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Anchorage, AK
(907) 561-2465

MUDLOG TVD

COMPANY ExxonMobil Production
WELL FRU197-33B5
FIELD Freedom Ranch
REGION Rockies
COORDINATES 39.921295000
108.282534000
ELEVATION 6460.5'
COUNTY, STATE Rio Blanco, CO
API INDEX 051031142500
SPUD DATE 04/24/2010
CONTRACTOR HE
CO. REP. Chad Jarvis
RIG/TYPE HP321
LOGGING UNIT Unit #31
GEOLOGISTS Barbara Delaney
Mike Franco
ADD. PERSONS Chad Record
CO. GEOLOGIST Chris Alba

LOG INTERVAL

CASING DATA

DEPTHS: 4524' TO 12445'
DATES: 04/25/2010 TO 05/13/2010
SCALE: 5"=100'

10.75" AT 4524'
4.5" AT 12444'
AT
AT

MUD TYPES

HOLE SIZE

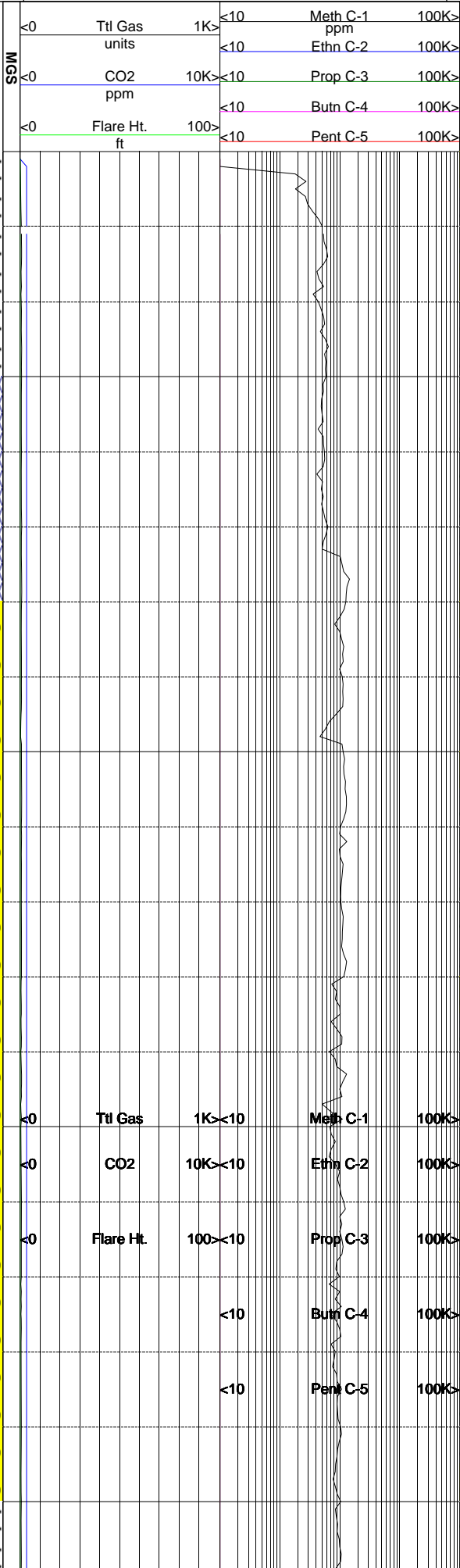
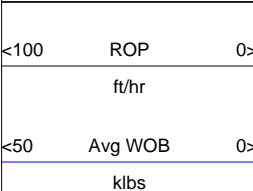
WATER-BASED TO 12445'
TO
TO
TO

8.750" TO 11087'
7.875" TO 12445'
TO
TO

ABBREVIATIONS

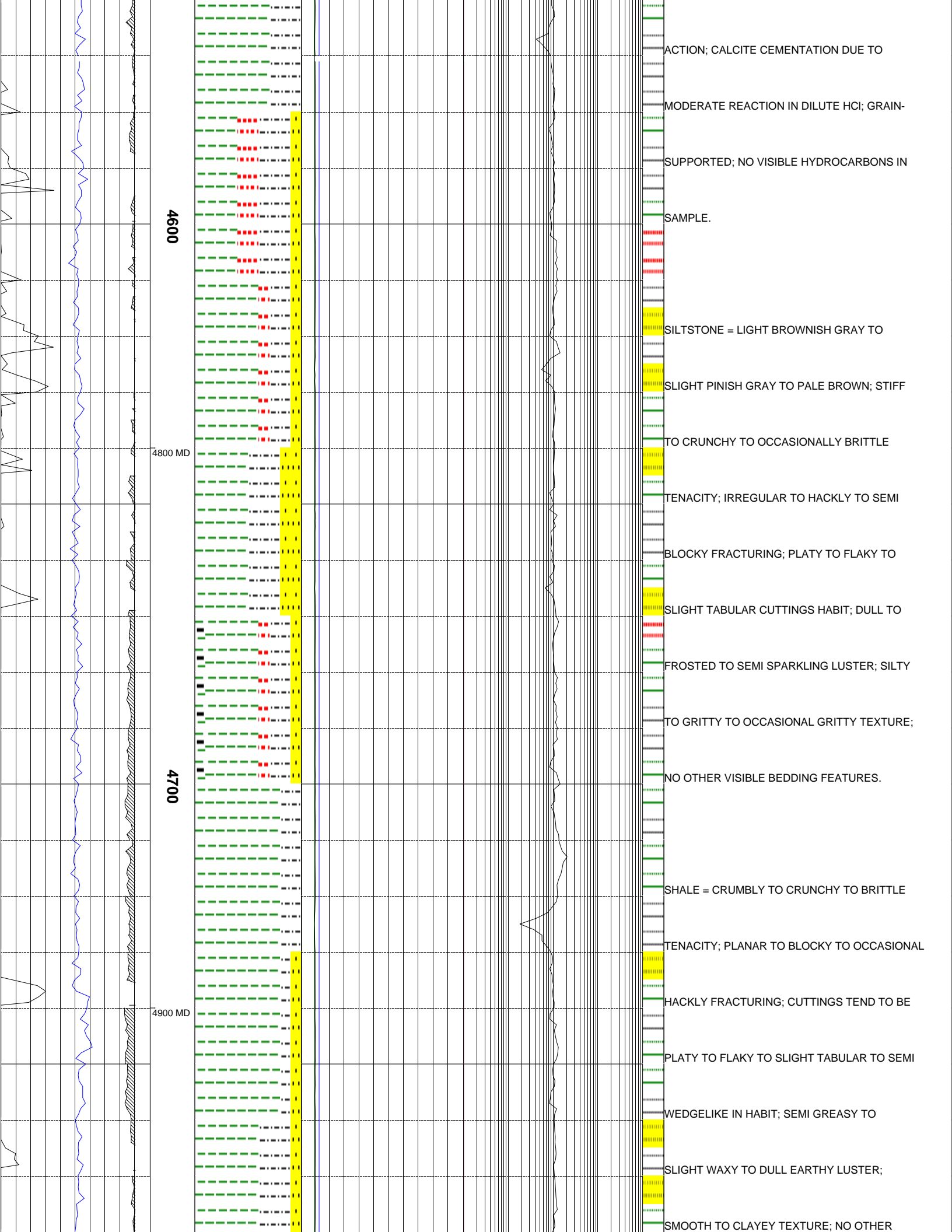
<i>NB</i> NEWBIT	<i>PV</i> PLASTIC VISCOSITY	<i>LC</i> LOST CIRCULATION
<i>RRB</i> RERUN BIT	<i>YP</i> YIELD POINT	<i>CO</i> CIRCULATE OUT
<i>CB</i> CORE BIT	<i>FL</i> FLUID LOSS	<i>NR</i> NO RETURNS
<i>WOB</i> WEIGHT ON BIT	<i>CL</i> PPM CLORIDE ION	<i>TG</i> TRIP GAS
<i>RPM</i> ROTARY REV/MIN	<i>Rm</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	KAOLINIC	RECRYSTALLIZED CALCITE	VOLCANICS
CHALK	DIATOMITE	LIMESTONE	RHYOLITE	
CRYSTALLINE TUFF	DIORITE	LITHIC TUFF	SALT	
CHERT - ARGILL	DOLOSTONE	MARL - DOLO	SAND	



Remarks
Survey Data, Mud Reports, Other Info.

SHALE = LIGHT GRAY TO LIGHT OLIVE GRAY;
 BRITTLE TO CRUMBLY TO CRUNCHY TENACITY;
 PREDOMINATELY PLANAR TO OCCASIONALLY
 BLOCKY FRACTURING; CUTTINGS TEND TO BE
 PLATY TO FLAKY TO OCCASIONALLY ELONGATED
 TABULAR IN HABIT; DULL TO SEMI GREASY TO
 EARTHY LUSTER; SILTY TO SMOOTH TO CLAYEY
 TEXTURE; VISIBLE NACHOLITE CRYSTALS IN
 MOST OF SAMPLE; 5-10% PALEOSOLS VISIBLE
 IN SAMPLE.
 SANDSTONE = TRANSLUCENT TO WHITE TO SEMI
 YELLOWISH GRAY; MOSTLY QUARTZ FRAMEWORK
 WITH 2-3% DARK LITHICS VISIBLE IN SAMPLE
 ; COARSE TO MEDIUM TO FINE GRAIN SIZE;
 FAIR TO POORLY SORTED; SUBROUND TO ROUND
 GRAINS; MODERATE TO HIGH SPHERICITY;
 A FEW SAMPLES HAVE A FROSTED APPEARANCE;
 A FEW CONSOLIDATED GRAINS DUE TO BIT



ACTION; CALCITE CEMENTATION DUE TO

MODERATE REACTION IN DILUTE HCl; GRAIN-

SUPPORTED; NO VISIBLE HYDROCARBONS IN

SAMPLE.

SILTSTONE = LIGHT BROWNISH GRAY TO

SLIGHT PINISH GRAY TO PALE BROWN; STIFF

TO CRUNCHY TO OCCASIONALLY BRITTLE

TENACITY; IRREGULAR TO HACKLY TO SEMI

BLOCKY FRACTURING; PLATY TO FLAKY TO

SLIGHT TABULAR CUTTINGS HABIT; DULL TO

FROSTED TO SEMI SPARKLING LUSTER; SILTY

TO GRITTY TO OCCASIONAL GRITTY TEXTURE;

NO OTHER VISIBLE BEDDING FEATURES.

SHALE = CRUMBLY TO CRUNCHY TO BRITTLE

TENACITY; PLANAR TO BLOCKY TO OCCASIONAL

HACKLY FRACTURING; CUTTINGS TEND TO BE

PLATY TO FLAKY TO SLIGHT TABULAR TO SEMI

WEDGELIKE IN HABIT; SEMI GREASY TO

SLIGHT WAXY TO DULL EARTHY LUSTER;

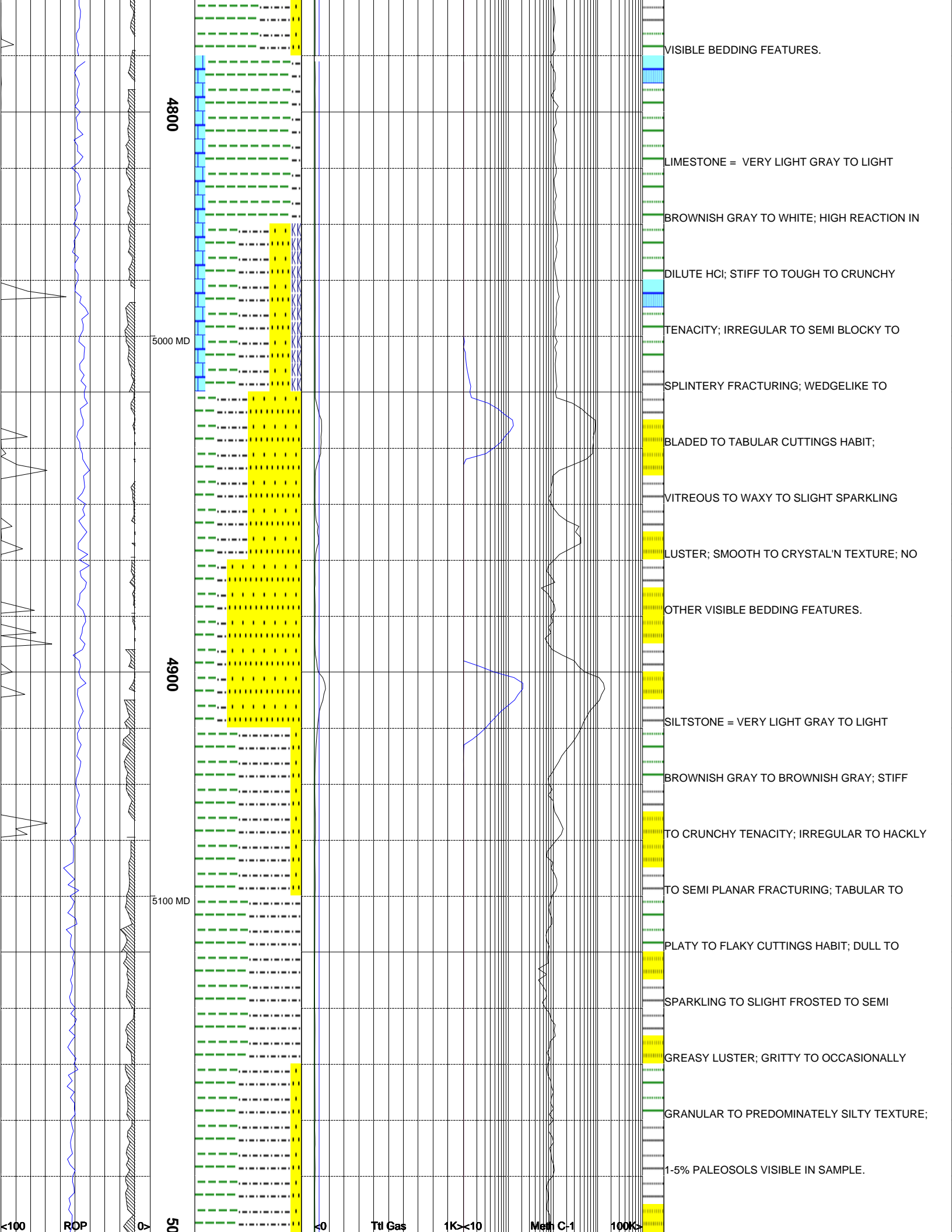
SMOOTH TO CLAYEY TEXTURE; NO OTHER

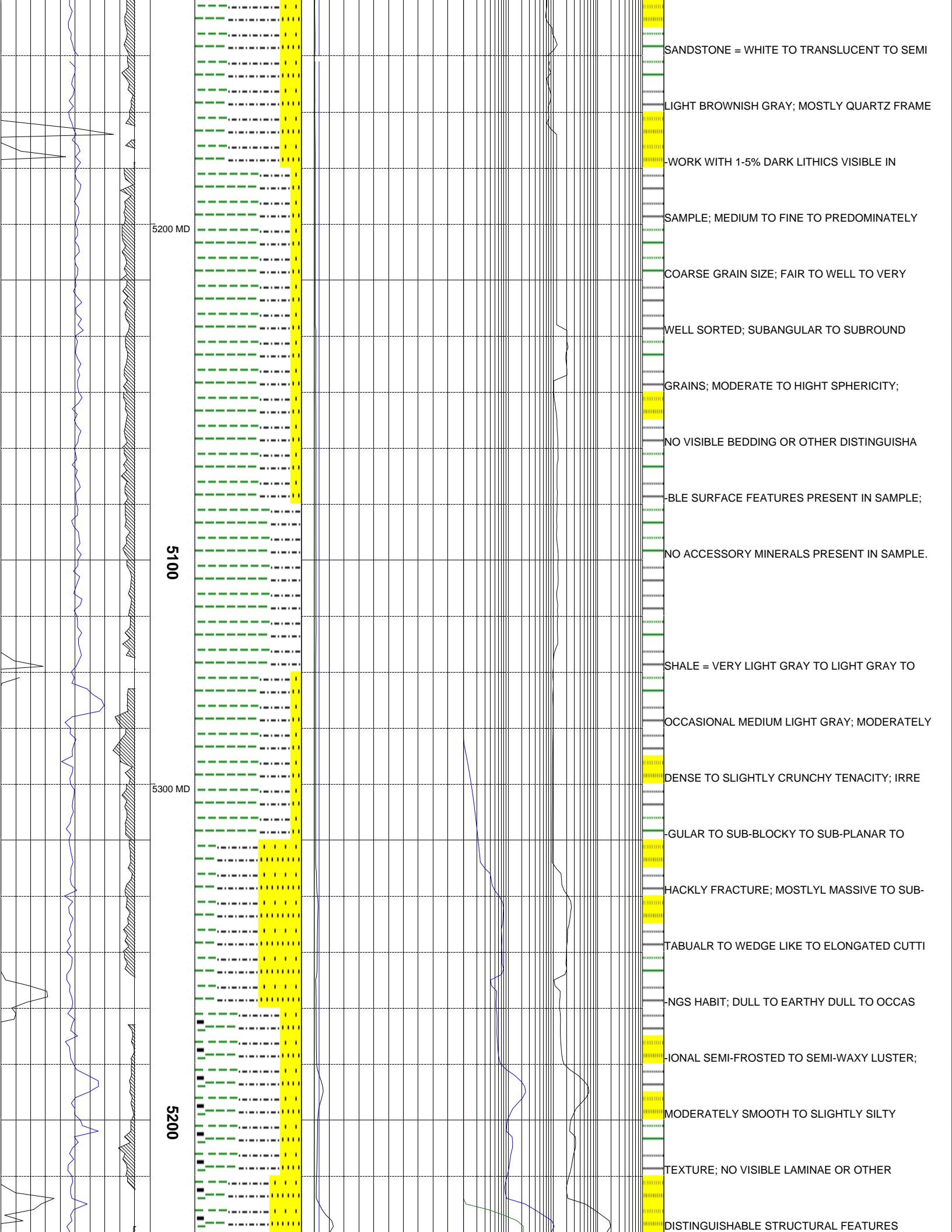
4600

4800 MD

4700

4900 MD



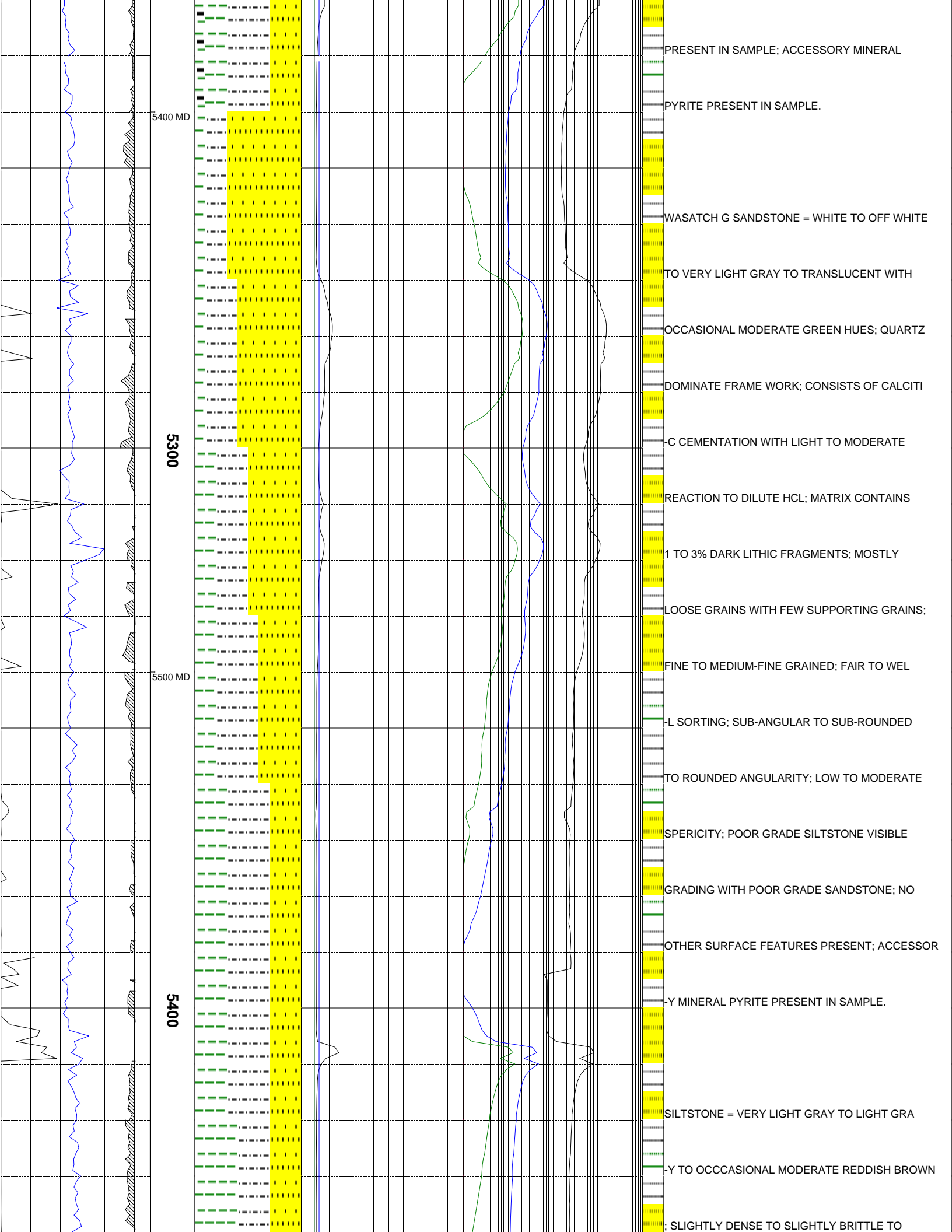


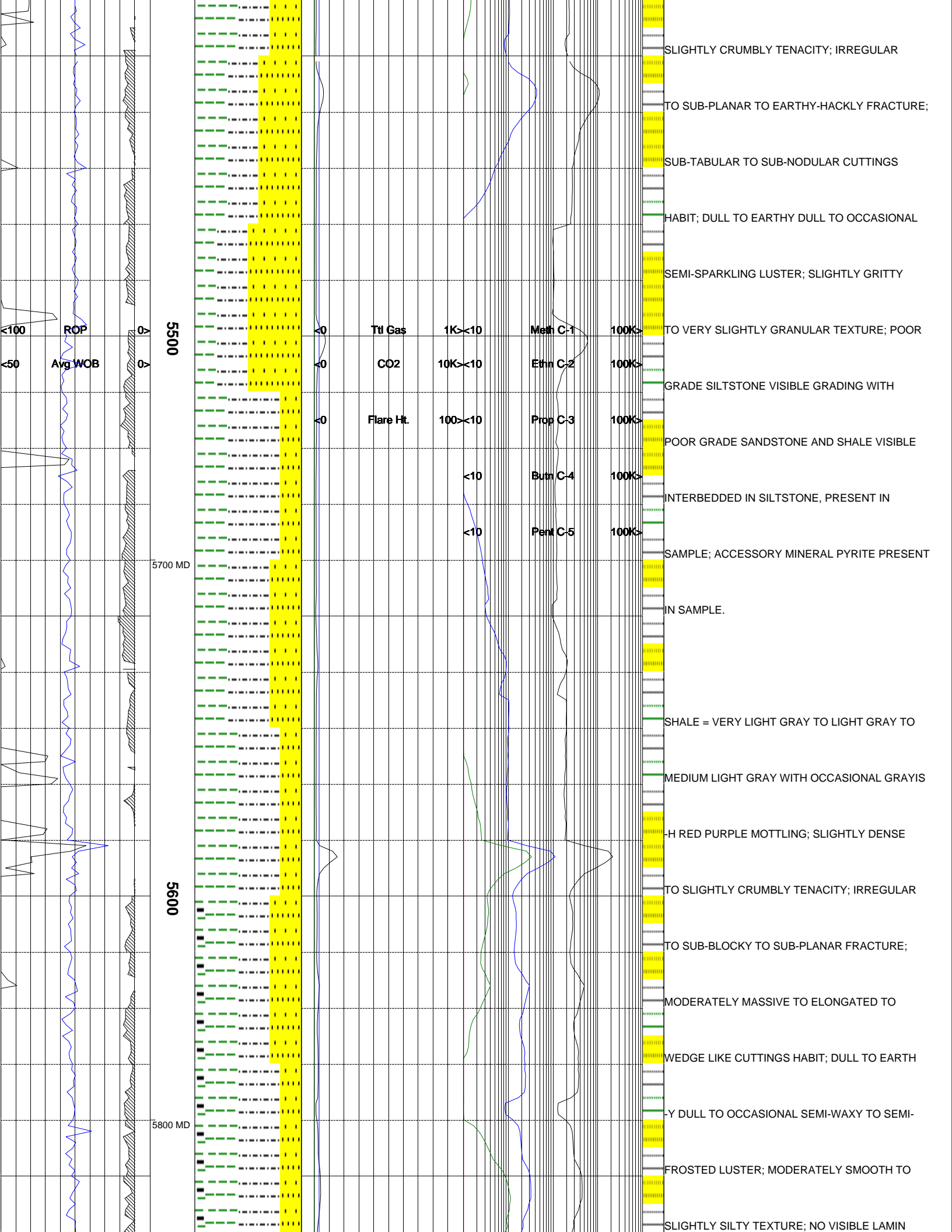
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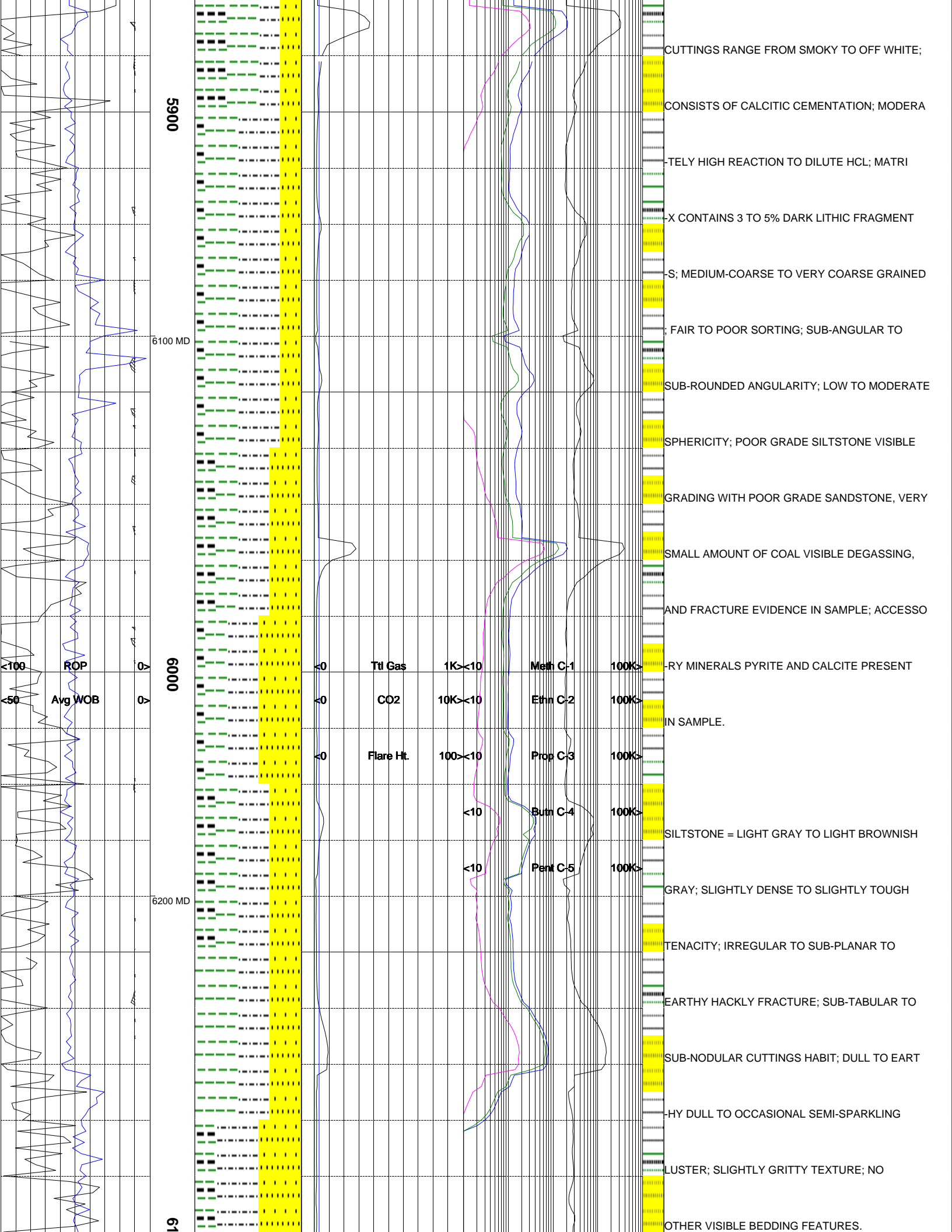
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5300 MD

5200







5900

6100 MD

6000

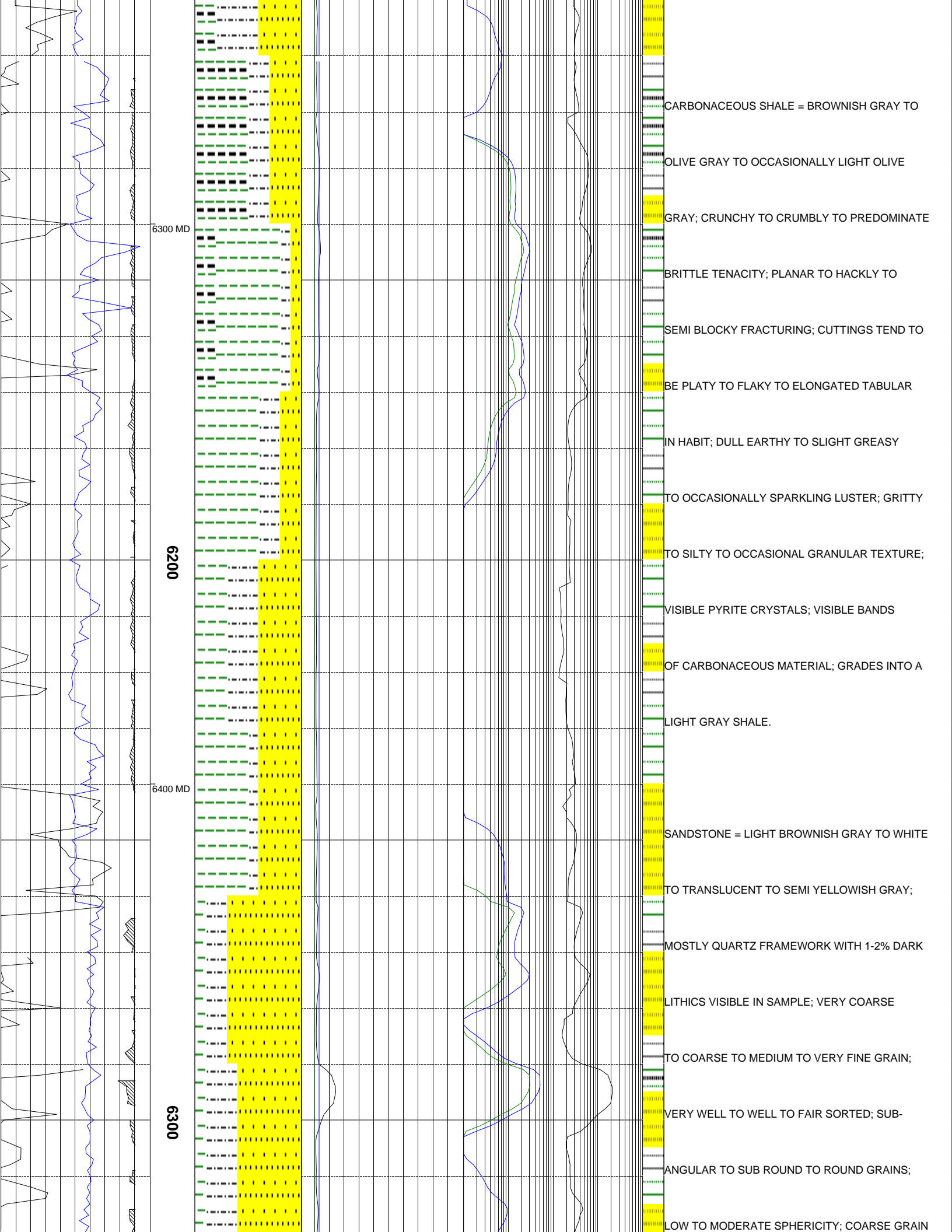
6200 MD

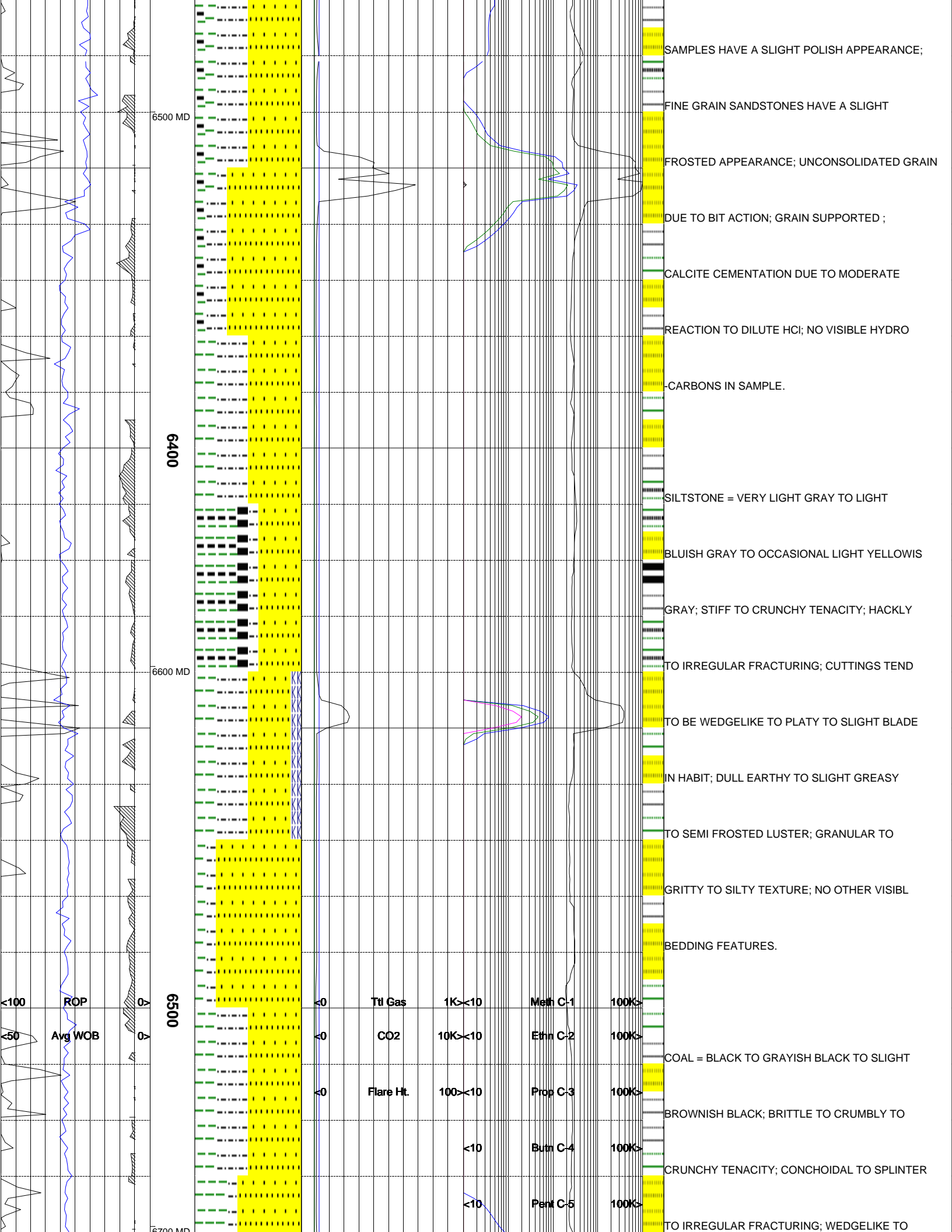
61

CUTTINGS RANGE FROM SMOKY TO OFF WHITE;
 CONSISTS OF CALCITIC CEMENTATION; MODERATELY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 3 TO 5% DARK LITHIC FRAGMENT
 S; MEDIUM-COARSE TO VERY COARSE GRAINED
 ; FAIR TO POOR SORTING; SUB-ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE
 GRADING WITH POOR GRADE SANDSTONE, VERY SMALL AMOUNT OF COAL VISIBLE DEGASSING, AND FRACTURE EVIDENCE IN SAMPLE; ACCESSORY MINERALS PYRITE AND CALCITE PRESENT
 IN SAMPLE.
 SILTSTONE = LIGHT GRAY TO LIGHT BROWNISH GRAY; SLIGHTLY DENSE TO SLIGHTLY TOUGH
 TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHLY HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY GRITTY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

<0	Ttl Gas	1K<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>

<100 ROP
 <50 Avg WOB





6500 MD

6400

6600 MD

6500

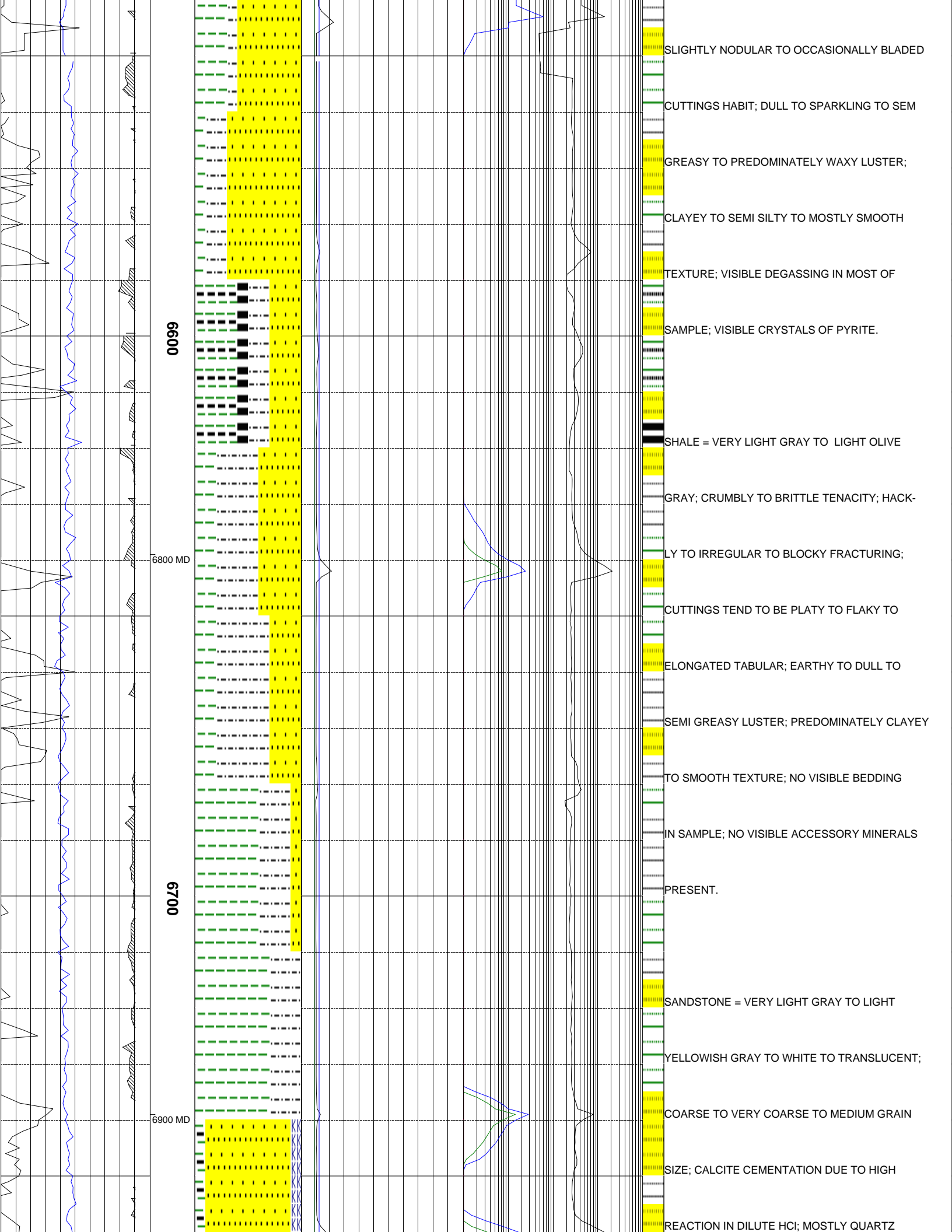
6700 MD

SAMPLES HAVE A SLIGHT POLISH APPEARANCE;
 FINE GRAIN SANDSTONES HAVE A SLIGHT
 FROSTED APPEARANCE; UNCONSOLIDATED GRAIN
 DUE TO BIT ACTION; GRAIN SUPPORTED ;
 CALCITE CEMENTATION DUE TO MODERATE
 REACTION TO DILUTE HCl; NO VISIBLE HYDRO
 CARBONS IN SAMPLE.
 SILTSTONE = VERY LIGHT GRAY TO LIGHT
 BLUISH GRAY TO OCCASIONAL LIGHT YELLOWISH
 GRAY; STIFF TO CRUNCHY TENACITY; HACKLY
 TO IRREGULAR FRACTURING; CUTTINGS TEND
 TO BE WEDGELIKE TO PLATY TO SLIGHT BLADE
 IN HABIT; DULL EARTHLY TO SLIGHT GREASY
 TO SEMI FROSTED LUSTER; GRANULAR TO
 GRITTY TO SILTY TEXTURE; NO OTHER VISIBLE
 BEDDING FEATURES.
 COAL = BLACK TO GRAYISH BLACK TO SLIGHT
 BROWNISH BLACK; BRITTLE TO CRUMBLY TO
 CRUNCHY TENACITY; CONCHOIDAL TO SPLINTER
 TO IRREGULAR FRACTURING; WEDGELIKE TO

<0	Ttl Gas	1K<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>

ROP

Avg WOB



6600

6800 MD

6700

6900 MD

SLIGHTLY NODULAR TO OCCASIONALLY BLADED

CUTTINGS HABIT; DULL TO SPARKLING TO SEM

GREASY TO PREDOMINATELY WAXY LUSTER;

CLAYEY TO SEMI SILTY TO MOSTLY SMOOTH

TEXTURE; VISIBLE DEGASSING IN MOST OF

SAMPLE; VISIBLE CRYSTALS OF PYRITE.

SHALE = VERY LIGHT GRAY TO LIGHT OLIVE

GRAY; CRUMBLY TO BRITTLE TENACITY; HACK-

LY TO IRREGULAR TO BLOCKY FRACTURING;

CUTTINGS TEND TO BE PLATY TO FLAKY TO

ELONGATED TABULAR; EARTHY TO DULL TO

SEMI GREASY LUSTER; PREDOMINATELY CLAYEY

TO SMOOTH TEXTURE; NO VISIBLE BEDDING

IN SAMPLE; NO VISIBLE ACCESSORY MINERALS

PRESENT.

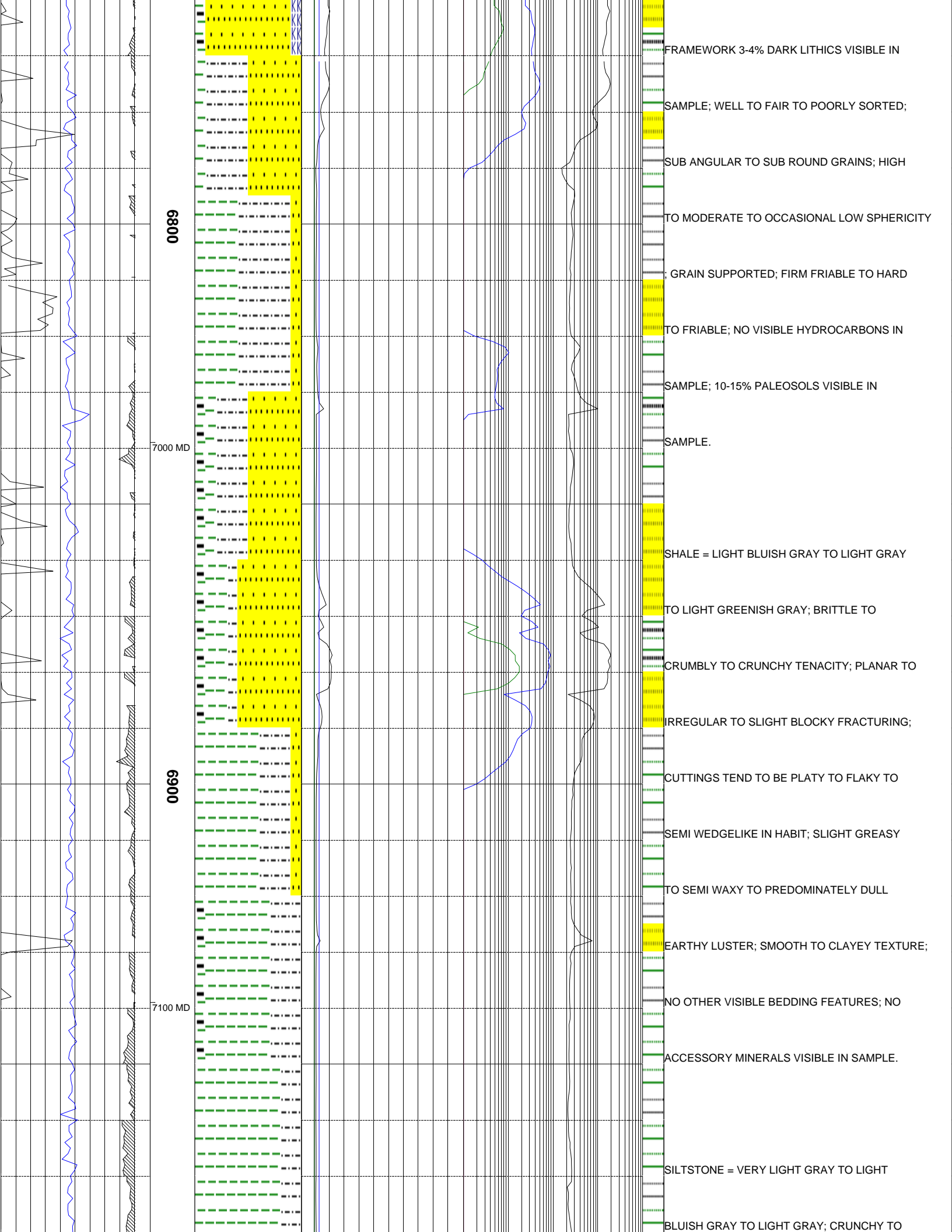
SANDSTONE = VERY LIGHT GRAY TO LIGHT

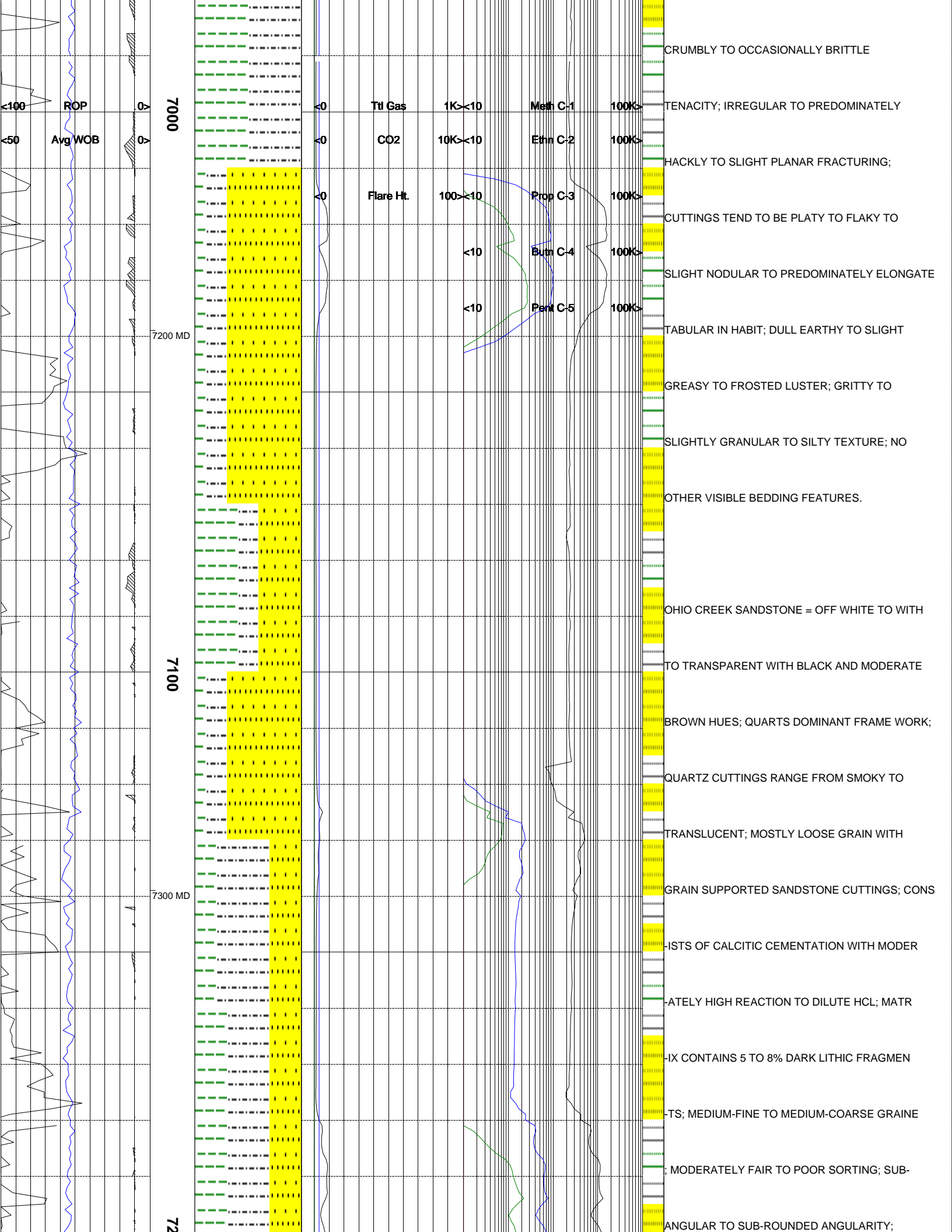
YELLOWISH GRAY TO WHITE TO TRANSLUCENT;

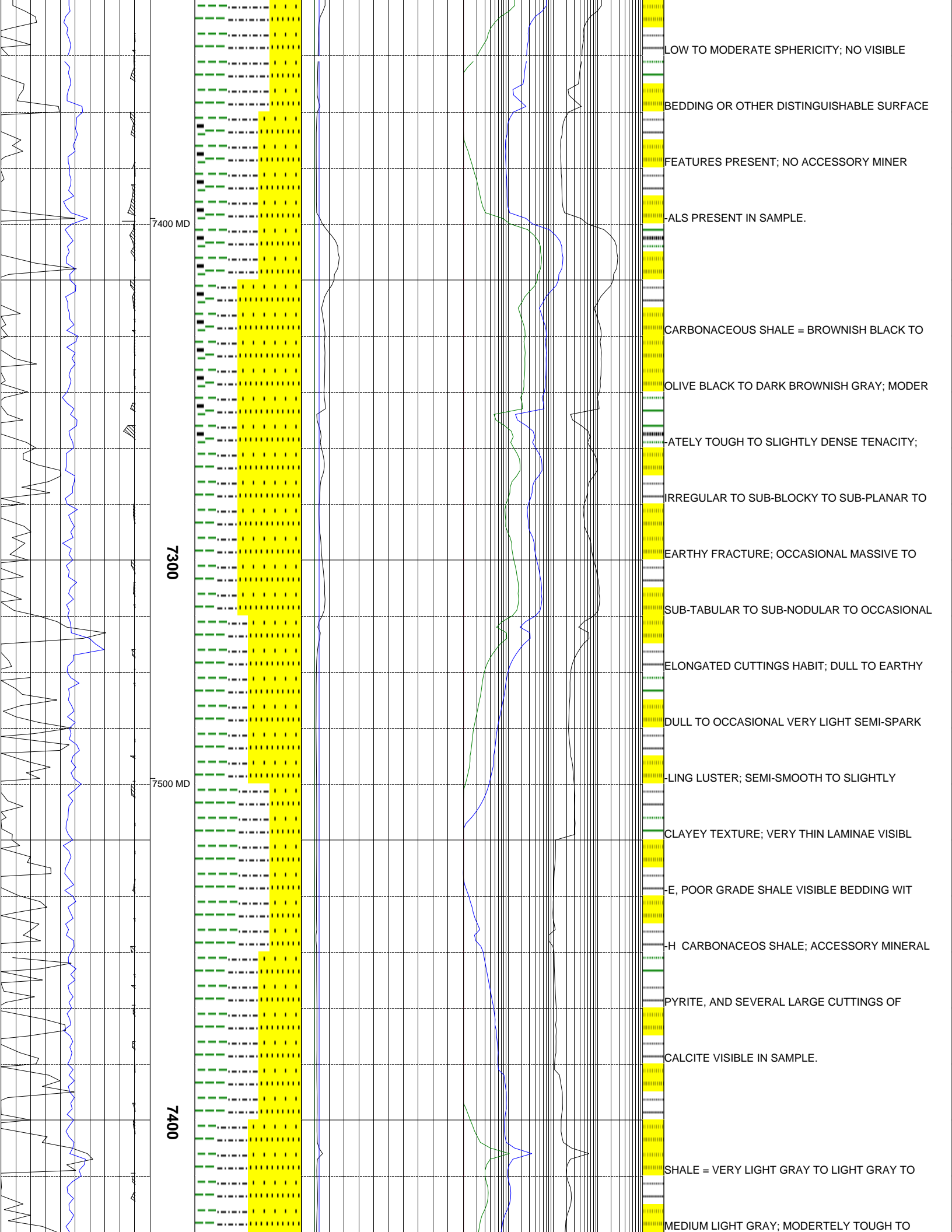
COARSE TO VERY COARSE TO MEDIUM GRAIN

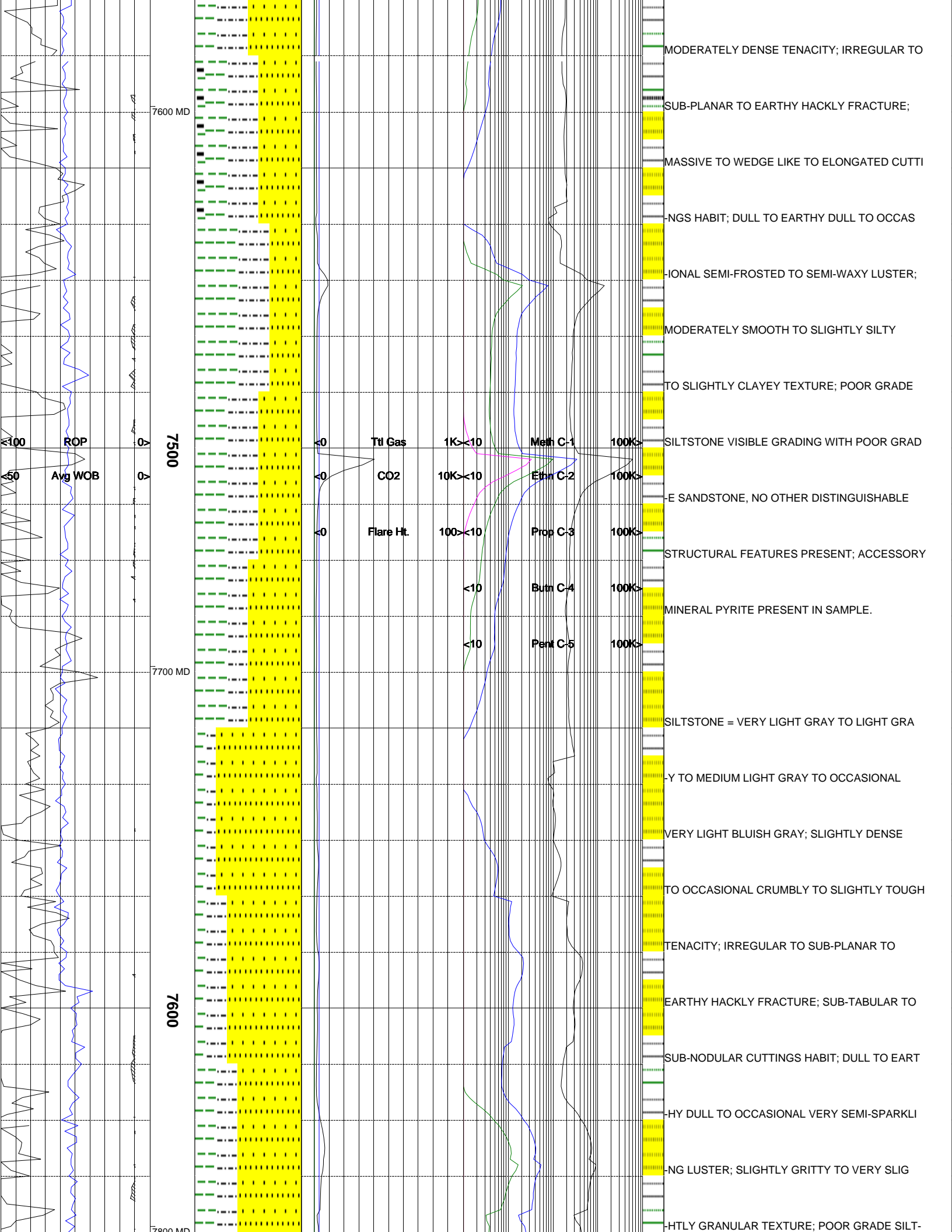
SIZE; CALCITE CEMENTATION DUE TO HIGH

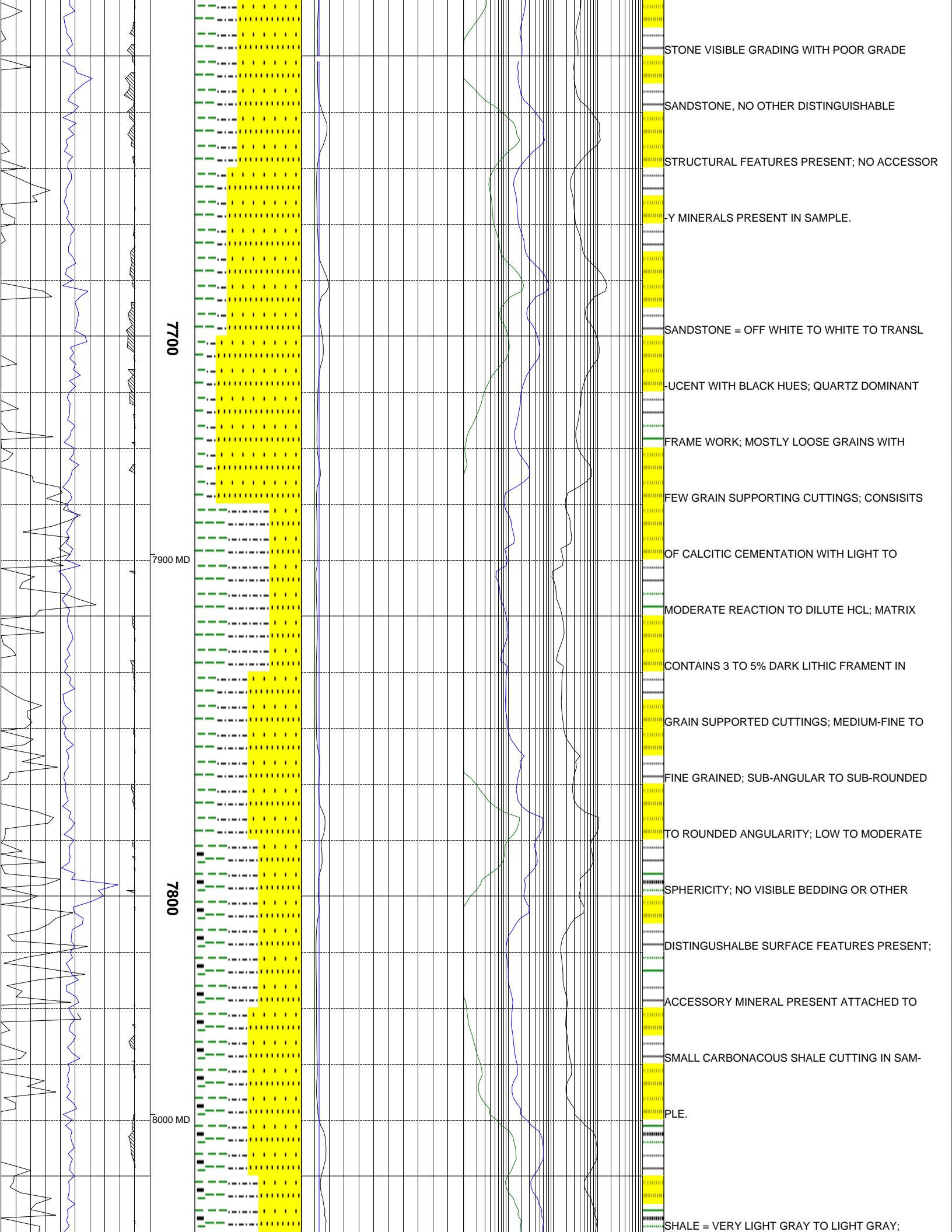
REACTION IN DILUTE HCl; MOSTLY QUARTZ

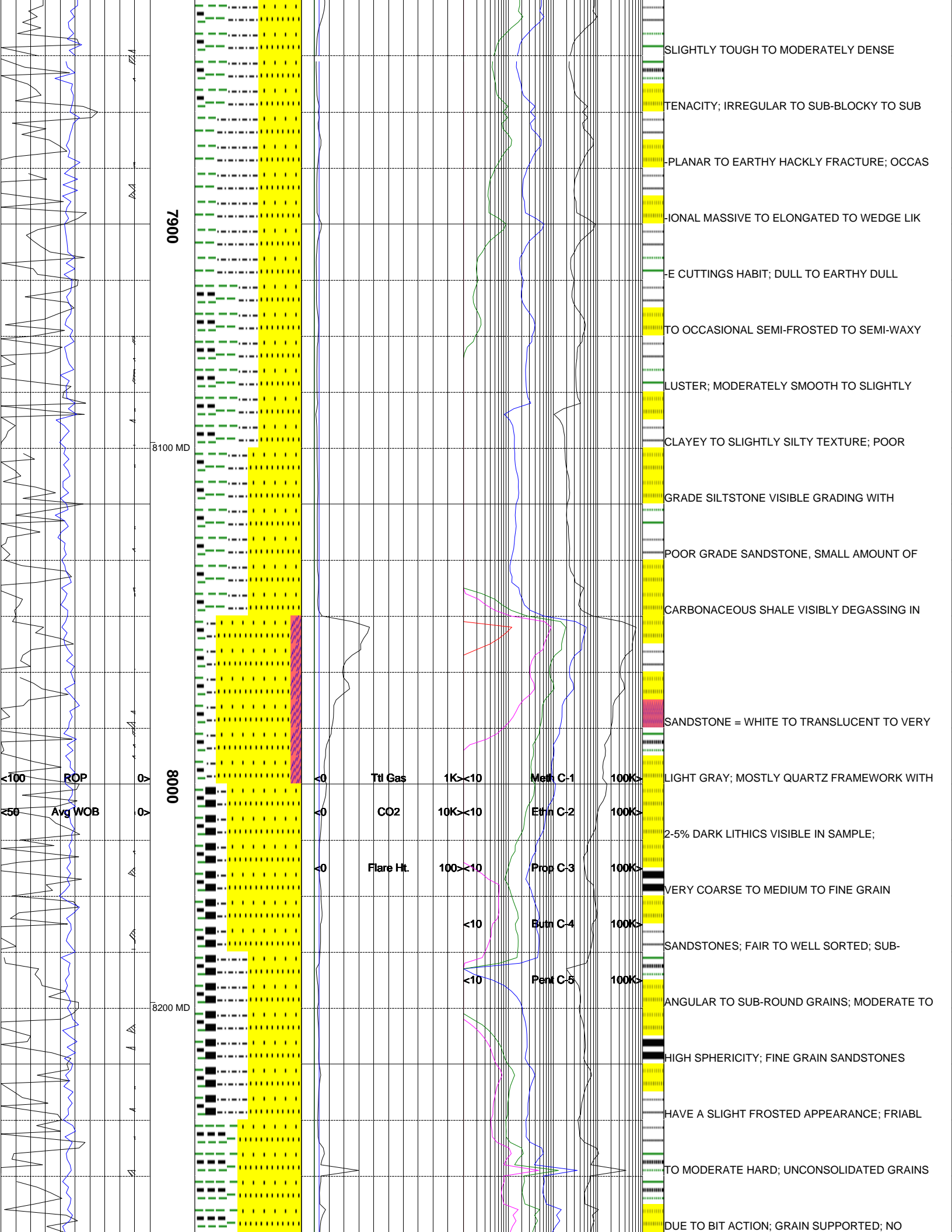


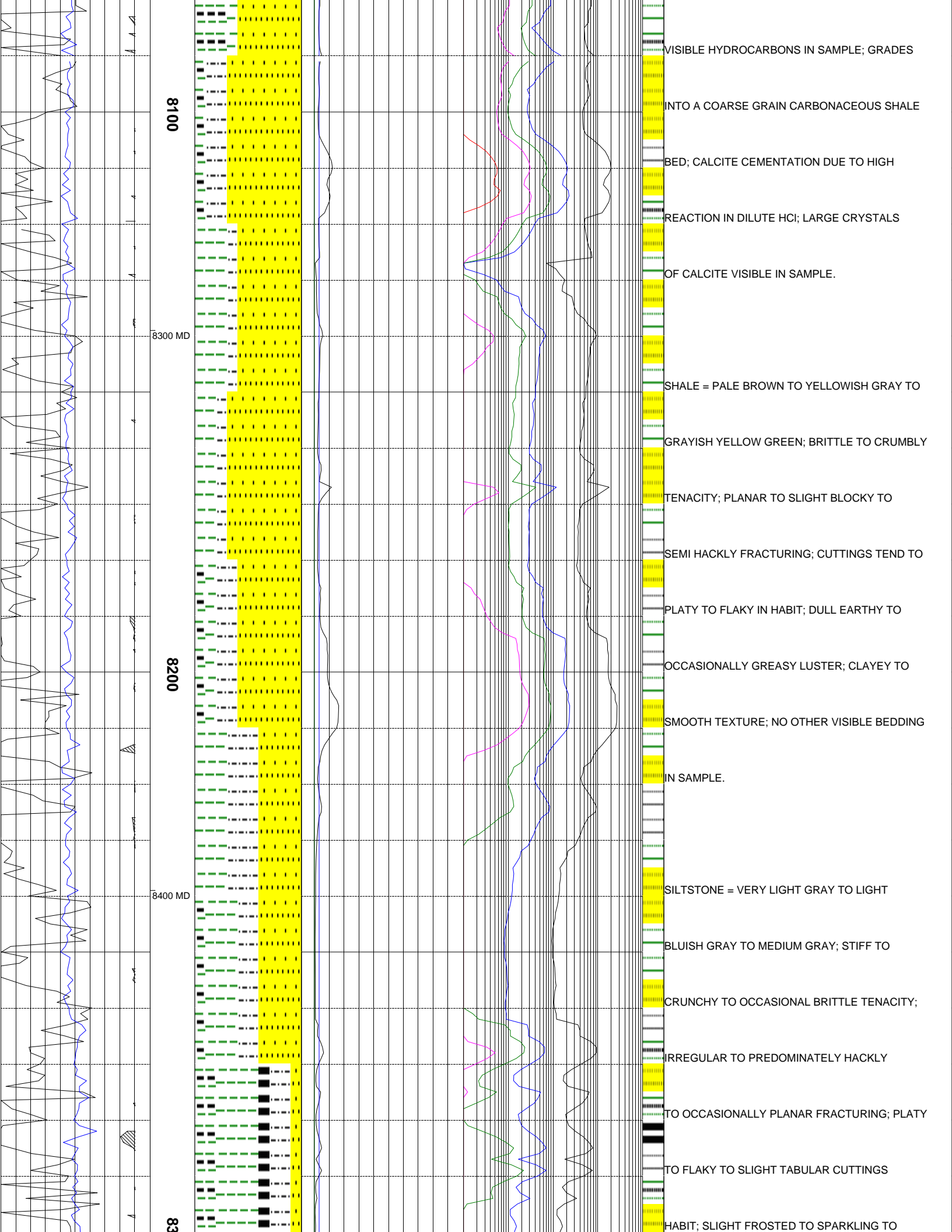


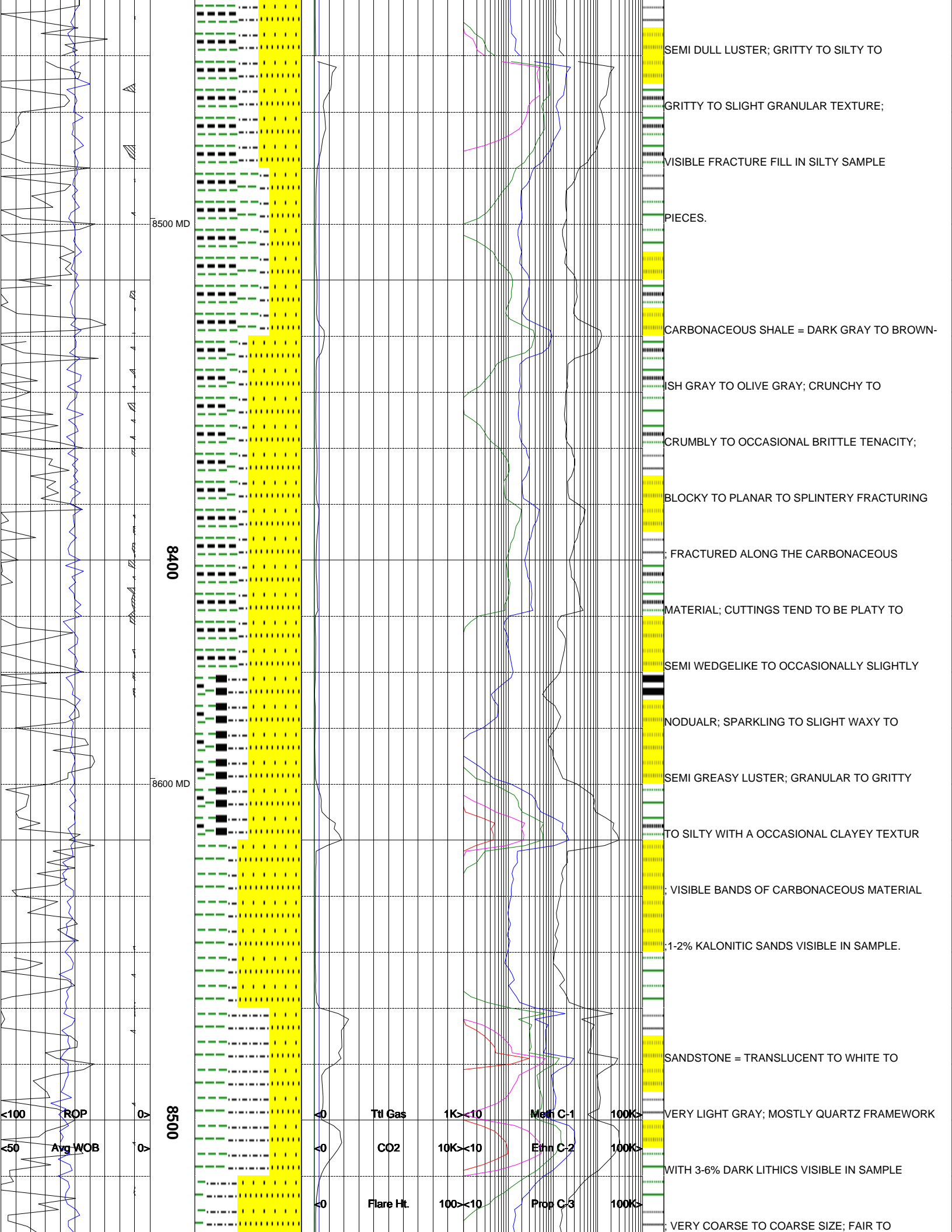












8500 MD

8400

8600 MD

8500

SEMI DULL LUSTER; GRITTY TO SILTY TO

GRITTY TO SLIGHT GRANULAR TEXTURE;

VISIBLE FRACTURE FILL IN SILTY SAMPLE

PIECES.

CARBONACEOUS SHALE = DARK GRAY TO BROWN-

ISH GRAY TO OLIVE GRAY; CRUNCHY TO

CRUMBLY TO OCCASIONAL BRITTLE TENACITY;

BLOCKY TO PLANAR TO SPLINTERY FRACTURING

; FRACTURED ALONG THE CARBONACEOUS

MATERIAL; CUTTINGS TEND TO BE PLATY TO

SEMI WEDGELIKE TO OCCASIONALLY SLIGHTLY

NODULAR; SPARKLING TO SLIGHT WAXY TO

SEMI GREASY LUSTER; GRANULAR TO GRITTY

TO SILTY WITH A OCCASIONAL CLAYEY TEXTUR

; VISIBLE BANDS OF CARBONACEOUS MATERIAL

; 1-2% KALONITIC SANDS VISIBLE IN SAMPLE.

SANDSTONE = TRANSLUCENT TO WHITE TO

VERY LIGHT GRAY; MOSTLY QUARTZ FRAMEWORK

WITH 3-6% DARK LITHICS VISIBLE IN SAMPLE

; VERY COARSE TO COARSE SIZE; FAIR TO

ROP

Avg WOB

Ttl Gas

CO2

Flare Ht.

1K<10

10K<10

100<10

Meth C-1

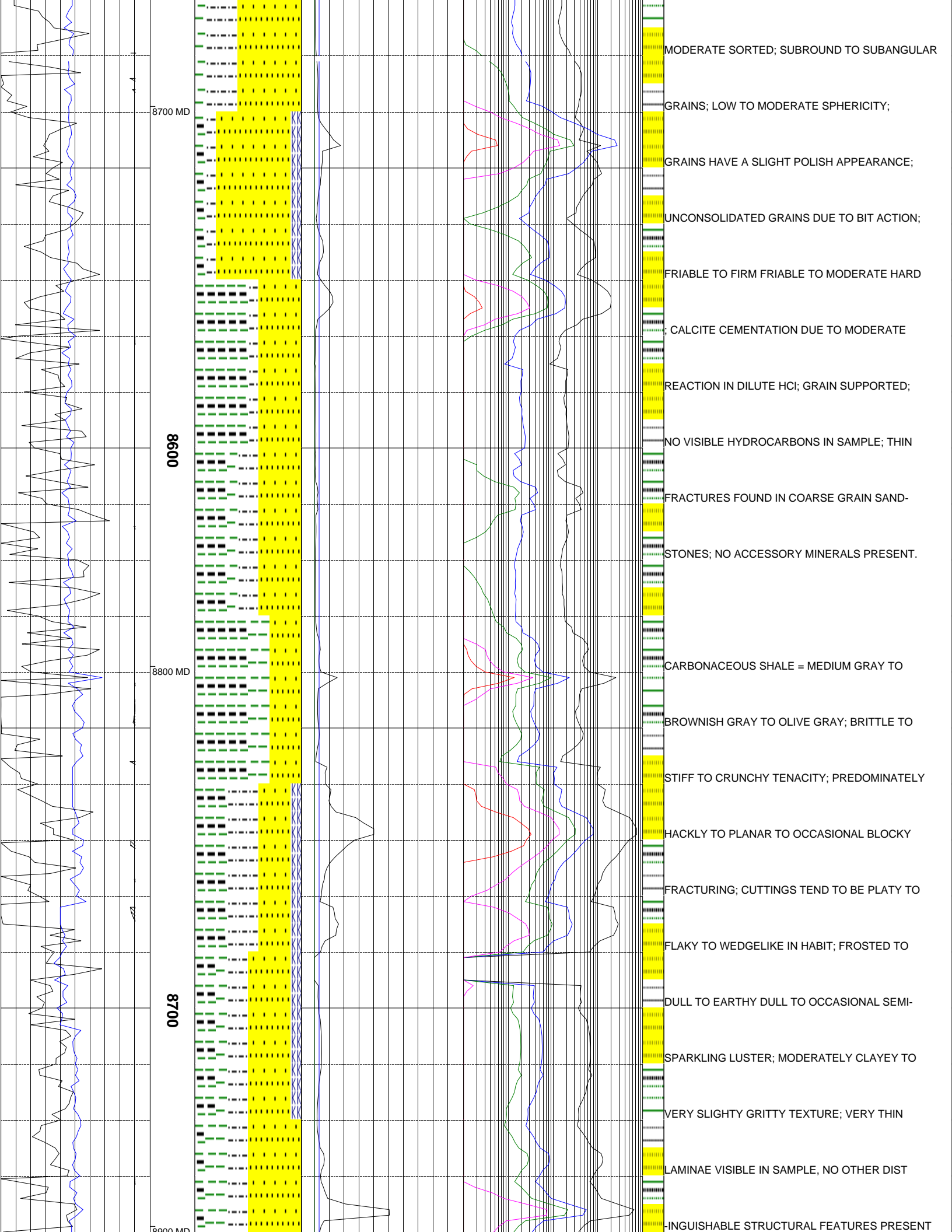
Ethn C-2

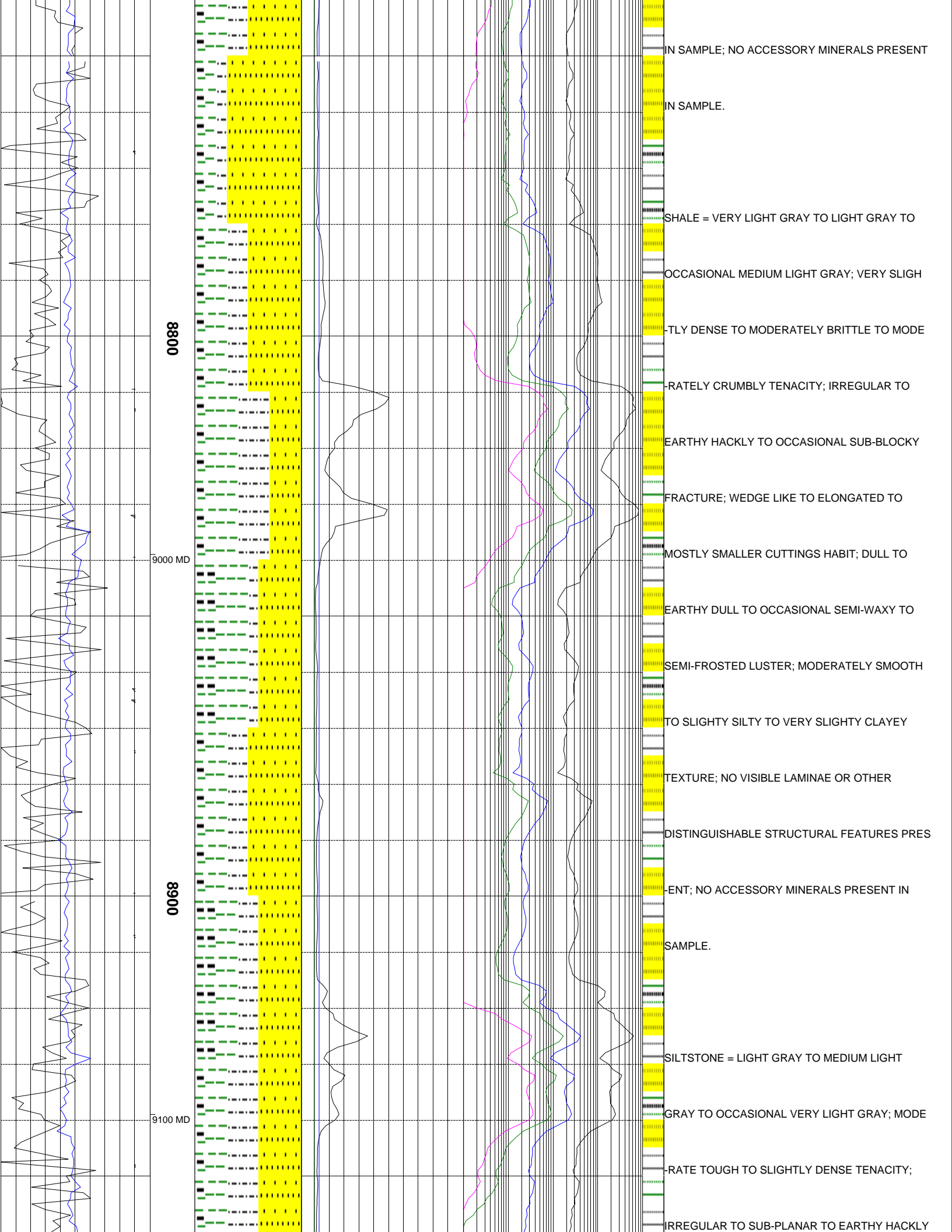
Prop C-3

100K>

100K>

100K>





0088

0068

9000 MD

9100 MD

IN SAMPLE; NO ACCESSORY MINERALS PRESENT

IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO

OCCASIONAL MEDIUM LIGHT GRAY; VERY SLIGHTLY

SLIGHTLY DENSE TO MODERATELY BRITTLE TO MODERATELY

CRUMBLY TENACITY; IRREGULAR TO

EARTHY HACKLY TO OCCASIONAL SUB-BLOCKY

FRACTURE; WEDGE LIKE TO ELONGATED TO

MOSTLY SMALLER CUTTINGS HABIT; DULL TO

EARTHY DULL TO OCCASIONAL SEMI-WAXY TO

SEMIFROSTED LUSTER; MODERATELY SMOOTH

TO SLIGHTLY SILTY TO VERY SLIGHTLY CLAYEY

TEXTURE; NO VISIBLE LAMINAE OR OTHER

DISTINGUISHABLE STRUCTURAL FEATURES PRESENT

PRESENT; NO ACCESSORY MINERALS PRESENT IN

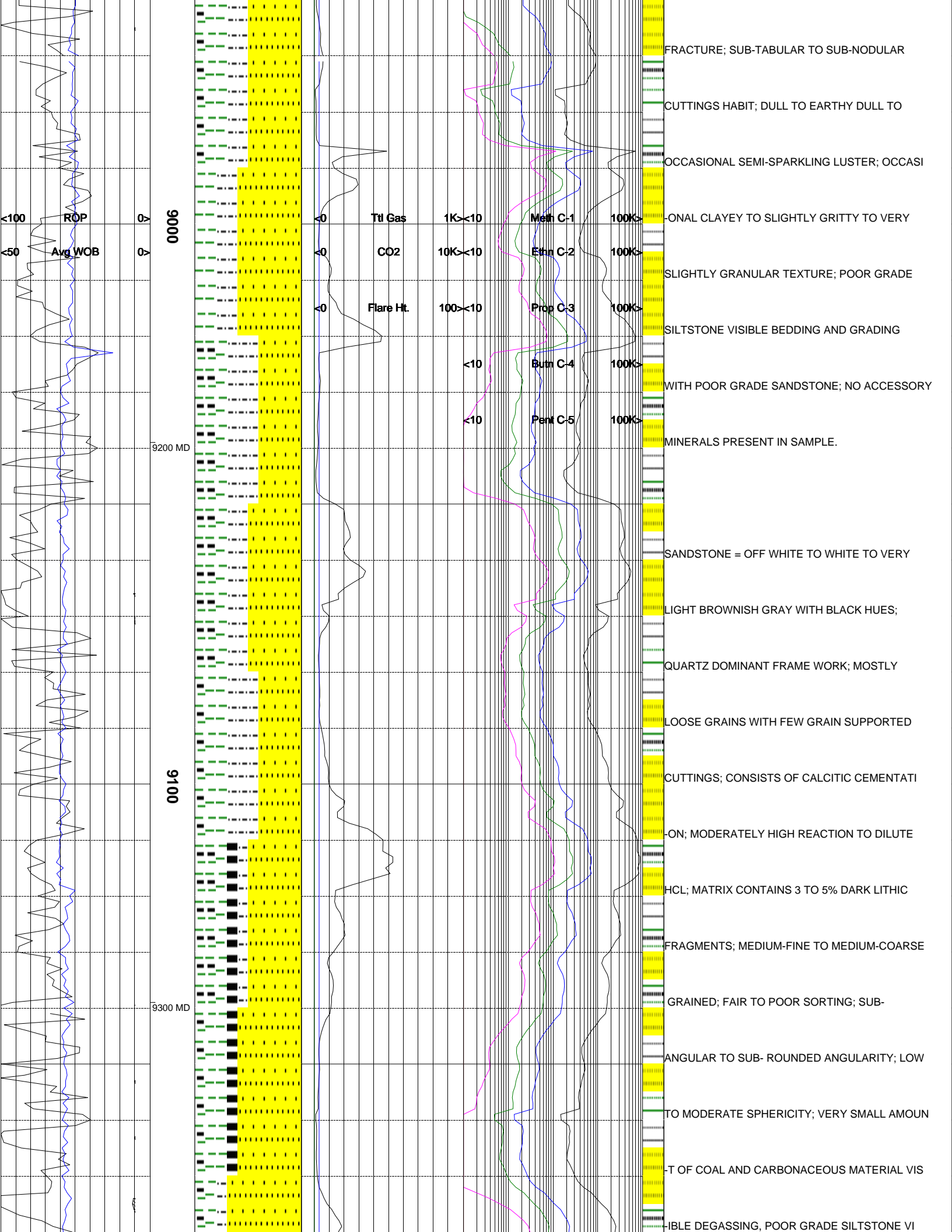
SAMPLE.

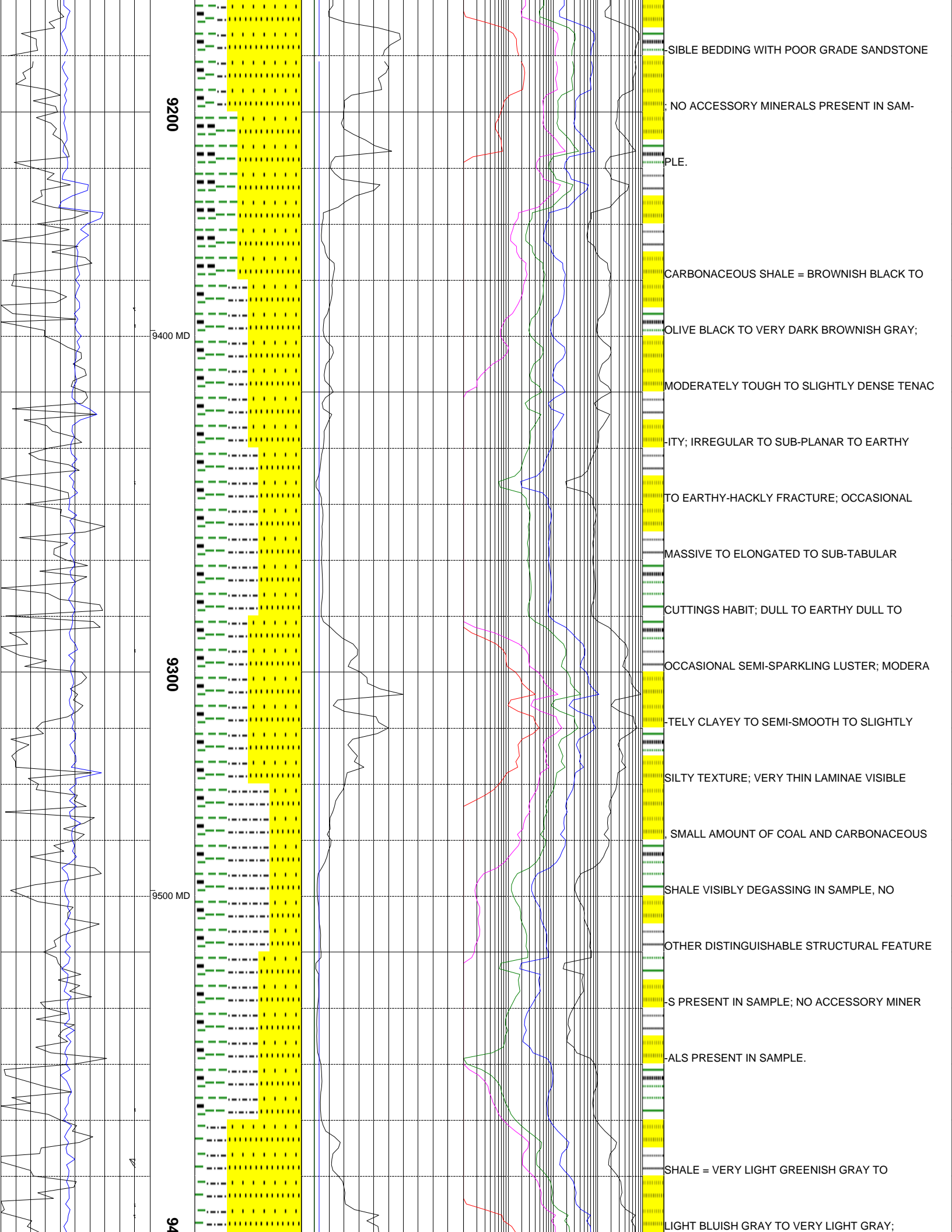
SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT

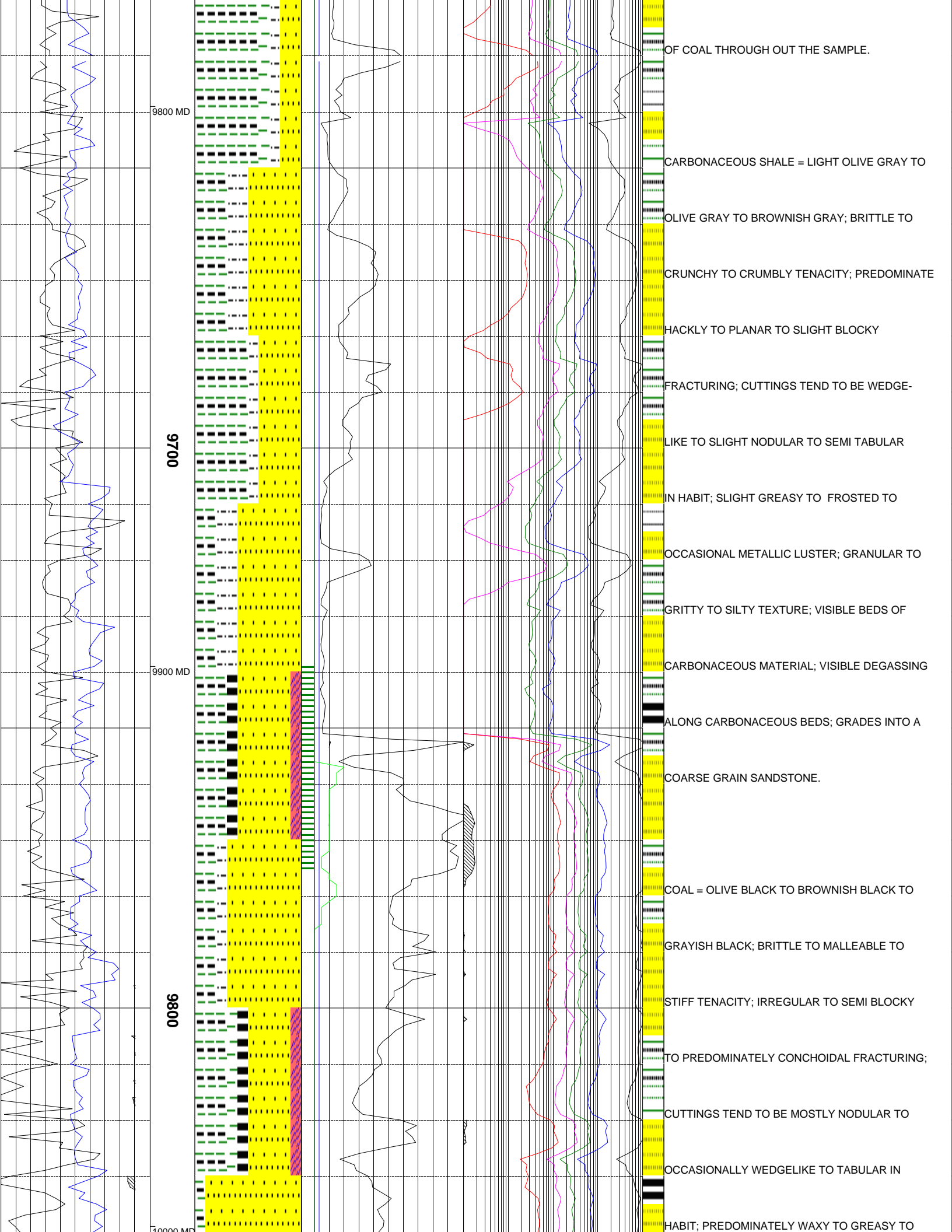
GRAY TO OCCASIONAL VERY LIGHT GRAY; MODERATE

TO SLIGHTLY DENSE TENACITY;

IRREGULAR TO SUB-PLANAR TO EARTHY HACKLY







9800 MD

9900 MD

10000 MD

9700

9800

OF COAL THROUGH OUT THE SAMPLE.

CARBONACEOUS SHALE = LIGHT OLIVE GRAY TO

OLIVE GRAY TO BROWNISH GRAY; BRITTLE TO

CRUNCHY TO CRUMBLY TENACITY; PREDOMINATE

HACKLY TO PLANAR TO SLIGHT BLOCKY

FRACTURING; CUTTINGS TEND TO BE WEDGE-

LIKE TO SLIGHT NODULAR TO SEMI TABULAR

IN HABIT; SLIGHT GREASY TO FROSTED TO

OCCASIONAL METALLIC LUSTER; GRANULAR TO

GRITTY TO SILTY TEXTURE; VISIBLE BEDS OF

CARBONACEOUS MATERIAL; VISIBLE DEGASSING

ALONG CARBONACEOUS BEDS; GRADES INTO A

COARSE GRAIN SANDSTONE.

COAL = OLIVE BLACK TO BROWNISH BLACK TO

GRAYISH BLACK; BRITTLE TO MALLEABLE TO

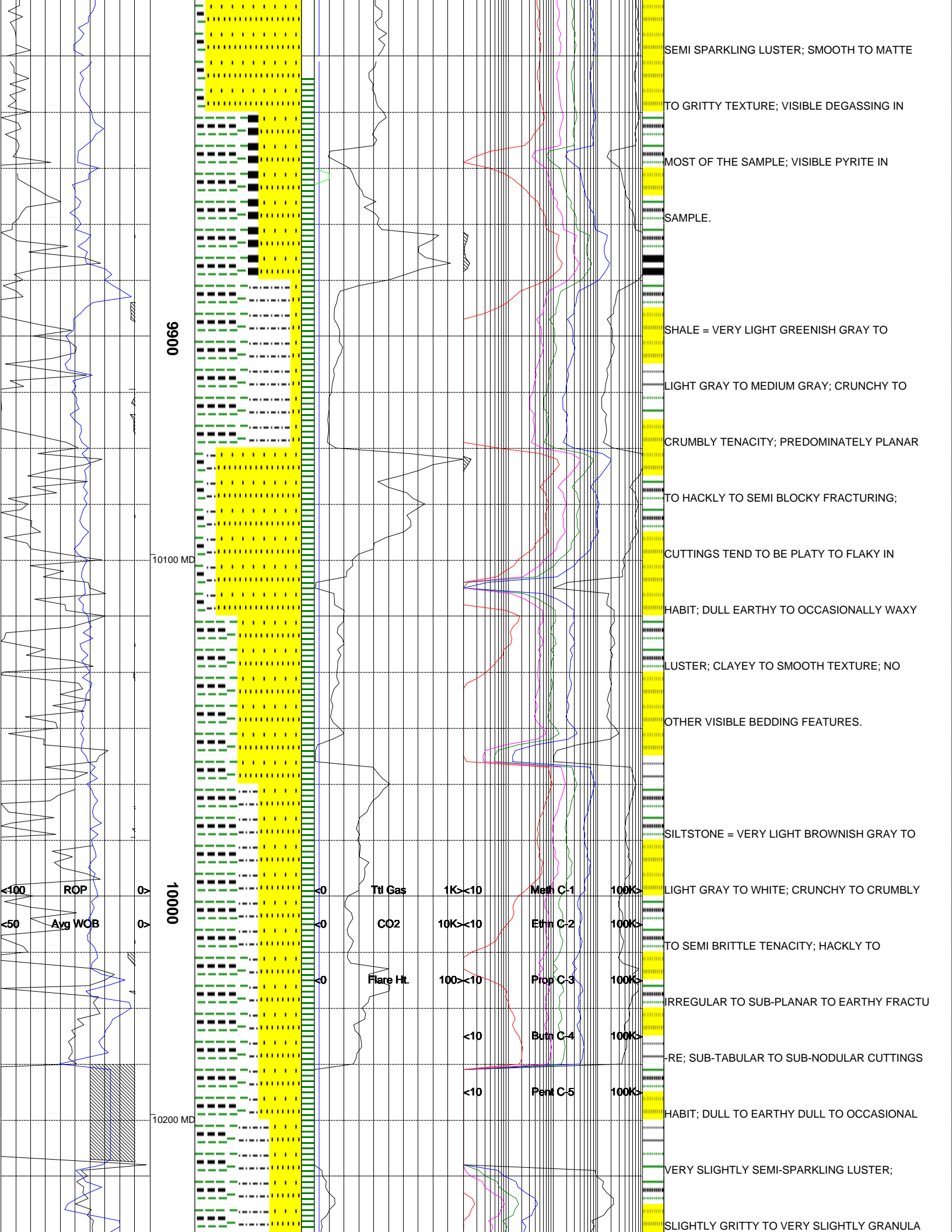
STIFF TENACITY; IRREGULAR TO SEMI BLOCKY

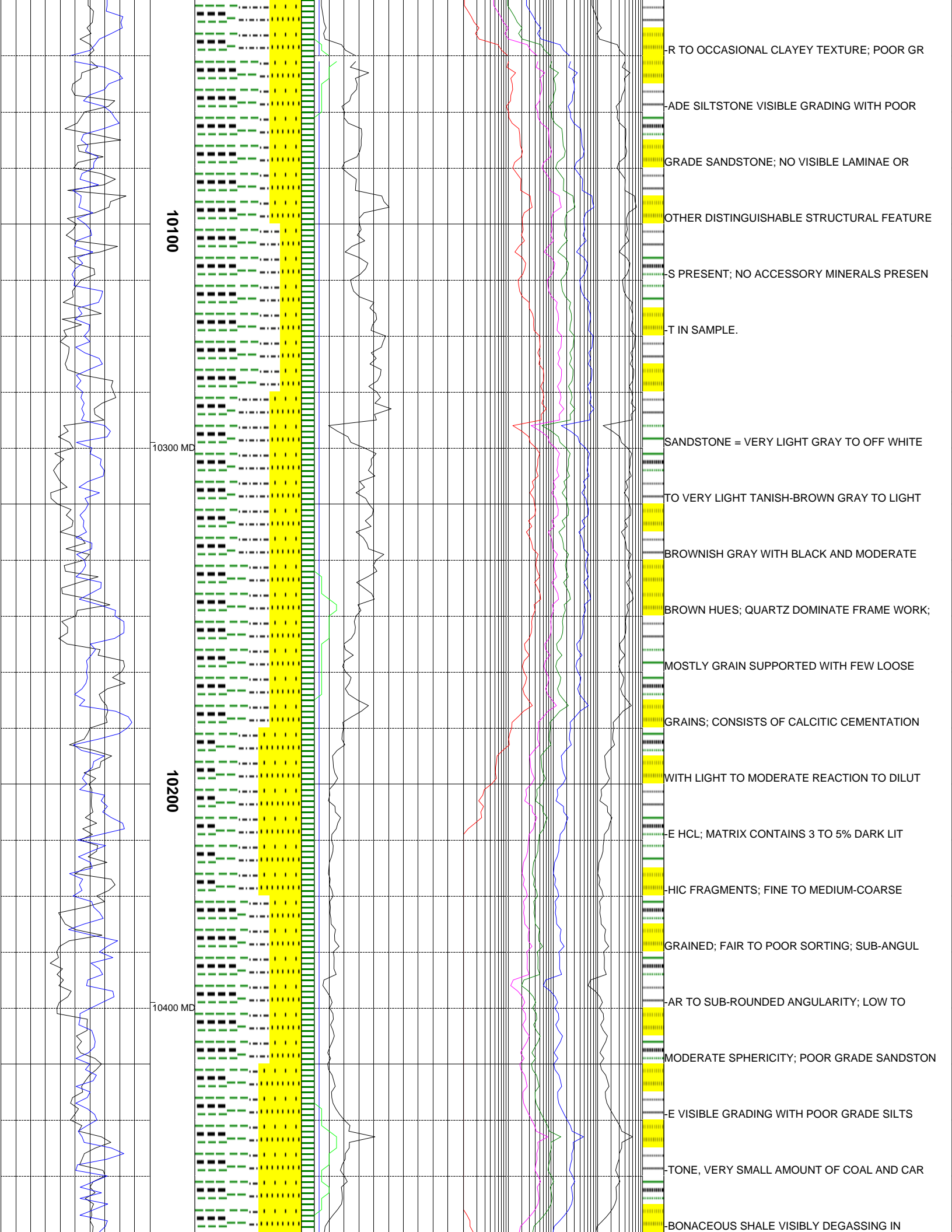
TO PREDOMINATELY CONCHOIDAL FRACTURING;

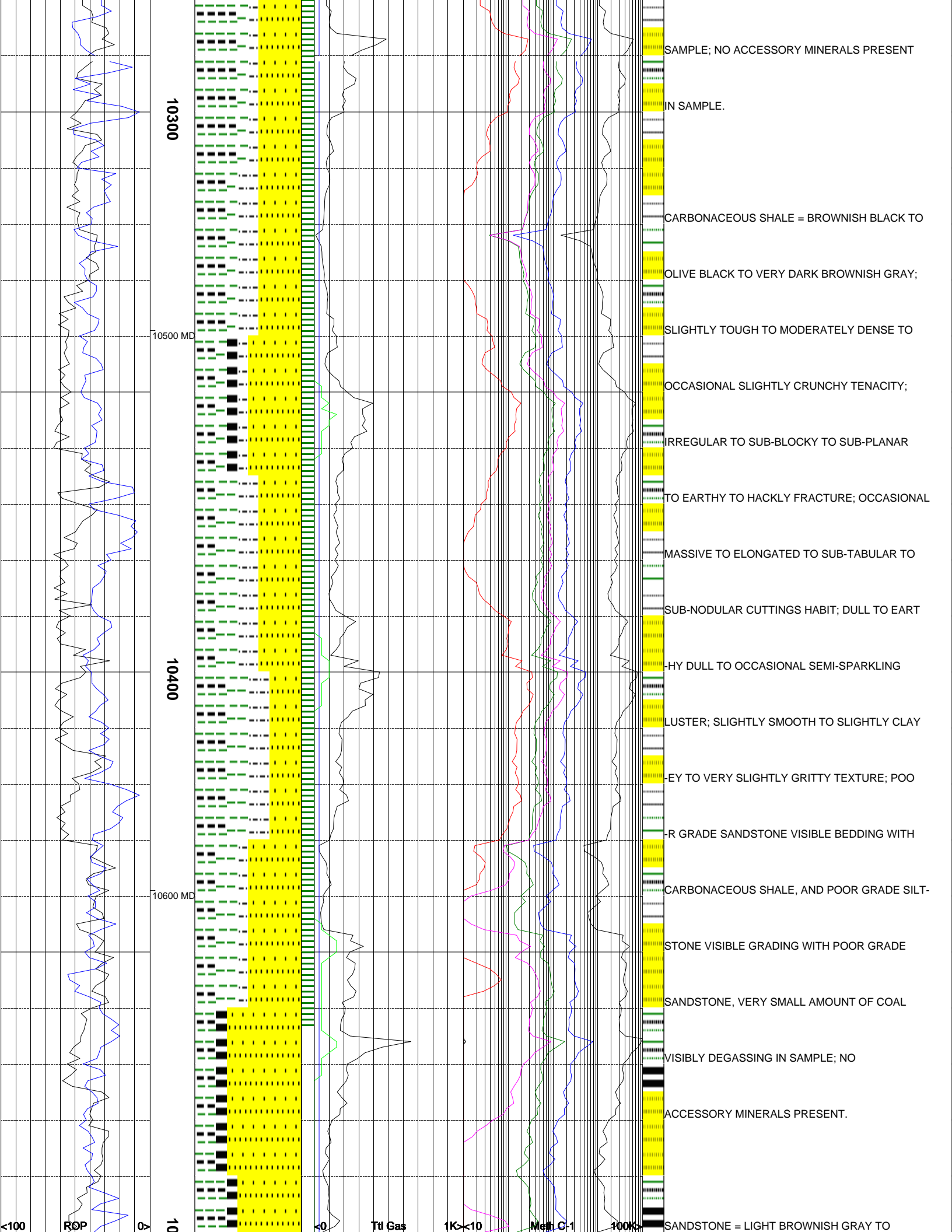
CUTTINGS TEND TO BE MOSTLY NODULAR TO

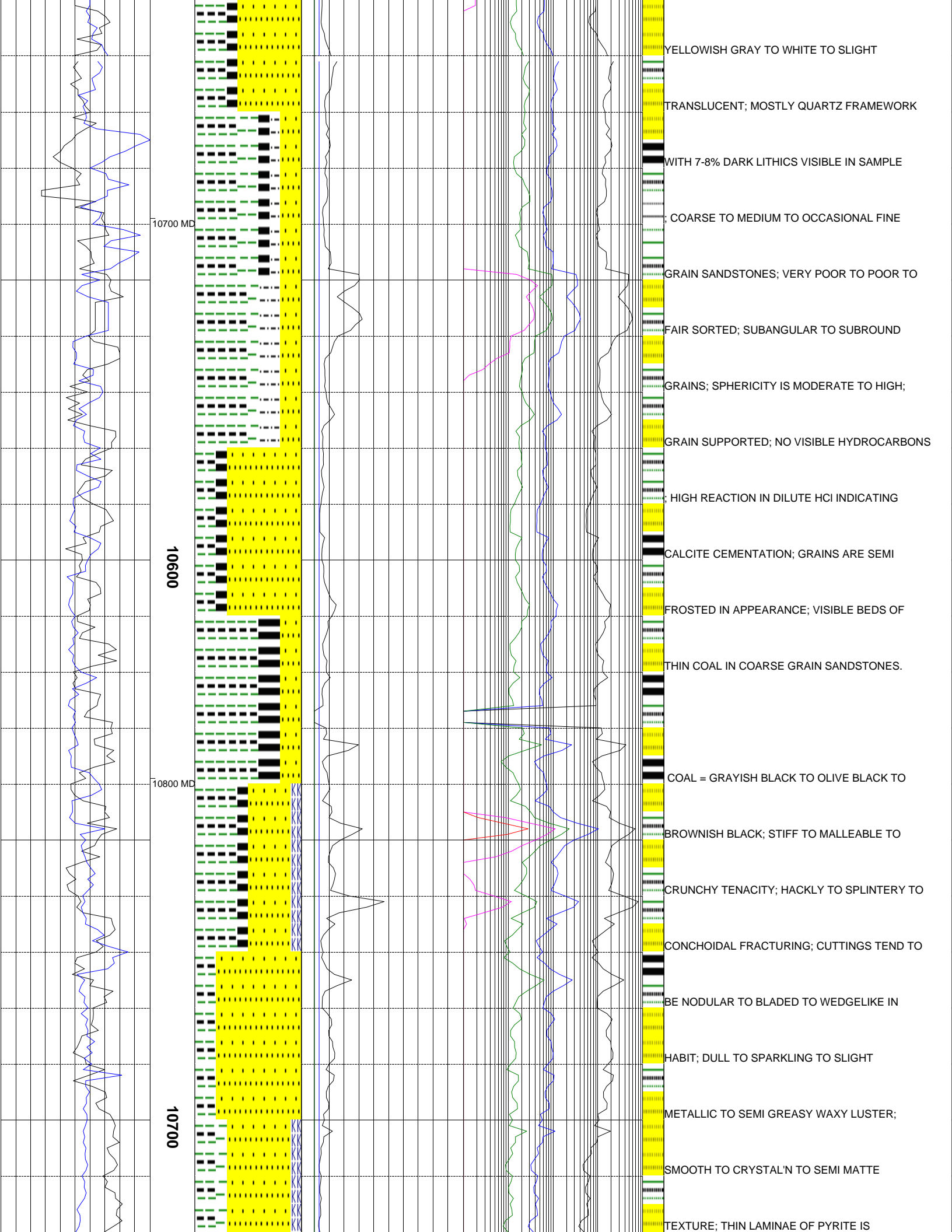
OCCASIONALLY WEDGELIKE TO TABULAR IN

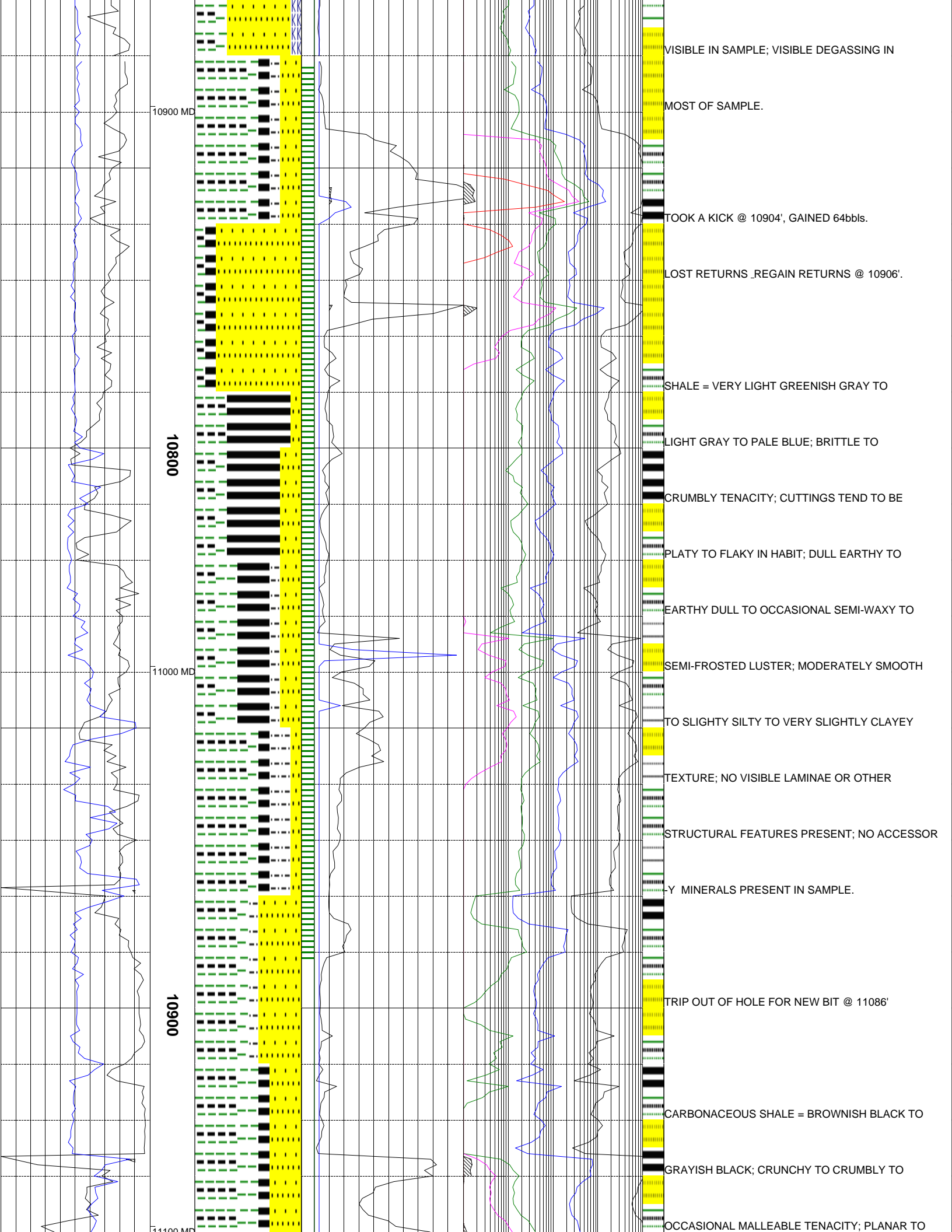
HABIT; PREDOMINATELY WAXY TO GREASY TO

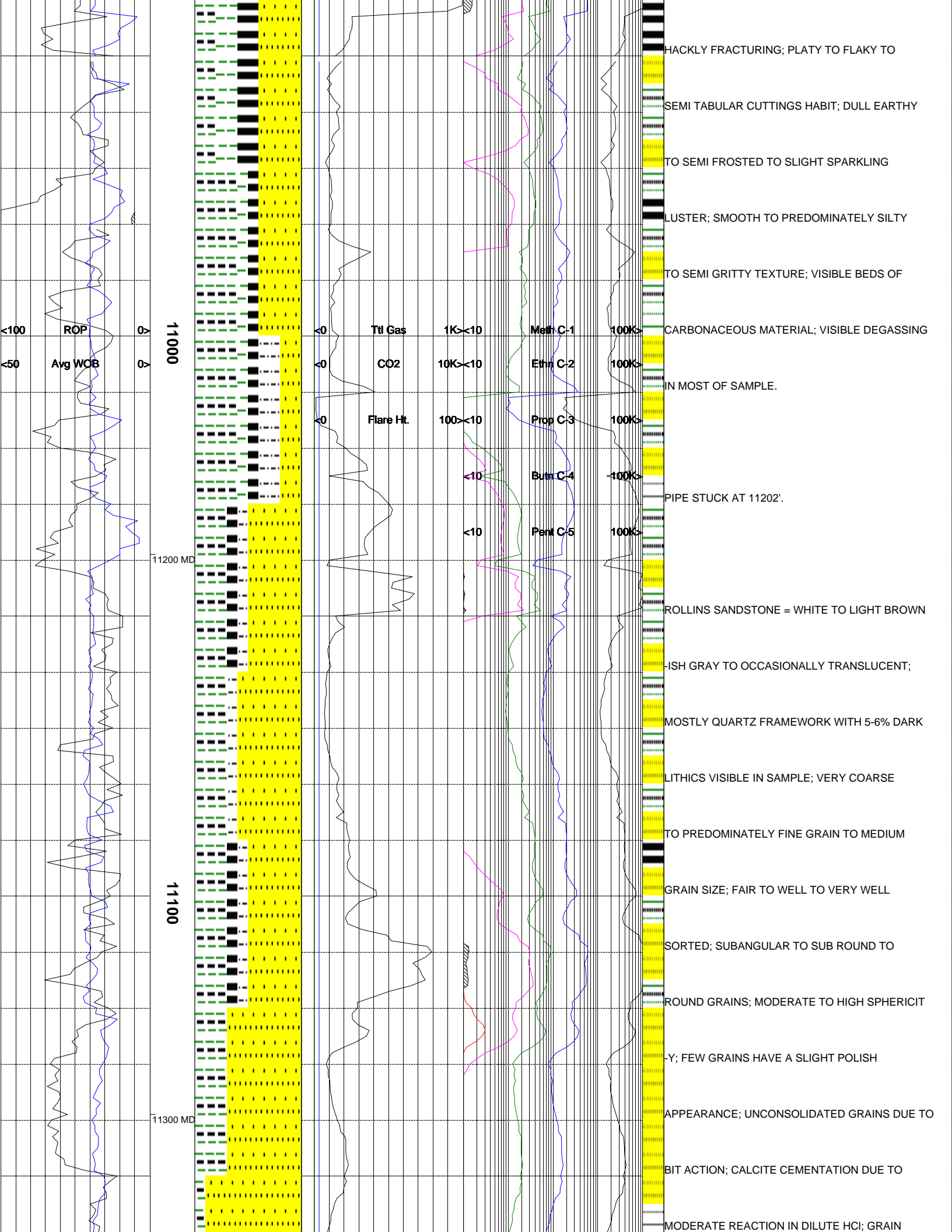


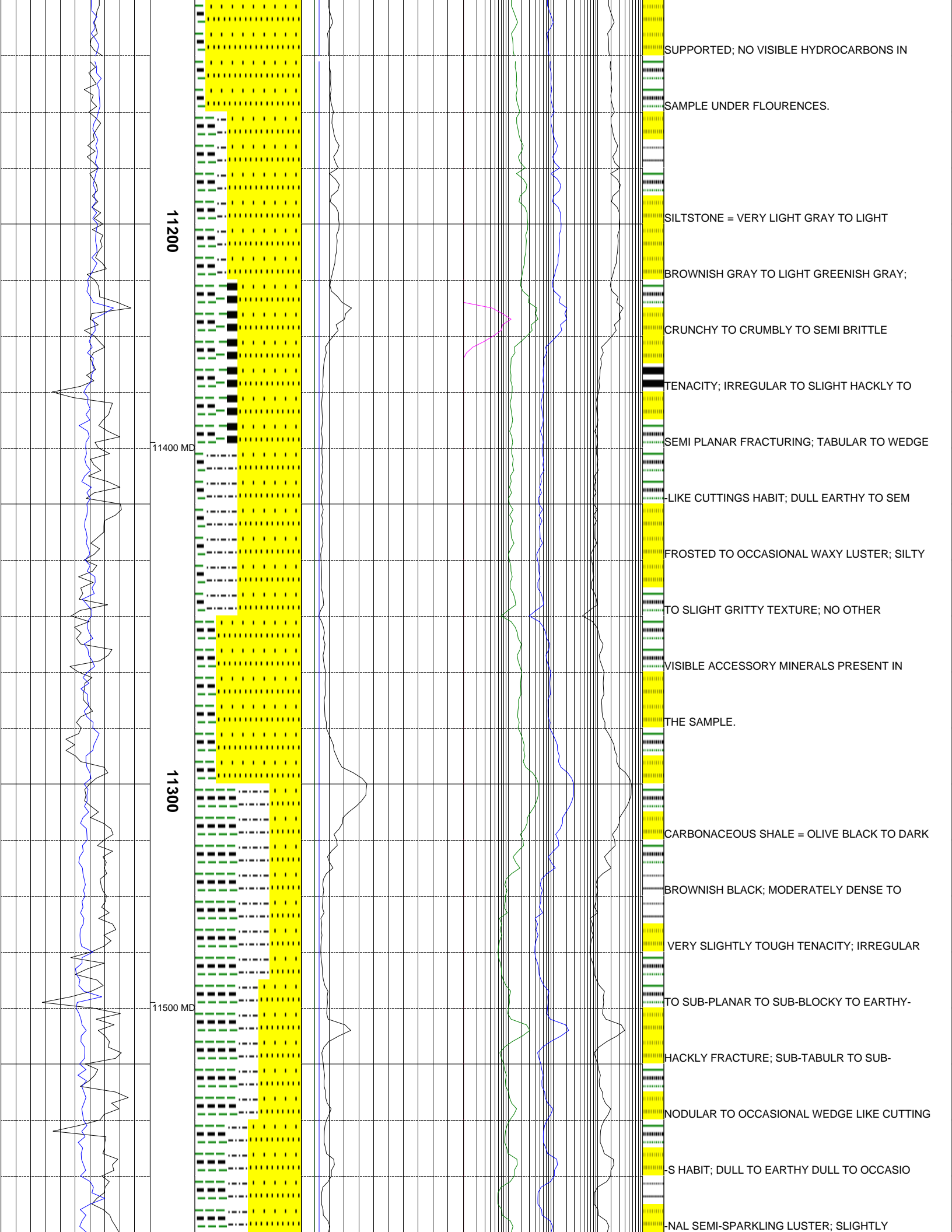


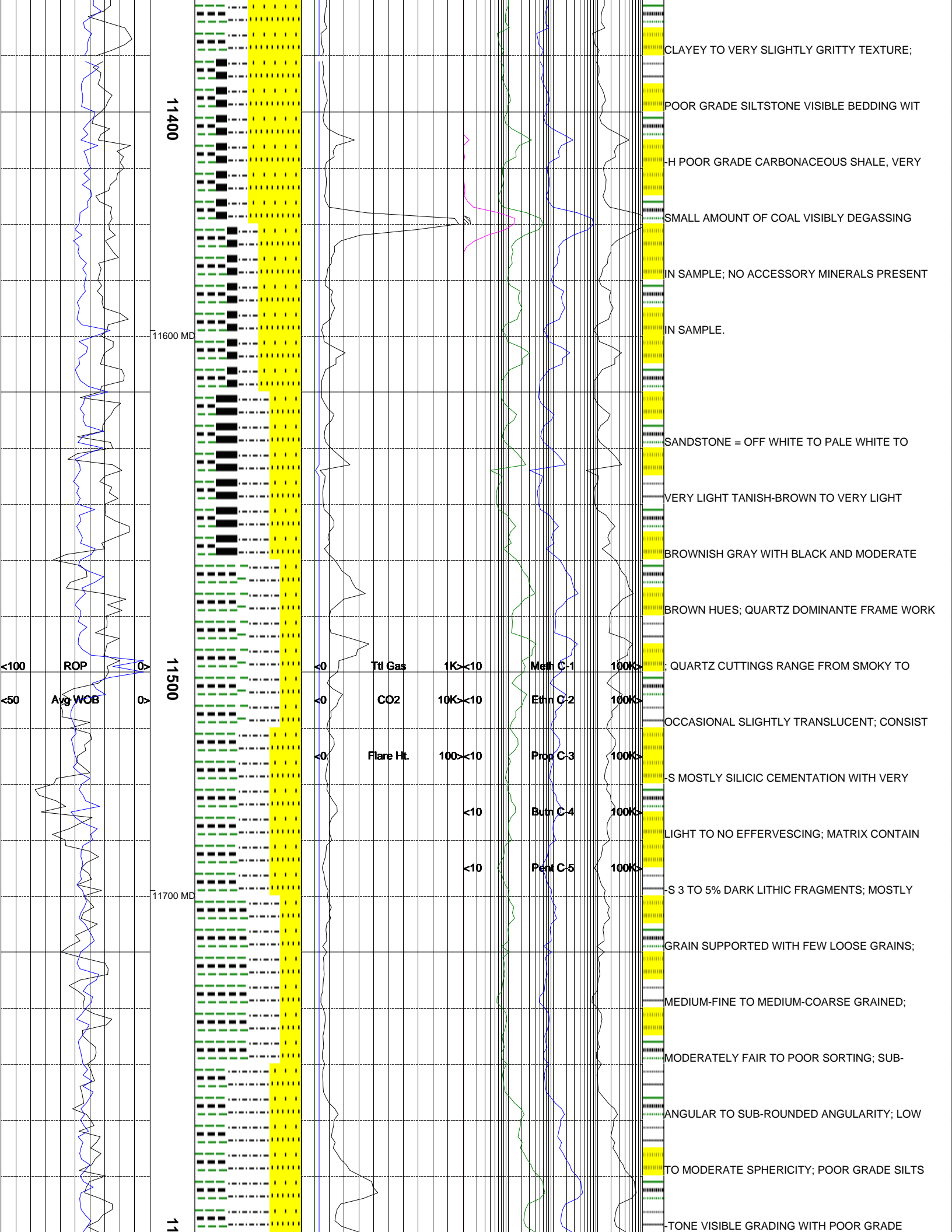


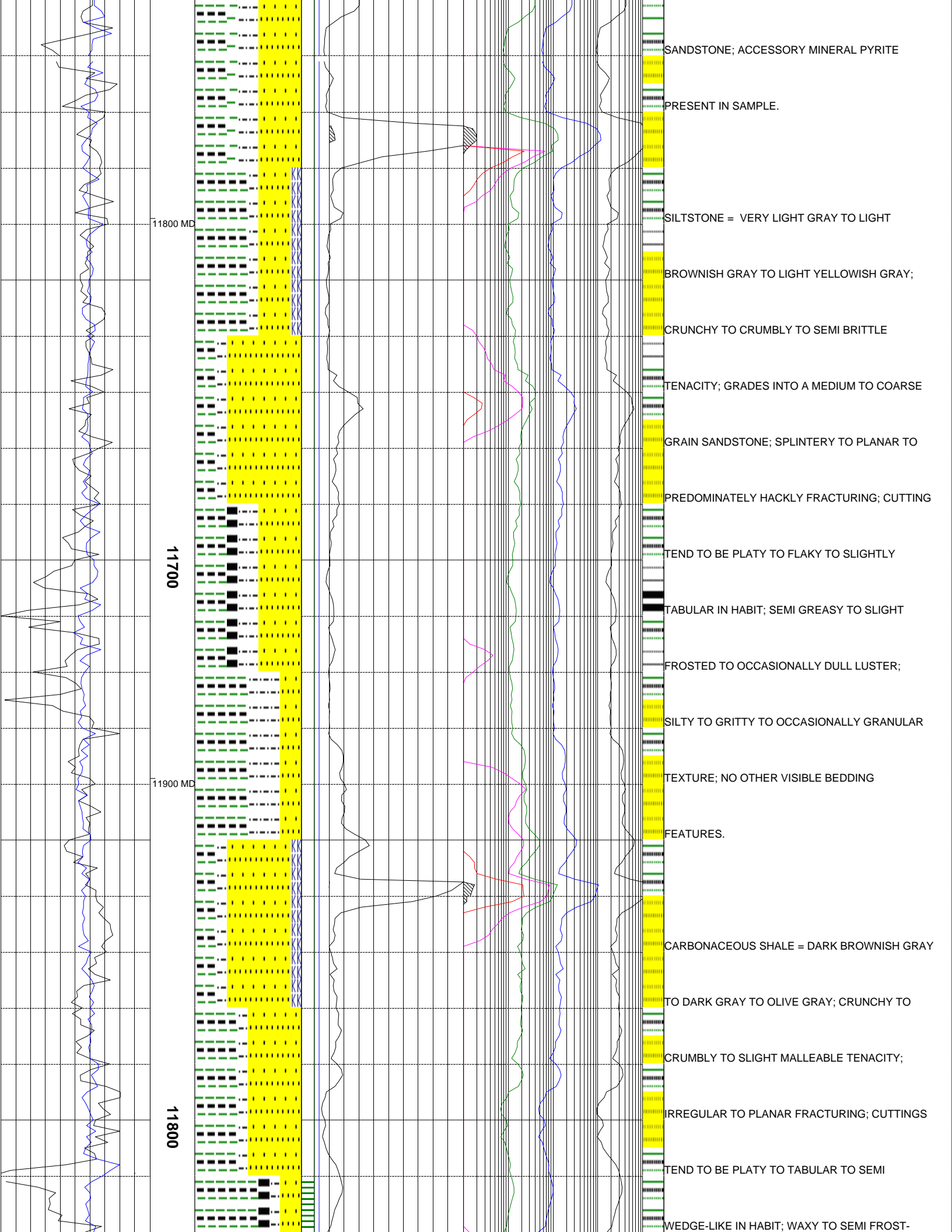


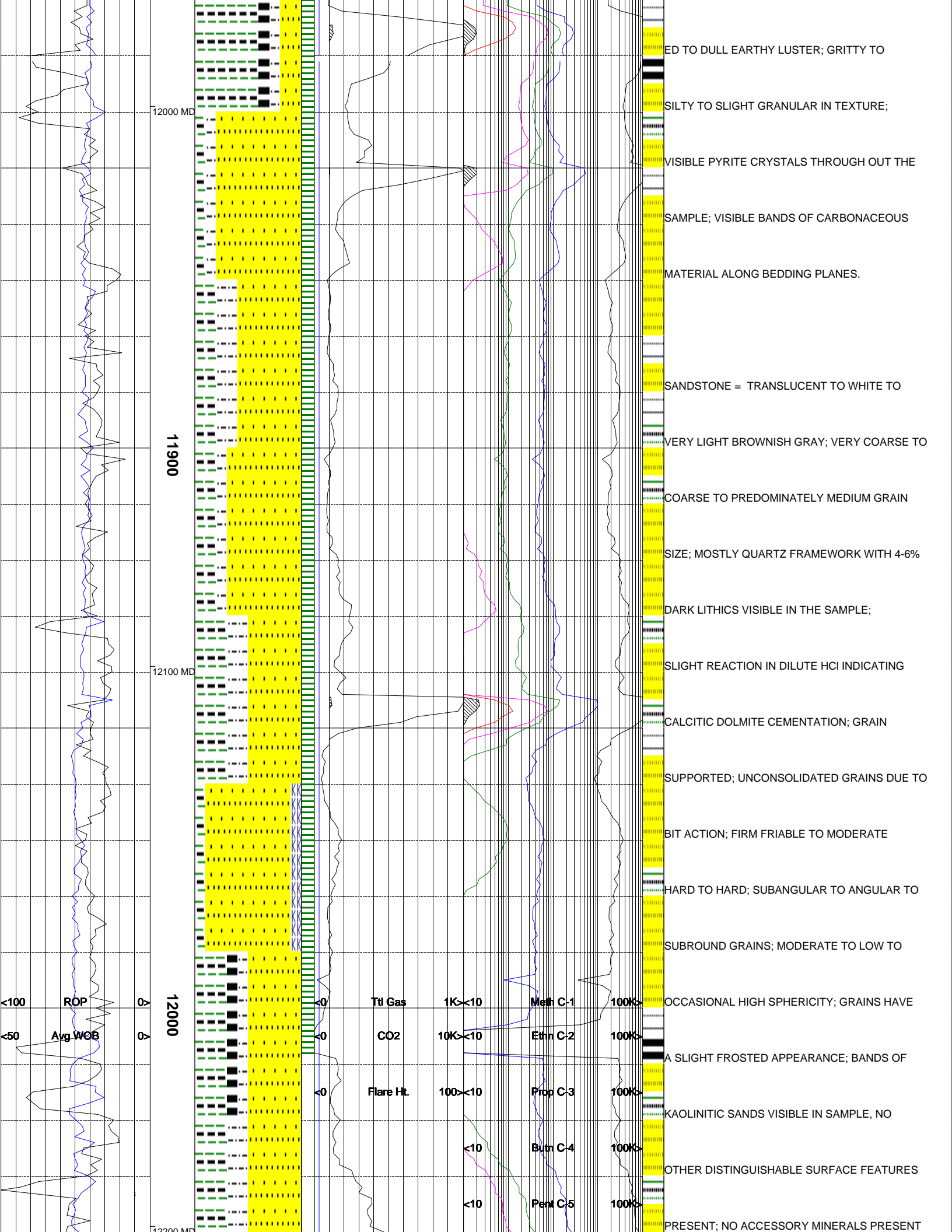












12000 MD

12100 MD

12200 MD

11900

12000

ED TO DULL EARTHY LUSTER; GRITTY TO

SILTY TO SLIGHT GRANULAR IN TEXTURE;

VISIBLE PYRITE CRYSTALS THROUGH OUT THE

SAMPLE; VISIBLE BANDS OF CARBONACEOUS

MATERIAL ALONG BEDDING PLANES.

SANDSTONE = TRANSLUCENT TO WHITE TO

VERY LIGHT BROWNISH GRAY; VERY COARSE TO

COARSE TO PREDOMINATELY MEDIUM GRAIN

SIZE; MOSTLY QUARTZ FRAMEWORK WITH 4-6%

DARK LITHICS VISIBLE IN THE SAMPLE;

SLIGHT REACTION IN DILUTE HCl INDICATING

CALCITIC DOLMITE CEMENTATION; GRAIN

SUPPORTED; UNCONSOLIDATED GRAINS DUE TO

BIT ACTION; FIRM FRIABLE TO MODERATE

HARD TO HARD; SUBANGULAR TO ANGULAR TO

SUBROUND GRAINS; MODERATE TO LOW TO

OCCASIONAL HIGH SPHERICITY; GRAINS HAVE

A SLIGHT FROSTED APPEARANCE; BANDS OF

KAOLINIC SANDS VISIBLE IN SAMPLE, NO

OTHER DISTINGUISHABLE SURFACE FEATURES

PRESENT; NO ACCESSORY MINERALS PRESENT

ROP

Avg WOB

Ttl Gas

CO2

Flare Ht.

Meth C-1

Ethn C-2

Prop C-3

Bum C-4

Pent C-5

1K<10

10K<10

100<10

<10

<10

100K>

100K>

100K>

100K>

100K>

>100

<50

<0

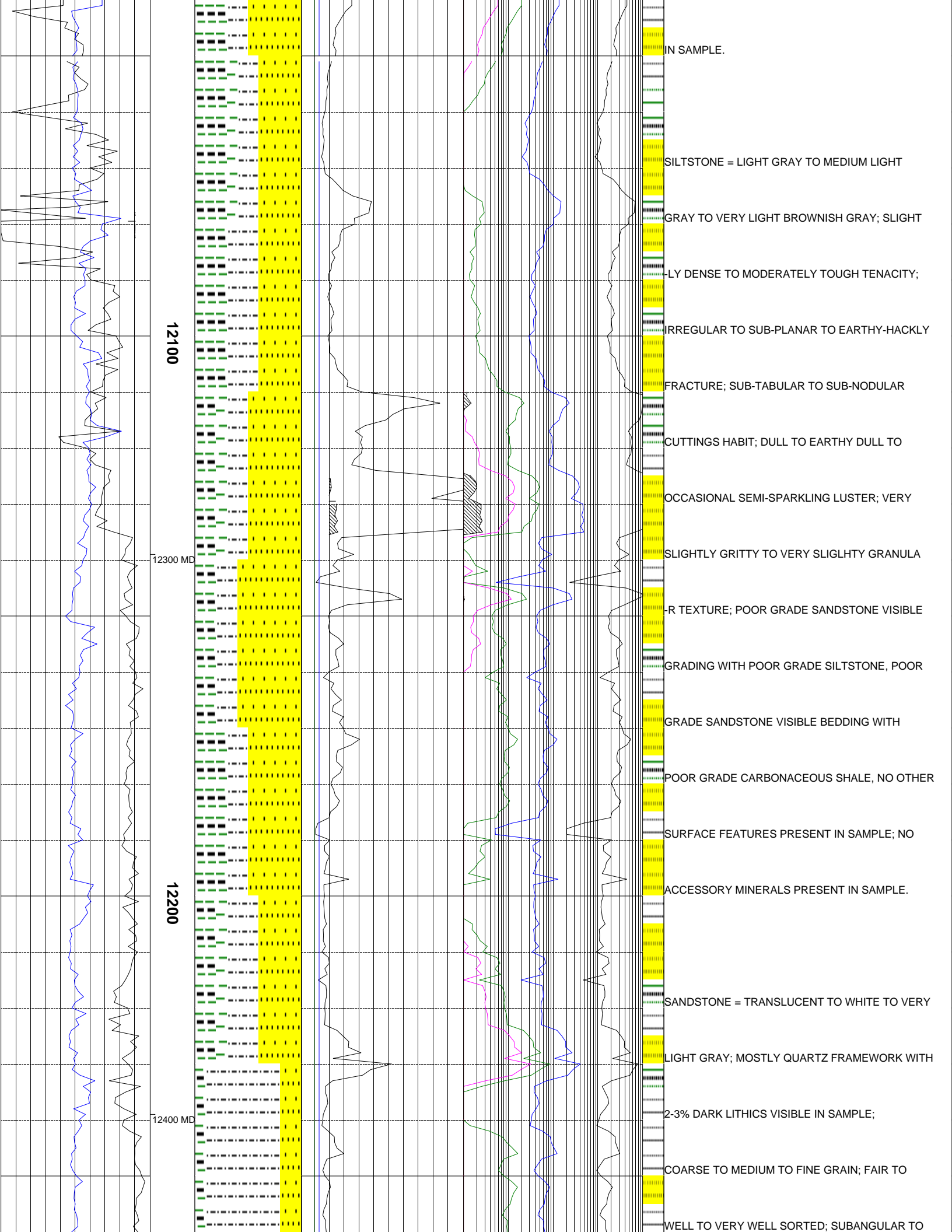
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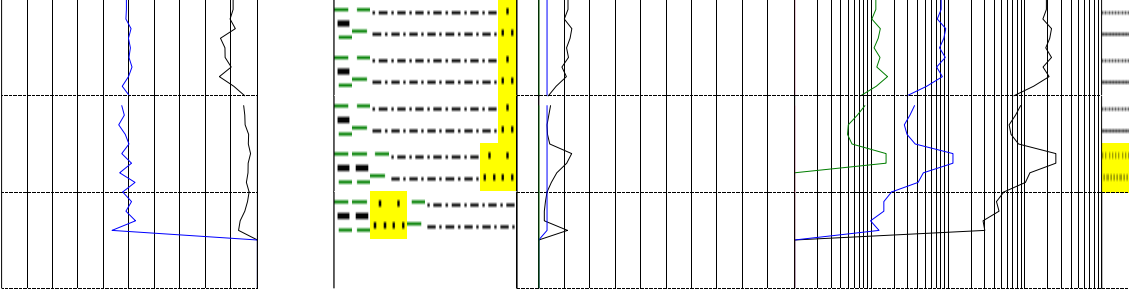
<0

<0

<0

12200 MD





SUBROUND TO PREDOMINATELY ROUND GRAINS.

TD FRU197-33B5 @ 12445' ON 05/13/2010.

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.

