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Houston, TX (281) 784-5500
Bakersfield, CA (661) 328-1595
New Iberia, LA (337) 364-2322
Anchorage, AK (907) 561-2465

MUDLOG TVD

COMPANY ExxonMobil Production
WELL PCU 296-5A01
FIELD Piceance Creek Unit
REGION Rocky Mountain
COORDINATES 39.912053000 108.198567000
ELEVATION 7295.5'
COUNTY, STATE Rio Blanco, CO
API INDEX 051031124800
SPUD DATE 10/21/2009
CONTRACTOR Helmerich and Payne
CO. REP. C.Curtis/ M. Hudon
RIG/TYPE 321 / Flex 4
LOGGING UNIT 031
GEOLOGISTS M. Franco
ADD. PERSONS C. Record/ B.Smelsor
CO. GEOLOGIST Nova Roosmawati

LOG INTERVAL

CASING DATA

DEPTHS: 4665' TO 14288'
DATES: 09/06/2010 TO 10/05/2010
SCALE: 5" = 100'

16.0" AT 150'
10.75" AT 4633'
7.0" AT 10105'
4.5" AT 14265'

MUD TYPES

HOLE SIZE

WATERBASED TO 14288'
TO
TO
TO

14.75" TO 126'
9.875" TO 10119'
6.125" TO 14288'
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

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

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

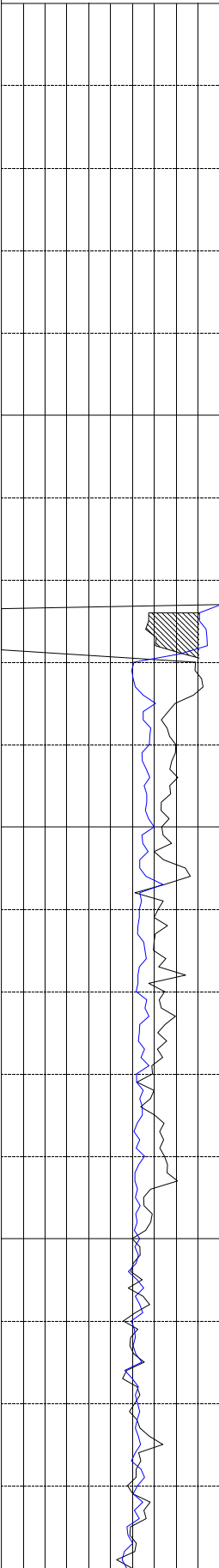
TVD Depth

Lithology

MGS	<0	Ttl Gas units	2.5K>	<10	Meth C-1 ppm	100K>
	<0	CO2 ppm	10K>	<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.



4600 MD

4600

4700 MD

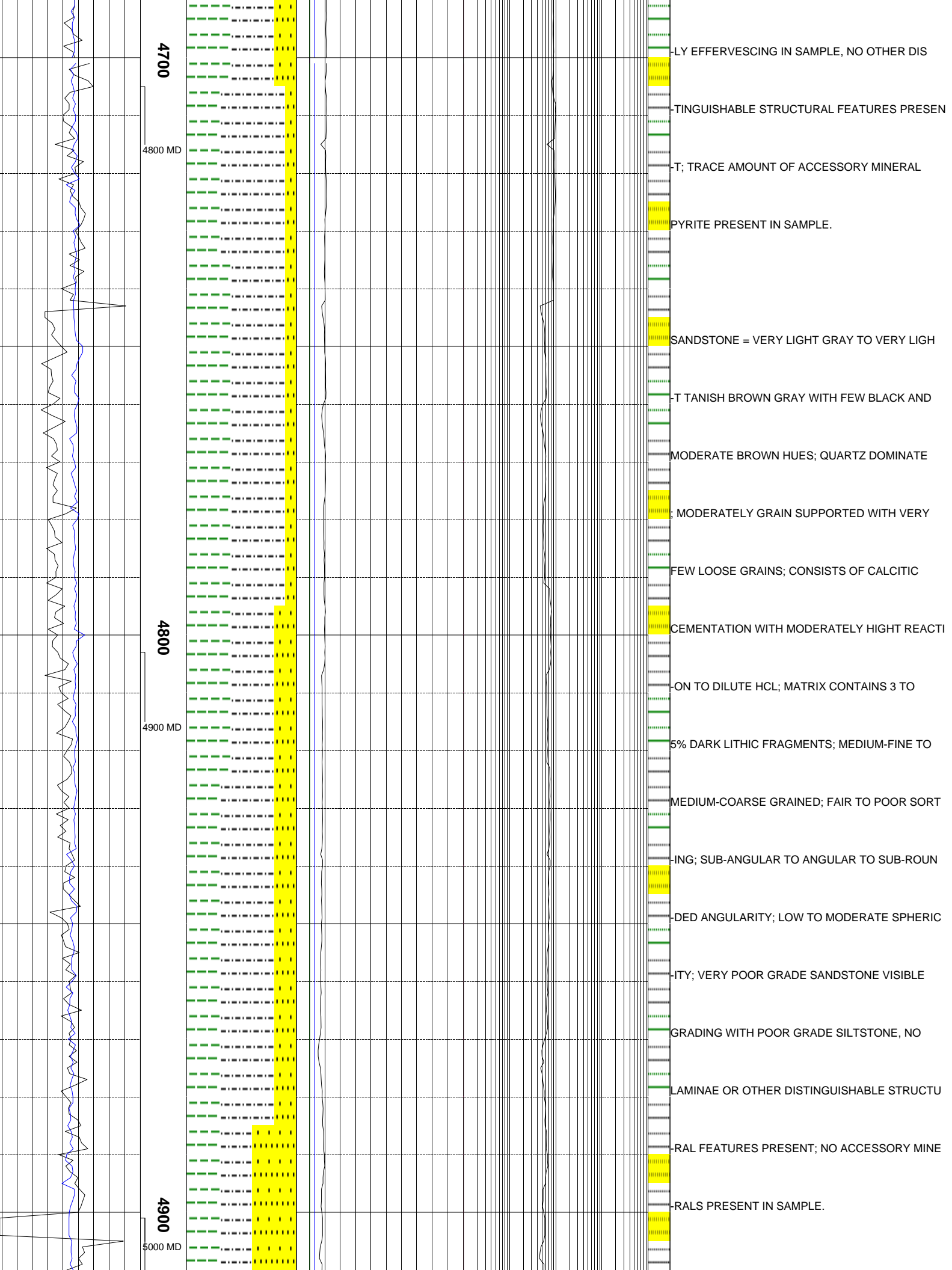


EPOCH WELL SERVICES COMMENCED LOGGING

THE FRU 296-5A01 WELL ON 9/7/2010

@ 4665' MD.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO OCCASIONAL PALE RED PURPLE AND LIGHT YELLOWISH TAN GRAY; SLIGHTLY DENSE TO SLIGHTLY CRUMBLY TO SLIGHTLY BRITTLE TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE CUTTINGS HABIT; DULL TO EARTHY DULL TO SEMI-FROSTED LUSTER; MODERATELY SMOOTH TO MODERATELY CLAYEY TO SLIGHTLY SILTY TEXTURE; VERY SMALL AMOUNT OF CARBONACEOUS SHALE VISIB



4700

4800 MD

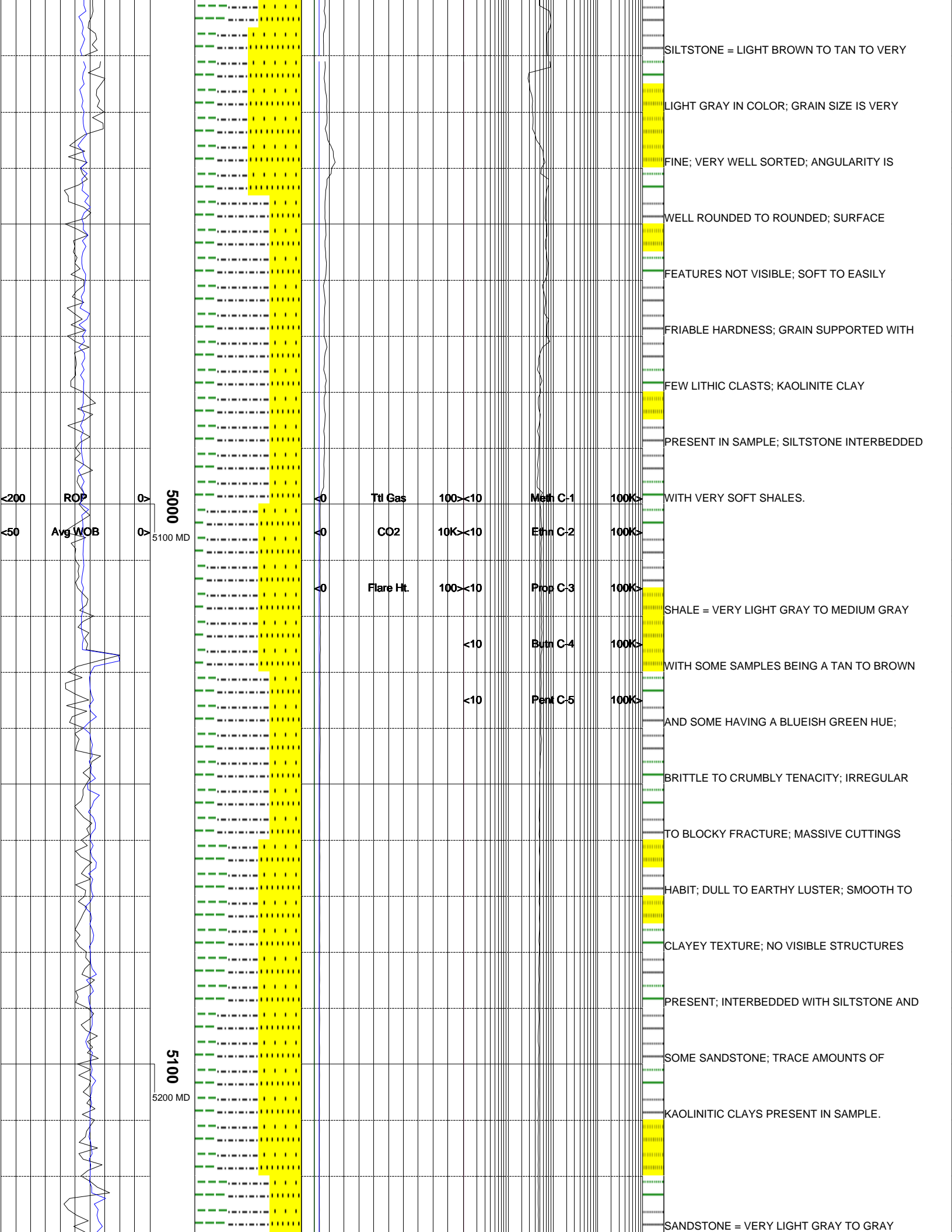
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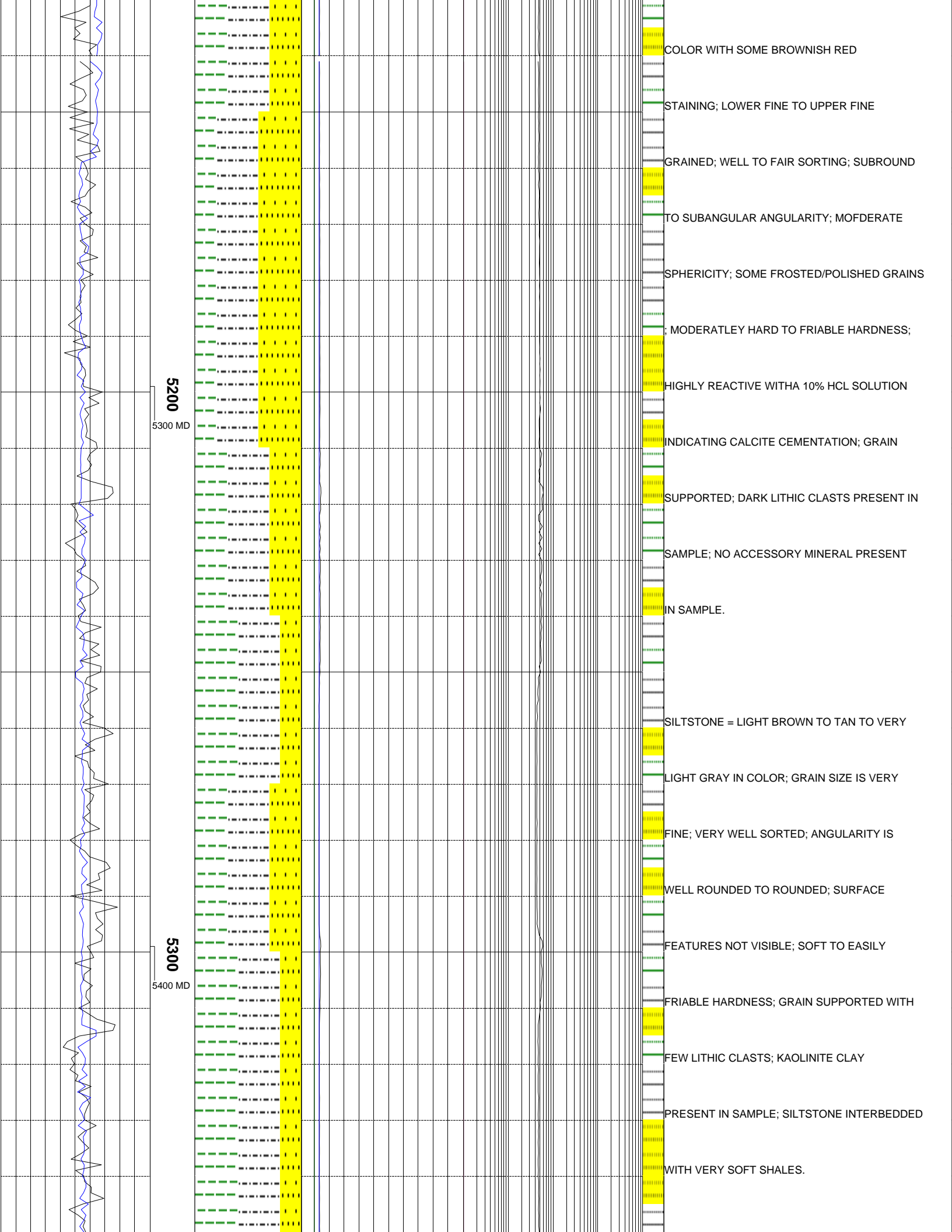
4900 MD

4900

5000 MD

-LY EFFERVESCING IN SAMPLE, NO OTHER DIS
 -TINGUISHABLE STRUCTURAL FEATURES PRESEN
 -T; TRACE AMOUNT OF ACCESSORY MINERAL
 PYRITE PRESENT IN SAMPLE.
 SANDSTONE = VERY LIGHT GRAY TO VERY LIGH
 -T TANISH BROWN GRAY WITH FEW BLACK AND
 MODERATE BROWN HUES; QUARTZ DOMINATE
 ; MODERATELY GRAIN SUPPORTED WITH VERY
 FEW LOOSE GRAINS; CONSISTS OF CALCITIC
 CEMENTATION WITH MODERATELY HIGHT REACTI
 -ON TO DILUTE HCL; MATRIX CONTAINS 3 TO
 5% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO
 MEDIUM-COARSE GRAINED; FAIR TO POOR SORT
 -ING; SUB-ANGULAR TO ANGULAR TO SUB-ROUN
 -DED ANGULARITY; LOW TO MODERATE SPHERIC
 -ITY; VERY POOR GRADE SANDSTONE VISIBLE
 GRADING WITH POOR GRADE SILTSTONE, NO
 LAMINAE OR OTHER DISTINGUISHABLE STRUCTU
 -RAL FEATURES PRESENT; NO ACCESSORY MINE
 -RALS PRESENT IN SAMPLE.



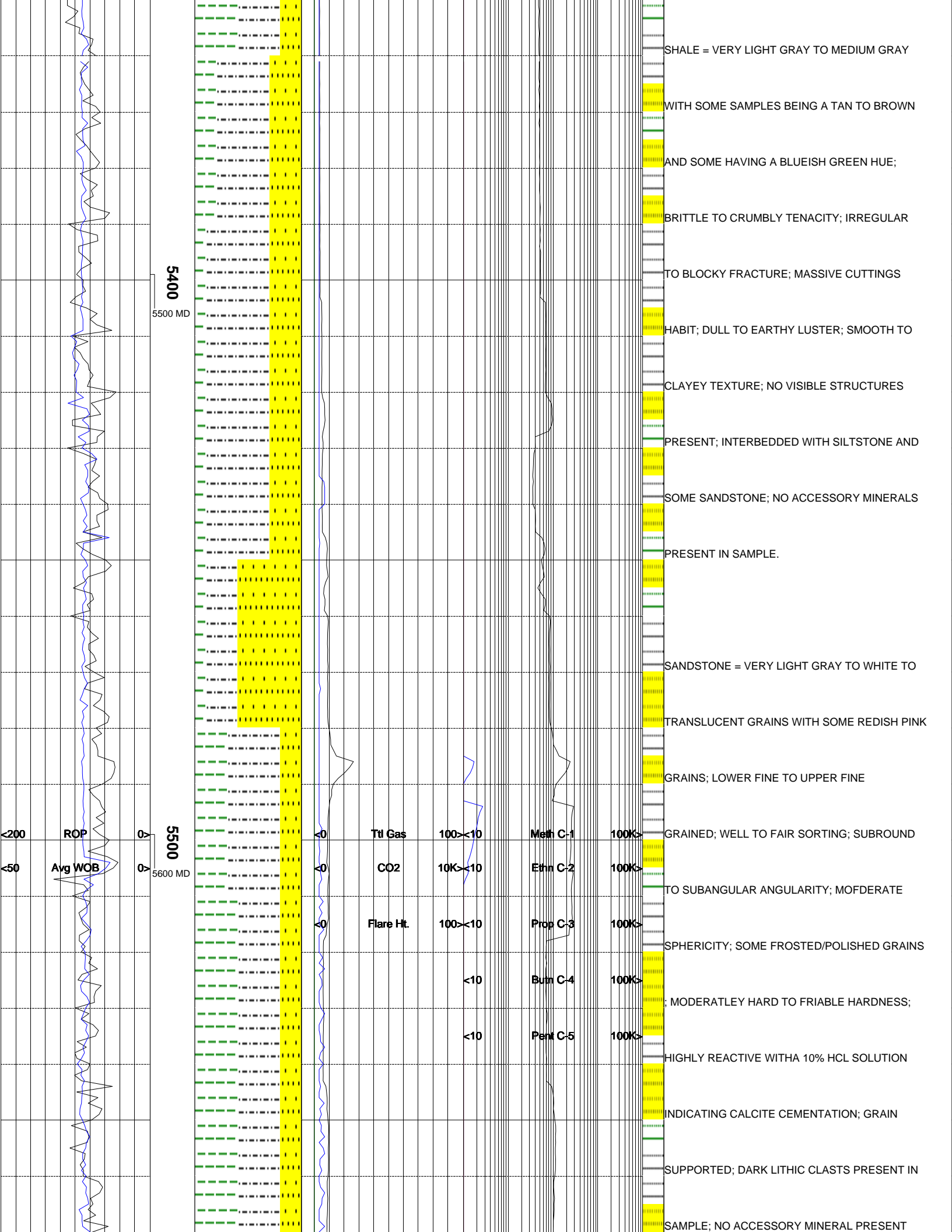


5200

5300 MD

5300

5400 MD



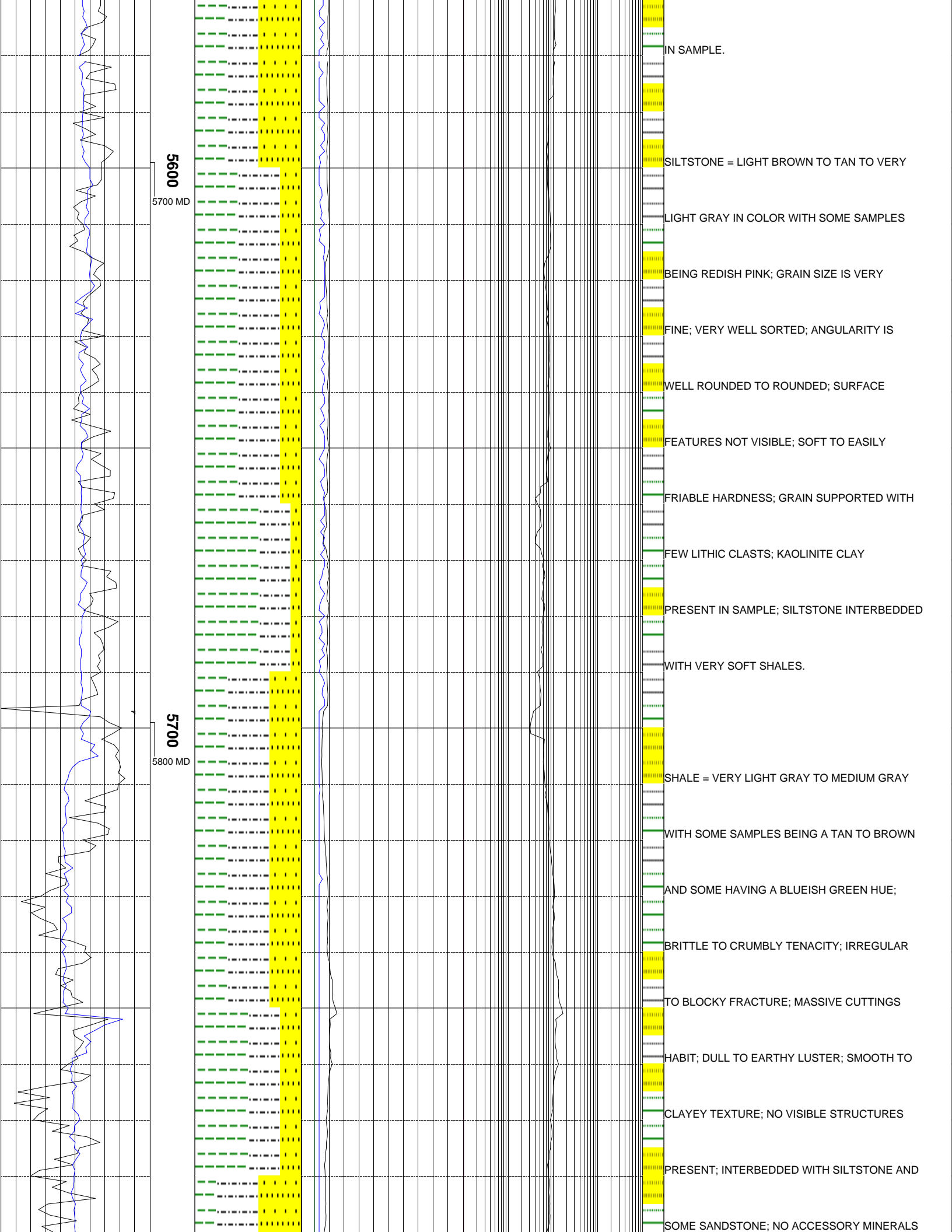
5400
5500 MD

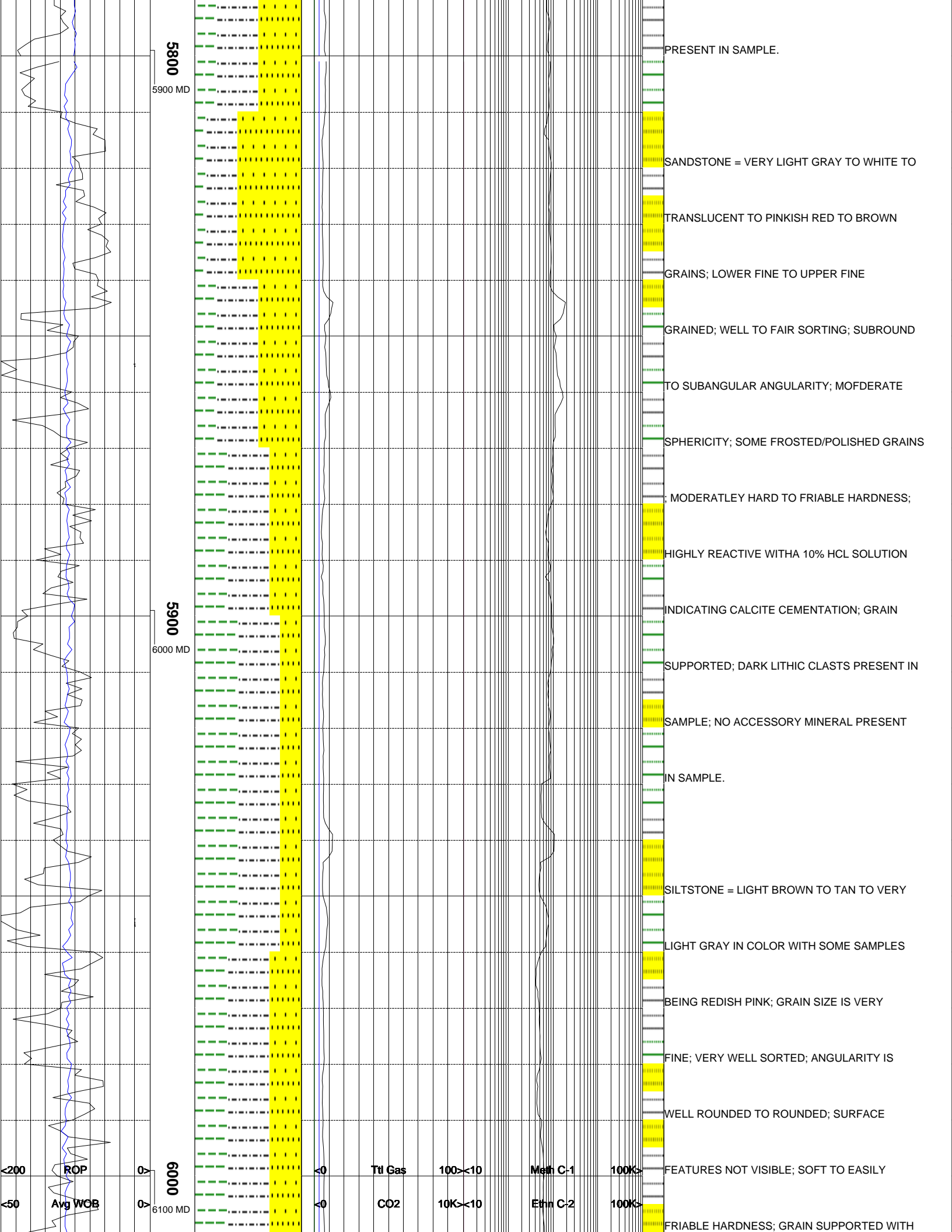
5500
5600 MD

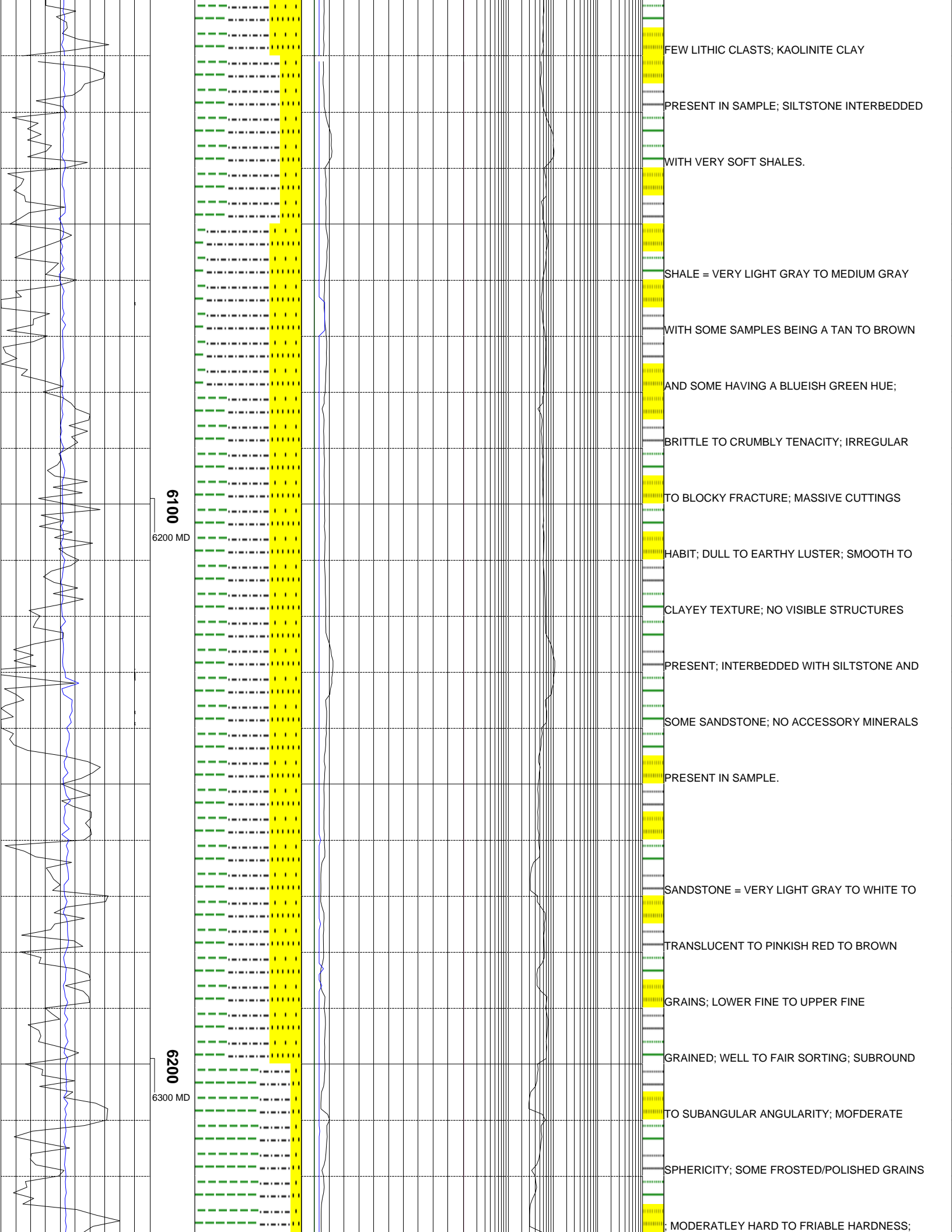
SHALE = VERY LIGHT GRAY TO MEDIUM GRAY
 WITH SOME SAMPLES BEING A TAN TO BROWN
 AND SOME HAVING A BLUEISH GREEN HUE;
 BRITTLE TO CRUMBLY TENACITY; IRREGULAR
 TO BLOCKY FRACTURE; MASSIVE CUTTINGS
 HABIT; DULL TO EARTHY LUSTER; SMOOTH TO
 CLAYEY TEXTURE; NO VISIBLE STRUCTURES
 PRESENT; INTERBEDDED WITH SILTSTONE AND
 SOME SANDSTONE; NO ACCESSORY MINERALS
 PRESENT IN SAMPLE.
 SANDSTONE = VERY LIGHT GRAY TO WHITE TO
 TRANSLUCENT GRAINS WITH SOME REDISH PINK
 GRAINS; LOWER FINE TO UPPER FINE
 GRAINED; WELL TO FAIR SORTING; SUBROUND
 TO SUBANGULAR ANGULARITY; MODERATE
 SPHERICITY; SOME FROSTED/POLISHED GRAINS
 ; MODERATELY HARD TO FRIABLE HARDNESS;
 HIGHLY REACTIVE WITH A 10% HCL SOLUTION
 INDICATING CALCITE CEMENTATION; GRAIN
 SUPPORTED; DARK LITHIC CLASTS PRESENT IN
 SAMPLE; NO ACCESSORY MINERAL PRESENT

200
50
ROP
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	Burn C-4	100K	>
		<10	Pent C-5	100K	>

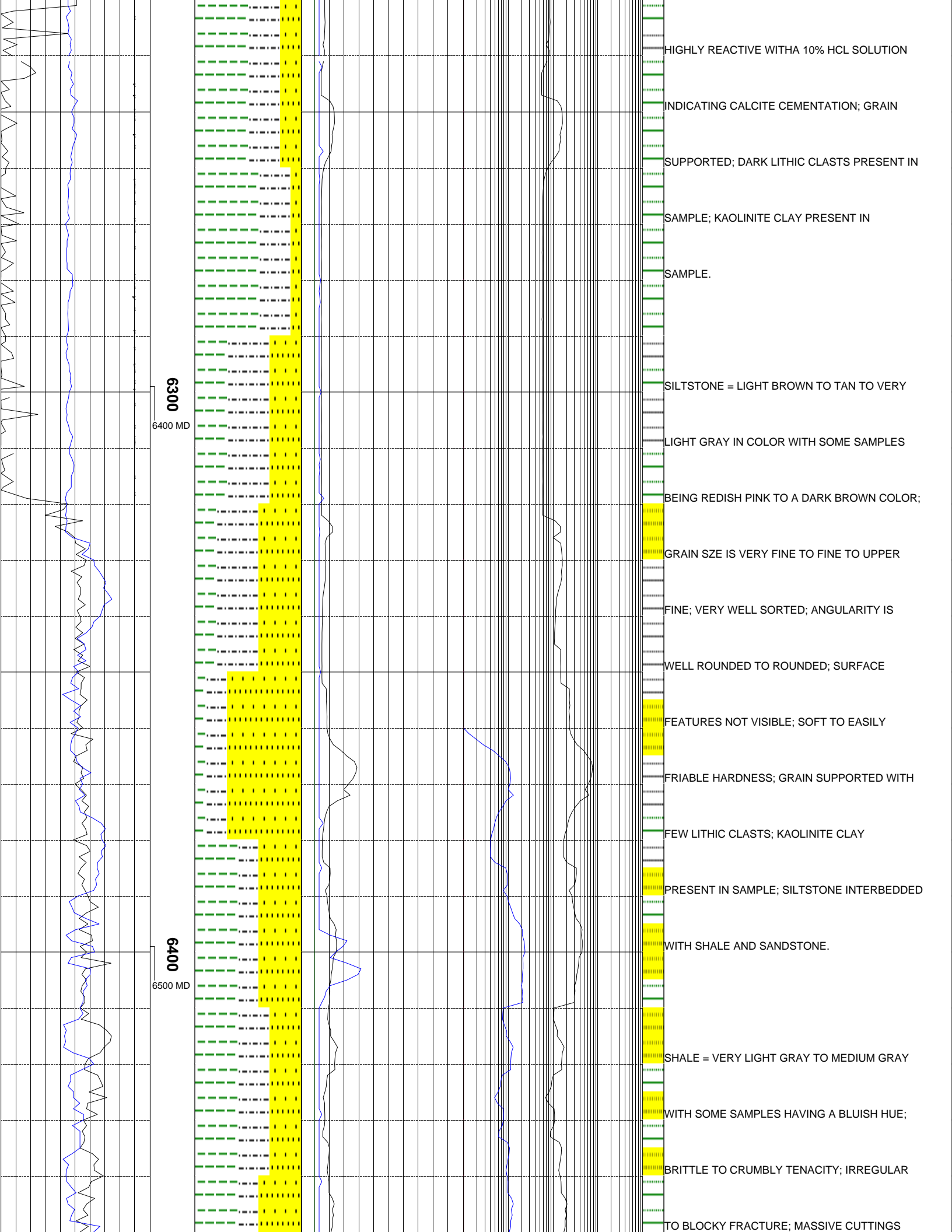


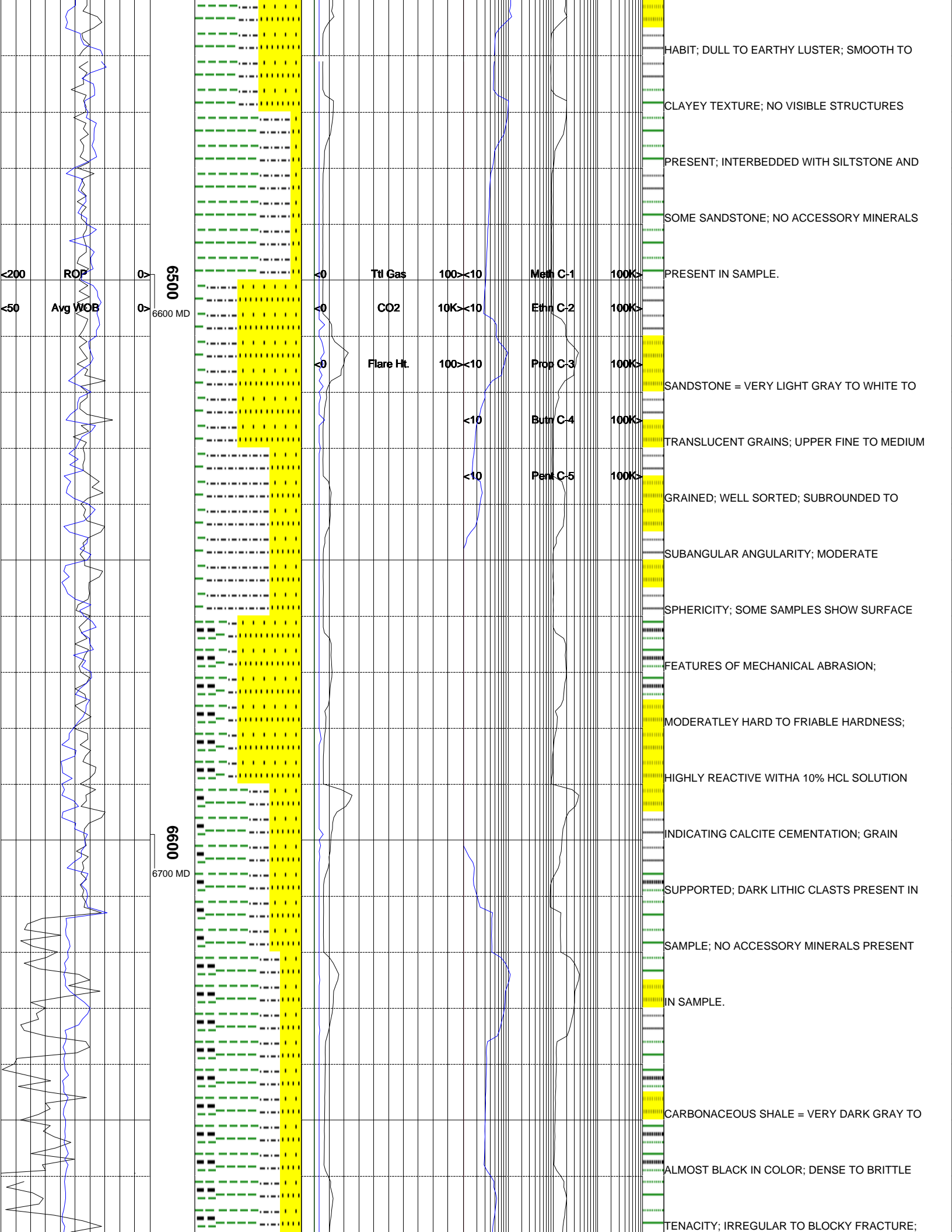


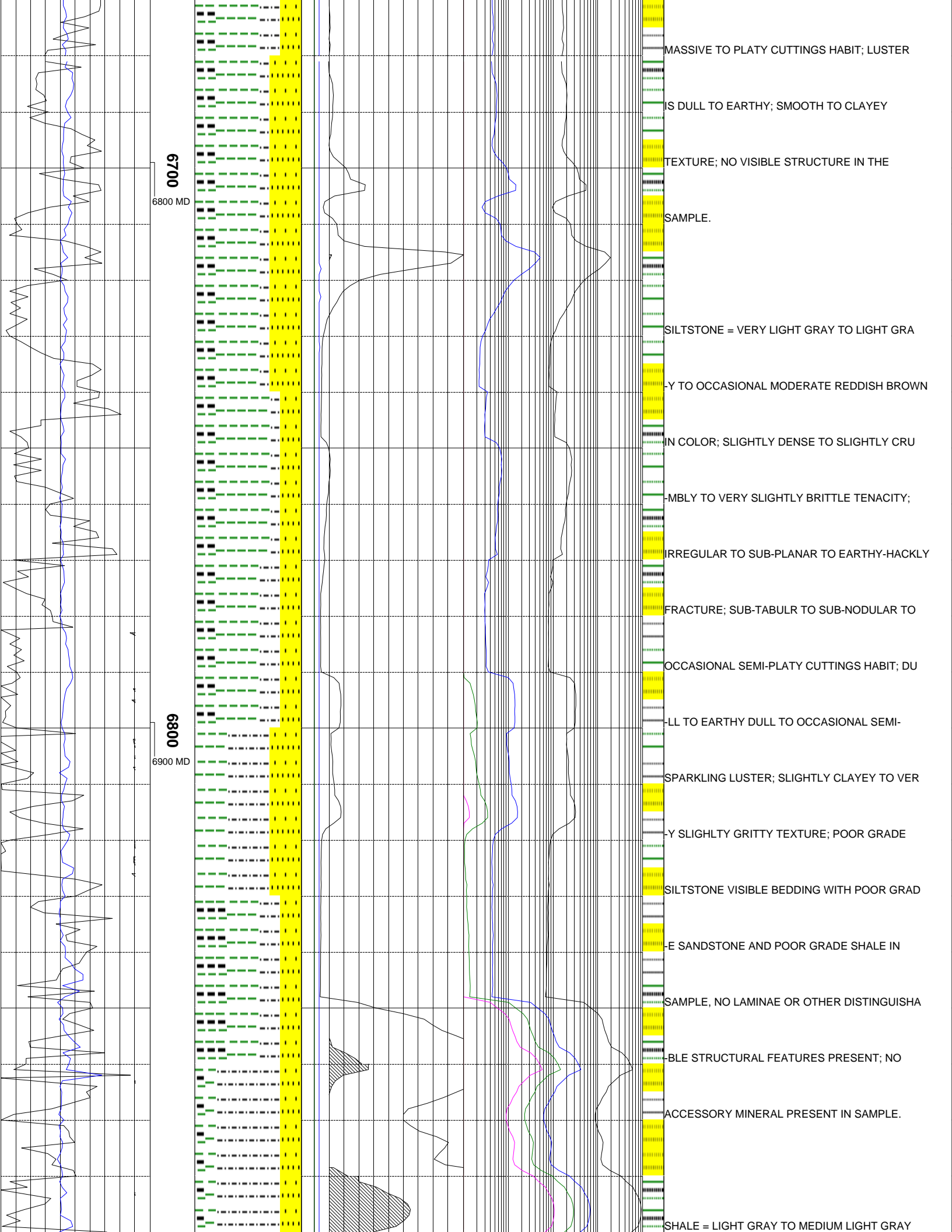


6100
6200 MD

6200
6300 MD



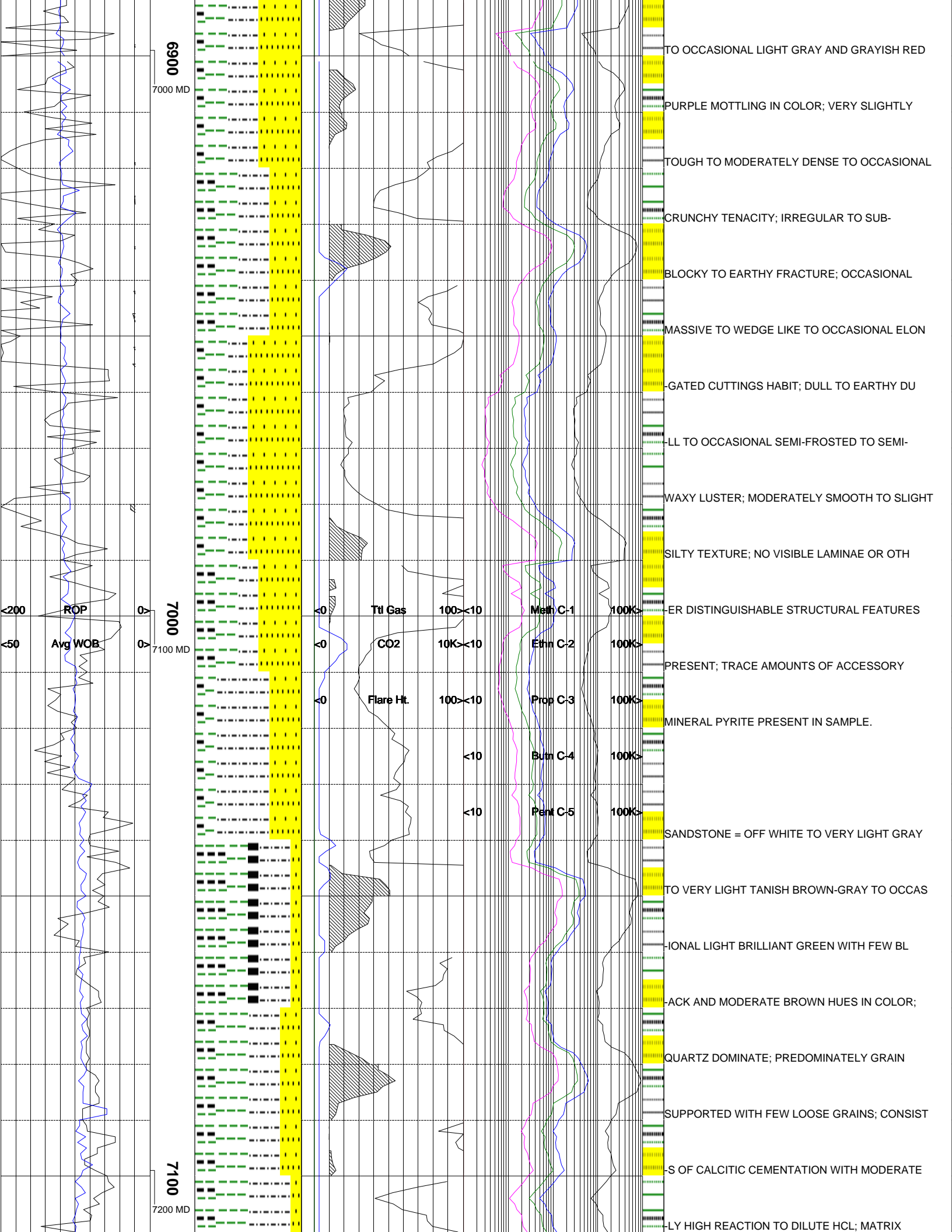




6700
6800 MD

6800
6900 MD

MASSIVE TO PLATY CUTTINGS HABIT; LUSTER
IS DULL TO EARTHY; SMOOTH TO CLAYEY
TEXTURE; NO VISIBLE STRUCTURE IN THE
SAMPLE.
SILTSTONE = VERY LIGHT GRAY TO LIGHT GRAY
Y TO OCCASIONAL MODERATE REDDISH BROWN
IN COLOR; SLIGHTLY DENSE TO SLIGHTLY CRU
MBLY TO VERY SLIGHTLY BRITTLE TENACITY;
IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY
FRACTURE; SUB-TABULR TO SUB-NODULAR TO
OCCASIONAL SEMI-PLATY CUTTINGS HABIT; DU
LL TO EARTHY DULL TO OCCASIONAL SEMI-
SPARKLING LUSTER; SLIGHTLY CLAYEY TO VER
Y SLIGHTLY GRITTY TEXTURE; POOR GRADE
SILTSTONE VISIBLE BEDDING WITH POOR GRAD
E SANDSTONE AND POOR GRADE SHALE IN
SAMPLE, NO LAMINAE OR OTHER DISTINGUISHA
BLE STRUCTURAL FEATURES PRESENT; NO
ACCESSORY MINERAL PRESENT IN SAMPLE.
SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY



6900

7000 MD

7000

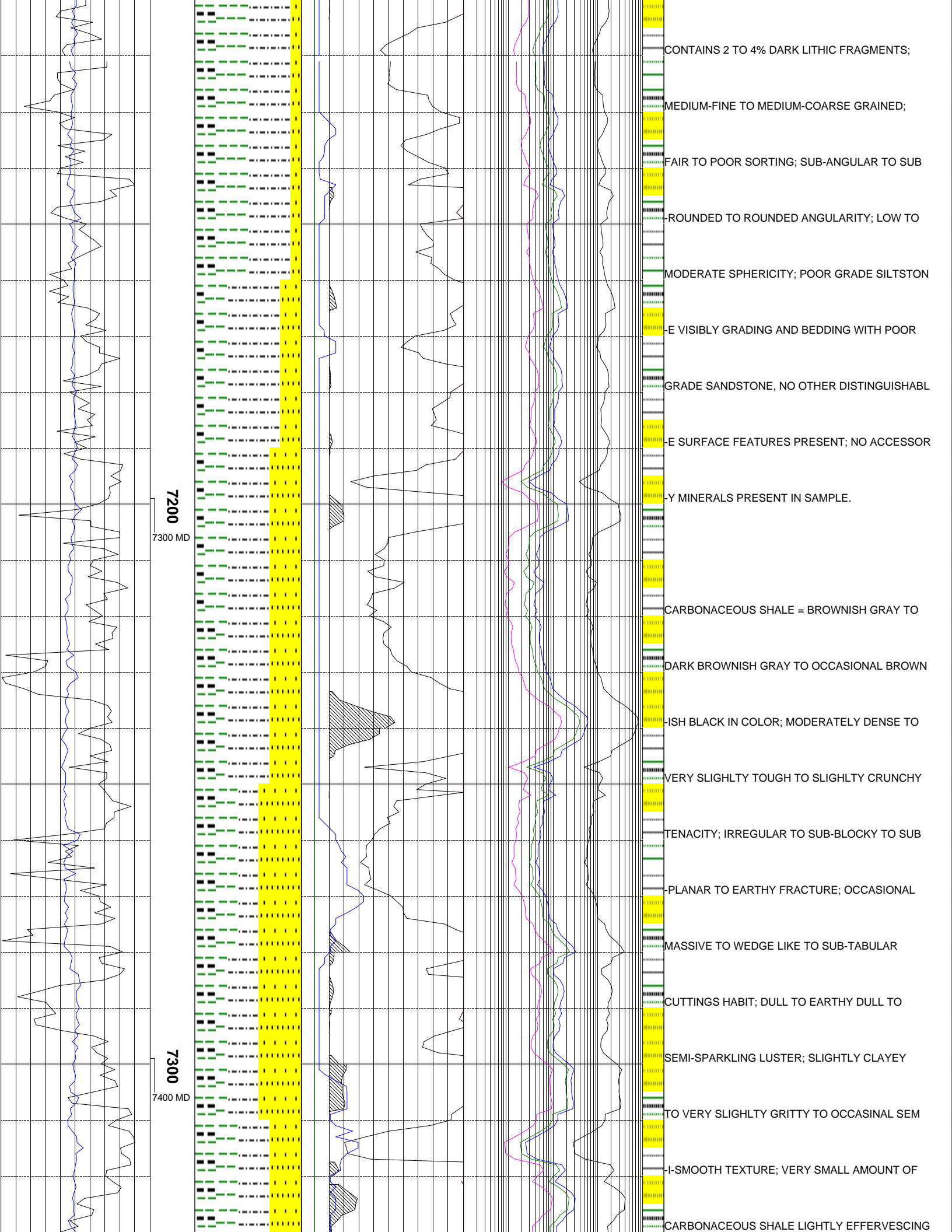
7100 MD

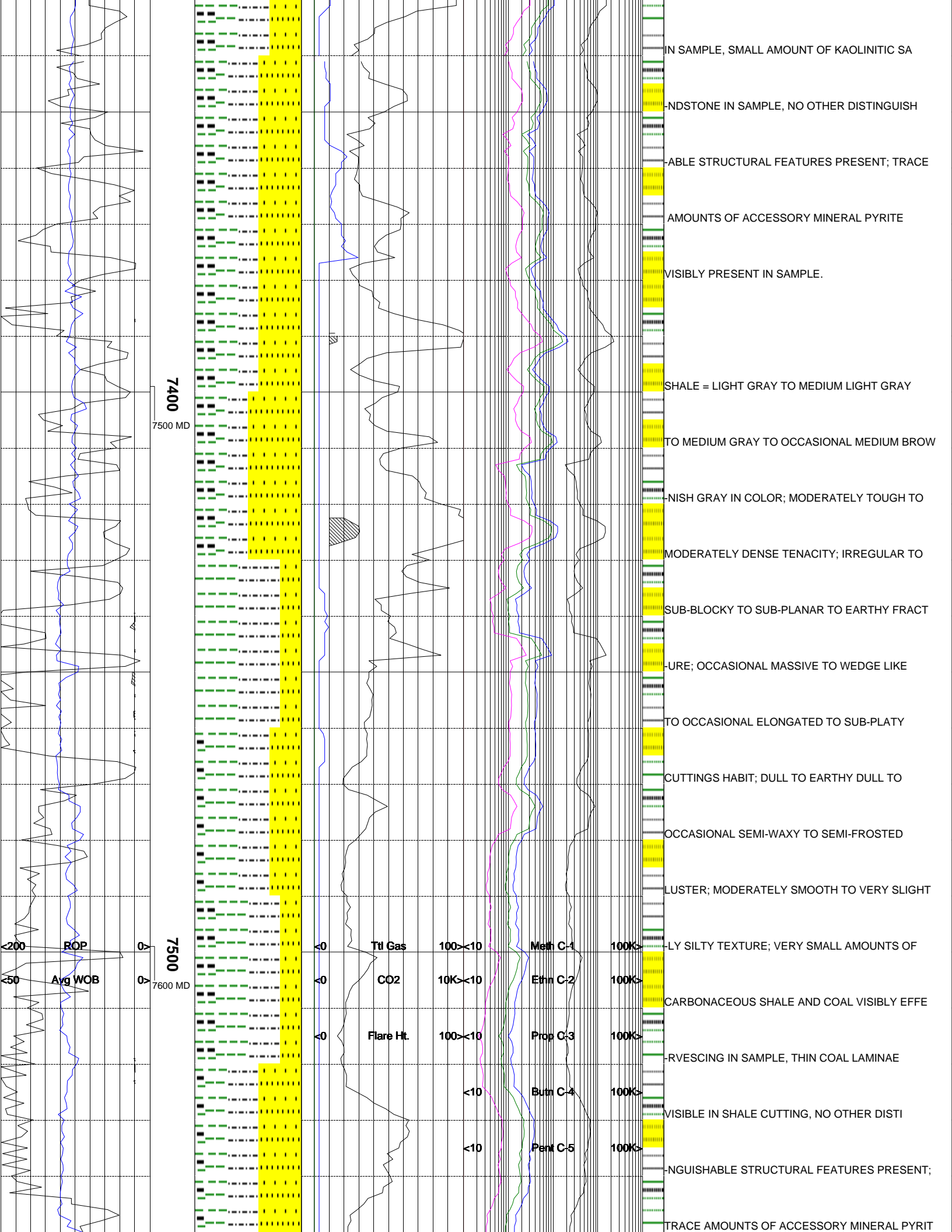
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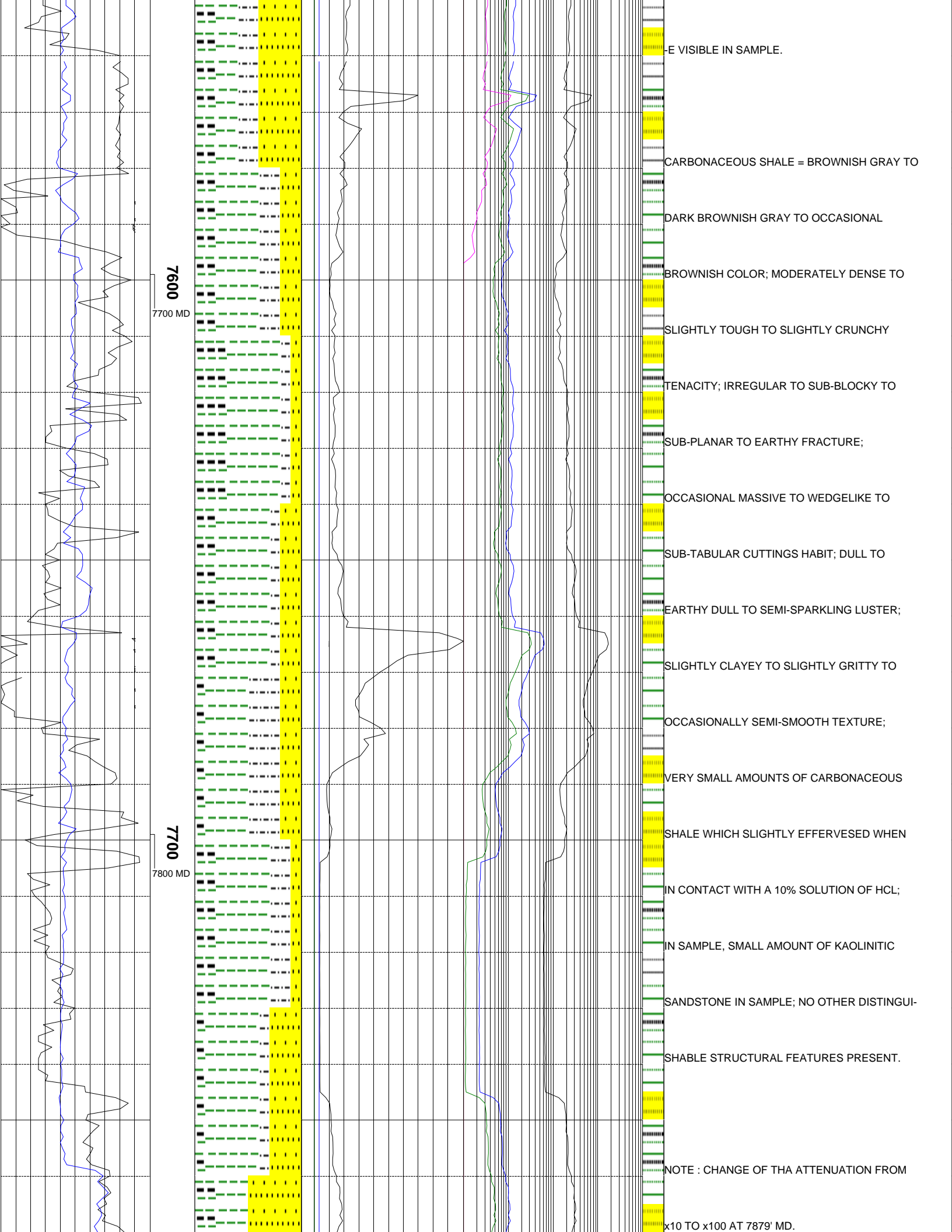
7200 MD

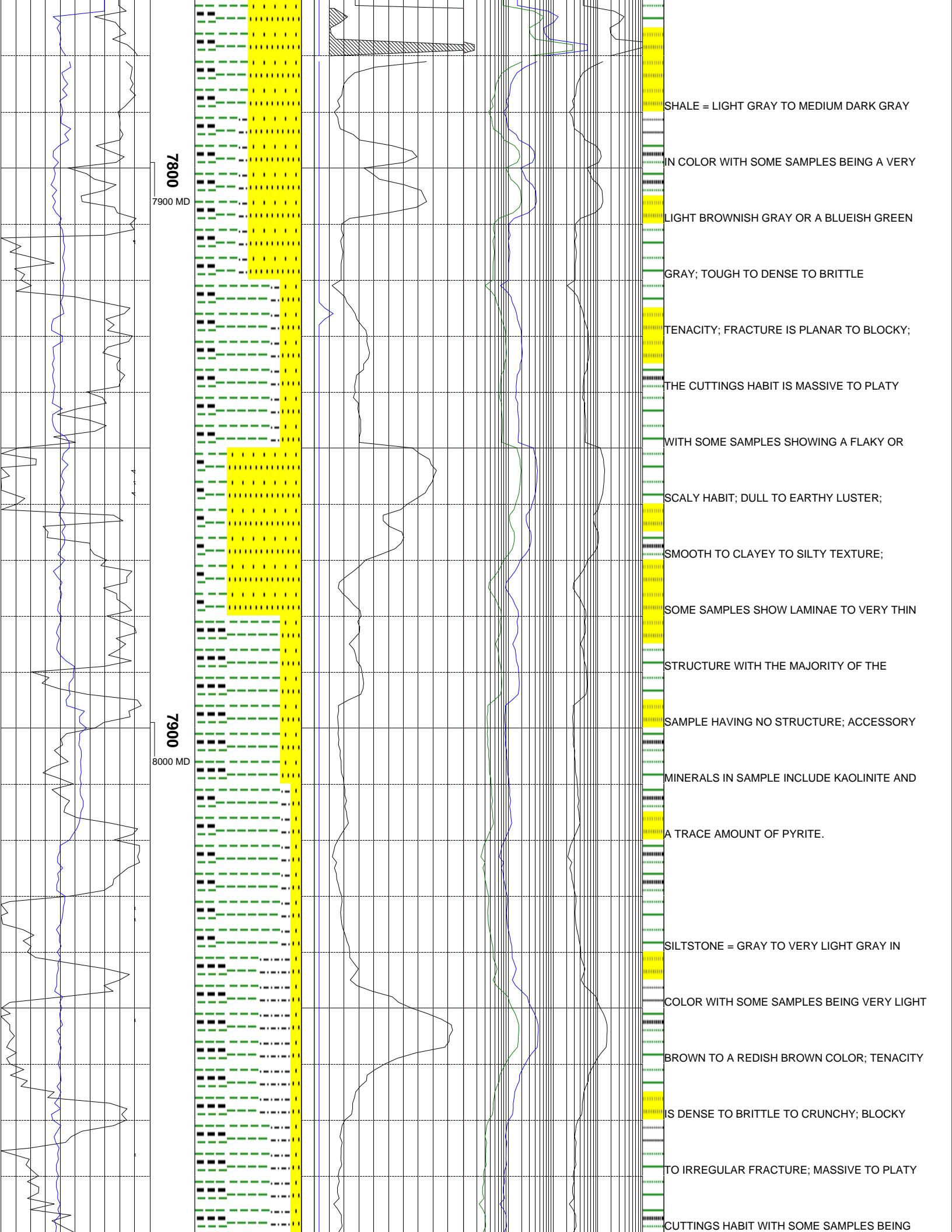
<200 ROP
<50 Avg WOB

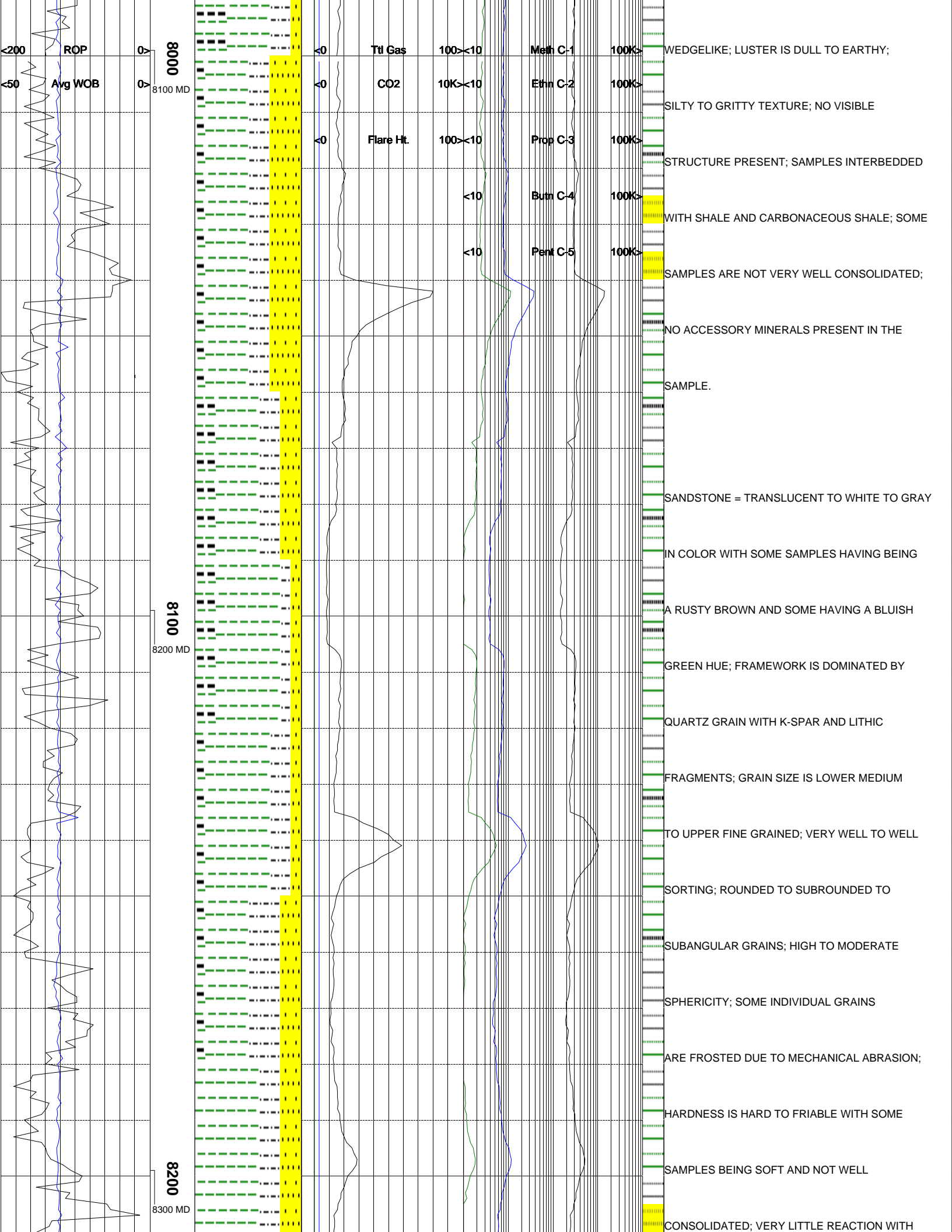
Ttl Gas 100 < 10 Meth C-1 100K >
 CO2 10K < 10 Ethn C-2 100K >
 Flare Ht. 100 < 10 Prop C-3 100K >
 < 10 Butn C-4 100K >
 < 10 Pent C-5 100K >

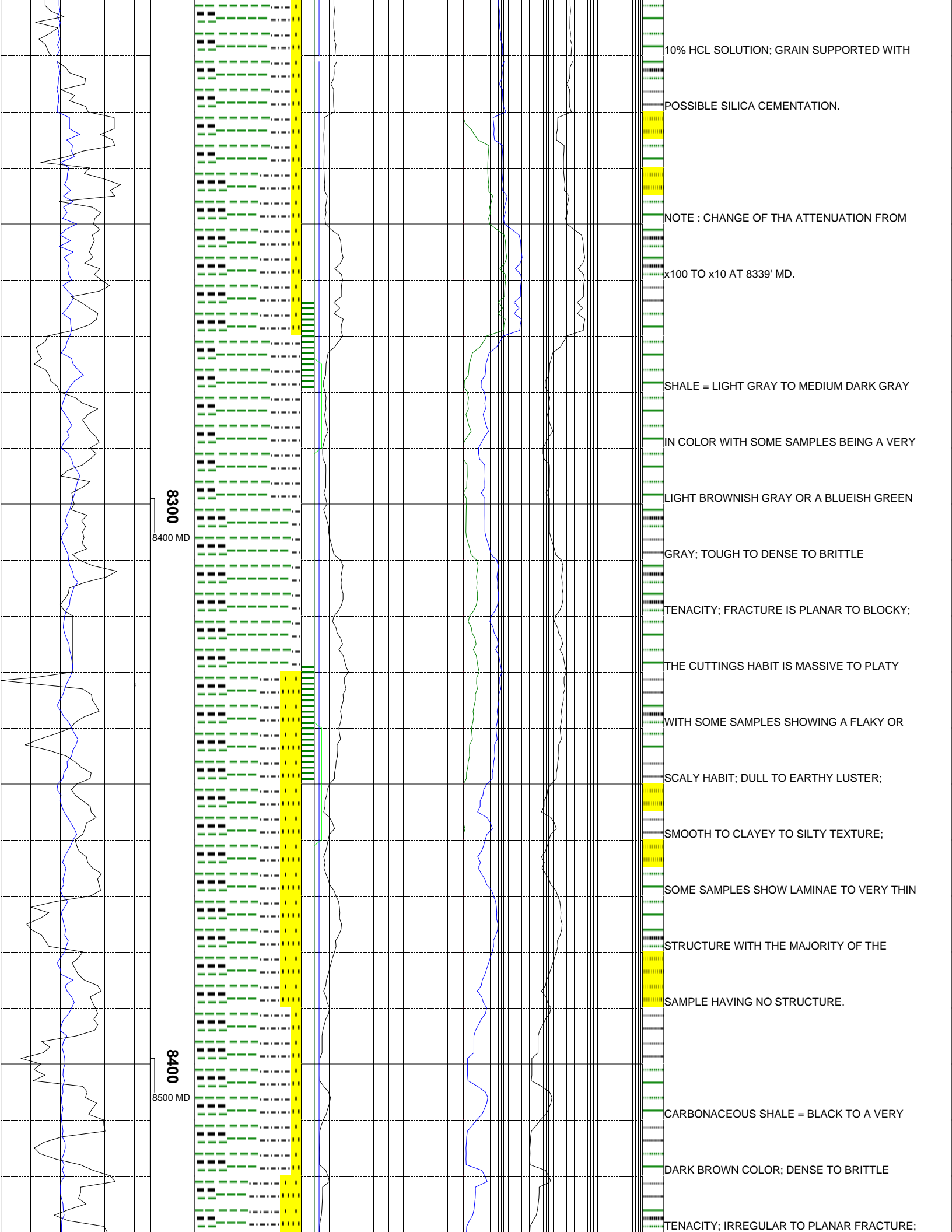


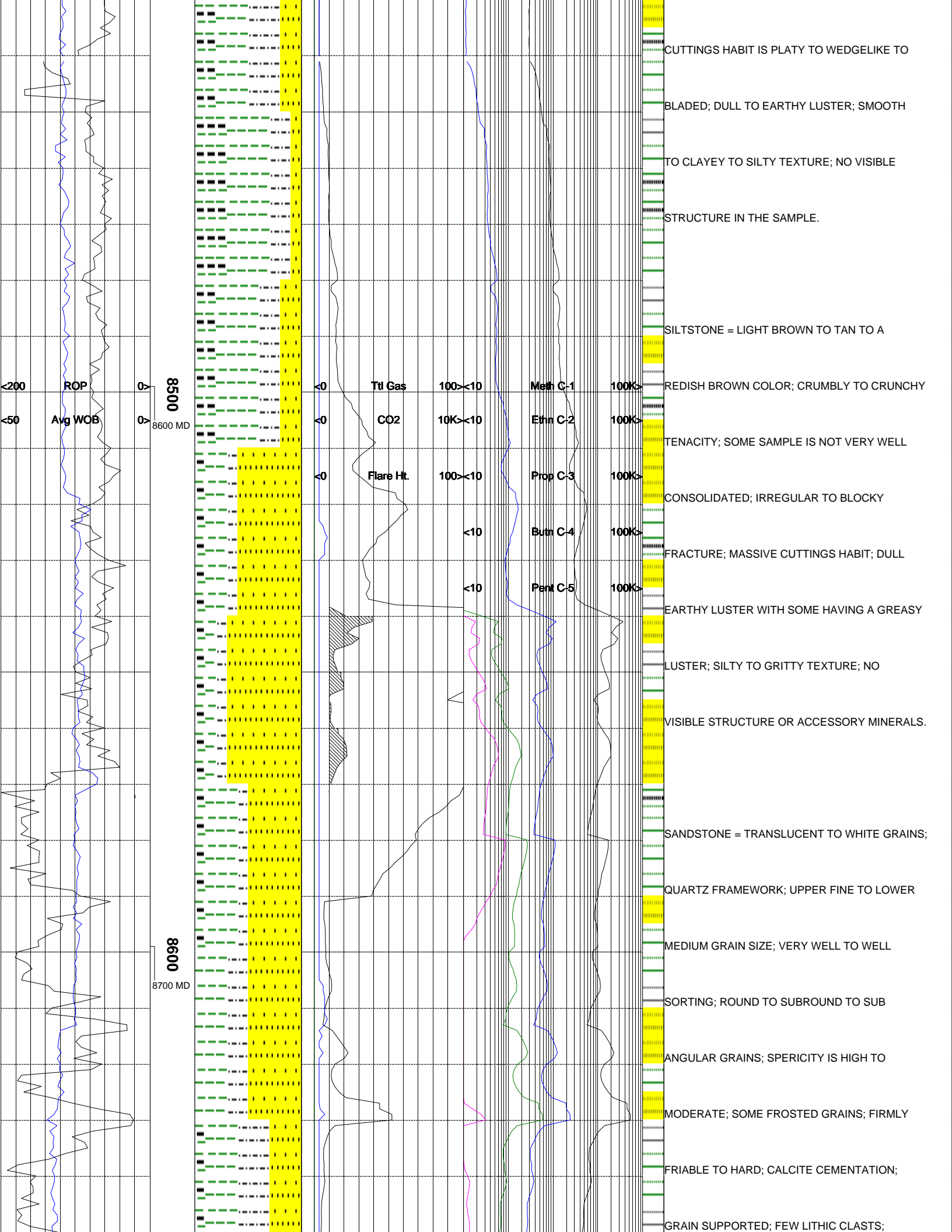


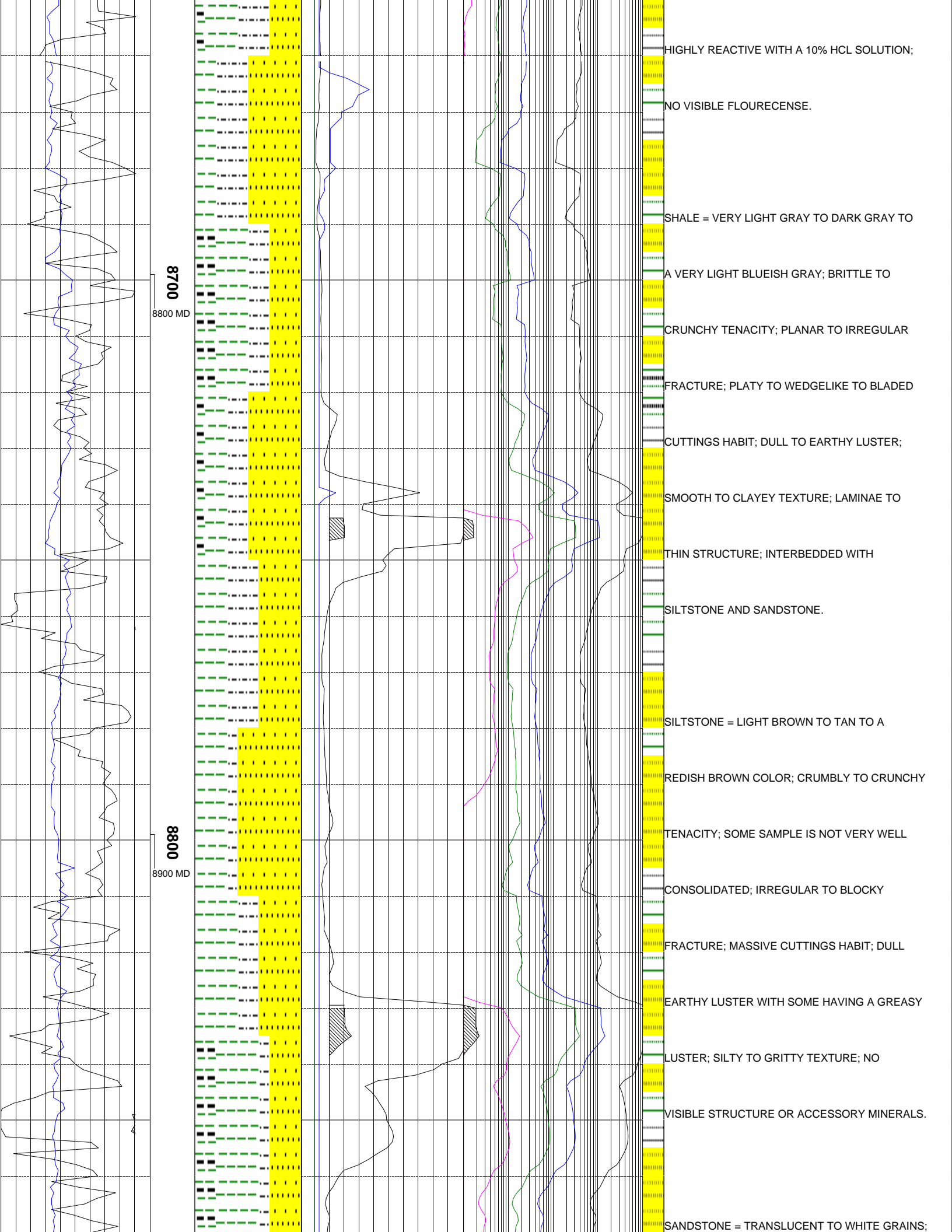












8700

8800 MD

8800

8900 MD

HIGHLY REACTIVE WITH A 10% HCL SOLUTION;

NO VISIBLE FLOURECENSE.

SHALE = VERY LIGHT GRAY TO DARK GRAY TO

A VERY LIGHT BLUEISH GRAY; BRITTLE TO

CRUNCHY TENACITY; PLANAR TO IRREGULAR

FRACTURE; PLATY TO WEDGELIKE TO BLADED

CUTTINGS HABIT; DULL TO EARTHLY LUSTER;

SMOOTH TO CLAYEY TEXTURE; LAMINAE TO

THIN STRUCTURE; INTERBEDDED WITH

SILTSTONE AND SANDSTONE.

SILTSTONE = LIGHT BROWN TO TAN TO A

REDISH BROWN COLOR; CRUMBLY TO CRUNCHY

TENACITY; SOME SAMPLE IS NOT VERY WELL

CONSOLIDATED; IRREGULAR TO BLOCKY

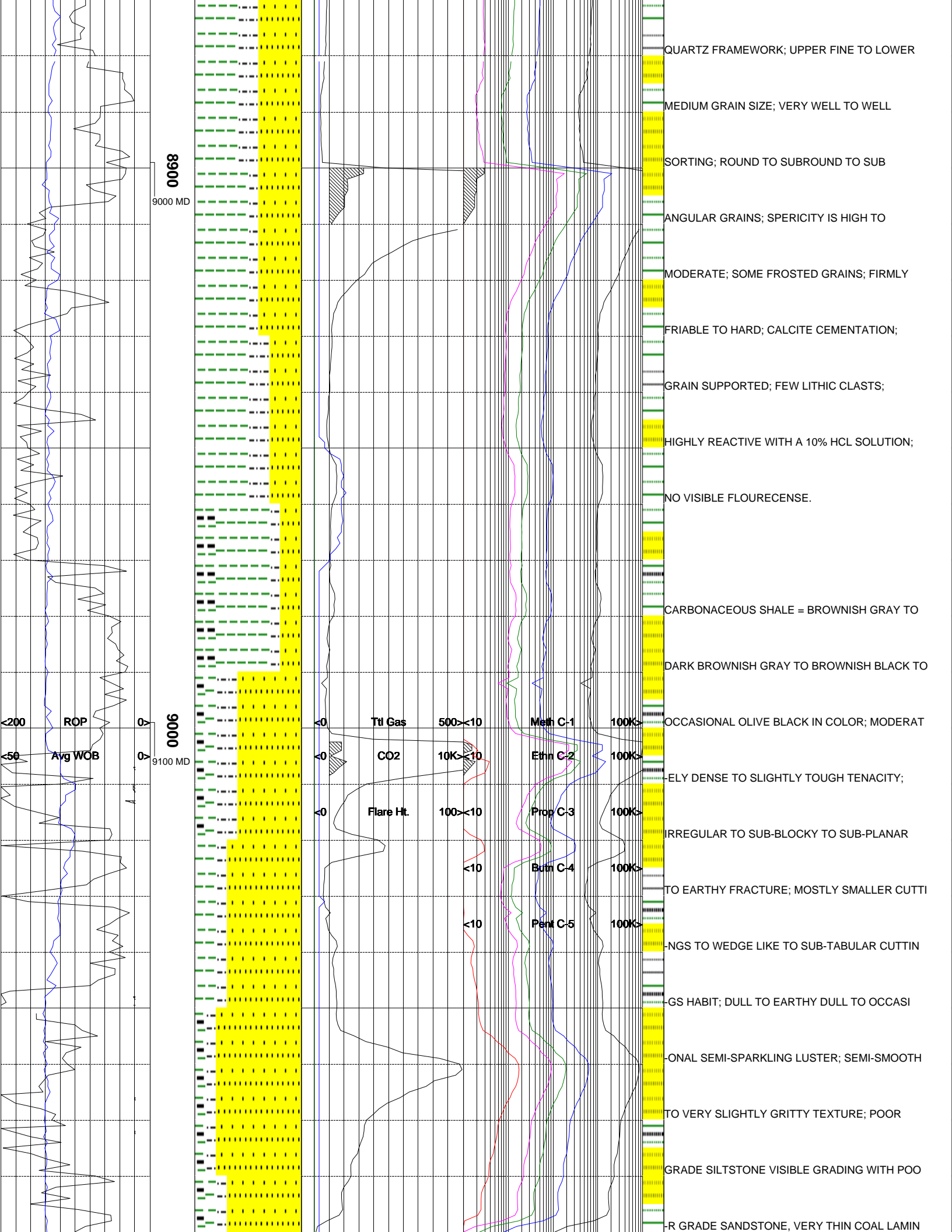
FRACTURE; MASSIVE CUTTINGS HABIT; DULL

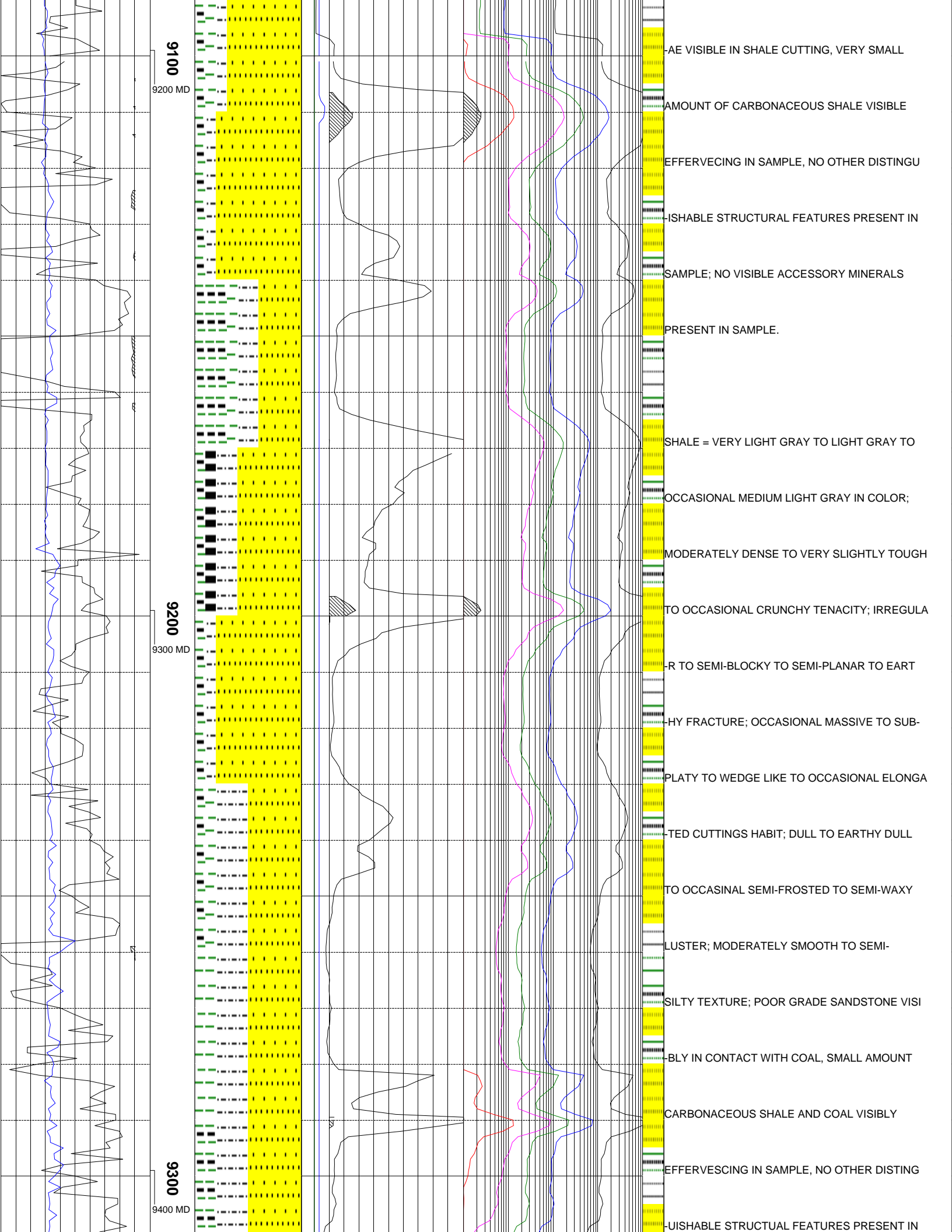
EARTHLY LUSTER WITH SOME HAVING A GREASY

LUSTER; SILTY TO GRITTY TEXTURE; NO

VISIBLE STRUCTURE OR ACCESSORY MINERALS.

SANDSTONE = TRANSLUCENT TO WHITE GRAINS;





9100

9200 MD

9200

9300 MD

9300

9400 MD

AE VISIBLE IN SHALE CUTTING, VERY SMALL

AMOUNT OF CARBONACEOUS SHALE VISIBLE

EFFERVESCING IN SAMPLE, NO OTHER DISTINGU

ISHABLE STRUCTURAL FEATURES PRESENT IN

SAMPLE; NO VISIBLE ACCESSORY MINERALS

PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO

OCCASIONAL MEDIUM LIGHT GRAY IN COLOR;

MODERATELY DENSE TO VERY SLIGHTLY TOUGH

TO OCCASIONAL CRUNCHY TENACITY; IRREGULA

R TO SEMI-BLOCKY TO SEMI-PLANAR TO EART

HY FRACTURE; OCCASIONAL MASSIVE TO SUB-

PLATY TO WEDGE LIKE TO OCCASIONAL ELONGA

TED CUTTINGS HABIT; DULL TO EARTHY DULL

TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY

LUSTER; MODERATELY SMOOTH TO SEMI-

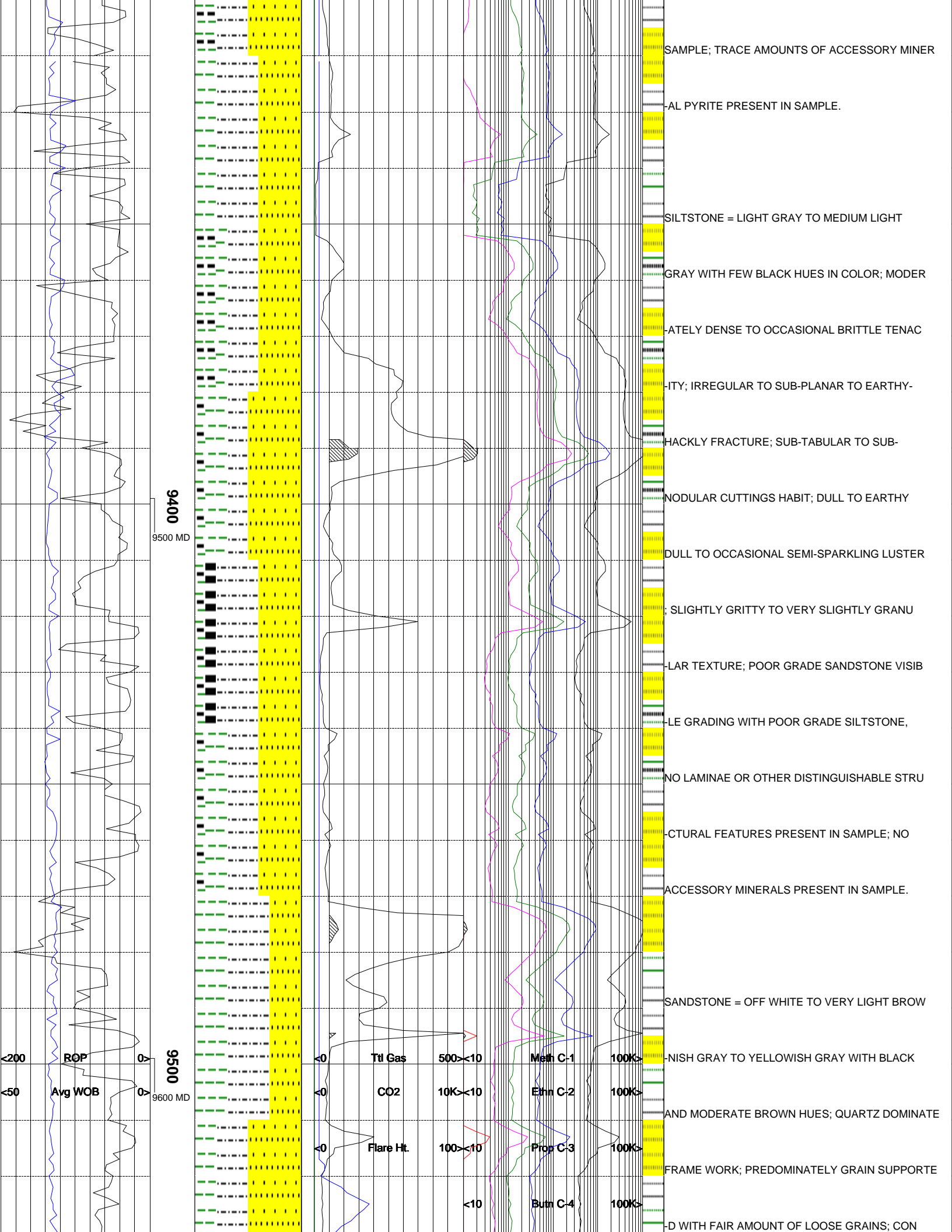
SILTY TEXTURE; POOR GRADE SANDSTONE VISI

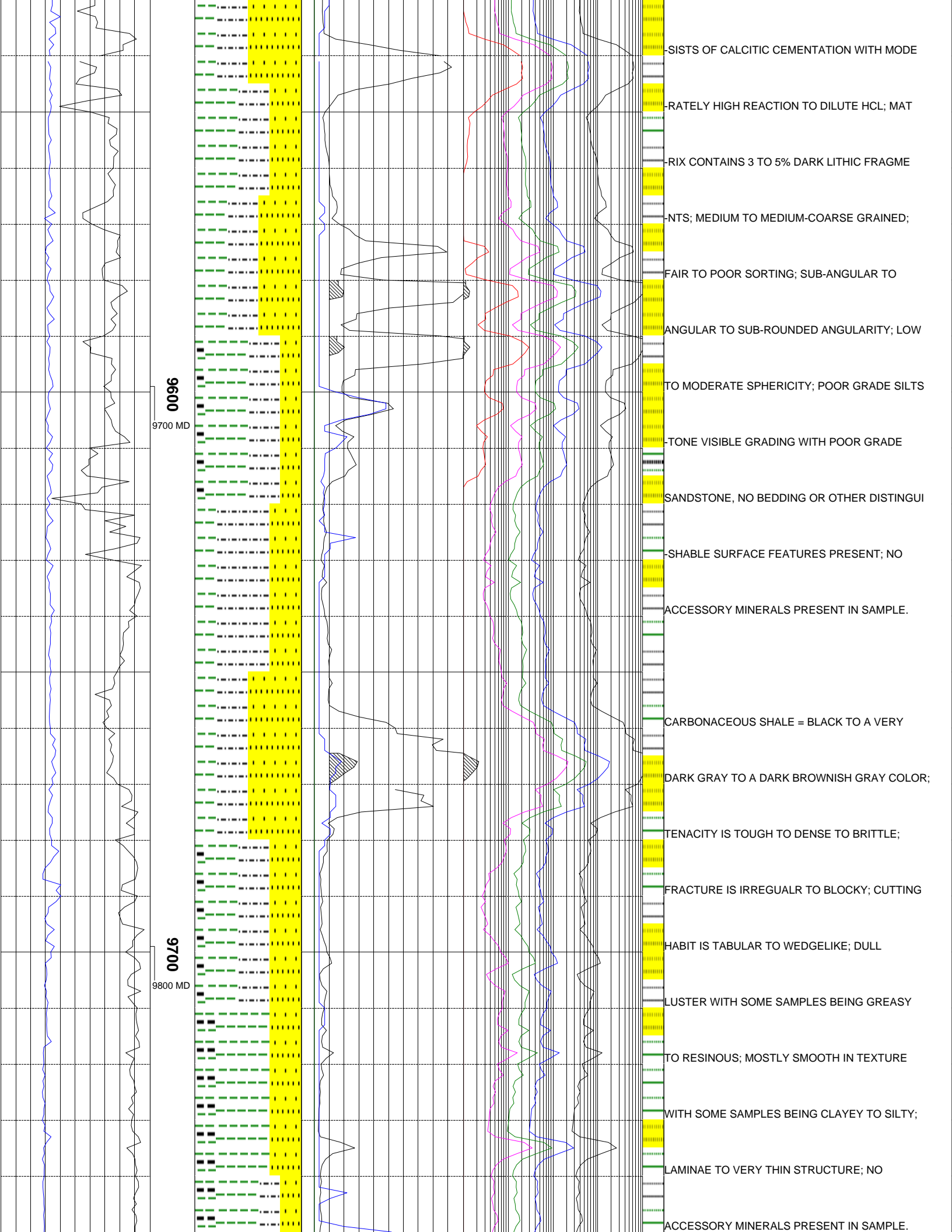
BLY IN CONTACT WITH COAL, SMALL AMOUNT

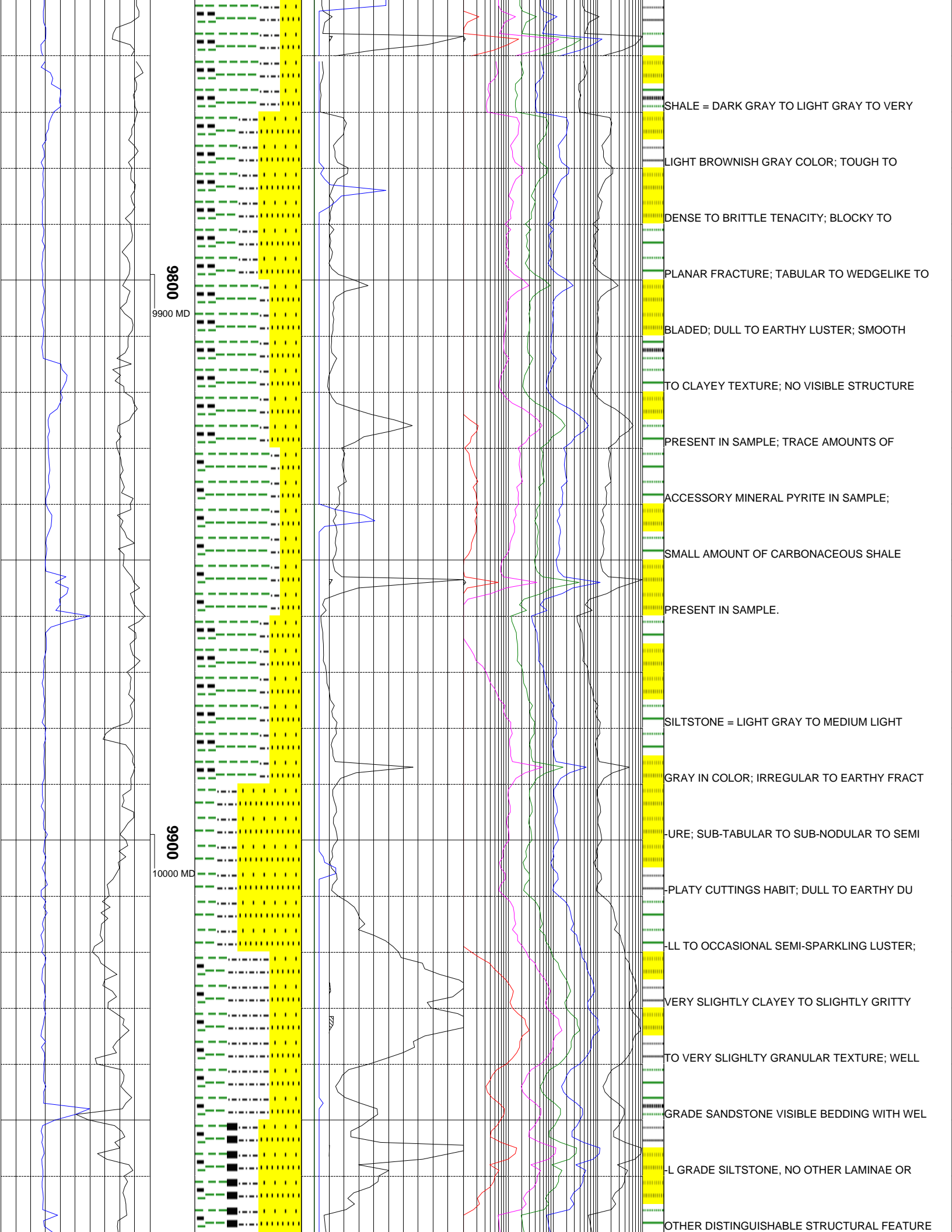
CARBONACEOUS SHALE AND COAL VISIBLY

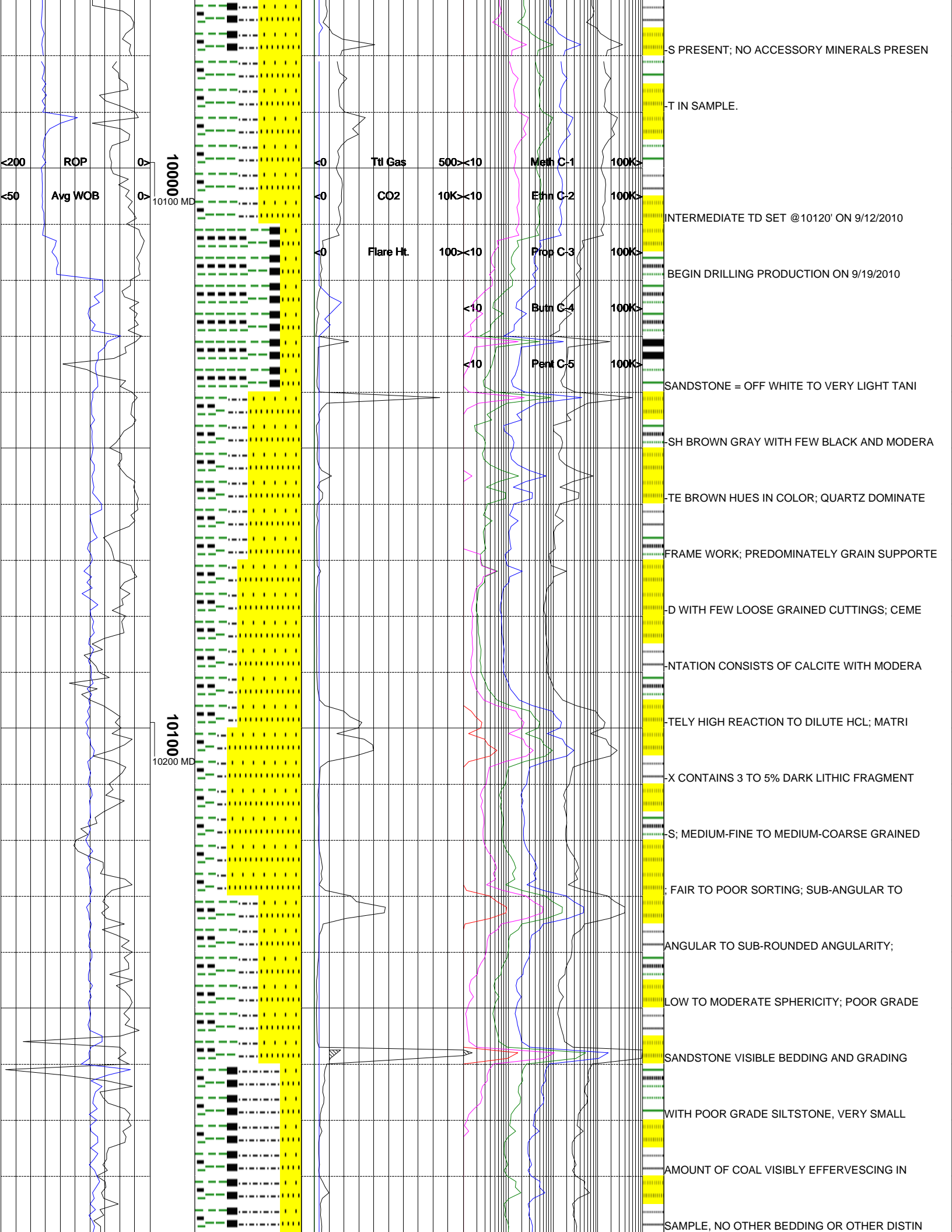
EFFERVESCING IN SAMPLE, NO OTHER DISTING

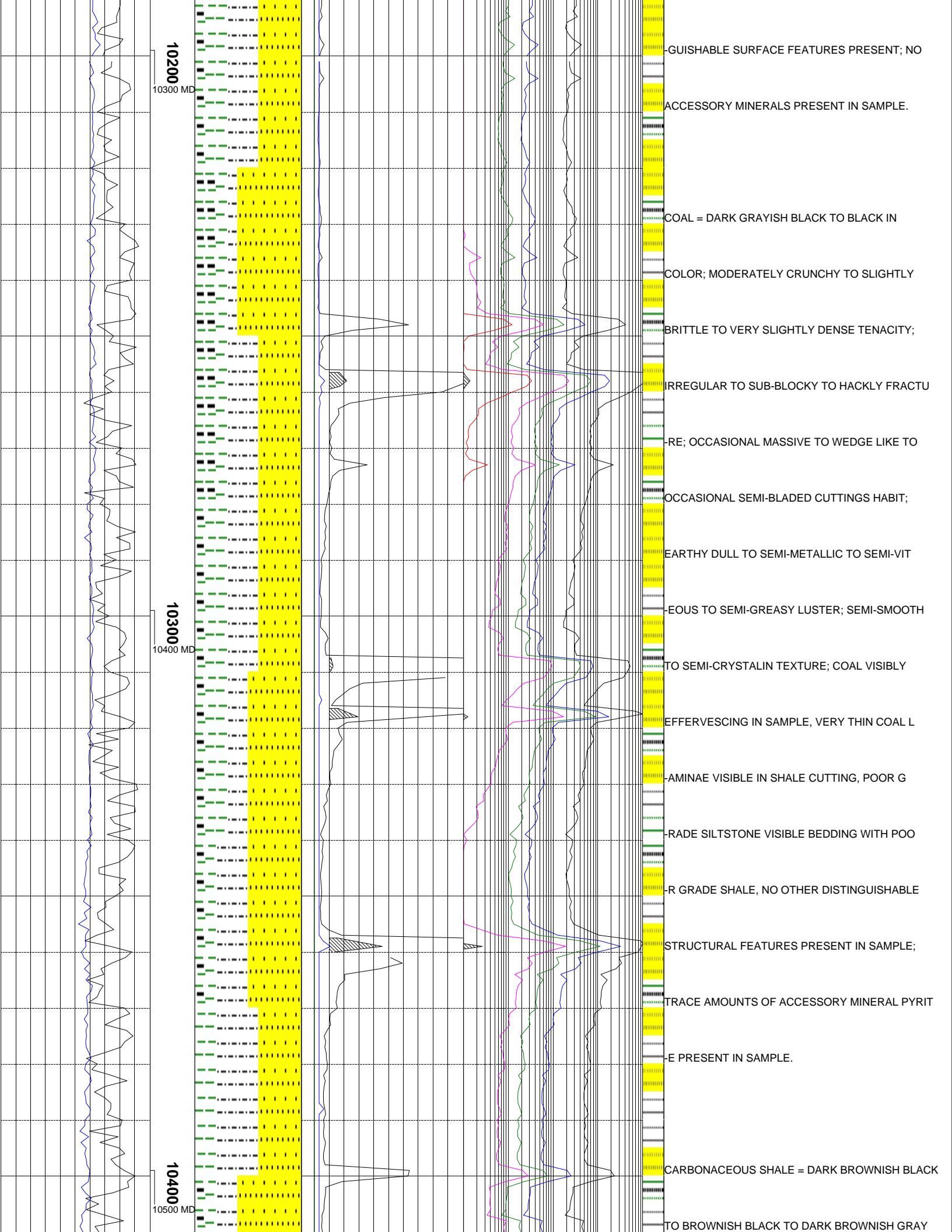
UISHABLE STRUCTURAL FEATURES PRESENT IN

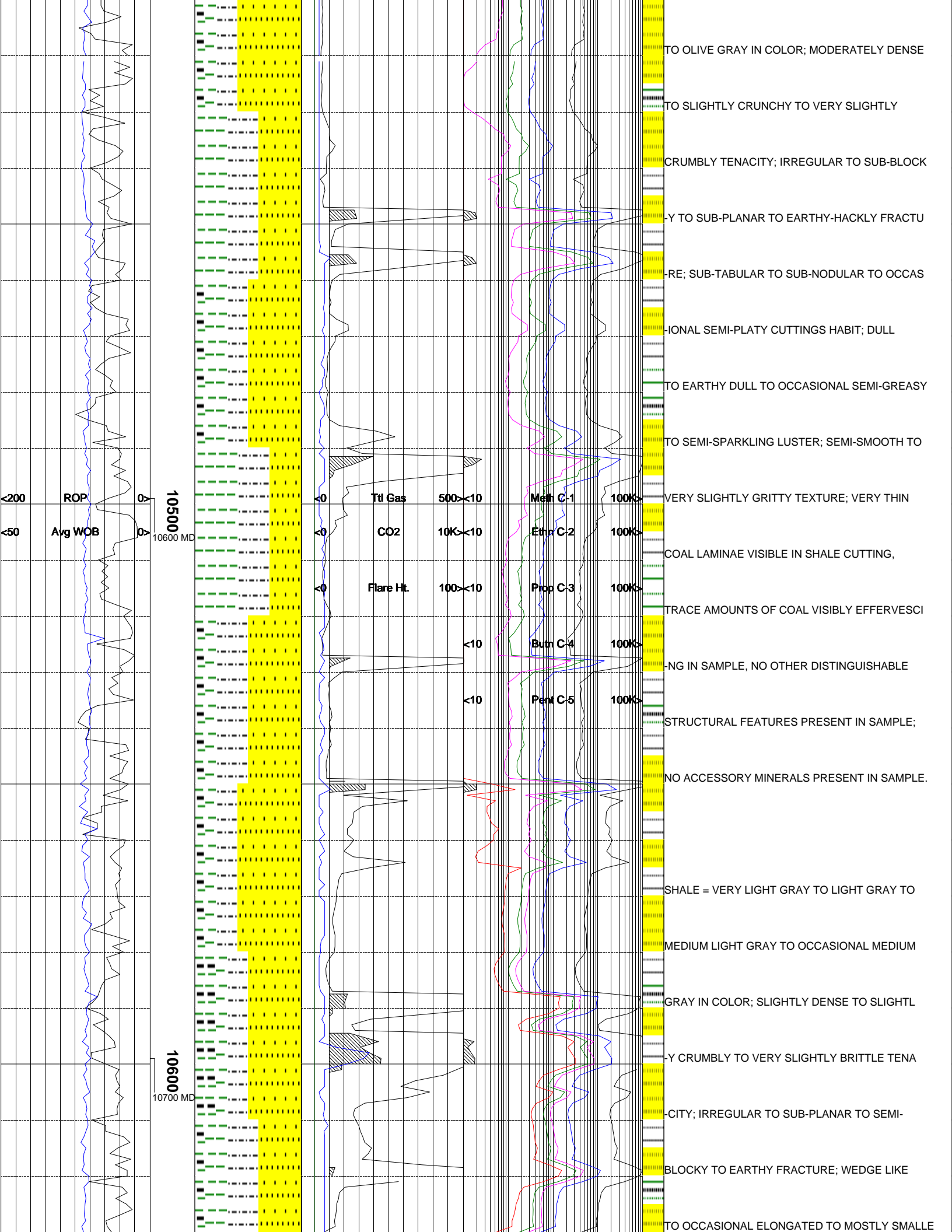


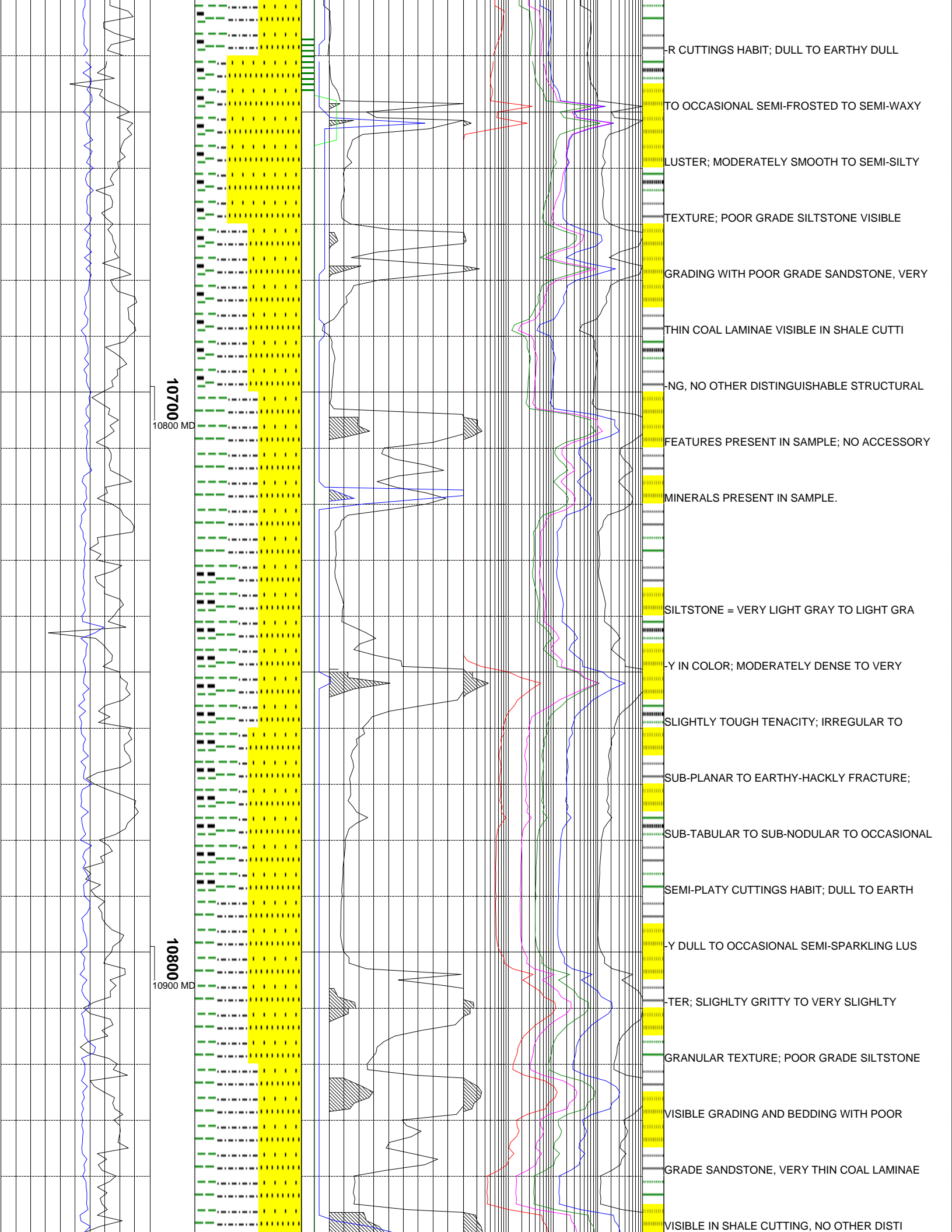












R CUTTINGS HABIT; DULL TO EARTHY DULL

TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY

LUSTER; MODERATELY SMOOTH TO SEMI-SILTY

TEXTURE; POOR GRADE SILTSTONE VISIBLE

GRADING WITH POOR GRADE SANDSTONE, VERY

THIN COAL LAMINAE VISIBLE IN SHALE CUTTI

NG, NO OTHER DISTINGUISHABLE STRUCTURAL

FEATURES PRESENT IN SAMPLE; NO ACCESSORY

MINERALS PRESENT IN SAMPLE.

SILTSTONE = 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-TABULAR TO SUB-NODULAR TO OCCASIONAL

SEMI-PLATY CUTTINGS HABIT; DULL TO EARTH

Y DULL TO OCCASIONAL SEMI-SPARKLING LUS

TER; SLIGHTLY GRITTY TO VERY SLIGHTLY

GRANULAR TEXTURE; POOR GRADE SILTSTONE

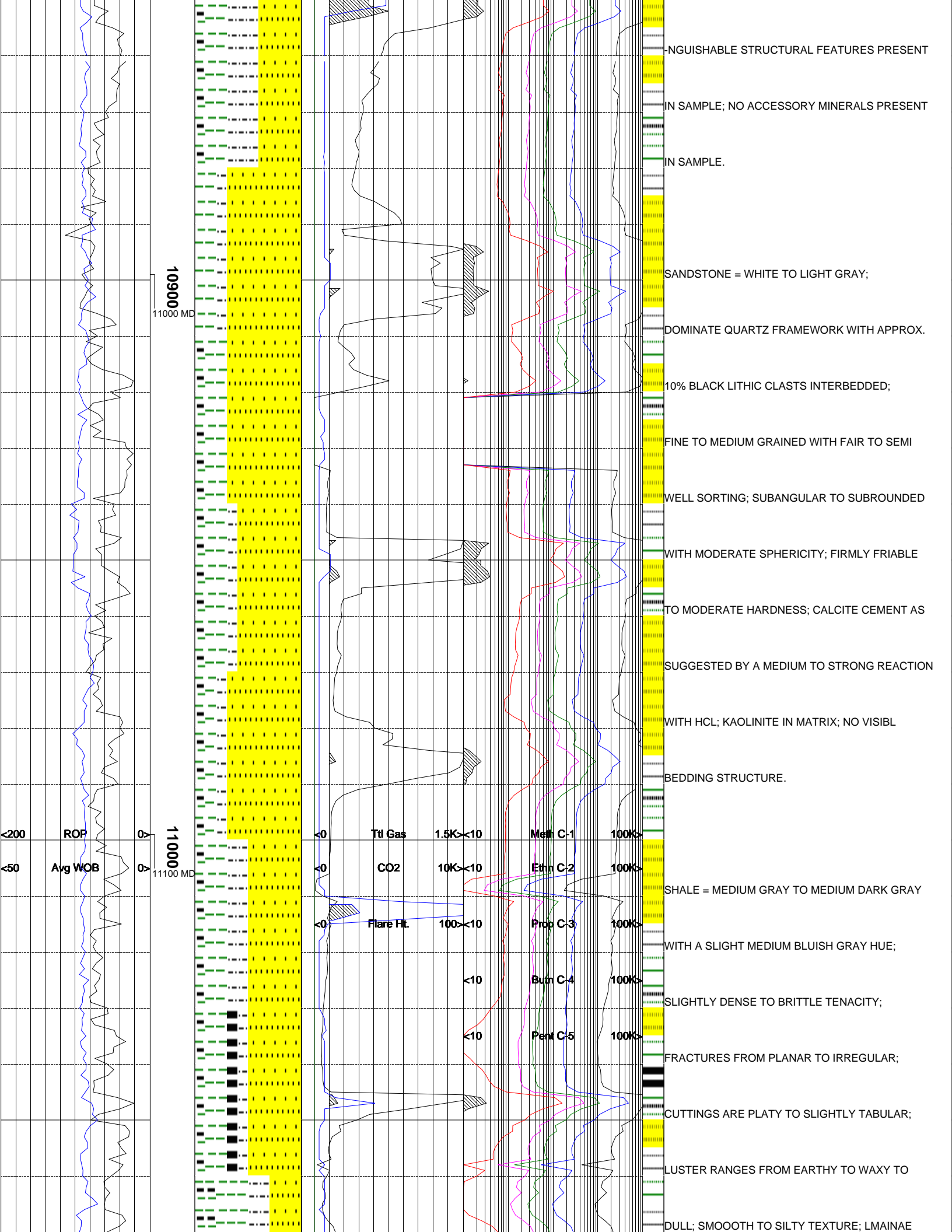
VISIBLE GRADING AND BEDDING WITH POOR

GRADE SANDSTONE, VERY THIN COAL LAMINAE

VISIBLE IN SHALE CUTTING, NO OTHER DISTI

10700
10800 MD

10800
10900 MD



INDISTINGUISHABLE STRUCTURAL FEATURES PRESENT

MINERAL IN SAMPLE; NO ACCESSORY MINERALS PRESENT

MINERAL IN SAMPLE.

SANDSTONE = WHITE TO LIGHT GRAY;

DOMINATE QUARTZ FRAMEWORK WITH APPROX.

10% BLACK LITHIC CLASTS INTERBEDDED;

FINE TO MEDIUM GRAINED WITH FAIR TO SEMI

WELL SORTING; SUBANGULAR TO SUBROUNDED

WITH MODERATE SPHERICITY; FIRMLY FRIABLE

TO MODERATE HARDNESS; CALCITE CEMENT AS

SUGGESTED BY A MEDIUM TO STRONG REACTION

WITH HCL; KAOLINITE IN MATRIX; NO VISIBL

BEDDING STRUCTURE.

SHALE = MEDIUM GRAY TO MEDIUM DARK GRAY

WITH A SLIGHT MEDIUM BLUISH GRAY HUE;

SLIGHTLY DENSE TO BRITTLE TENACITY;

FRACTURES FROM PLANAR TO IRREGULAR;

CUTTINGS ARE PLATY TO SLIGHTLY TABULAR;

LUSTER RANGES FROM EARTHY TO WAXY TO

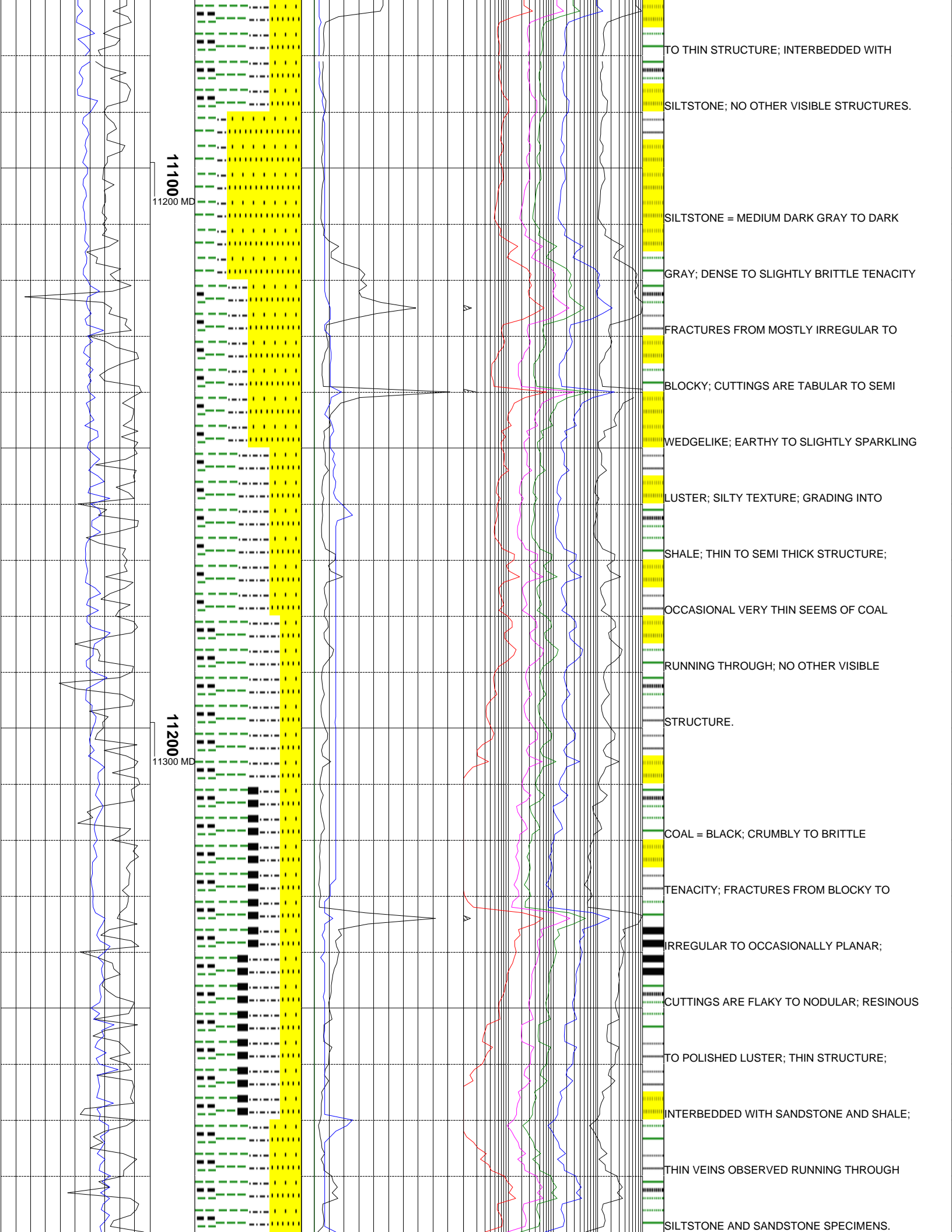
DULL; SMOOTH TO SILTY TEXTURE; LMAINAE

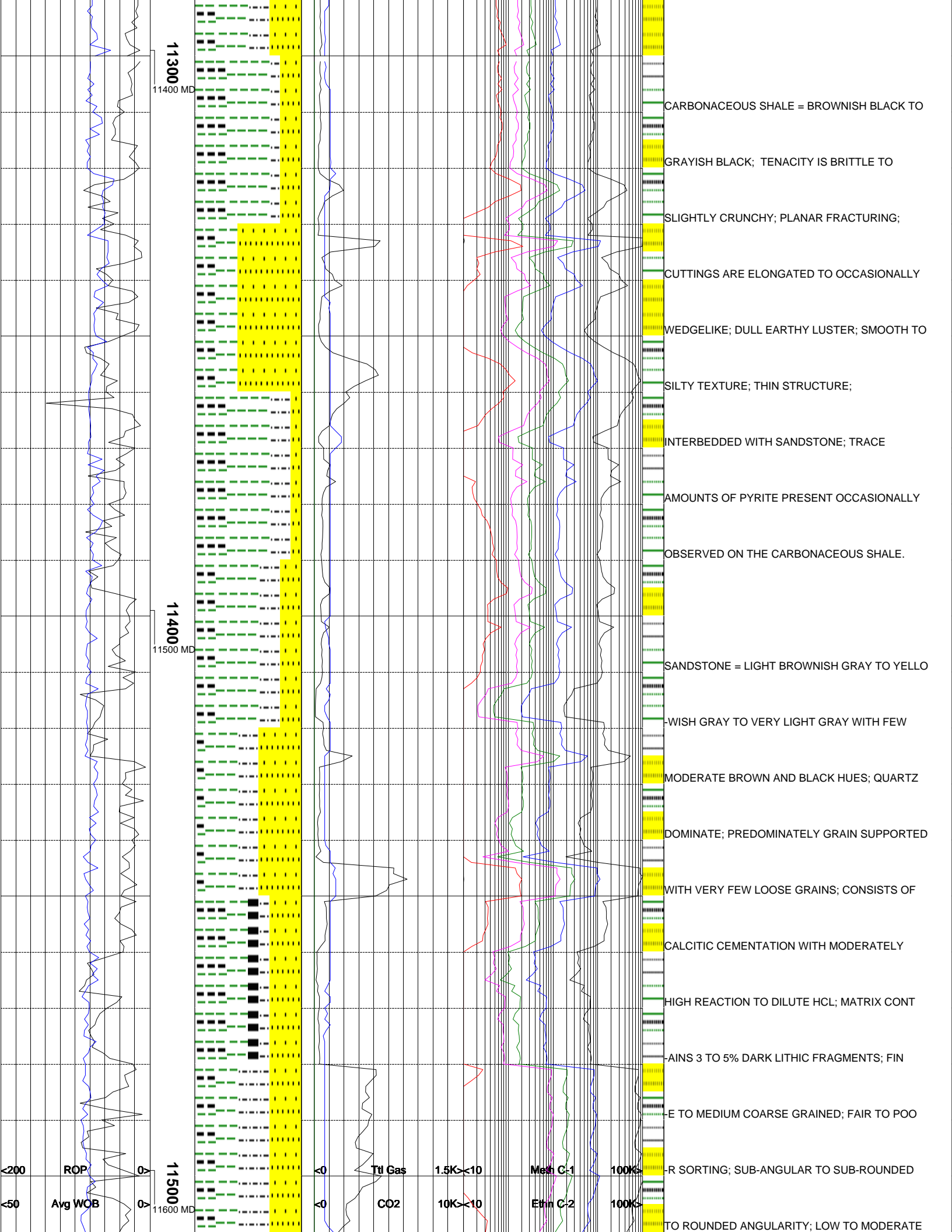
10900
11000 MD

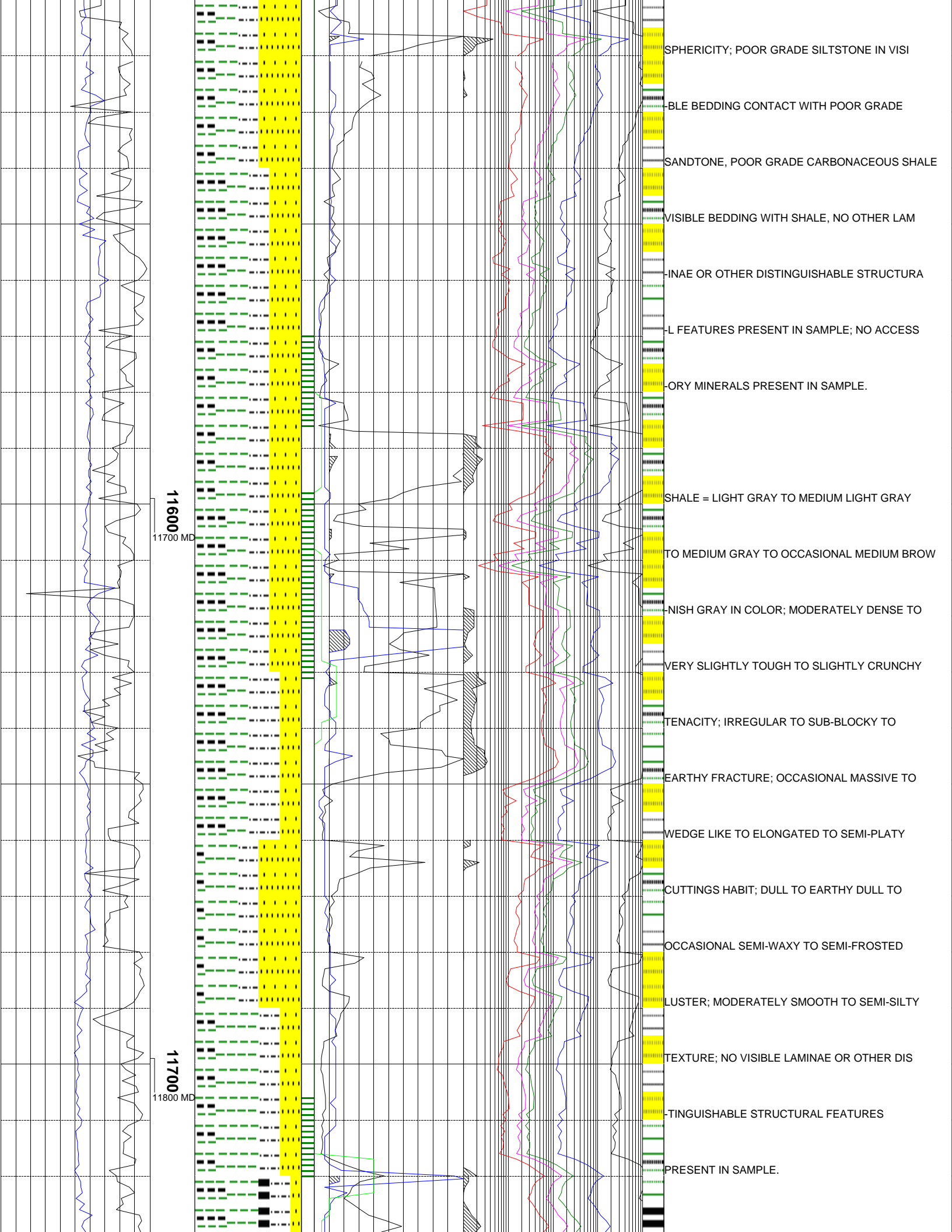
11000
11100 MD

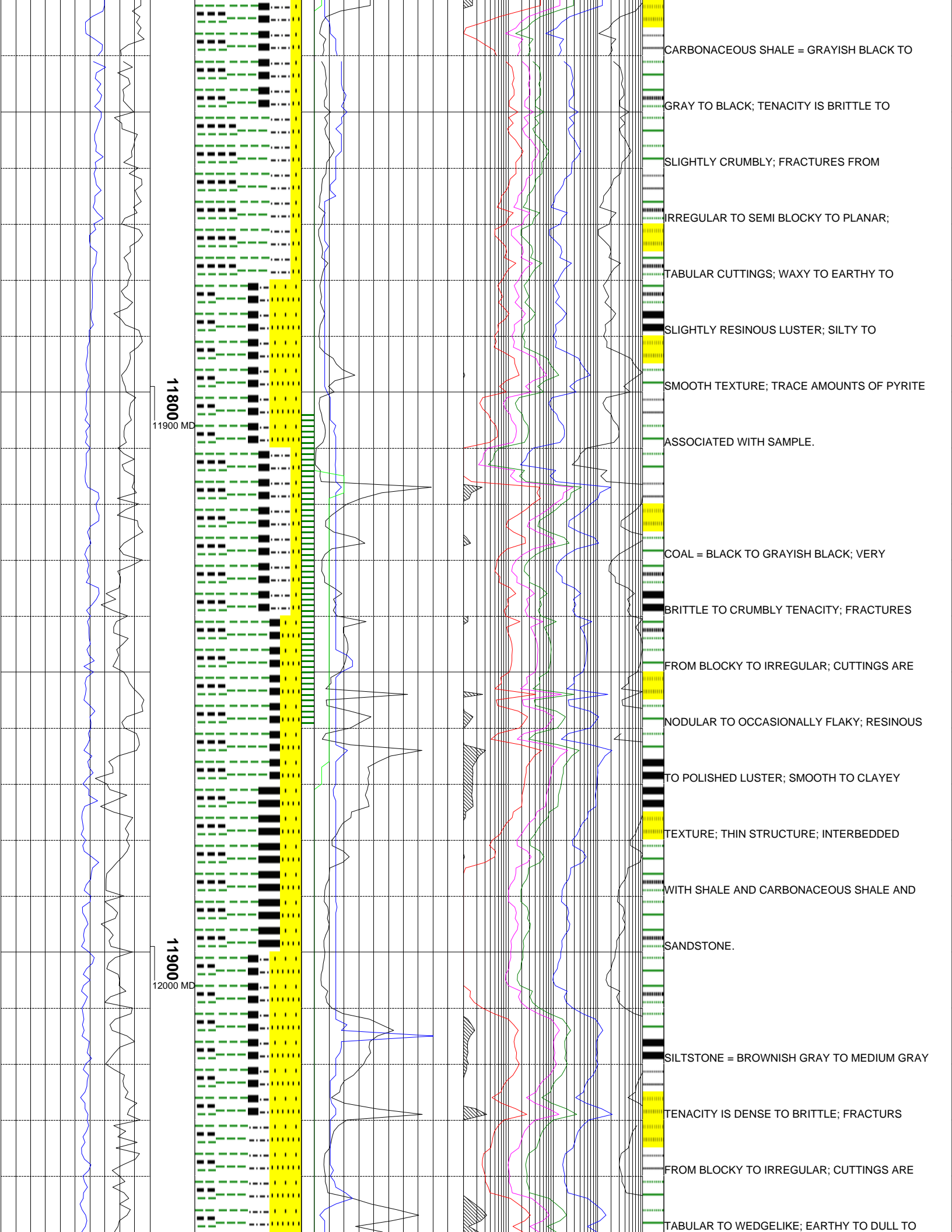
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<50 Avg WOB

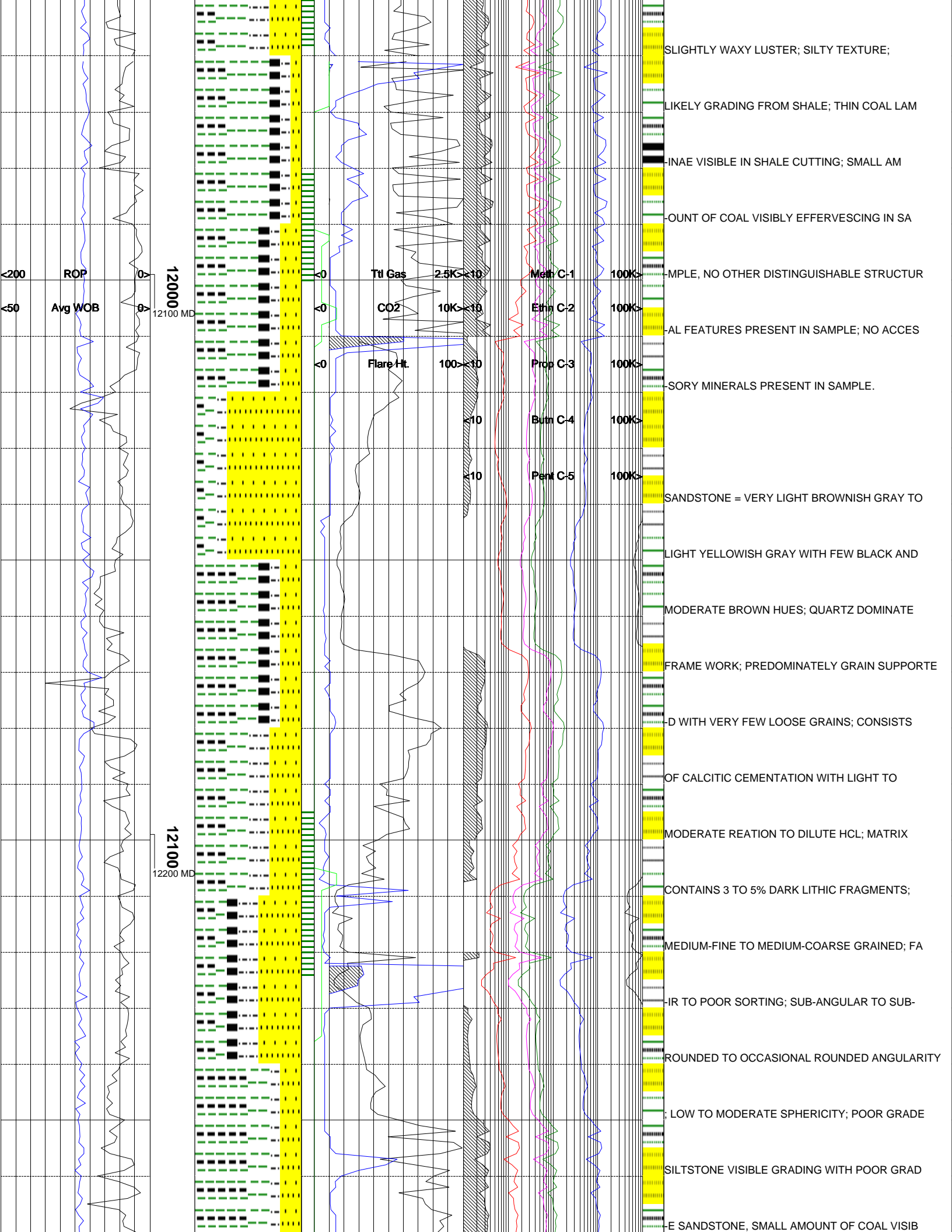
Ttl Gas 1.5K<10 Meth C-1 100K<
CO2 10K<10 Ethn C-2 100K<
Flare Ht. 100<10 Prop C-3 100K<
<10 But C-4 100K<
<10 Pent C-5 100K<

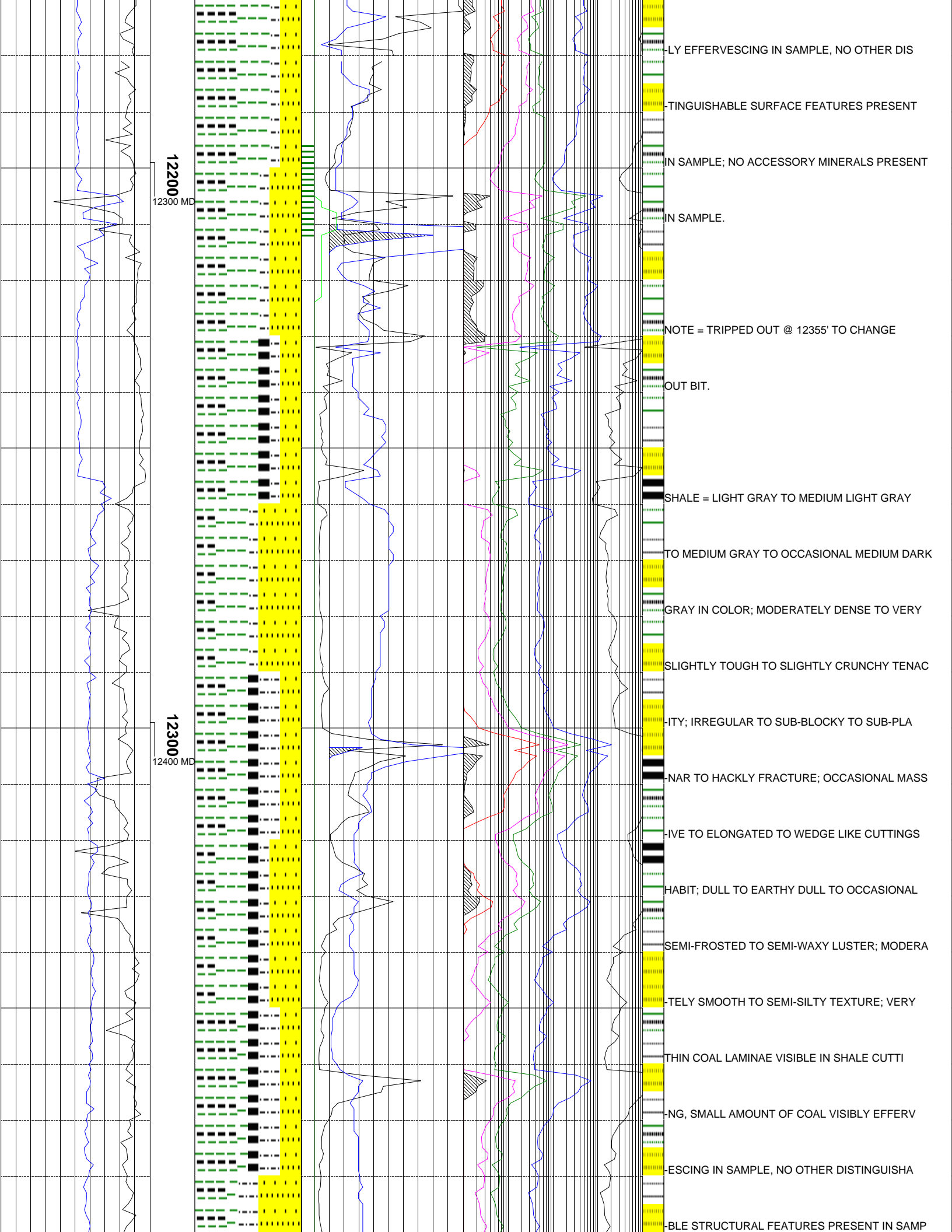












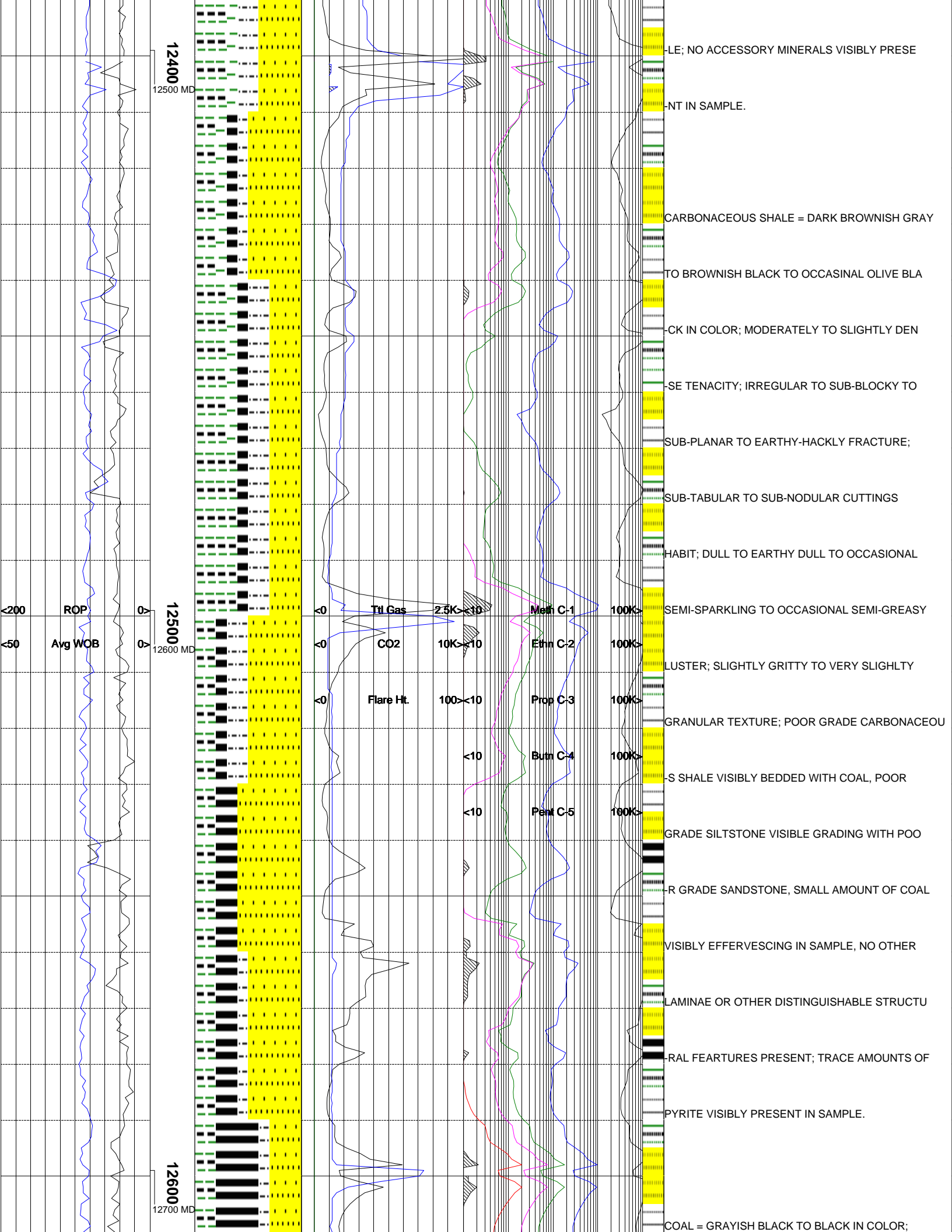
12200

12300 MD

12300

12400 MD

-LY EFFERVESCING IN SAMPLE, NO OTHER DIS
 -TINGUISHABLE SURFACE FEATURES PRESENT
 -IN SAMPLE; NO ACCESSORY MINERALS PRESENT
 -IN SAMPLE.
 NOTE = TRIPPED OUT @ 12355' TO CHANGE
 OUT BIT.
 SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY
 TO MEDIUM GRAY TO OCCASIONAL MEDIUM DARK
 GRAY IN COLOR; MODERATELY DENSE TO VERY
 SLIGHTLY TOUGH TO SLIGHTLY CRUNCHY TENAC
 -ITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLA
 -NAR TO HACKLY FRACTURE; OCCASIONAL MASS
 -IVE TO ELONGATED TO WEDGE LIKE CUTTINGS
 HABIT; DULL TO EARTHY DULL TO OCCASIONAL
 SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERA
 -TELY SMOOTH TO SEMI-SILTY TEXTURE; VERY
 THIN COAL LAMINAE VISIBLE IN SHALE CUTTI
 -NG, SMALL AMOUNT OF COAL VISIBLY EFFERV
 -ESCING IN SAMPLE, NO OTHER DISTINGUISHA
 -BLE STRUCTURAL FEATURES PRESENT IN SAMP

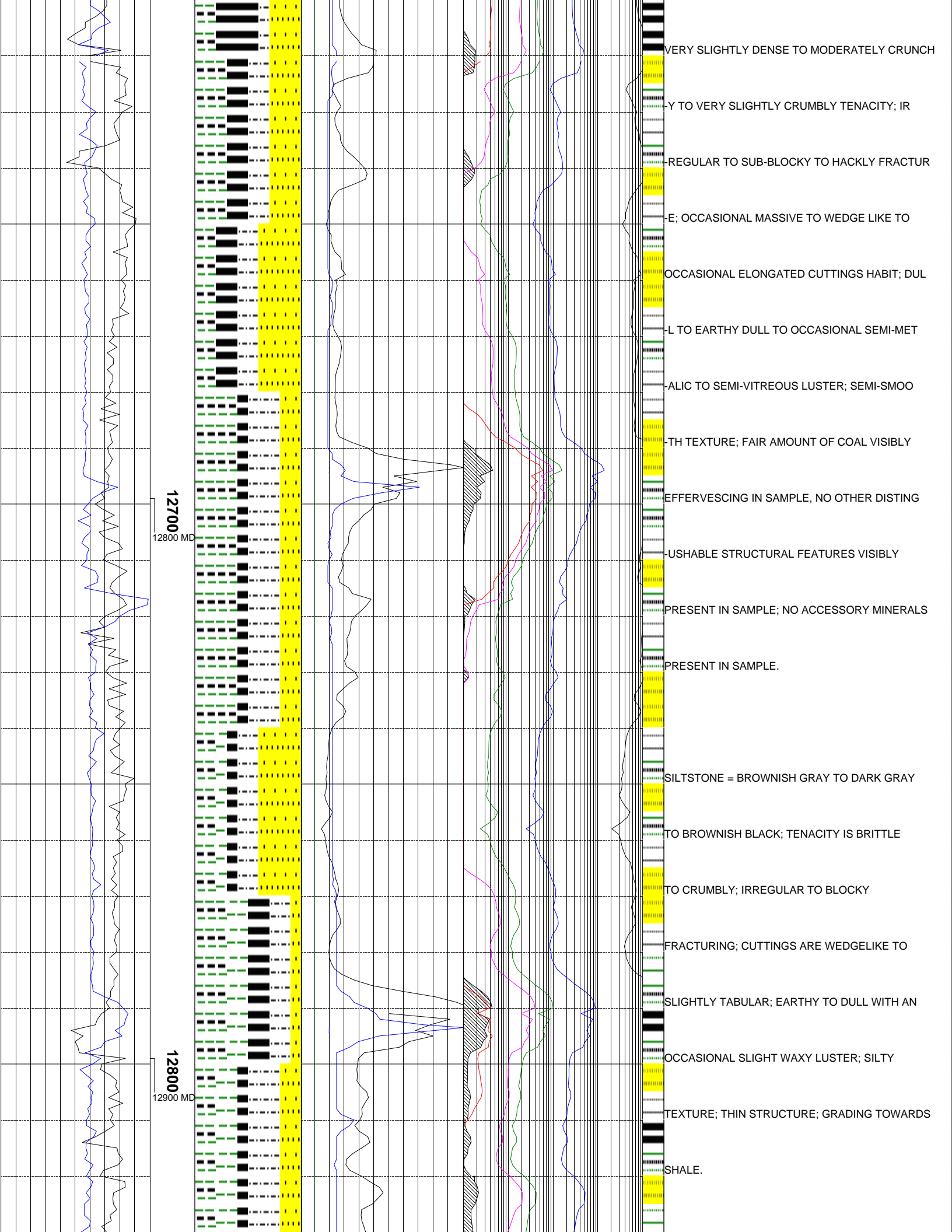


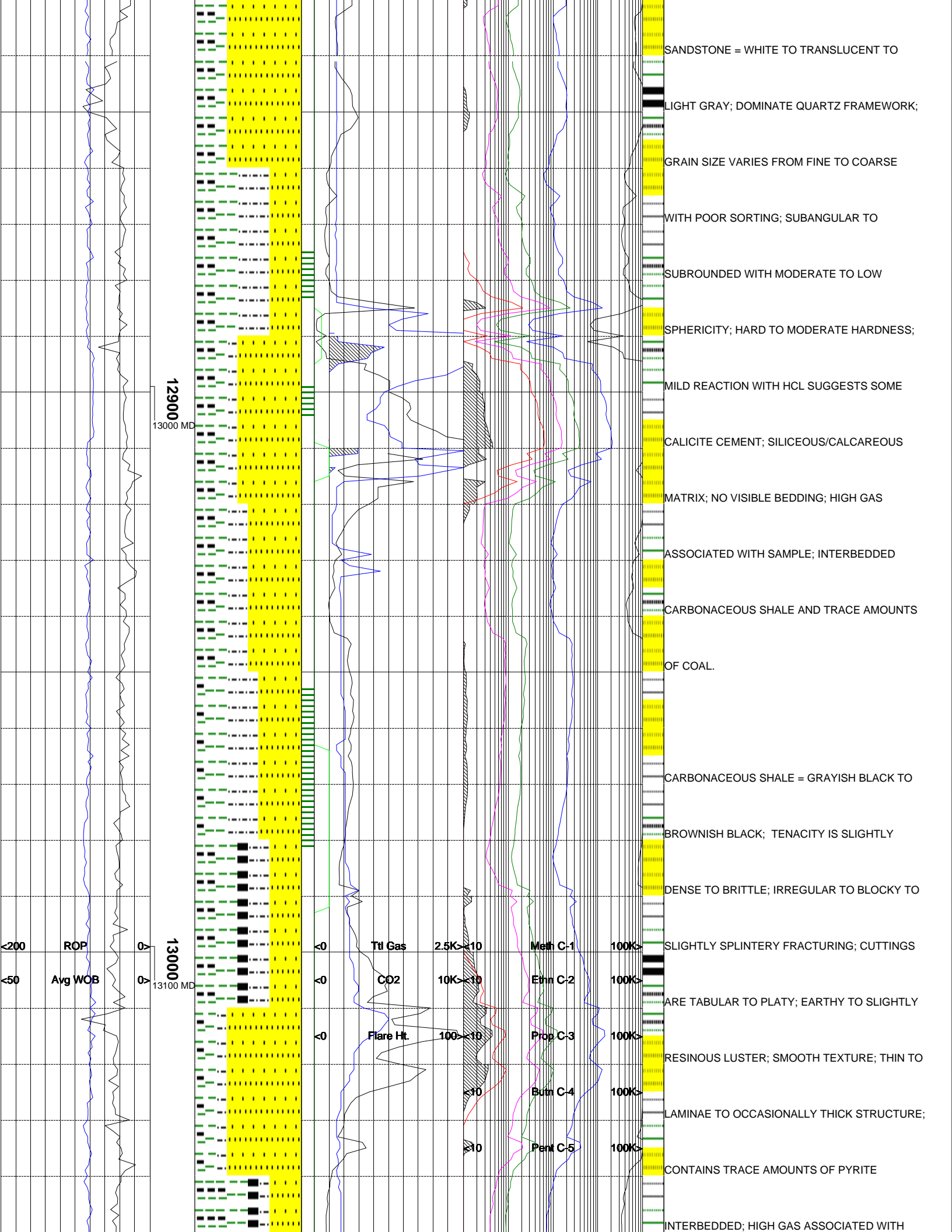
12400
12500 MD
12500
12600 MD
12600
12700 MD
12700

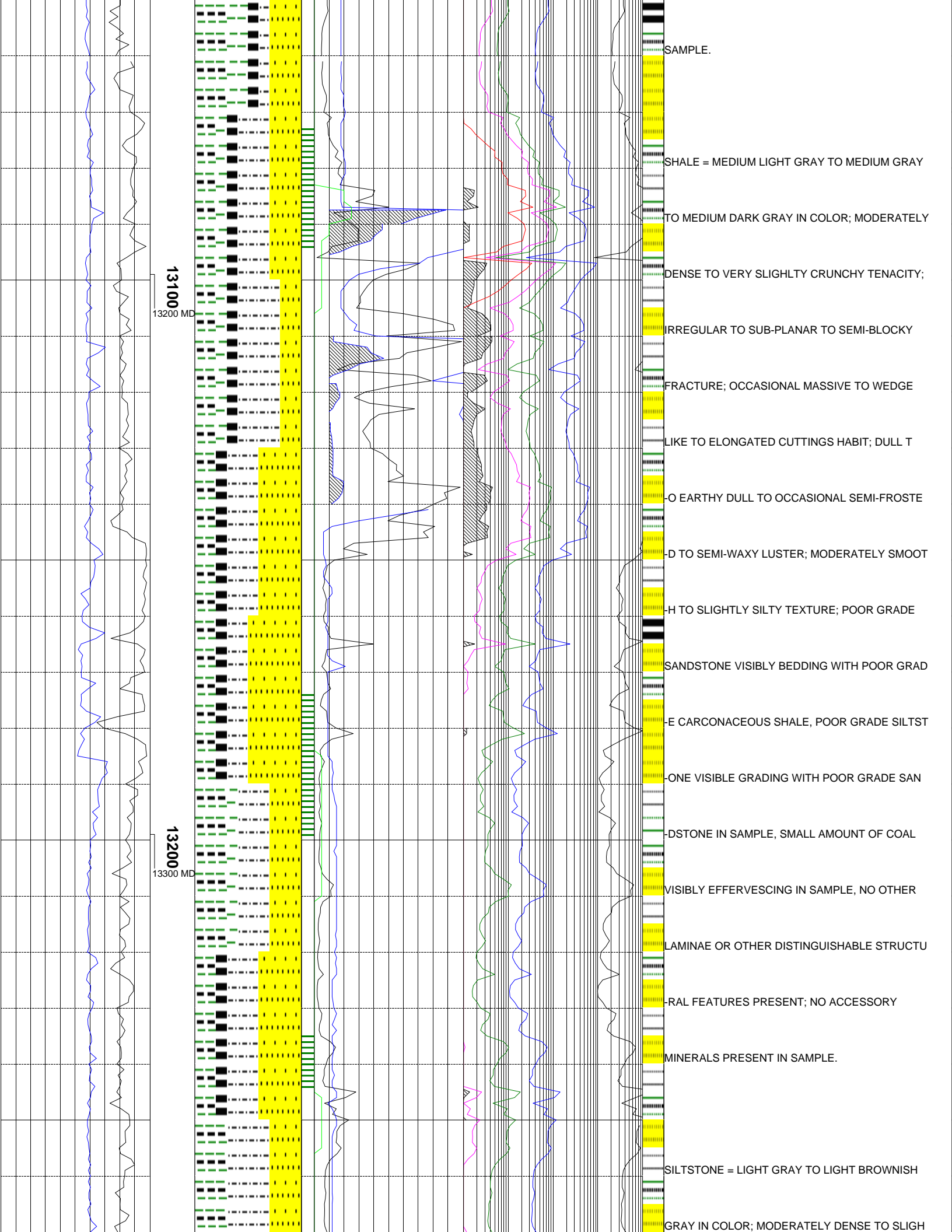
<200 ROP
<50 Avg WOB

Ttl Gas 2.5K <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 <

LE; NO ACCESSORY MINERALS VISIBLY PRESE
NT IN SAMPLE.
CARBONACEOUS SHALE = DARK BROWNISH GRAY
TO BROWNISH BLACK TO OCCASINAL OLIVE BLA
CK IN COLOR; MODERATELY TO SLIGHTLY DEN
SE TENACITY; IRREGULAR TO SUB-BLOCKY TO
SUB-PLANAR TO EARTHY-HACKLY FRACTURE;
SUB-TABULAR TO SUB-NODULAR CUTTINGS
HABIT; DULL TO EARTHY DULL TO OCCASIONAL
SEMI-SPARKLING TO OCCASIONAL SEMI-GREASY
LUSTER; SLIGHTLY GRITTY TO VERY SLIGHTLY
GRANULAR TEXTURE; POOR GRADE CARBONACEOU
S SHALE VISIBLY BEDDED WITH COAL, POOR
GRADE SILTSTONE VISIBLE GRADING WITH POO
R GRADE SANDSTONE, SMALL AMOUNT OF COAL
VISIBLY EFFERVESCING IN SAMPLE, NO OTHER
LAMINAE OR OTHER DISTINGUISHABLE STRUCTU
RAL FEATURS PRESENT; TRACE AMOUNTS OF
PYRITE VISIBLY PRESENT IN SAMPLE.
COAL = GRAYISH BLACK TO BLACK IN COLOR;







13100
13200 MD

13200
13300 MD

SAMPLE.

SHALE = MEDIUM LIGHT GRAY TO MEDIUM GRAY

TO MEDIUM DARK GRAY IN COLOR; MODERATELY

DENSE TO VERY SLIGHTLY CRUNCHY TENACITY;

IRREGULAR TO SUB-PLANAR TO SEMI-BLOCKY

FRACTURE; OCCASIONAL MASSIVE TO WEDGE

LIKE TO ELONGATED CUTTINGS HABIT; DULL T

TO EARTHY DULL TO OCCASIONAL SEMI-FROSTE

D TO SEMI-WAXY LUSTER; MODERATELY SMOOT

H TO SLIGHTLY SILTY TEXTURE; POOR GRADE

SANDSTONE VISIBLY BEDDING WITH POOR GRAD

E CARCONACEOUS SHALE, POOR GRADE SILTST

ONE VISIBLE GRADING WITH POOR GRADE SAN

DSTONE IN SAMPLE, SMALL AMOUNT OF COAL

VISIBLY EFFERVESCING IN SAMPLE, NO OTHER

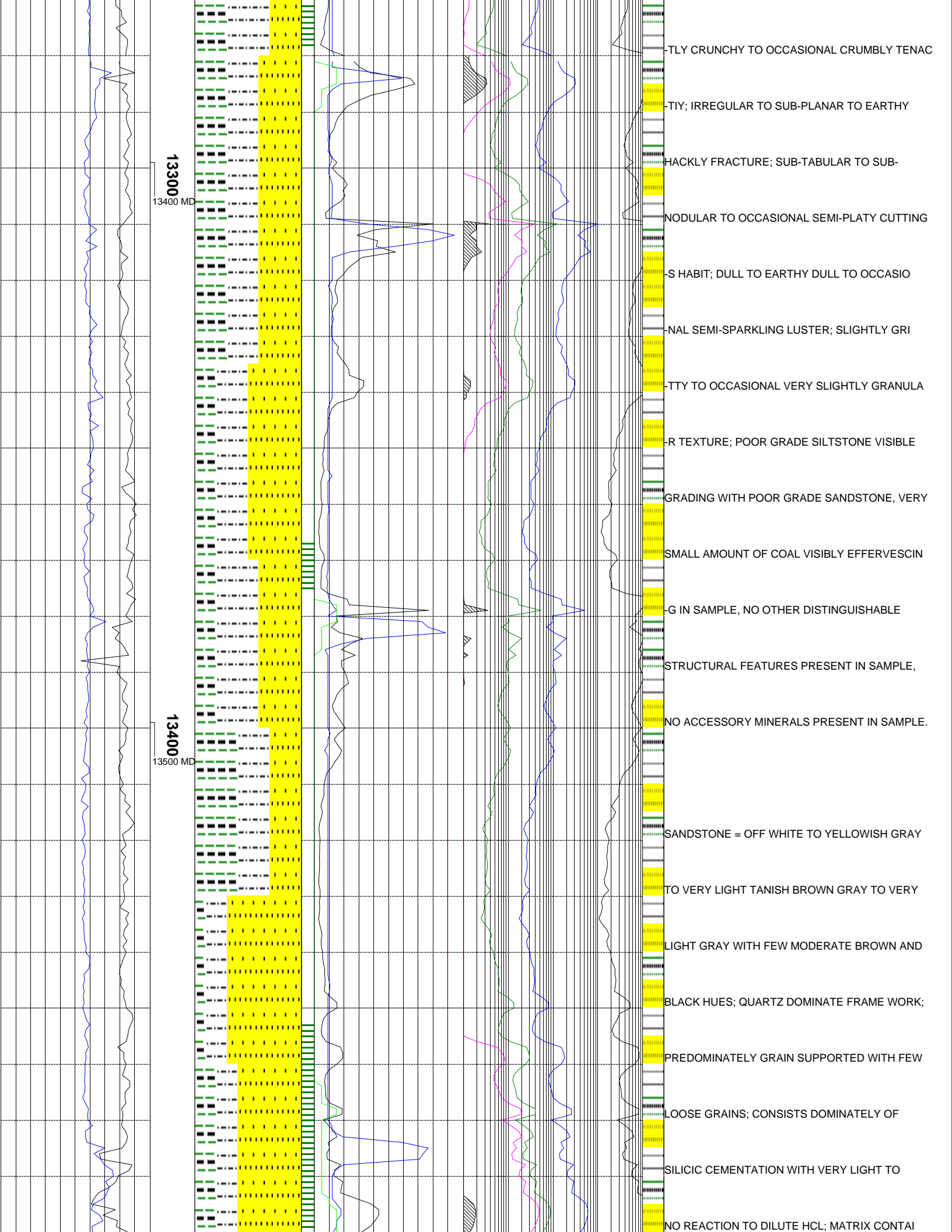
LAMINAE OR OTHER DISTINGUISHABLE STRUCTU

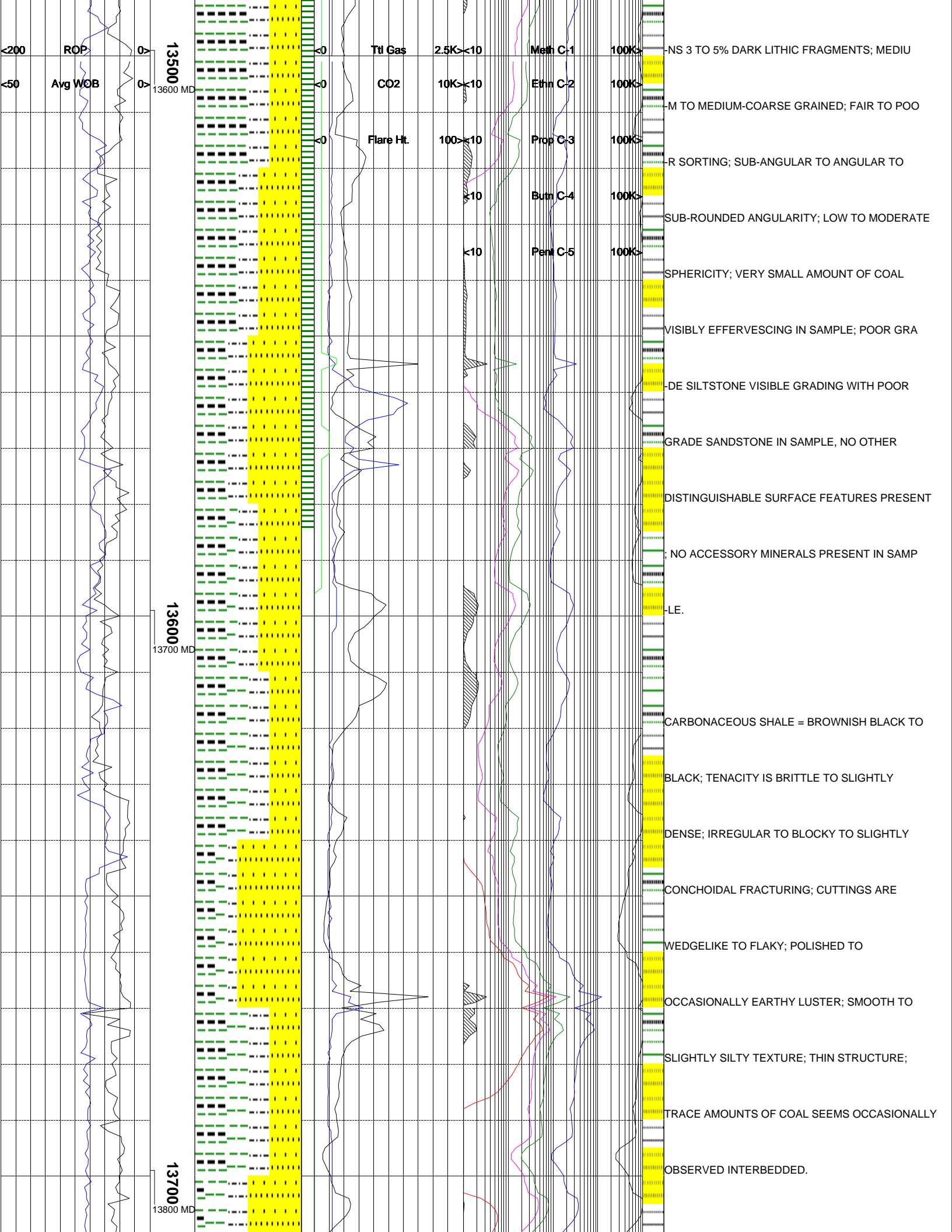
RAL FEATURES PRESENT; NO ACCESSORY

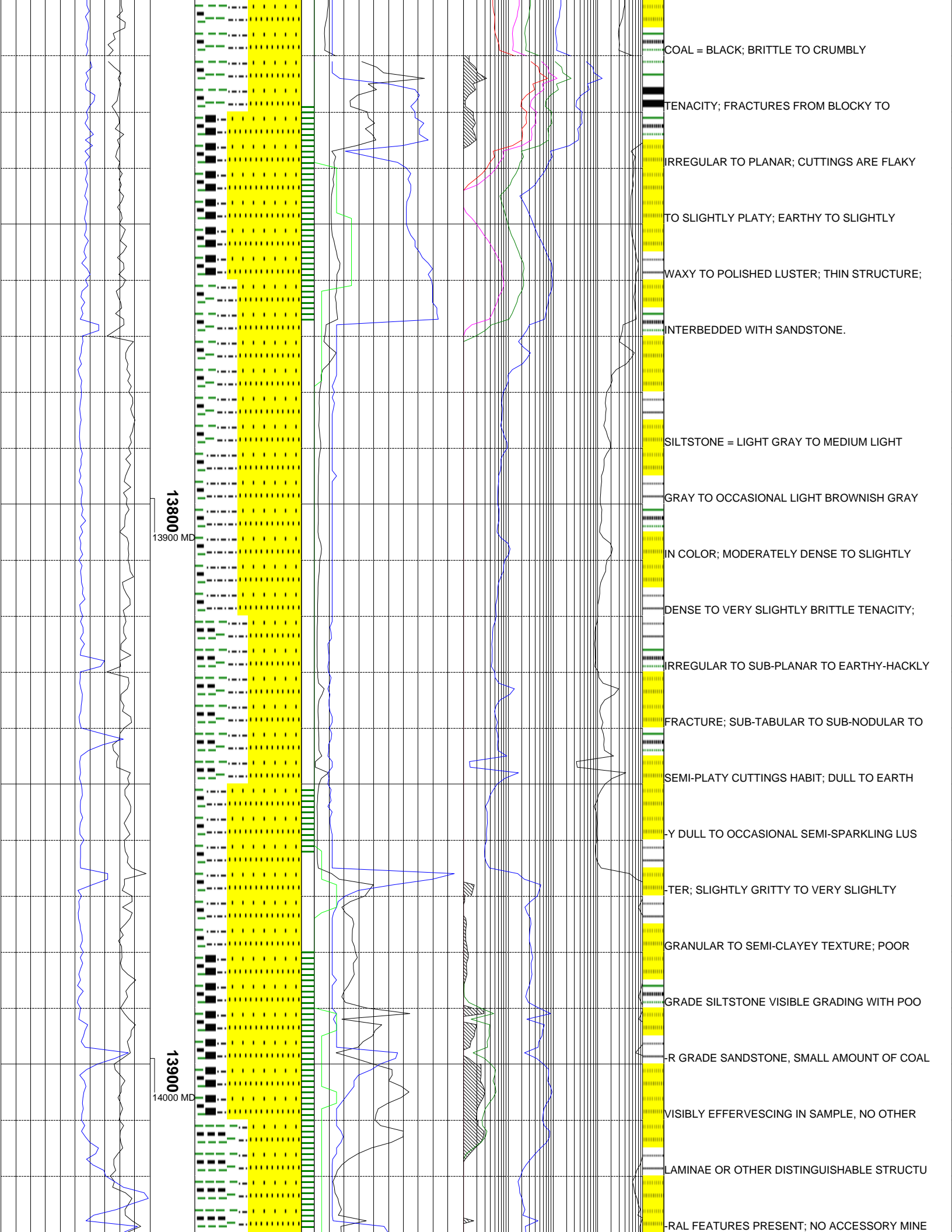
MINERALS PRESENT IN SAMPLE.

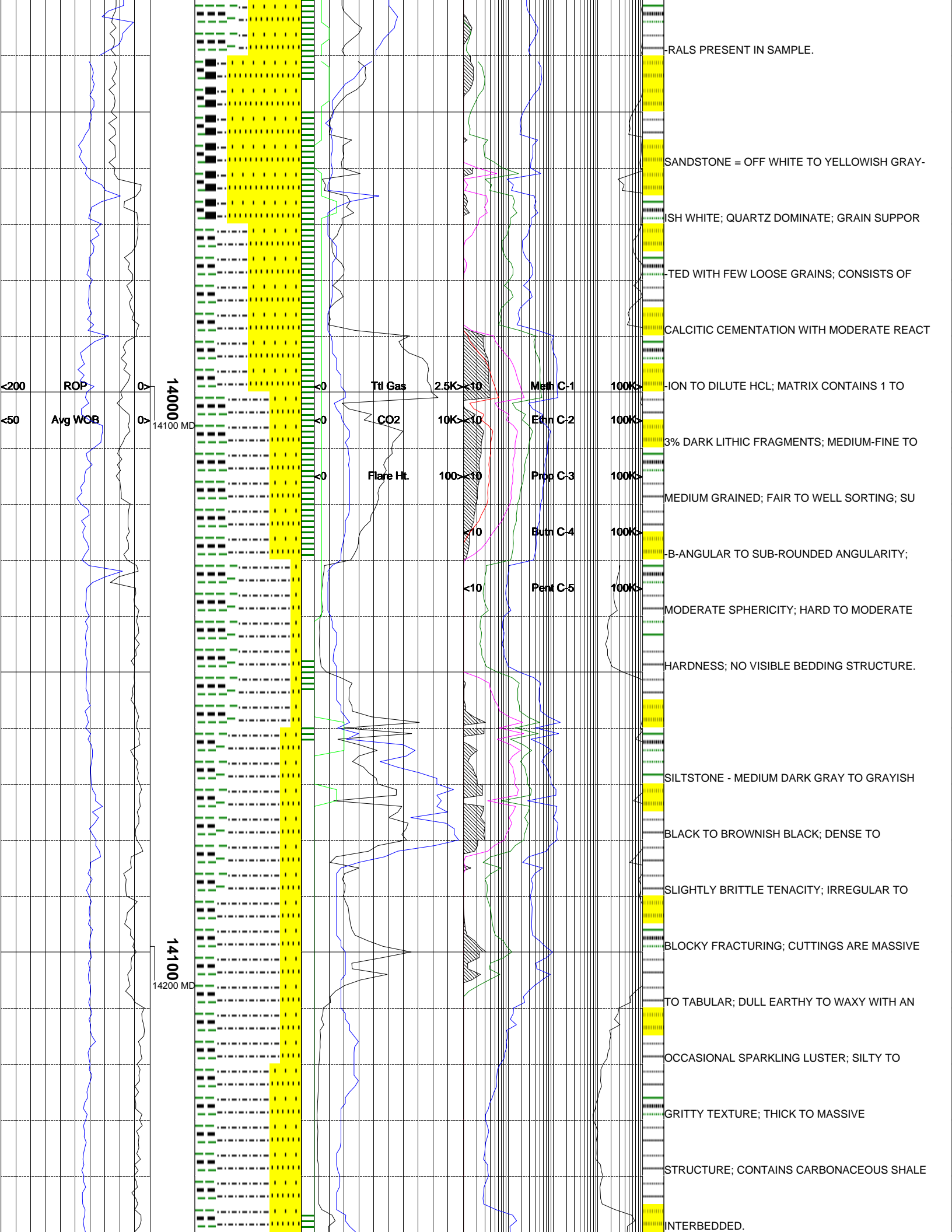
SILTSTONE = LIGHT GRAY TO LIGHT BROWNISH

GRAY IN COLOR; MODERATELY DENSE TO SLIGH









14000 MD
14100 MD
14200 MD

<200 ROP
<50 Avg WOB

Ttl Gas 2.5K > 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 >

RALS PRESENT IN SAMPLE.

SANDSTONE = OFF WHITE TO YELLOWISH GRAY-

ISH WHITE; QUARTZ DOMINATE; GRAIN SUPPOR

TED WITH FEW LOOSE GRAINS; CONSISTS OF

CALCITIC CEMENTATION WITH MODERATE REACT

ION TO DILUTE HCL; MATRIX CONTAINS 1 TO

3% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO

MEDIUM GRAINED; FAIR TO WELL SORTING; SU

B-ANGULAR TO SUB-ROUNDED ANGULARITY;

MODERATE SPHERICITY; HARD TO MODERATE

HARDNESS; NO VISIBLE BEDDING STRUCTURE.

SILTSTONE - MEDIUM DARK GRAY TO GRAYISH

BLACK TO BROWNISH BLACK; DENSE TO

SLIGHTLY BRITTLE TENACITY; IRREGULAR TO

BLOCKY FRACTURING; CUTTINGS ARE MASSIVE

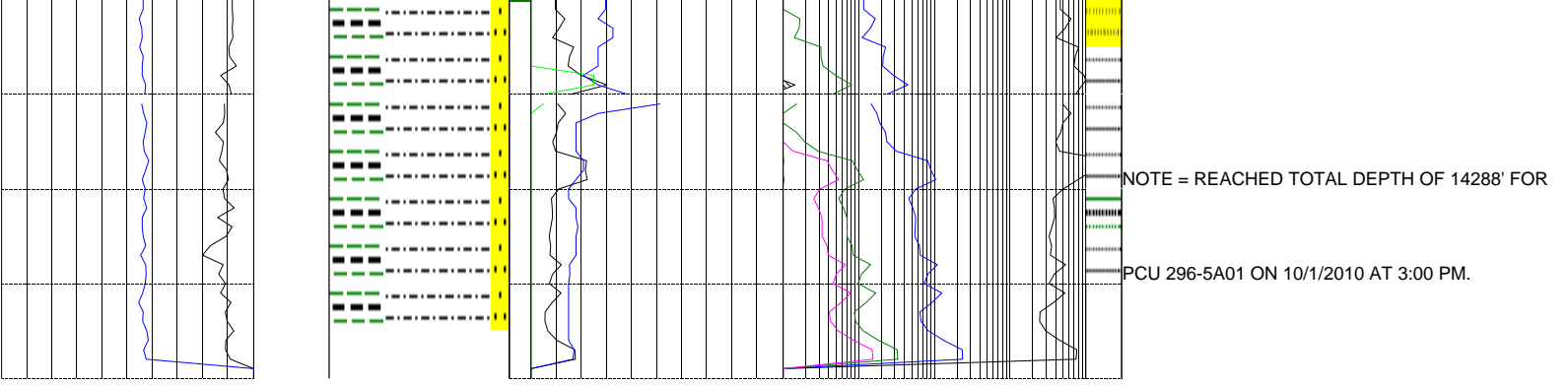
TO TABULAR; DULL EARTHY TO WAXY WITH AN

OCCASIONAL SPARKLING LUSTER; SILTY TO

GRITTY TEXTURE; THICK TO MASSIVE

STRUCTURE; CONTAINS CARBONACEOUS SHALE

INTERBEDDED.



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