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
WELL	PCU-297-11B1ST1
FIELD	PICEANCE CREEK
REGION	ROCKY MT
COORDINATES	LAT.39.879628000
	LON.108.240365000
ELEVATION	GL = 7126'
	KB = 7143'
COUNTY, STATE	RIO BLANCO CO. CO
API INDEX	051031137801
SPUD DATE	04/10/2009
CONTRACTOR	HELMERICH PAYNE
CO. REP.	RICKY T. OWENS
RIG/TYPE	FLEX 3
LOGGING UNIT	MLU038
GEOLOGISTS	GEORGE BAKER
	BRENDA MARSH
ADD. PERSONS	BILL JOHANNING
	DEVIN CLAAR
CO. GEOLOGIST	MICHAEL HOWELL

LOG INTERVAL

DEPTHS:	3,960'	**TO**	13,000'
DATES:	09/21/2009	**TO**	10/10/2009
SCALE:	5" = 100'		

MUD TYPES

LSND	**TO**	13,000'
	TO	
	TO	
	TO	

CASING DATA

16"	**AT**	130'
10.75"	**AT**	3,953'
7.00"	**AT**	9,006'
	AT	

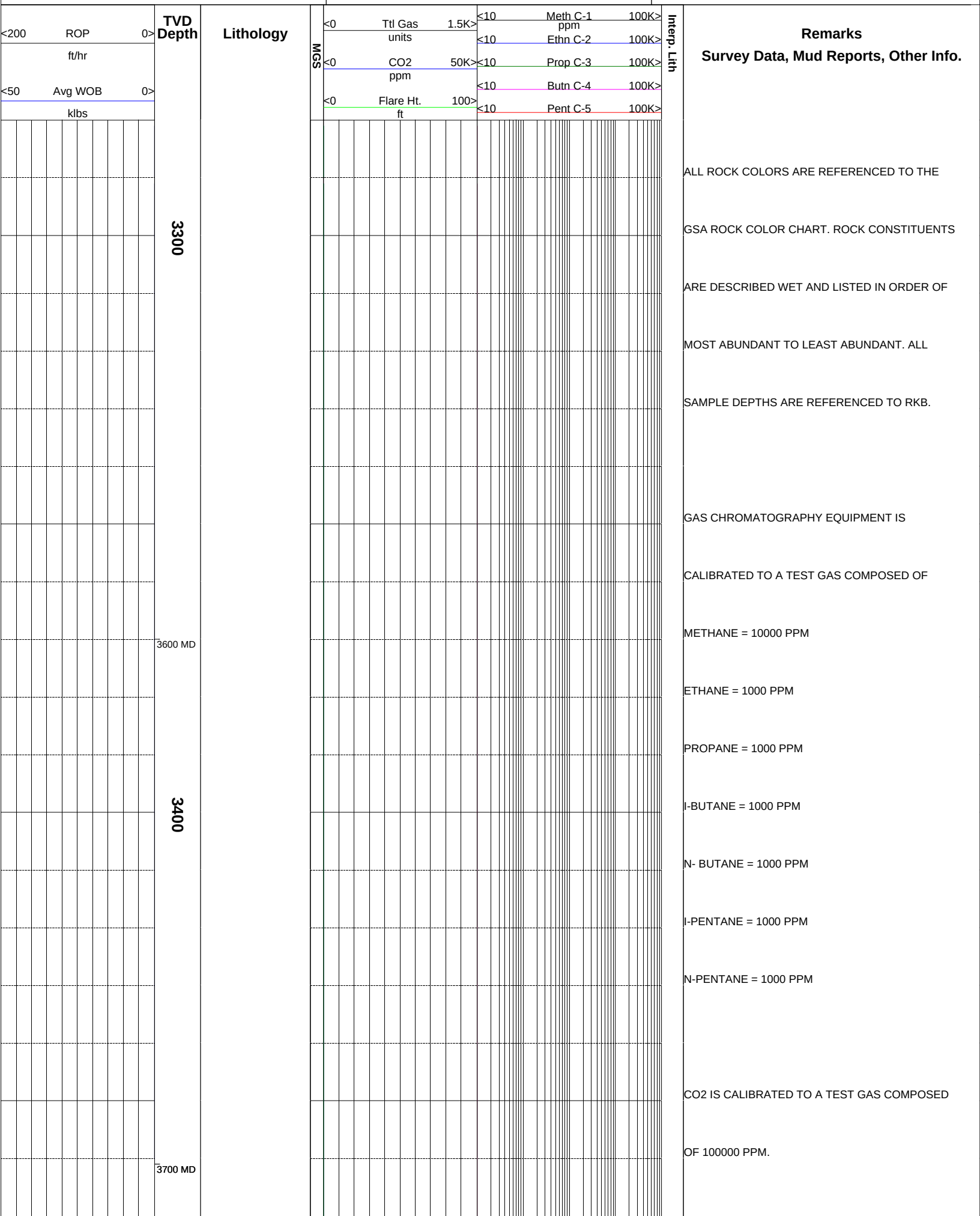
HOLE SIZE

9.875"	**TO**	8,976'
6.125"	**TO**	9,006'
6.125"	**TO**	13,000'
	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
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
SALT
SAND
SANDSTONE
SANDSTONE-TUFFACEOUS
SERICITIZATION
SERPENTINE
SHALE
SHALE TUFFACEOUS
SHELL FRAGMENTS
SIDERITE
SILICIFICATION
SILTSTONE
SILTST-TUFFACEOUS
TUFF
VOLCANICLASTICS SEDS
VOLCANICS



Remarks
Survey Data, Mud Reports, Other Info.

ALL ROCK COLORS ARE REFERENCED TO THE GSA ROCK COLOR CHART. ROCK CONSTITUENTS ARE DESCRIBED WET AND LISTED IN ORDER OF MOST ABUNDANT TO LEAST ABUNDANT. ALL SAMPLE DEPTHS ARE REFERENCED TO RKB.

GAS CHROMATOGRAPHY EQUIPMENT IS CALIBRATED TO A TEST GAS COMPOSED OF

METHANE = 10000 PPM

ETHANE = 1000 PPM

PROPANE = 1000 PPM

I-BUTANE = 1000 PPM

N- BUTANE = 1000 PPM

I-PENTANE = 1000 PPM

N-PENTANE = 1000 PPM

CO2 IS CALIBRATED TO A TEST GAS COMPOSED OF 100000 PPM.

<200	ROP	0>
<50	Avg WOB	0>

3500

3800 MD

3600

3900 MD

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

1 UNIT OF GAS = 200 PPM C-1 ME

CONNECTION GAS, TRIP GAS AND WIPER GAS ARE NOTED ON THE MUD LOG. FLARE HEIGHTS AND DEPTHS OF GAS BUSTER USEAGE ARE ALSO NOTED.

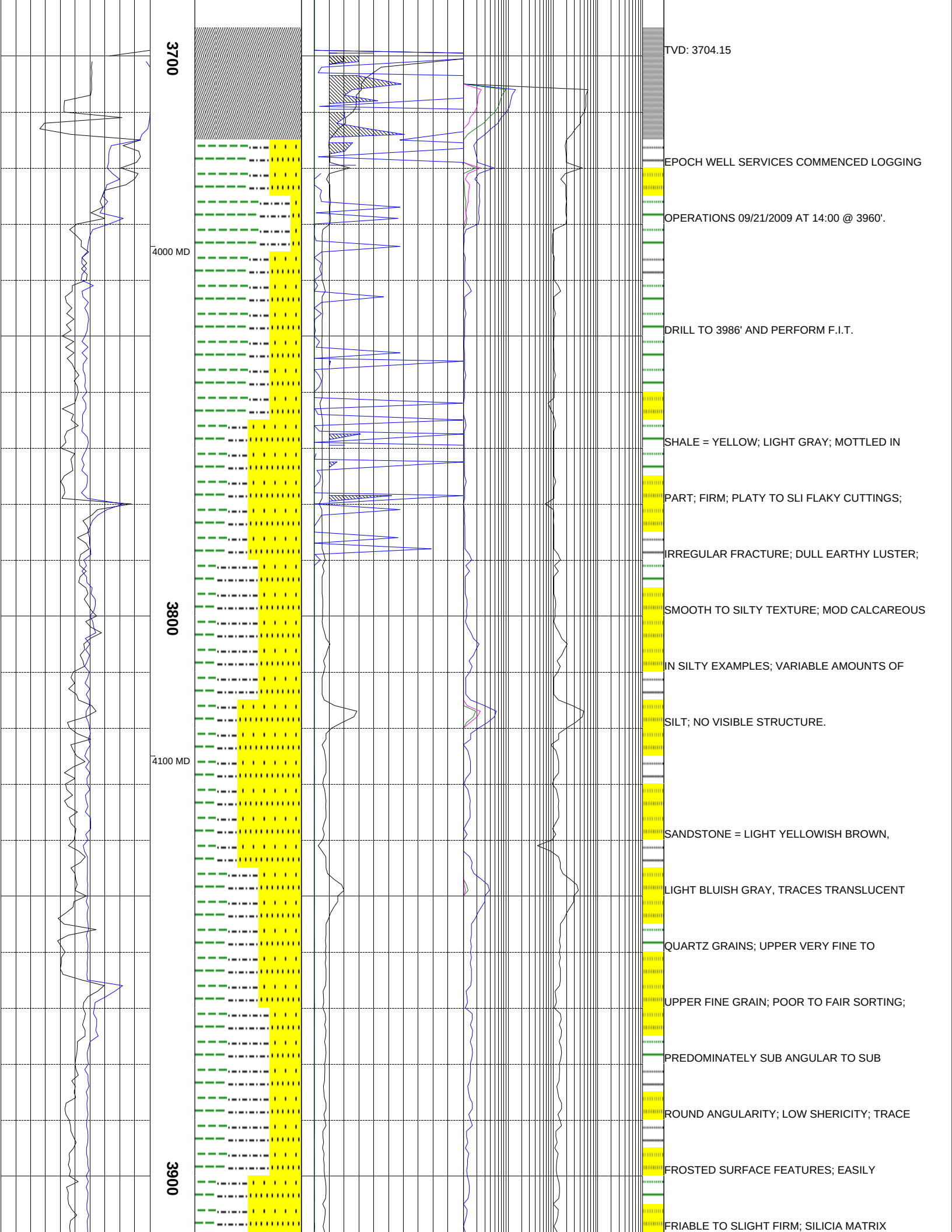
EARLY CONNECTION GASES REPRESENTING UP HOLE GAS INTERVALS BLEEDING INTO THE BOREHOLE ARE COMMON IN THE PRODUCTION INTERVAL.

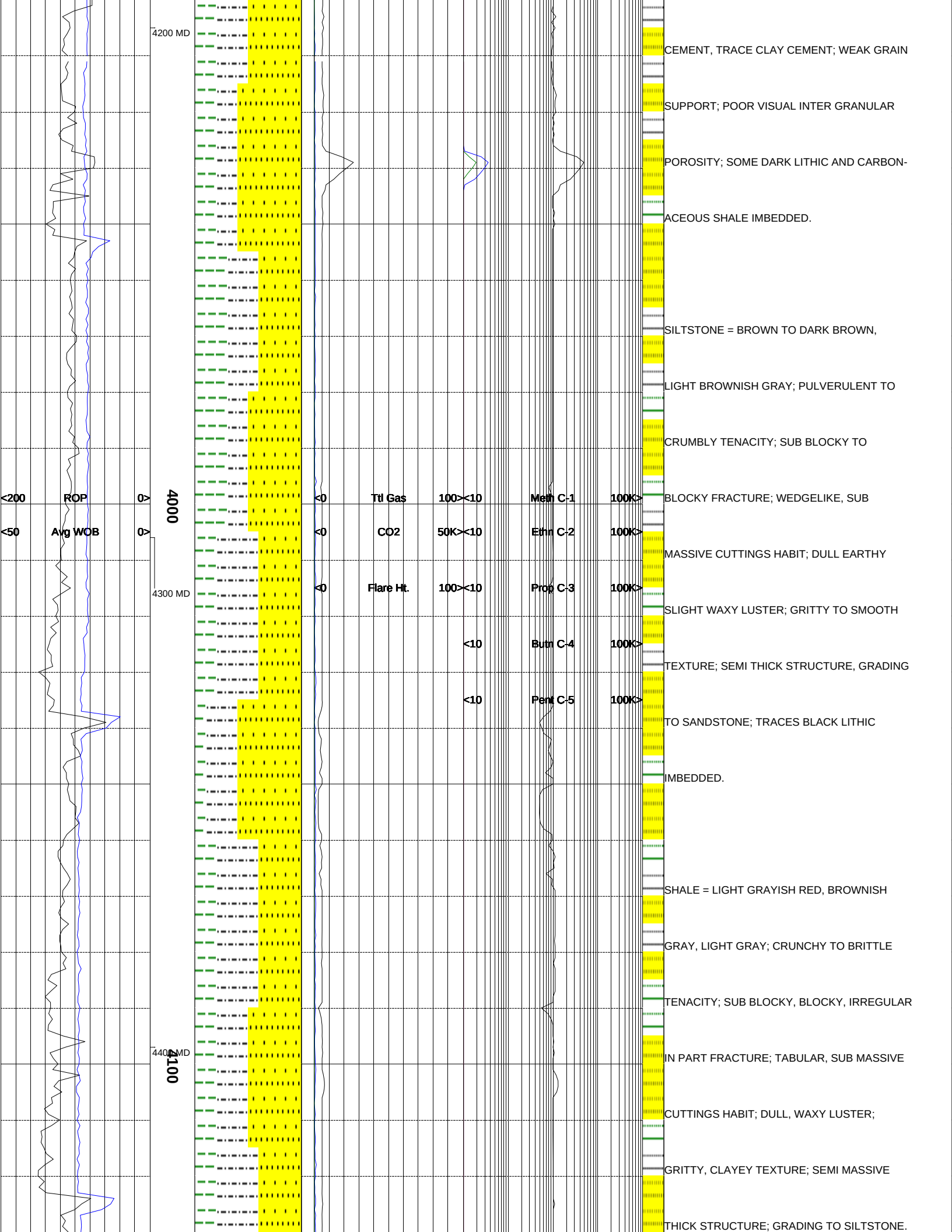
EVIDENCE OF FRACTURE FILL IS NOTED ON THE LOG USING THE LITHOLOGY SYMBOL FOR METAMORPHICS. THE 10% DOES NOT REPRESENT 10% FRACTURE FILL IN SAMPLE. IT ONLY INDICATES THAT FRACTURE FILL HAS BEEN OBSERVED OVER THE INTERVAL.

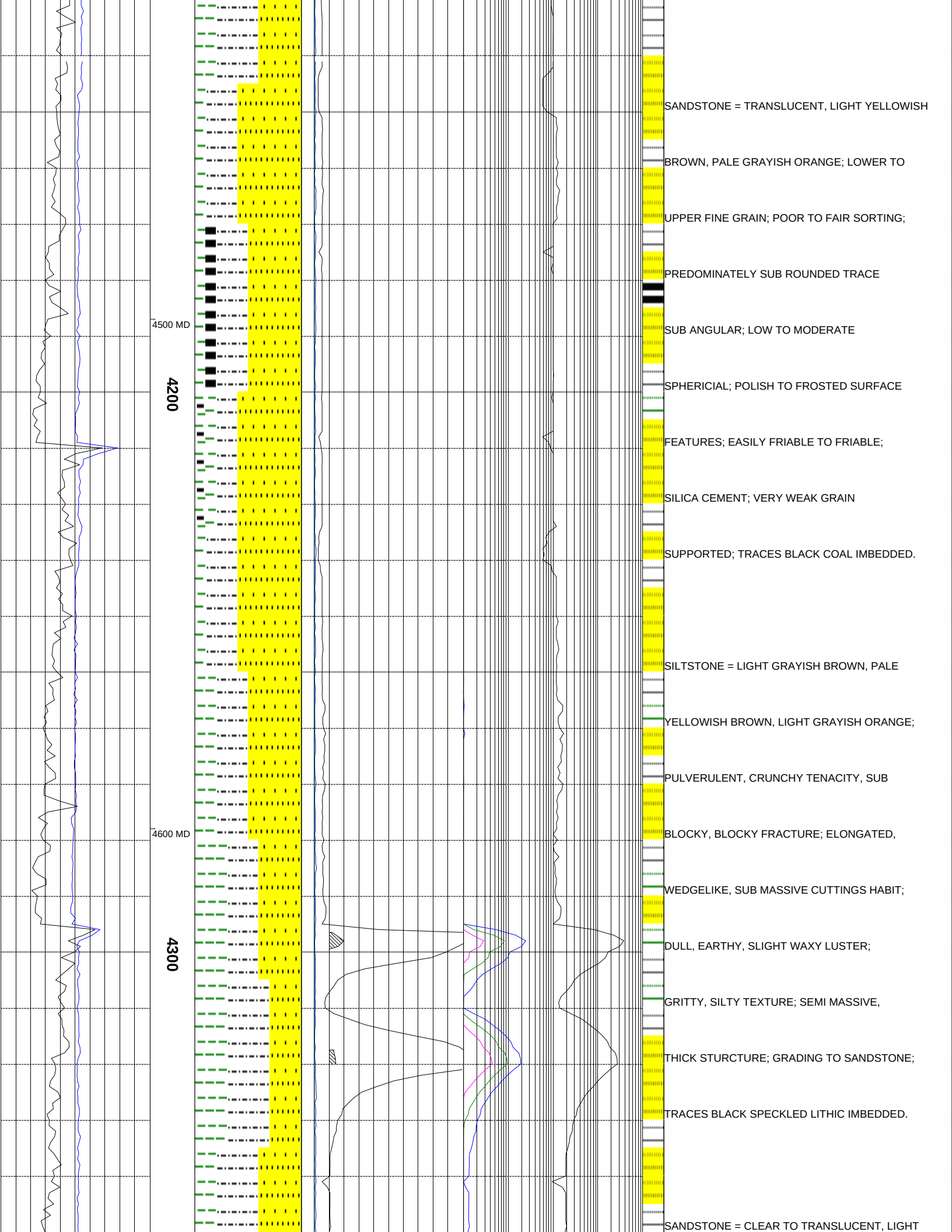
SURVEY DATA @ 3968'

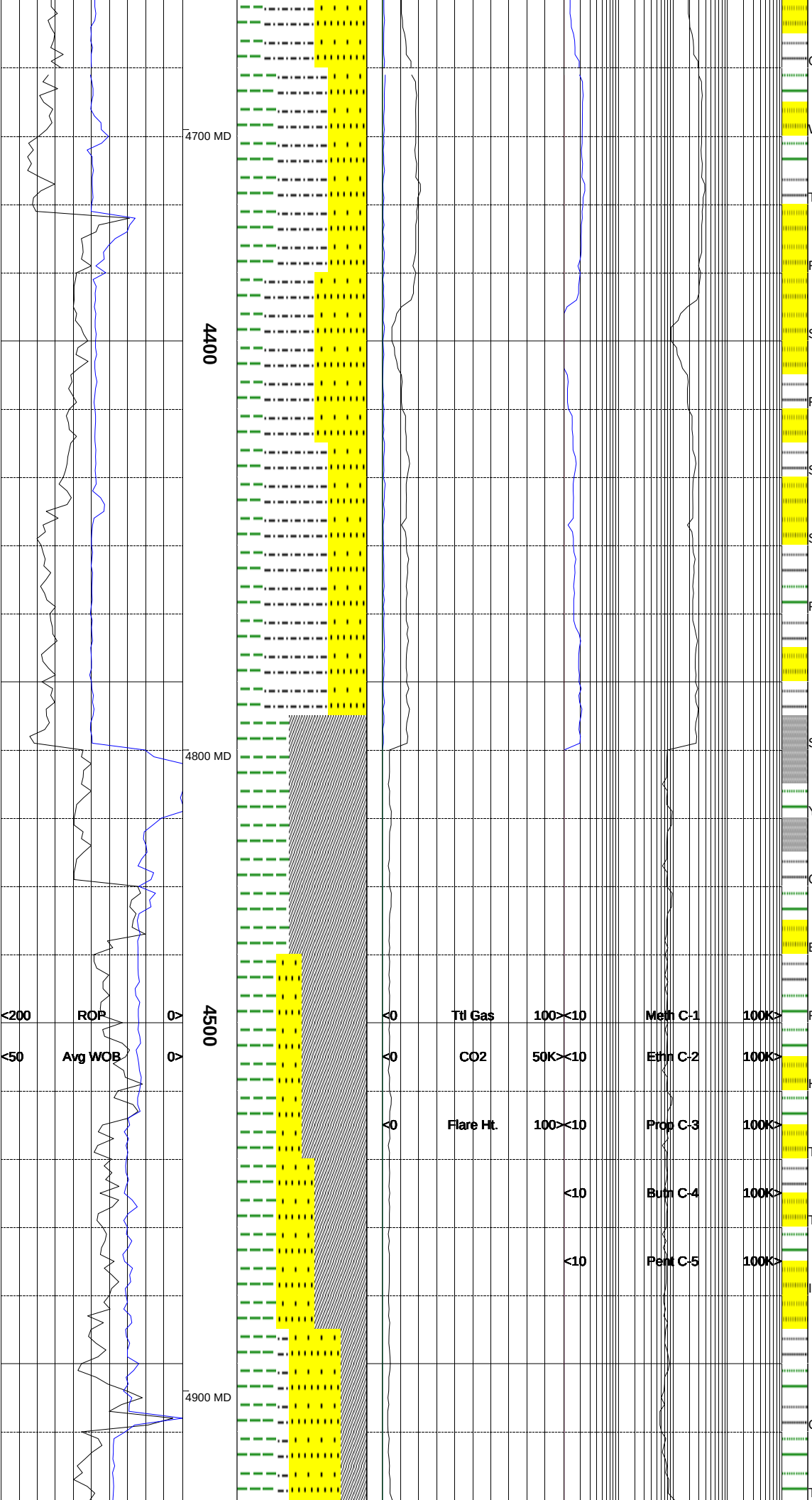
INC. 25.05

AZIMUTH: 187.66


3700
4000 MD
3800
4100 MD
3900
TVD: 3704.15
EPOCH WELL SERVICES COMMENCED LOGGING
OPERATIONS 09/21/2009 AT 14:00 @ 3960'.
DRILL TO 3986' AND PERFORM F.I.T.
SHALE = YELLOW; LIGHT GRAY; MOTTLED IN
PART; FIRM; PLATY TO SLI FLAKY CUTTINGS;
IRREGULAR FRACTURE; DULL EARTHY LUSTER;
SMOOTH TO SILTY TEXTURE; MOD CALCAREOUS
IN SILTY EXAMPLES; VARIABLE AMOUNTS OF
SILT; NO VISIBLE STRUCTURE.
SANDSTONE = LIGHT YELLOWISH BROWN,
LIGHT BLUISH GRAY, TRACES TRANSLUCENT
QUARTZ GRAINS; UPPER VERY FINE TO
UPPER FINE GRAIN; POOR TO FAIR SORTING;
PREDOMINATELY SUB ANGULAR TO SUB
ROUND ANGULARITY; LOW SHERICITY; TRACE
FROSTED SURFACE FEATURES; EASILY
FRIABLE TO SLIGHT FIRM; SILICIA MATRIX


4200 MD
4000
4300 MD
4100
4400 MD
<200
ROP
0>
<50
Avg WOB
0>
<0
Ttl Gas
100><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>
CEMENT, TRACE CLAY CEMENT; WEAK GRAIN
SUPPORT; POOR VISUAL INTER GRANULAR
POROSITY; SOME DARK LITHIC AND CARBON-
ACEOUS SHALE IMBEDDED.
SILTSTONE = BROWN TO DARK BROWN,
LIGHT BROWNISH GRAY; PULVERULENT TO
CRUMBLY TENACITY; SUB BLOCKY TO
BLOCKY FRACTURE; WEDGELIKE, SUB
MASSIVE CUTTINGS HABIT; DULL EARTHY
SLIGHT WAXY LUSTER; GRITTY TO SMOOTH
TEXTURE; SEMI THICK STRUCTURE, GRADING
TO SANDSTONE; TRACES BLACK LITHIC
IMBEDDED.
SHALE = LIGHT GRAYISH RED, BROWNISH
GRAY, LIGHT GRAY; CRUNCHY TO BRITTLE
TENACITY; SUB BLOCKY, BLOCKY, IRREGULAR
IN PART FRACTURE; TABULAR, SUB MASSIVE
CUTTINGS HABIT; DULL, WAXY LUSTER;
GRITTY, CLAYEY TEXTURE; SEMI MASSIVE
THICK STRUCTURE; GRADING TO SILTSTONE.


4500 MD
4200
4600 MD
4300
SANDSTONE = TRANSLUCENT, LIGHT YELLOWISH
BROWN, PALE GRAYISH ORANGE; LOWER TO
UPPER FINE GRAIN; POOR TO FAIR SORTING;
PREDOMINATELY SUB ROUNDED TRACE
SUB ANGULAR; LOW TO MODERATE
SPHERICIAL; POLISH TO FROSTED SURFACE
FEATURES; EASILY FRIABLE TO FRIABLE;
SILICA CEMENT; VERY WEAK GRAIN
SUPPORTED; TRACES BLACK COAL IMBEDDED.
SILTSTONE = LIGHT GRAYISH BROWN, PALE
YELLOWISH BROWN, LIGHT GRAYISH ORANGE;
PULVERULENT, CRUNCHY TENACITY, SUB
BLOCKY, BLOCKY FRACTURE; ELONGATED,
WEDGELIKE, SUB MASSIVE CUTTINGS HABIT;
DULL, EARTHY, SLIGHT WAXY LUSTER;
GRITTY, SILTY TEXTURE; SEMI MASSIVE,
THICK STURCTURE; GRADING TO SANDSTONE;
TRACES BLACK SPECKLED LITHIC IMBEDDED.
SANDSTONE = CLEAR TO TRANSLUCENT, LIGHT



GRAYISH BLUE, OFF WHITE; QUARTZ FRAME-

WORK; LOWER TO UPPER FINE GRAIN; FAIR

TO WELL SORTED; PREDOMINATELY SUB

ROUND TO ROUND ANGULARITY; MODERATE

SPHERICITY; FROSTED TO POLISH SURFACE

FEATURE; VERY FRIABLE TO FRIABLE; SOME

SILICA MATRIX CEMENT, VERY WEAK GRAIN

SUPPORT, GOOD VISUAL INTER GRANULAR

POROSITY; BLACK SPECKLED COAL IMBEDDED.

SILTSTONE = DUSKY YELLOWISH, PALE

YELLOWISH BROWN; PULVERULENT,

CRUMBLY, SLIGHT BRITTLE TENACITY;

EARTHY, SUB BLOCKY, IRREGULAR IN PART

FRACTURE; WEDGELIKE, TABULAR CUTTINGS

HABIT; DULL, RESINOUS LUSTER; GRITTY

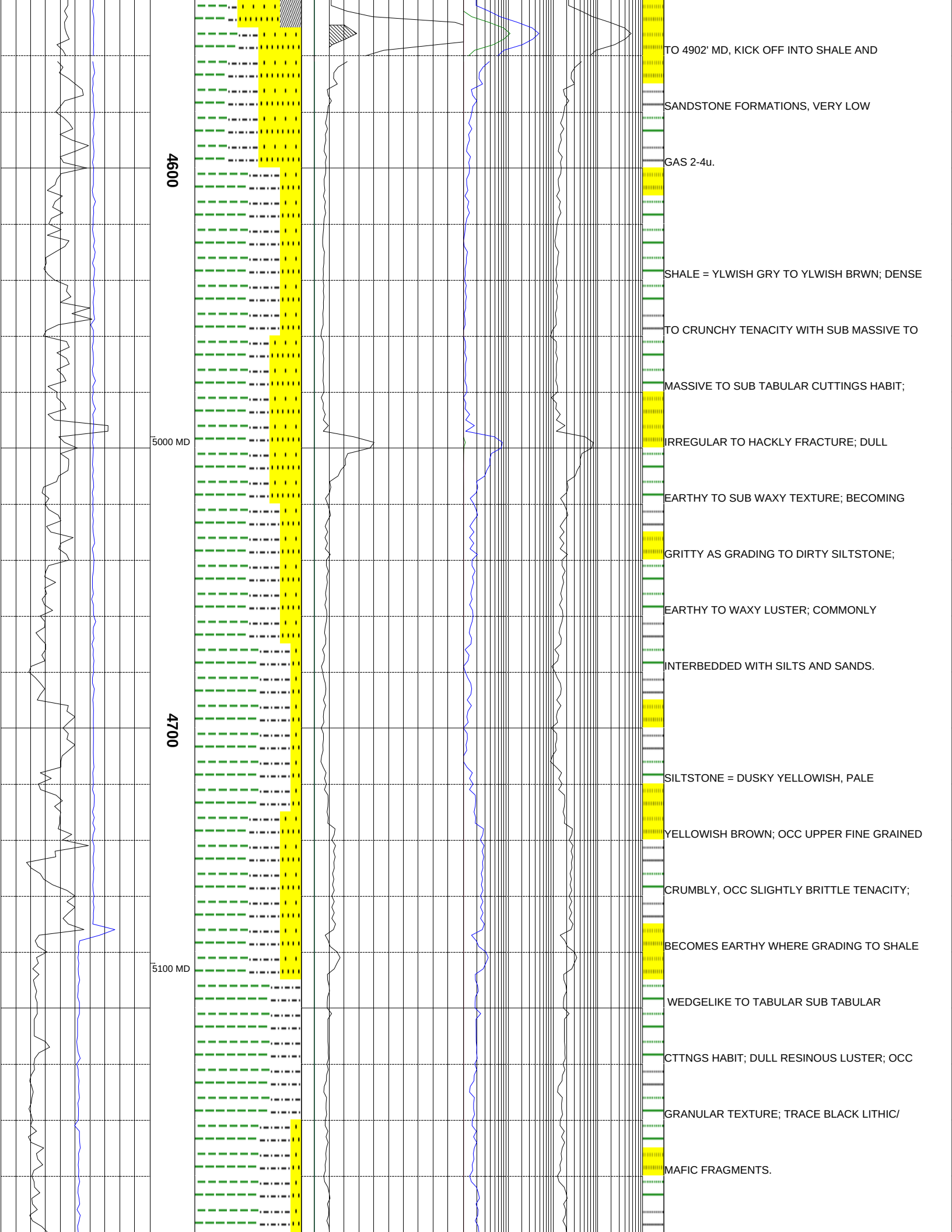
TO GRANULAR TEXTURE; SEMI MASSIVE

THICK STRUCTURE; TRACES BLACK LITHIC

IMBEDDED.

CEMENT = TIME DRILLING TO KICK OFF

THE PCU 297-11B1ST1 FROM 4800'



TO 4902' MD, KICK OFF INTO SHALE AND

SANDSTONE FORMATIONS, VERY LOW

GAS 2-4u.

SHALE = YLWISH GRY TO YLWISH BRWN; DENSE

TO CRUNCHY TENACITY WITH SUB MASSIVE TO

MASSIVE TO SUB TABULAR CUTTINGS HABIT;

IRREGULAR TO HACKLY FRACTURE; DULL

EARTHY TO SUB WAXY TEXTURE; BECOMING

GRITTY AS GRADING TO DIRTY SILTSTONE;

EARTHY TO WAXY LUSTER; COMMONLY

INTERBEDDED WITH SILTS AND SANDS.

SILTSTONE = DUSKY YELLOWISH, PALE

YELLOWISH BROWN; OCC UPPER FINE GRAINED

CRUMBLY, OCC SLIGHTLY BRITTLE TENACITY;

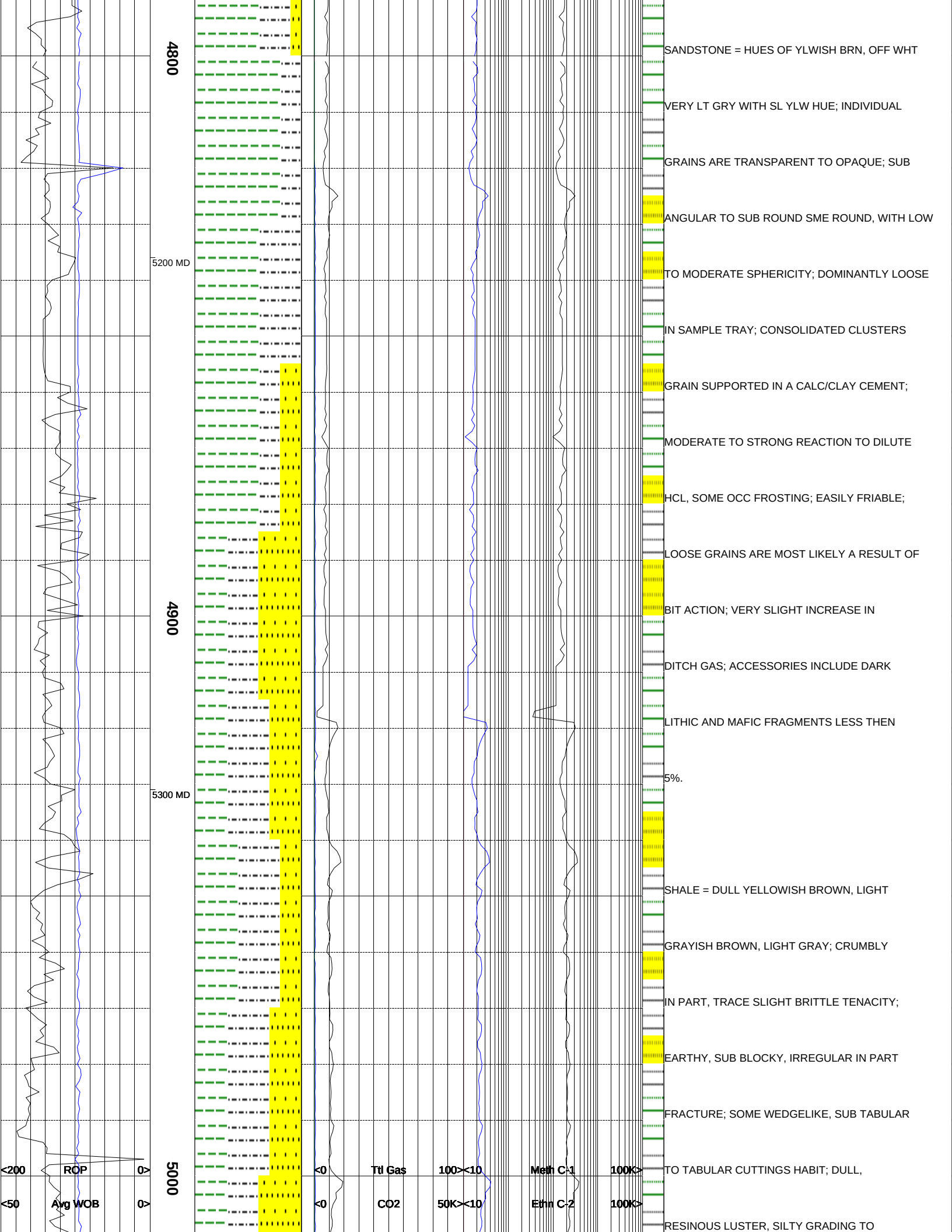
BECOMES EARTHY WHERE GRADING TO SHALE

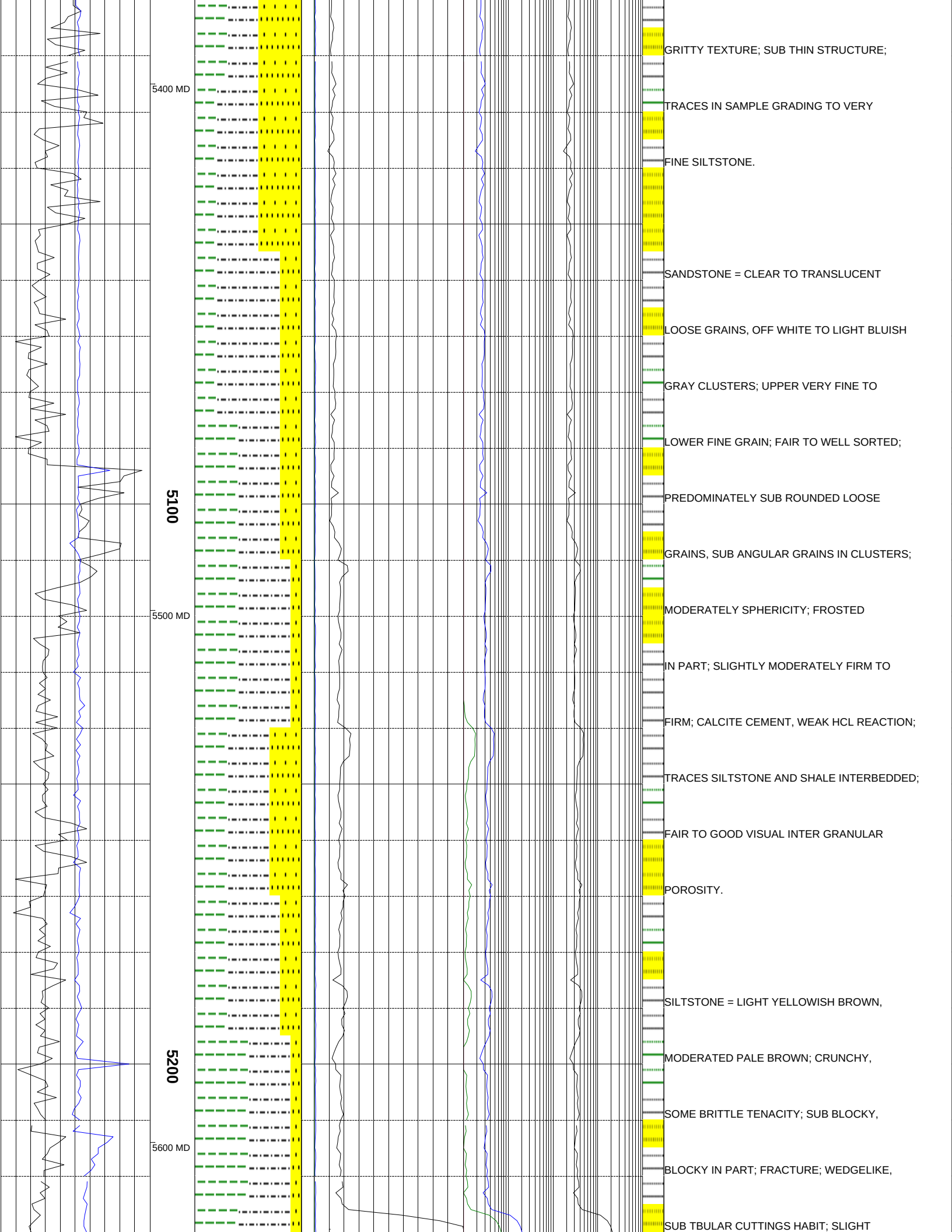
WEDGELIKE TO TABULAR SUB TABULAR

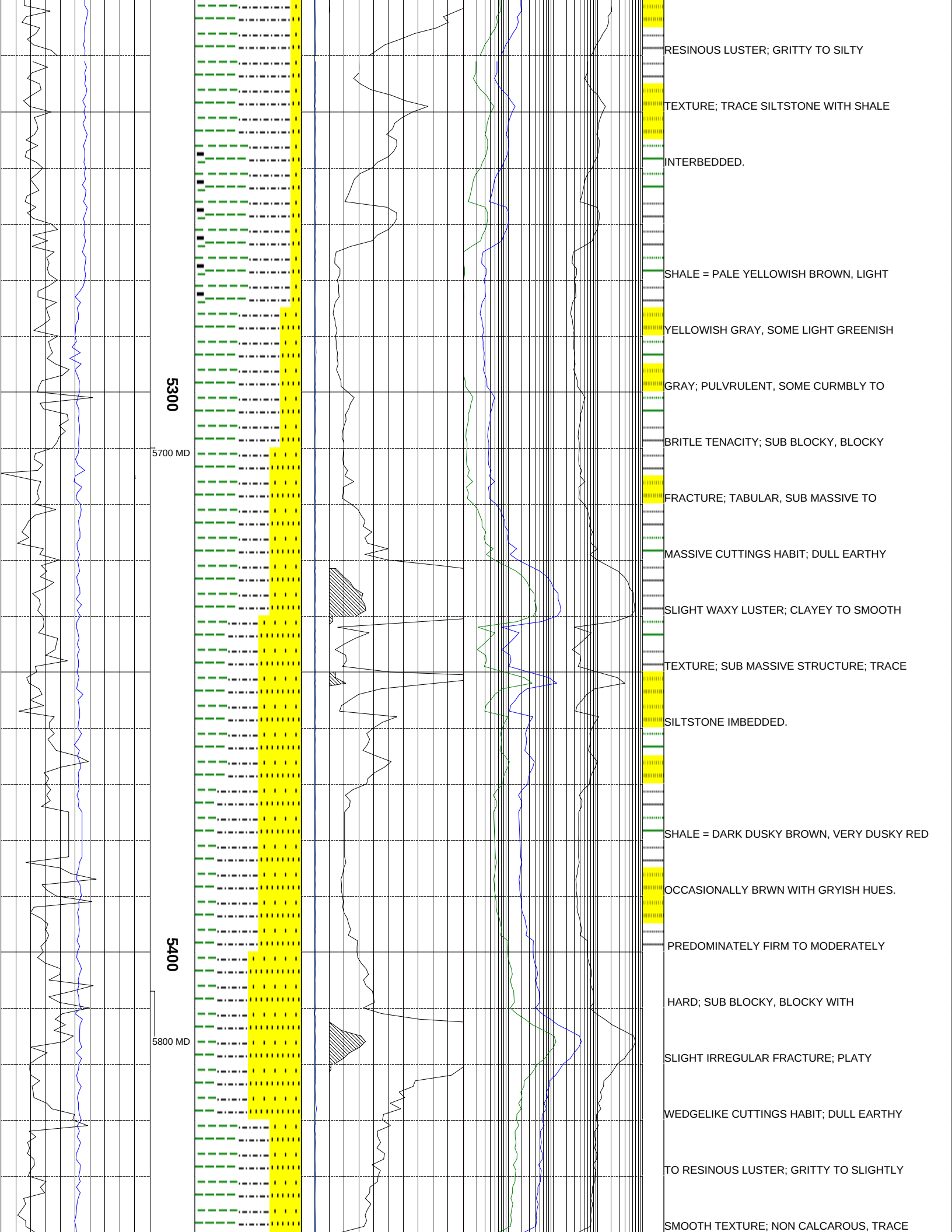
CTTNGS HABIT; DULL RESINOUS LUSTER; OCC

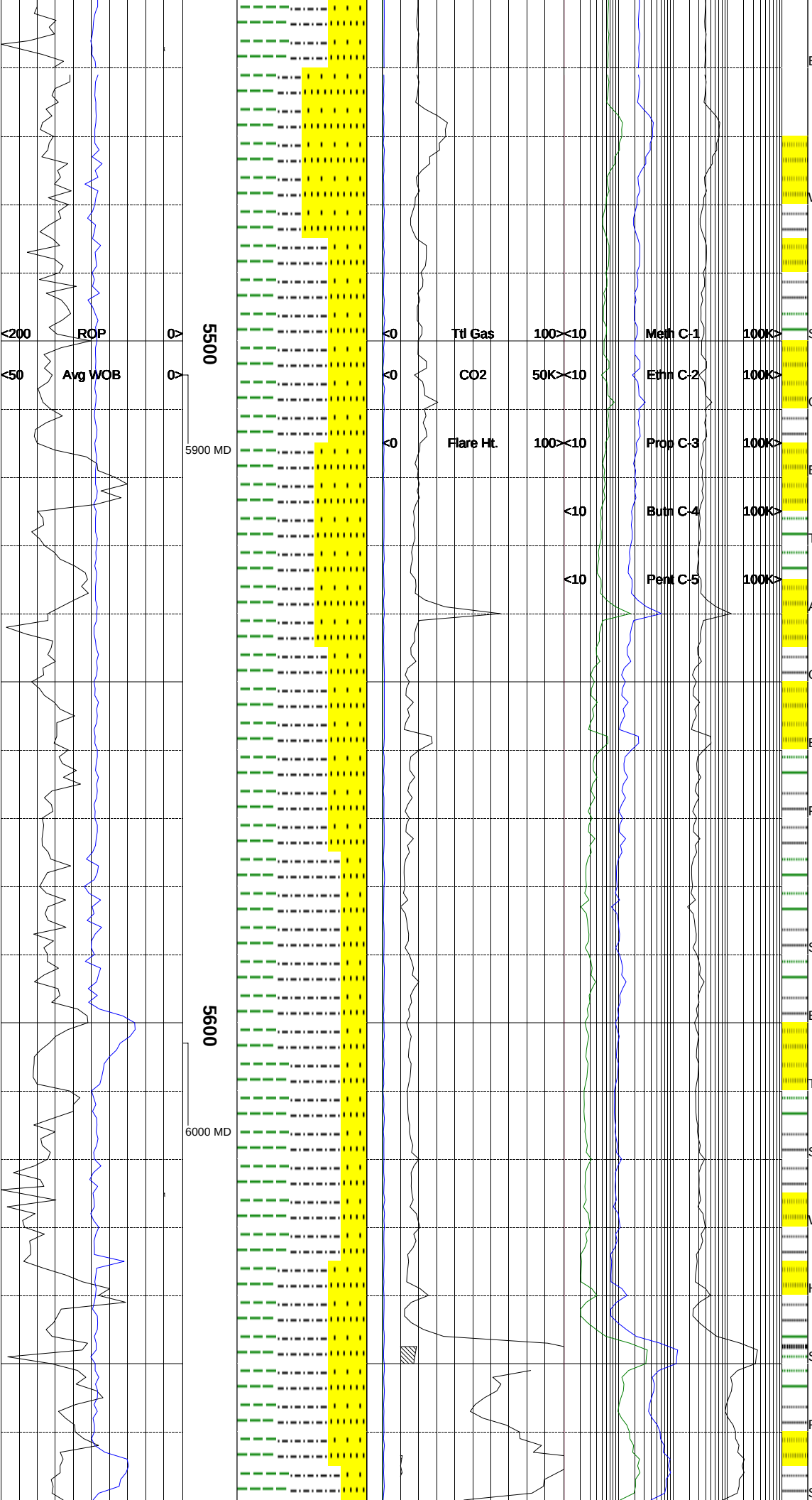
GRANULAR TEXTURE; TRACE BLACK LITHIC/

MAFIC FRAGMENTS.


4800
5200 MD
4900
5300 MD
5000
<200
ROP
0>
<50
Avg WOB
0>
<0
Ttl Gas
100><10
<0
CO2
50K><10
Meth C-1
100K>
Ethn C-2
100K>
SANDSTONE = HUES OF YLWISH BRN, OFF WHT
VERY LT GRY WITH SL YLW HUE; INDIVIDUAL
GRAINS ARE TRANSPARENT TO OPAQUE; SUB
ANGULAR TO SUB ROUND SME ROUND, WITH LOW
TO MODERATE SPHERICITY; DOMINANTLY LOOSE
IN SAMPLE TRAY; CONSOLIDATED CLUSTERS
GRAIN SUPPORTED IN A CALC/CLAY CEMENT;
MODERATE TO STRONG REACTION TO DILUTE
HCL, SOME OCC FROSTING; EASILY FRIABLE;
LOOSE GRAINS ARE MOST LIKELY A RESULT OF
BIT ACTION; VERY SLIGHT INCREASE IN
DITCH GAS; ACCESSORIES INCLUDE DARK
LITHIC AND MAFIC FRAGMENTS LESS THEN
5%.
SHALE = DULL YELLOWISH BROWN, LIGHT
GRAYISH BROWN, LIGHT GRAY; CRUMBLY
IN PART, TRACE SLIGHT BRITTLE TENACITY;
EARTHY, SUB BLOCKY, IRREGULAR IN PART
FRACTURE; SOME WEDGELIKE, SUB TABULAR
TO TABULAR CUTTINGS HABIT; DULL,
RESINOUS LUSTER, SILTY GRADING TO


5400 MD
5100
5500 MD
5200
5600 MD
GRITTY TEXTURE; SUB THIN STRUCTURE;
TRACES IN SAMPLE GRADING TO VERY
FINE SILTSTONE.
SANDSTONE = CLEAR TO TRANSLUCENT
LOOSE GRAINS, OFF WHITE TO LIGHT BLUISH
GRAY CLUSTERS; UPPER VERY FINE TO
LOWER FINE GRAIN; FAIR TO WELL SORTED;
PREDOMINATELY SUB ROUNDED LOOSE
GRAINS, SUB ANGULAR GRAINS IN CLUSTERS;
MODERATELY SPHERICITY; FROSTED
IN PART; SLIGHTLY MODERATELY FIRM TO
FIRM; CALCITE CEMENT, WEAK HCL REACTION;
TRACES SILTSTONE AND SHALE INTERBEDDED;
FAIR TO GOOD VISUAL INTER GRANULAR
POROSITY.
SILTSTONE = LIGHT YELLOWISH BROWN,
MODERATED PALE BROWN; CRUNCHY,
SOME BRITTLE TENACITY; SUB BLOCKY,
BLOCKY IN PART; FRACTURE; WEDGELIKE,
SUB TBULAR CUTTINGS HABIT; SLIGHT


5300
5700 MD
5400
5800 MD
RESINOUS LUSTER; GRITTY TO SILTY
TEXTURE; TRACE SILTSTONE WITH SHALE
INTERBEDDED.
SHALE = PALE YELLOWISH BROWN, LIGHT
YELLOWISH GRAY, SOME LIGHT GREENISH
GRAY; PULVRULENT, SOME CURMBLY TO
BRITLE TENACITY; SUB BLOCKY, BLOCKY
FRACTURE; TABULAR, SUB MASSIVE TO
MASSIVE CUTTINGS HABIT; DULL EARTHY
SLIGHT WAXY LUSTER; CLAYEY TO SMOOTH
TEXTURE; SUB MASSIVE STRUCTURE; TRACE
SILTSTONE IMBEDDED.
SHALE = DARK DUSKY BROWN, VERY DUSKY RED
OCCASIONALLY BRWN WITH GRYISH HUES.
PREDOMINATELY FIRM TO MODERATELY
HARD; SUB BLOCKY, BLOCKY WITH
SLIGHT IRREGULAR FRACTURE; PLATY
WEDGELIKE CUTTINGS HABIT; DULL EARTHY
TO RESINOUS LUSTER; GRITTY TO SLIGHTLY
SMOOTH TEXTURE; NON CALCAROUS, TRACE



BLACK LITHIC / COAL IMBEDDED.

WASATCHA G 5710' MD 5320' TVD

SANDSTONE = ABUNDANT LOOSE GRAINS,

CLEAR TO TRANSLUCENT, OFF WHITE, LIGHT

BLUISH GRAY CLUSTERS; UPPER VERY FINE

TO FINE GRAIN; FAIR TO WELL SORTED;

ANGULAR TO SUBANGULAR, SILICA MATRIX

CEMENT, TRACE CALCAREOUS CEMENT, TRACE

BLACK GRAINS, GOOD VISUAL INTERGRANULAR

POROSITY, TRACE CALCITE CRYSTALS.

SILTSTONE = LIGHT REDDISH BROWN, LIGHT

BROWN, DUSKY BROWN IN PART; CRUNCHY,

TO BRITTLE TENACITY; PREDOMINATELY

SUB BLOCKY, SOME BLOCKY FRACTURE;

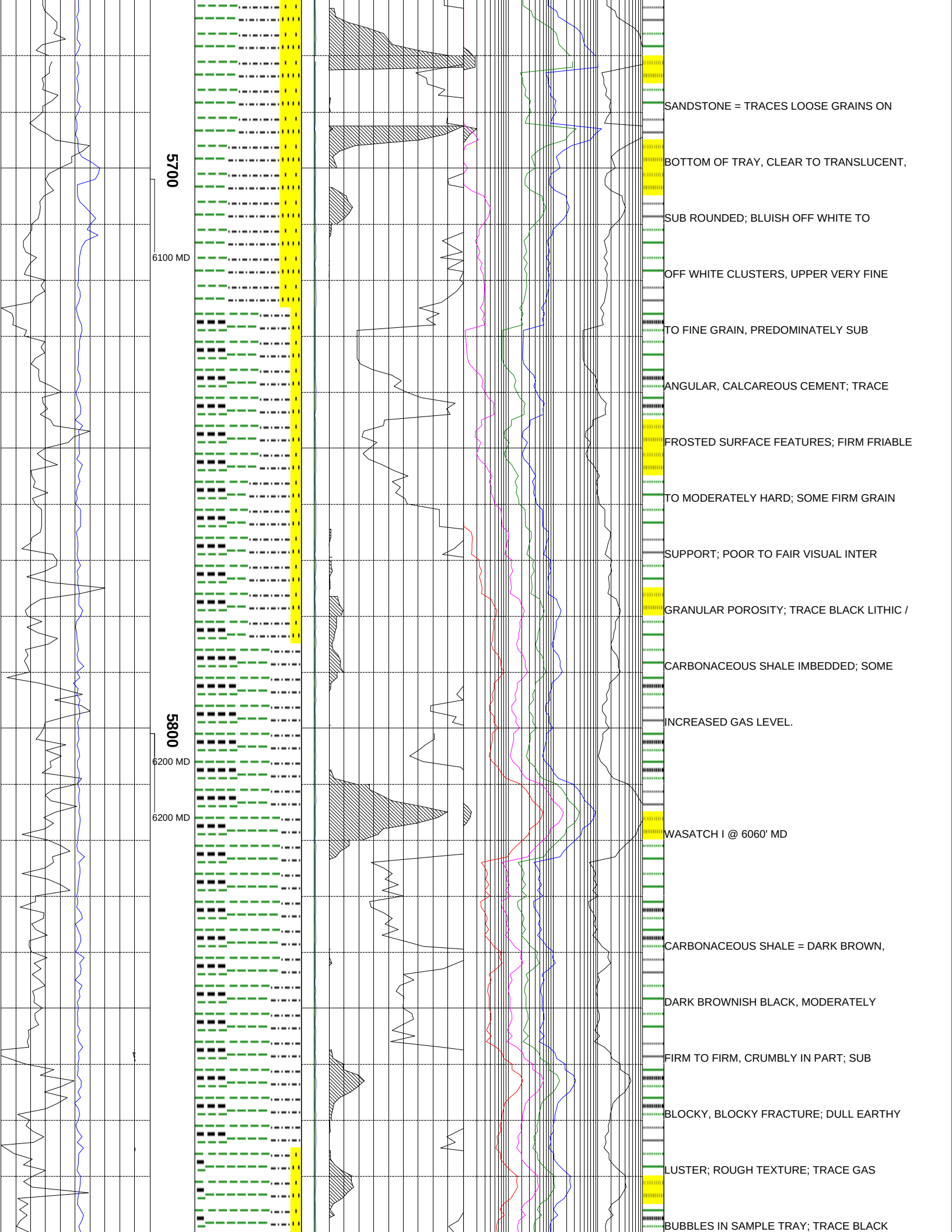
WEDGELIKE TO SUB MASSIVE CUTTINGS

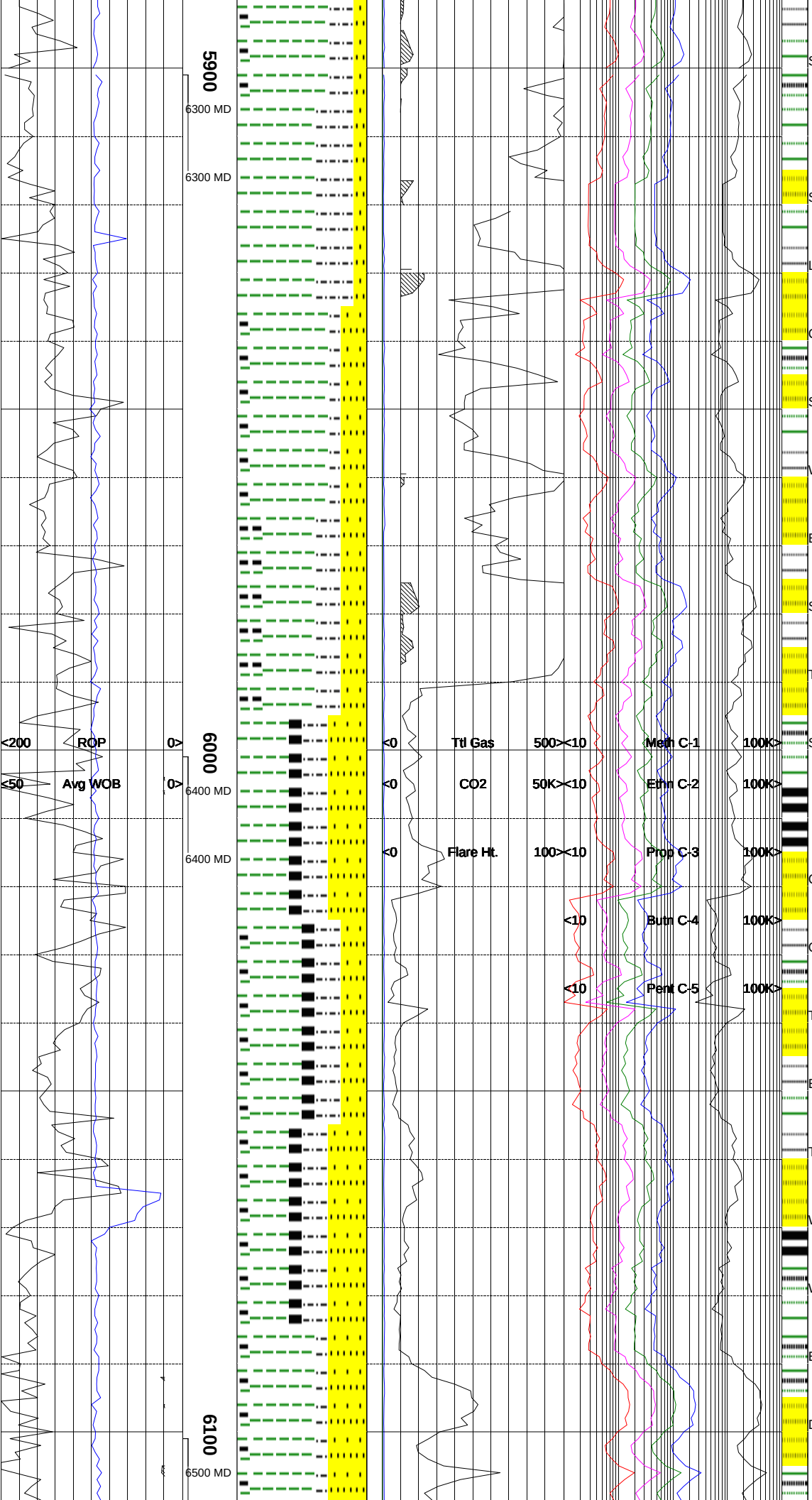
HABIT; DULL, RESINOUS LUSTER; GRITTY,

SLIGHTLY SMOOTH TEXTURE, TRACE

PRYITIC IMBEDDED, SLIGHT GRADING TO

SANDSTONE.


5700
6100 MD
5800
6200 MD
6200 MD
SANDSTONE = TRACES LOOSE GRAINS ON
BOTTOM OF TRAY, CLEAR TO TRANSLUCENT,
SUB ROUNDED; BLUISH OFF WHITE TO
OFF WHITE CLUSTERS, UPPER VERY FINE
TO FINE GRAIN, PREDOMINATELY SUB
ANGULAR, CALCAREOUS CEMENT; TRACE
FROSTED SURFACE FEATURES; FIRM FRIABLE
TO MODERATELY HARD; SOME FIRM GRAIN
SUPPORT; POOR TO FAIR VISUAL INTER
GRANULAR POROSITY; TRACE BLACK LITHIC /
CARBONACEOUS SHALE IMBEDDED; SOME
INCREASED GAS LEVEL.
WASATCH I @ 6060' MD
CARBONACEOUS SHALE = DARK BROWN,
DARK BROWNISH BLACK, MODERATELY
FIRM TO FIRM, CRUMBLY IN PART; SUB
BLOCKY, BLOCKY FRACTURE; DULL EARTHY
LUSTER; ROUGH TEXTURE; TRACE GAS
BUBBLES IN SAMPLE TRAY; TRACE BLACK



SPECKLED LITHIC IMBEDDED.

SILTSTONE = MEDIUM LIGHT REDISH BROWN,

LIGHT GRAYISH BROWN; CRUNCHY,

CRUMBLY TENACITY; PREDOMINATELY

SUB BLOCKY, BLOCKY FRACTURE;

WEDGELIKE, SUB TABULAR CUTTINGS HABIT;

EARTHY, DULL, RESINOUS LUSTER; GRITTY

SMOOTH TEXTURE; SUB THICK STRUCTURE;

TRACES BLACK LITHIC / CARBONACEOUS

SHALE IMBEDDED.

CARBONACEOUS SHALE = DARK GRY, BLACK,

OCC DARK BRWN; CRUNCHY TO BRITTLE

TENACITY; SUB TAB TO SUB WEDGELIKE /

ELONGATED CUTTINGS HABIT WITH IRREGULAR

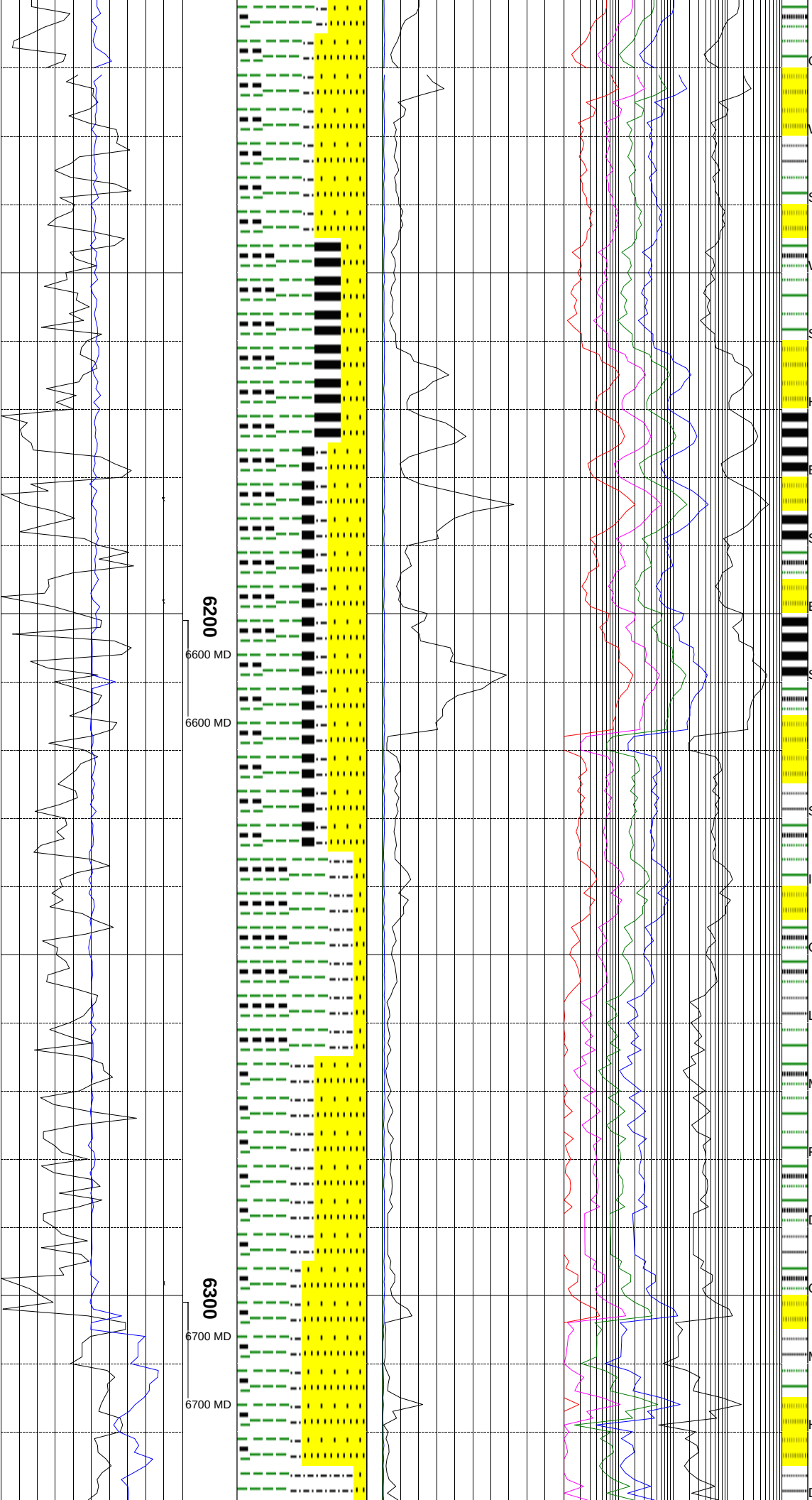
TO HACKLY FRACTURE; PLANAR FRACTURE

WITH PLATY CUTTINGS; DULL EARTHY TO SUB

WAXY OCC SUB VITREOUS LUSTER WITH

EARTHY TO SMOOTH TEXTURE; SL INCREASE IN

DITCH GAS ON OCCASION.



COAL = DARK BLACK, BLACK, VERY DARK BRWN

WHERE GRADING FROM CARBONACEOUS

SHALE TO COAL; DENSE TO BRITTLE TENACITY

WITH IRREGULAR TO HACKLY FRACTURE;

SUB TABULAR TO SUB WEDGELIKE CUTTINGS

HABIT; SLIGHTLY PYRITIC IN PLACES; DULL

EARTHY TO SUB VITREOUS LUSTER WITH

SMOOTH TO SUB GLASSY TEXTURE; OCC

EARTHY IN PLACES; VISIBLE DEGASSING IN

SAMPLE TRAY; OCC INCREASE IN DITCH GAS.

SANDSTONE = LT GRY, OFF WHT, GRY;

INDIVIDUAL GRAINS ARE TRANSPARENT TO

OPAQUE; SUB ANGULAR TO SUB ROUND;

LOW TO OCC MODERATE SPHERICITY; OVERALL

MODERATELY TO WELL SORTED; UPPER FINE TO

FINE GRAINED OCC UPPER MEDIUM GRAINED;

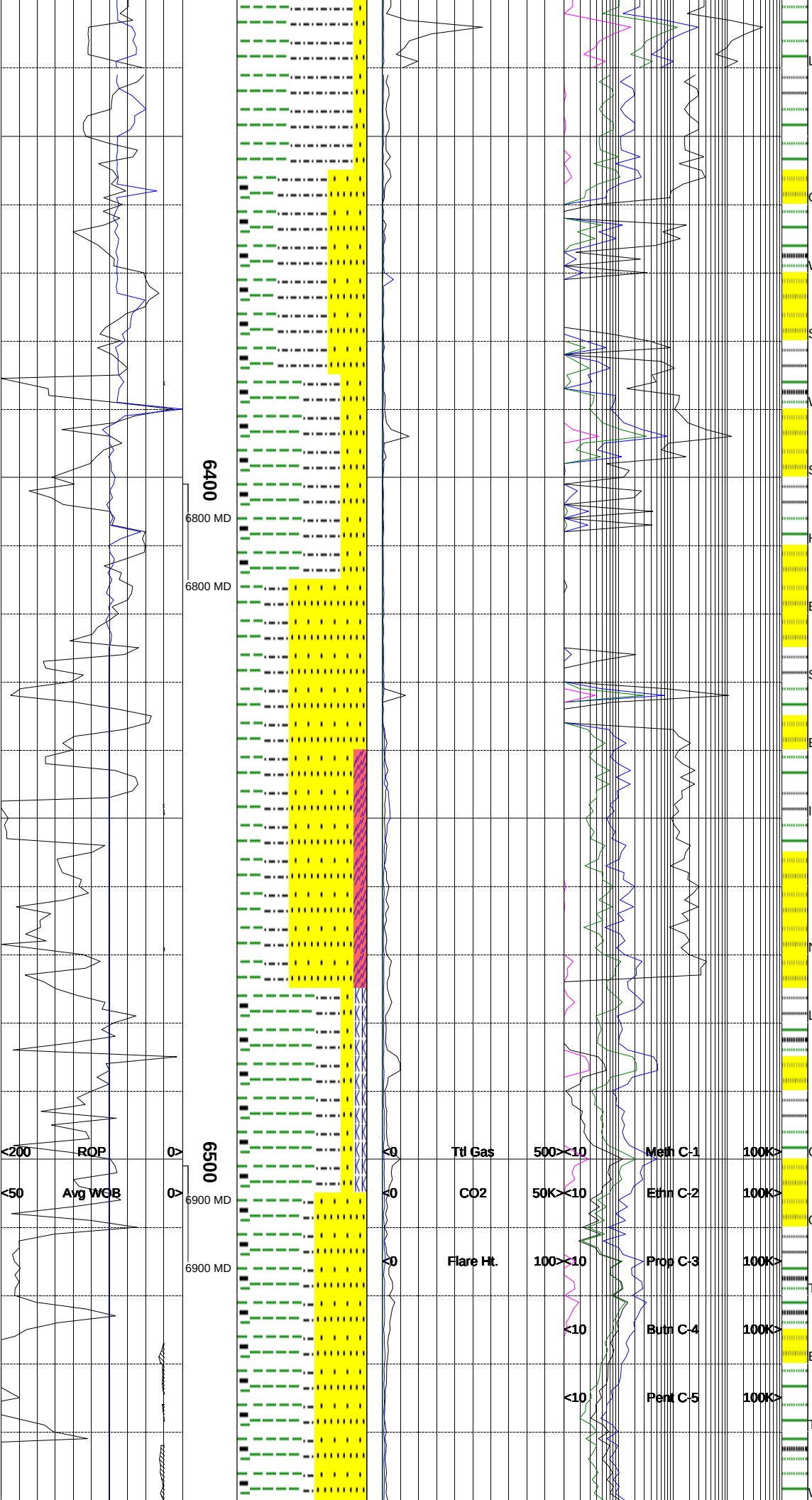
DMINANTLY CONSOLIDATED; CLUSTERS ARE

GRAIN SUPPORTED IN A CALC/CLAY CEMENT

MODERATE TO STRONG REACTION TO DILUTE

HCL; SLIGHT TO MODERATE INCREASE IN

DITCH GAS; ACCESSORIES INCLUDE DARK



LITHIC AND MAFIC FRAGMENTS 3% - 5%.

COAL = DARK BLACK, BLACK, VERY DARK BRWN

WHERE GRADING FROM CARBONACEOUS

SHALE TO COAL; DENSE TO BRITTLE TENACITY

WITH IRREGULAR TO HACKLY FRACTURE;

SUB TABULAR TO SUB WEDGELIKE CUTTINGS

HABIT; SLIGHTLY PYRITIC IN PLACES; DULL

EARTHY TO SUB VITREOUS LUSTER WITH

SMOOTH TO SUB GLASSY TEXTURE; OCC

EARTHY IN PLACES; VISIBLE DEGASSING IN

IN SAMPLE TRAY.

NOTE: TOH @ 6702' TO CHANGE OUT BHA AND

LAY DOWN SHLUMBERGER'S TOOLS. 09-29-09.

CARBONACEOUS SHALE = DARK BRWN, BLACK,

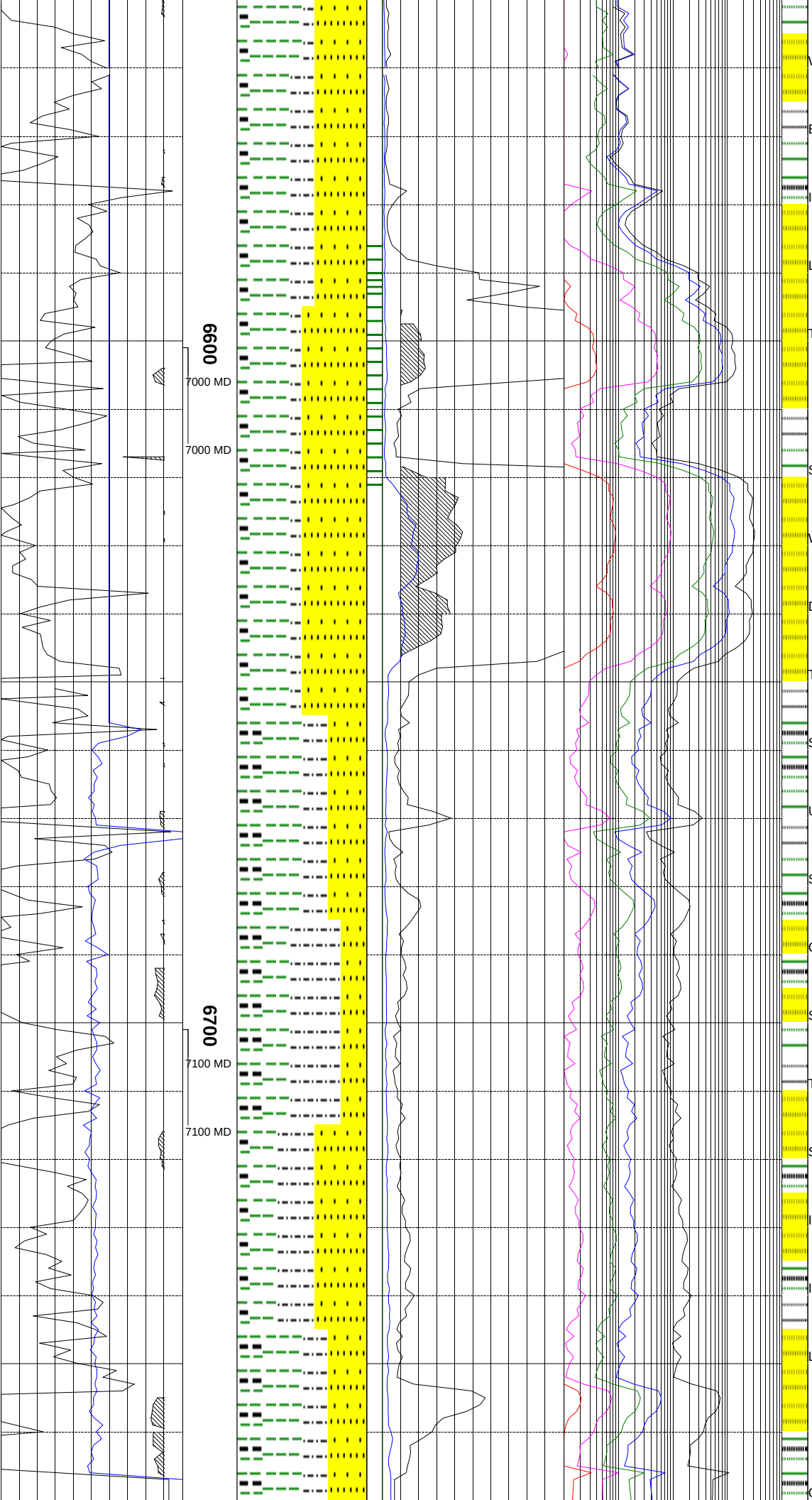
OCC DARK GRY; CRUNCHY TO BRITTLE

TENACITY; SUB TAB TO SUB WEDGELIKE /

ELONGATED CUTTINGS HABIT WITH IRREGULAR

TO HACKLY FRACTURE; PLANAR FRACTURE

WITH PLATY CUTTINGS; DULL EARTHY TO SUB



WAXY OCC SUB VITREOUS LUSTER WITH

EARTHY TO SMOOTH TEXTURE; SL PYRITIC

IN PLACES; OCC COAL LAMINAE AND

LENSES; VISIBLE DEGASSING IN SAMPLE

TRAY IN PLACES.

SANDSTONE = WHT, OFF WHT, LT GRY, GRY

WITH OCC HUES OF LT BRWN, GRY;

DOMINANTLY LOOSE TRANSPARENT TO

TRANSLUCENT GRAINS IN TRAY; ROUND TO

SUB ROUND; HIGH SPHERICITY; WELL SORTED;

UPPER MEDIUM TO LOWER FINE GRAINED IN

SIZE; APPEARS BI-MODAL AS CONSOLIDATED

CLUSTER ARE FINER GRAINED; MODERATELY

SORTED; FINE TO UPPER FINE GRAINED; LOW

TO MODERATE SPHERICITY; SUB ANGULAR TO

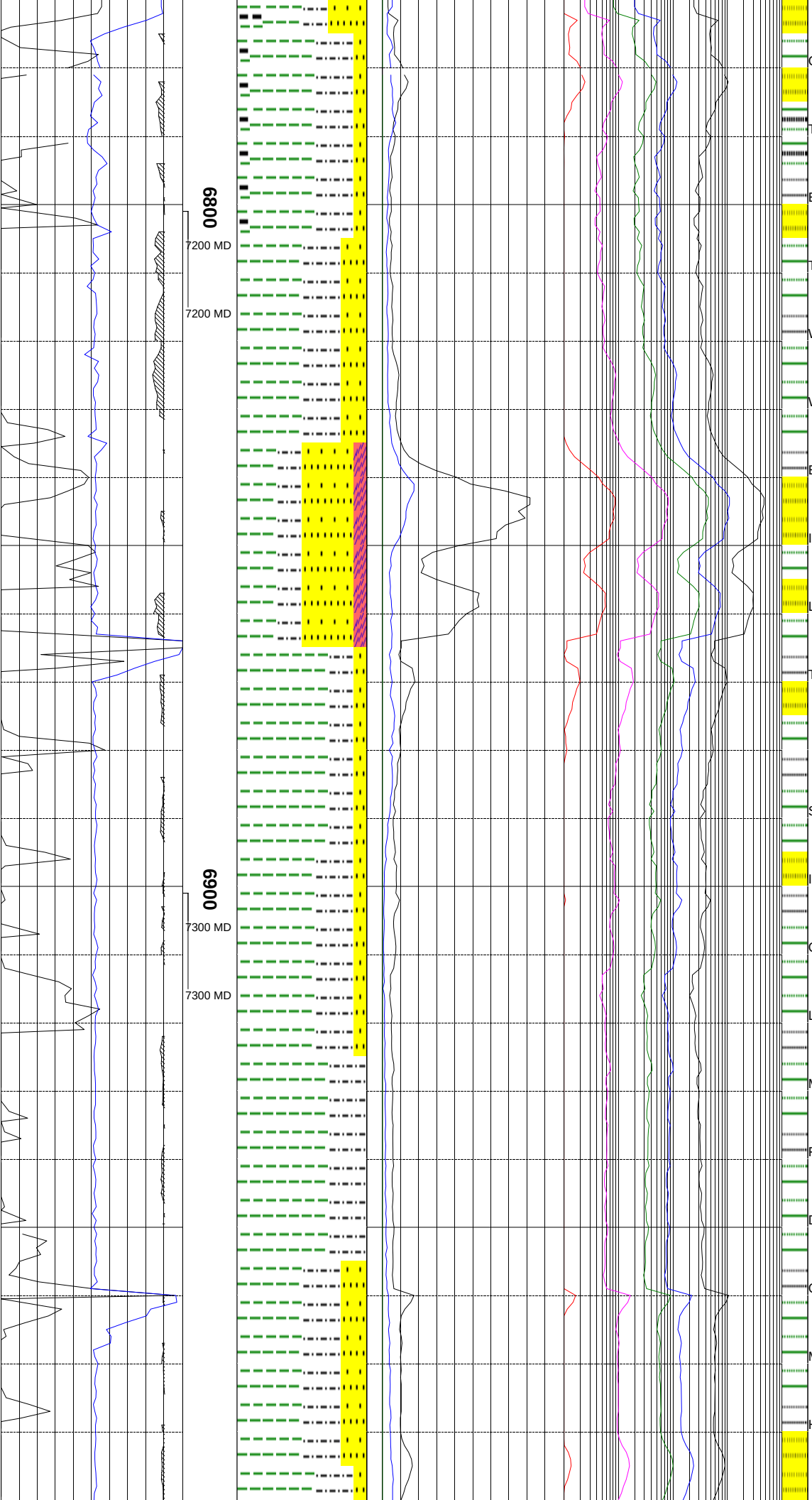
SUB ROUND; CLUSTERS ARE GRAIN SUPPORTED

IN A CALC/CLAY MATRIX; ACCESSORIES

INCLUDE DARK LITHIC AND MAFIC FRAGMENTS;

LOOSE CALCITE GRAINS IN SAMPLE TRAP.

CARBONACEOUS SHALE = DARK BRWN, BLACK,



OCC DARK GRY; CRUNCHY TO BRITTLE

TENACITY; SUB TAB TO SUB WEDGELIKE /

ELONGATED CUTTINGS HABIT WITH IRREGULAR

TO HACKLY FRACTURE; PLANAR FRACTURE

WITH PLATY CUTTINGS; DULL EARTHY TO SUB

WAXY OCC SUB VITREOUS LUSTER WITH

EARTHY TO SMOOTH TEXTURE; SL PYRITIC

IN PLACES; OCC COAL LAMINAE AND

LENSES; VISIBLE DEGASSING IN SAMPLE

TRAY IN PLACES.

SANDSTONE = LT GRY, OFF WHT, GRY;

INDIVIDUAL GRAINS ARE TRANSPARENT TO

OPAQUE; SUB ANGULAR TO SUB ROUND;

LOW TO OCC MODERATE SPHERICITY; OVERALL

MODERATELY TO WELL SORTED; UPPER FINE TO

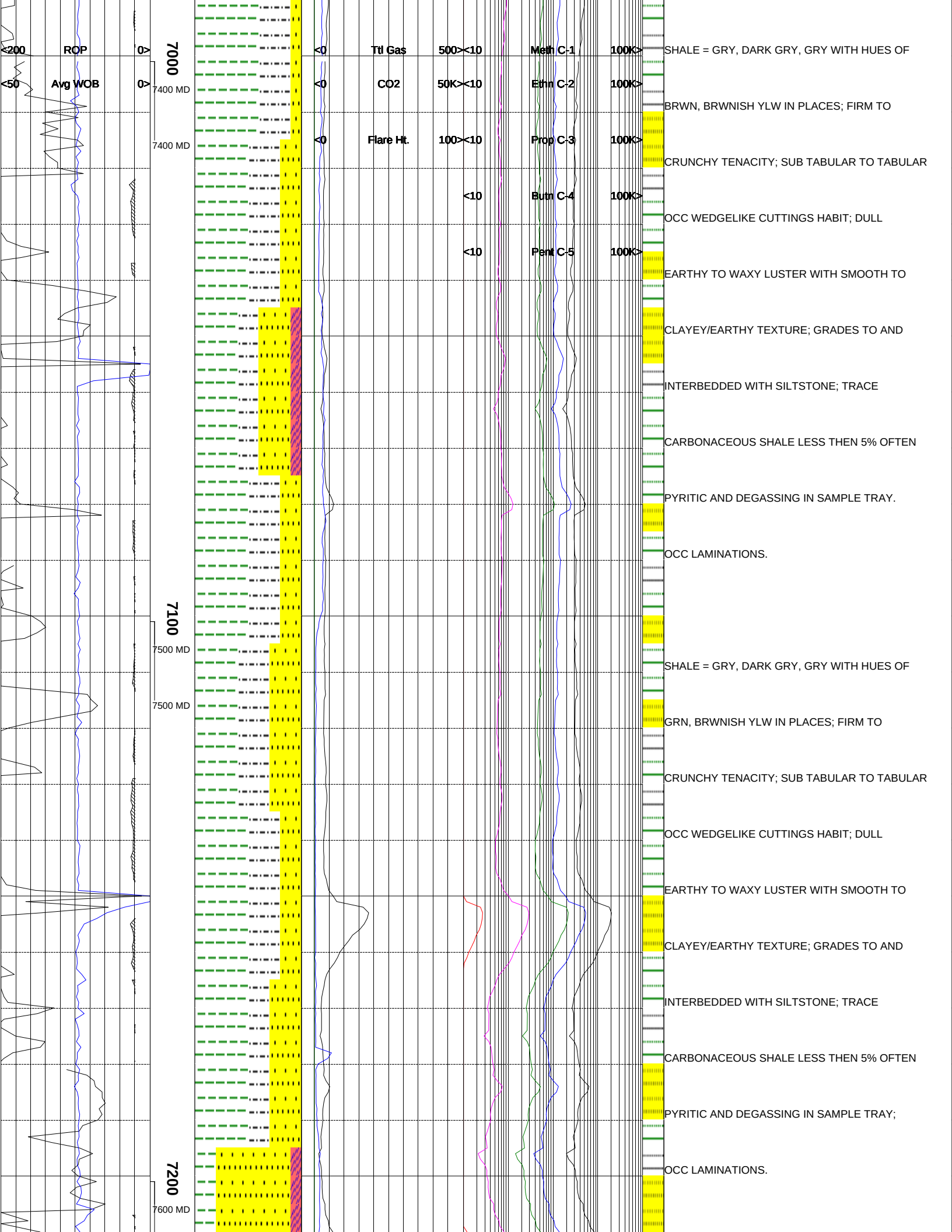
FINE GRAINED OCC UPPER MEDIUM GRAINED;

DOMINANTLY CONSOLIDATED; CLUSTERS ARE

GRAIN SUPPORTED IN A CALC/CLAY CEMENT

MODERATE TO STRONG REACTION TO DILUTE

HCL; SLIGHT TO MODERATE INCREASE IN GAS.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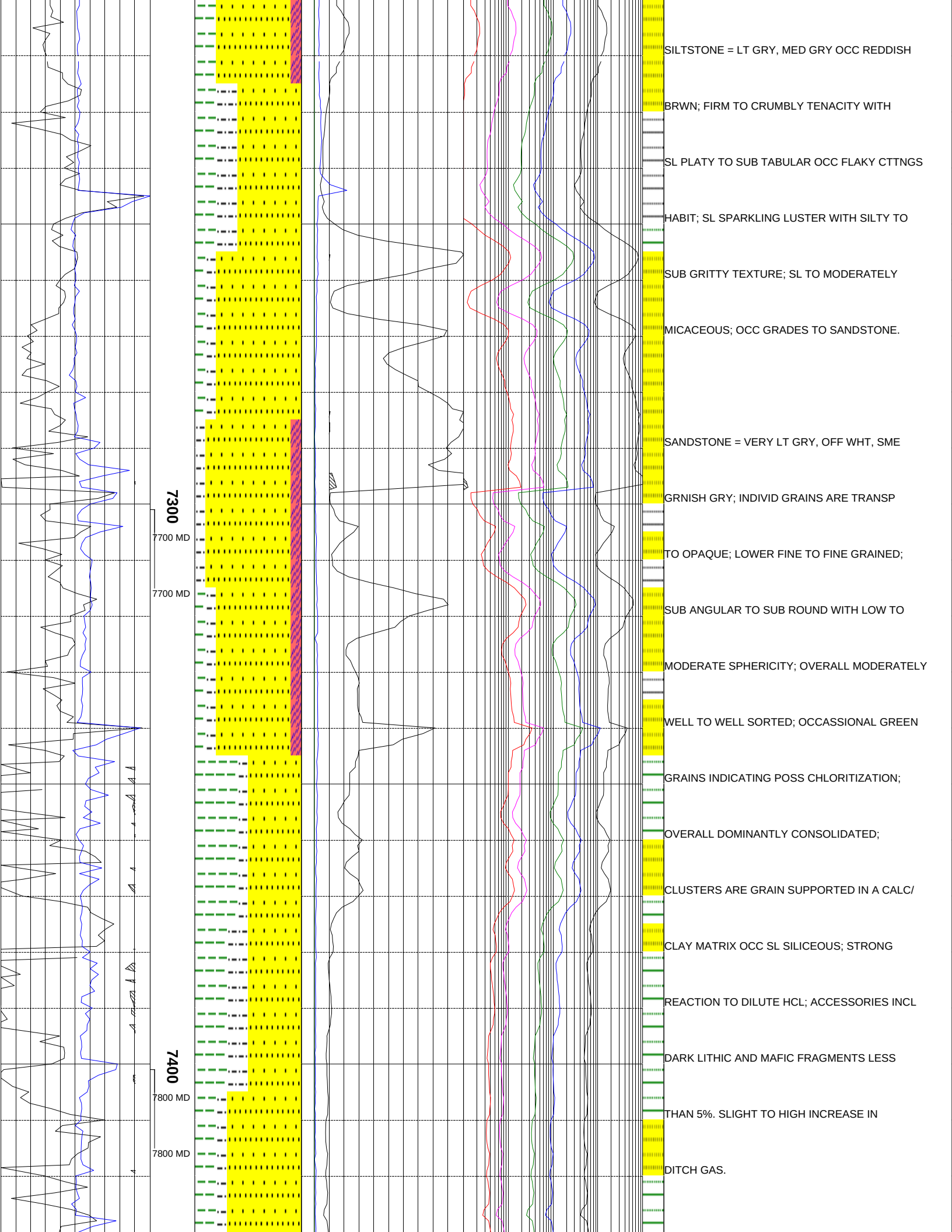
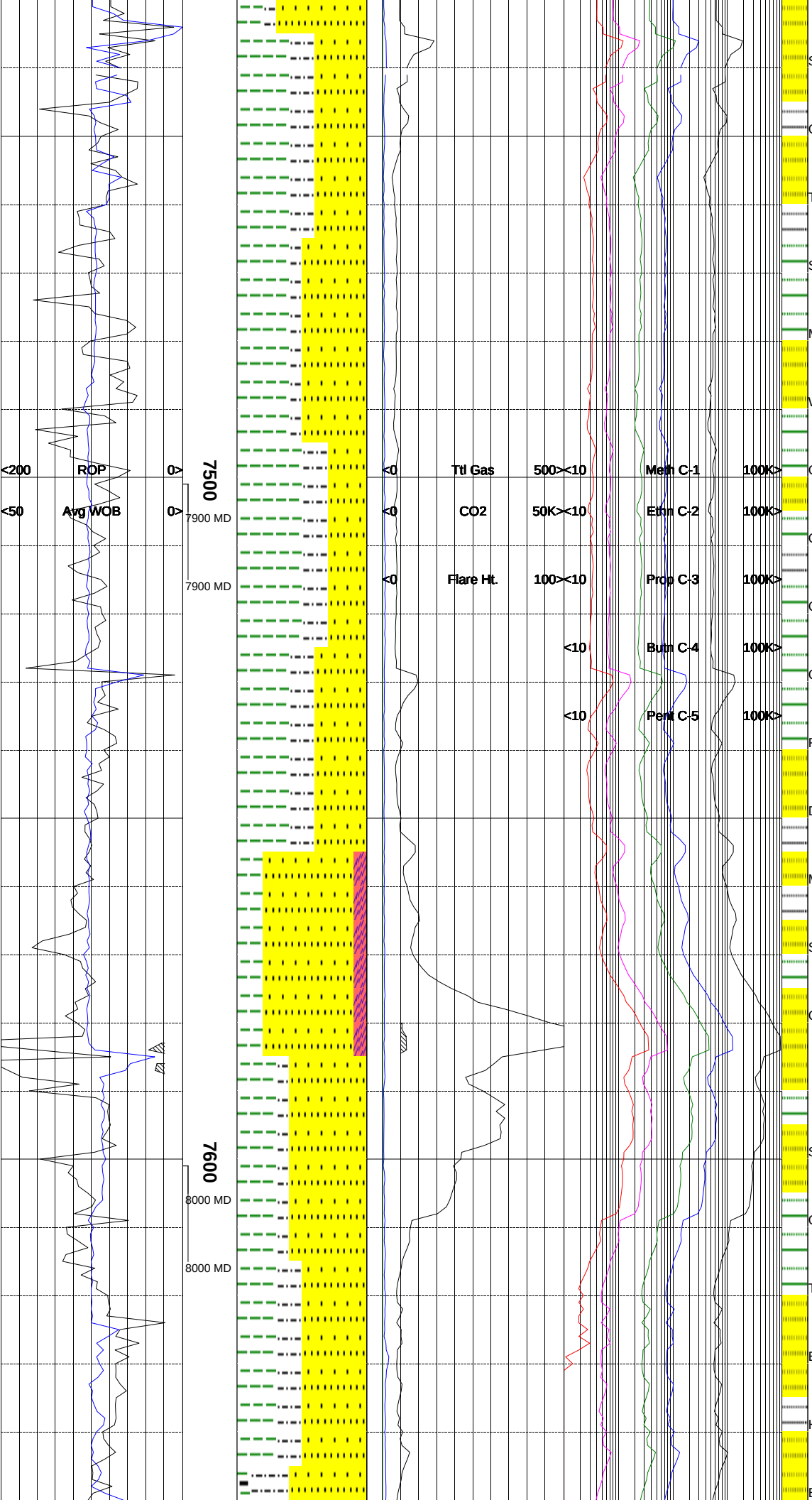
<10 Pent C-5 100K>
SHALE = GRY, DARK GRY, GRY WITH HUES OF
BRWN, BRWNISH YLW IN PLACES; FIRM TO
CRUNCHY TENACITY; SUB TABULAR TO TABULAR
OCC WEDGELIKE CUTTINGS HABIT; DULL
EARTHY TO WAXY LUSTER WITH SMOOTH TO
CLAYEY/EARTHY TEXTURE; GRADES TO AND
INTERBEDDED WITH SILTSTONE; TRACE
CARBONACEOUS SHALE LESS THEN 5% OFTEN
PYRITIC AND DEGASSING IN SAMPLE TRAY.
OCC LAMINATIONS.
SHALE = GRY, DARK GRY, GRY WITH HUES OF
GRN, BRWNISH YLW IN PLACES; FIRM TO
CRUNCHY TENACITY; SUB TABULAR TO TABULAR
OCC WEDGELIKE CUTTINGS HABIT; DULL
EARTHY TO WAXY LUSTER WITH SMOOTH TO
CLAYEY/EARTHY TEXTURE; GRADES TO AND
INTERBEDDED WITH SILTSTONE; TRACE
CARBONACEOUS SHALE LESS THEN 5% OFTEN
PYRITIC AND DEGASSING IN SAMPLE TRAY;
OCC LAMINATIONS.



SILTSTONE = LT GRY, MED GRY OCC REDDISH BRWN; FIRM TO CRUMBLY TENACITY WITH SL PLATY TO SUB TABULAR OCC FLAKY CTTNGS HABIT; SL SPARKLING LUSTER WITH SILTY TO SUB GRITTY TEXTURE; SL TO MODERATELY MICACEOUS; OCC GRADES TO SANDSTONE.

SANDSTONE = VERY LT GRY, OFF WHT, SME GRNISH GRY; INDIVID GRAINS ARE TRANSP TO OPAQUE; LOWER FINE TO FINE GRAINED; SUB ANGULAR TO SUB ROUND WITH LOW TO MODERATE SPHERICITY; OVERALL MODERATELY WELL TO WELL SORTED; OCCASSIONAL GREEN GRAINS INDICATING POSS CHLORITIZATION; OVERALL DOMINANTLY CONSOLIDATED; CLUSTERS ARE GRAIN SUPPORTED IN A CALC/ CLAY MATRIX OCC SL SILICEOUS; STRONG REACTION TO DILUTE HCL; ACCESSORIES INCL DARK LITHIC AND MAFIC FRAGMENTS LESS THAN 5%. SLIGHT TO HIGH INCREASE IN DITCH GAS.



SANDSTONE = VERY LT GRY, OFF WHT, SME

GRNISH GRY; INDIVID GRAINS ARE TRANSP

TO OPAQUE; FINE TO UPPER FINE GRAINED;

SUB ANGULAR TO SUB ROUND WITH LOW TO

MODERATE SPHERICITY; OVERALL MODERATELY

WELL TO WELL SORTED; OCCASIONAL GREEN

GRAINS INDICATING POSS CHLORITIZATION;

OVERALL DOMINANTLY CONSOLIDATED;

CLUSTERS ARE GRAIN SUPPORTED IN A CALC/

CLAY MATRIX OCC SL SILICEOUS; STRONG

REACTION TO DILUTE HCL; ACCESSORIES INCL

DARK LITHIC AND MAFIC FRAGMENTS 5-10%

MODERATE TO HIGH INCREASE IN DITCH GAS

SOME LOOSE CALCITE CRYSTALS; TRACE

CHERT.

SHALE = GRNISH GRY, GRY, BRWN WITH HUES

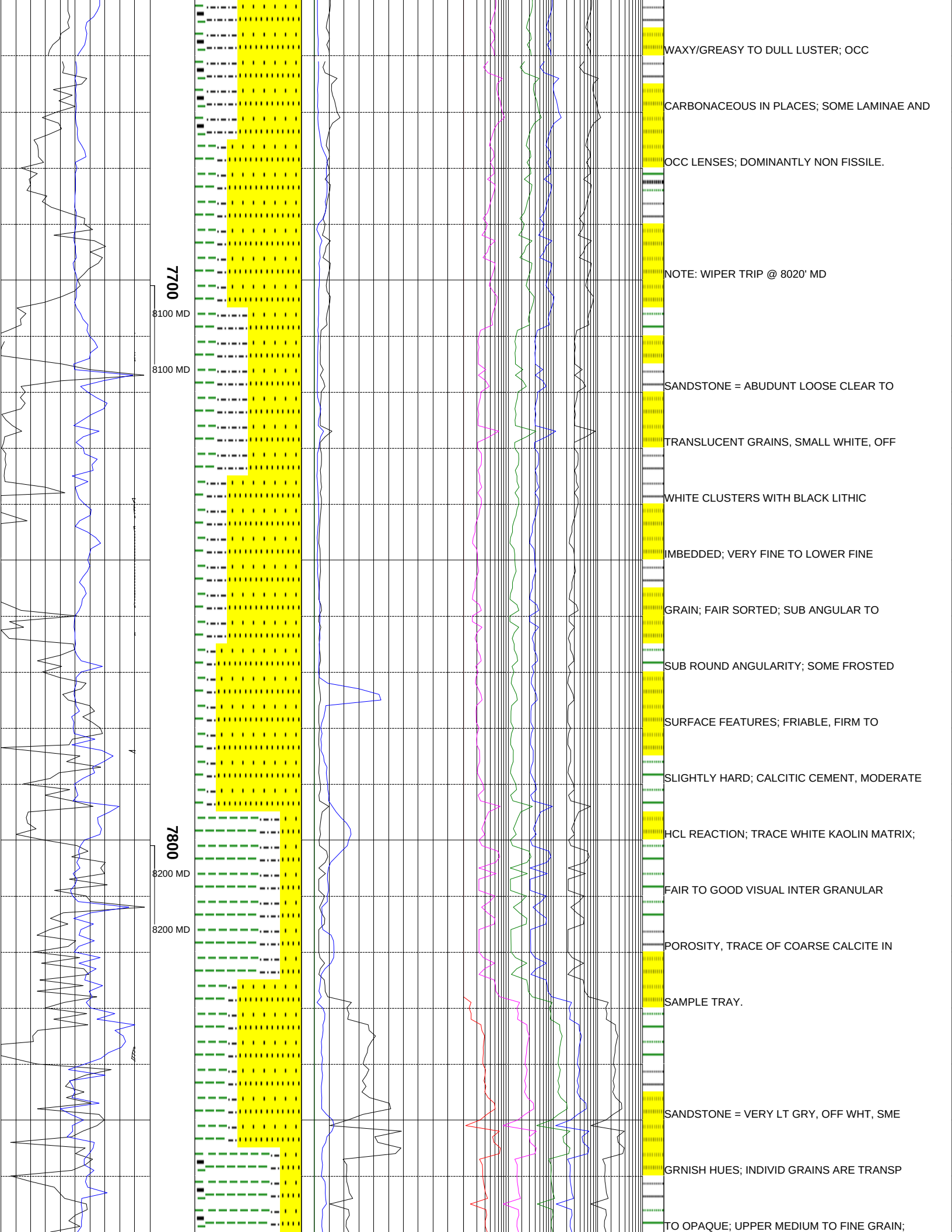
OF PURP, BRWN; LT BRWN; STIFF TO CRUNCHY

TENACITY WITH SUB WEDGELIKE TO SUB

ELONGATED CUTTINGS HABIT; IRREGULAR TO

HACKLY FRACTURE SL SPLINTERY IN PLACES;

EARTHY TO SMOOTH WAXY TEXTURE WITH



WAXY/GREASY TO DULL LUSTER; OCC

CARBONACEOUS IN PLACES; SOME LAMINAE AND

OCC LENSES; DOMINANTLY NON FISSILE.

NOTE: WIPER TRIP @ 8020' MD

SANDSTONE = ABUDUNT LOOSE CLEAR TO

TRANSLUCENT GRAINS, SMALL WHITE, OFF

WHITE CLUSTERS WITH BLACK LITHIC

IMBEDDED; VERY FINE TO LOWER FINE

GRAIN; FAIR SORTED; SUB ANGULAR TO

SUB ROUND ANGULARITY; SOME FROSTED

SURFACE FEATURES; FRIABLE, FIRM TO

SLIGHTLY HARD; CALCITIC CEMENT, MODERATE

HCL REACTION; TRACE WHITE KAOLIN MATRIX;

FAIR TO GOOD VISUAL INTER GRANULAR

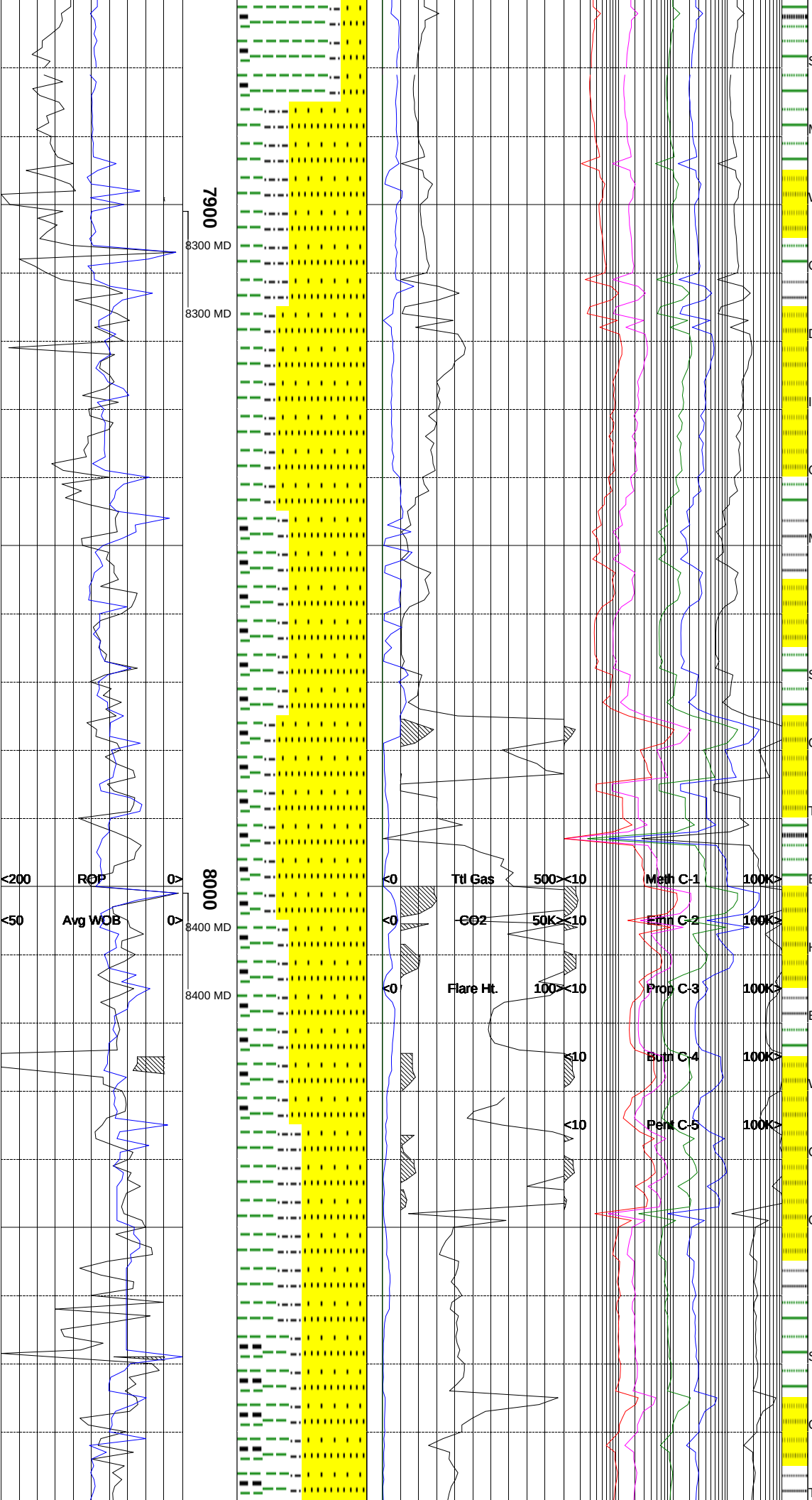
POROSITY, TRACE OF COARSE CALCITE IN

SAMPLE TRAY.

SANDSTONE = VERY LT GRY, OFF WHT, SME

GRNISH HUES; INDIVID GRAINS ARE TRANSP

TO OPAQUE; UPPER MEDIUM TO FINE GRAIN;



SUB ANGULAR TO SUB ROUND WITH LOW TO

MODERATE SPHERICITY; OVERALL MODERATELY

WELL TO WELL SORTED; OCCASIONAL GREEN

GRAINS INDICATING POSS CHLORITIZATION;

DOMINANTLY UNCONSOLIDATED AND LOOSE

IN SAMPLE TRAY; OCCASIONAL CLUSTERS ARE

GRAIN SUPPORTED IN A CALC/CLAY MATRIX;

MODERATELY TO EASILY FRIABLE.

SHALE = GRNISH GRY, GRY, BRWN WITH HUES

GRY, DRK BRWN; LT BRWN; STIFF TO CRUNCHY

TENACITY WITH SUB WEDGELIKE TO SUB

ELONGATED CUTTINGS HABIT; IRREGULAR TO

HACKLY FRACTURE SL SPLINTERY IN PLACES;

EARTHY TO SMOOTH WAXY TEXTURE WITH

WAXY/GREASY TO DULL LUSTER; OCC

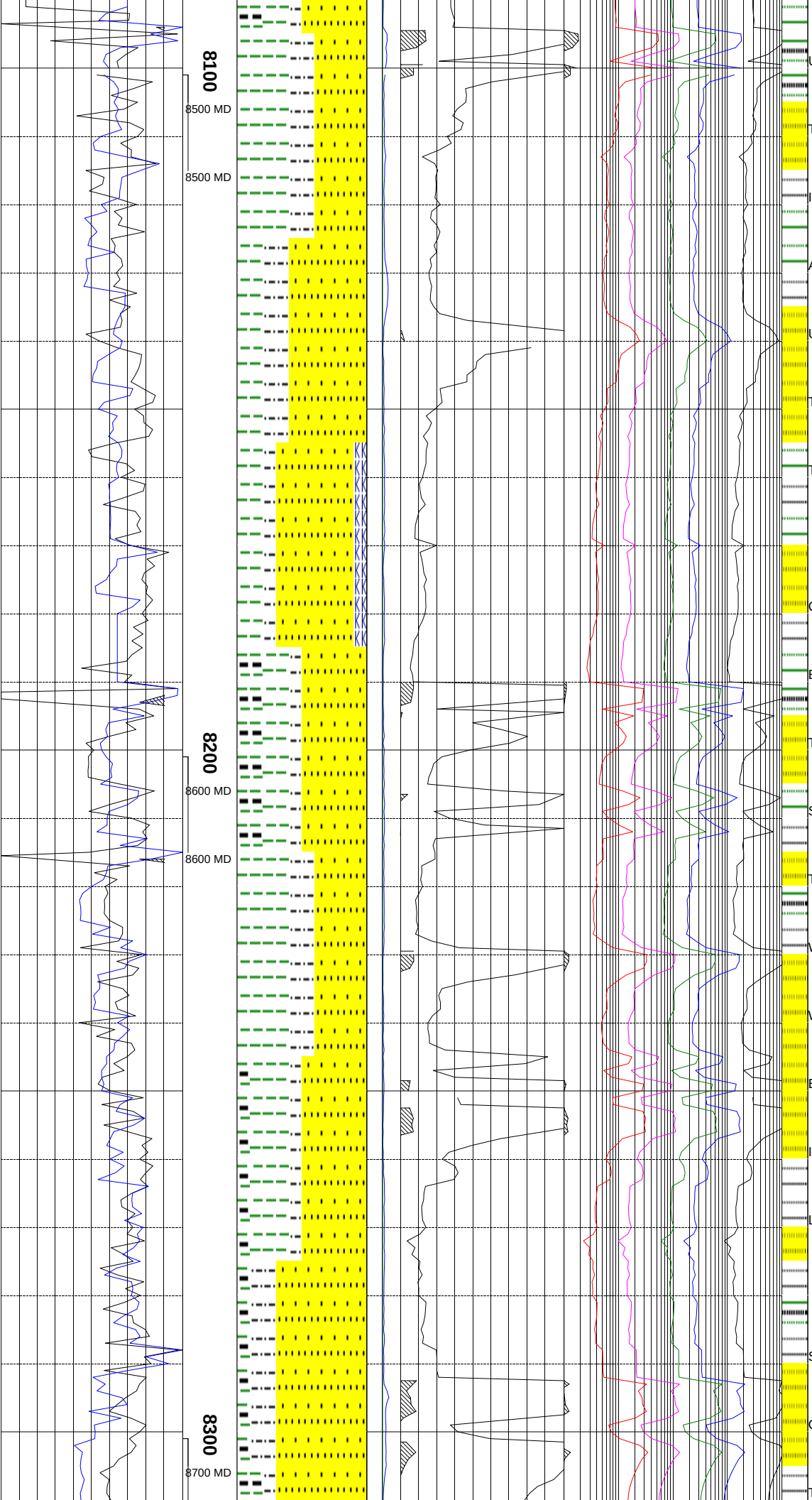
CARBONACEOUS IN PLACES; SOME LAMINAE AND

OCC LENSES; OVERALL LOW FISSILITY.

SANDSTONE = WHT TO TRANSPARENT OCC LT

GRY; ABUNDANT LOOSE GRAINS IN SAMPLE

TRAY; OCCASIONAL CLUSTERS BUT DOMINANTLY



UNCONSOLIDATED; INDIVIDUAL GRAINS ARE

TRANSPARENT OR TRANSLUCENT, OPAQUE

IN PLACES, BUT RARE; SUB ROUND TO SUB

ANGULAR WITH MODERATE SPHERICITY;

UPPER MEDIUM TO FINE GRAINED; MODERATELY

TO WELL SORTED; SOME FROSTING; MODERATE

TO HIGH INCREASE IN DITCH GAS.

CARBONACEOUS SHALE = DARK BRWN, BLACK,

BRWN WITH BLACK HUES; CRUNCHY TO BRITTLE

TENACITY; SUB WEDGELIKE/ WEDGELIKE TO

SUB TABULAR CTTNGS HABIT WITH IRREGULAR

TO HACKLY FRACTURE; PLANAR FRACTURE

WITH PLATY CUTTINGS; DULL EARTHY TO SUB

WAXY OCC SUB VITREOUS LUSTER WITH

EARTHY TO SMOOTH TEXTURE; SL PYRITIC

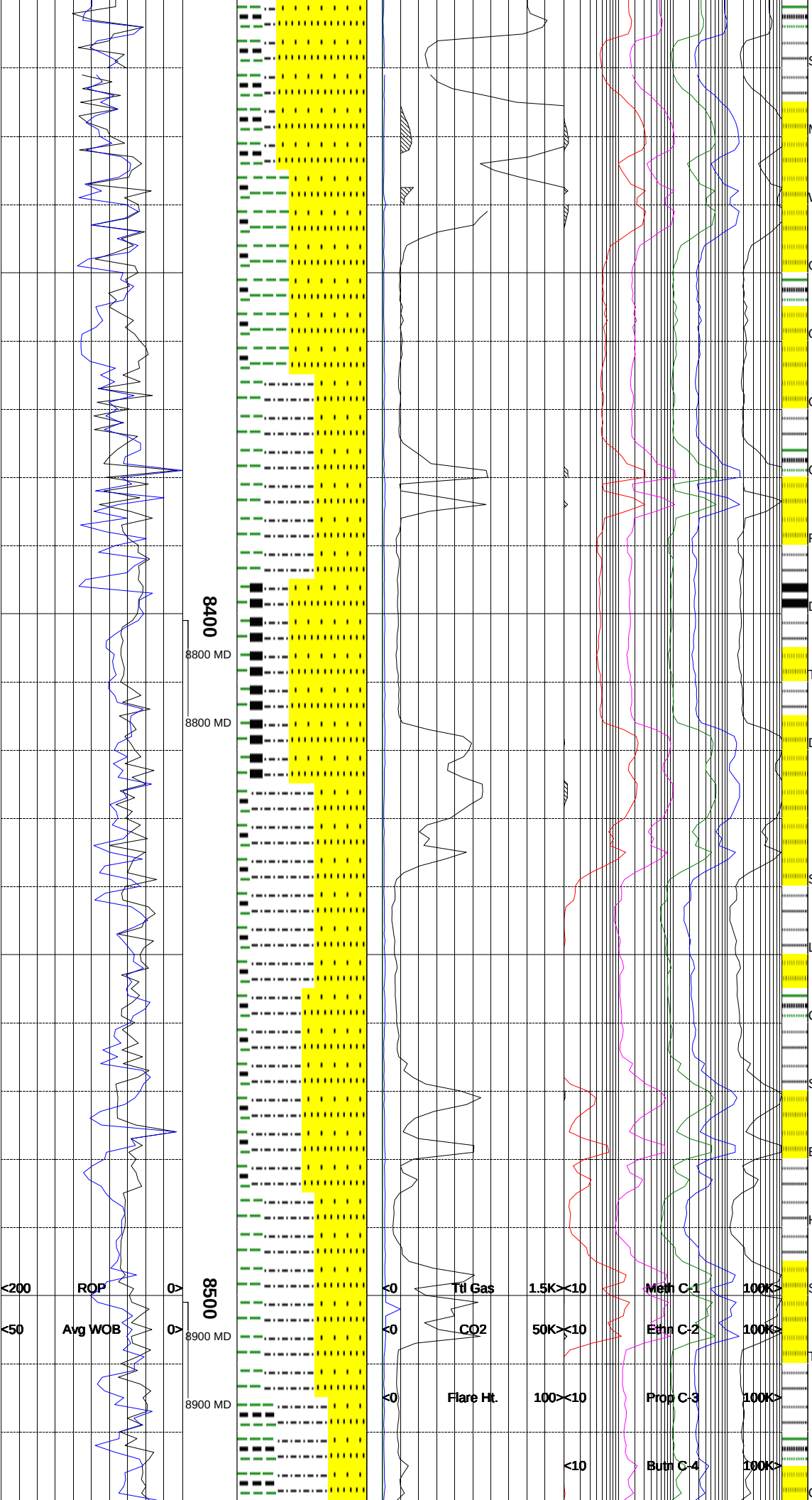
IN PLACES; OCC COAL LAMINAE AND

LENSES.

SANDSTONE = WHT, OFF WHT, VERY LT GRY

OCC GRY; INDIVID GRAINS ARE TRANSP

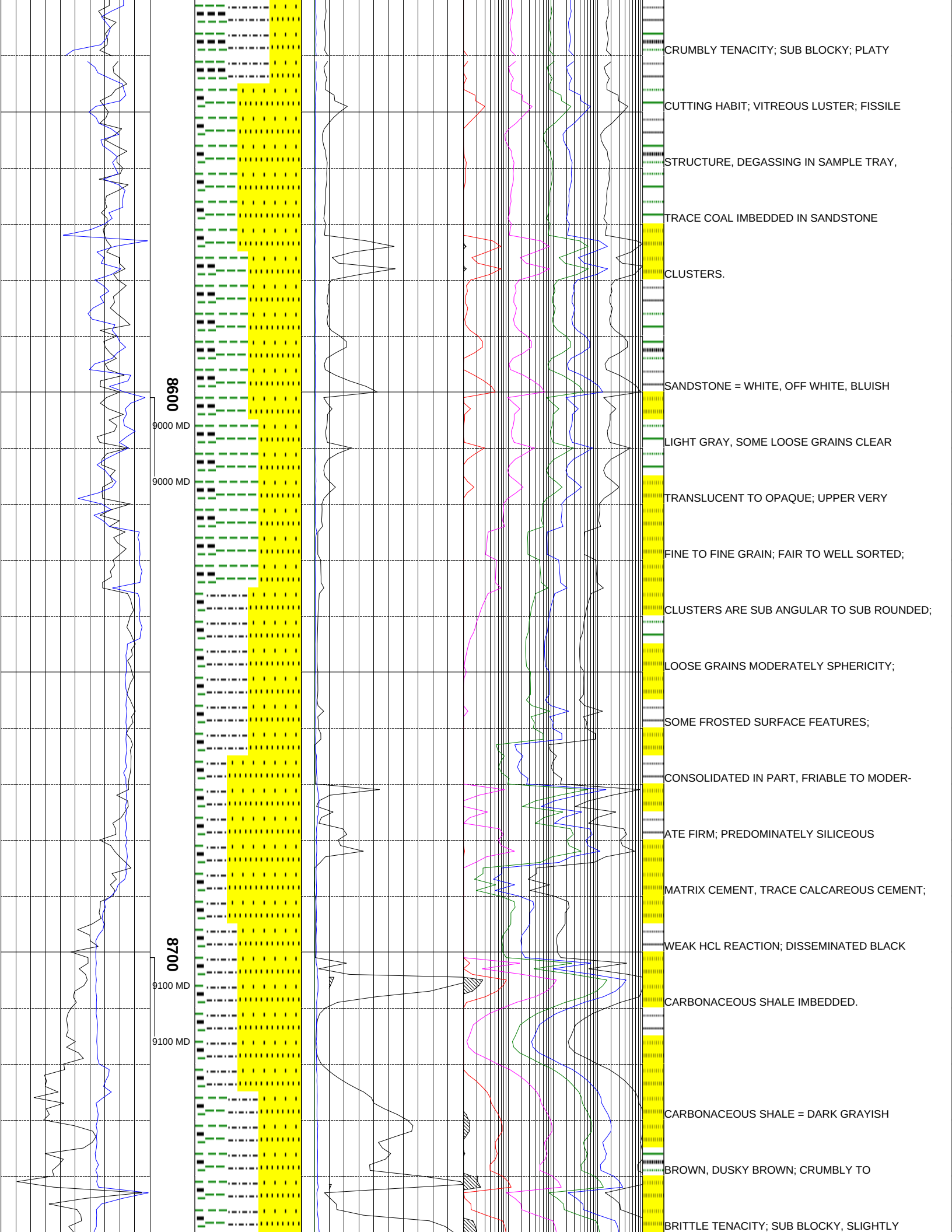
TO OPAQUE; FINE TO UPPER FINE GRAINED;



SUB ANGULAR TO SUB ROUND WITH LOW TO MODERATE SPHERICITY; OVERALL MODERATELY WELL TO WELL SORTED; OCCASIONAL BLACK CARBONACEOUS MATERIAL LENSES / LAMINAE; OVERALL DOMINANTLY CONSOLIDATED; CLUSTERS ARE GRAIN SUPPORTED IN A CALC/ CLAY MATRIX OCC SL SILICEOUS; STRONG REACTION TO DILUTE HCL; ACCESSORIES INCL DARK LITHIC AND MAFIC FRAGMENTS LESS THAN 5%; MODERATE TO HIGH INCREASE IN DITCH GAS.

SILTSTONE = LIGHT GREENISH BLUE GRAY, LIGHT BLUISH GRAY, LIGHT GRAY; CRUMBLY, CRUNCHY TRACE BRITTLE TENACITY; SPLINTERY, SUB BLOCKY, BLOCKY FRACTURE; ELONGATED, WEDGELIKE TO PLAYT CUTTINGS HABIT; DULL, RESINOUS LUSTER; GRITTY TO SILTY TEXTURE; THIN STRUCTURE, GRADING TO VERY FINE SANDSTONE.

COAL = BLACK, DARK BROWNISH BLACK;



CRUMBLY TENACITY; SUB BLOCKY; PLATY

CUTTING HABIT; VITREOUS LUSTER; FISSILE

STRUCTURE, DEGASSING IN SAMPLE TRAY,

TRACE COAL IMBEDDED IN SANDSTONE

CLUSTERS.

SANDSTONE = WHITE, OFF WHITE, BLUISH

LIGHT GRAY, SOME LOOSE GRAINS CLEAR

TRANSLUCENT TO OPAQUE; UPPER VERY

FINE TO FINE GRAIN; FAIR TO WELL SORTED;

CLUSTERS ARE SUB ANGULAR TO SUB ROUNDED;

LOOSE GRAINS MODERATELY SPHERICITY;

SOME FROSTED SURFACE FEATURES;

CONSOLIDATED IN PART, FRIABLE TO MODER-

ATE FIRM; PREDOMINATELY SILICEOUS

MATRIX CEMENT, TRACE CALCAREOUS CEMENT;

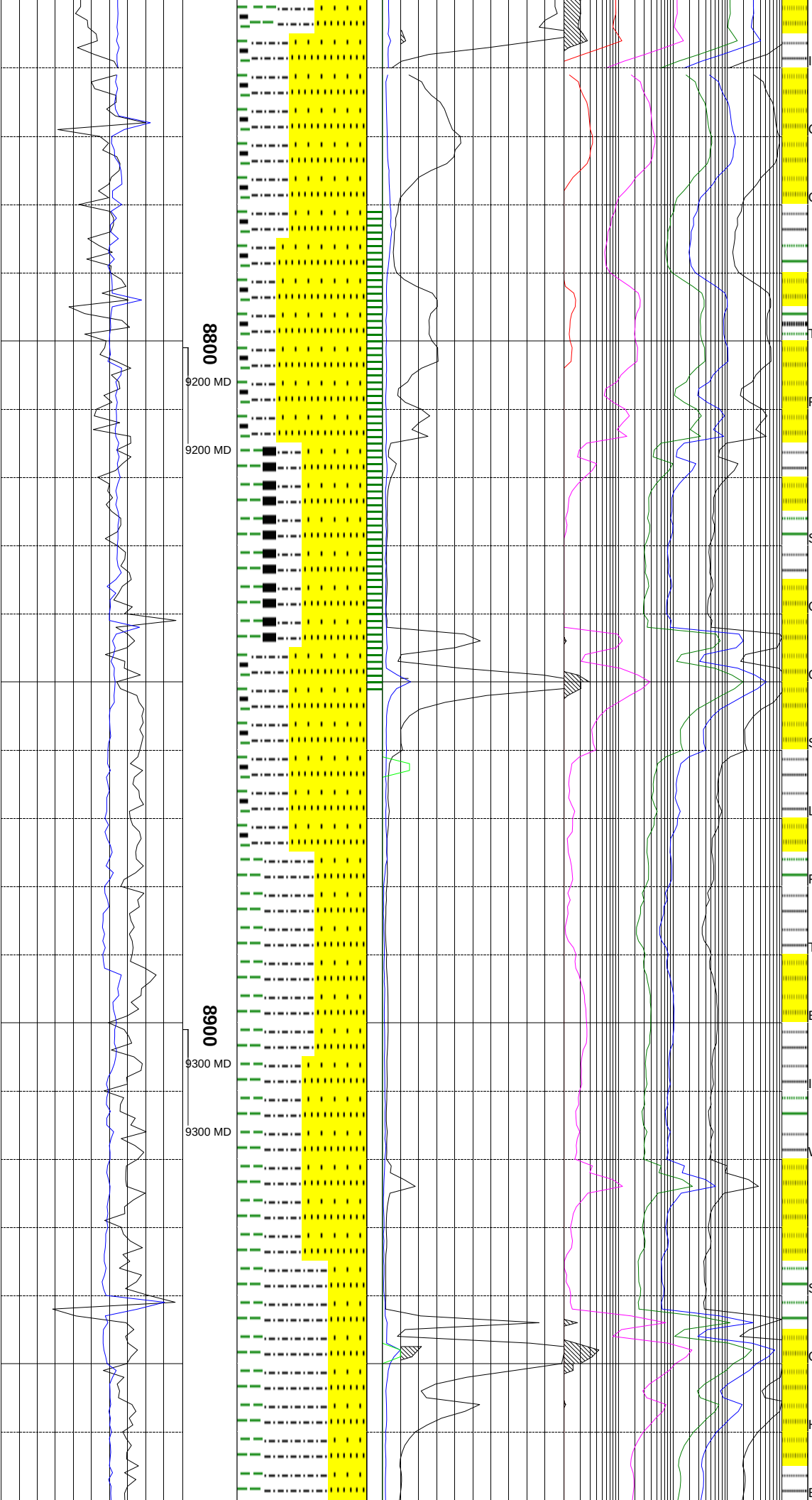
WEAK HCL REACTION; DISSEMINATED BLACK

CARBONACEOUS SHALE IMBEDDED.

CARBONACEOUS SHALE = DARK GRAYISH

BROWN, DUSKY BROWN; CRUMBLY TO

BRITTLE TENACITY; SUB BLOCKY, SLIGHTLY



IRREGULAR FRACTURES; SUB TABULAR

CUTTINGS HABIT; DULL, EARTHY LUSTER;

GRITTY TEXTURE; SUB MASSIVE STRUCTURE.

TD INTERMEDIATE @ 9022' MD 10-02-2009

RESUMED DRILLING 10-05-2009 @17:35.

SANDSTONE = LIGHT GRAY, OFF WHITE,

GRAYISH WHITE; LOWER FINE TO MEDIUM

GRAIN; PREDOMINATELY FAIR SORTING;

SUBANGULAR TO SUBROUND ANGULARITY;

LOW SPHERICITY; EASILY FRIABLE TO

FRIABLE; PREDOMIATELY CALCITE CEMENT;

TRACES CALCITE CRYSTALS IN FRACTURES;

BLACK LITHIC AND CARBONACEOUS SHALE

IMBEDDED; HIGHER GASES ASSOCIATED

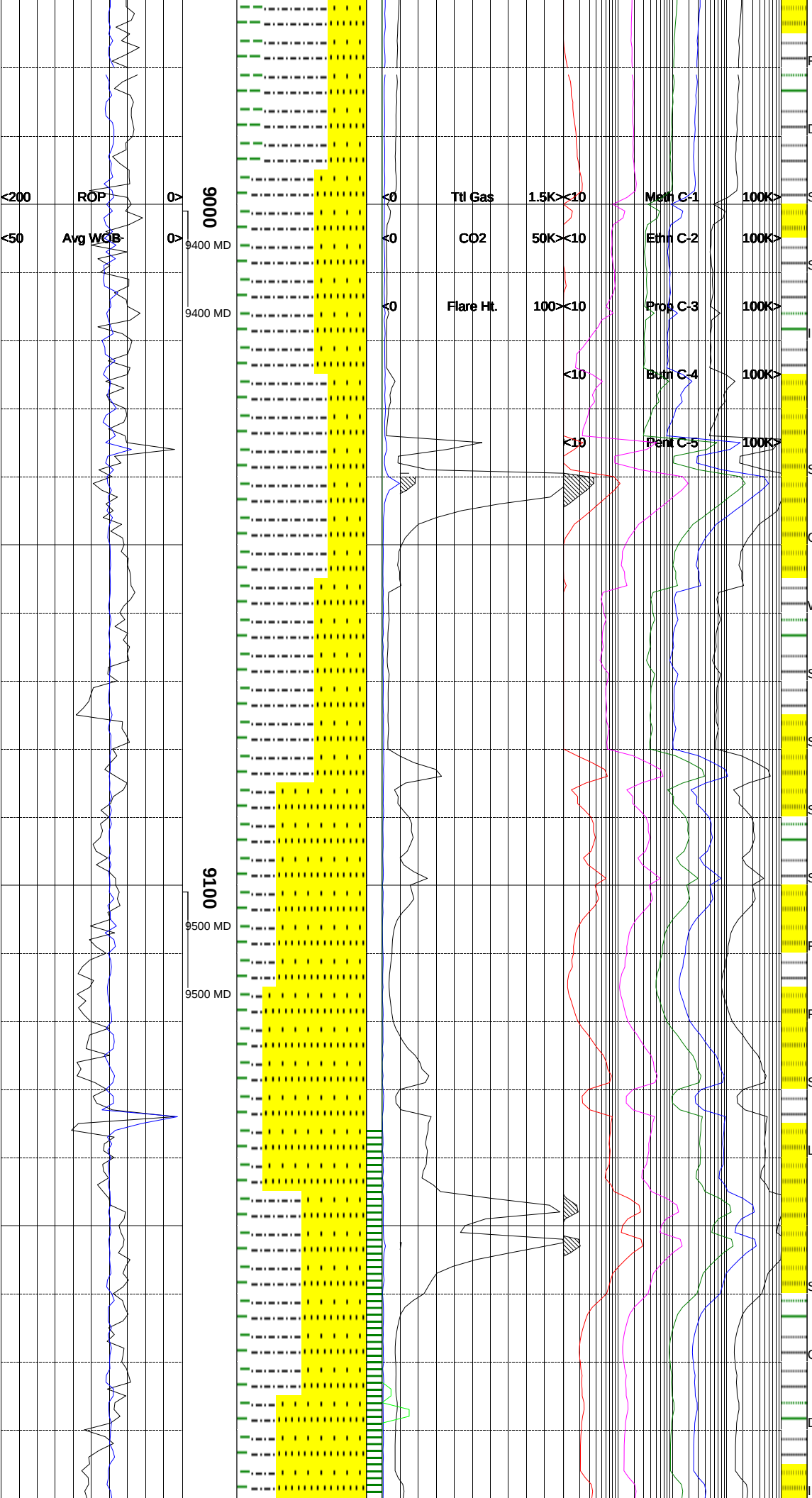
WITH SANDSTONE.

SILTSTONE = MODERATE LIGHT GRAY, LIGHT

GRAY, TRACE DARK GREENISH GRAY; FIRM,

HARD TO OCCASIONAL VERY HARD; SUB

BLOCKY, BLOCKY IN PART, SOME IRREGULAR



FRACTURE; TABULAR, PLATY CUTTINGS HABIT;

DULL WAXY LUSTER; GRITTY, TO SLIGHTLY

SMOOTH TEXTURE; TRACE SANDSTONE AND

SHALE IMBEDDED; LOWER GASES OBSERVED

IN SILTSTONE.

SANDSTONE = OFF WHITE, LIGHT BLUISH

GRAY, LIGHT GRAYISH WHITE; SPECKLED

WITH BLACK LITHIC AND CARBONACEOUS

SHALE; LOWER TO MEDIUM FINE GRAIN;

SOME POOR TO PREDOMINATE FAIR SORTING;

SUB ANGULAR TO SUBROUND, LOW

SPHERICITY; TRACE FOSTED SURFACE FEATURE

FIRM FRIABLE TO MODERATELY HARD;

PREDOMINATELY CALCAREOUS CEMENT, SOME

SILICA MATRIX CEMENT; TRACE BLACK COAL

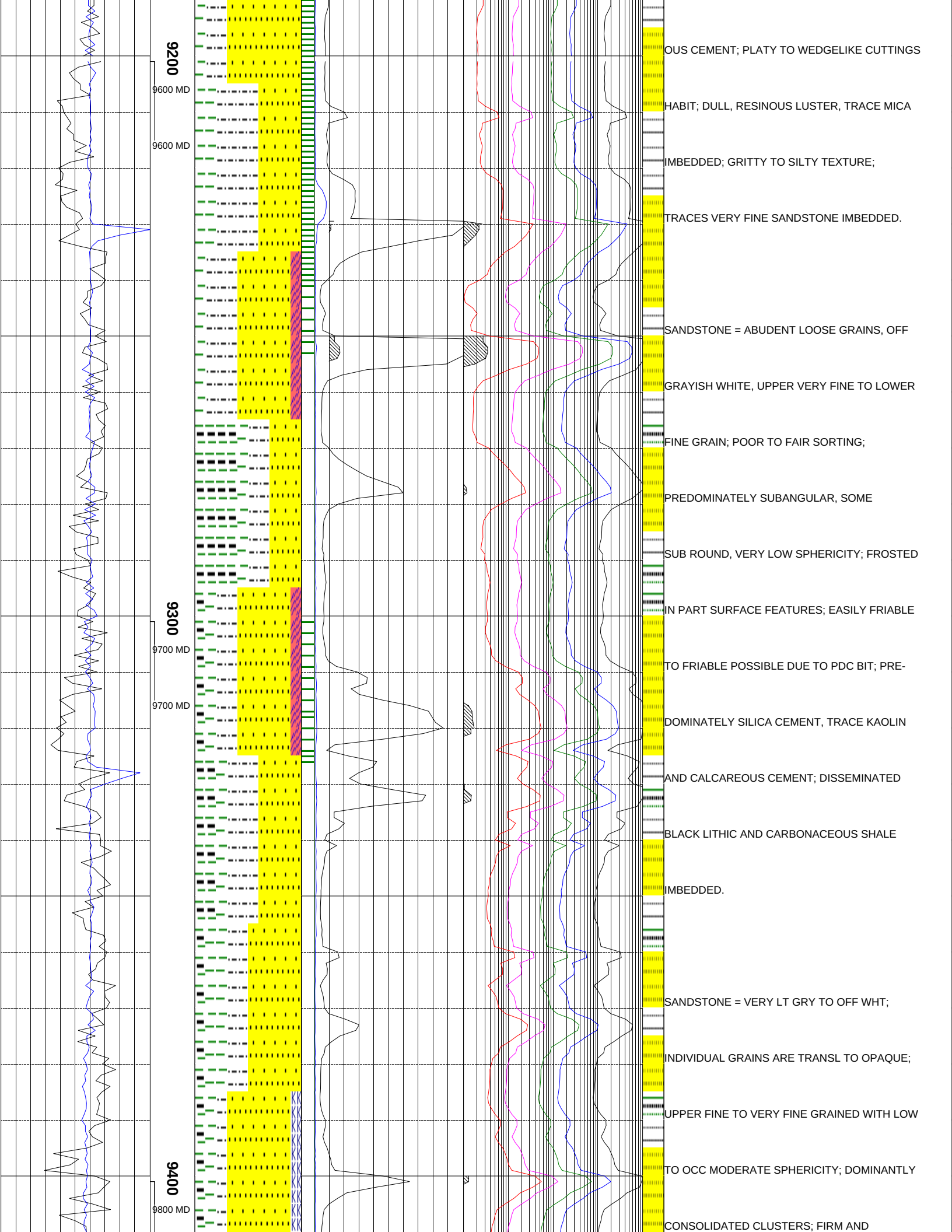
LAMINATION; HIGH LEVELS OF GAS SHOWS.

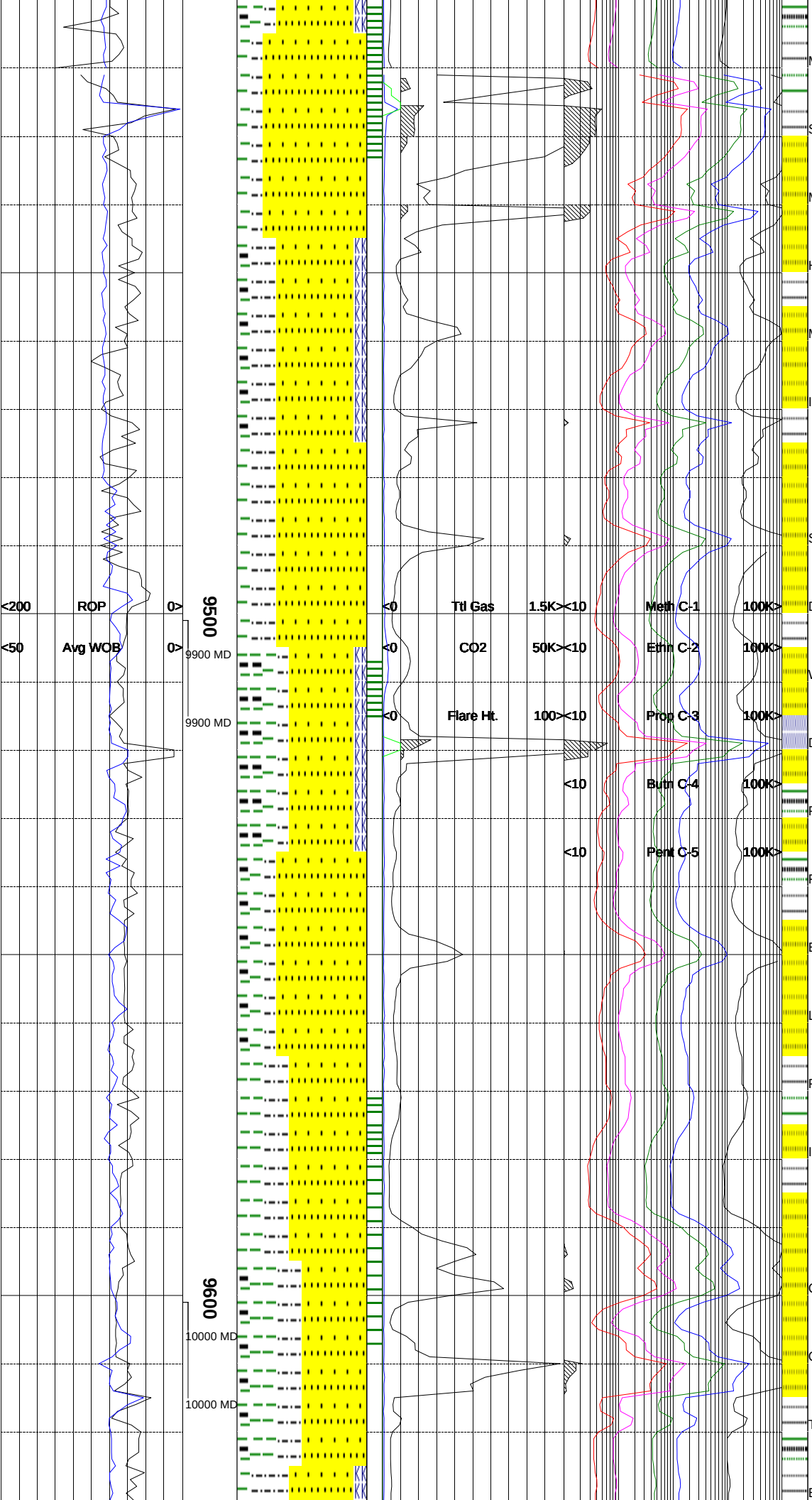
SILTSTONE = MODERATE DARK GRAY, LIGHT

GRAY, MEDIUM BLUISH GRAY; BRITTLE TO

DENSE; SUB BLOCKY, BLOCKY SLIGHT

IRREGULAR FRACTURES; TRACE CALCARE-


9200
9600 MD
9600 MD
9300
9700 MD
9700 MD
9400
9800 MD
OUS CEMENT; PLATY TO WEDGELIKE CUTTINGS
HABIT; DULL, RESINOUS LUSTER, TRACE MICA
IMBEDDED; GRITTY TO SILTY TEXTURE;
TRACES VERY FINE SANDSTONE IMBEDDED.
SANDSTONE = ABUDENT LOOSE GRAINS, OFF
GRAYISH WHITE, UPPER VERY FINE TO LOWER
FINE GRAIN; POOR TO FAIR SORTING;
PREDOMINATELY SUBANGULAR, SOME
SUB ROUND, VERY LOW SPHERICITY; FROSTED
IN PART SURFACE FEATURES; EASILY FRIABLE
TO FRIABLE POSSIBLE DUE TO PDC BIT; PRE-
DOMINATELY SILICA CEMENT, TRACE KAOLIN
AND CALCAREOUS CEMENT; DISSEMINATED
BLACK LITHIC AND CARBONACEOUS SHALE
IMBEDDED.
SANDSTONE = VERY LT GRY TO OFF WHT;
INDIVIDUAL GRAINS ARE TRANSL TO OPAQUE;
UPPER FINE TO VERY FINE GRAINED WITH LOW
TO OCC MODERATE SPHERICITY; DOMINANTLY
CONSOLIDATED CLUSTERS; FIRM AND



MODERATELY FRIABLE; OVERALL GRAIN

SUPPORTED IN A CALC/CLAY MATRIX;

MODERATE TO STRONG REACTION TO DILUTE

HCL; ACCESSORIES INCLUDE DARK LITHIC AND

MAFIC FRAGMENTS 3-5%; SLIGHT TO HIGH

INCREASE IN DITCH GAS.

SHALE = GRY, BRWNISH GRY, OCC DARK GRY;

DENSE TO STIFF TENACITY WITH SUB

WEDGELIKE TO SUB TABULAR CUTTINGS HABIT;

DARK CARBONACEOUS FOSSILIZED IMPRINTS OF

PLANT MATERIAL; IRREGULAR TO SUB PLANAR

FRACTURE; DULL TO SUB WAXY LUSTER WITH

EARTHY TO SMOOTH TEXTURE; CARBONACEOUS

LAMINATIONS AND LENSES; SL PYRITIC IN

PLACES; GRADES TO CARBONACEOUS SHALE

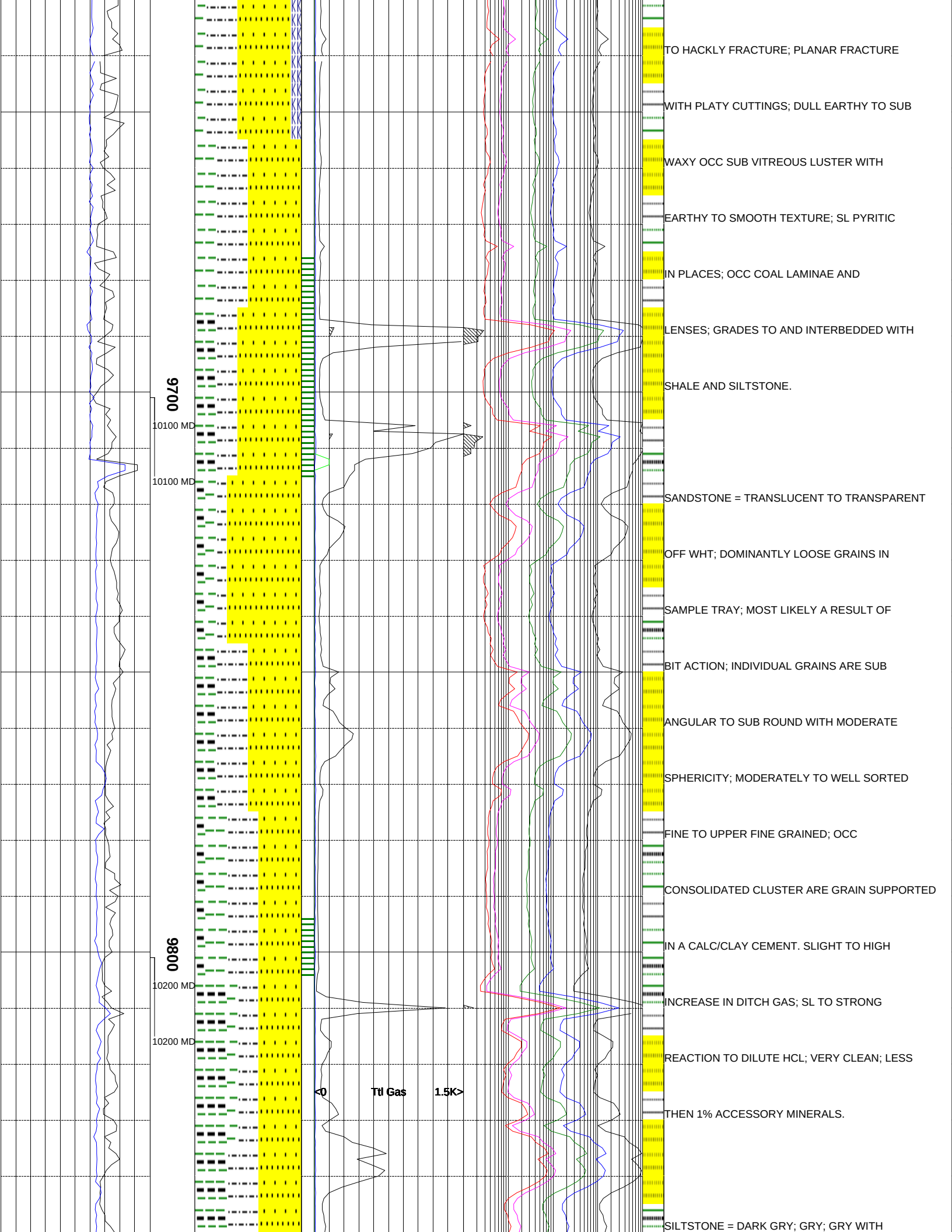
IN PLACES; NO REACTION TO DILUTE HCL.

CARBONACEOUS SHALE = DARK BRWN, BLACK,

OCC DARK GRY; CRUNCHY TO BRITTLE

TENACITY; SUB TAB TO SUB WEDGELIKE /

ELONGATED CUTTINGS HABIT WITH IRREGULAR



TO HACKLY FRACTURE; PLANAR FRACTURE

WITH PLATY CUTTINGS; DULL EARTHY TO SUB

WAXY OCC SUB VITREOUS LUSTER WITH

EARTHY TO SMOOTH TEXTURE; SL PYRITIC

IN PLACES; OCC COAL LAMINAE AND

LENSES; GRADES TO AND INTERBEDDED WITH

SHALE AND SILTSTONE.

SANDSTONE = TRANSLUCENT TO TRANSPARENT

OFF WHT; DOMINANTLY LOOSE GRAINS IN

SAMPLE TRAY; MOST LIKELY A RESULT OF

BIT ACTION; INDIVIDUAL GRAINS ARE SUB

ANGULAR TO SUB ROUND WITH MODERATE

SPHERICITY; MODERATELY TO WELL SORTED

FINE TO UPPER FINE GRAINED; OCC

CONSOLIDATED CLUSTER ARE GRAIN SUPPORTED

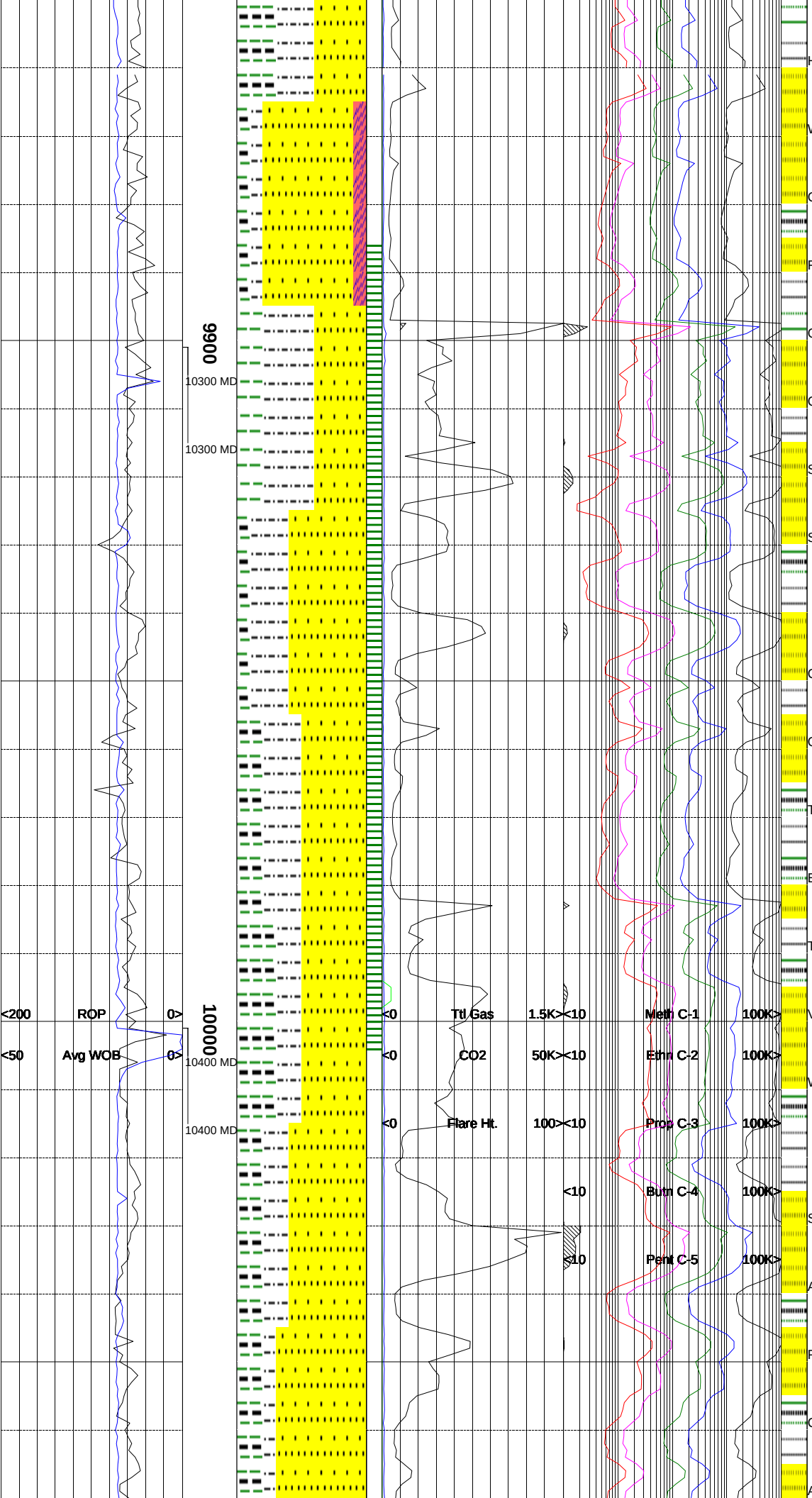
IN A CALC/CLAY CEMENT. SLIGHT TO HIGH

INCREASE IN DITCH GAS; SL TO STRONG

REACTION TO DILUTE HCL; VERY CLEAN; LESS

THEN 1% ACCESSORY MINERALS.

SILTSTONE = DARK GRY; GRY; GRY WITH



HUES OF BRWN; HARD TO DENSE TENACITY

WITH MASSIVE TO TABULAR/SUB TABULAR

CUTTINGS HABIT; IRREGULAR TO HACKLY

FRACTURE; SPARKLY TO DULL LUSTER WITH

GRITTY TO SILTY TEXTURE; COMMON

CARBONACEOUS LAMINAE OCC APPEARS

SLICKENSIDAL; COMMONLY INTERBEDDED WITH

SANDSTONE.

CARBONACEOUS SHALE = DARK BRWN, BLACK,

OCC DARK GRY; CRUNCHY TO BRITTLE

TENACITY; SUB TAB TO SUB WEDGELIKE /

ELONGATED CUTTINGS HABIT WITH IRREGULAR

TO HACKLY FRACTURE; DULL EARTHY TO SUB

VITREOUS LUSTER OCC GREASY; EARTHY TO

WAXY SMOOTH TEXTURE.

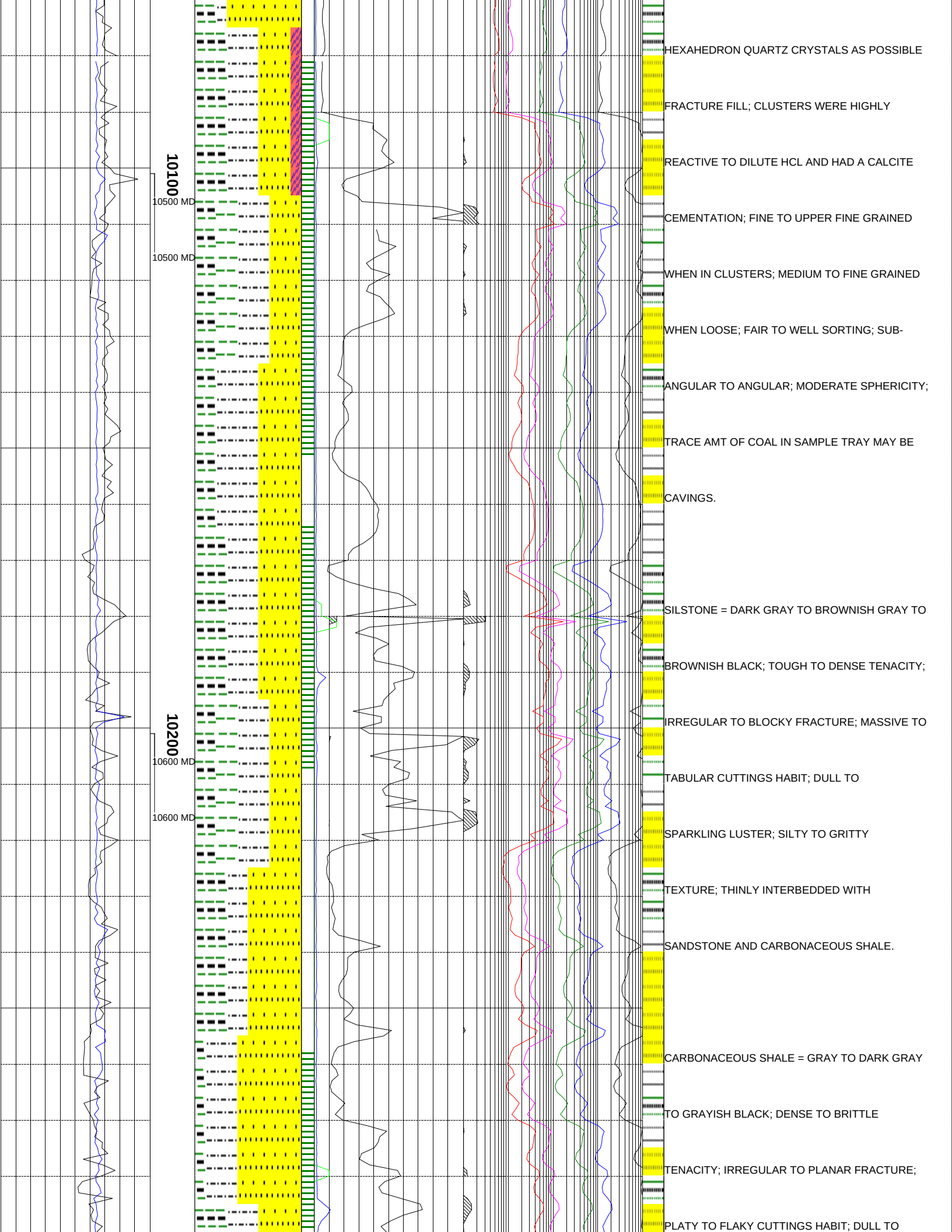
SANDSTONE = CLEAR TO WHITE WITH A TRACE

AMOUNT OF DARK LITHICS GIVING A SALT AND

PEPPERED APPERANCE; MIXTURE OF SMALL

CLUSTERS AND LOOSE INDIVIDUAL GRAINS;

ALSO PRESENT WERE LOOSE CALCITE AND



HEXAHEDRON QUARTZ CRYSTALS AS POSSIBLE

FRACTURE FILL; CLUSTERS WERE HIGHLY

REACTIVE TO DILUTE HCL AND HAD A CALCITE

CEMENTATION; FINE TO UPPER FINE GRAINED

WHEN IN CLUSTERS; MEDIUM TO FINE GRAINED

WHEN LOOSE; FAIR TO WELL SORTING; SUB-

ANGULAR TO ANGULAR; MODERATE SPHERICITY;

TRACE AMT OF COAL IN SAMPLE TRAY MAY BE

CAVINGS.

SILSTONE = DARK GRAY TO BROWNISH GRAY TO

BROWNISH BLACK; TOUGH TO DENSE TENACITY;

IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO

TABULAR CUTTINGS HABIT; DULL TO

SPARKLING LUSTER; SILTY TO GRITTY

TEXTURE; THINLY INTERBEDDED WITH

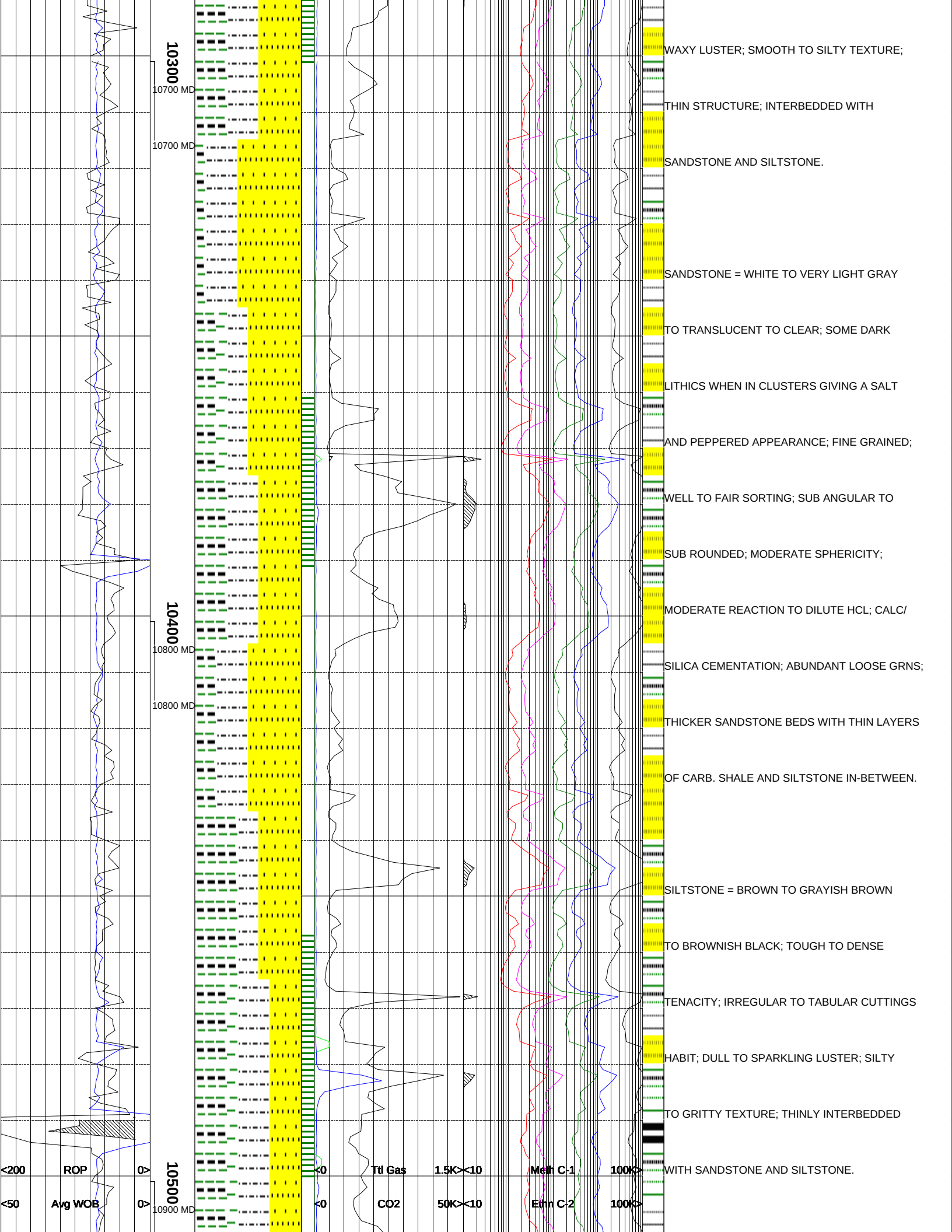
SANDSTONE AND CARBONACEOUS SHALE.

CARBONACEOUS SHALE = GRAY TO DARK GRAY

TO GRAYISH BLACK; DENSE TO BRITTLE

TENACITY; IRREGULAR TO PLANAR FRACTURE;

PLATY TO FLAKY CUTTINGS HABIT; DULL TO



WAXY LUSTER; SMOOTH TO SILTY TEXTURE;

THIN STRUCTURE; INTERBEDDED WITH

SANDSTONE AND SILTSTONE.

SANDSTONE = WHITE TO VERY LIGHT GRAY

TO TRANSLUCENT TO CLEAR; SOME DARK

LITHICS WHEN IN CLUSTERS GIVING A SALT

AND PEPPERED APPEARANCE; FINE GRAINED;

WELL TO FAIR SORTING; SUB ANGULAR TO

SUB ROUNDED; MODERATE SPHERICITY;

MODERATE REACTION TO DILUTE HCL; CALC/

SILICA CEMENTATION; ABUNDANT LOOSE GRNS;

THICKER SANDSTONE BEDS WITH THIN LAYERS

OF CARB. SHALE AND SILTSTONE IN-BETWEEN.

SILTSTONE = BROWN TO GRAYISH BROWN

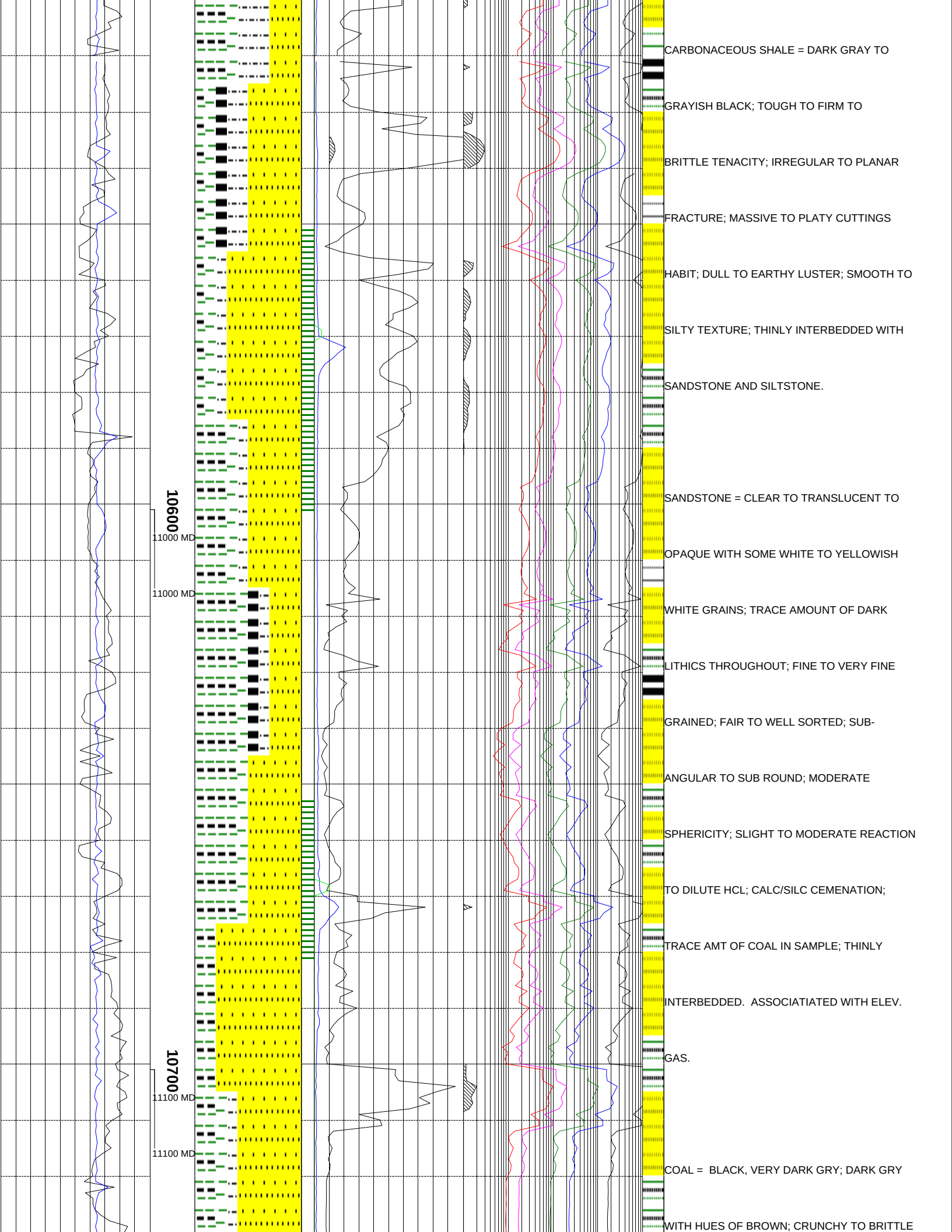
TO BROWNISH BLACK; TOUGH TO DENSE

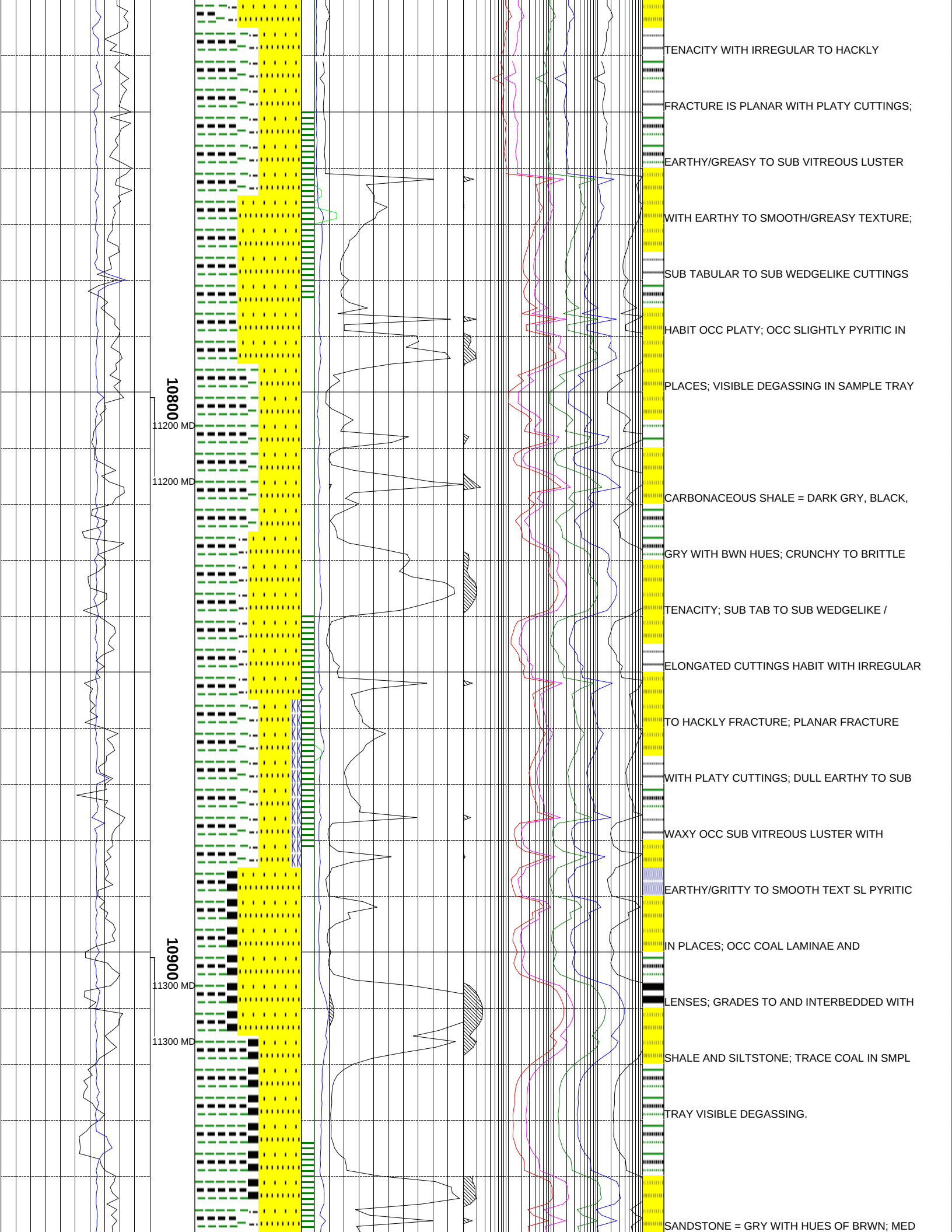
TENACITY; IRREGULAR TO TABULAR CUTTINGS

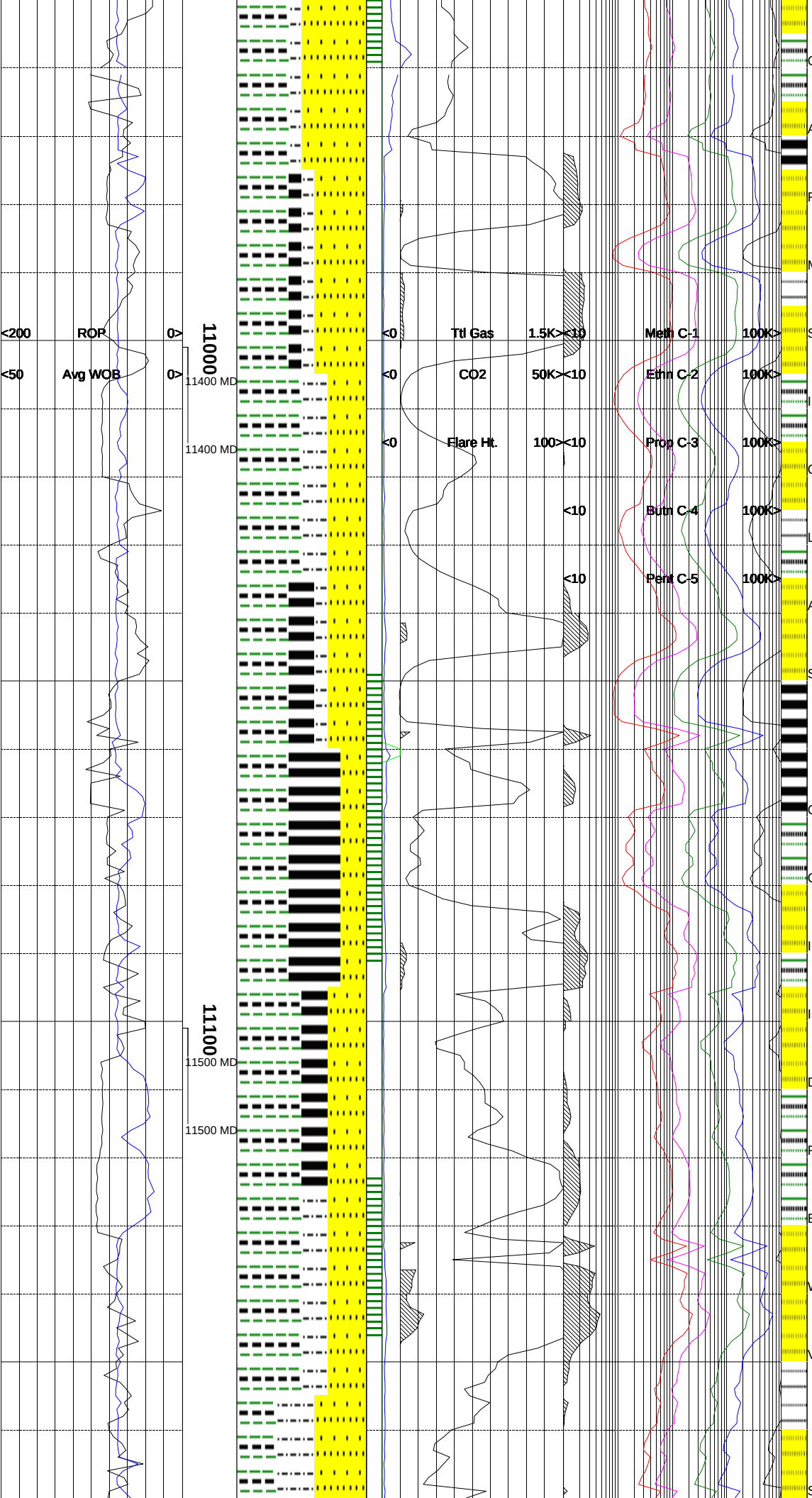
HABIT; DULL TO SPARKLING LUSTER; SILTY

TO GRITTY TEXTURE; THINLY INTERBEDDED

WITH SANDSTONE AND SILTSTONE.


CARBONACEOUS SHALE = DARK GRAY TO
GRAYISH BLACK; TOUGH TO FIRM TO
BRITTLE TENACITY; IRREGULAR TO PLANAR
FRACTURE; MASSIVE TO PLATY CUTTINGS
HABIT; DULL TO EARTHY LUSTER; SMOOTH TO
SILTY TEXTURE; THINLY INTERBEDDED WITH
SANDSTONE AND SILTSTONE.
10600
11000 MD
11000 MD
SANDSTONE = CLEAR TO TRANSLUCENT TO
OPAQUE WITH SOME WHITE TO YELLOWISH
WHITE GRAINS; TRACE AMOUNT OF DARK
LITHICS THROUGHOUT; FINE TO VERY FINE
GRAINED; FAIR TO WELL SORTED; SUB-
ANGULAR TO SUB ROUND; MODERATE
SPHERICITY; SLIGHT TO MODERATE REACTION
TO DILUTE HCL; CALC/SILC CEMENATION;
TRACE AMT OF COAL IN SAMPLE; THINLY
INTERBEDDED. ASSOCIATIATED WITH ELEV.
GAS.
10700
11100 MD
11100 MD
COAL = BLACK, VERY DARK GRY; DARK GRY
WITH HUES OF BROWN; CRUNCHY TO BRITTLE


TENACITY WITH IRREGULAR TO HACKLY
FRACTURE IS PLANAR WITH PLATY CUTTINGS;
EARTHY/GREASY TO SUB VITREOUS LUSTER
WITH EARTHY TO SMOOTH/GREASY TEXTURE;
SUB TABULAR TO SUB WEDGELIKE CUTTINGS
HABIT OCC PLATY; OCC SLIGHTLY PYRITIC IN
PLACES; VISIBLE DEGASSING IN SAMPLE TRAY
10800
11200 MD
11200 MD
CARBONACEOUS SHALE = DARK GRY, BLACK,
GRY WITH BWN HUES; CRUNCHY TO BRITTLE
TENACITY; SUB TAB TO SUB WEDGELIKE /
ELONGATED CUTTINGS HABIT WITH IRREGULAR
TO HACKLY FRACTURE; PLANAR FRACTURE
WITH PLATY CUTTINGS; DULL EARTHY TO SUB
WAXY OCC SUB VITREOUS LUSTER WITH
EARTHY/GRITTY TO SMOOTH TEXT SL PYRITIC
IN PLACES; OCC COAL LAMINAE AND
10900
11300 MD
LENSES; GRADES TO AND INTERBEDDED WITH
11300 MD
SHALE AND SILTSTONE; TRACE COAL IN SMPL
TRAY VISIBLE DEGASSING.
SANDSTONE = GRY WITH HUES OF BRWN; MED



GRY SM LT BRWNISH GRY; INDIVIDUAL GRAINS

ARE SUB ANGULAR TO ANGULAR OCC SUB

ROUND; FINE TO VERY FINE; MODERATELY TO

MODERATELY WELL SORTED, WITH LOW

SPHERICITY; DOMINANTLY GRAIN SUPPORTED

IN A SILICEOUS/SL CALC MATRIX; OCC

CARBONACEOUS LAMINATIONS AND LENSES;

LOW PENETRATION RATES AS GRADING TO

AND INTERBEDDED WITH SILTSTONES; TIGHT.

SL TO MODERATELY KAOLINITIC IN PLACES.

COAL = BLACK, VERY DARK GRY;

CRUNCHY TO BRITTLE TENACITY WITH

IRREGULAR TO HACKLY FRACTURE; FRACTURE

IS PLANAR WITH PLATY CUTTINGS HABIT;

DOMINANTLY SUB TABULAR TO TABULAR OCC

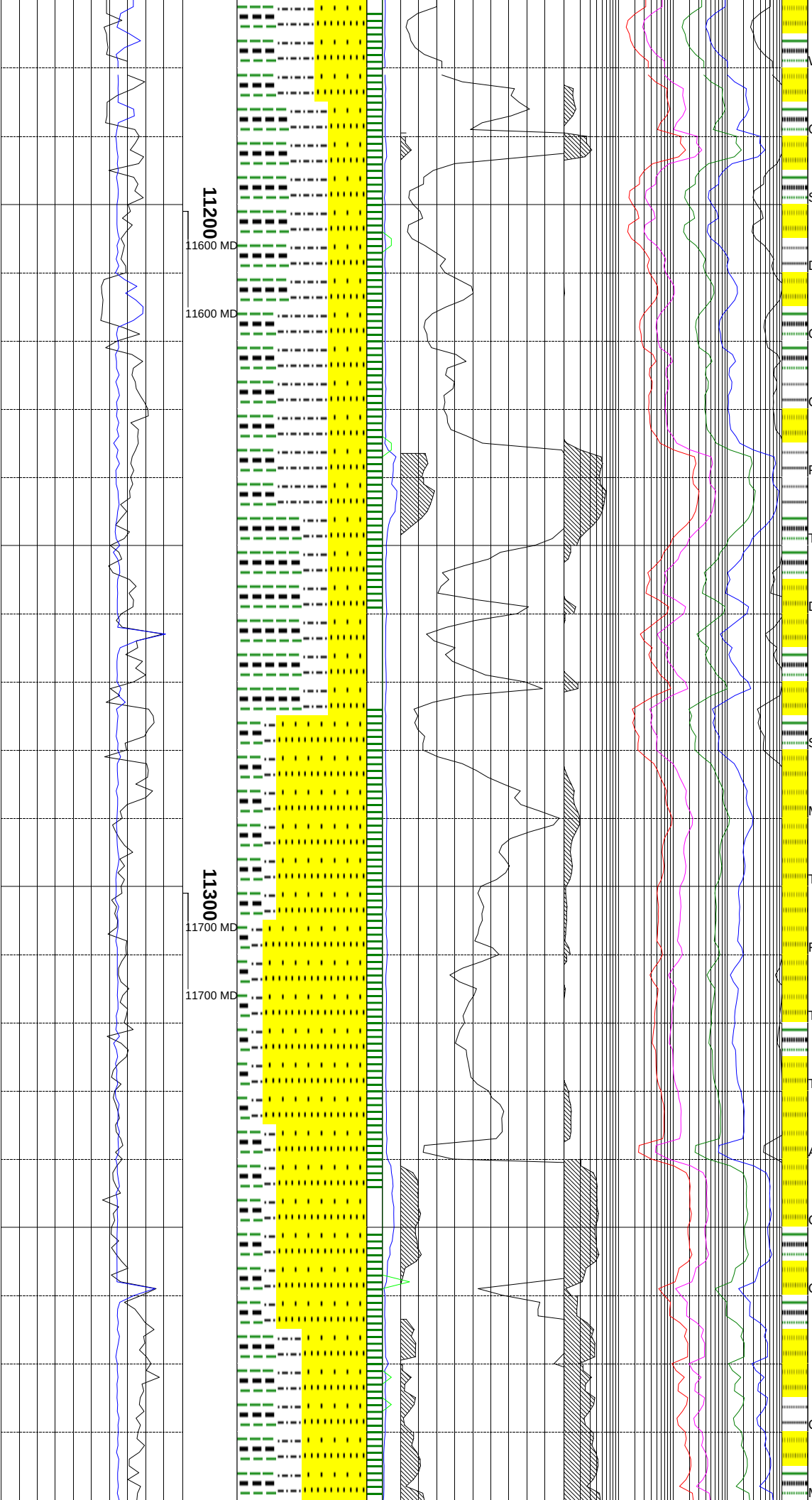
PLATY SUB PLATY CUTTINGS HABIT;

EARTHY/GREASY TO SUB VITREOUS LUSTER

WITH EARTHY TO SMOOTH/GREASY TEXTURE;

VISIBLE DEGASSING IN SAMPLE TRAY.

SANDSTONE = LT GRYISH BRWN; LT BRWN



WITH GRY HUES MED GRY; TRANSPARENT TO

OPAQUE; FINE TO LOWER VERY FINE GRAINED;

SUB ANGULAR TO ANGULAR OCC SUB ROUND;

DOMINANTLY CONSOLIDATED; CLUSTERS ARE

GRAIN SUPPORTED IN A SILICEOUS SL

CALCAREOUS CEMENT OCC KAOLINITIC IN

PLACES; MODERATELY TO WELL SORTED; LOW

TO MODERATE SPHERICITY; SL REACTION TO

DILUTE HCL.

SILTSTONE = GRAYISH BROWN TO DARK GRAY

MOTTLED WITH A DARK GRAY TO BLACK SPECKS

TOUGH TO CRUNCHY; IRREGULAR TO HACKLY

FRACTURE; TABULAR CUTTINGS HABIT; SILTY

TO GRAINULAR TEXTURE; THIN STRUCTURE;

THINLY INTERBEDDED WITH CARB; SHALE

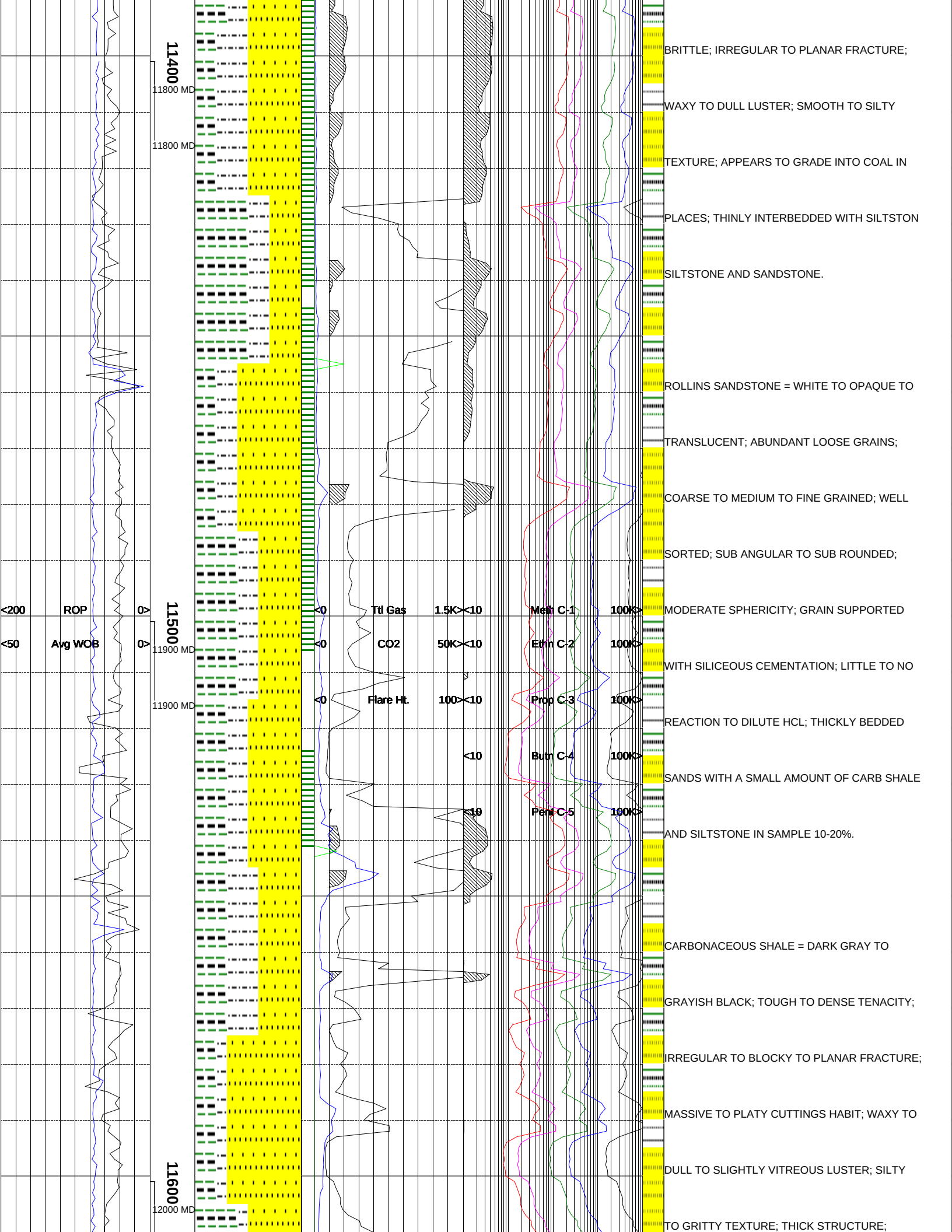
AND SANDSTONE; A TRACE AMOUNT OF

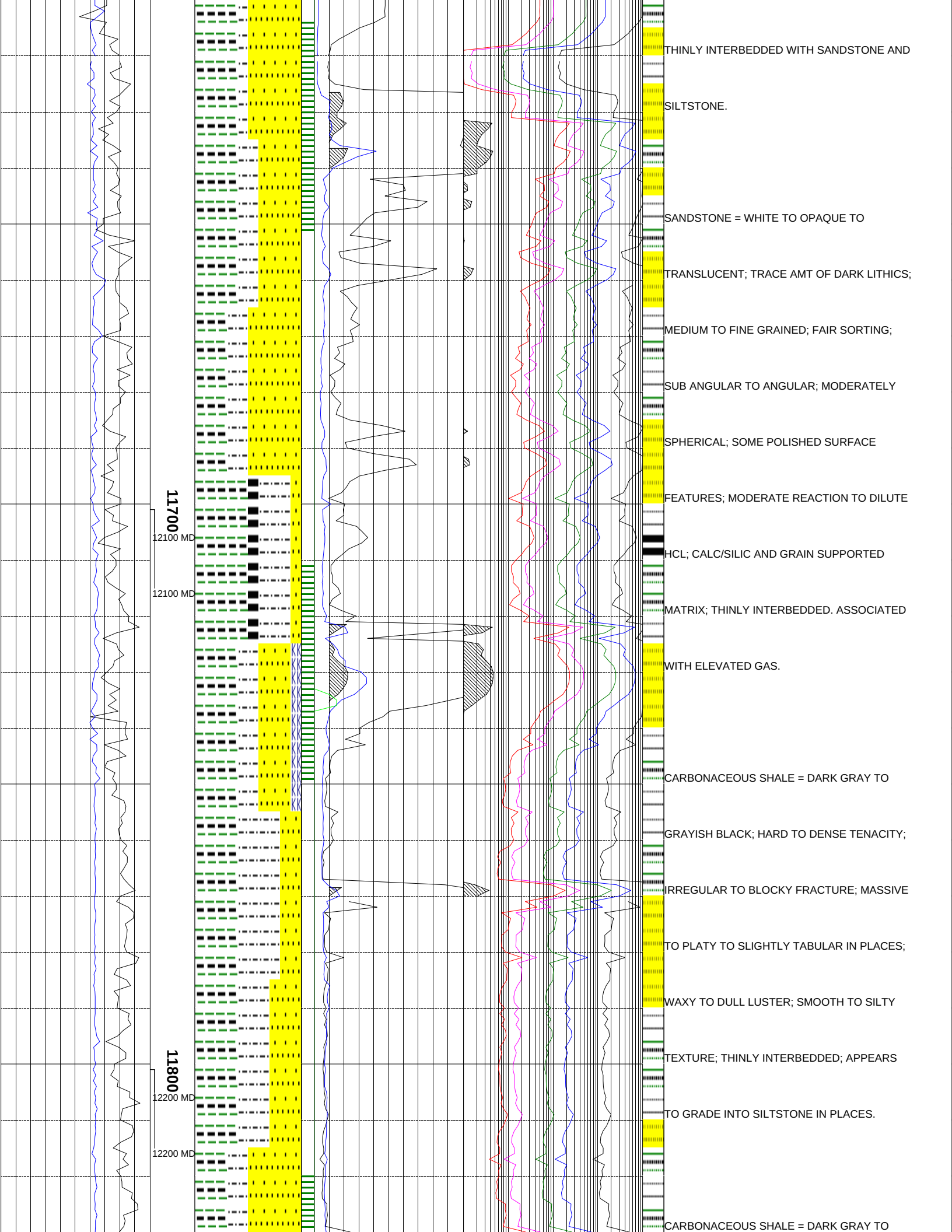
COAL WAS IN SAMPLE TRAY WHICH MAY BE

CAVINGS.

CARBONACEOUS SHALE = GRAY TO DARK GRAY

MOTTLED WITH BLACK SPECS; TOUGH TO


11400
11800 MD
11800 MD
11500
11900 MD
11900 MD
11600
12000 MD
<200
ROP
0>
<50
Avg WOB
0>
<0
Ttl Gas
1.5K><10
Meth C-1
100K>
<0
CO2
50K><10
Eth'n C-2
100K>
<0
Flare Ht.
100><10
Prop C-3
100K>
<10
Butn C-4
100K>
<10
Pent C-5
100K>
BRITTLE; IRREGULAR TO PLANAR FRACTURE;
WAXY TO DULL LUSTER; SMOOTH TO SILTY
TEXTURE; APPEARS TO GRADE INTO COAL IN
PLACES; THINLY INTERBEDDED WITH SILTSTON
SILTSTONE AND SANDSTONE.
ROLLINS SANDSTONE = WHITE TO OPAQUE TO
TRANSLUCENT; ABUNDANT LOOSE GRAINS;
COARSE TO MEDIUM TO FINE GRAINED; WELL
SORTED; SUB ANGULAR TO SUB ROUNDED;
MODERATE SPHERICITY; GRAIN SUPPORTED
WITH SILICEOUS CEMENTATION; LITTLE TO NO
REACTION TO DILUTE HCL; THICKLY BEDDED
SANDS WITH A SMALL AMOUNT OF CARB SHALE
AND SILTSTONE IN SAMPLE 10-20%.
CARBONACEOUS SHALE = DARK GRAY TO
GRAYISH BLACK; TOUGH TO DENSE TENACITY;
IRREGULAR TO BLOCKY TO PLANAR FRACTURE;
MASSIVE TO PLATY CUTTINGS HABIT; WAXY TO
DULL TO SLIGHTLY VITREOUS LUSTER; SILTY
TO GRITTY TEXTURE; THICK STRUCTURE;



THINLY INTERBEDDED WITH SANDSTONE AND

SILTSTONE.

SANDSTONE = WHITE TO OPAQUE TO

TRANSLUCENT; TRACE AMT OF DARK LITHICS;

MEDIUM TO FINE GRAINED; FAIR SORTING;

SUB ANGULAR TO ANGULAR; MODERATELY

SPHERICAL; SOME POLISHED SURFACE

FEATURES; MODERATE REACTION TO DILUTE

HCL; CALC/SILIC AND GRAIN SUPPORTED

MATRIX; THINLY INTERBEDDED. ASSOCIATED

WITH ELEVATED GAS.

CARBONACEOUS SHALE = DARK GRAY TO

GRAYISH BLACK; HARD TO DENSE TENACITY;

IRREGULAR TO BLOCKY FRACTURE; MASSIVE

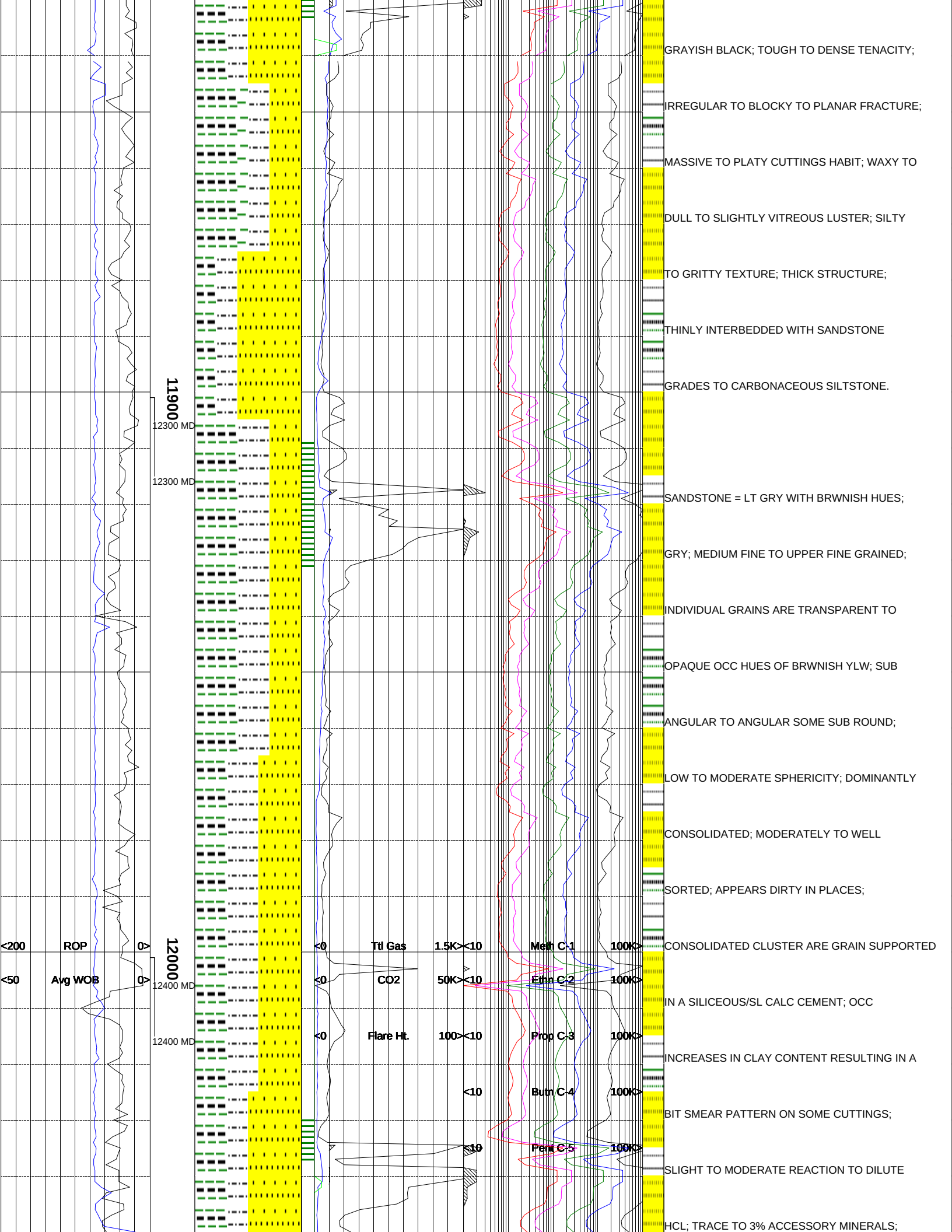
TO PLATY TO SLIGHTLY TABULAR IN PLACES;

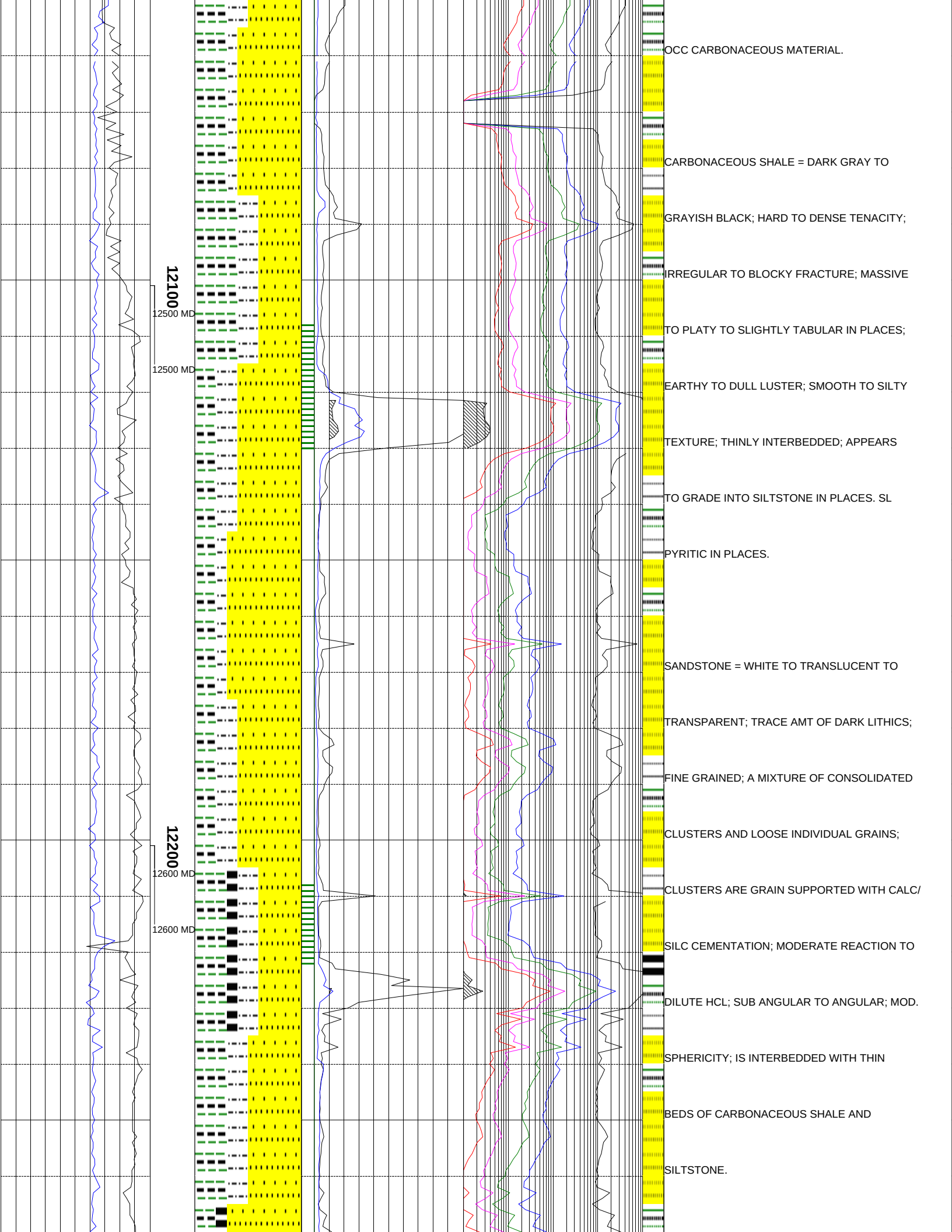
WAXY TO DULL LUSTER; SMOOTH TO SILTY

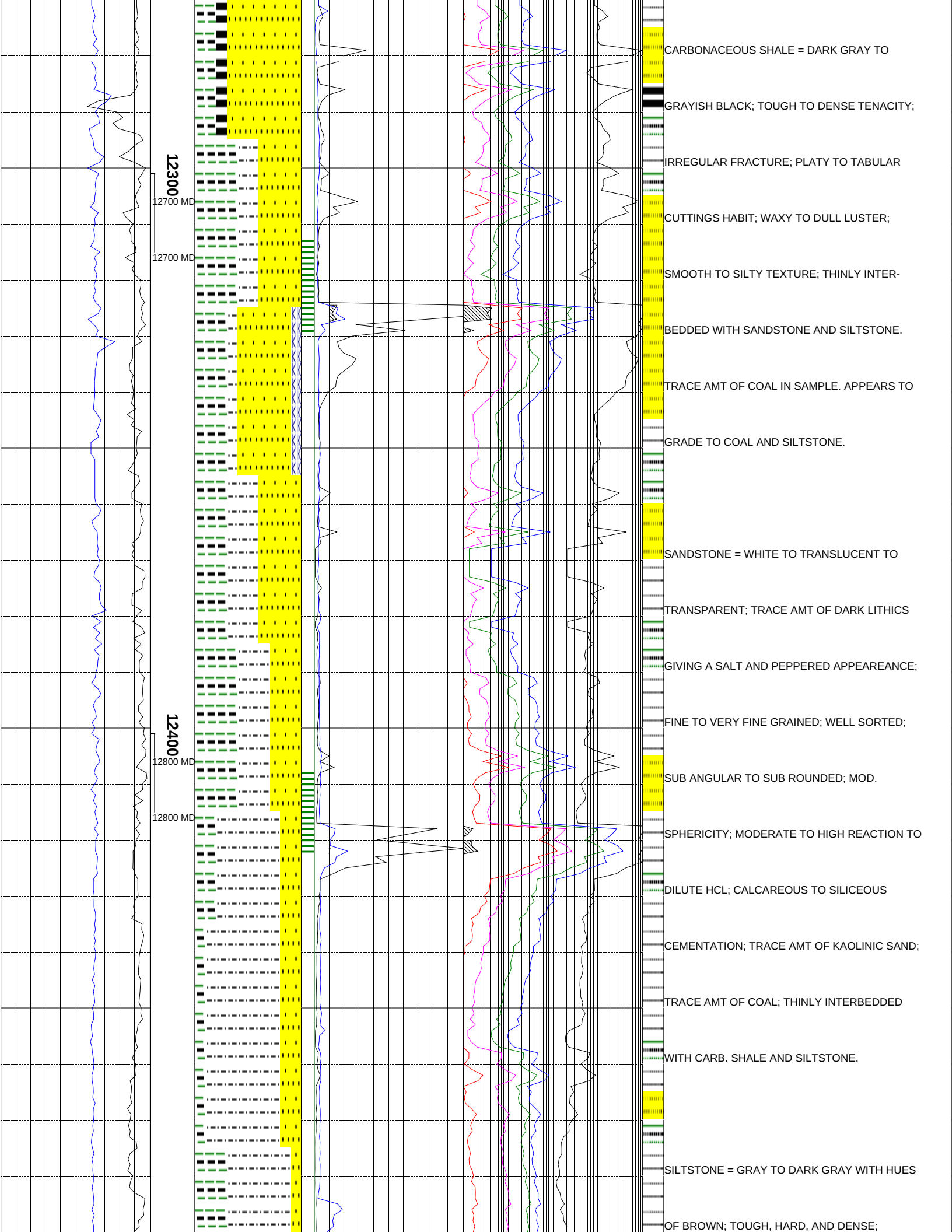
TEXTURE; THINLY INTERBEDDED; APPEARS

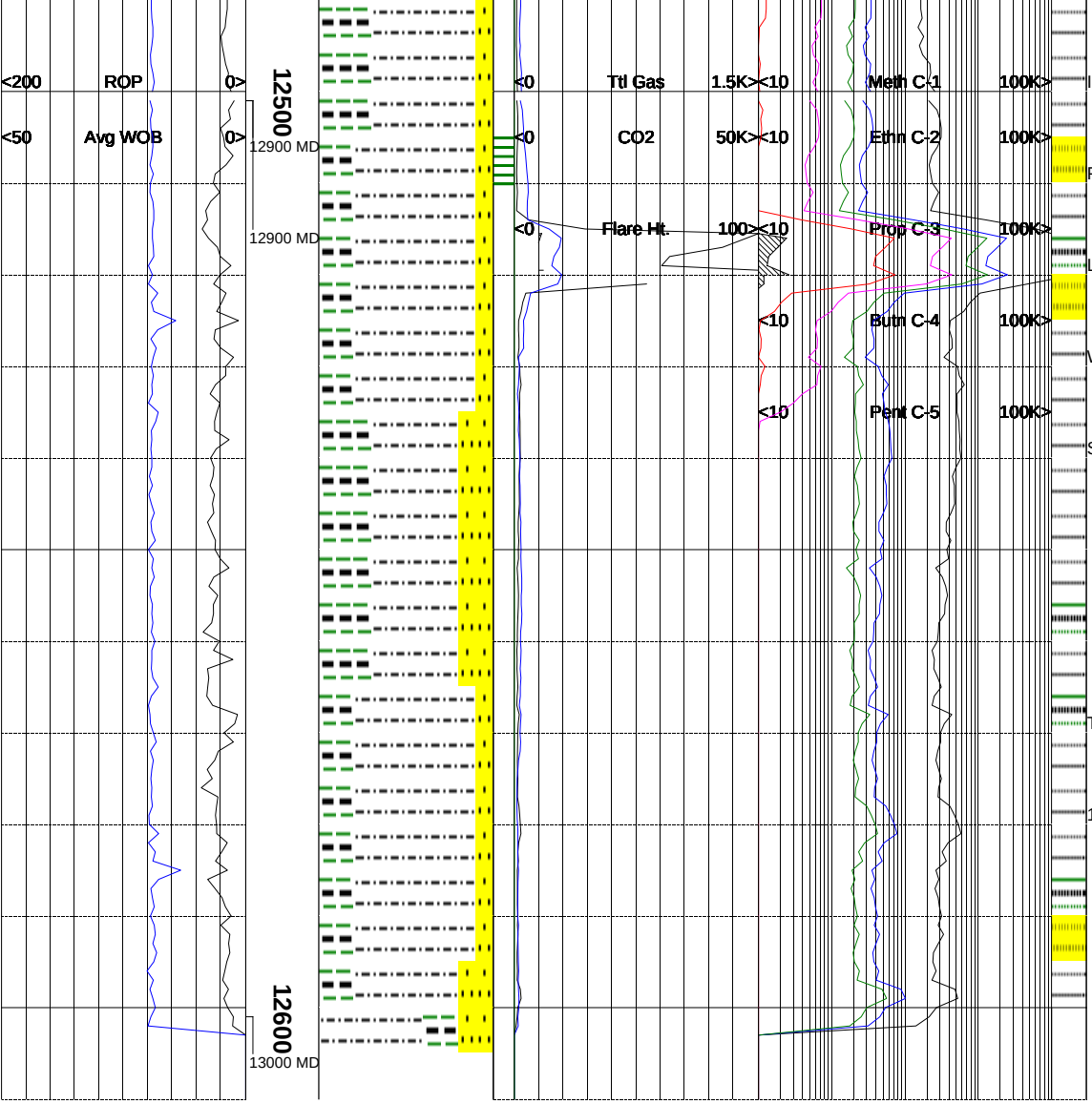
TO GRADE INTO SILTSTONE IN PLACES.

CARBONACEOUS SHALE = DARK GRAY TO


GRAYISH BLACK; TOUGH TO DENSE TENACITY;
IRREGULAR TO BLOCKY TO PLANAR FRACTURE;
MASSIVE TO PLATY CUTTINGS HABIT; WAXY TO
DULL TO SLIGHTLY VITREOUS LUSTER; SILTY
TO GRITTY TEXTURE; THICK STRUCTURE;
THINLY INTERBEDDED WITH SANDSTONE
GRADES TO CARBONACEOUS SILTSTONE.
11900
12300 MD
12300 MD
SANDSTONE = LT GRY WITH BRWNISH HUES;
GRY; MEDIUM FINE TO UPPER FINE GRAINED;
INDIVIDUAL GRAINS ARE TRANSPARENT TO
OPAQUE OCC HUES OF BRWNISH YLW; SUB
ANGULAR TO ANGULAR SOME SUB ROUND;
LOW TO MODERATE SPHERICITY; DOMINANTLY
CONSOLIDATED; MODERATELY TO WELL
SORTED; APPEARS DIRTY IN PLACES;
<200
ROP
0>
12000
<0
Ttl Gas
1.5K><10
Meth C-1
100K>
CONSOLIDATED CLUSTER ARE GRAIN SUPPORTED
<50
Avg WOB
0>
12400 MD
<0
CO2
50K><10
Etha C-2
100K>
IN A SILICEOUS/SL CALC CEMENT; OCC
<0
Flare Ht.
100><10
Prop C-3
100K>
12400 MD
INCREASES IN CLAY CONTENT RESULTING IN A
<10
Butn C-4
100K>
BIT SMEAR PATTERN ON SOME CUTTINGS;
<10
Pent C-5
100K>
SLIGHT TO MODERATE REACTION TO DILUTE
HCL; TRACE TO 3% ACCESSORY MINERALS;


12100
12500 MD
12500 MD
12200
12600 MD
12600 MD
OCC CARBONACEOUS MATERIAL.
CARBONACEOUS SHALE = DARK GRAY TO
GRAYISH BLACK; HARD TO DENSE TENACITY;
IRREGULAR TO BLOCKY FRACTURE; MASSIVE
TO PLATY TO SLIGHTLY TABULAR IN PLACES;
EARTHY TO DULL LUSTER; SMOOTH TO SILTY
TEXTURE; THINLY INTERBEDDED; APPEARS
TO GRADE INTO SILTSTONE IN PLACES. SL
PYRITIC IN PLACES.
SANDSTONE = WHITE TO TRANSLUCENT TO
TRANSPARENT; TRACE AMT OF DARK LITHICS;
FINE GRAINED; A MIXTURE OF CONSOLIDATED
CLUSTERS AND LOOSE INDIVIDUAL GRAINS;
CLUSTERS ARE GRAIN SUPPORTED WITH CALC/
SILC CEMENTATION; MODERATE REACTION TO
DILUTE HCL; SUB ANGULAR TO ANGULAR; MOD.
SPHERICITY; IS INTERBEDDED WITH THIN
BEDS OF CARBONACEOUS SHALE AND
SILTSTONE.


12300
12700 MD
12700 MD
12400
12800 MD
12800 MD
CARBONACEOUS SHALE = DARK GRAY TO
GRAYISH BLACK; TOUGH TO DENSE TENACITY;
IRREGULAR FRACTURE; PLATY TO TABULAR
CUTTINGS HABIT; WAXY TO DULL LUSTER;
SMOOTH TO SILTY TEXTURE; THINLY INTER-
BEDDED WITH SANDSTONE AND SILTSTONE.
TRACE AMT OF COAL IN SAMPLE. APPEARS TO
GRADE TO COAL AND SILTSTONE.
SANDSTONE = WHITE TO TRANSLUCENT TO
TRANSPARENT; TRACE AMT OF DARK LITHICS
GIVING A SALT AND PEPPERED APPEAREANCE;
FINE TO VERY FINE GRAINED; WELL SORTED;
SUB ANGULAR TO SUB ROUNDED; MOD.
SPHERICITY; MODERATE TO HIGH REACTION TO
DILUTE HCL; CALCAREOUS TO SILICEOUS
CEMENTATION; TRACE AMT OF KAOLINIC SAND;
TRACE AMT OF COAL; THINLY INTERBEDDED
WITH CARB. SHALE AND SILTSTONE.
SILTSTONE = GRAY TO DARK GRAY WITH HUES
OF BROWN; TOUGH, HARD, AND DENSE;



IRREGULAR TO TABULAR TO SLIGHTLY

PLATY CUTTINGS HABIT; DULL TO SPARKLING

LUSTER; THIN STRUCTURE; INTERBEDDED

WITH CARB. SHALE AND SMALL BEDS OF

SANDSTONE.

TOTAL DEPTH OF 13,000' MD REACHED

10/09/2009 AT 23:45HRS.