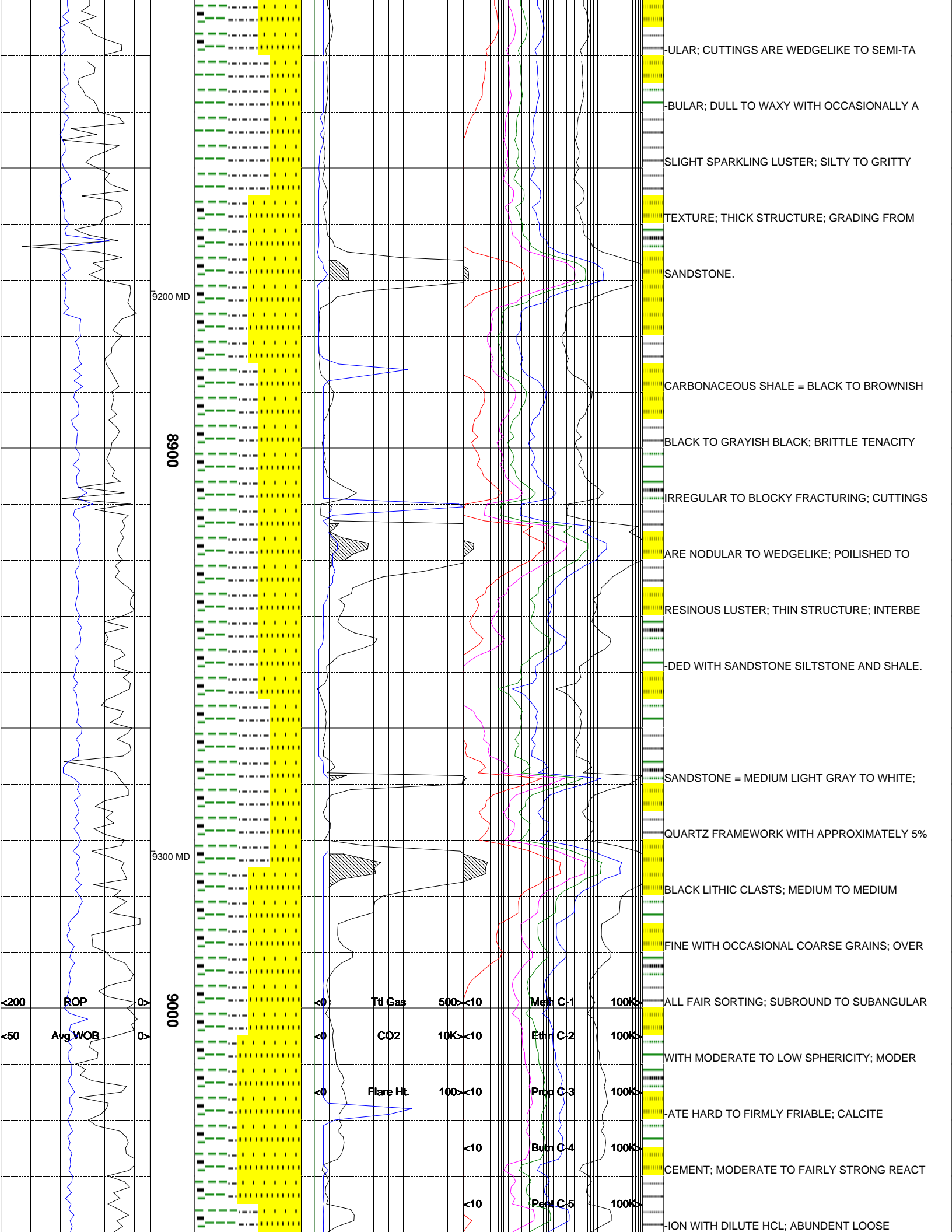


9000 MD

8700

9100 MD

8800



9200 MD

0068

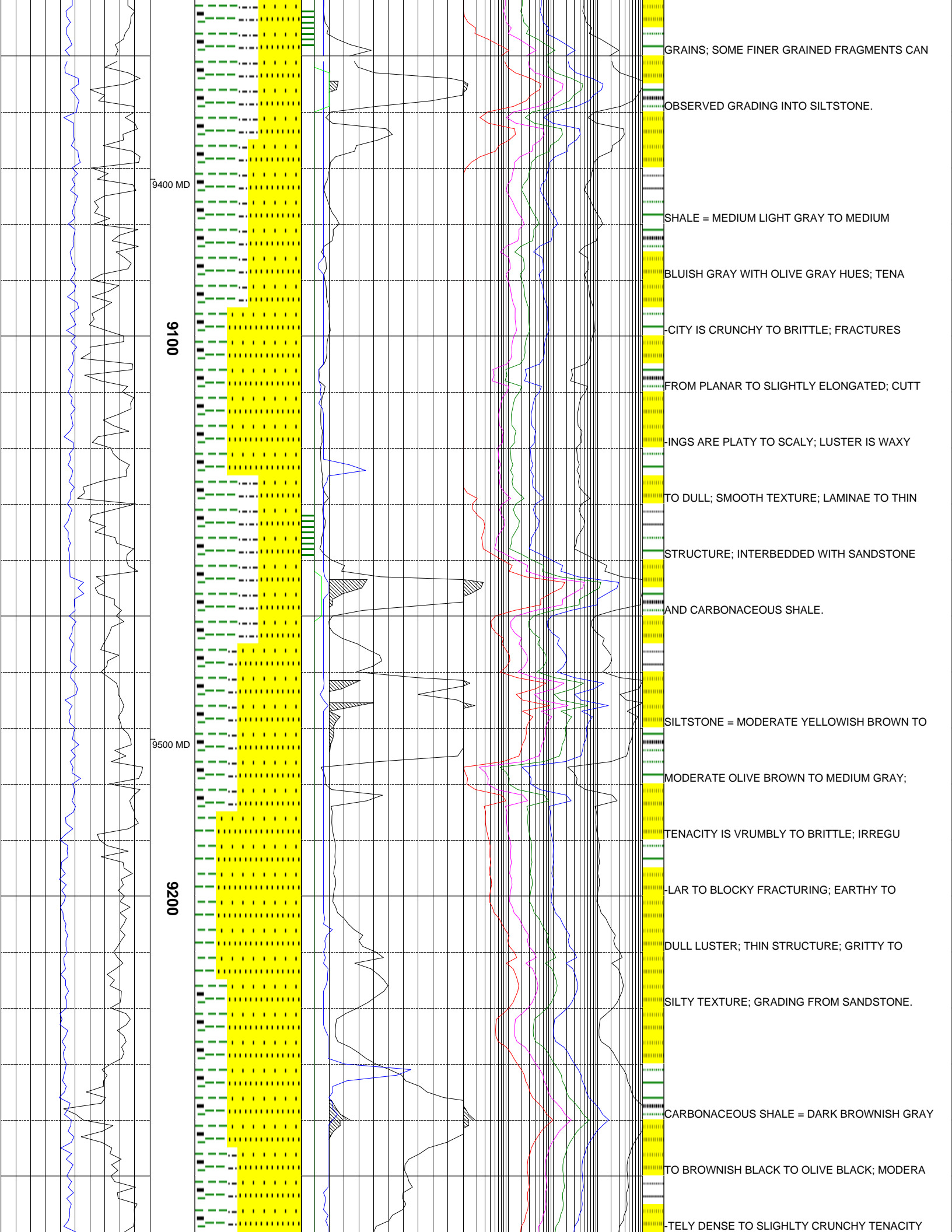
9300 MD

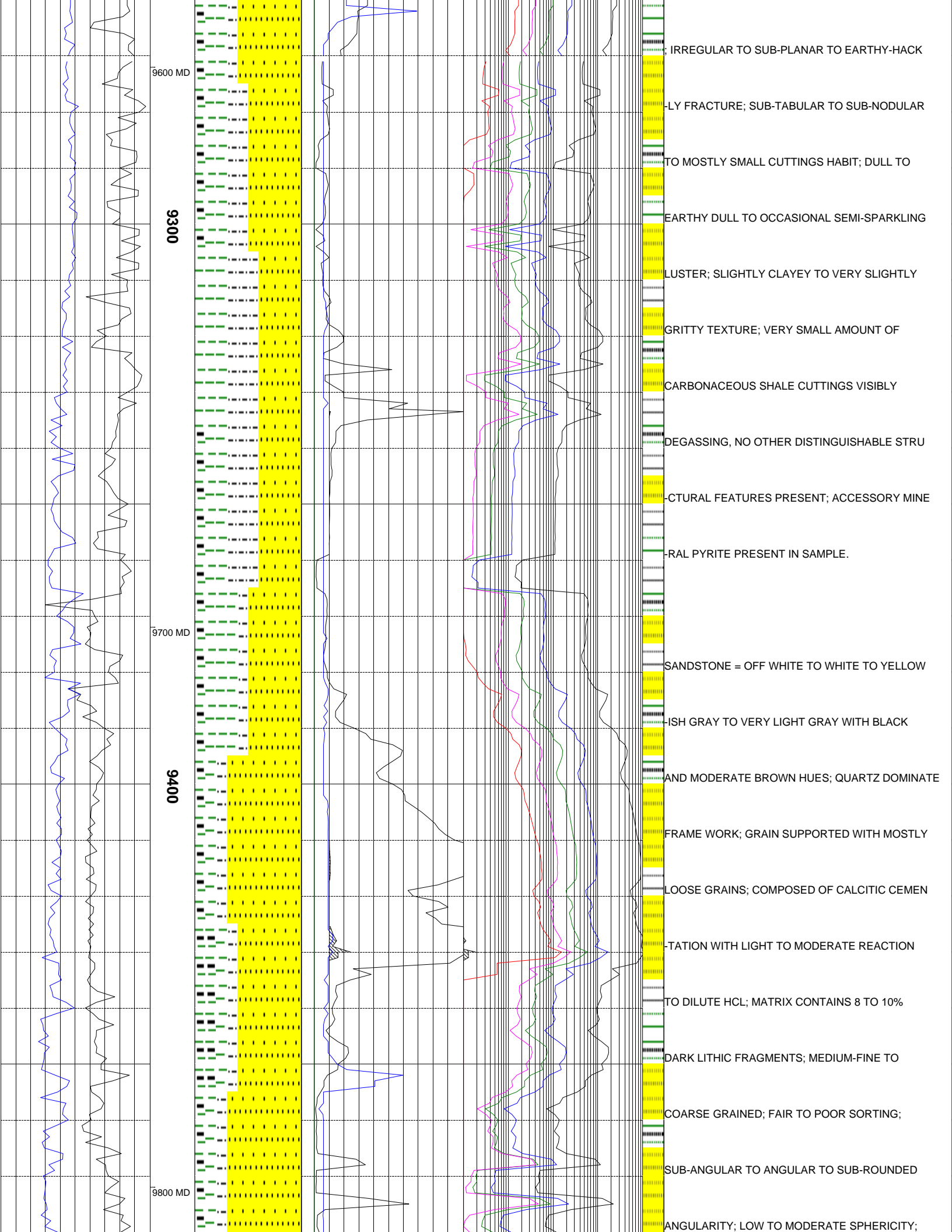
0006

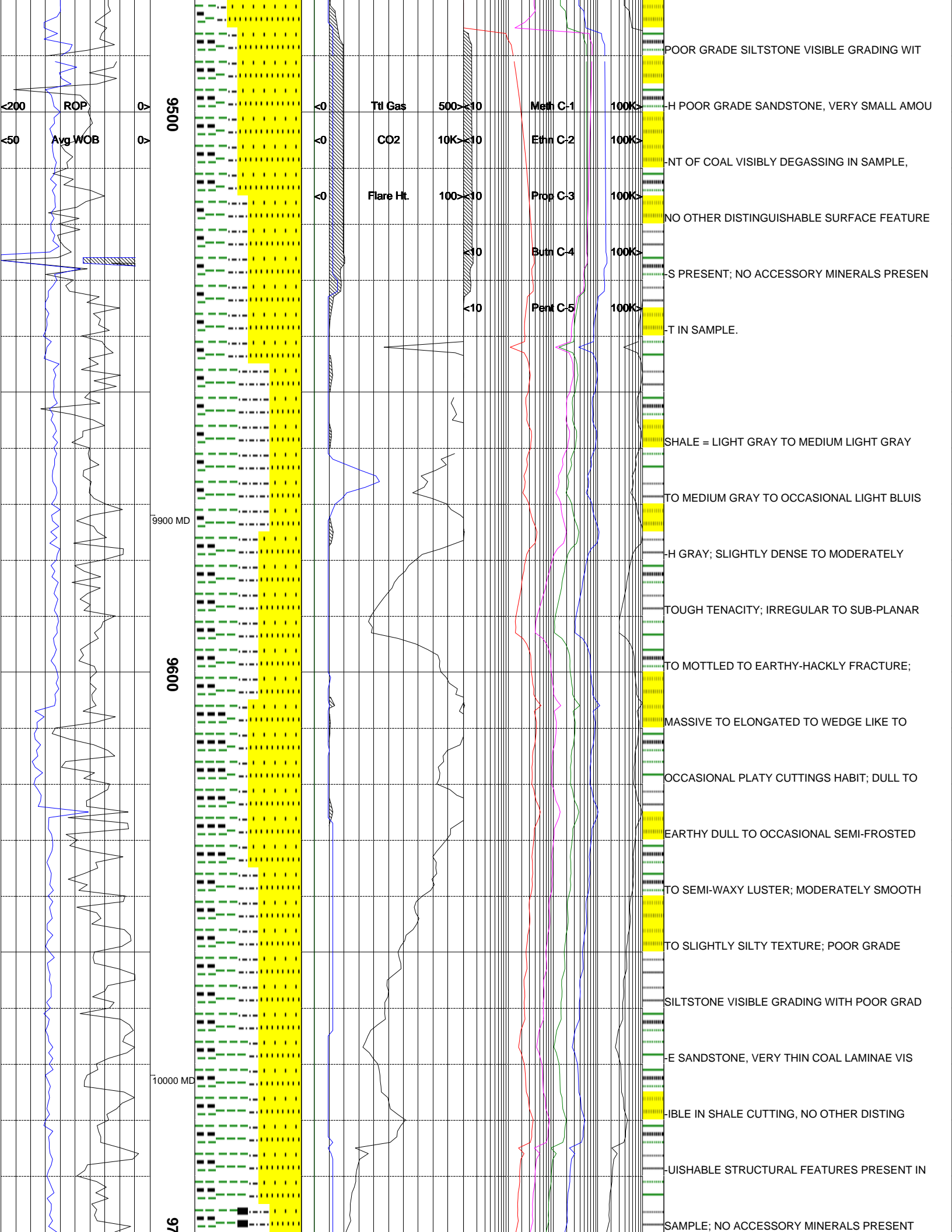
<200 ROP
<50 Avg WOB

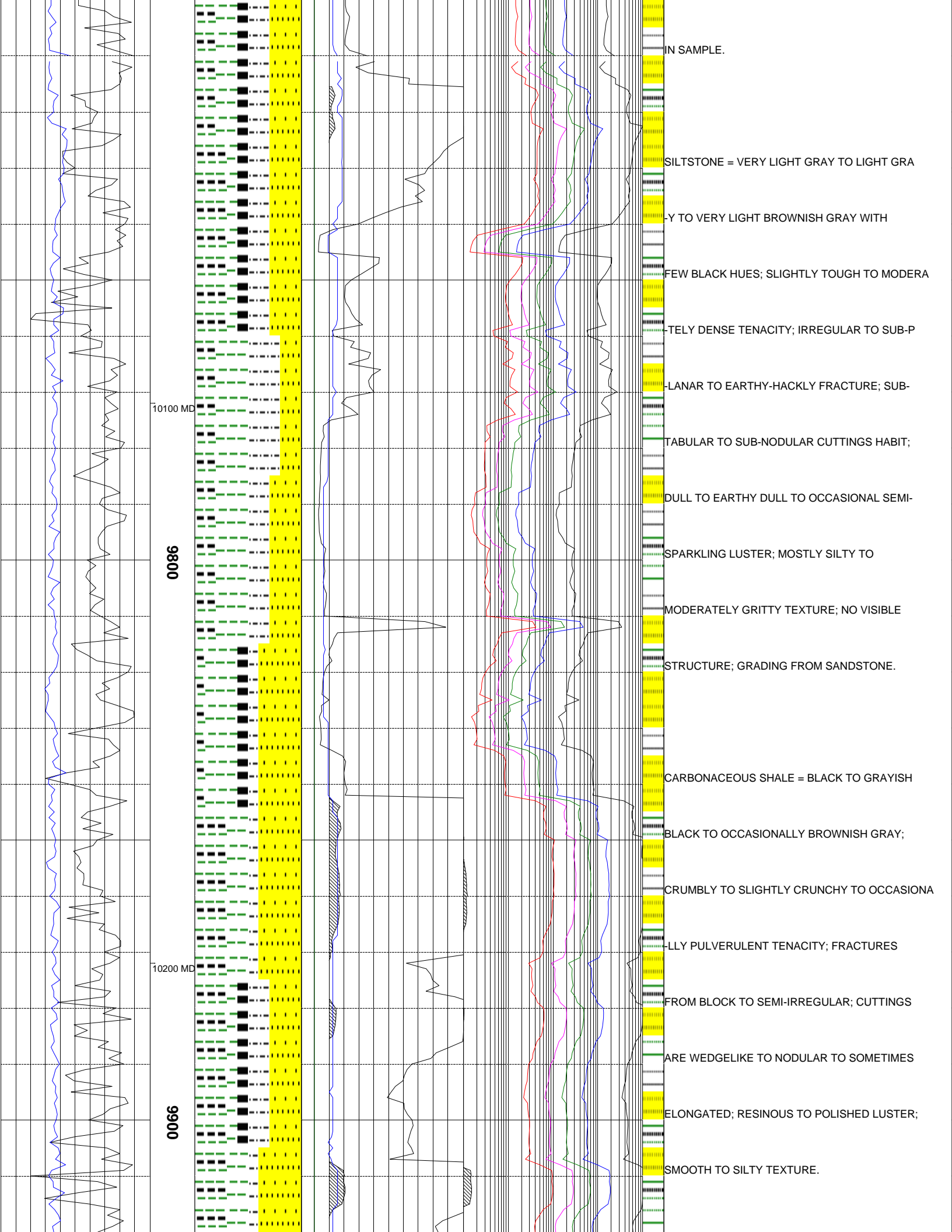
<0 Ttl Gas 500<10 Meth C-1 100K<
<0 CO2 10K<10 Ethn C-2 100K<
<0 Flare Ht. 100<10 Prop C-3 100K<
<10 Butn C-4 100K<
<10 Pent C-5 100K<

ULAR; CUTTINGS ARE WEDGELIKE TO SEMI-TA
 BULAR; DULL TO WAXY WITH OCCASIONALLY A
 SLIGHT SPARKLING LUSTER; SILTY TO GRITTY
 TEXTURE; THICK STRUCTURE; GRADING FROM
 SANDSTONE.
 CARBONACEOUS SHALE = BLACK TO BROWNISH
 BLACK TO GRAYISH BLACK; BRITTLE TENACITY
 IRREGULAR TO BLOCKY FRACTURING; CUTTINGS
 ARE NODULAR TO WEDGELIKE; POLISHED TO
 RESINOUS LUSTER; THIN STRUCTURE; INTERBE
 DED WITH SANDSTONE SILTSTONE AND SHALE.
 SANDSTONE = MEDIUM LIGHT GRAY TO WHITE;
 QUARTZ FRAMEWORK WITH APPROXIMATELY 5%
 BLACK LITHIC CLASTS; MEDIUM TO MEDIUM
 FINE WITH OCCASIONAL COARSE GRAINS; OVER
 ALL FAIR SORTING; SUBROUND TO SUBANGULAR
 WITH MODERATE TO LOW SPHERICITY; MODER
 ATE HARD TO FIRMLY FRIABLE; CALCITE
 CEMENT; MODERATE TO FAIRLY STRONG REACT
 ION WITH DILUTE HCL; ABUNDENT LOOSE









10100 MD

0086

10200 MD

0066

IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRAY

VERY LIGHT BROWNISH GRAY WITH

FEW BLACK HUES; SLIGHTLY TOUGH TO MODERATELY DENSE TENACITY; IRREGULAR TO SUB-P

PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT;

DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; MOSTLY SILTY TO

MODERATELY GRITTY TEXTURE; NO VISIBLE STRUCTURE; GRADING FROM SANDSTONE.

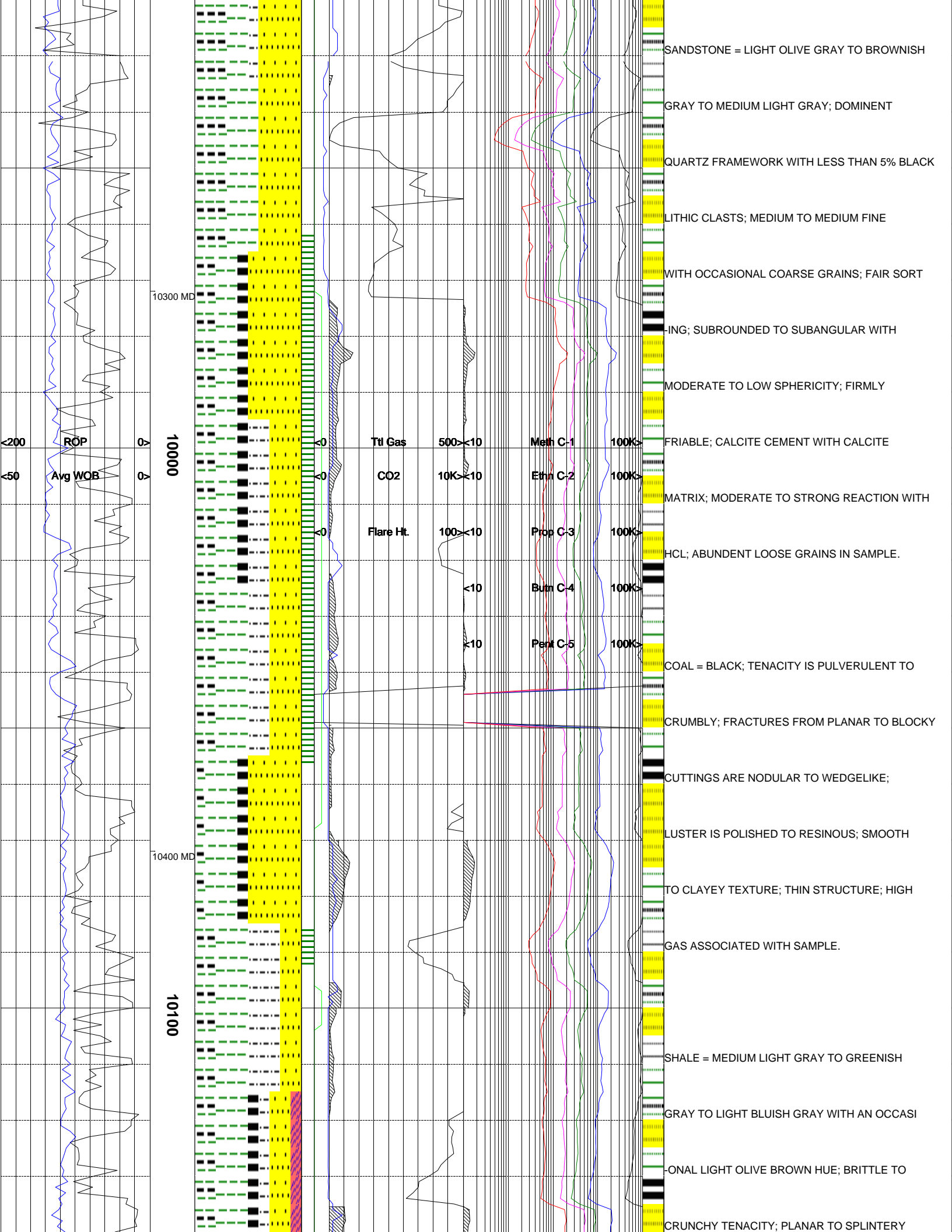
CARBONACEOUS SHALE = BLACK TO GRAYISH

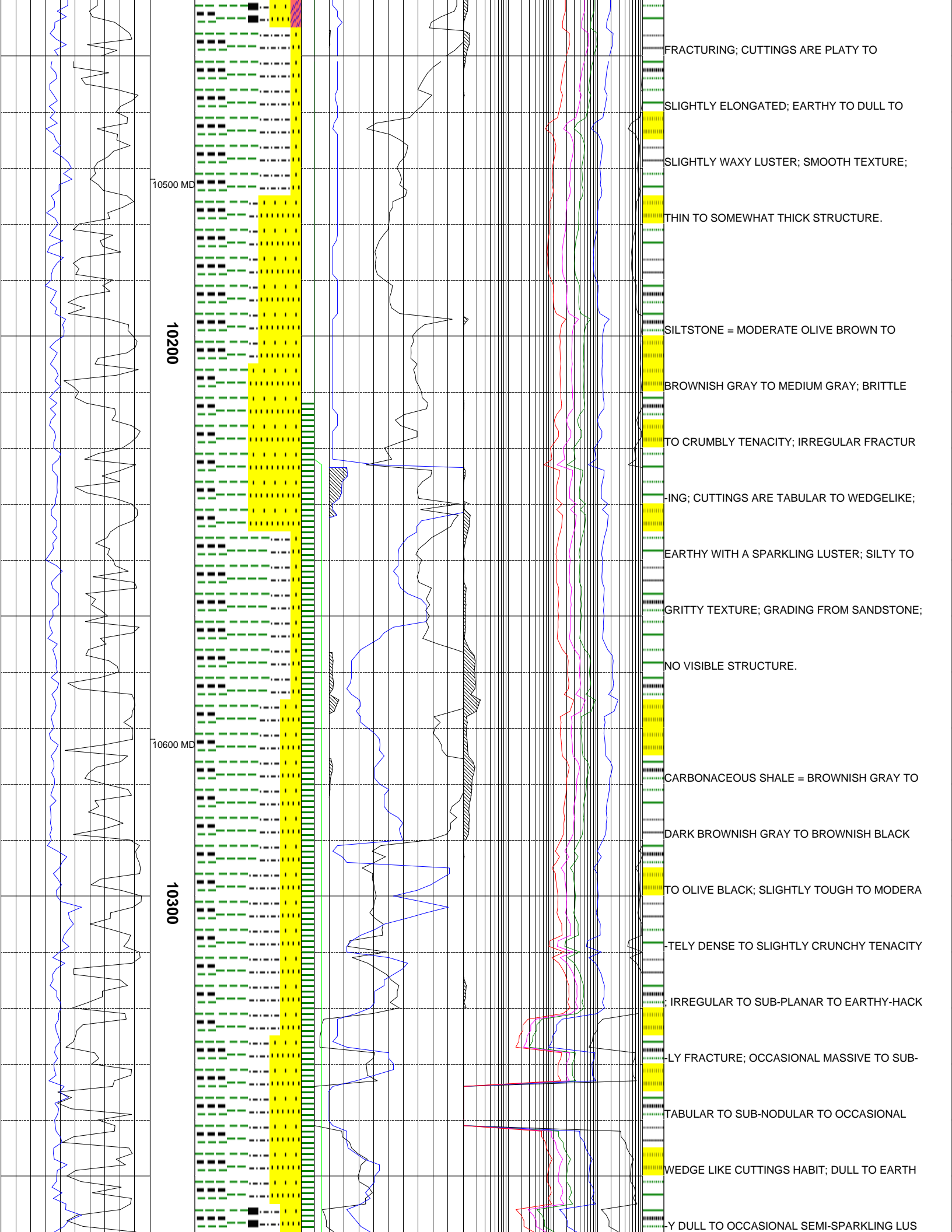
BLACK TO OCCASIONALLY BROWNISH GRAY;

CRUMBLY TO SLIGHTLY CRUNCHY TO OCCASIONALLY PULVERULENT TENACITY; FRACTURES

FROM BLOCK TO SEMI-IRREGULAR; CUTTINGS ARE WEDGELIKE TO NODULAR TO SOMETIMES

ELONGATED; RESINOUS TO POLISHED LUSTER; SMOOTH TO SILTY TEXTURE.





10500 MD

10200

10600 MD

10300

FRACTURING; CUTTINGS ARE PLATY TO

SLIGHTLY ELONGATED; EARTHY TO DULL TO

SLIGHTLY WAXY LUSTER; SMOOTH TEXTURE;

THIN TO SOMEWHAT THICK STRUCTURE.

SILTSTONE = MODERATE OLIVE BROWN TO

BROWNISH GRAY TO MEDIUM GRAY; BRITTLE

TO CRUMBLY TENACITY; IRREGULAR FRACTUR

ING; CUTTINGS ARE TABULAR TO WEDGELIKE;

EARTHY WITH A SPARKLING LUSTER; SILTY TO

GRITTY TEXTURE; GRADING FROM SANDSTONE;

NO VISIBLE STRUCTURE.

CARBONACEOUS SHALE = BROWNISH GRAY TO

DARK BROWNISH GRAY TO BROWNISH BLACK

TO OLIVE BLACK; SLIGHTLY TOUGH TO MODERA

TELY DENSE TO SLIGHTLY CRUNCHY TENACITY

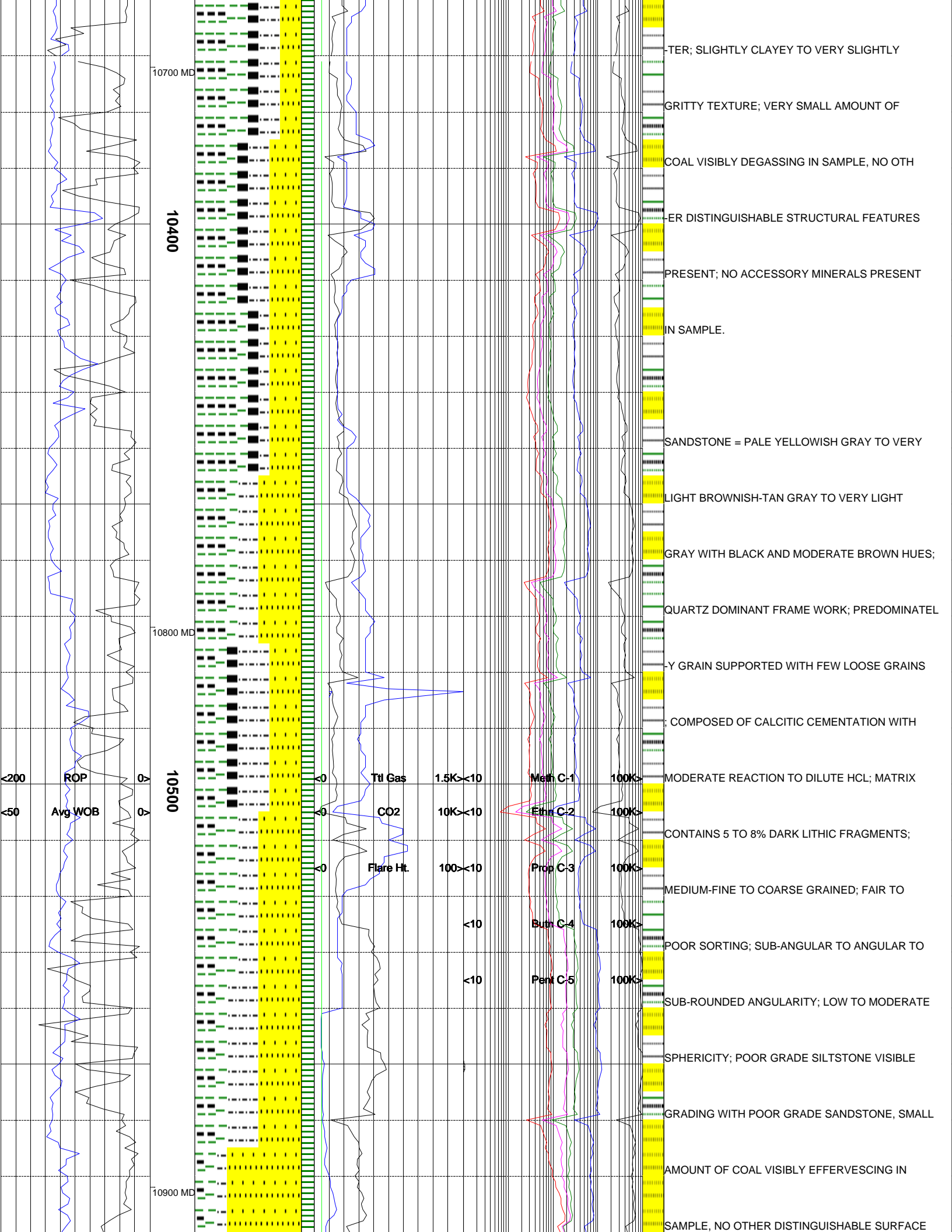
; IRREGULAR TO SUB-PLANAR TO EARTHY-HACK

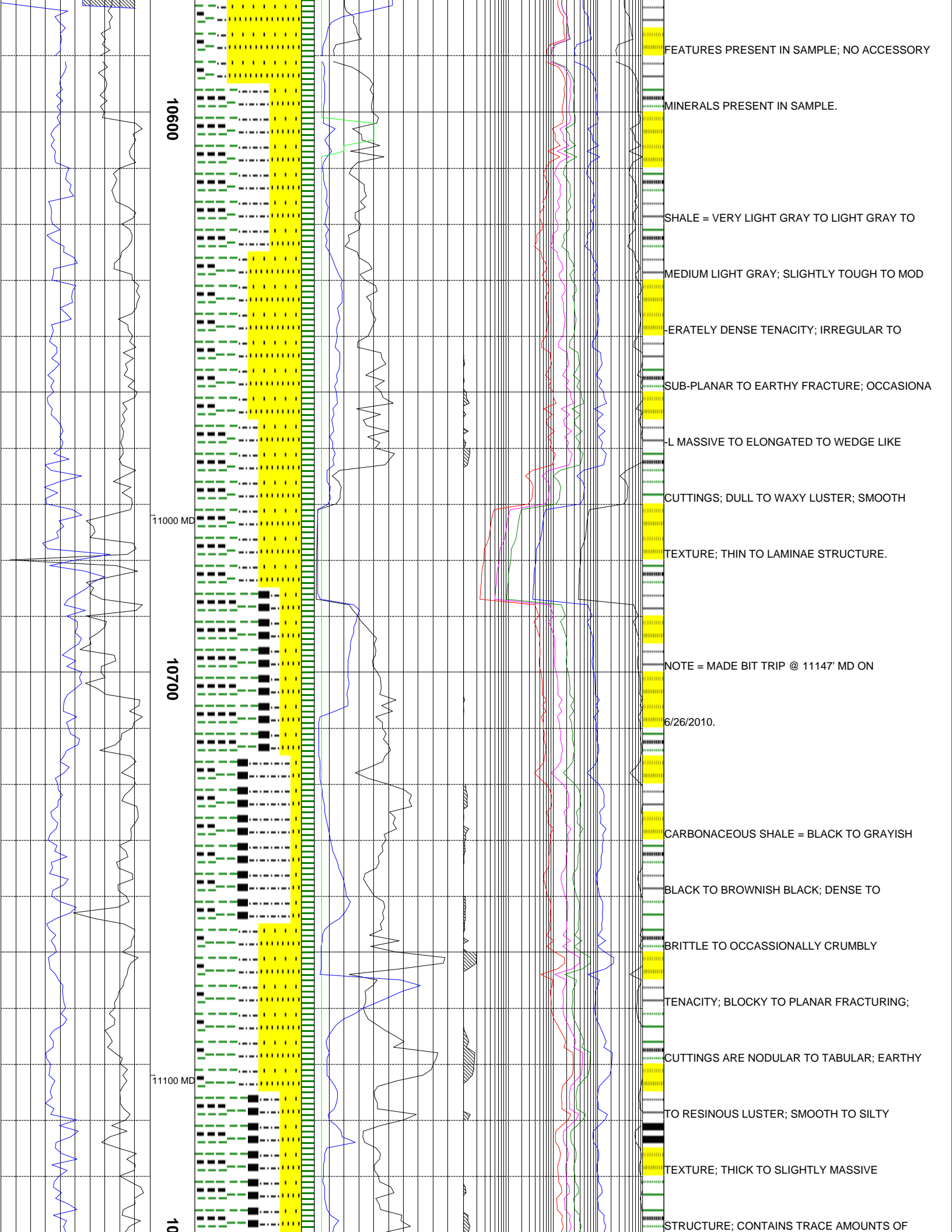
LY FRACTURE; OCCASIONAL MASSIVE TO SUB-

TABULAR TO SUB-NODULAR TO OCCASIONAL

WEDGE LIKE CUTTINGS HABIT; DULL TO EARTH

Y DULL TO OCCASIONAL SEMI-SPARKLING LUS





10600

11000 MD

10700

11100 MD

10

FEATURES PRESENT IN SAMPLE; NO ACCESSORY

MINERALS PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO

MEDIUM LIGHT GRAY; SLIGHTLY TOUGH TO MOD

ERATELY DENSE TENACITY; IRREGULAR TO

SUB-PLANAR TO EARTHY FRACTURE; OCCASIONA

L MASSIVE TO ELONGATED TO WEDGE LIKE

CUTTINGS; DULL TO WAXY LUSTER; SMOOTH

TEXTURE; THIN TO LAMINAE STRUCTURE.

NOTE = MADE BIT TRIP @ 11147' MD ON

6/26/2010.

CARBONACEOUS SHALE = BLACK TO GRAYISH

BLACK TO BROWNISH BLACK; DENSE TO

BRITTLE TO OCCASSIONALLY CRUMBLY

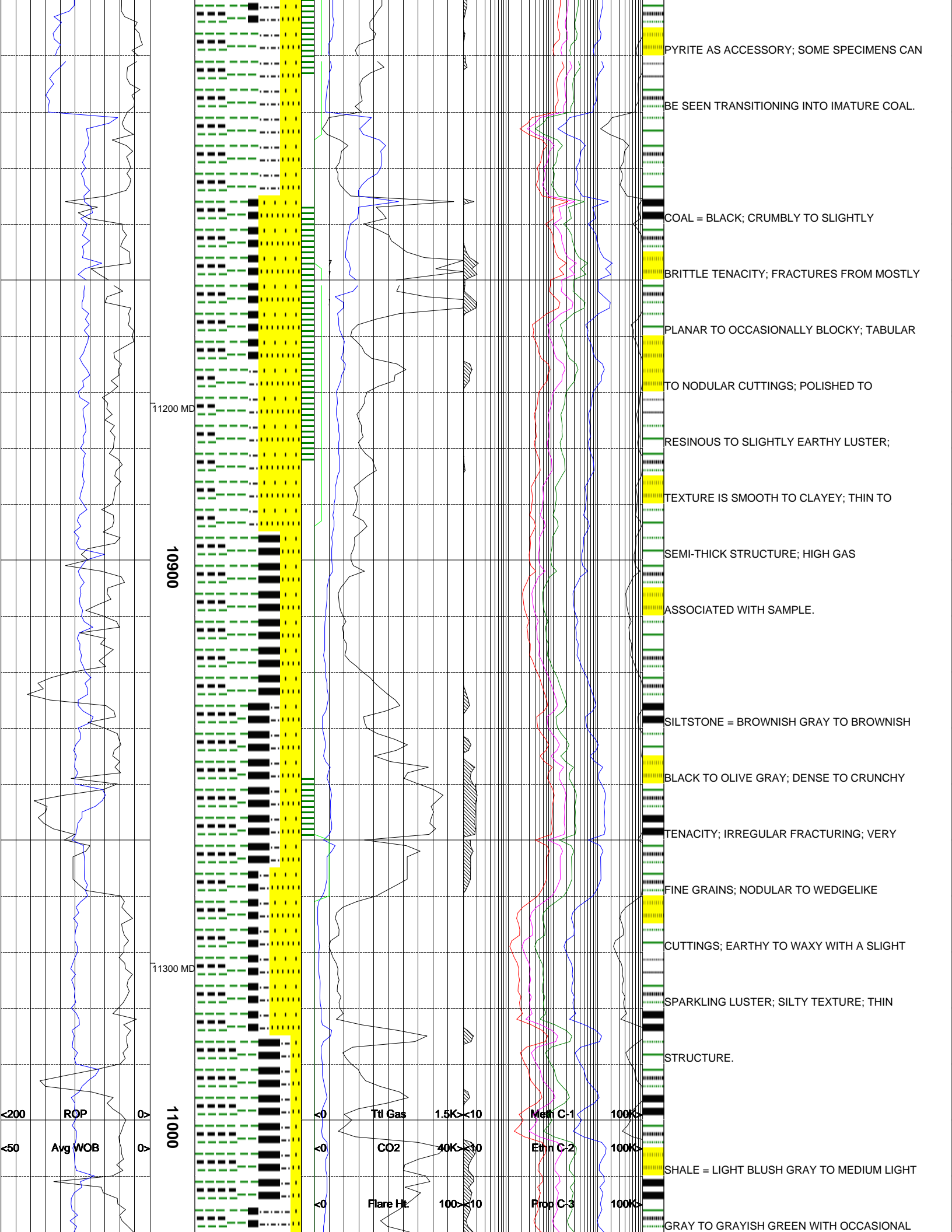
TENACITY; BLOCKY TO PLANAR FRACTURING;

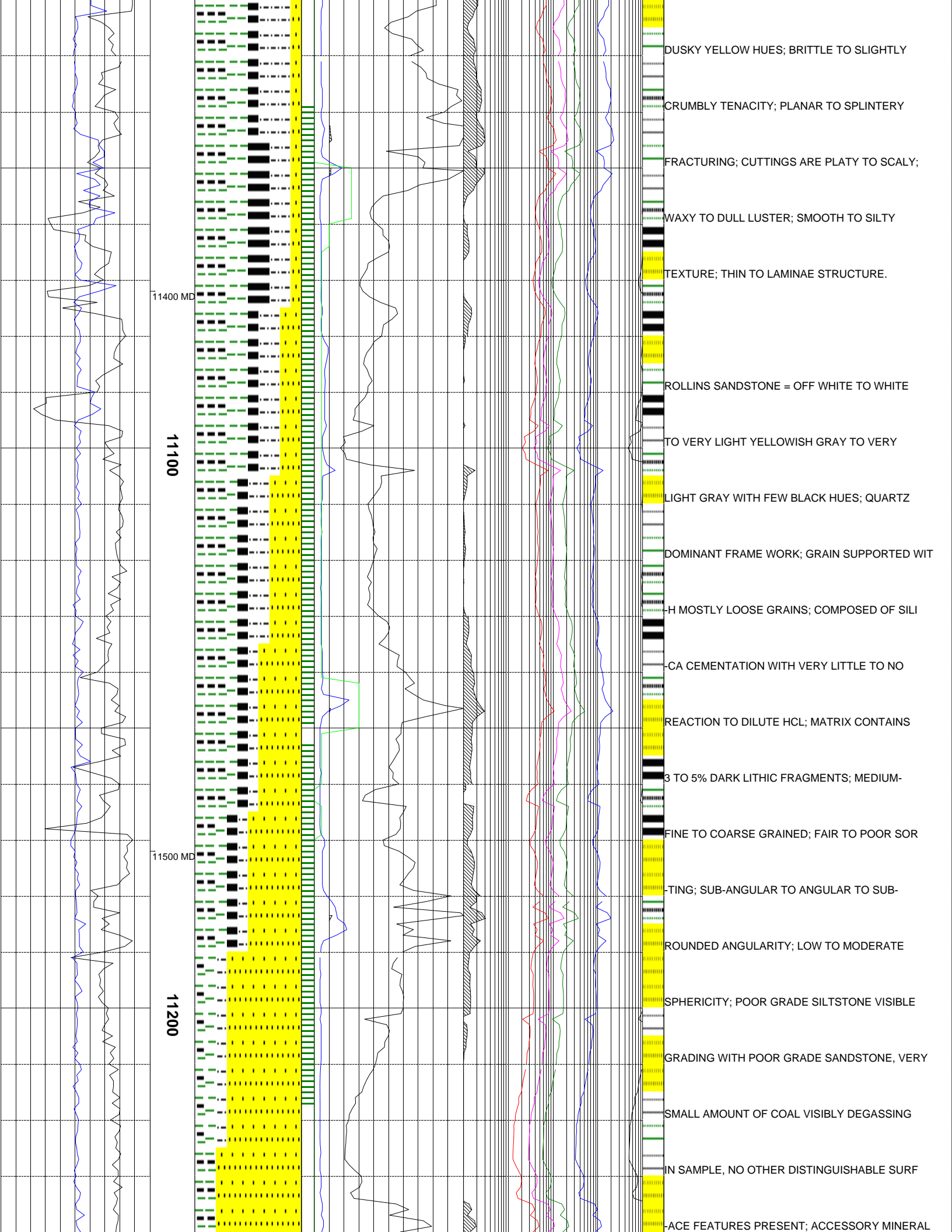
CUTTINGS ARE NODULAR TO TABULAR; EARTHY

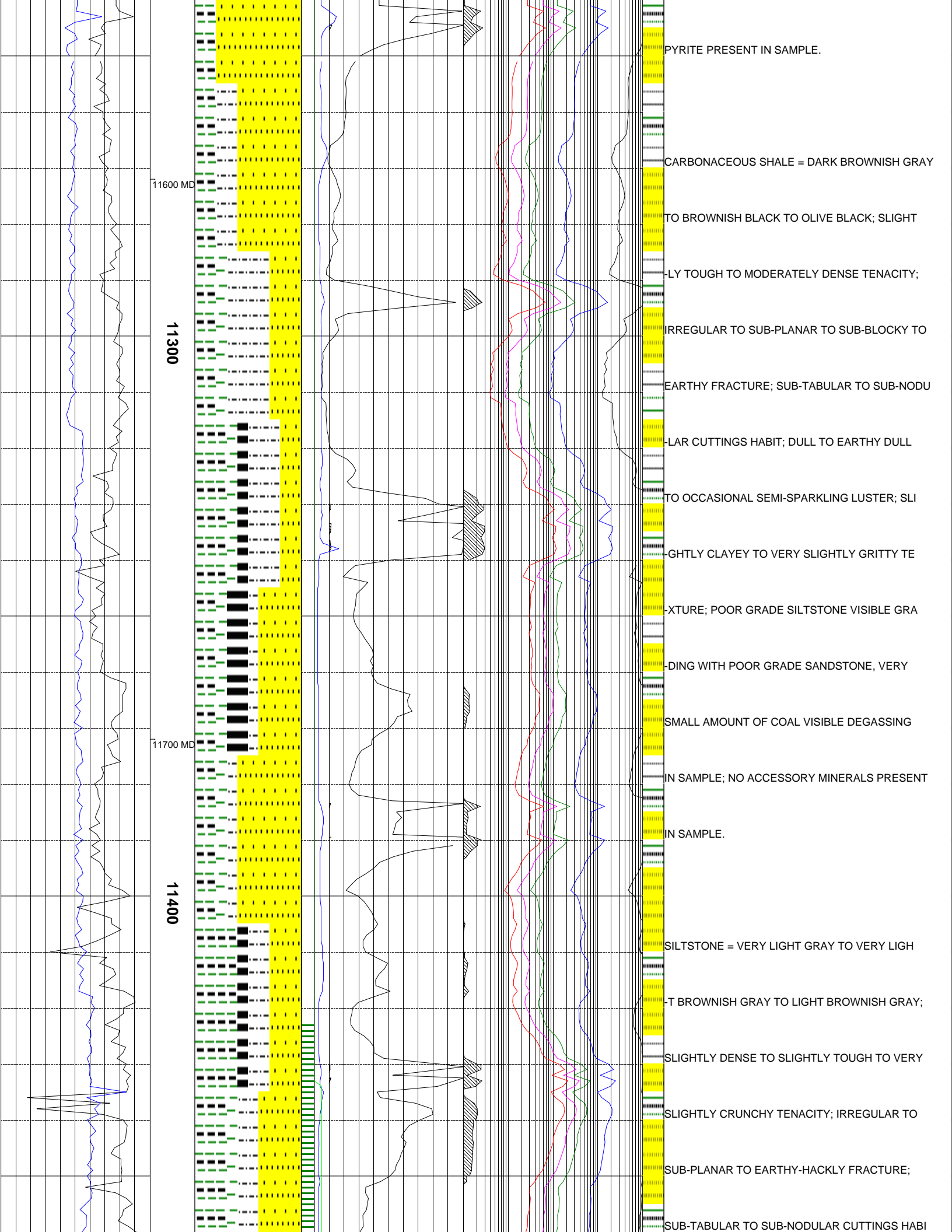
TO RESINOUS LUSTER; SMOOTH TO SILTY

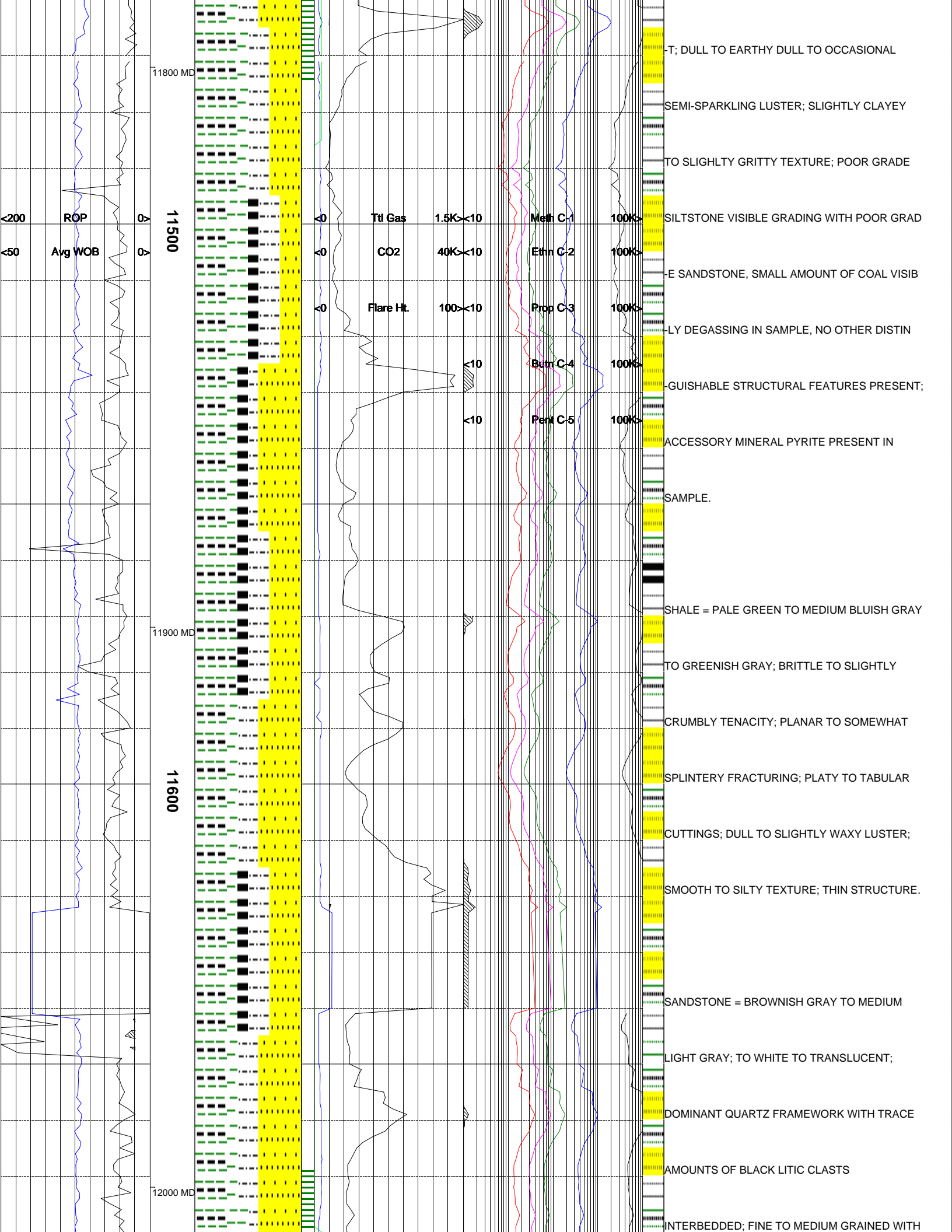
TEXTURE; THICK TO SLIGHTLY MASSIVE

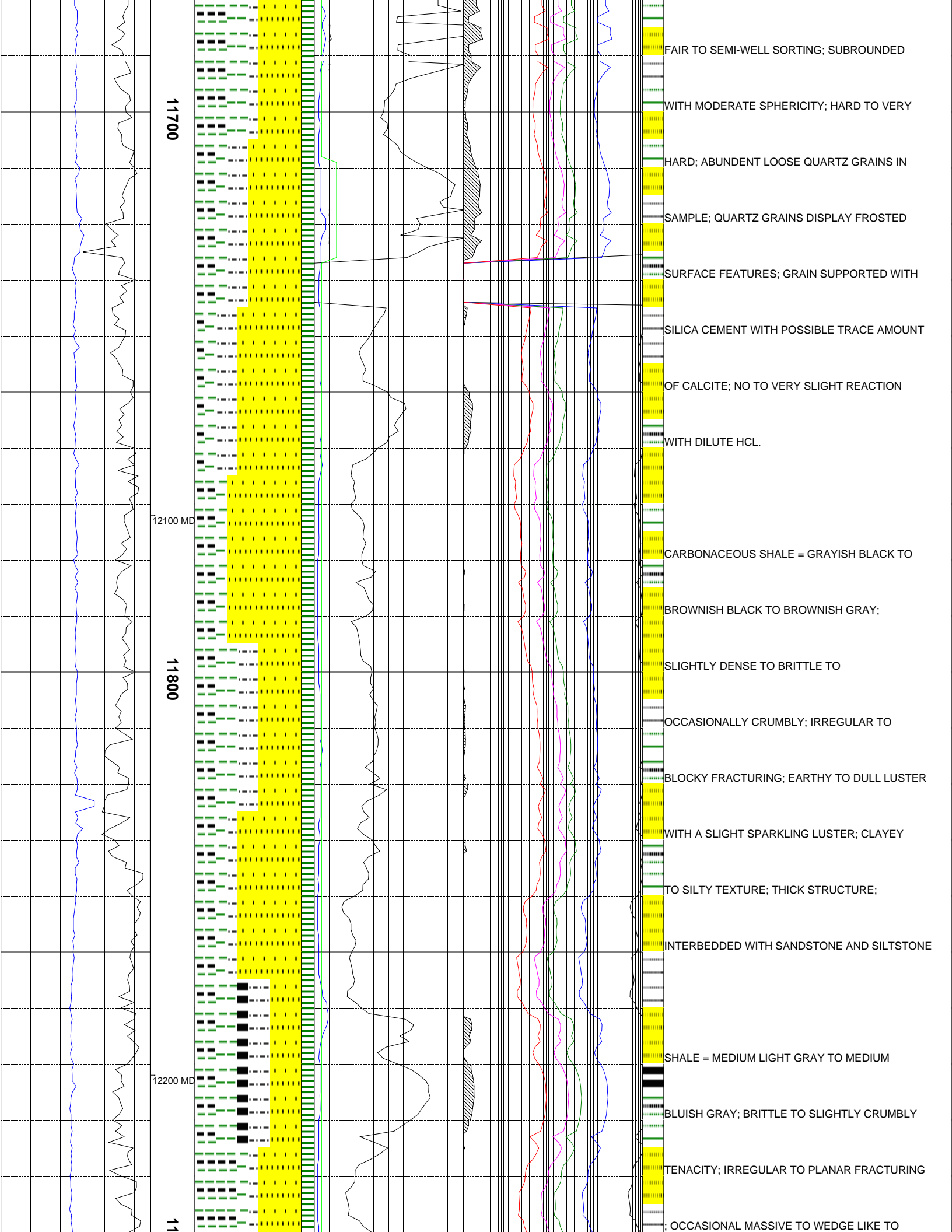
STRUCTURE; CONTAINS TRACE AMOUNTS OF

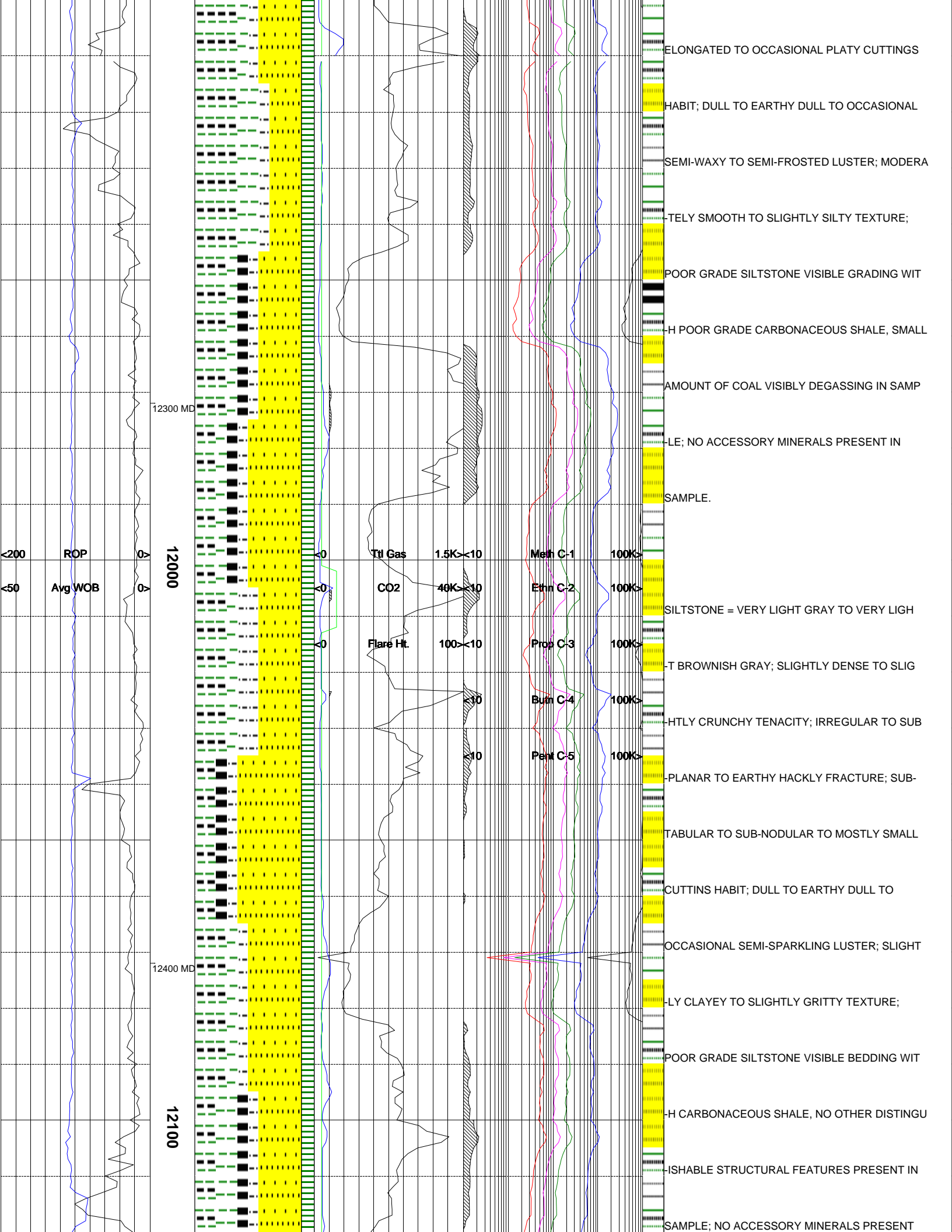












12300 MD

12000

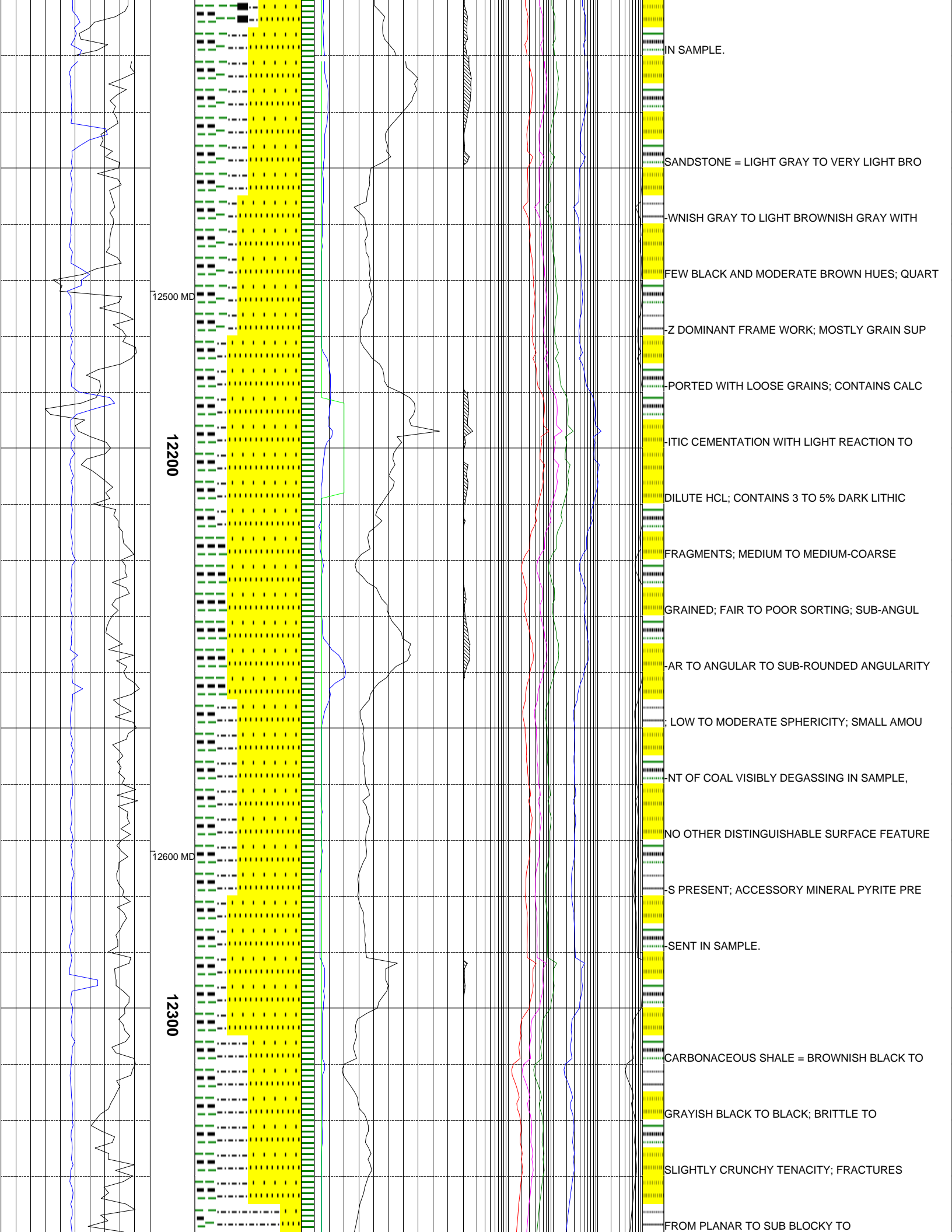
12400 MD

12100

<200 ROP
<50 Avg WOB

Ttl Gas 1.5K <10
CO2 40K >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 >

ELONGATED TO OCCASIONAL PLATY CUTTINGS
 HABIT; DULL TO EARTHY DULL TO OCCASIONAL
 SEMI-WAXY TO SEMI-FROSTED LUSTER; MODERA
 TELY SMOOTH TO SLIGHTLY SILTY TEXTURE;
 POOR GRADE SILTSTONE VISIBLE GRADING WIT
 H POOR GRADE CARBONACEOUS SHALE, SMALL
 AMOUNT OF COAL VISIBLY DEGASSING IN SAMP
 LE; NO ACCESSORY MINERALS PRESENT IN
 SAMPLE.
 SILTSTONE = VERY LIGHT GRAY TO VERY LIGH
 T BROWNISH GRAY; SLIGHTLY DENSE TO SLIG
 HTLY CRUNCHY TENACITY; IRREGULAR TO SUB
 PLANAR TO EARTHY HACKLY FRACTURE; SUB-
 TABULAR TO SUB-NODULAR TO MOSTLY SMALL
 CUTTINS HABIT; DULL TO EARTHY DULL TO
 OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHT
 LY CLAYEY TO SLIGHTLY GRITTY TEXTURE;
 POOR GRADE SILTSTONE VISIBLE BEDDING WIT
 H CARBONACEOUS SHALE, NO OTHER DISTINGU
 ISHABLE STRUCTURAL FEATURES PRESENT IN
 SAMPLE; NO ACCESSORY MINERALS PRESENT



12500 MD

12200

12600 MD

12300

IN SAMPLE.

SANDSTONE = LIGHT GRAY TO VERY LIGHT BRO

WNISH GRAY TO LIGHT BROWNISH GRAY WITH

FEW BLACK AND MODERATE BROWN HUES; QUARTZ

Z DOMINANT FRAME WORK; MOSTLY GRAIN SUP

PORTED WITH LOOSE GRAINS; CONTAINS CALC

ITIC CEMENTATION WITH LIGHT REACTION TO

DILUTE HCL; CONTAINS 3 TO 5% DARK LITHIC

FRAGMENTS; MEDIUM TO MEDIUM-COARSE

GRAINED; FAIR TO POOR SORTING; SUB-ANGUL

AR TO ANGULAR TO SUB-ROUNDED ANGULARITY

; LOW TO MODERATE SPHERICITY; SMALL AMOU

NT OF COAL VISIBLY DEGASSING IN SAMPLE,

NO OTHER DISTINGUISHABLE SURFACE FEATURE

S PRESENT; ACCESSORY MINERAL PYRITE PRE

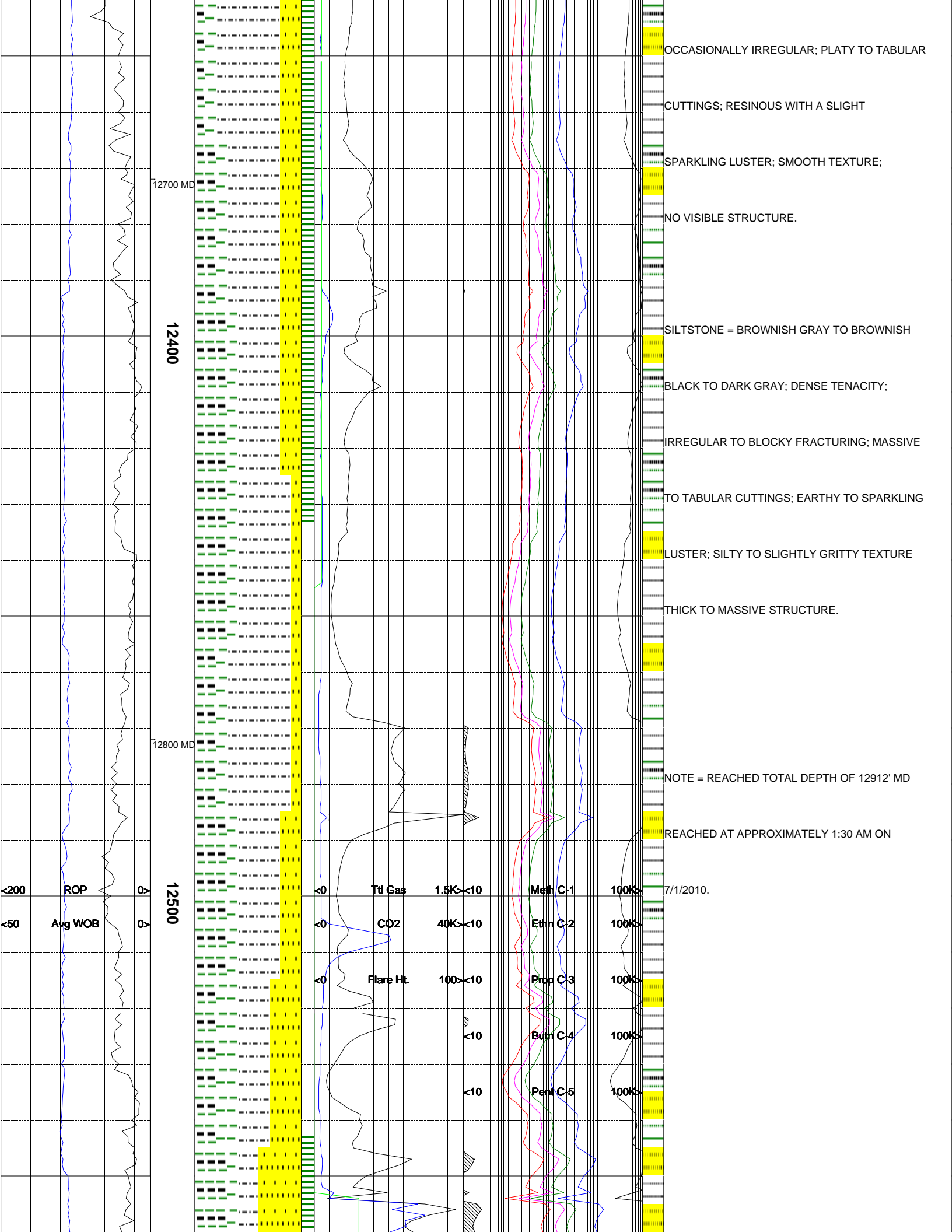
SENT IN SAMPLE.

CARBONACEOUS SHALE = BROWNISH BLACK TO

GRAYISH BLACK TO BLACK; BRITTLE TO

SLIGHTLY CRUNCHY TENACITY; FRACTURES

FROM PLANAR TO SUB BLOCKY TO



12700 MD

12400

12800 MD

12500

OCCASIONALLY IRREGULAR; PLATY TO TABULAR

CUTTINGS; RESINOUS WITH A SLIGHT

SPARKLING LUSTER; SMOOTH TEXTURE;

NO VISIBLE STRUCTURE.

SILTSTONE = BROWNISH GRAY TO BROWNISH

BLACK TO DARK GRAY; DENSE TENACITY;

IRREGULAR TO BLOCKY FRACTURING; MASSIVE

TO TABULAR CUTTINGS; EARTHY TO SPARKLING

LUSTER; SILTY TO SLIGHTLY GRITTY TEXTURE

THICK TO MASSIVE STRUCTURE.

NOTE = REACHED TOTAL DEPTH OF 12912' MD

REACHED AT APPROXIMATELY 1:30 AM ON

7/1/2010.

>200 ROP

<50 Avg WOB

Ttl Gas 1.5K<10

CO2 40K<10

Flare Ht. 100<10

Meth C-1 100K>

Ethn C-2 100K>

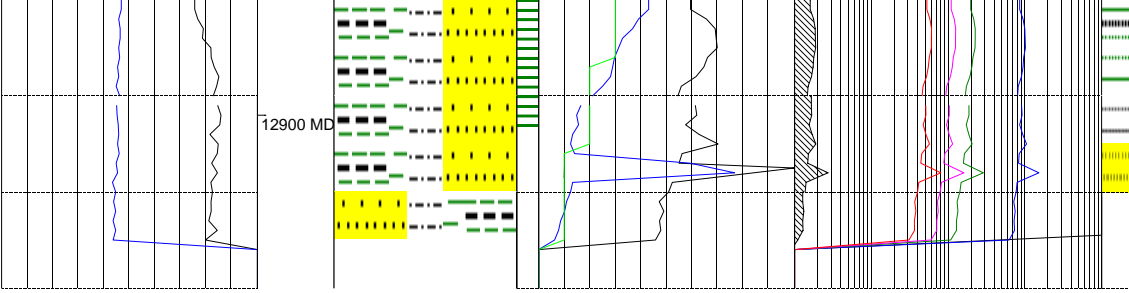
Prop C-3 100K>

Butn C-4 100K>

Pent C-5 100K>

<10

<10



The log data, interpretations and recommendation provided by Epoch are inferences and assumptions based on measurements of drilling fluids. Such inferences and assumptions are not infallible and reasonable professionals may differ. Epoch does not represent or warrant the accuracy, correctness or completeness of any log data, interpretations, recommendations or information provided by Epoch, its officers, agents or employees. Epoch does not and cannot guarantee the accuracy of any such interpretation of the log data, interpretations or recommendations and Company is fully responsible for all decisions and actions it takes based on such log data, interpretations and recommendations.

