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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 197-34A9
FIELD PICEANCE CREEK UNIT
REGION ROCKY MOUNTAINS
COORDINATES LAT: 39.918077
LONG: - 108.277049
ELEVATION G.L.: 6489.4'
RKB: 30.2'
COUNTY, STATE RIO BLANCO, CO
API INDEX 051031153600
SPUD DATE 03/15/2010
CONTRACTOR HELMERICH AND PAYNE
CO. REP. JOSH LOVE
RIG/TYPE HP 325 / FLEX 4S
LOGGING UNIT MLU 48
GEOLOGISTS MARK GROSS
DONNA NEW
ADD. PERSONS JENN SELL
CO. GEOLOGIST MELISSA SAURBORN

LOG INTERVAL

CASING DATA

DEPTHS: 3665' TO 12534'
DATES: 05/21/2010 TO 09/05/2010
SCALE: 5" = 100'

10.75" AT 3654'
7.00" AT 8503'
AT
AT

MUD TYPES

HOLE SIZE

SPUD MUD TO 3665'
LSND TO 12534'
TO
TO

14.75" TO 3665'
9.875" TO 8522'
6.125" TO 12534'
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, KAOLINITIC, 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.

<300 ROP 0>  
ft/hr

<50 Avg WOB 0>  
klbs

<0 Gamma 100>  
API Units

**TVD Depth**

**Lithology**

MGS

<0 Ttl Gas 1K>  
units

<0 CO2 50K>  
ppm

<0 Flare Ht. 100>  
ft

<10 Meth C-1 100K>  
ppm

<10 Ethn C-2 100K>

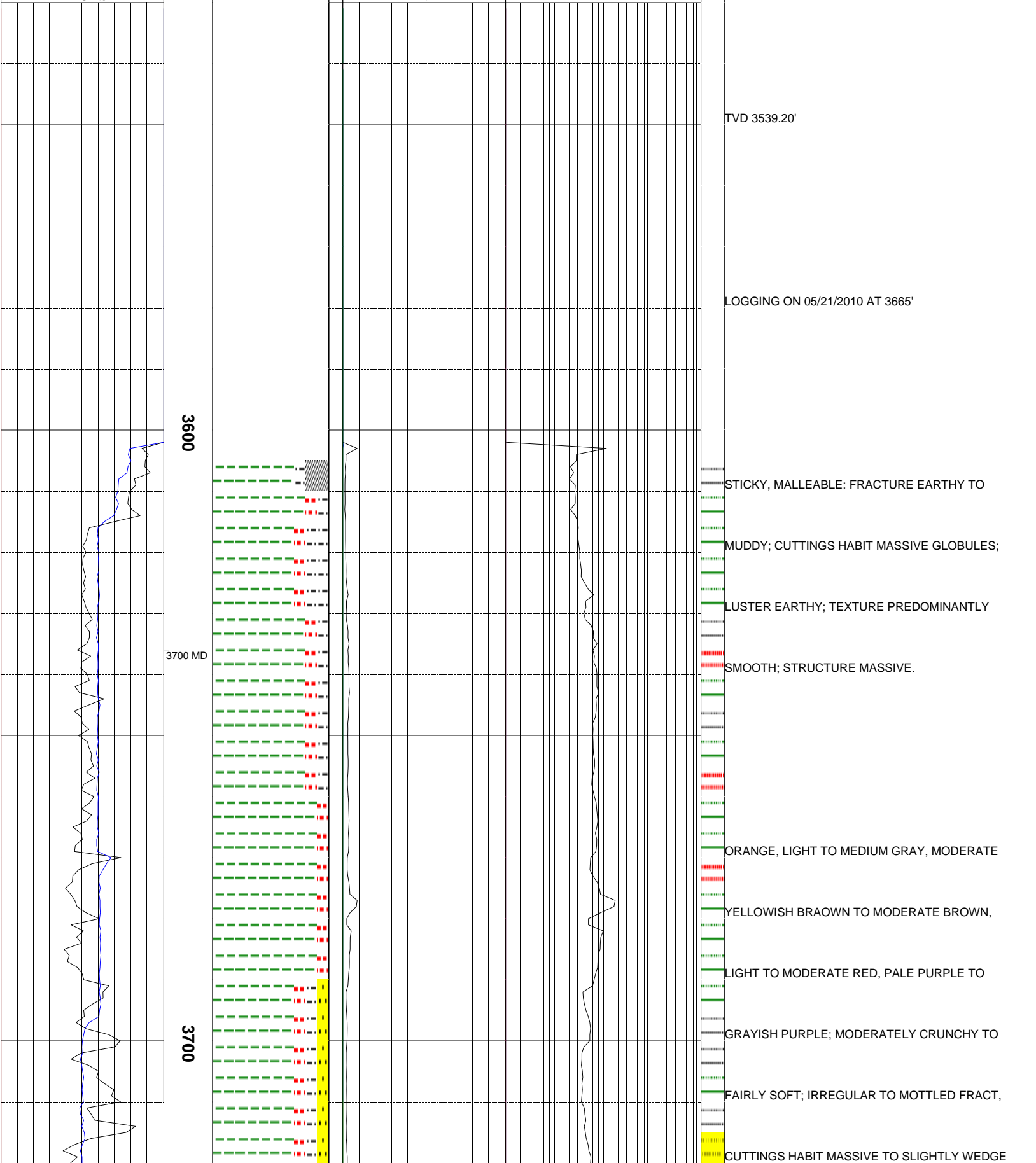
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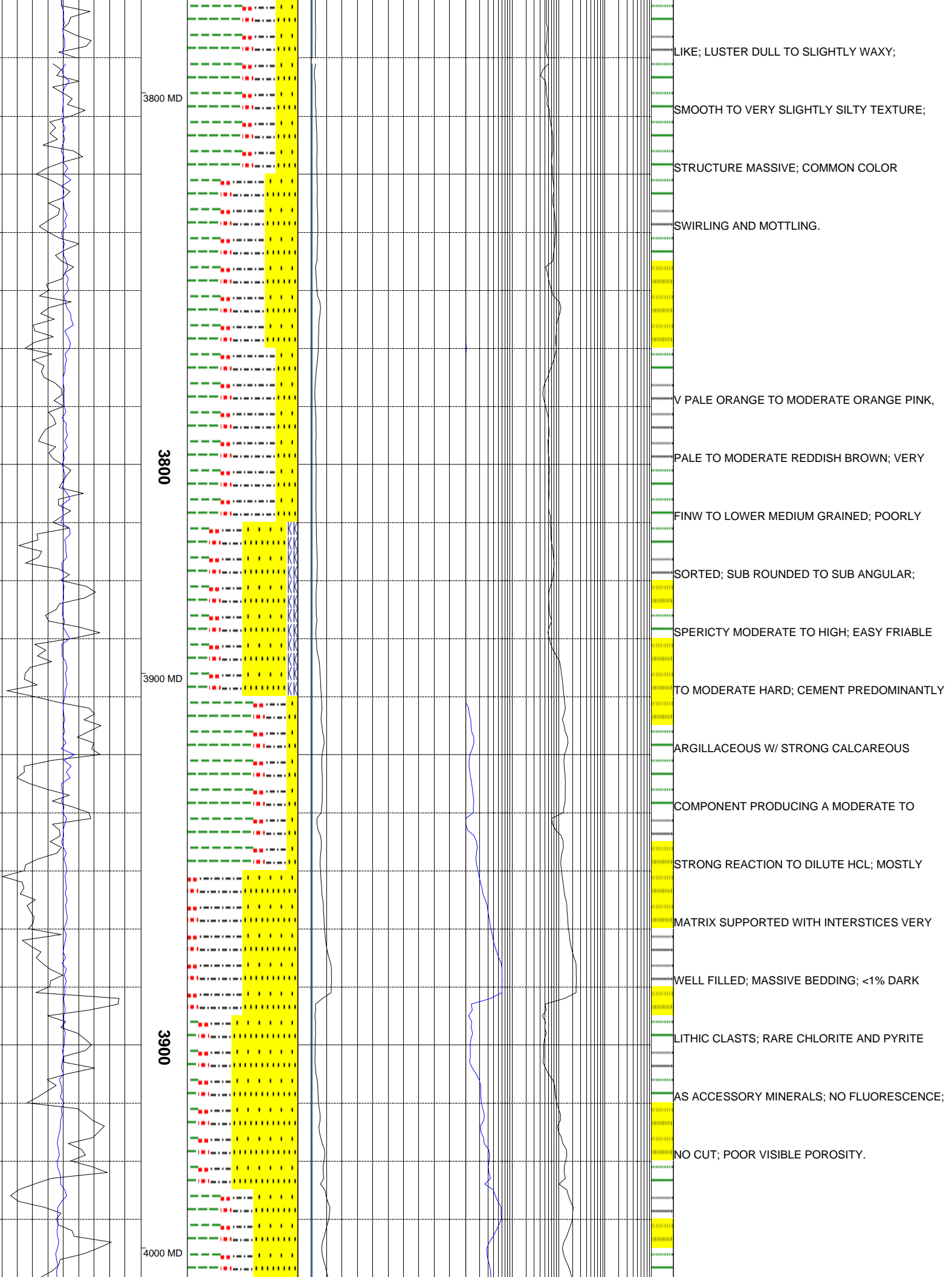
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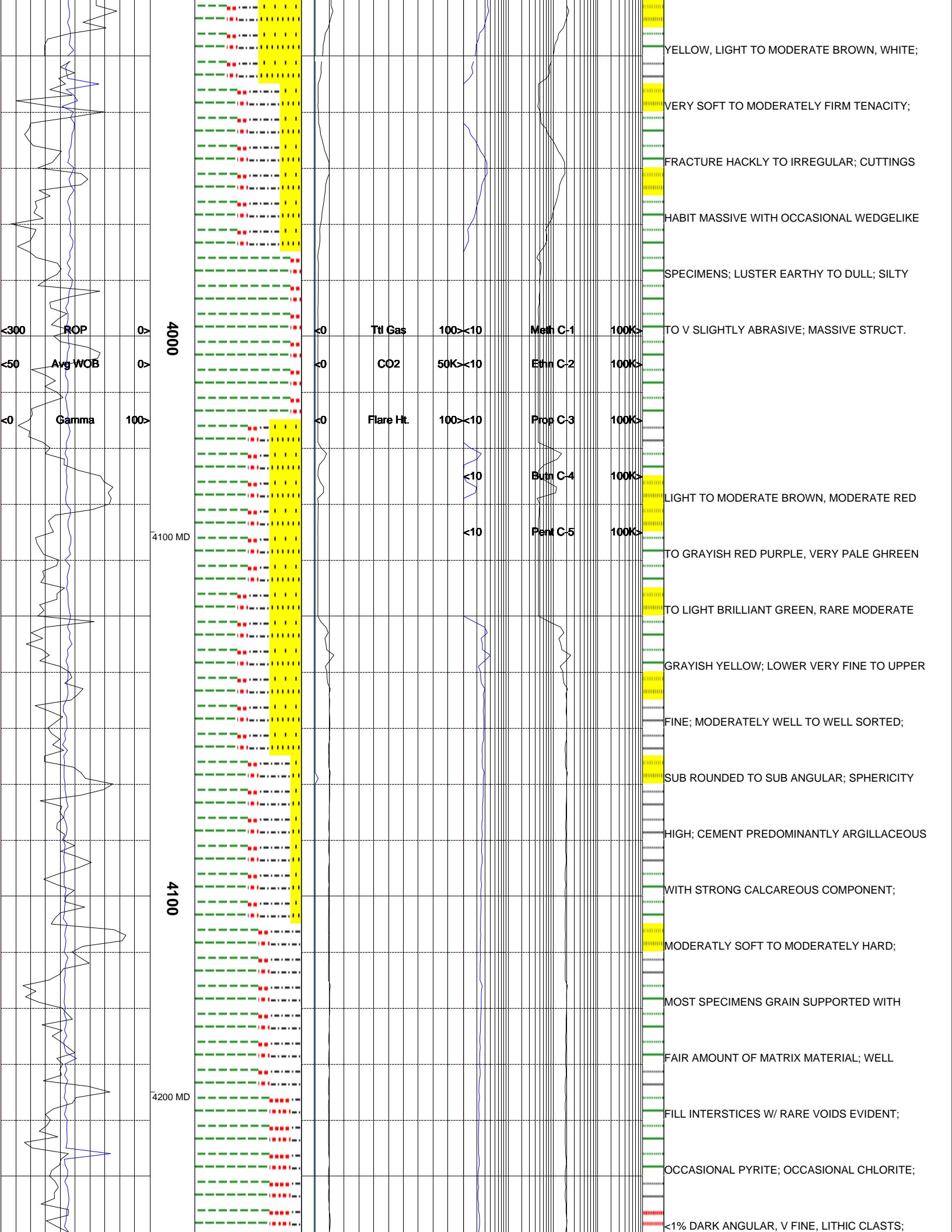
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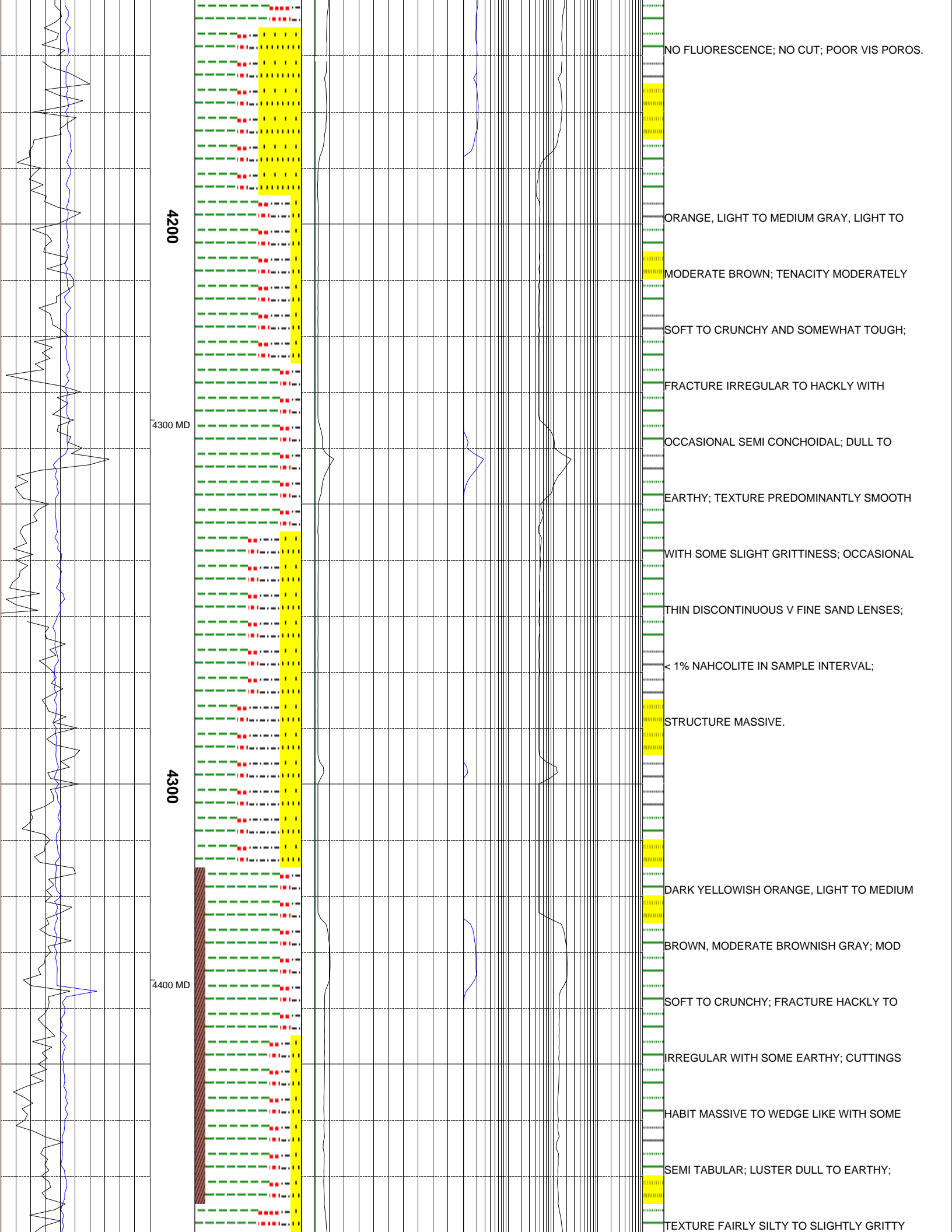
**Interp. Lith**

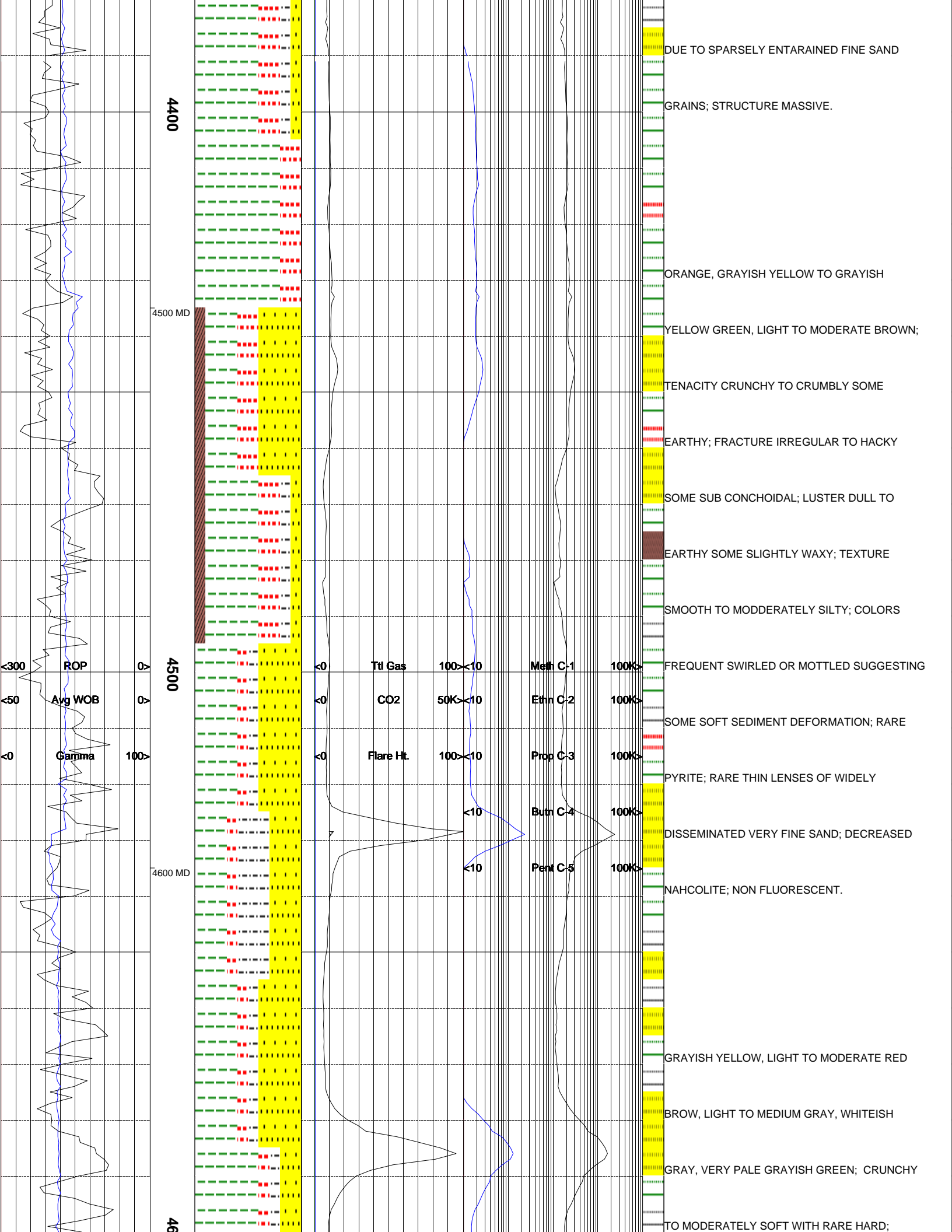
**Remarks**  
Survey Data, Mud Reports, Other Info.

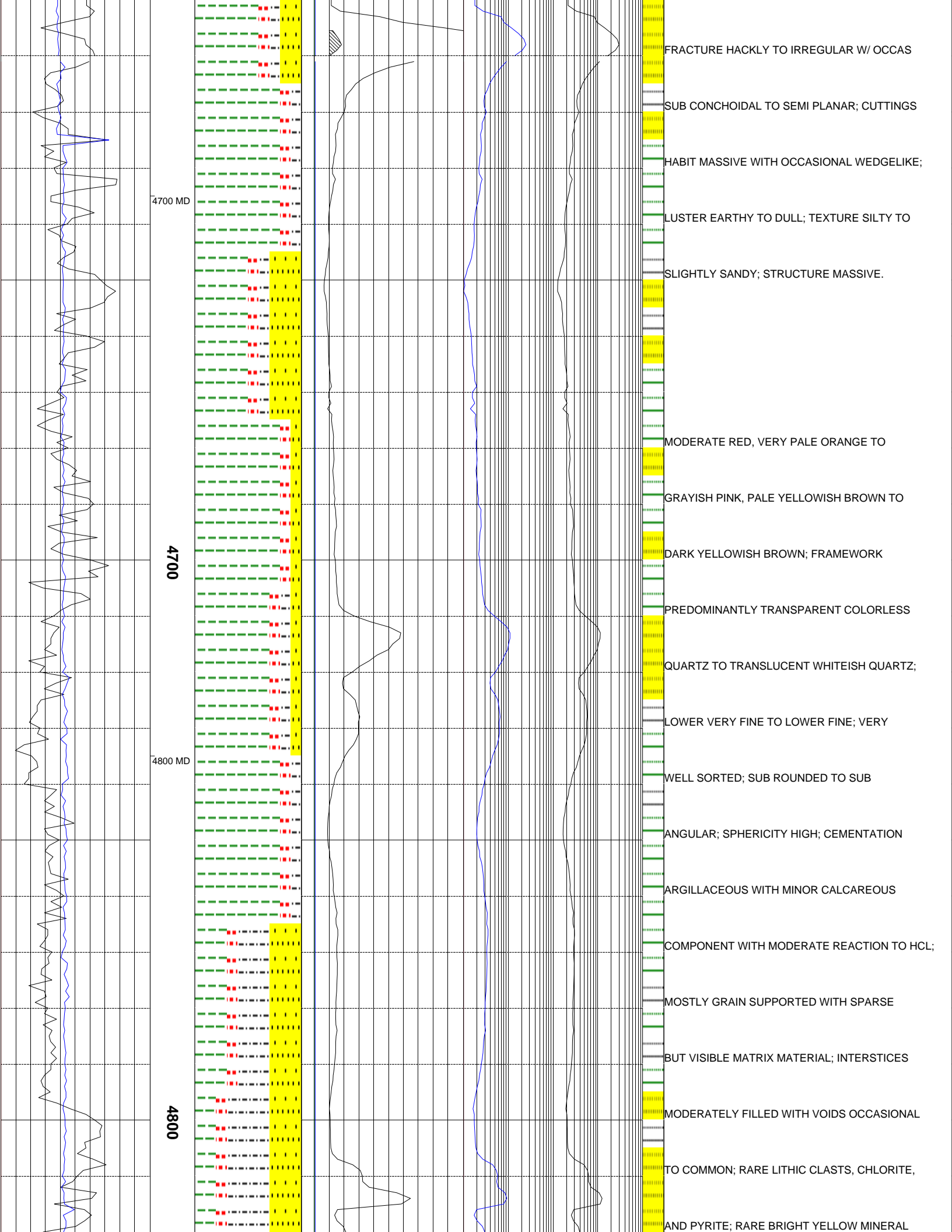


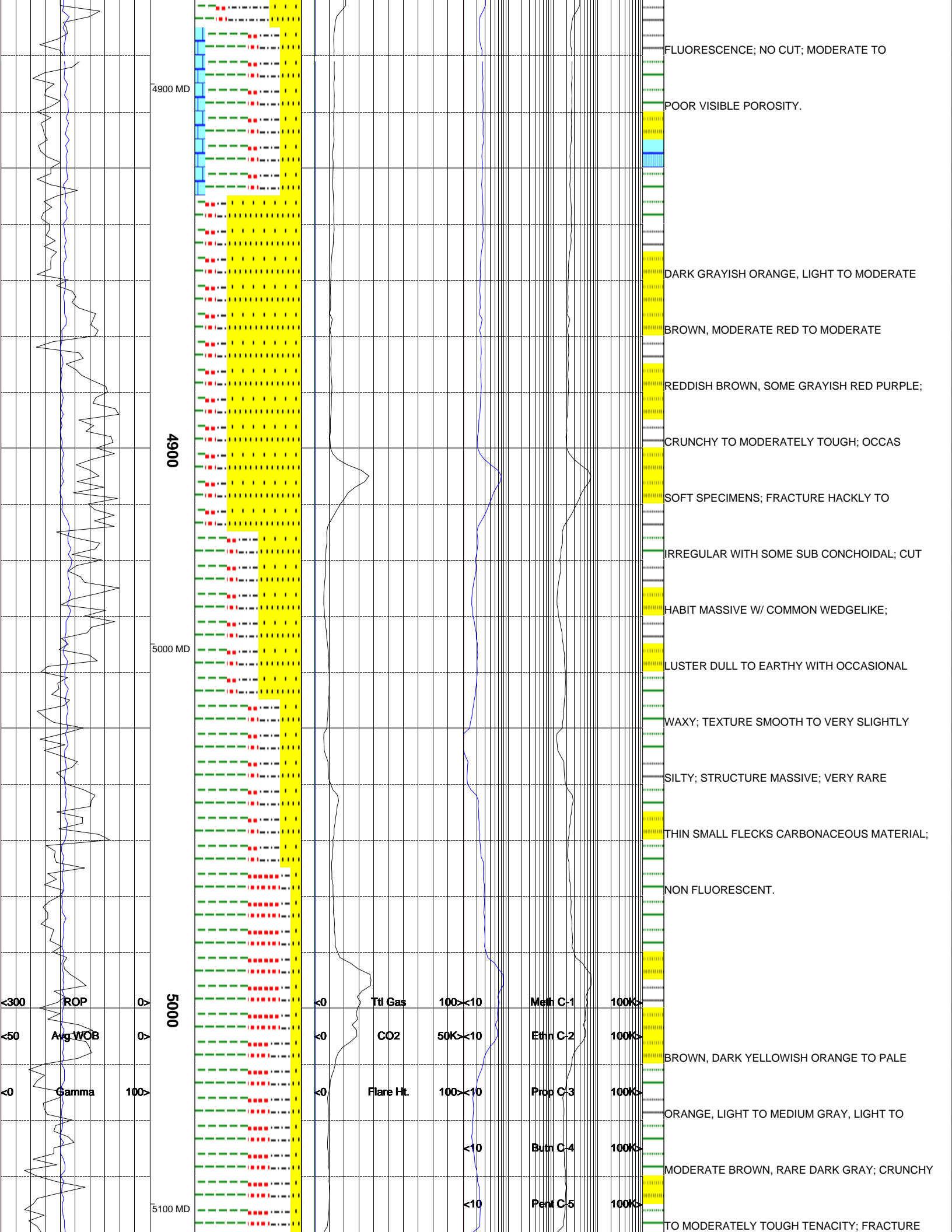












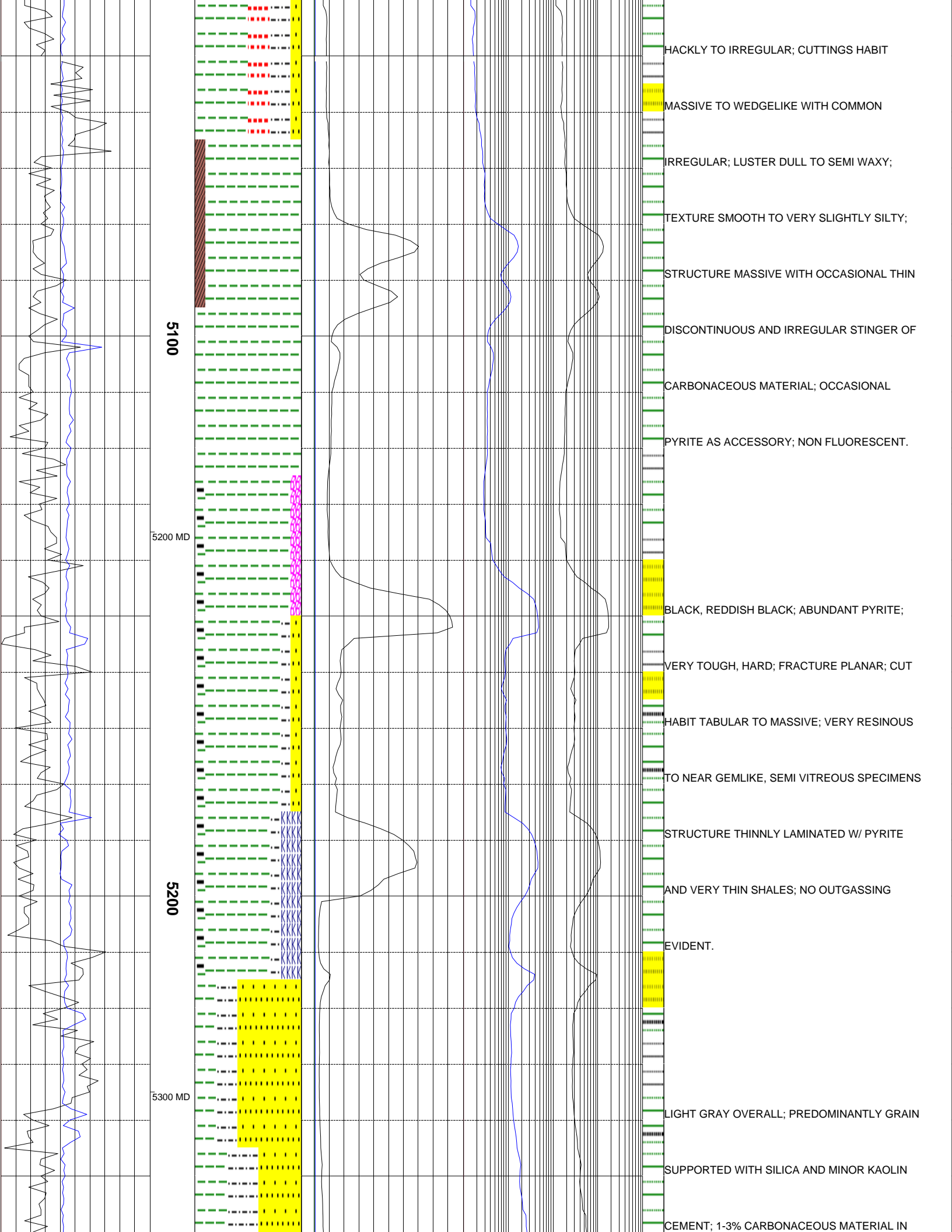
4900 MD  
4900  
5000 MD  
5000  
5100 MD

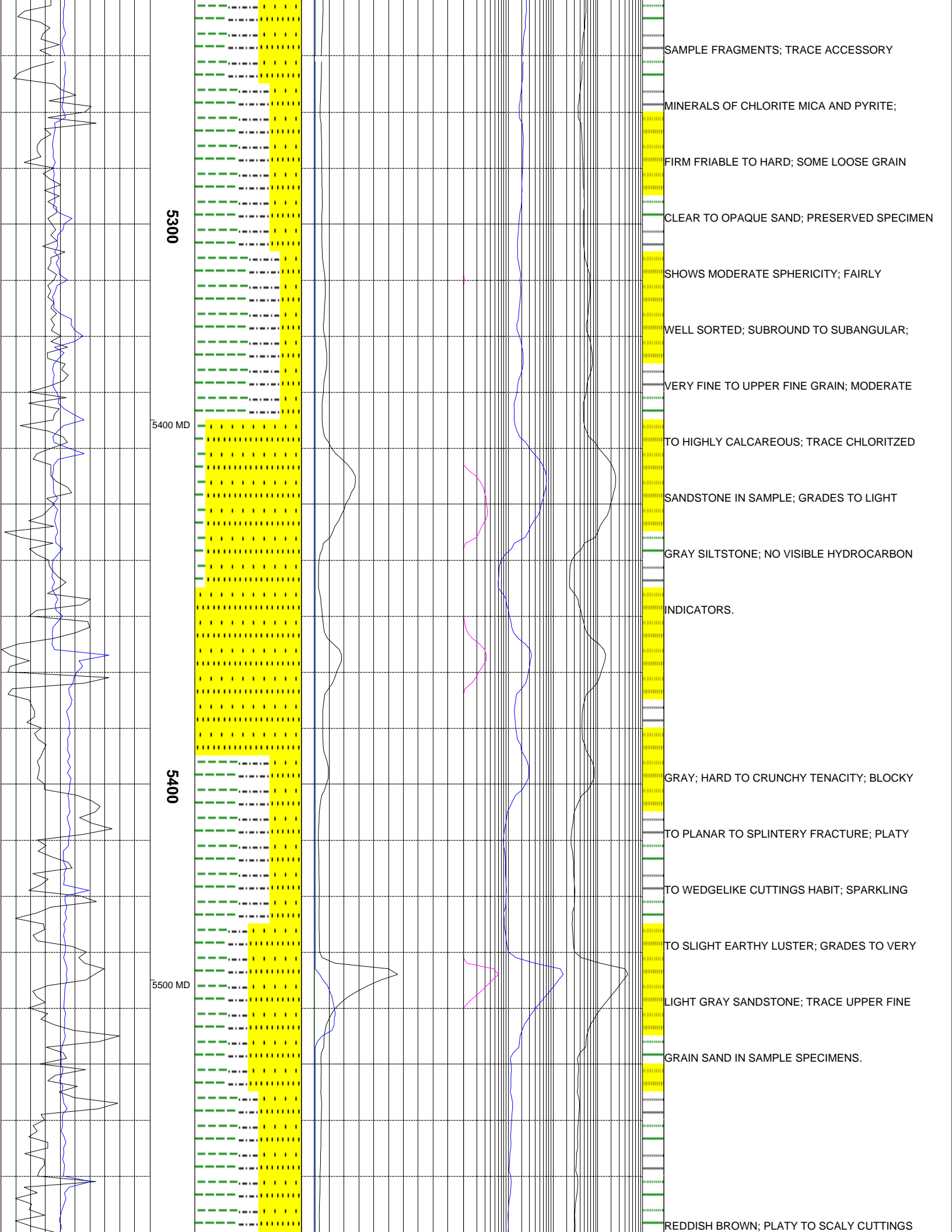
300 ROP  
50 Avg WOB  
100 Gamma

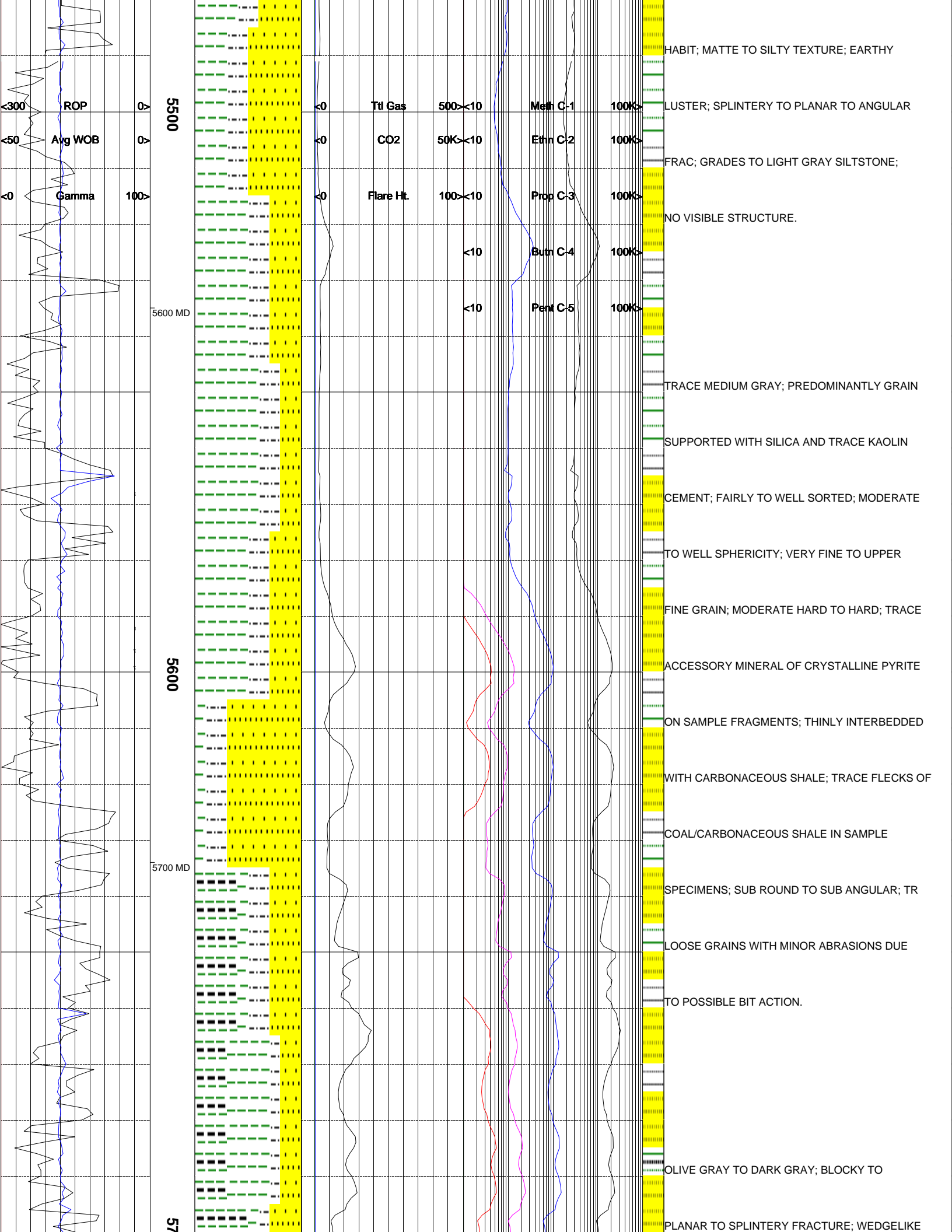
Ttl Gas 100 < 10  
CO2 50K < 10  
Flare Ht. 100 < 10  
< 10  
< 10

FLUORESCENCE; NO CUT; MODERATE TO  
POOR VISIBLE POROSITY.  
DARK GRAYISH ORANGE, LIGHT TO MODERATE  
BROWN, MODERATE RED TO MODERATE  
REDDISH BROWN, SOME GRAYISH RED PURPLE;  
CRUNCHY TO MODERATELY TOUGH; OCCAS  
SOFT SPECIMENS; FRACTURE HACKLY TO  
IRREGULAR WITH SOME SUB CONCHOIDAL; CUT  
HABIT MASSIVE W/ COMMON WEDGELIKE;  
LUSTER DULL TO EARTHY WITH OCCASIONAL  
WAXY; TEXTURE SMOOTH TO VERY SLIGHTLY  
SILTY; STRUCTURE MASSIVE; VERY RARE  
THIN SMALL FLECKS CARBONACEOUS MATERIAL;  
NON FLUORESCENT.  
BROWN, DARK YELLOWISH ORANGE TO PALE  
ORANGE, LIGHT TO MEDIUM GRAY, LIGHT TO  
MODERATE BROWN, RARE DARK GRAY; CRUNCHY  
TO MODERATELY TOUGH TENACITY; FRACTURE

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







5500

5600 MD

5600

5700 MD

57

ROP  
Avg WOB  
Gamma

Ttl Gas 500  
CO2 50K  
Flare Ht. 100  
Meth C-1 100K  
Ethn C-2 100K  
Prop C-3 100K  
Butn C-4 100K  
Pent C-5 100K

HABIT; MATTE TO SILTY TEXTURE; EARTHY

LUSTER; SPLINTERY TO PLANAR TO ANGULAR

FRAC; GRADES TO LIGHT GRAY SILTSTONE;

NO VISIBLE STRUCTURE.

TRACE MEDIUM GRAY; PREDOMINANTLY GRAIN

SUPPORTED WITH SILICA AND TRACE KAOLIN

CEMENT; FAIRLY TO WELL SORTED; MODERATE

TO WELL SPHERICITY; VERY FINE TO UPPER

FINE GRAIN; MODERATE HARD TO HARD; TRACE

ACCESSORY MINERAL OF CRYSTALLINE PYRITE

ON SAMPLE FRAGMENTS; THINLY INTERBEDDED

WITH CARBONACEOUS SHALE; TRACE FLECKS OF

COAL/CARBONACEOUS SHALE IN SAMPLE

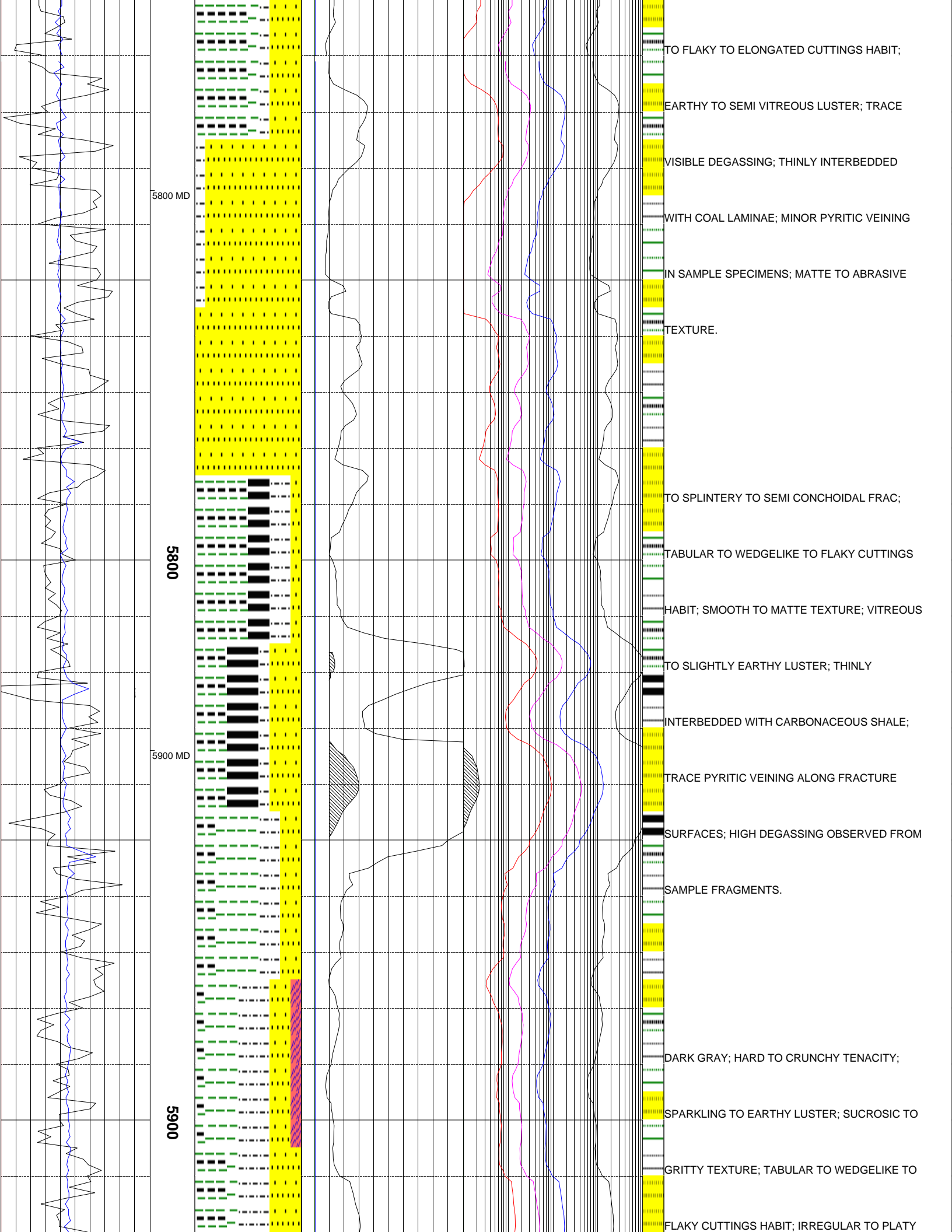
SPECIMENS; SUB ROUND TO SUB ANGULAR; TR

LOOSE GRAINS WITH MINOR ABRASIONS DUE

TO POSSIBLE BIT ACTION.

OLIVE GRAY TO DARK GRAY; BLOCKY TO

PLANAR TO SPLINTERY FRACTURE; WEDGELIKE

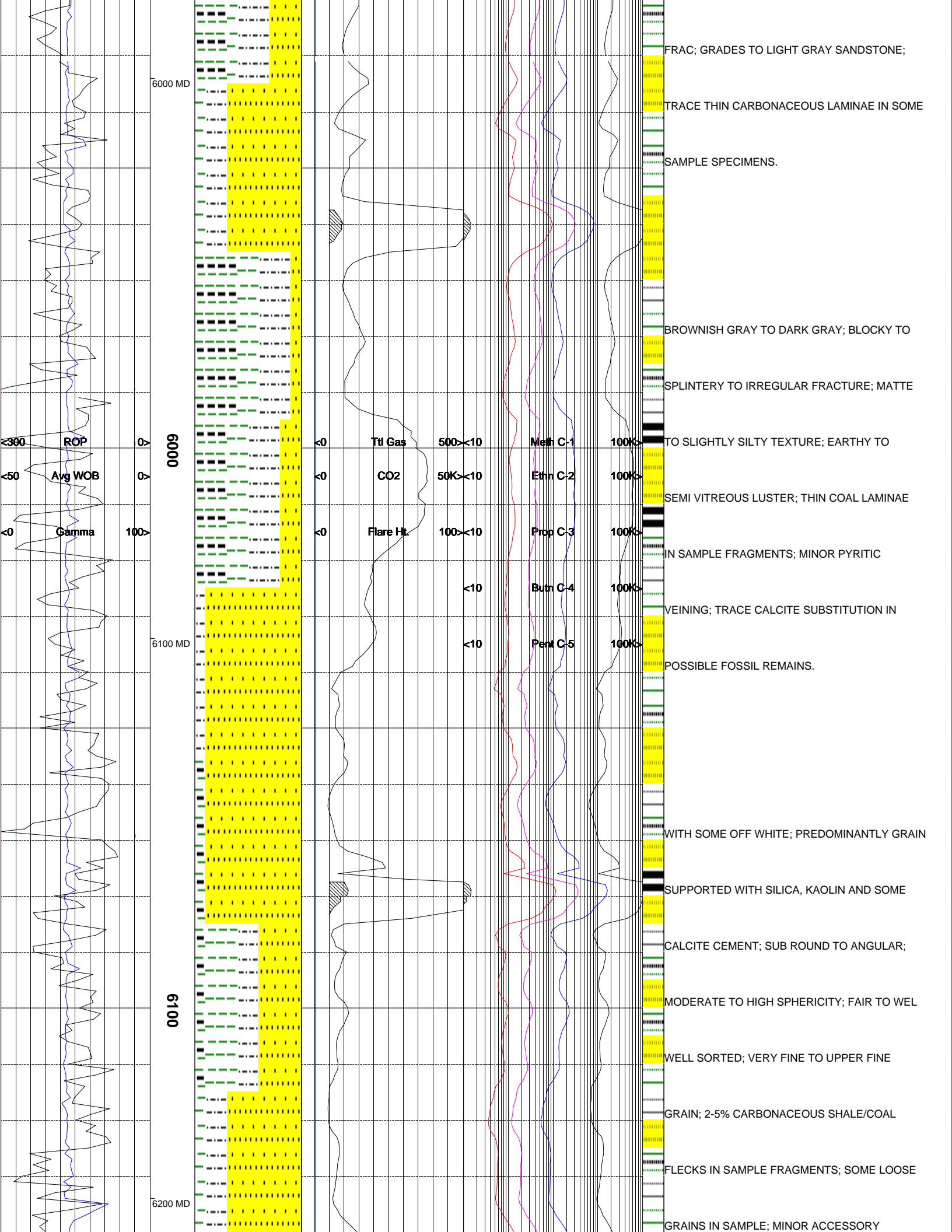


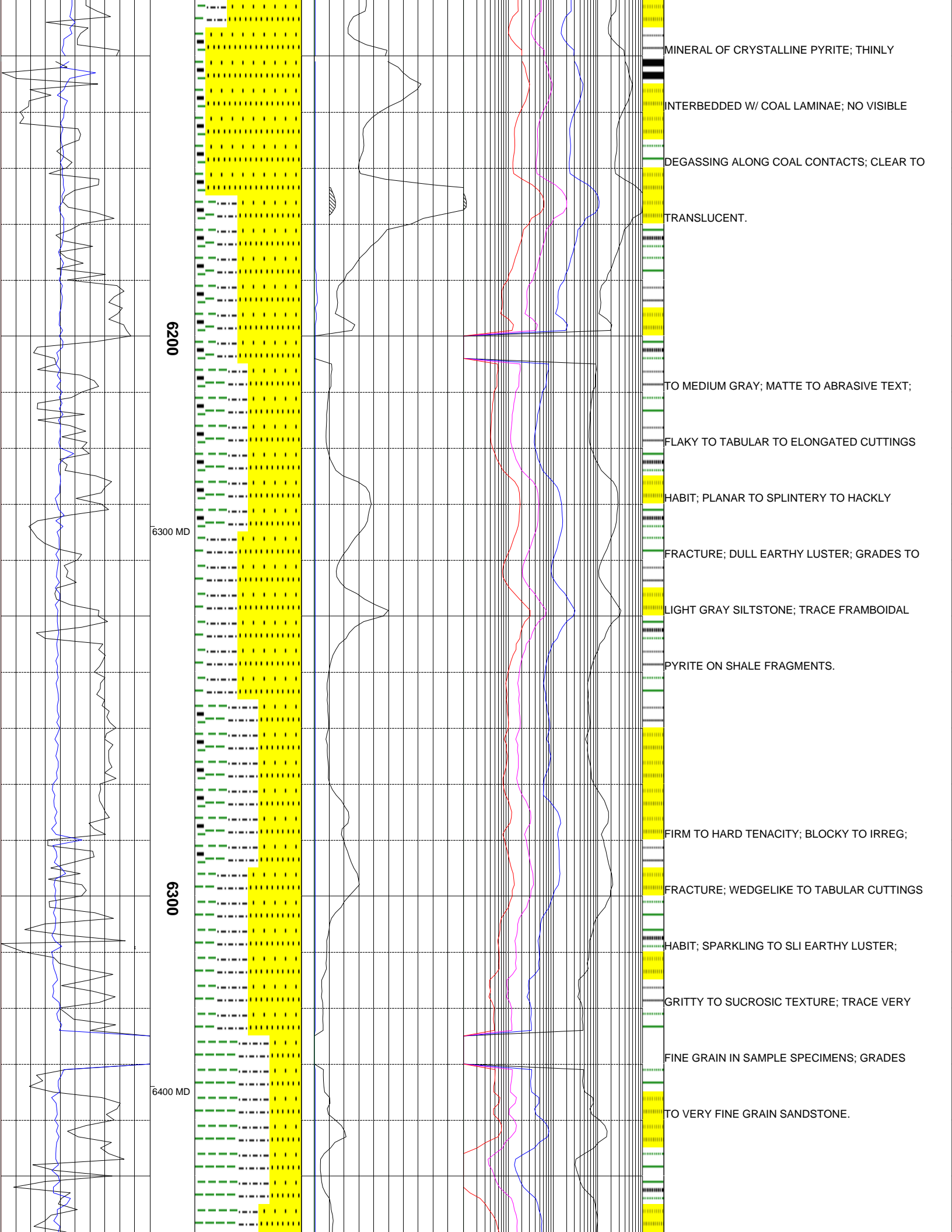
5800 MD

5800

5900 MD

5900





6200

6300 MD

6300

6400 MD

MINERAL OF CRYSTALLINE PYRITE; THINLY

INTERBEDDED W/ COAL LAMINAE; NO VISIBLE

DEGASSING ALONG COAL CONTACTS; CLEAR TO

TRANSLUCENT.

TO MEDIUM GRAY; MATTE TO ABRASIVE TEXT;

FLAKY TO TABULAR TO ELONGATED CUTTINGS

HABIT; PLANAR TO SPLINTERY TO HACKLY

FRACTURE; DULL EARTHLY LUSTER; GRADES TO

LIGHT GRAY SILTSTONE; TRACE FRAMBOIDAL

PYRITE ON SHALE FRAGMENTS.

FIRM TO HARD TENACITY; BLOCKY TO IRREG;

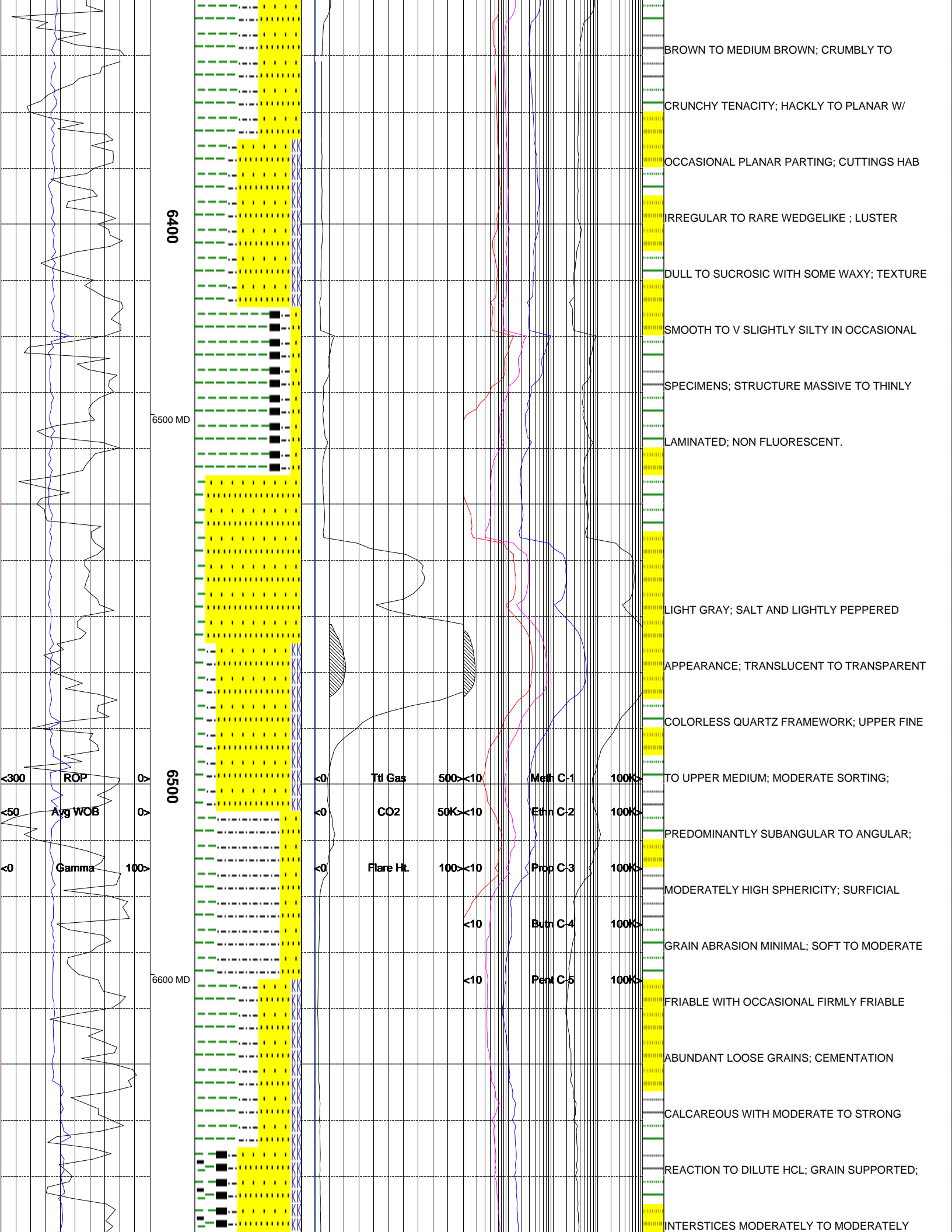
FRACTURE; WEDGELIKE TO TABULAR CUTTINGS

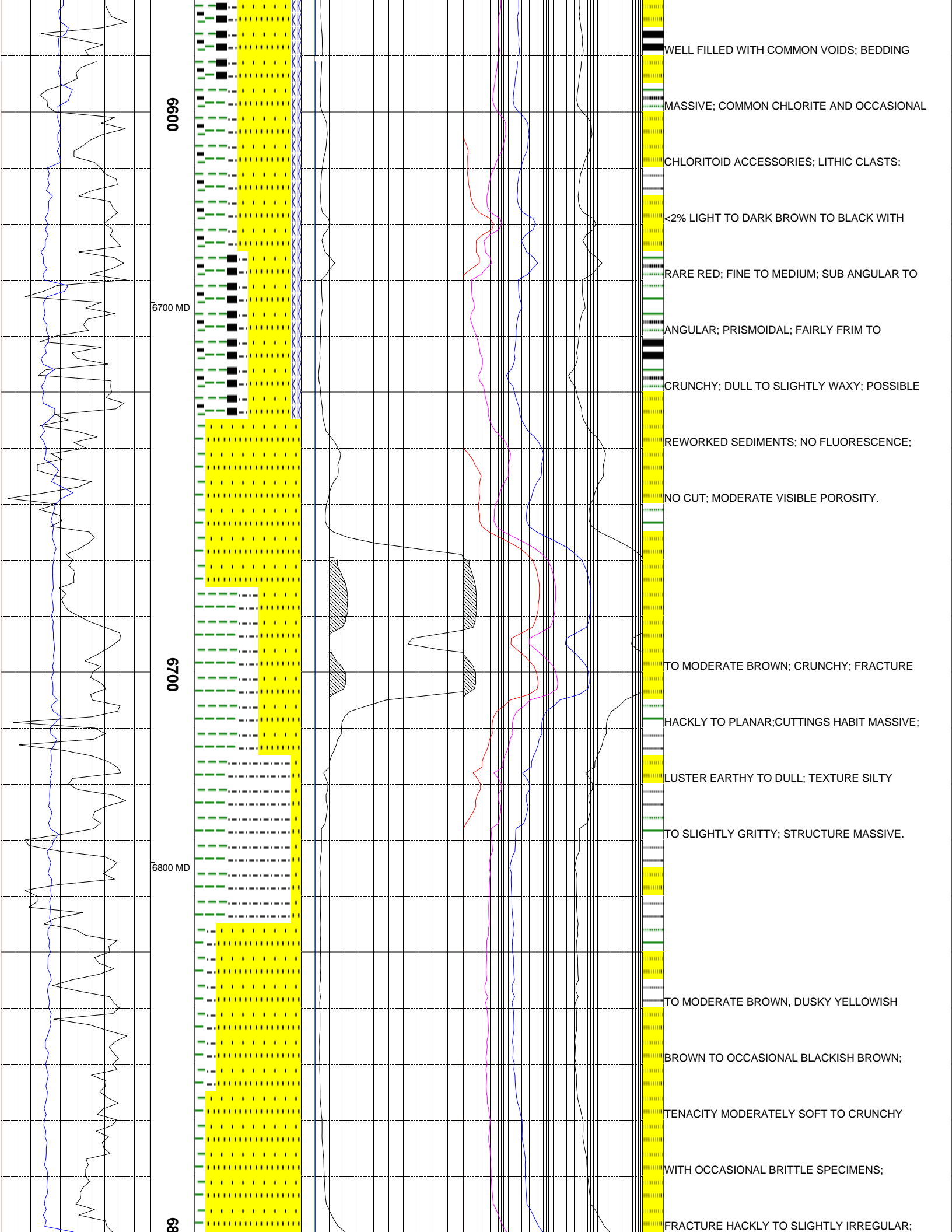
HABIT; SPARKLING TO SLI EARTHLY LUSTER;

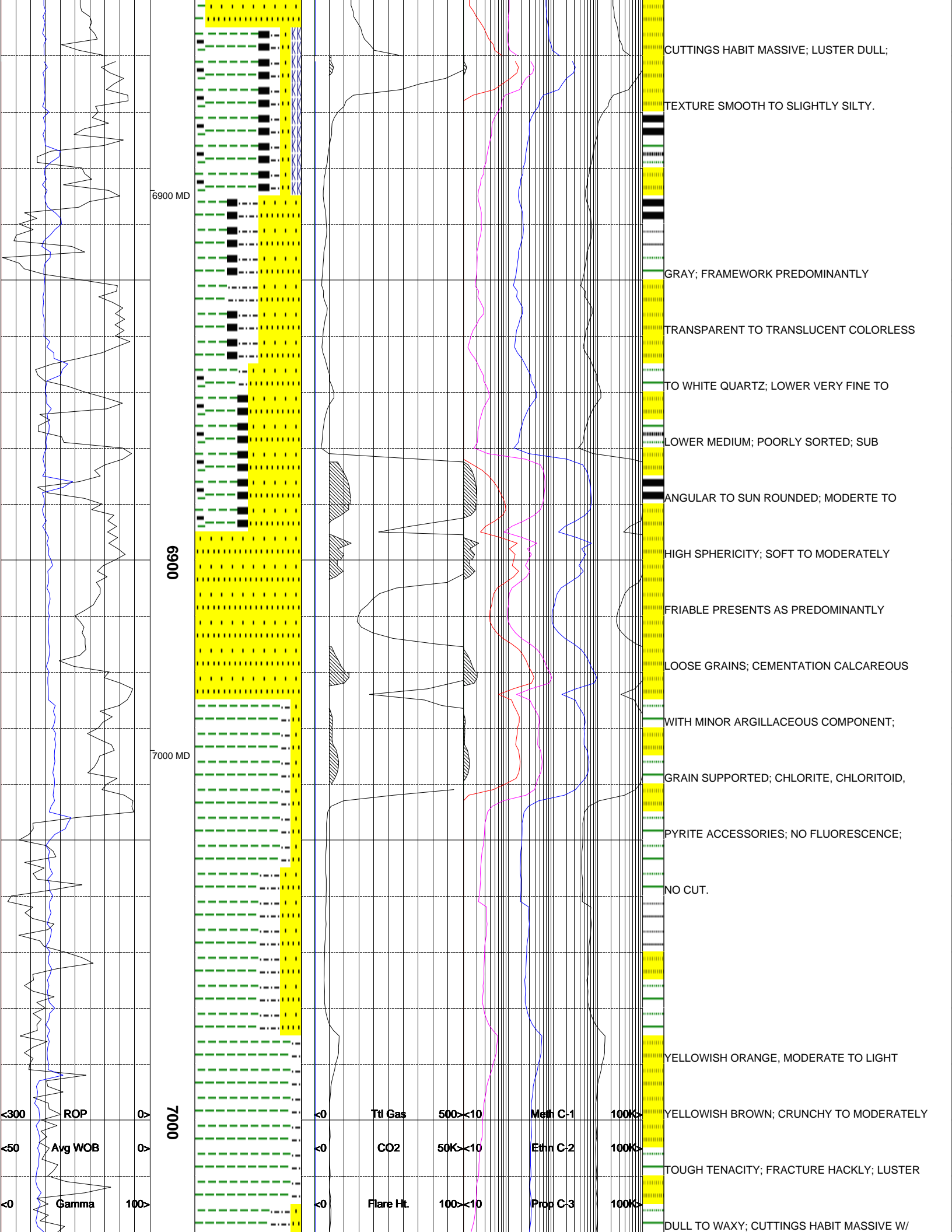
GRITTY TO SUCROSIC TEXTURE; TRACE VERY

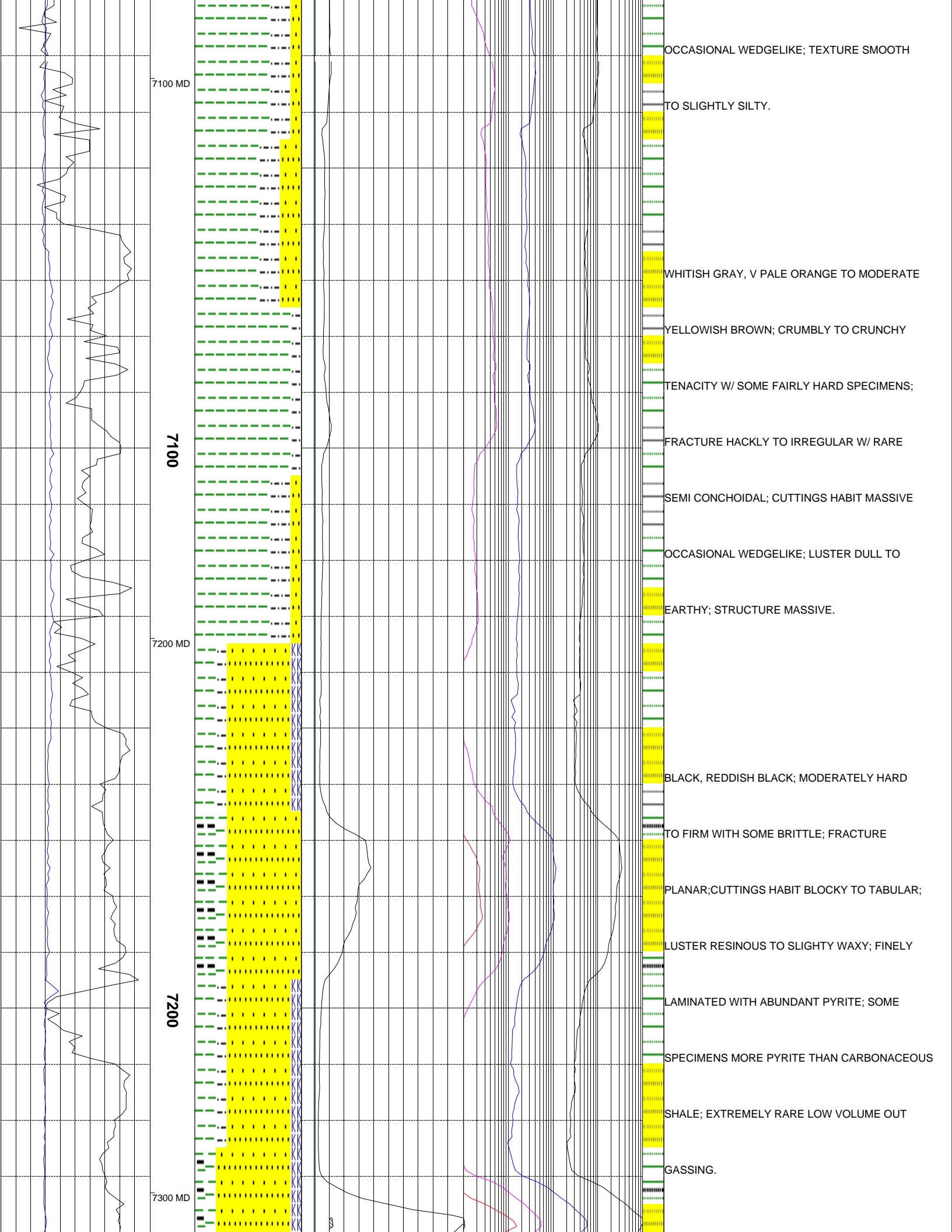
FINE GRAIN IN SAMPLE SPECIMENS; GRADES

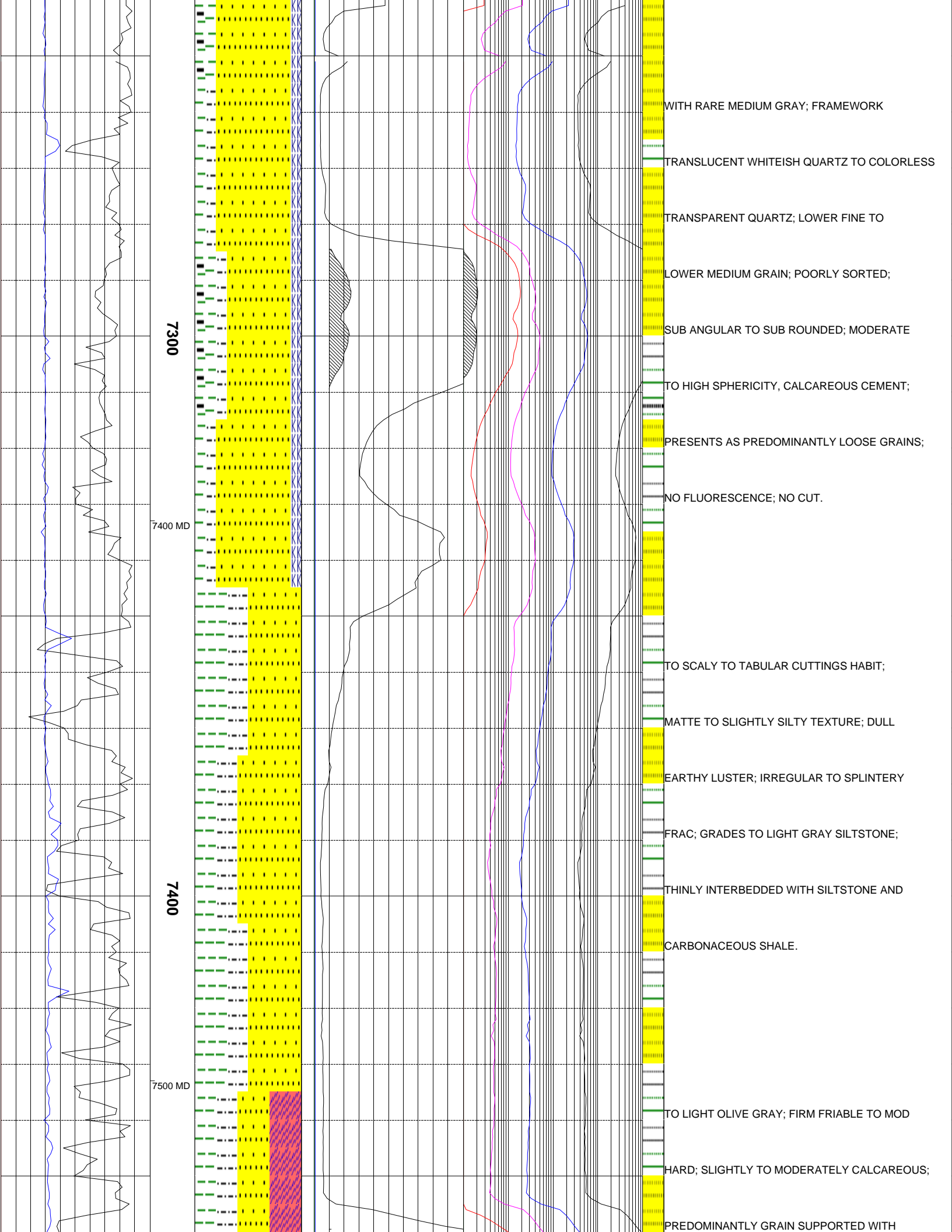
TO VERY FINE GRAIN SANDSTONE.

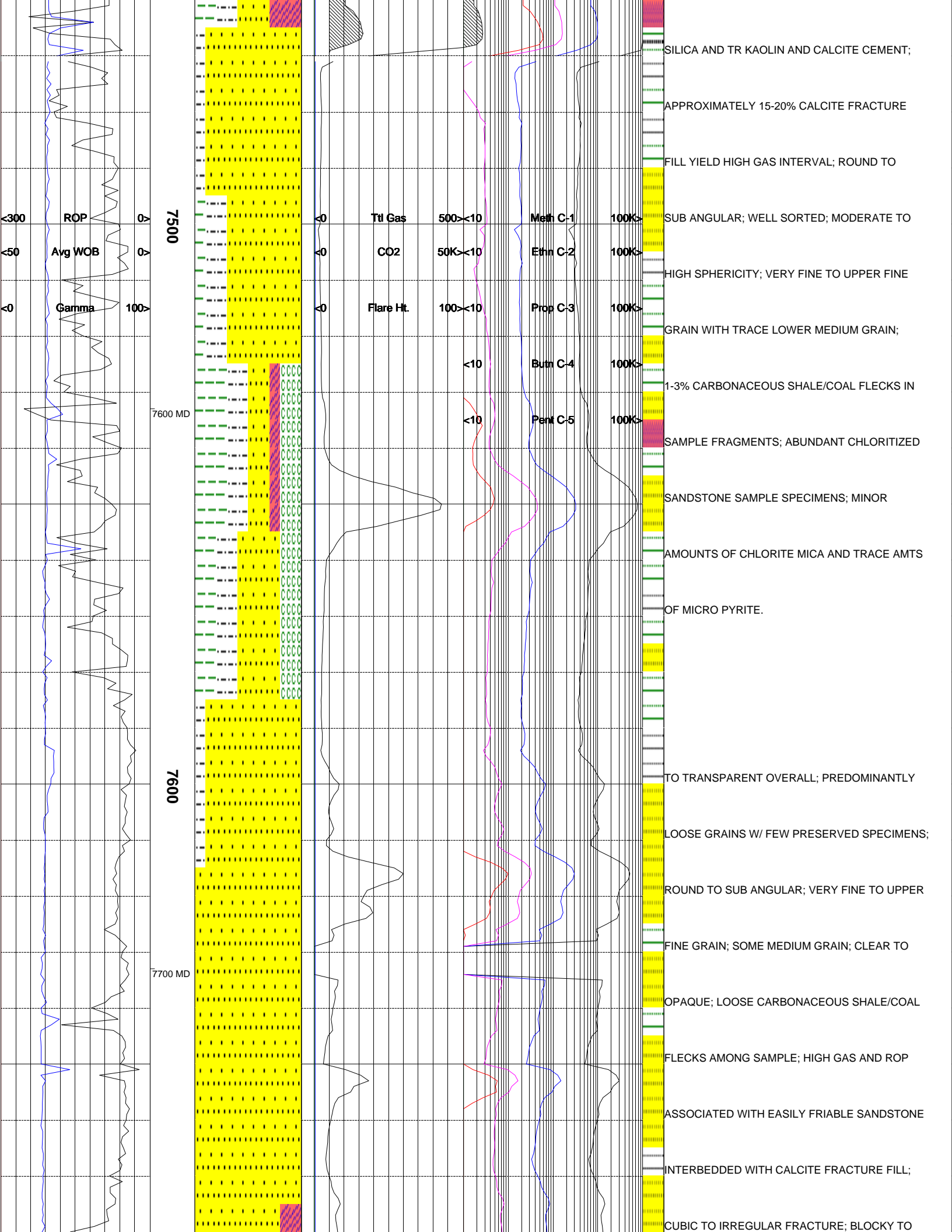












300 ROP  
 50 Avg WOB  
 100 Gamma

7500

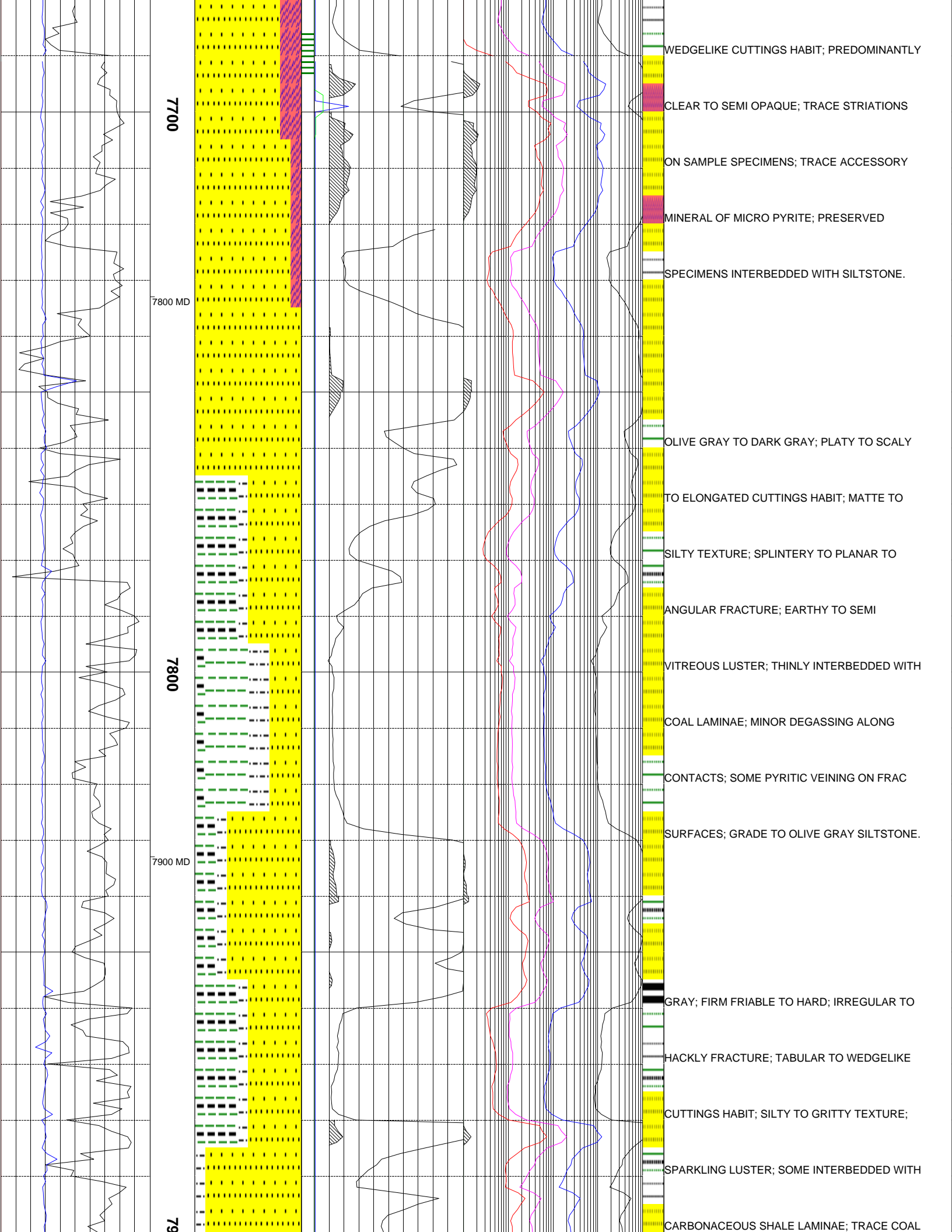
7600 MD

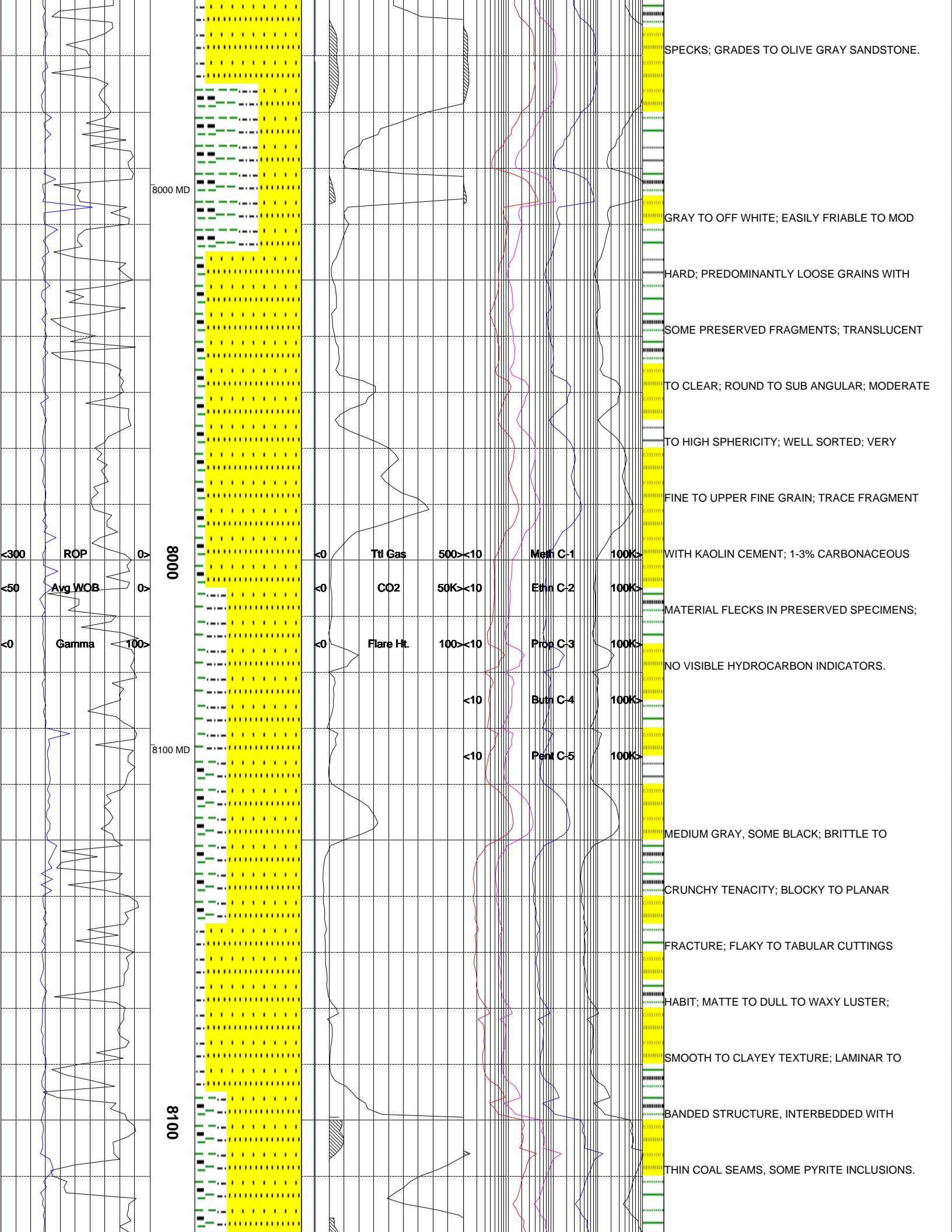
7600

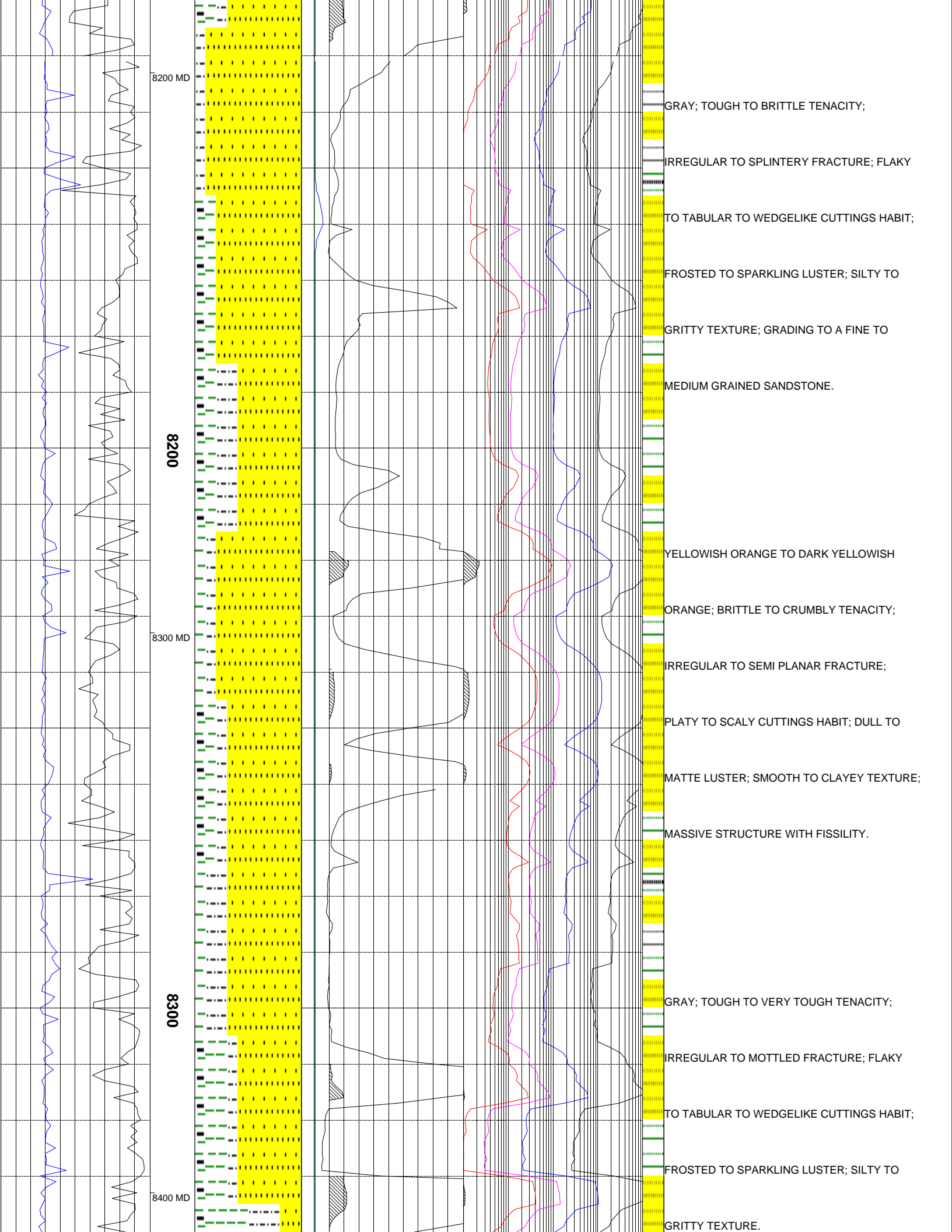
7700 MD

Ttl Gas 500 < 10  
 Meth C-1 100K >  
 CO2 50K < 10  
 Ethn C-2 100K >  
 Flare Ht. 100 < 10  
 Prop C-3 100K >  
 Butn C-4 < 10  
 Pent C-5 100K >

SILICA AND TR KAOLIN AND CALCITE CEMENT;  
 APPROXIMATELY 15-20% CALCITE FRACTURE  
 FILL YIELD HIGH GAS INTERVAL; ROUND TO  
 SUB ANGULAR; WELL SORTED; MODERATE TO  
 HIGH SPHERICITY; VERY FINE TO UPPER FINE  
 GRAIN WITH TRACE LOWER MEDIUM GRAIN;  
 1-3% CARBONACEOUS SHALE/COAL FLECKS IN  
 SAMPLE FRAGMENTS; ABUNDANT CHLORITIZED  
 SANDSTONE SAMPLE SPECIMENS; MINOR  
 AMOUNTS OF CHLORITE MICA AND TRACE AMTS  
 OF MICRO PYRITE.  
 TO TRANSPARENT OVERALL; PREDOMINANTLY  
 LOOSE GRAINS W/ FEW PRESERVED SPECIMENS;  
 ROUND TO SUB ANGULAR; VERY FINE TO UPPER  
 FINE GRAIN; SOME MEDIUM GRAIN; CLEAR TO  
 OPAQUE; LOOSE CARBONACEOUS SHALE/COAL  
 FLECKS AMONG SAMPLE; HIGH GAS AND ROP  
 ASSOCIATED WITH EASILY FRIABLE SANDSTONE  
 INTERBEDDED WITH CALCITE FRACTURE FILL;  
 CUBIC TO IRREGULAR FRACTURE; BLOCKY TO







8200 MD

GRAY; TOUGH TO BRITTLE TENACITY;

IRREGULAR TO SPLINTERY FRACTURE; FLAKY

TO TABULAR TO WEDGELIKE CUTTINGS HABIT;

FROSTED TO SPARKLING LUSTER; SILTY TO

GRITTY TEXTURE; GRADING TO A FINE TO

MEDIUM GRAINED SANDSTONE.

8200

YELLOWISH ORANGE TO DARK YELLOWISH

ORANGE; BRITTLE TO CRUMBLY TENACITY;

8300 MD

IRREGULAR TO SEMI PLANAR FRACTURE;

PLATY TO SCALY CUTTINGS HABIT; DULL TO

MATTE LUSTER; SMOOTH TO CLAYEY TEXTURE;

MASSIVE STRUCTURE WITH FISSILITY.

8300

GRAY; TOUGH TO VERY TOUGH TENACITY;

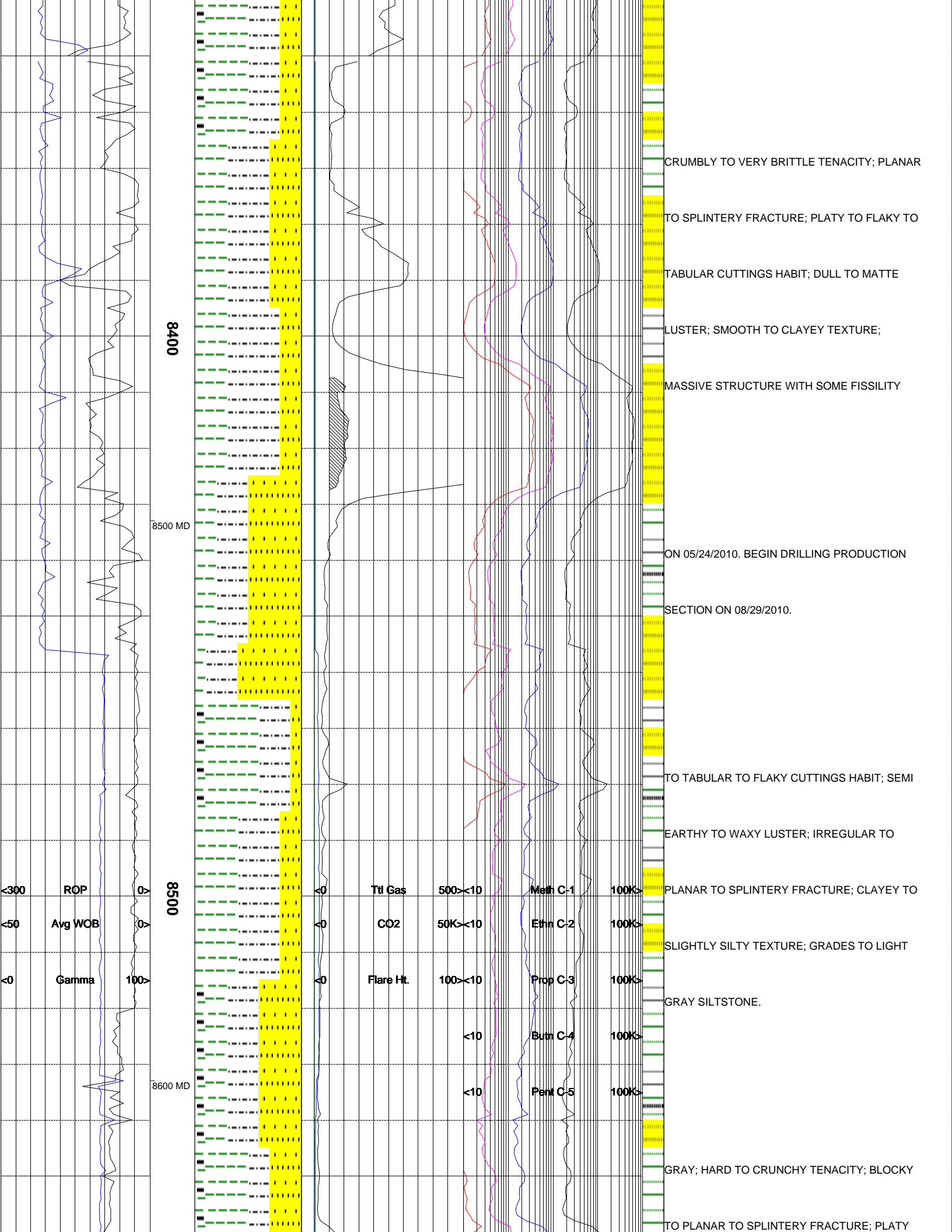
IRREGULAR TO MOTTLED FRACTURE; FLAKY

TO TABULAR TO WEDGELIKE CUTTINGS HABIT;

8400 MD

FROSTED TO SPARKLING LUSTER; SILTY TO

GRITTY TEXTURE.



8400

8500 MD

8500

8600 MD

<300 ROP  
<50 Avg WOB  
<0 Gamma 100>

<0 Ttl Gas 500><10 Meth C-1 100K>  
<0 CO2 50K><10 Ethn C-2 100K>  
<0 Flare Ht. 100><10 Prop C-3 100K>  
<10 Butn C-4 100K>  
<10 Pent C-5 100K>

CRUMBLY TO VERY BRITTLE TENACITY; PLANAR

TO SPLINTERY FRACTURE; PLATY TO FLAKY TO

TABULAR CUTTINGS HABIT; DULL TO MATTE

LUSTER; SMOOTH TO CLAYEY TEXTURE;

MASSIVE STRUCTURE WITH SOME FISSILITY

ON 05/24/2010. BEGIN DRILLING PRODUCTION

SECTION ON 08/29/2010.

TO TABULAR TO FLAKY CUTTINGS HABIT; SEMI

EARTHY TO WAXY LUSTER; IRREGULAR TO

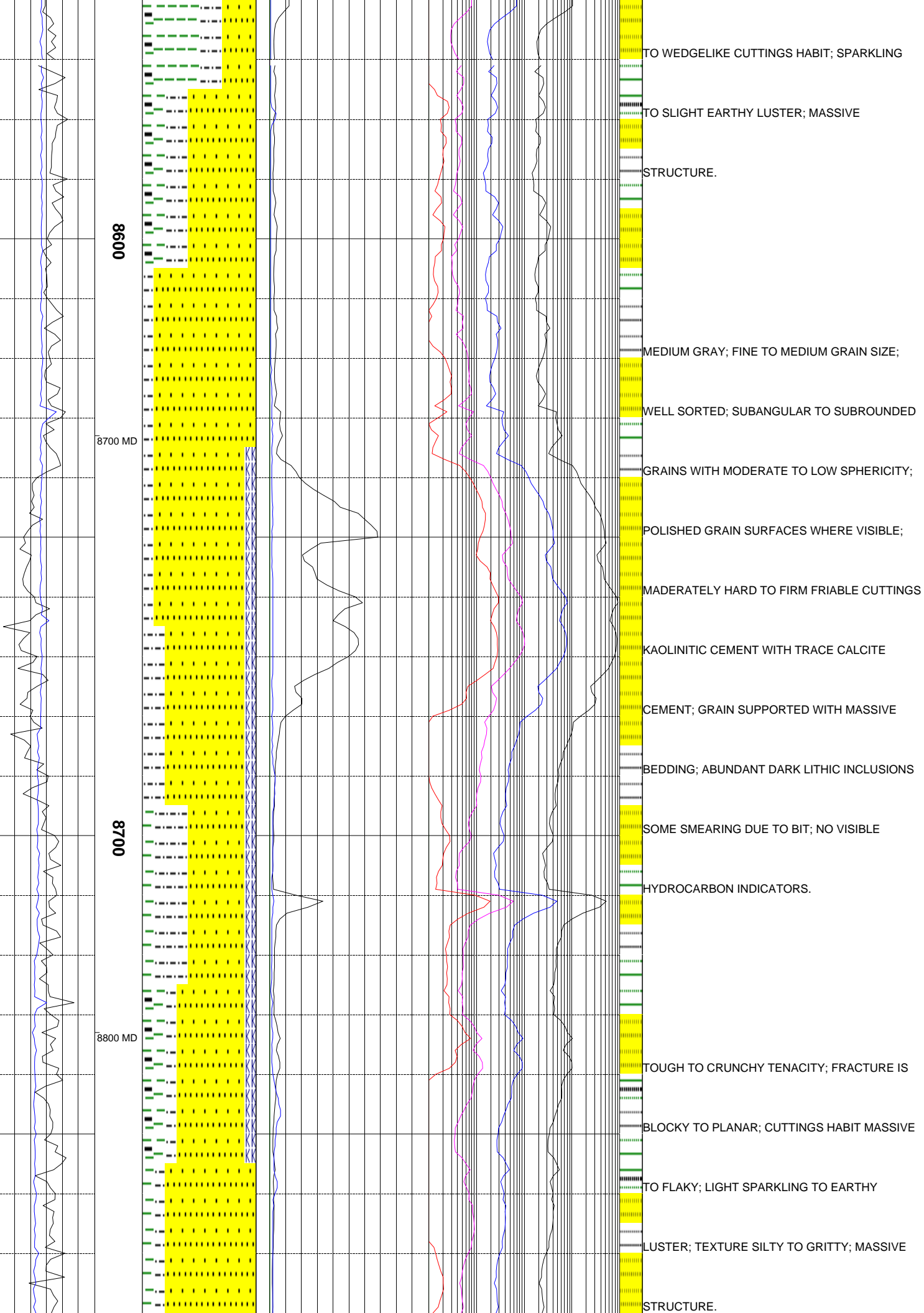
PLANAR TO SPLINTERY FRACTURE; CLAYEY TO

SLIGHTLY SILTY TEXTURE; GRADES TO LIGHT

GRAY SILTSTONE.

GRAY; HARD TO CRUNCHY TENACITY; BLOCKY

TO PLANAR TO SPLINTERY FRACTURE; PLATY

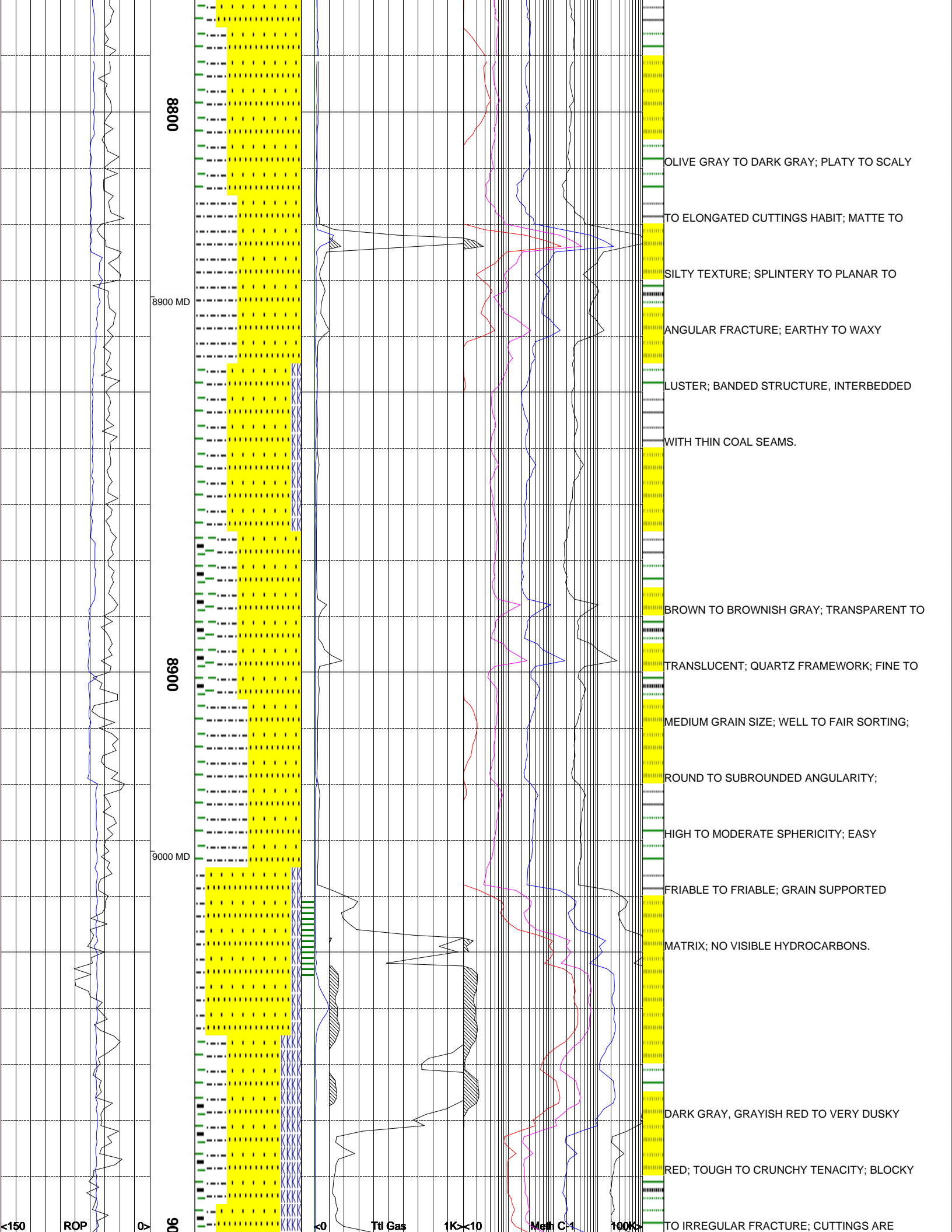


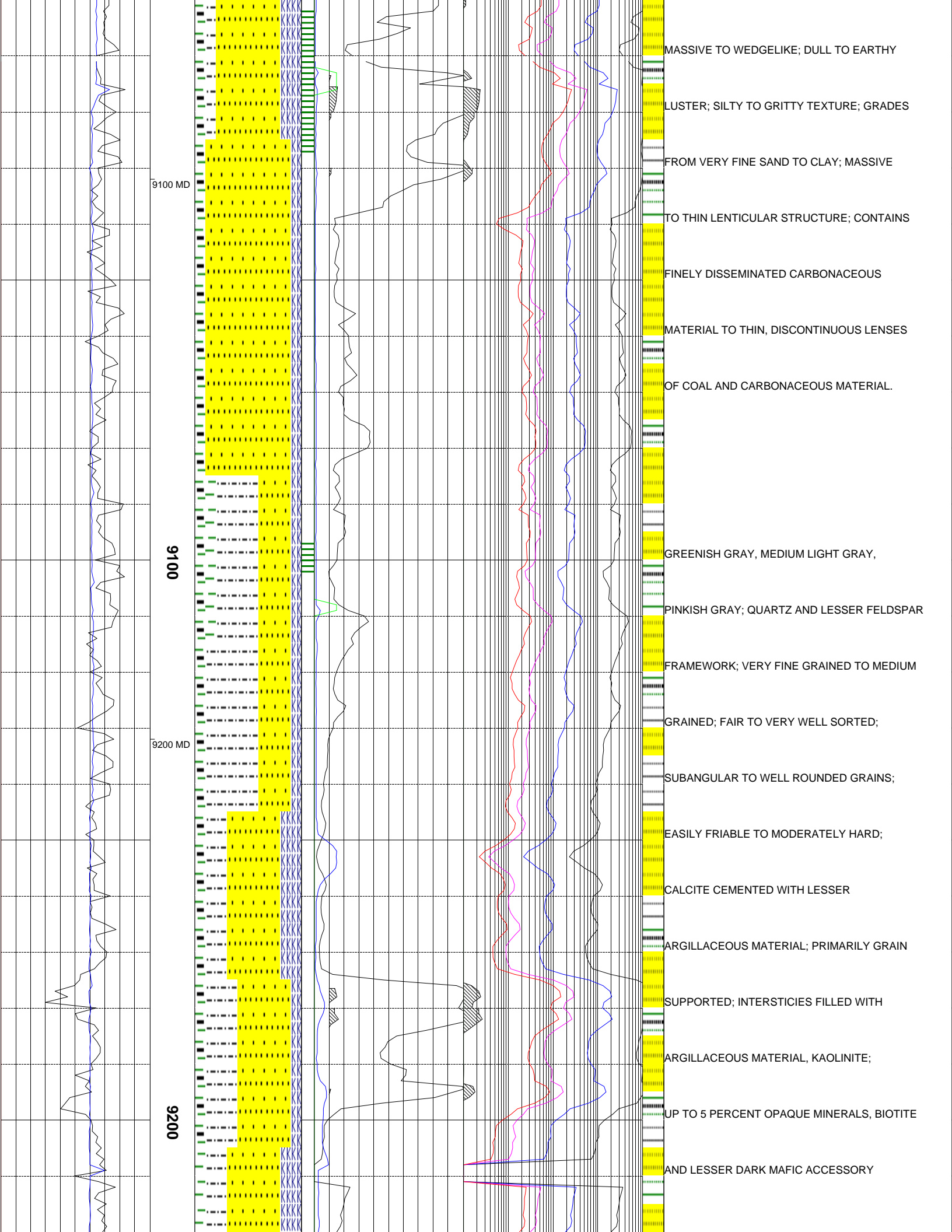
8600

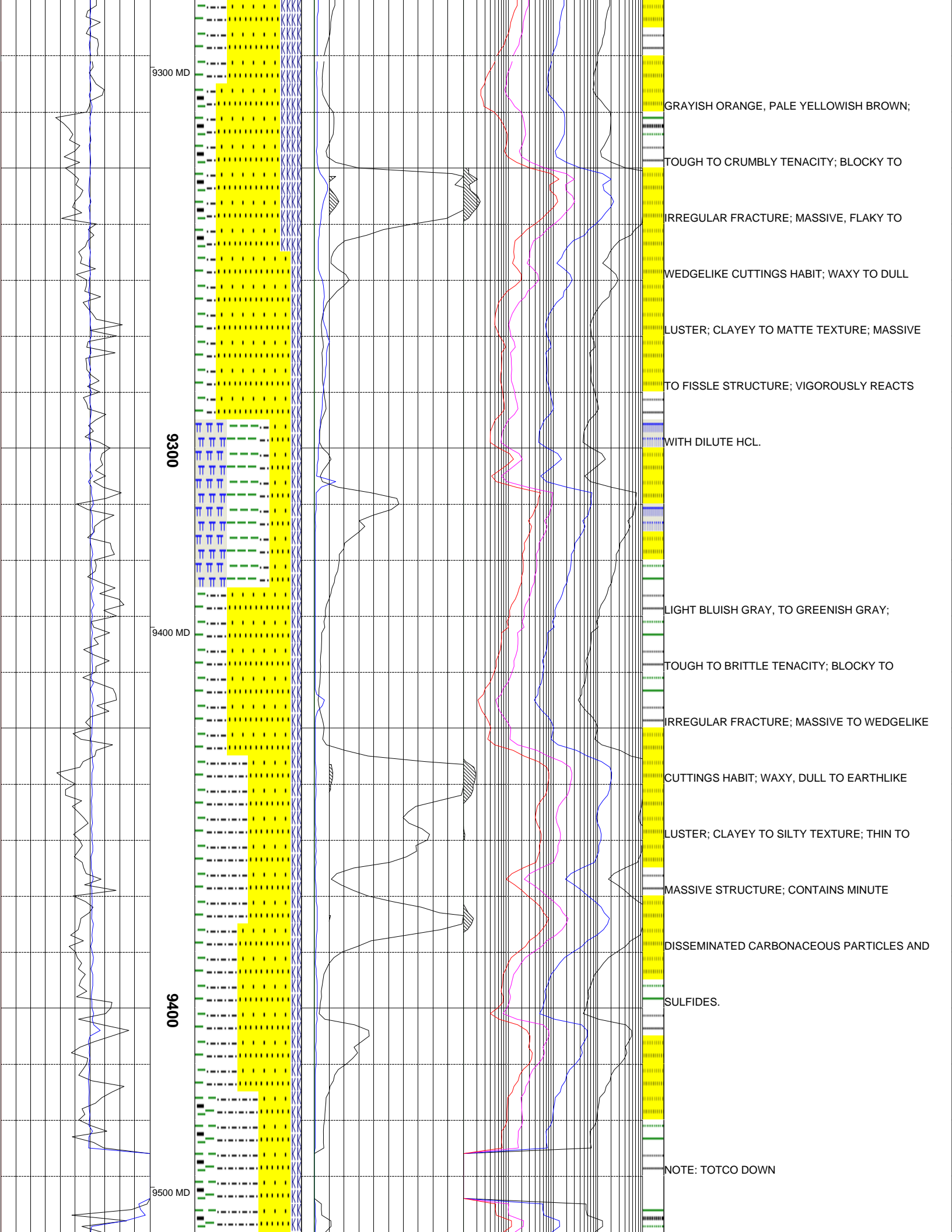
8700 MD

8700

8800 MD







9300 MD

GRAYISH ORANGE, PALE YELLOWISH BROWN;

TOUGH TO CRUMBLY TENACITY; BLOCKY TO

IRREGULAR FRACTURE; MASSIVE, FLAKY TO

WEDGELIKE CUTTINGS HABIT; WAXY TO DULL

LUSTER; CLAYEY TO MATTE TEXTURE; MASSIVE

TO FISSLE STRUCTURE; VIGOROUSLY REACTS

9300

WITH DILUTE HCL.

9400 MD

LIGHT BLUISH GRAY, TO GREENISH GRAY;

TOUGH TO BRITTLE TENACITY; BLOCKY TO

IRREGULAR FRACTURE; MASSIVE TO WEDGELIKE

CUTTINGS HABIT; WAXY, DULL TO EARTHLIKE

LUSTER; CLAYEY TO SILTY TEXTURE; THIN TO

MASSIVE STRUCTURE; CONTAINS MINUTE

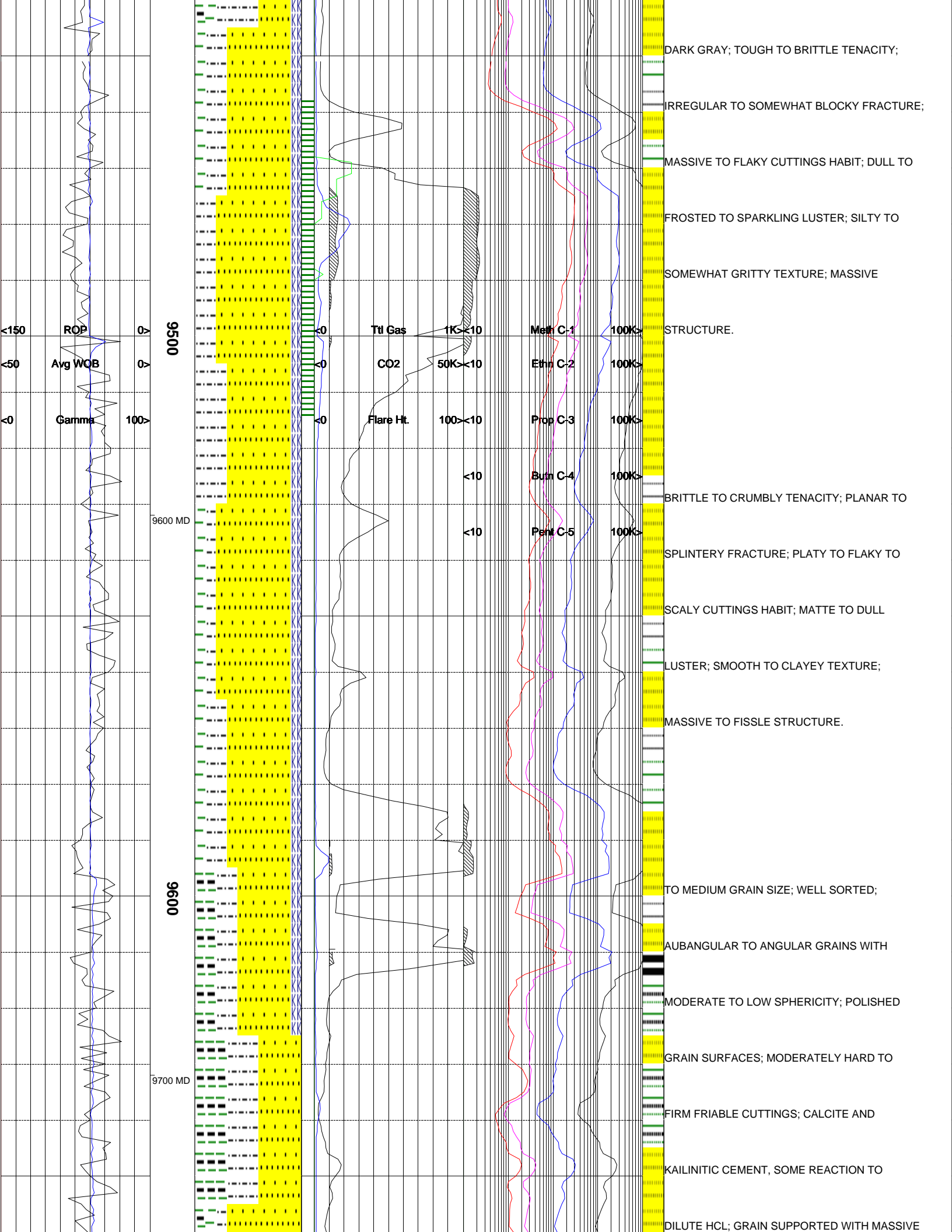
DISSEMINATED CARBONACEOUS PARTICLES AND

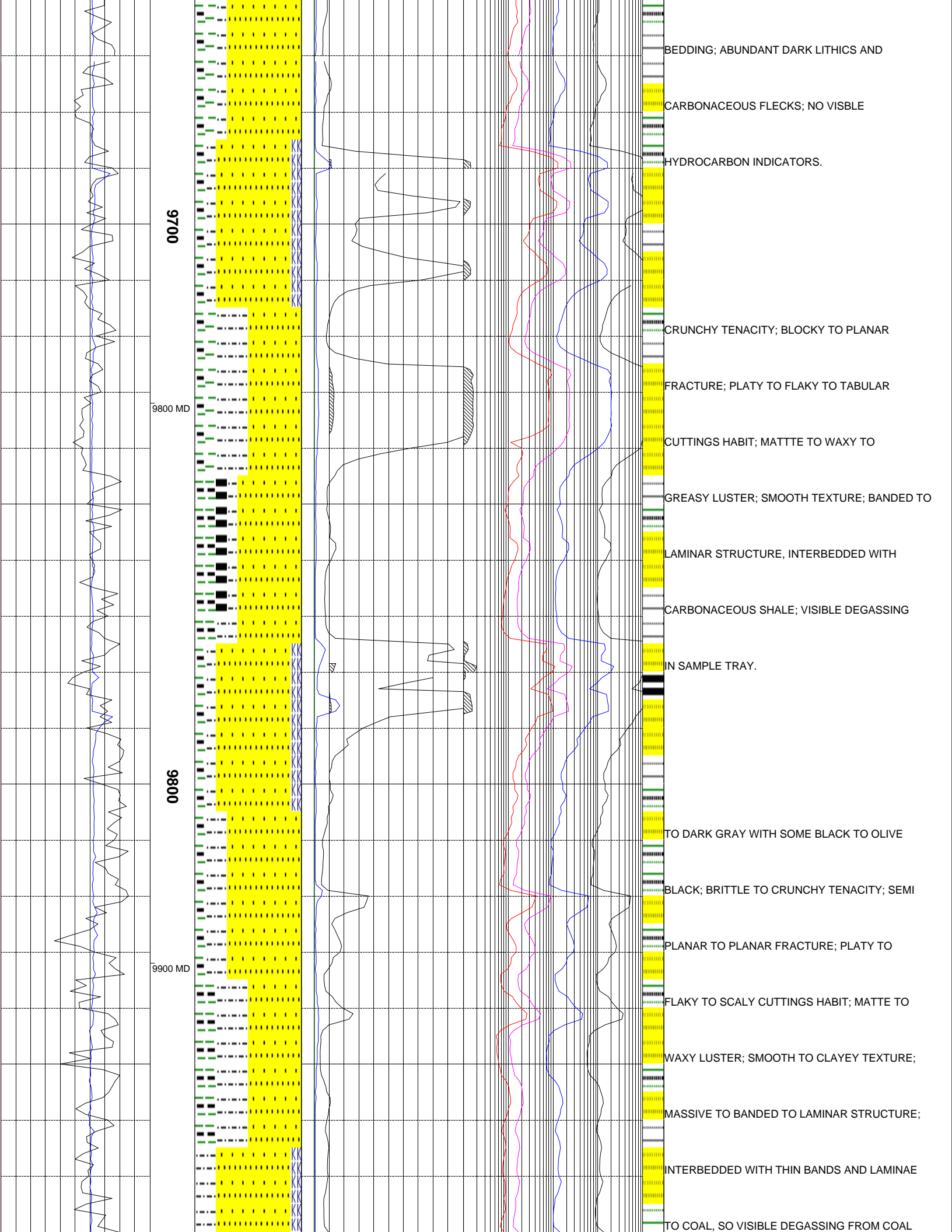
SULFIDES.

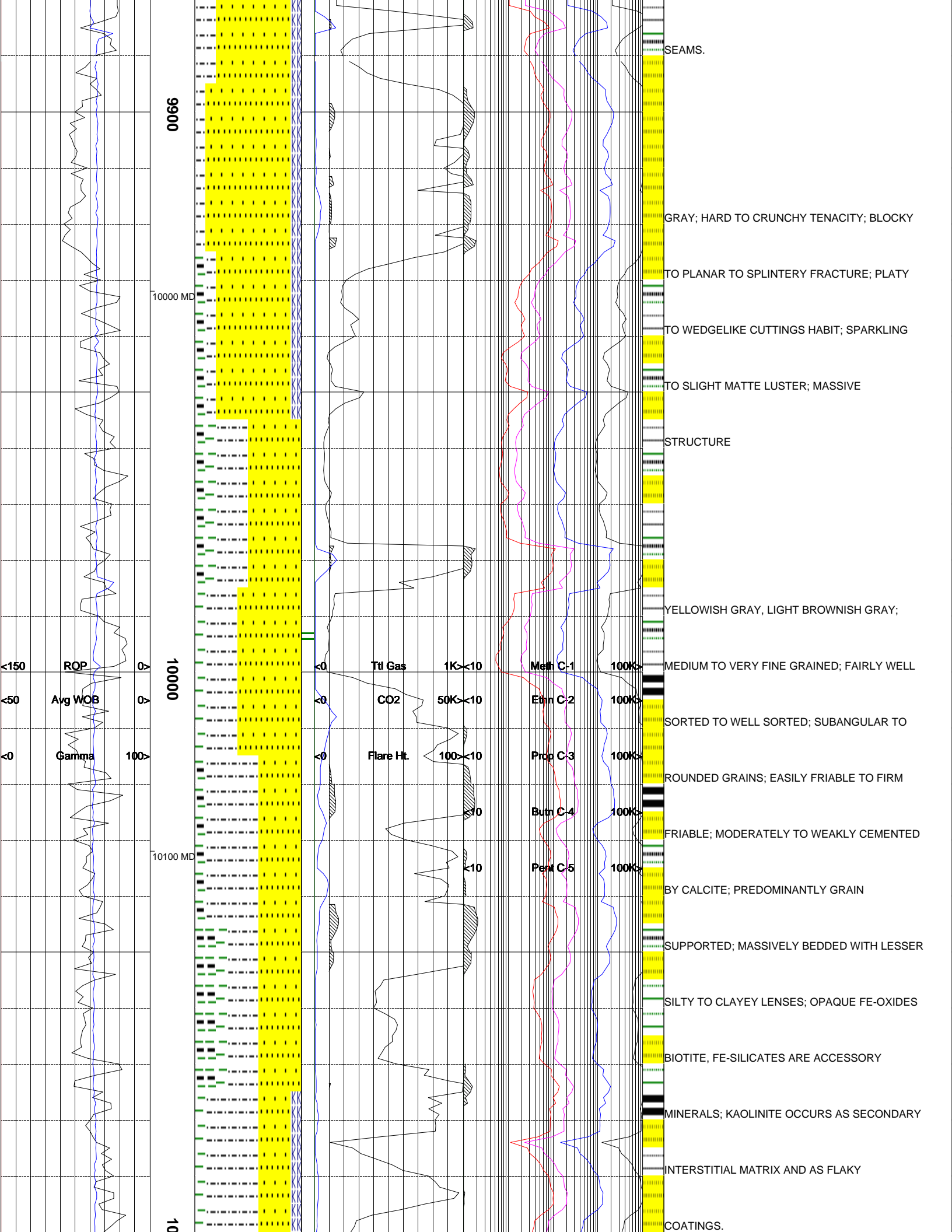
9400

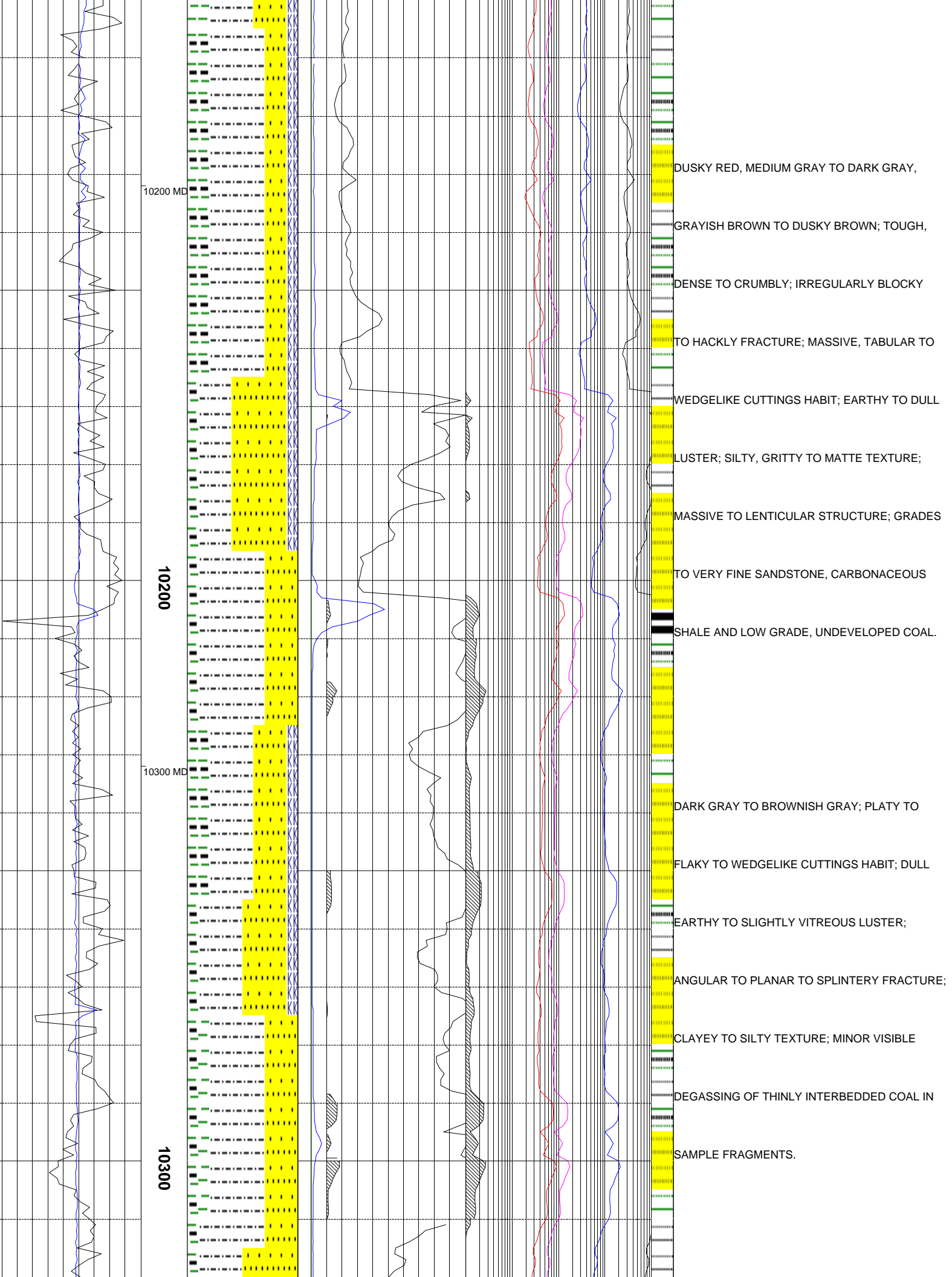
9500 MD

NOTE: TOTCO DOWN









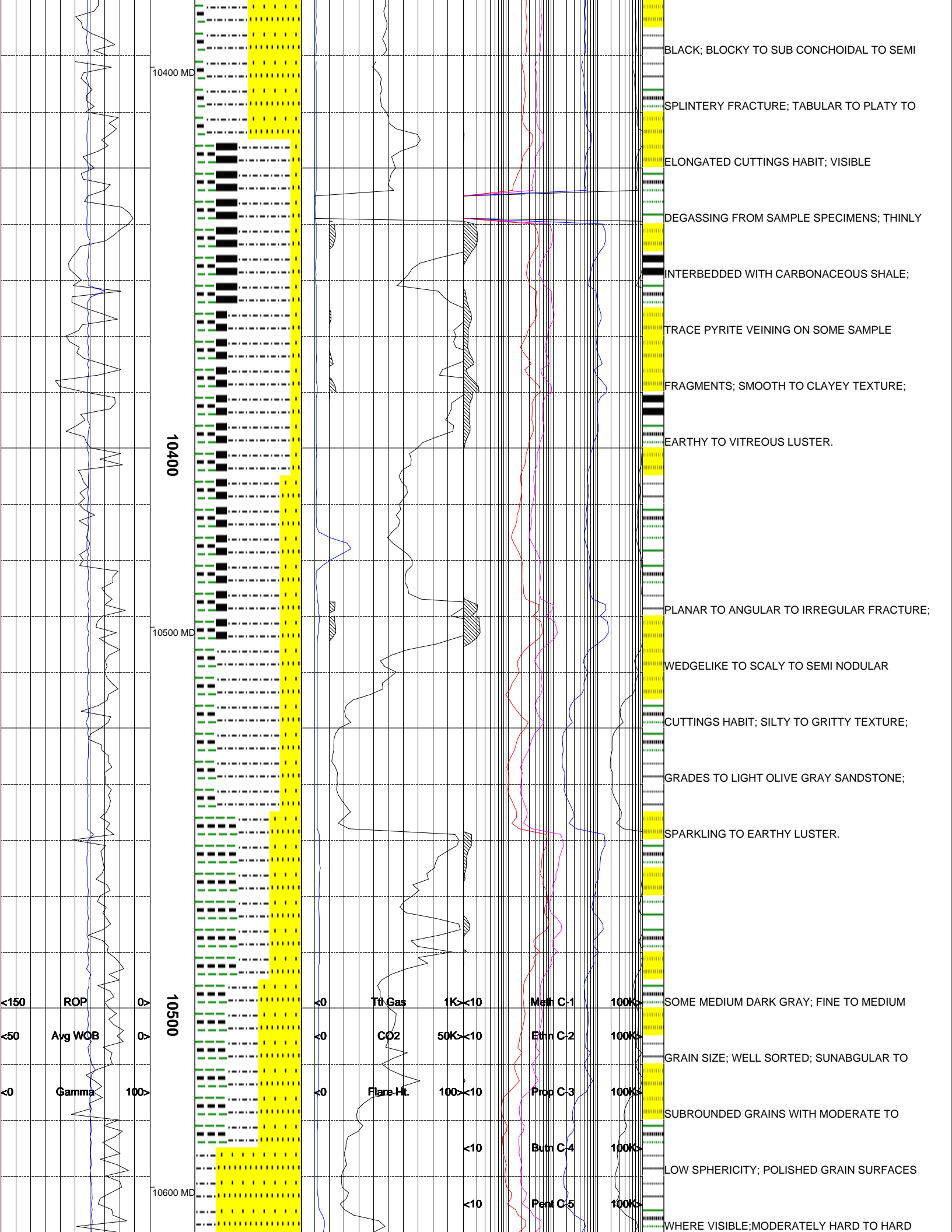
10200 MD

10200

10300 MD

10300

DUSKY RED, MEDIUM GRAY TO DARK GRAY,  
GRAYISH BROWN TO DUSKY BROWN; TOUGH,  
DENSE TO CRUMBLY; IRREGULARLY BLOCKY  
TO HACKLY FRACTURE; MASSIVE, TABULAR TO  
WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL  
LUSTER; SILTY, GRITTY TO MATTE TEXTURE;  
MASSIVE TO LENTICULAR STRUCTURE; GRADES  
TO VERY FINE SANDSTONE, CARBONACEOUS  
SHALE AND LOW GRADE, UNDEVELOPED COAL.  
DARK GRAY TO BROWNISH GRAY; PLATY TO  
FLAKY TO WEDGELIKE CUTTINGS HABIT; DULL  
EARTHY TO SLIGHTLY VITREOUS LUSTER;  
ANGULAR TO PLANAR TO SPLINTERY FRACTURE;  
CLAYEY TO SILTY TEXTURE; MINOR VISIBLE  
DEGASSING OF THINLY INTERBEDDED COAL IN  
SAMPLE FRAGMENTS.



10400 MD

10400

10500 MD

10500

10600 MD

BLACK; BLOCKY TO SUB CONCHOIDAL TO SEMI

SPLINTERY FRACTURE; TABULAR TO PLATY TO

ELONGATED CUTTINGS HABIT; VISIBLE

DEGASSING FROM SAMPLE SPECIMENS; THINLY

INTERBEDDED WITH CARBONACEOUS SHALE;

TRACE PYRITE VEINING ON SOME SAMPLE

FRAGMENTS; SMOOTH TO CLAYEY TEXTURE;

EARTHY TO VITREOUS LUSTER.

PLANAR TO ANGULAR TO IRREGULAR FRACTURE;

WEDGELIKE TO SCALY TO SEMI NODULAR

CUTTINGS HABIT; SILTY TO GRITTY TEXTURE;

GRADES TO LIGHT OLIVE GRAY SANDSTONE;

SPARKLING TO EARTHY LUSTER.

SOME MEDIUM DARK GRAY; FINE TO MEDIUM

GRAIN SIZE; WELL SORTED; SUBANGULAR TO

SUBROUNDED GRAINS WITH MODERATE TO

LOW SPHERICITY; POLISHED GRAIN SURFACES

WHERE VISIBLE; MODERATELY HARD TO HARD

<150 ROP

<50 Avg WOB

<0 Gamma

<0 Ttl Gas 1K<10

<0 CO2 50K<10

<0 Flare Ht. 100<10

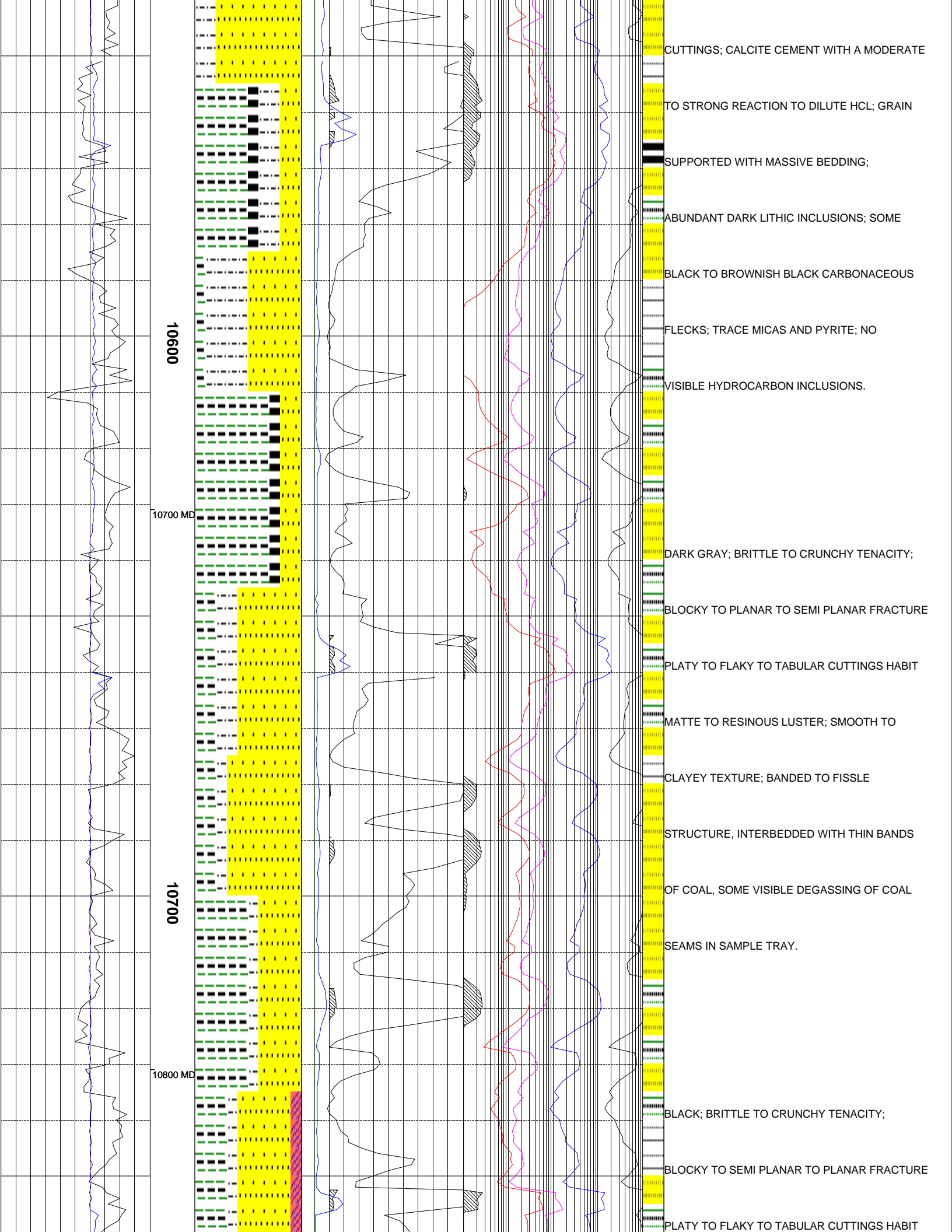
Meth C-1 100K>

Ethn C-2 100K>

Prop C-3 100K>

<10 Butn C-4 100K>

<10 Pent C-5 100K>



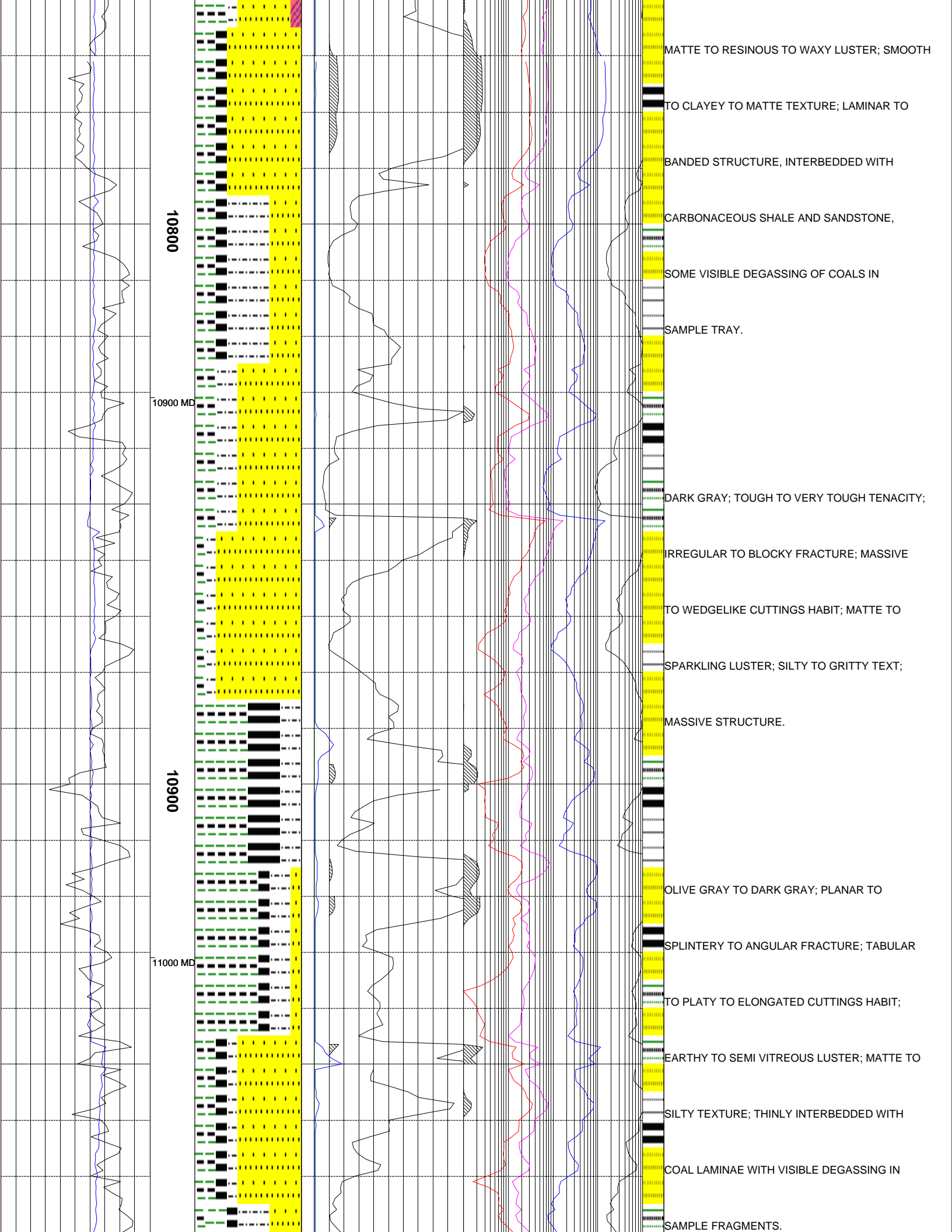
10600

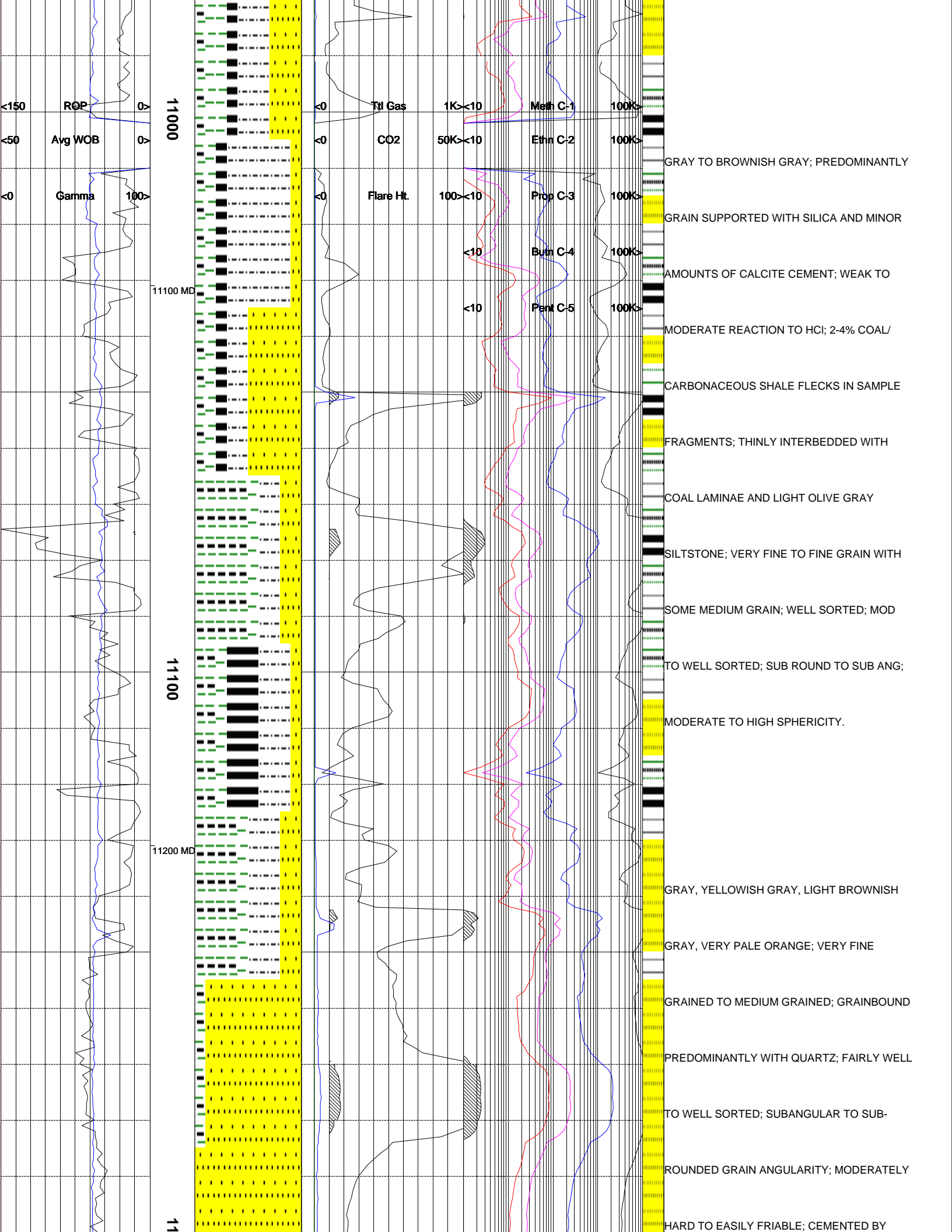
10700 MD

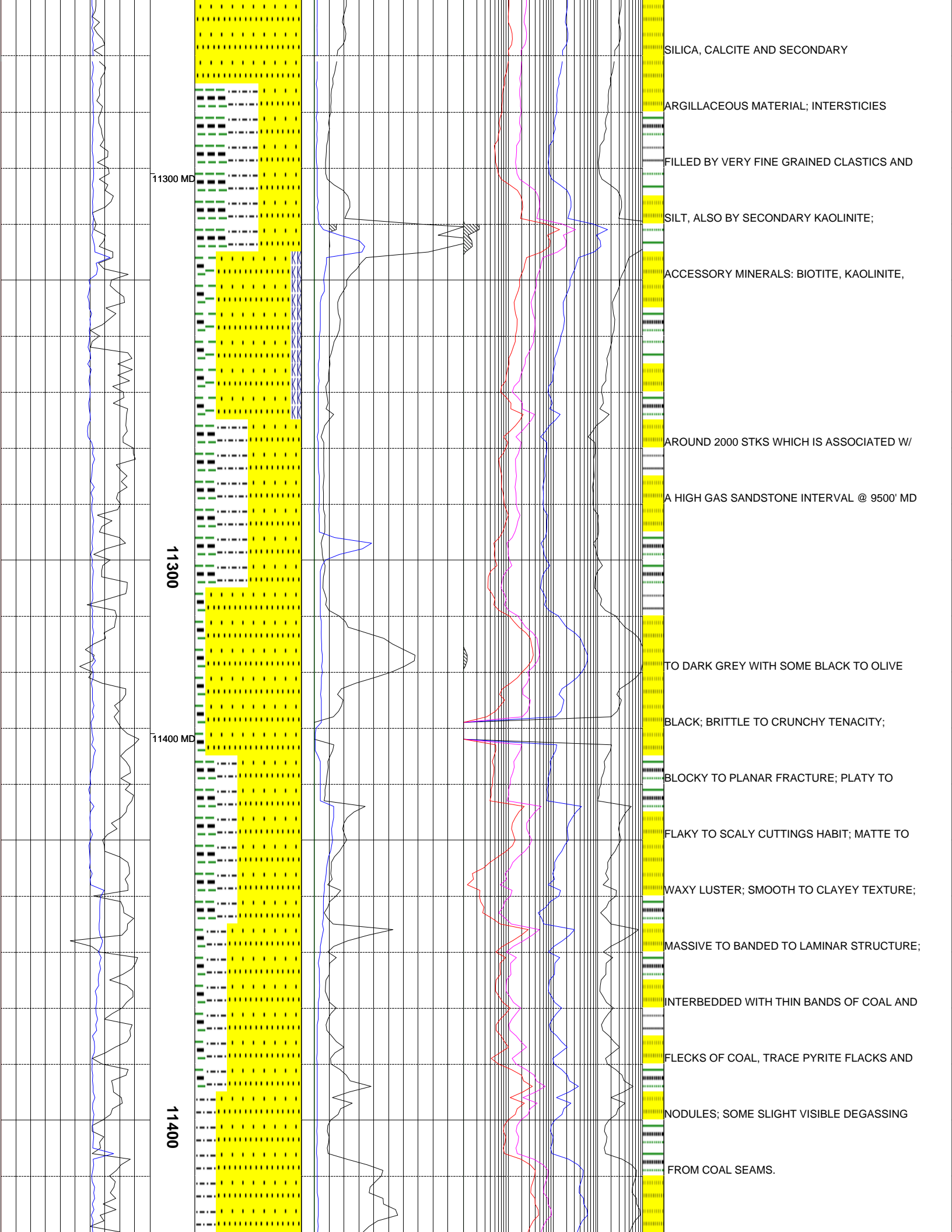
10700

10800 MD

CUTTINGS; CALCITE CEMENT WITH A MODERATE  
 TO STRONG REACTION TO DILUTE HCL; GRAIN  
 SUPPORTED WITH MASSIVE BEDDING;  
 ABUNDANT DARK LITHIC INCLUSIONS; SOME  
 BLACK TO BROWNISH BLACK CARBONACEOUS  
 FLECKS; TRACE MICAS AND PYRITE; NO  
 VISIBLE HYDROCARBON INCLUSIONS.  
 DARK GRAY; BRITTLE TO CRUNCHY TENACITY;  
 BLOCKY TO PLANAR TO SEMI PLANAR FRACTURE  
 PLATY TO FLAKY TO TABULAR CUTTINGS HABIT  
 MATTE TO RESINOUS LUSTER; SMOOTH TO  
 CLAYEY TEXTURE; BANDED TO FISSLE  
 STRUCTURE, INTERBEDDED WITH THIN BANDS  
 OF COAL, SOME VISIBLE DEGASSING OF COAL  
 SEAMS IN SAMPLE TRAY.  
 BLACK; BRITTLE TO CRUNCHY TENACITY;  
 BLOCKY TO SEMI PLANAR TO PLANAR FRACTURE  
 PLATY TO FLAKY TO TABULAR CUTTINGS HABIT





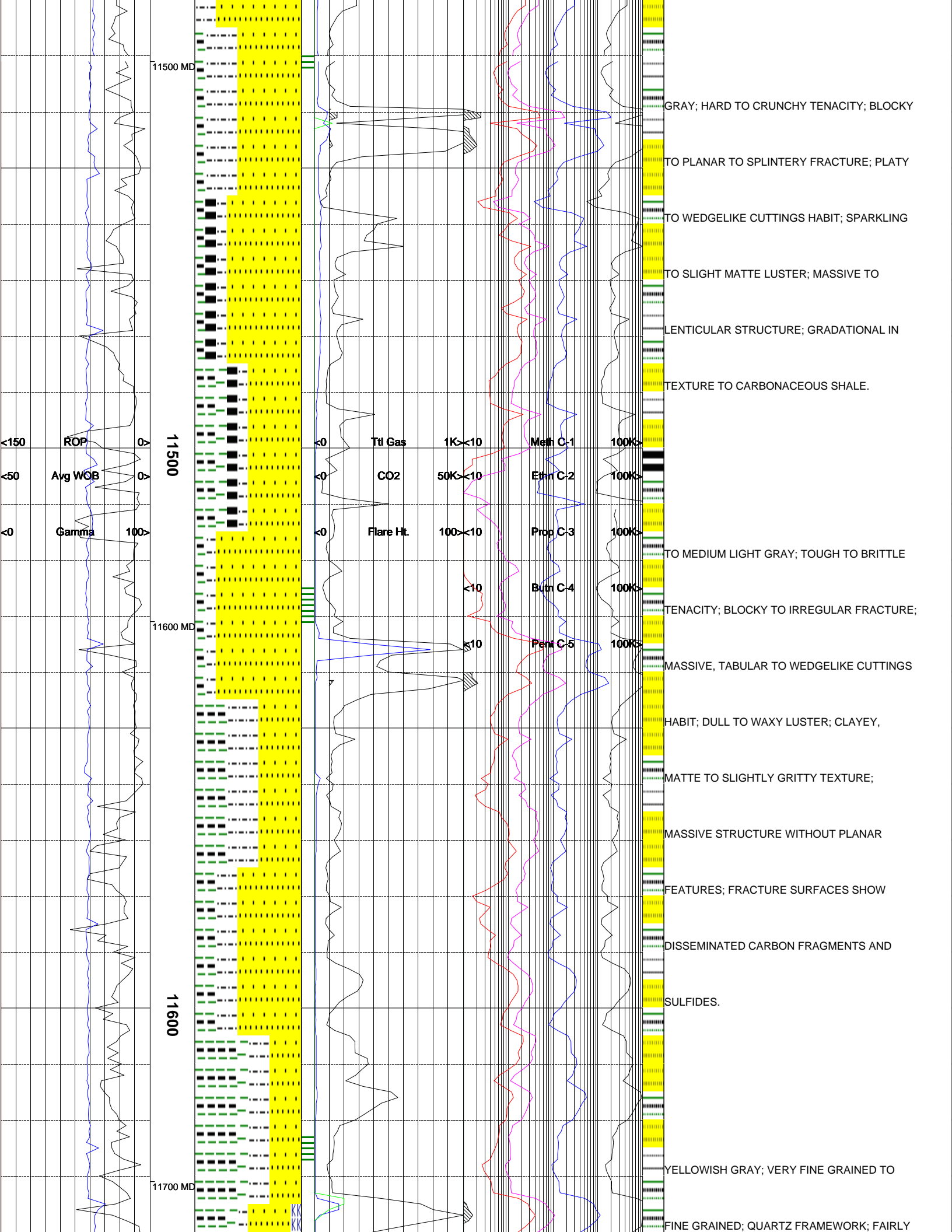


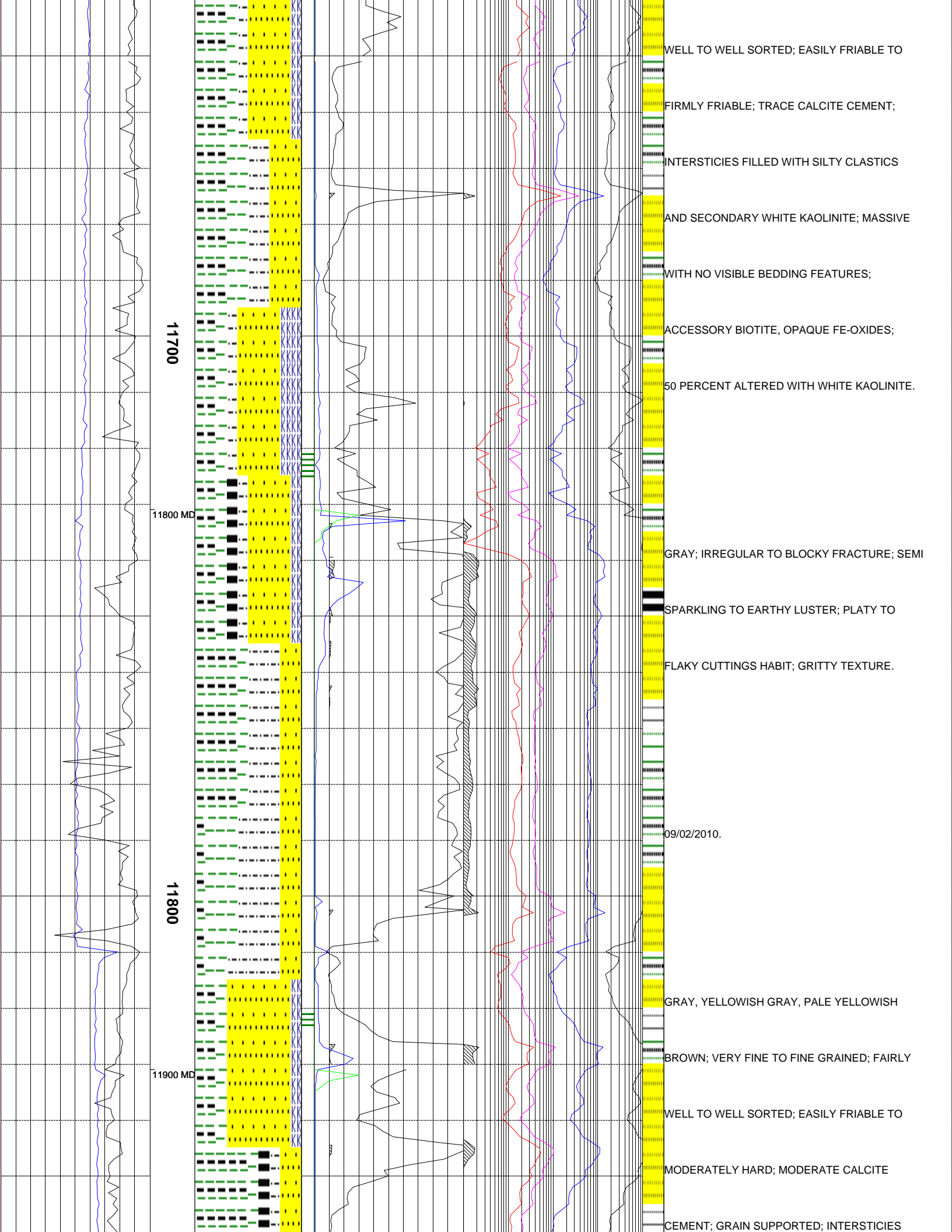
11300 MD

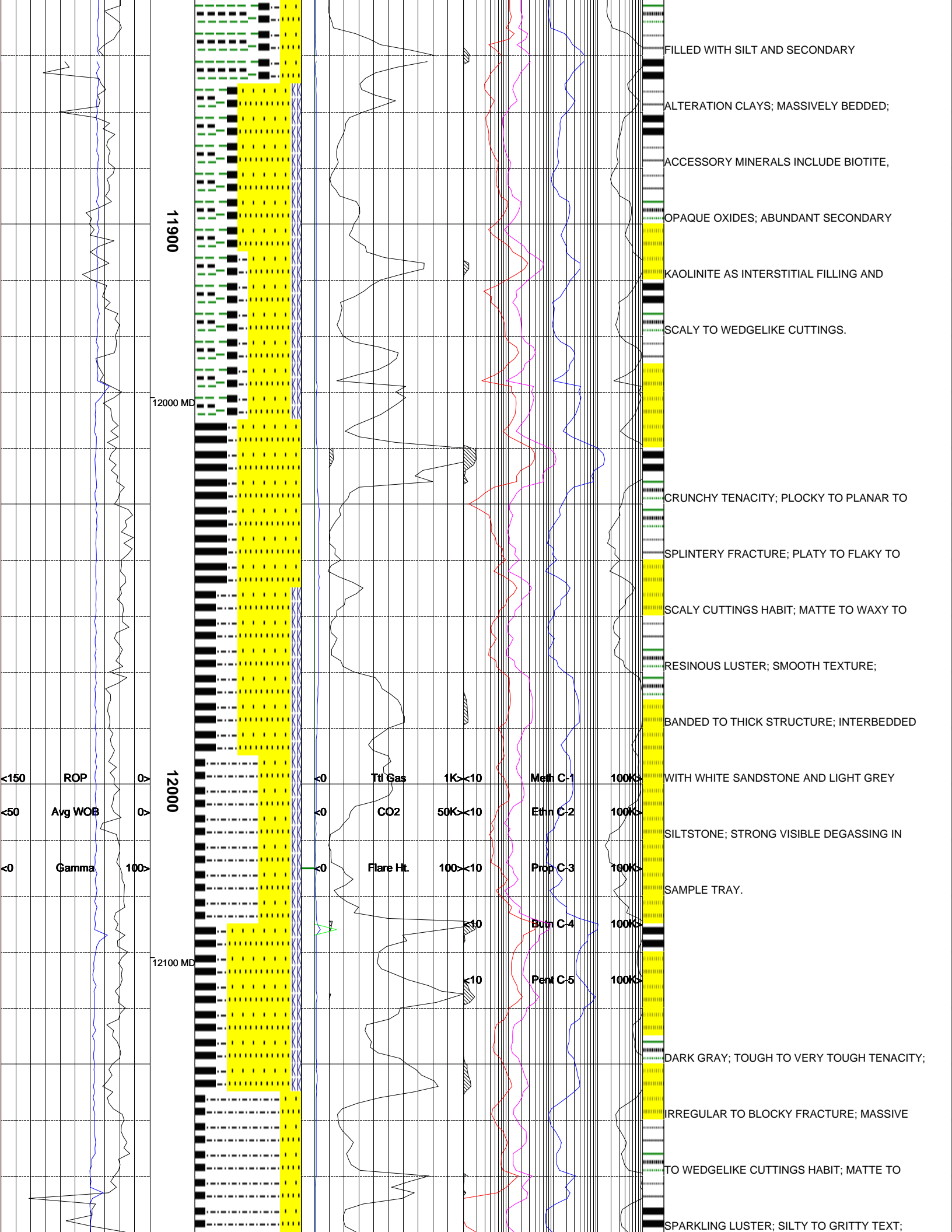
11300

11400 MD

11400







11900

12000 MD

12000

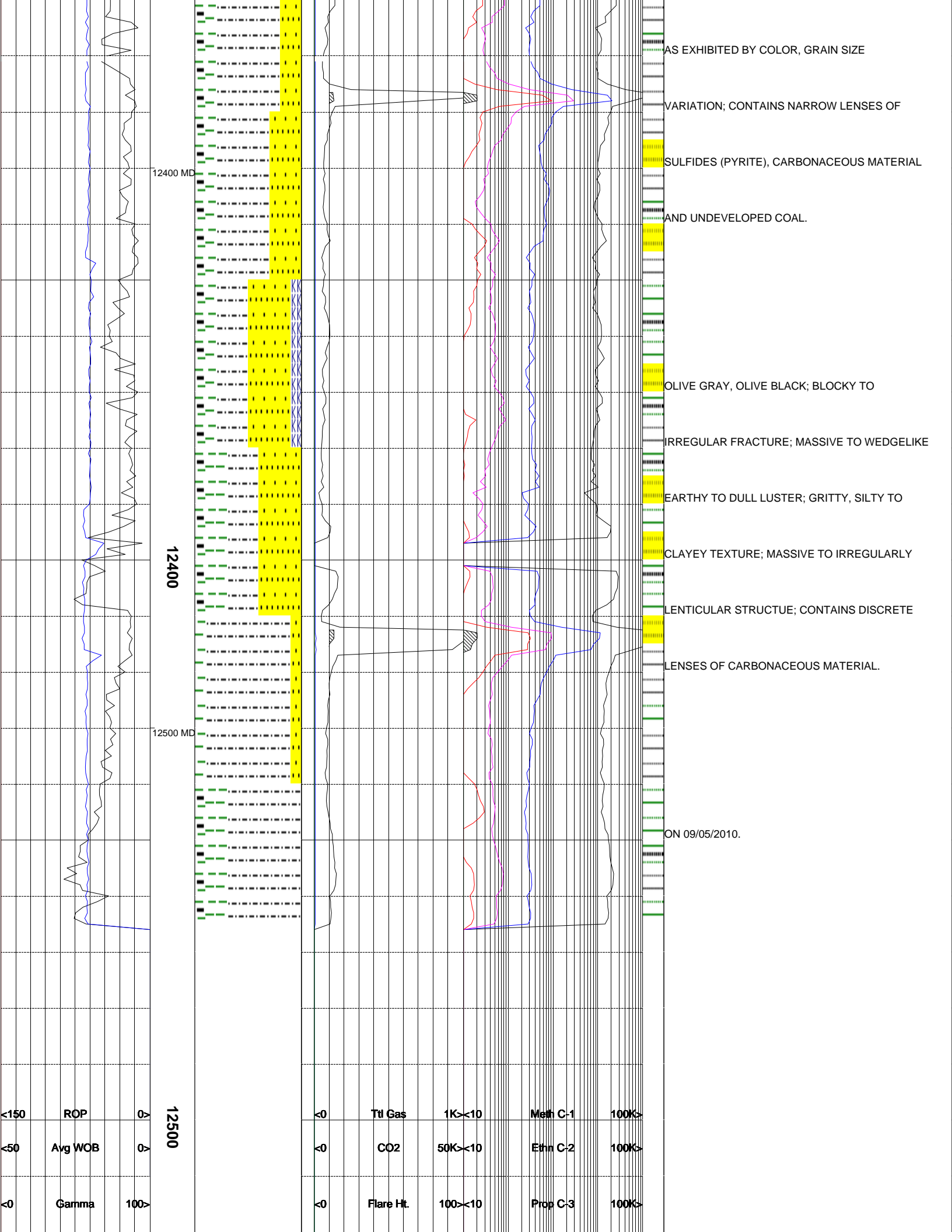
12100 MD

>150 ROP  
 <50 Avg WOB  
 <0 Gamma

<0 Ttl Gas 1K<10 Meth C-1 100K>  
 <0 CO2 50K<10 Ethn C-2 100K>  
 <0 Flare Ht. 100<10 Prop C-3 100K>  
 <10 Burn C-4 100K>  
 <10 Pent C-5 100K>

FILLED WITH SILT AND SECONDARY  
 ALTERATION CLAYS; MASSIVELY BEDDED;  
 ACCESSORY MINERALS INCLUDE BIOTITE,  
 OPAQUE OXIDES; ABUNDANT SECONDARY  
 KAOLINITE AS INTERSTITIAL FILLING AND  
 SCALY TO WEDGELIKE CUTTINGS.  
 CRUNCHY TENACITY; PLOCKY TO PLANAR TO  
 SPLINTERY FRACTURE; PLATY TO FLAKY TO  
 SCALY CUTTINGS HABIT; MATTE TO WAXY TO  
 RESINOUS LUSTER; SMOOTH TEXTURE;  
 BANDED TO THICK STRUCTURE; INTERBEDDED  
 WITH WHITE SANDSTONE AND LIGHT GREY  
 SILTSTONE; STRONG VISIBLE DEGASSING IN  
 SAMPLE TRAY.  
 DARK GRAY; TOUGH TO VERY TOUGH TENACITY;  
 IRREGULAR TO BLOCKY FRACTURE; MASSIVE  
 TO WEDGELIKE CUTTINGS HABIT; MATTE TO  
 SPARKLING LUSTER; SILTY TO GRITTY TEXT;





12400 MD

12400

12500 MD

12500

AS EXHIBITED BY COLOR, GRAIN SIZE

VARIATION; CONTAINS NARROW LENSES OF

SULFIDES (PYRITE), CARBONACEOUS MATERIAL

AND UNDEVELOPED COAL.

OLIVE GRAY, OLIVE BLACK; BLOCKY TO

IRREGULAR FRACTURE; MASSIVE TO WEDGELIKE

EARTHY TO DULL LUSTER; GRITTY, SILTY TO

CLAYEY TEXTURE; MASSIVE TO IRREGULARLY

LENTICULAR STRUCTUE; CONTAINS DISCRETE

LENSES OF CARBONACEOUS MATERIAL.

ON 09/05/2010.

>150	ROP	Δ
>50	Avg WOB	Δ
>0	Gamma	100

>0	Ttl Gas	1K<10	Meth C-1	100K>
>0	CO2	50K<10	Ethn C-2	100K>
>0	Flare Ht.	100>10	Prop C-3	100K>





