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

MUDLOG TVD

COMPANY	EXXON MOBIL
WELL	PCU 197-34B8
FIELD	PICEANCE CREEK
REGION	ROCKY MOUNTAINS
COORDINATES	39.915659000
	108.261198000
ELEVATION	6,649.1'
COUNTY, STATE	RIO BLANCO, CO
API INDEX	05-103-11082-00
SPUD DATE	12/13/2008
CONTRACTOR	H _P
CO. REP.	S.GUYOTE/W.GARNER
RIG/TYPE	# 320/FLEX 4S+
LOGGING UNIT	MLU # 032
GEOLOGISTS	J.KEEVAN
	C.RECORD/C.PIERCE
ADD. PERSONS	M.PIPER/B. HICKS
	T.WALKER
CO. GEOLOGIST	CHRIS ALBA

LOG INTERVAL

DEPTHS:	4,000'	**TO**	12,645'
DATES:	9/30/2009	**TO**	12/28/2009
SCALE:		5"=100'	

MUD TYPES

LSND	**TO**	12,645'
	TO	
	TO	
	TO	

CASING DATA

15"	**AT**	150'
10.75"	**AT**	3,976'
7"	**AT**	8,794'
	AT	

HOLE SIZE

14.75"	**TO**	4,000'
9.875"	**TO**	8,806'
6.125"	**TO**	12,645'
	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		

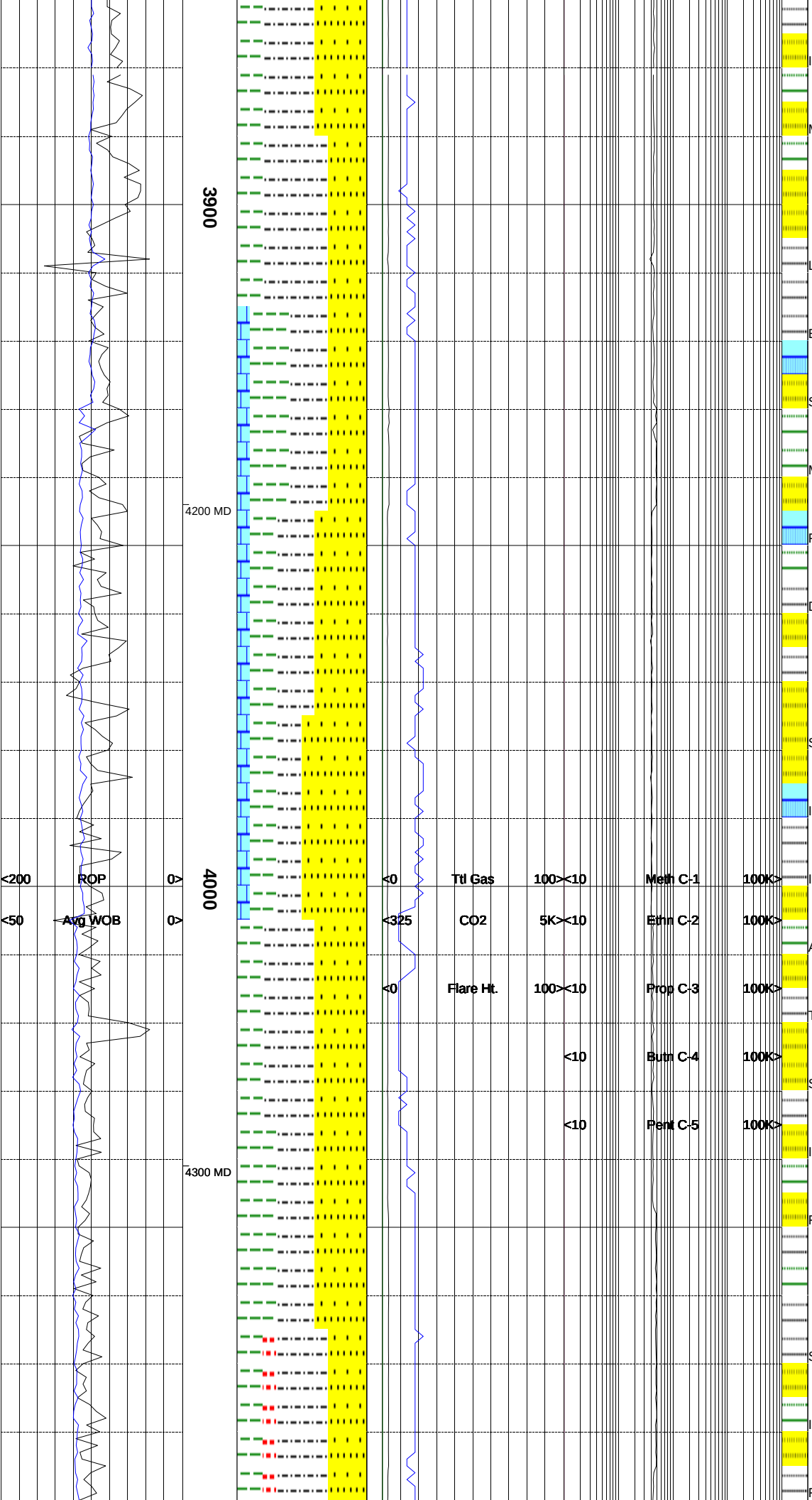
ALTERED ZONE
ANDESITE
ANHYDRITE
BASALT
BENTONITE
BIOTITIZATION
BRECCIA
CALCARENITE
CALCAREOUS TUFF
CALCILUTITE
CARBONATES
CARBONACEOUS MAT
CARBONACEOUS SH
CEMENT CONTAM.
CHALK
CRYSTALLINE TUFF
CHERT - ARGILL
CHERT - GLASSY
CHERT - PORCEL
CHERT - TIGER STRIPE
CHERT - UNDIFF
CLAY
CLAY-MUDSTONE
CLYST-TUFFACEOUS
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.

SANDSTONE = YELLOWISH GRAY TO WHITE IN COLOR; QUARTZ FRAMEWORK; MEDIUM TO FINE GRAIN SIZE; FAIR TO WELL SORTING; GRAINS ARE ROUNDED TO SUBANGULAR WITH MODERATE TO HIGH SPHERICITY; SAMPLE IS FRIABLE TO MODERATELY HARD; CALCITE CEMENT; NO VISIBLE BEDDING; NO VISIBLE VOIDS; NO GAS SHOWS FROM THIS SANDSTONE.

SILTSTONE = DARK YELLOWISH ORANGE TO DARK YELLOWISH BROWN IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; CUTTINGS RANGE FROM PLATY TO WEDGELIKE IN APPEARANCE; DULL TO EARTHY LUSTER EXHIBITED; TEXTURE RANGES FROM SILTY TO GRANULAR WITH SOME GRADATION



INTO SANDSTONE NOTICEABLE; THICK TO

MASSIVE STRUCTURE APPARENT.

LIMESTONE = LIGHT BLUISH GRAY TO MEDIUM

BLUISH GRAY WITH POSSIBLE LIMONITE

STAINING; MATRIX DOMINATED - MUDSTONE;

MATRIX APPEARS TO BE CLASTIC IN ORIGIN;

POINT CONTACTS FABRIC WITH NO

DISCERNIBLE POROSITY.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY

IN COLOR; CRUMBLY TO PULVERANT TENACITY;

IRREGULAR TO BLOCKY FRACTURE; CUTTINGS

ARE PLATY TO TABULAR IN APPEARANCE; DULL

TO EARTHY LUSTER EXHIBITED; CLAYEY TO

SILTY TEXTURE; THIN TO LAMINAE STRUCTURE

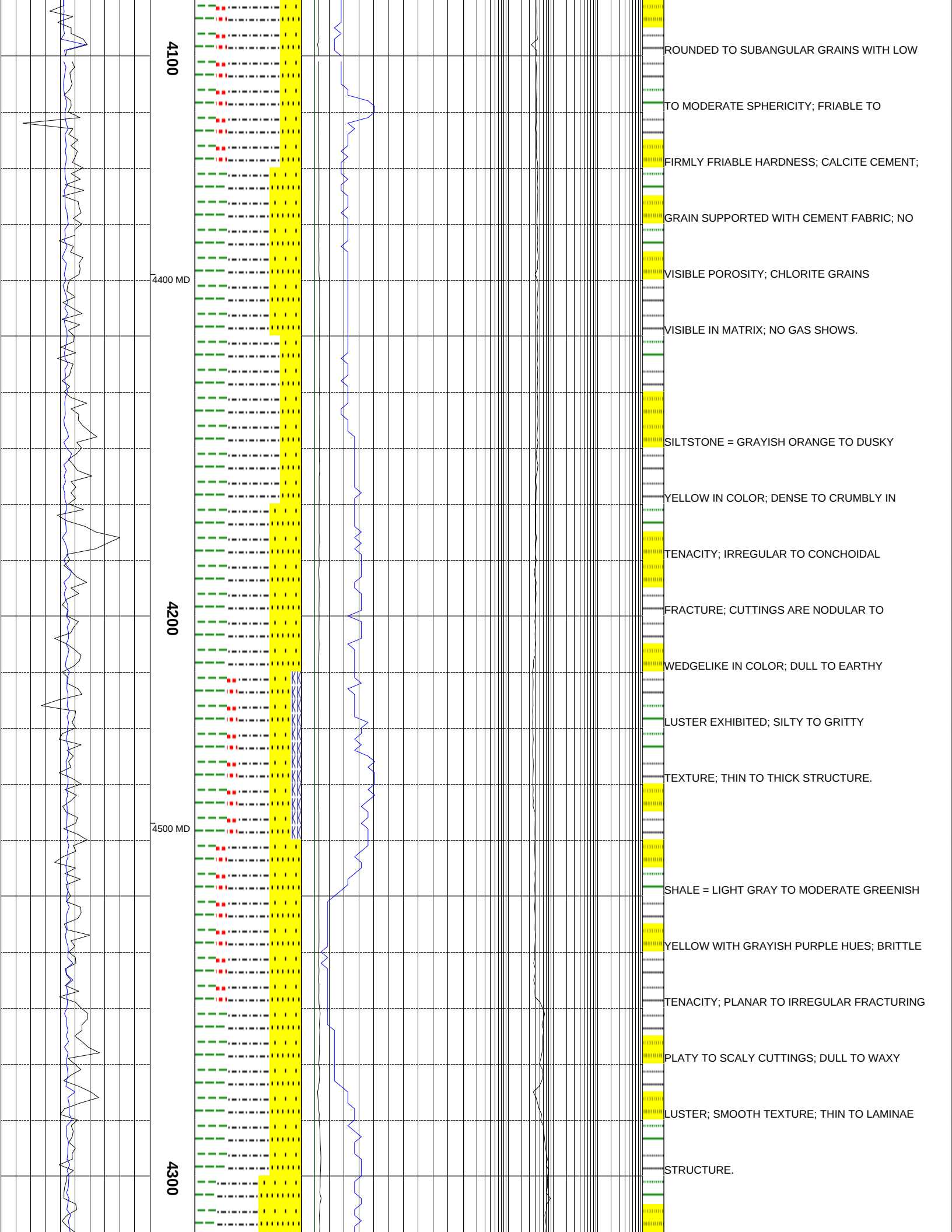
INTERBEDDED WITH SILTSTONES APPARENT

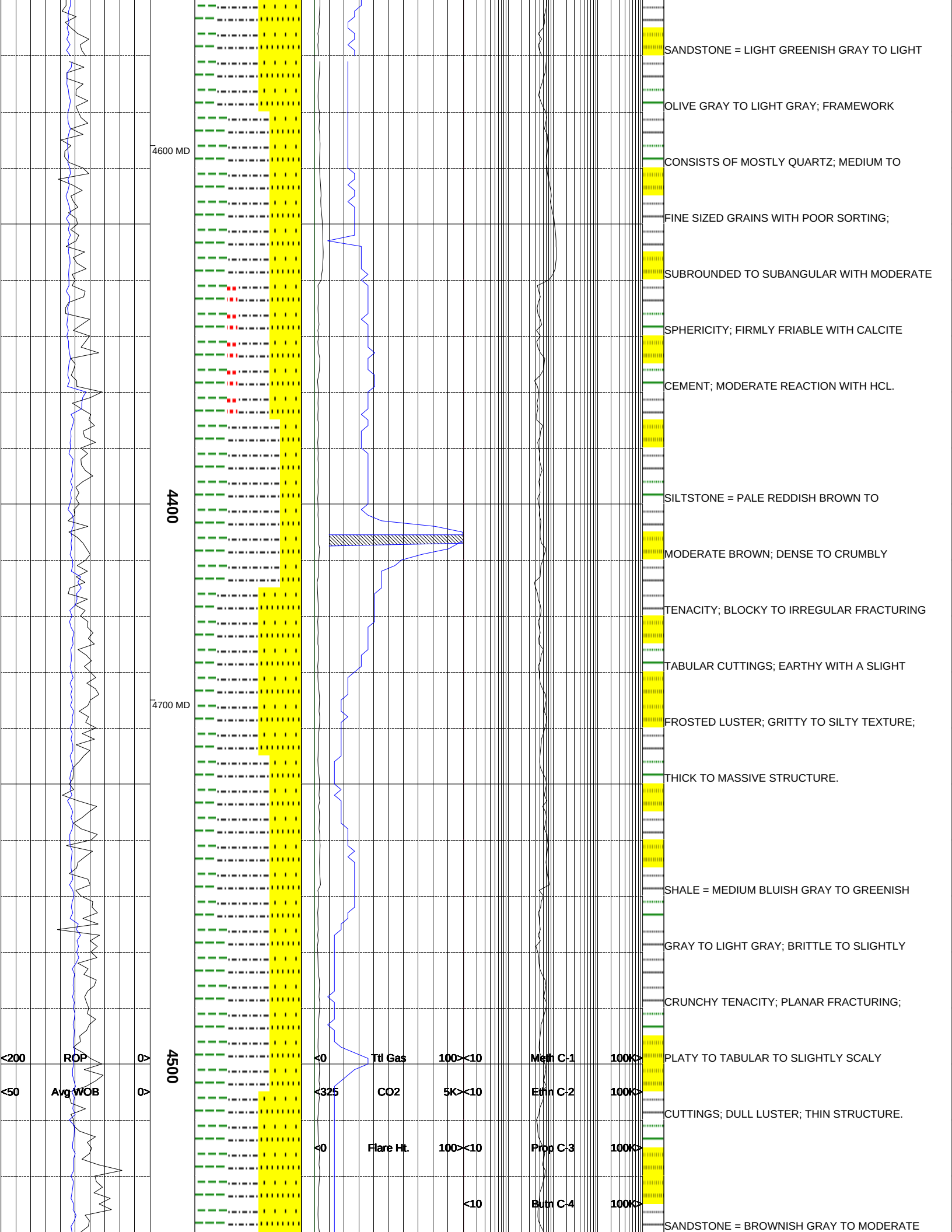
FROM DRILL BREAKS.

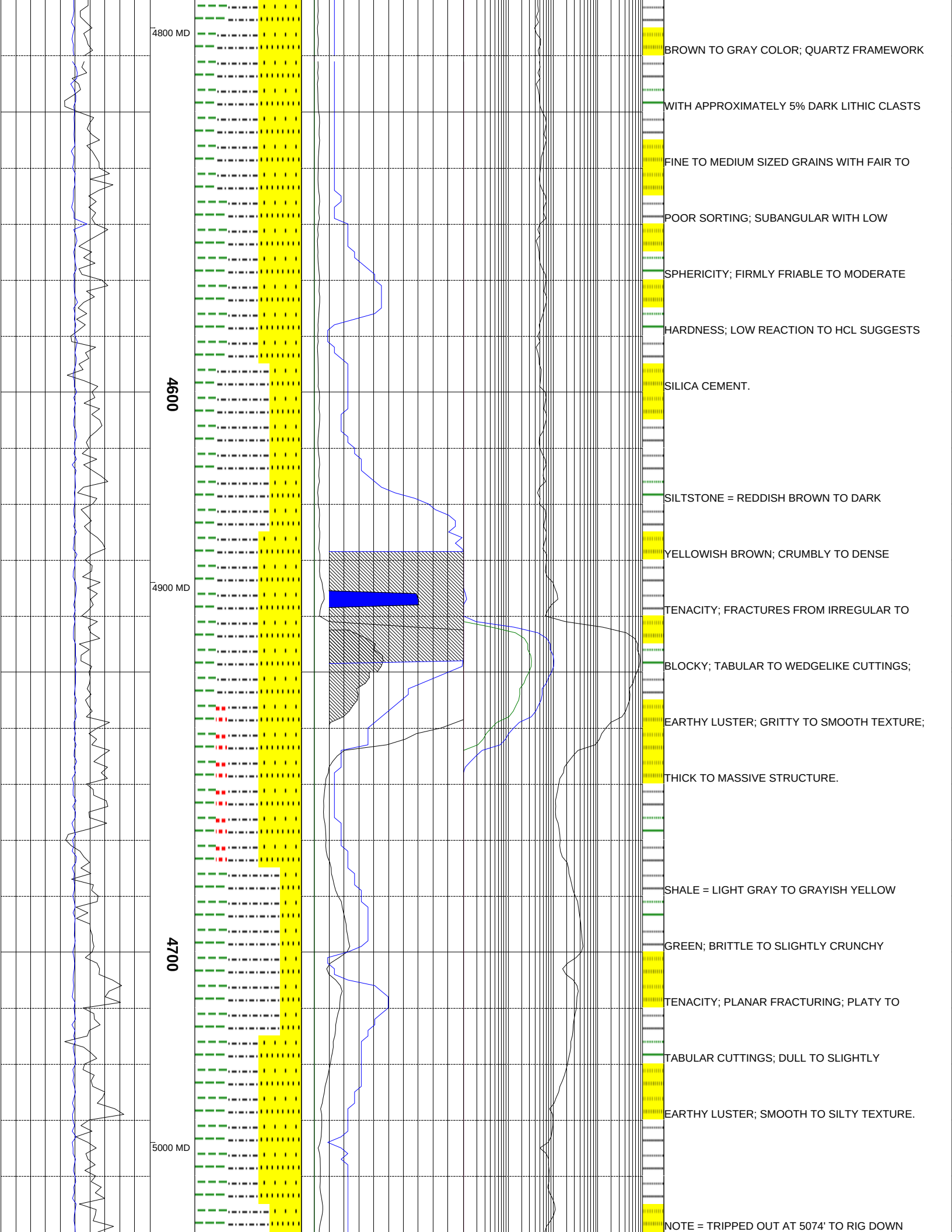
SANDSTONE = LIGHT GREENISH GRAY TO WHITE

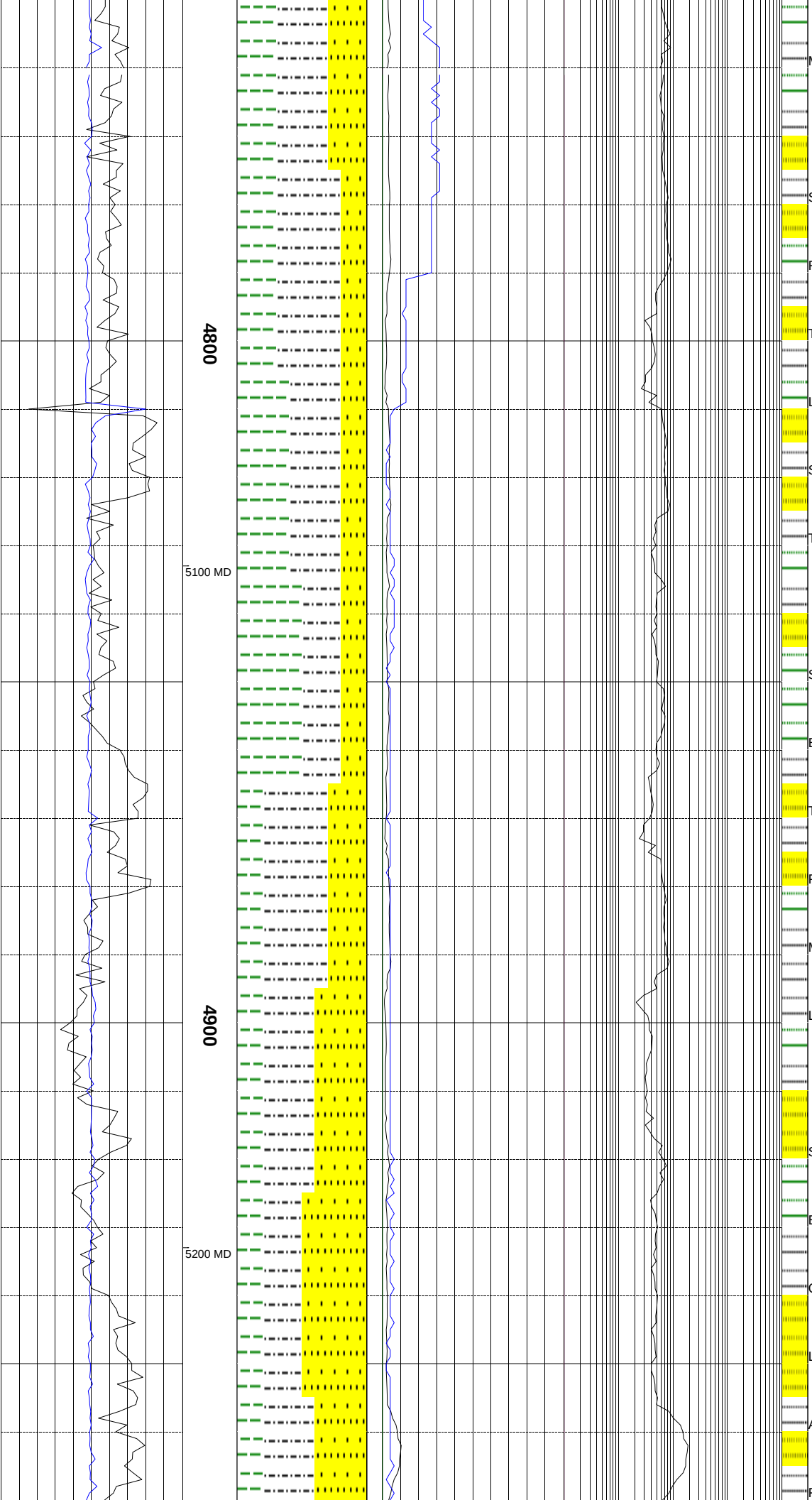
IN COLOR; QUARTZ FRAMEWORK; COARSE TO

FINE GRAIN SIZE; POOR TO FAIR SORTING;


4100
4400 MD
4200
4500 MD
4300
ROUNDED TO SUBANGULAR GRAINS WITH LOW
TO MODERATE SPHERICITY; FRIABLE TO
FIRMLY FRIABLE HARDNESS; CALCITE CEMENT;
GRAIN SUPPORTED WITH CEMENT FABRIC; NO
VISIBLE POROSITY; CHLORITE GRAINS
VISIBLE IN MATRIX; NO GAS SHOWS.
SILTSTONE = GRAYISH ORANGE TO DUSKY
YELLOW IN COLOR; DENSE TO CRUMBLY IN
TENACITY; IRREGULAR TO CONCHOIDAL
FRACTURE; CUTTINGS ARE NODULAR TO
WEDGELIKE IN COLOR; DULL TO EARTHY
LUSTER EXHIBITED; SILTY TO GRITTY
TEXTURE; THIN TO THICK STRUCTURE.
SHALE = LIGHT GRAY TO MODERATE GREENISH
YELLOW WITH GRAYISH PURPLE HUES; BRITTLE
TENACITY; PLANAR TO IRREGULAR FRACTURING
PLATY TO SCALY CUTTINGS; DULL TO WAXY
LUSTER; SMOOTH TEXTURE; THIN TO LAMINAE
STRUCTURE.


4600 MD
4400
4700 MD
4500
<200
ROP
0>
<50
Avg WOB
0>
<0
Ttl Gas
100><10
Meth C-1
100K>
<325
CO2
5K><10
Ethn C-2
100K>
<0
Flare Ht.
100><10
Prop C-3
100K>
<10
Butn C-4
100K>
SANDSTONE = LIGHT GREENISH GRAY TO LIGHT
OLIVE GRAY TO LIGHT GRAY; FRAMEWORK
CONSISTS OF MOSTLY QUARTZ; MEDIUM TO
FINE SIZED GRAINS WITH POOR SORTING;
SUBROUNDED TO SUBANGULAR WITH MODERATE
SPHERICITY; FIRMLY FRIABLE WITH CALCITE
CEMENT; MODERATE REACTION WITH HCL.
SILTSTONE = PALE REDDISH BROWN TO
MODERATE BROWN; DENSE TO CRUMBLY
TENACITY; BLOCKY TO IRREGULAR FRACTURING
TABULAR CUTTINGS; EARTHY WITH A SLIGHT
FROSTED LUSTER; GRITTY TO SILTY TEXTURE;
THICK TO MASSIVE STRUCTURE.
SHALE = MEDIUM BLUISH GRAY TO GREENISH
GRAY TO LIGHT GRAY; BRITTLE TO SLIGHTLY
CRUNCHY TENACITY; PLANAR FRACTURING;
PLATY TO TABULAR TO SLIGHTLY SCALY
CUTTINGS; DULL LUSTER; THIN STRUCTURE.
SANDSTONE = BROWNISH GRAY TO MODERATE


4800 MD
4600
4900 MD
4700
5000 MD
BROWN TO GRAY COLOR; QUARTZ FRAMEWORK
WITH APPROXIMATELY 5% DARK LITHIC CLASTS
FINE TO MEDIUM SIZED GRAINS WITH FAIR TO
POOR SORTING; SUBANGULAR WITH LOW
SPHERICITY; FIRMLY FRIABLE TO MODERATE
HARDNESS; LOW REACTION TO HCL SUGGESTS
SILICA CEMENT.
SILTSTONE = REDDISH BROWN TO DARK
YELLOWISH BROWN; CRUMBLY TO DENSE
TENACITY; FRACTURES FROM IRREGULAR TO
BLOCKY; TABULAR TO WEDGELIKE CUTTINGS;
EARTHY LUSTER; GRITTY TO SMOOTH TEXTURE;
THICK TO MASSIVE STRUCTURE.
SHALE = LIGHT GRAY TO GRAYISH YELLOW
GREEN; BRITTLE TO SLIGHTLY CRUNCHY
TENACITY; PLANAR FRACTURING; PLATY TO
TABULAR CUTTINGS; DULL TO SLIGHTLY
EARTHY LUSTER; SMOOTH TO SILTY TEXTURE.
NOTE = TRIPPED OUT AT 5074' TO RIG DOWN



MWD TOOLS ON 10/01/2009 AT 1:30 AM.

SILTSTONE = BROWNISH GRAY TO MODERATE

REDDISH BROWN; DENSE TO CRUMBLY TENACITY

TABULAR TO WEDGELIKE CUTTINGS; EARTHY

LUSTER; SILTY TEXTURE WITH A THICK

STRUCTURE; FRACTURES FROM IRREGULAR TO

TABULAR.

SHALE = LIGHT GRAY TO TO LIGHT OLIVE

BROWN WITH OCCASSIONAL PALE PURPLE HUES;

TENACITY IS BRITTLE TO SLIGHTLY DENSE;

PLANAR FRACTURING; CUTTINGS RANGE FROM

MOSTLY PLANAR TO TABULAR; DULL TO EARTHY

LUSTER; SMOOTH TO SILTY TEXTURE; THIN ST

SANDSTONE = MEDIUM DARK GRAY TO GRAYISH

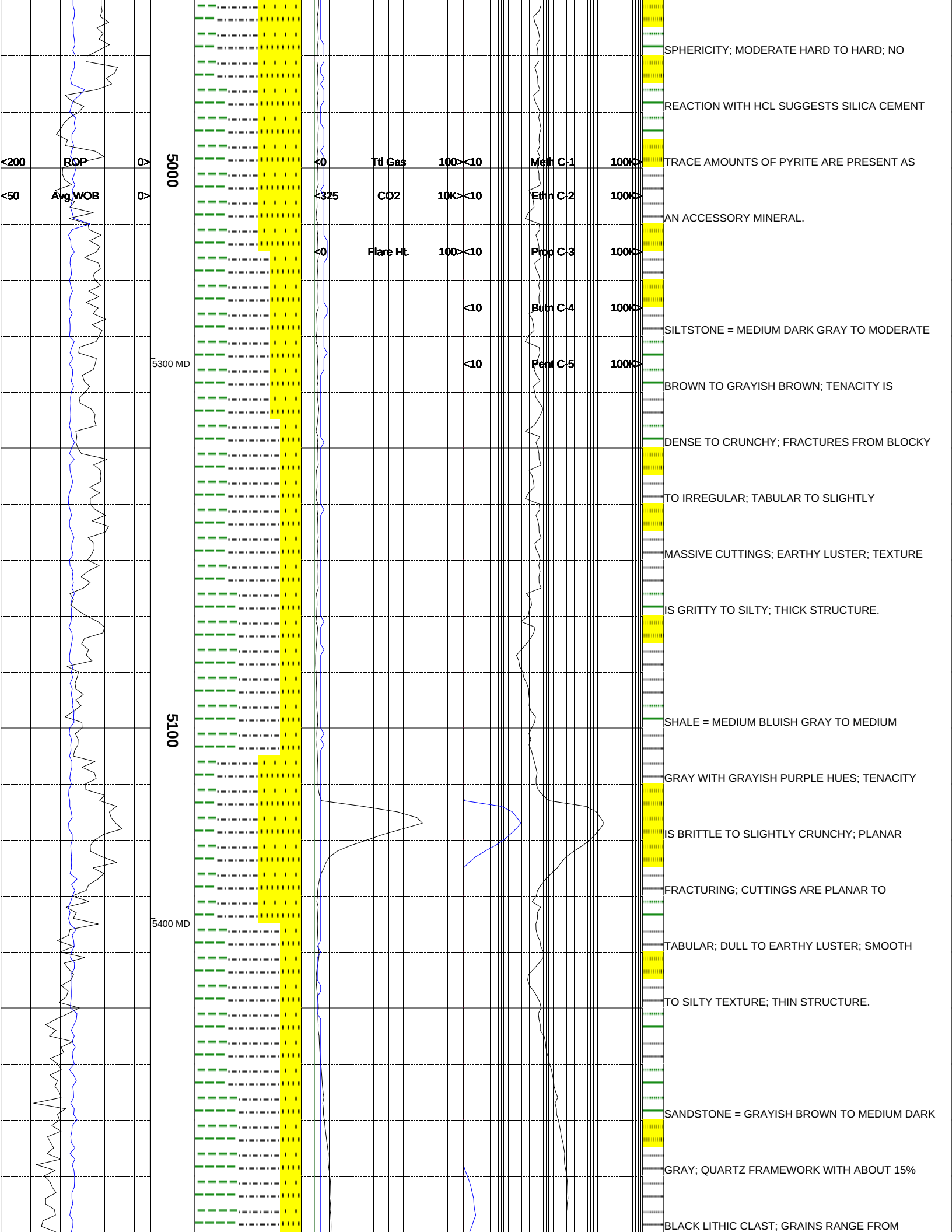
BROWN; FRAMEWORK CONSIST MOSTLY OF

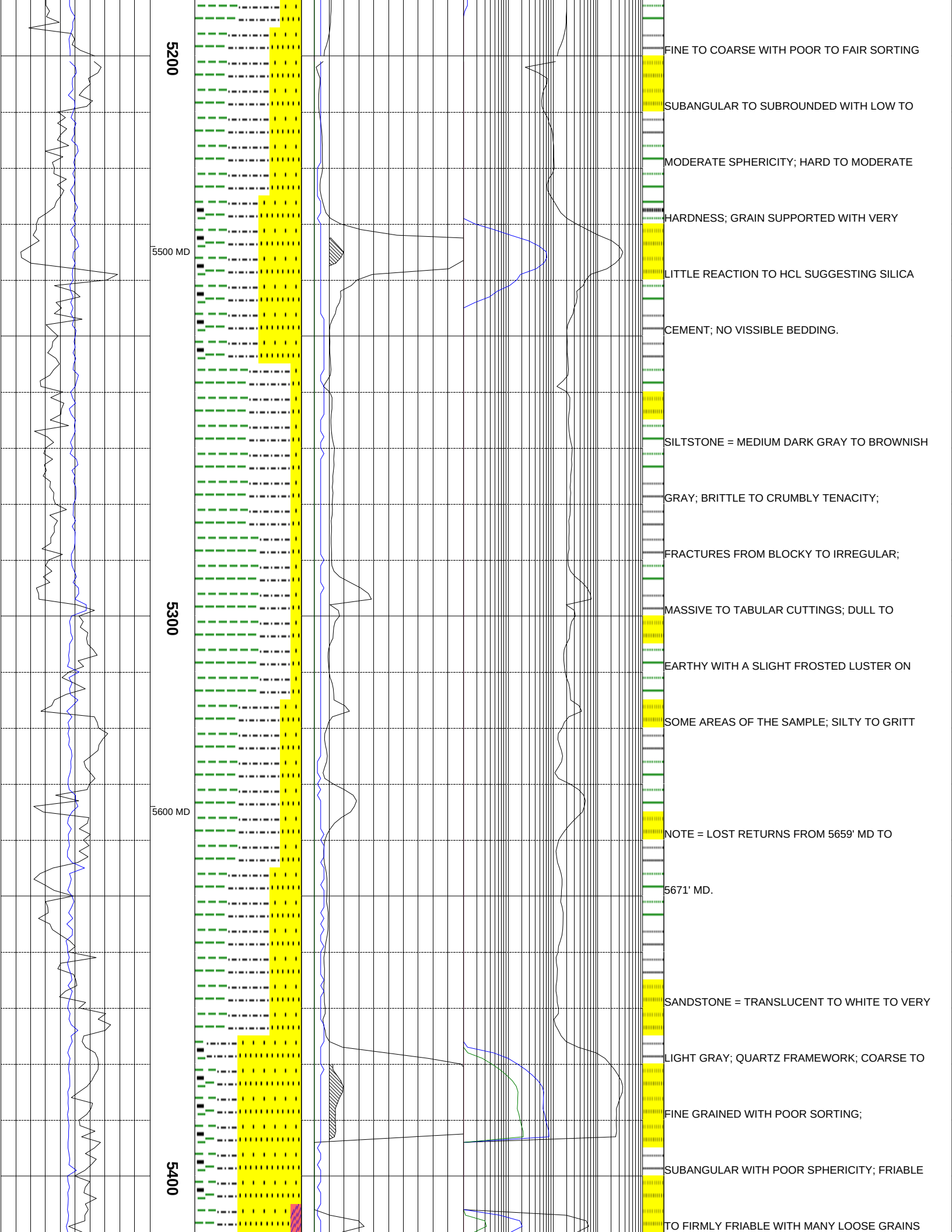
QUARTZ WITH APPROXIMATELY 10% BLACK

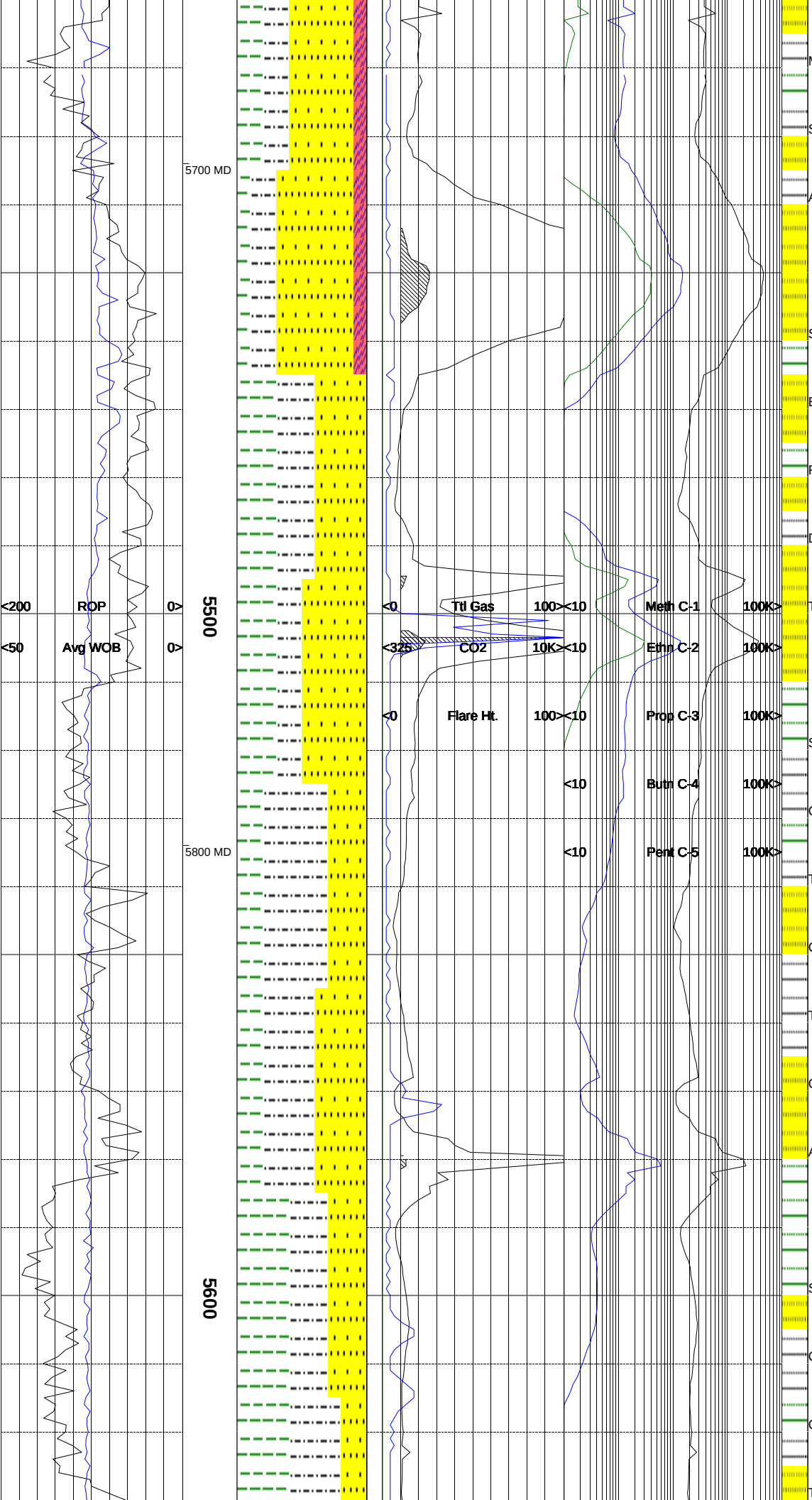
LITHIC CLASTS CREATING A SALT AND PEPPER

APPEARANCE; FINE TO MEDIUM SIZED WITH

FAIR SORTING; SUB ROUNDED WITH MODERATE


<200 ROP 0>
<50 Avg WOB 0>
5000
5300 MD
5100
5400 MD
<0 Ttl Gas 100><10 Meth C-1 100K>
<325 CO2 10K><10 Etha C-2 100K>
<0 Flare Ht. 100><10 Prop C-3 100K>
<10 Buta C-4 100K>
<10 Pent C-5 100K>
SPHERICITY; MODERATE HARD TO HARD; NO
REACTION WITH HCL SUGGESTS SILICA CEMENT
TRACE AMOUNTS OF PYRITE ARE PRESENT AS
AN ACCESSORY MINERAL.
SILTSTONE = MEDIUM DARK GRAY TO MODERATE
BROWN TO GRAYISH BROWN; TENACITY IS
DENSE TO CRUNCHY; FRACTURES FROM BLOCKY
TO IRREGULAR; TABULAR TO SLIGHTLY
MASSIVE CUTTINGS; EARTHY LUSTER; TEXTURE
IS GRITTY TO SILTY; THICK STRUCTURE.
SHALE = MEDIUM BLUISH GRAY TO MEDIUM
GRAY WITH GRAYISH PURPLE HUES; TENACITY
IS BRITTLE TO SLIGHTLY CRUNCHY; PLANAR
FRACTURING; CUTTINGS ARE PLANAR TO
TABULAR; DULL TO EARTHY LUSTER; SMOOTH
TO SILTY TEXTURE; THIN STRUCTURE.
SANDSTONE = GRAYISH BROWN TO MEDIUM DARK
GRAY; QUARTZ FRAMEWORK WITH ABOUT 15%
BLACK LITHIC CLAST; GRAINS RANGE FROM


5200
5500 MD
5300
5600 MD
5400
FINE TO COARSE WITH POOR TO FAIR SORTING
SUBANGULAR TO SUBROUNDED WITH LOW TO
MODERATE SPHERICITY; HARD TO MODERATE
HARDNESS; GRAIN SUPPORTED WITH VERY
LITTLE REACTION TO HCL SUGGESTING SILICA
CEMENT; NO VISSIBLE BEDDING.
SILTSTONE = MEDIUM DARK GRAY TO BROWNISH
GRAY; BRITTLE TO CRUMBLY TENACITY;
FRACTURES FROM BLOCKY TO IRREGULAR;
MASSIVE TO TABULAR CUTTINGS; DULL TO
EARTHY WITH A SLIGHT FROSTED LUSTER ON
SOME AREAS OF THE SAMPLE; SILTY TO GRITT
NOTE = LOST RETURNS FROM 5659' MD TO
5671' MD.
SANDSTONE = TRANSLUCENT TO WHITE TO VERY
LIGHT GRAY; QUARTZ FRAMEWORK; COARSE TO
FINE GRAINED WITH POOR SORTING;
SUBANGULAR WITH POOR SPHERICITY; FRIABLE
TO FIRMLY FRIABLE WITH MANY LOOSE GRAINS



MILD REACTION TO HCL SUGGESTS CALCITE/

SILICA CEMENT; PYRITE PRESENT AS AN

ACCESSORY MINERAL.

SHALE = LIGHT TO MEDIUM DARK GRAY;

BRITTLE TO CRUNCHY TENACITY; PLANAR

FRACTURING; PLATY TO SCALY CUTTINGS;

DULL TO EARTHY LUSTER; SMOOTH TO SILTY

TEXTURE; LAMINAE TO THIN STRUCTURE.

SILTSTONE = PALE RED TO GRAYISH RED IN

COLOR; BRITTLE TO NEARLY PULVERANT IN

TENACITY; MOTTLED TO IRREGULAR FRACUTRE;

CUTTINGS ARE TABULAR TO WEDGELIKE; DULL

TO FROSTED LUSTER EXHIBITED; SILTY TO

GRITTY TEXTURE; THIN TO THICK STRUCTURE

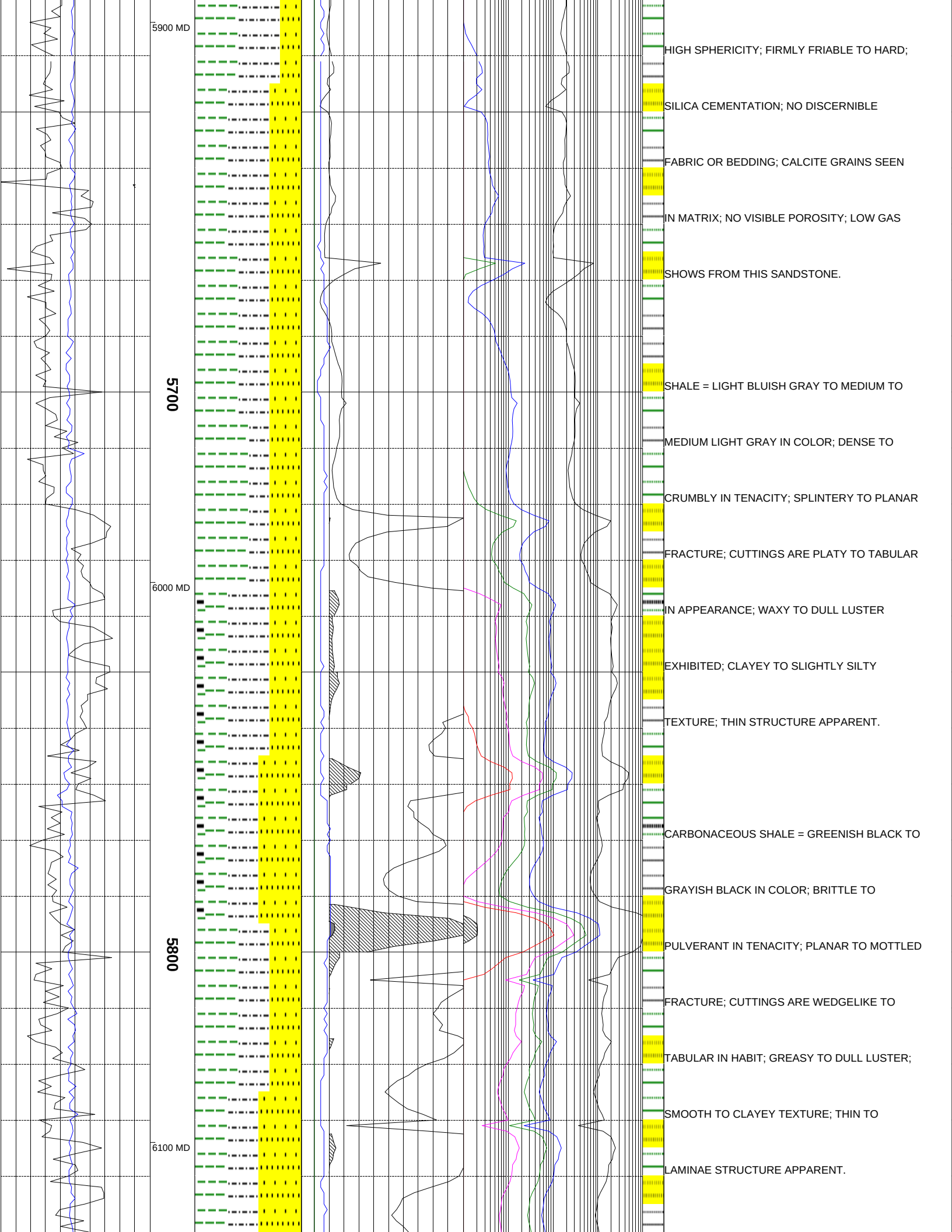
APPARENT.

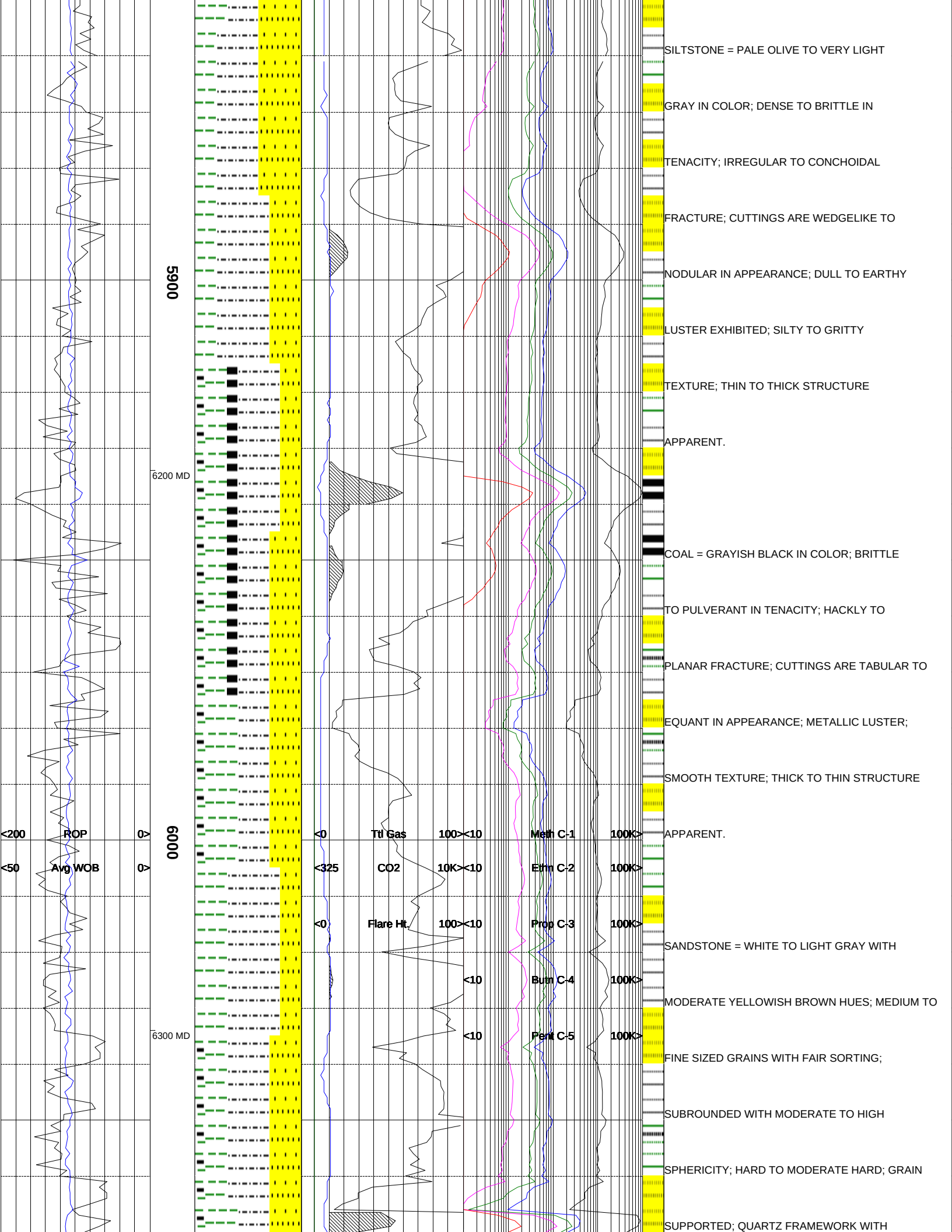
SANDSTONE = WHITE TO YELLOWISH GRAY IN

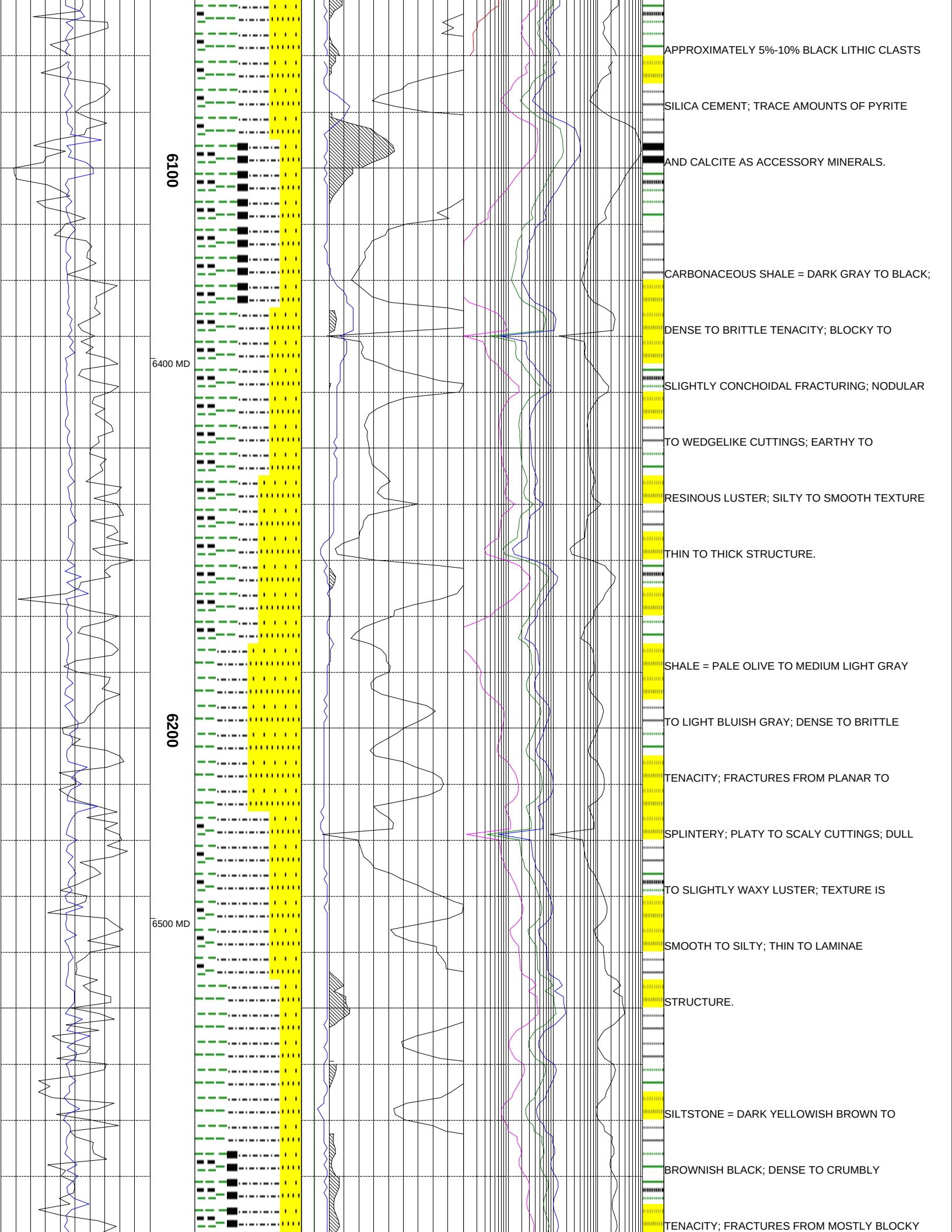
COLOR; QUARTZ FRAMEWORK; MEDIUM TO FINE

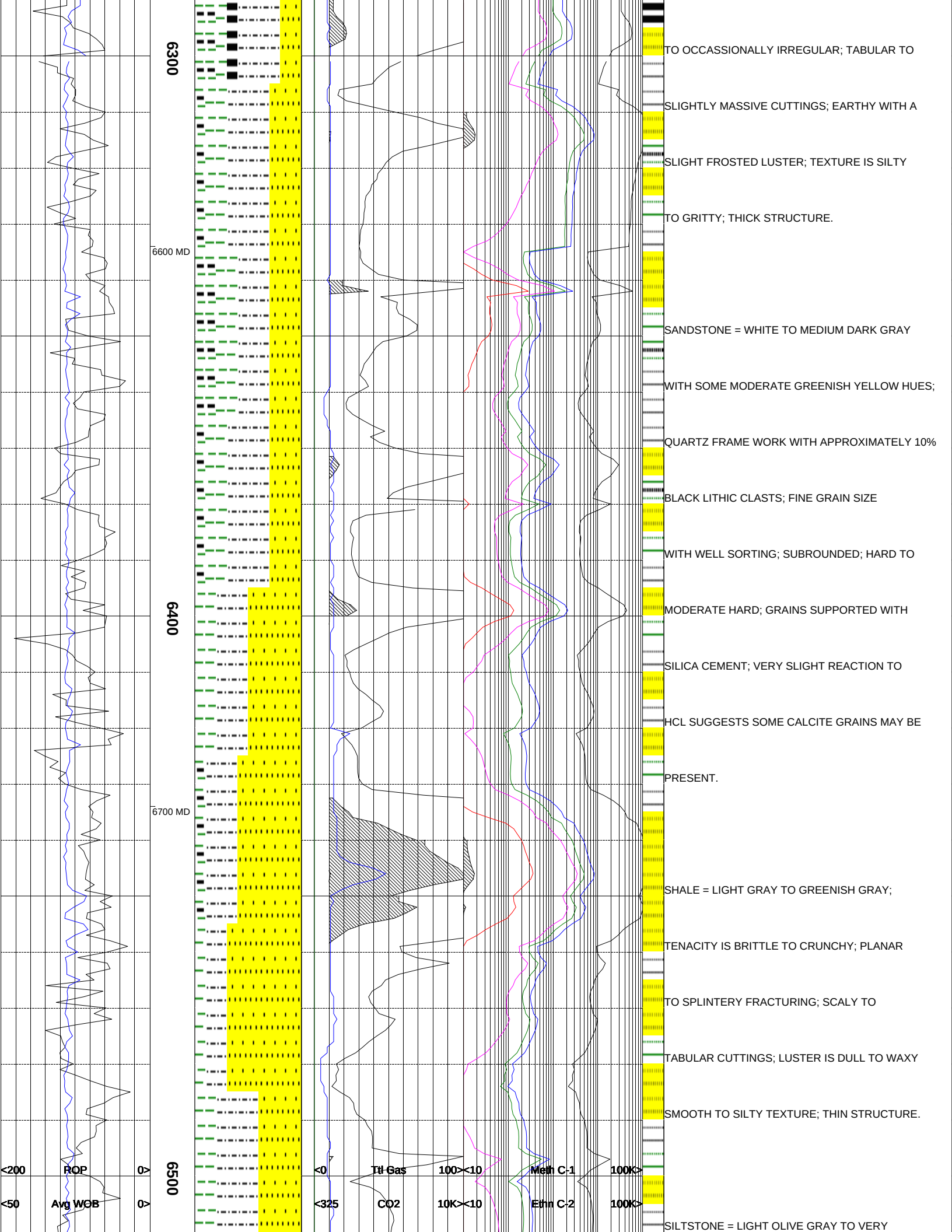
GRAIN SIZE; FAIR TO WELL SORTED; ROUNDED

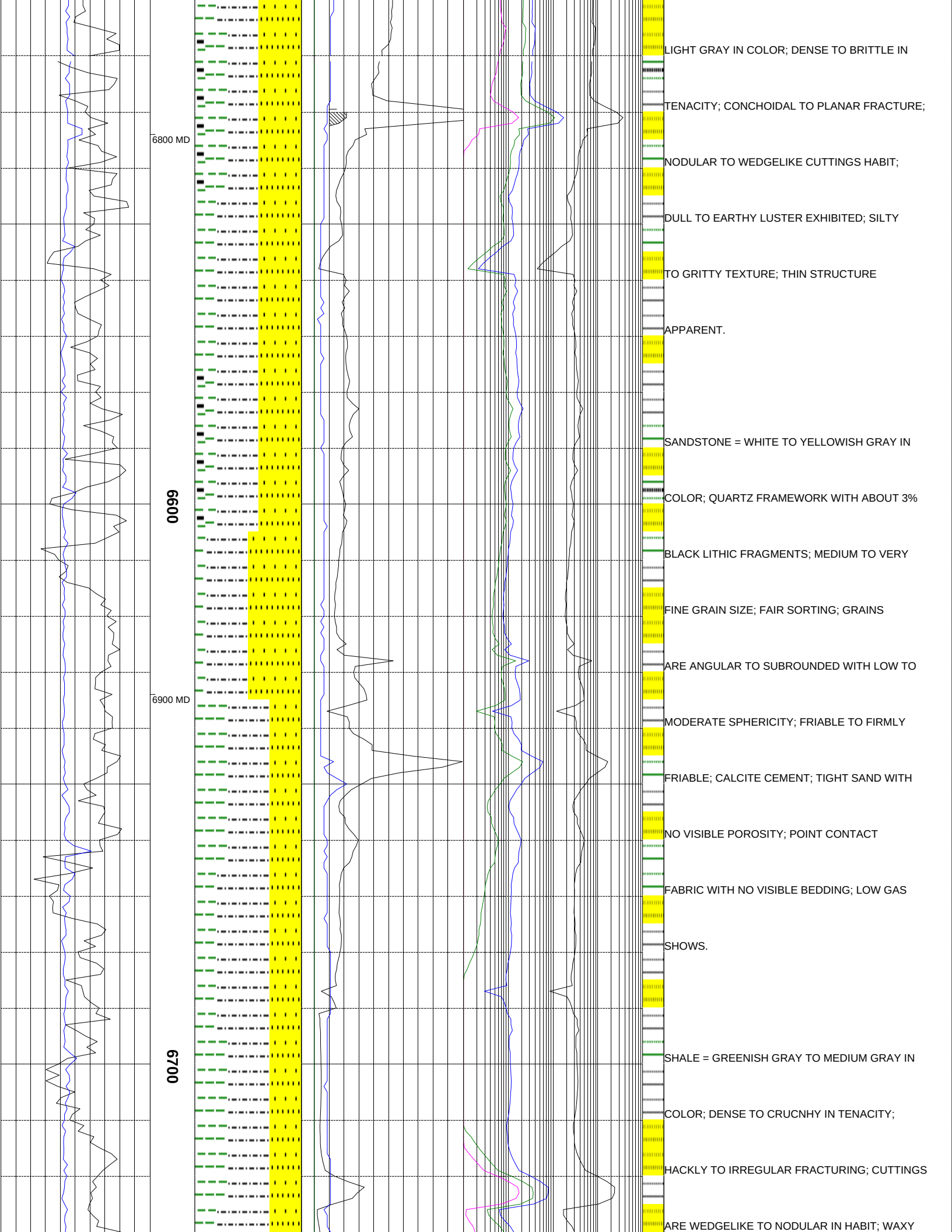
TO SUBROUNDED GRAINS WIT MODERATE TO

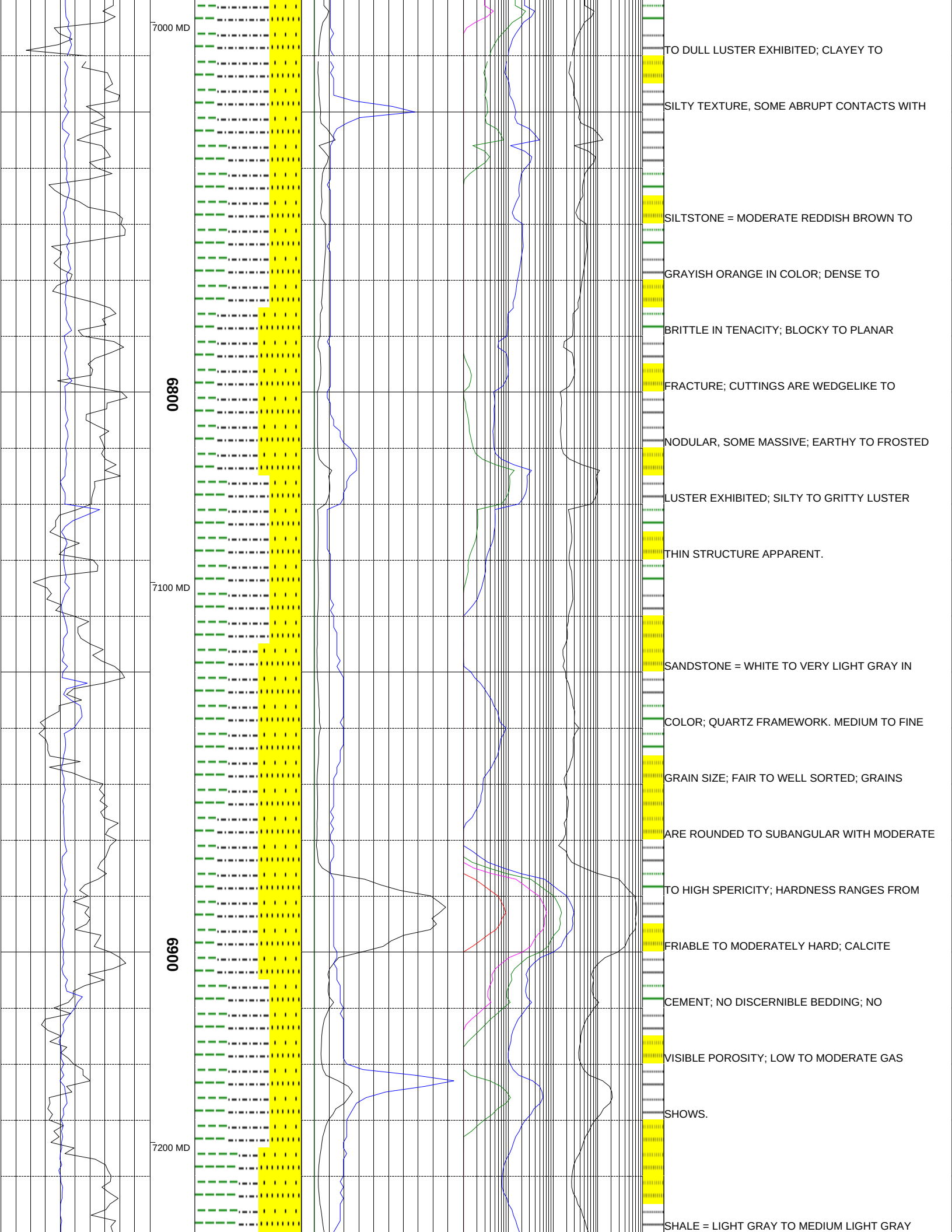

5900 MD
5700
6000 MD
5800
6100 MD
HIGH SPHERICITY; FIRMLY FRIABLE TO HARD;
SILICA CEMENTATION; NO DISCERNIBLE
FABRIC OR BEDDING; CALCITE GRAINS SEEN
IN MATRIX; NO VISIBLE POROSITY; LOW GAS
SHOWS FROM THIS SANDSTONE.
SHALE = LIGHT BLUISH GRAY TO MEDIUM TO
MEDIUM LIGHT GRAY IN COLOR; DENSE TO
CRUMBLY IN TENACITY; SPLINTERY TO PLANAR
FRACTURE; CUTTINGS ARE PLATY TO TABULAR
IN APPEARANCE; WAXY TO DULL LUSTER
EXHIBITED; CLAYEY TO SLIGHTLY SILTY
TEXTURE; THIN STRUCTURE APPARENT.
CARBONACEOUS SHALE = GREENISH BLACK TO
GRAYISH BLACK IN COLOR; BRITTLE TO
PULVERANT IN TENACITY; PLANAR TO MOTTLED
FRACTURE; CUTTINGS ARE WEDGELIKE TO
TABULAR IN HABIT; GREASY TO DULL LUSTER;
SMOOTH TO CLAYEY TEXTURE; THIN TO
LAMINAE STRUCTURE APPARENT.

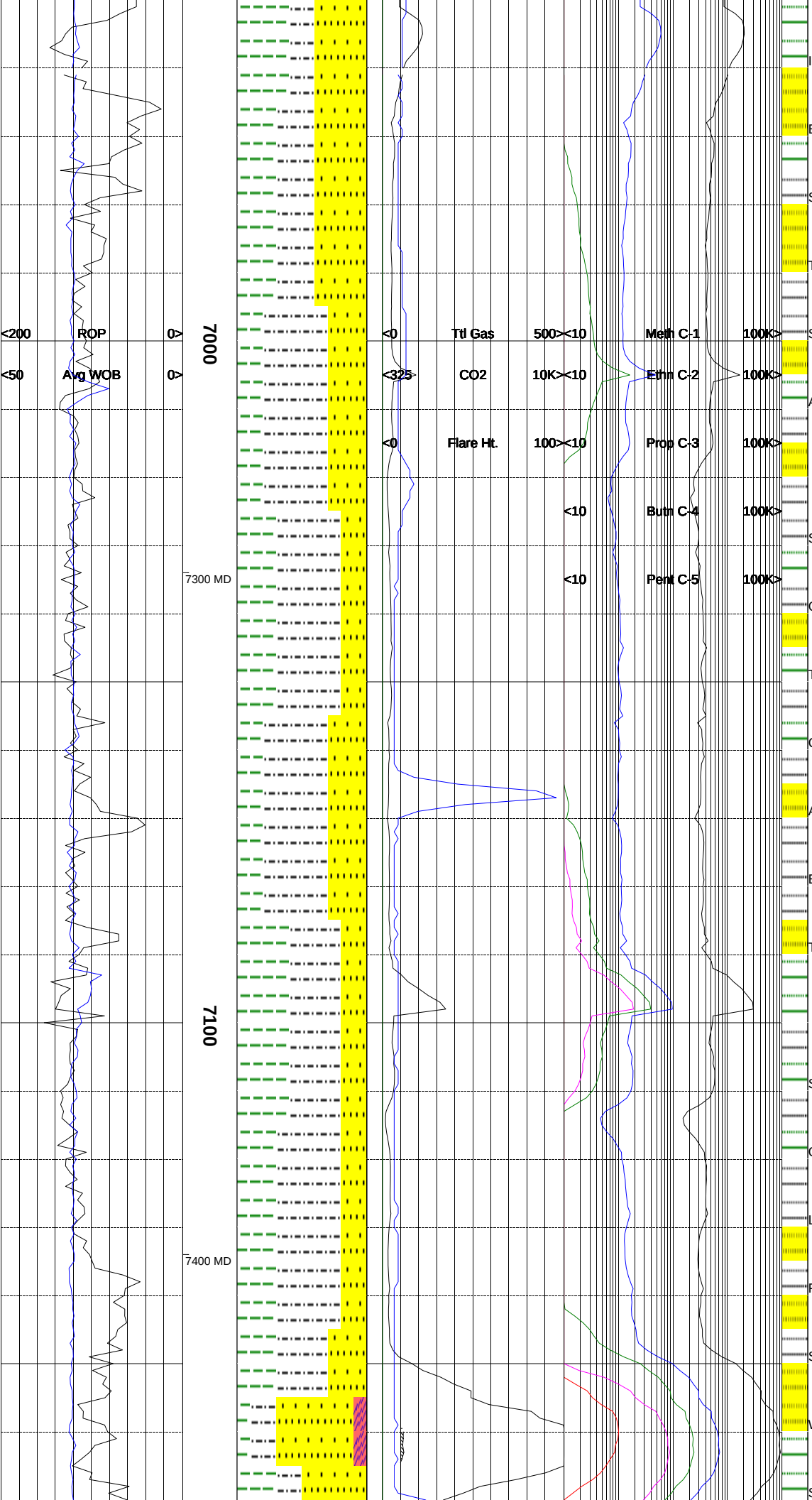

5900
6000
6200 MD
6300 MD
<200 ROP 0>
<50 Avg WOB 0>
<0 Ttl Gas 100><10 Meth C-1 100K>
<325 CO2 10K><10 Etnn C-2 100K>
<0 Flare Ht. 100><10 Prop C-3 100K>
<10 Butn C-4 100K>
<10 Pent C-5 100K>
SILTSTONE = PALE OLIVE TO VERY LIGHT
GRAY IN COLOR; DENSE TO BRITTLE IN
TENACITY; IRREGULAR TO CONCHOIDAL
FRACTURE; CUTTINGS ARE WEDGELIKE TO
NODULAR IN APPEARANCE; DULL TO EARTHY
LUSTER EXHIBITED; SILTY TO GRITTY
TEXTURE; THIN TO THICK STRUCTURE
APPARENT.
COAL = GRAYISH BLACK IN COLOR; BRITTLE
TO PULVERANT IN TENACITY; HACKLY TO
PLANAR FRACTURE; CUTTINGS ARE TABULAR TO
EQUANT IN APPEARANCE; METALLIC LUSTER;
SMOOTH TEXTURE; THICK TO THIN STRUCTURE
APPARENT.
SANDSTONE = WHITE TO LIGHT GRAY WITH
MODERATE YELLOWISH BROWN HUES; MEDIUM TO
FINE SIZED GRAINS WITH FAIR SORTING;
SUBROUNDED WITH MODERATE TO HIGH
SPHERICITY; HARD TO MODERATE HARD; GRAIN
SUPPORTED; QUARTZ FRAMEWORK WITH


6100
6400 MD
6200
6500 MD
APPROXIMATELY 5%-10% BLACK LITHIC CLASTS
SILICA CEMENT; TRACE AMOUNTS OF PYRITE
AND CALCITE AS ACCESSORY MINERALS.
CARBONACEOUS SHALE = DARK GRAY TO BLACK;
DENSE TO BRITTLE TENACITY; BLOCKY TO
SLIGHTLY CONCHOIDAL FRACTURING; NODULAR
TO WEDGELIKE CUTTINGS; EARTHY TO
RESINOUS LUSTER; SILTY TO SMOOTH TEXTURE
THIN TO THICK STRUCTURE.
SHALE = PALE OLIVE TO MEDIUM LIGHT GRAY
TO LIGHT BLUISH GRAY; DENSE TO BRITTLE
TENACITY; FRACTURES FROM PLANAR TO
SPLINTERY; PLATY TO SCALY CUTTINGS; DULL
TO SLIGHTLY WAXY LUSTER; TEXTURE IS
SMOOTH TO SILTY; THIN TO LAMINAE
STRUCTURE.
SILTSTONE = DARK YELLOWISH BROWN TO
BROWNISH BLACK; DENSE TO CRUMBLY
TENACITY; FRACTURES FROM MOSTLY BLOCKY


6300
6600 MD
6400
6700 MD
6500
<200
ROP
0>
<50
Avg WOB
0>
<0
Tot Gas
100><10
Meth C-1
100K>
<325
CO2
10K><10
Ethn C-2
100K>
TO OCCASSIONALLY IRREGULAR; TABULAR TO
SLIGHTLY MASSIVE CUTTINGS; EARTHY WITH A
SLIGHT FROSTED LUSTER; TEXTURE IS SILTY
TO GRITTY; THICK STRUCTURE.
SANDSTONE = WHITE TO MEDIUM DARK GRAY
WITH SOME MODERATE GREENISH YELLOW HUES;
QUARTZ FRAME WORK WITH APPROXIMATELY 10%
BLACK LITHIC CLASTS; FINE GRAIN SIZE
WITH WELL SORTING; SUBROUNDED; HARD TO
MODERATE HARD; GRAINS SUPPORTED WITH
SILICA CEMENT; VERY SLIGHT REACTION TO
HCL SUGGESTS SOME CALCITE GRAINS MAY BE
PRESENT.
SHALE = LIGHT GRAY TO GREENISH GRAY;
TENACITY IS BRITTLE TO CRUNCHY; PLANAR
TO SPLINTERY FRACTURING; SCALY TO
TABULAR CUTTINGS; LUSTER IS DULL TO WAXY
SMOOTH TO SILTY TEXTURE; THIN STRUCTURE.
SILTSTONE = LIGHT OLIVE GRAY TO VERY


6800 MD
6800
6900 MD
6700
LIGHT GRAY IN COLOR; DENSE TO BRITTLE IN
TENACITY; CONCHOIDAL TO PLANAR FRACTURE;
NODULAR TO WEDGELIKE CUTTINGS HABIT;
DULL TO EARTHY LUSTER EXHIBITED; SILTY
TO GRITTY TEXTURE; THIN STRUCTURE
APPARENT.
SANDSTONE = WHITE TO YELLOWISH GRAY IN
COLOR; QUARTZ FRAMEWORK WITH ABOUT 3%
BLACK LITHIC FRAGMENTS; MEDIUM TO VERY
FINE GRAIN SIZE; FAIR SORTING; GRAINS
ARE ANGULAR TO SUBROUNDED WITH LOW TO
MODERATE SPHERICITY; FRIABLE TO FIRMLY
FRIABLE; CALCITE CEMENT; TIGHT SAND WITH
NO VISIBLE POROSITY; POINT CONTACT
FABRIC WITH NO VISIBLE BEDDING; LOW GAS
SHOWS.
SHALE = GREENISH GRAY TO MEDIUM GRAY IN
COLOR; DENSE TO CRUCNHY IN TENACITY;
HACKLY TO IRREGULAR FRACTURING; CUTTINGS
ARE WEDGELIKE TO NODULAR IN HABIT; WAXY


7000 MD
6800
7100 MD
6900
7200 MD
TO DULL LUSTER EXHIBITED; CLAYEY TO
SILTY TEXTURE, SOME ABRUPT CONTACTS WITH
SILTSTONE = MODERATE REDDISH BROWN TO
GRAYISH ORANGE IN COLOR; DENSE TO
BRITTLE IN TENACITY; BLOCKY TO PLANAR
FRACTURE; CUTTINGS ARE WEDGELIKE TO
NODULAR, SOME MASSIVE; EARTHY TO FROSTED
LUSTER EXHIBITED; SILTY TO GRITTY LUSTER
THIN STRUCTURE APPARENT.
SANDSTONE = WHITE TO VERY LIGHT GRAY IN
COLOR; QUARTZ FRAMEWORK. MEDIUM TO FINE
GRAIN SIZE; FAIR TO WELL SORTED; GRAINS
ARE ROUNDED TO SUBANGULAR WITH MODERATE
TO HIGH SPERICITY; HARDNESS RANGES FROM
FRIABLE TO MODERATELY HARD; CALCITE
CEMENT; NO DISCERNIBLE BEDDING; NO
VISIBLE POROSITY; LOW TO MODERATE GAS
SHOWS.
SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY



IN COLOR; BRITTLE TO CRUMBLY IN TENACITY

BLOCKY TO PLANAR FRACTURE; CUTTINGS ARE

SCALY TO ELONGATED IN APPEARANCE; WAXY

TO DULL LUSTER EXHIBITED; CLAYEY TO

SLIGHTLY SILTY TEXTURE; THIN STRUCTURE

APPARENT.

SILTSTONE = LIGHT BROWNISH GRAY TO LIGHT

GRAY IN COLOR; DENSE TO CRUMBLY IN

TENACITY; IRREGULAR TO BLOCKY FRACTURE;

CUTTINGS ARE NODULAR TO WEDGELIKE IN

APPEARANCE; EARTHY TO FROSTED LUSTER

EXHIBITED; SILTY TO GRITTY IN TEXTURE;

THICK STRUCTURE APPARENT.

SANDSTONE = LIGHT GRAY TO WHITE IN COLOR

QUARTZ FRAMEWORK WITH 3 - 5% BLACK

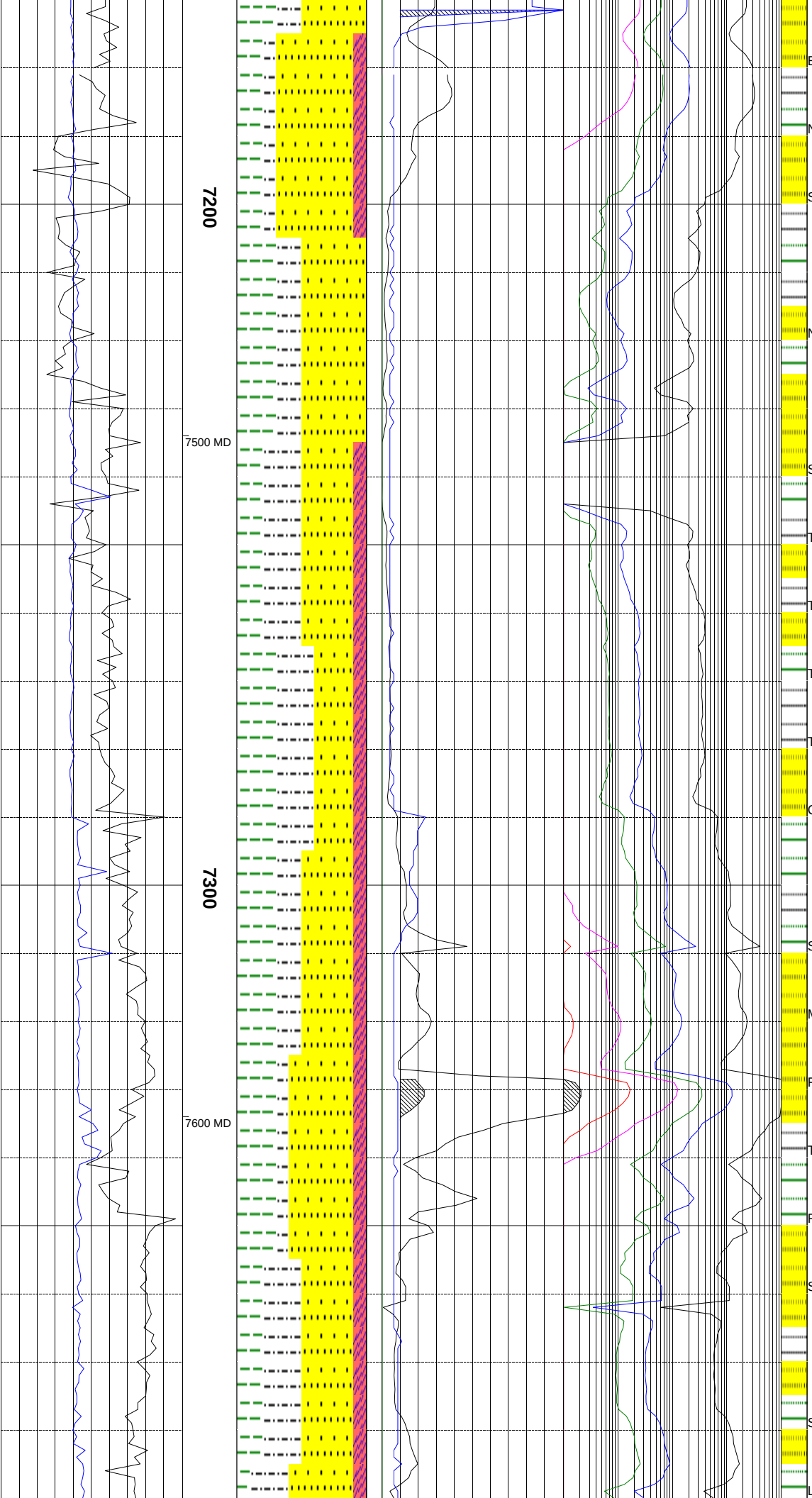
LITHIC FRAGMENTS GIVING A SALT AND

PEPPER APPEARANCE; MEDIUM TO FINE GRAIN

SIZE WITH SOME COARSE GRAINS; FAIR TO

WELL SORTED; GRAINS ARE SUBANGULAR TO

SUBROUNDED WITH MODERATE SPHERICITY;



EASILY TO FIRMLY FRIABLE; CALCITE CEMENT

NO VISIBLE POROSITY; MODERATE TO LOW GAS

SHOWS.

NOTE = LOST RETURNS @ 7500'.

SHALE = PALE BLUE TO MEDIUM GRAY;

TENACITY IS BRITTLE TO CRUMBLY; PLANAR

TO SLIGHTLY BLOCKY FRACTURING; SCALY TO

TABULAR CUTTINGS; DULL WO WAXY LUSTER;

TEXTURE IS SMOOTH TO SILTY TO SLIGHTLY

CLAYEY; THIN STRUCTURE.

SILTSTONE = LIGHT BROWNISH GRAY TO

MEDIUM GRAY; DENSE TO BRITTLE TENACITY;

FRACTURES FROM BLOCKY TO IRREGULAR;

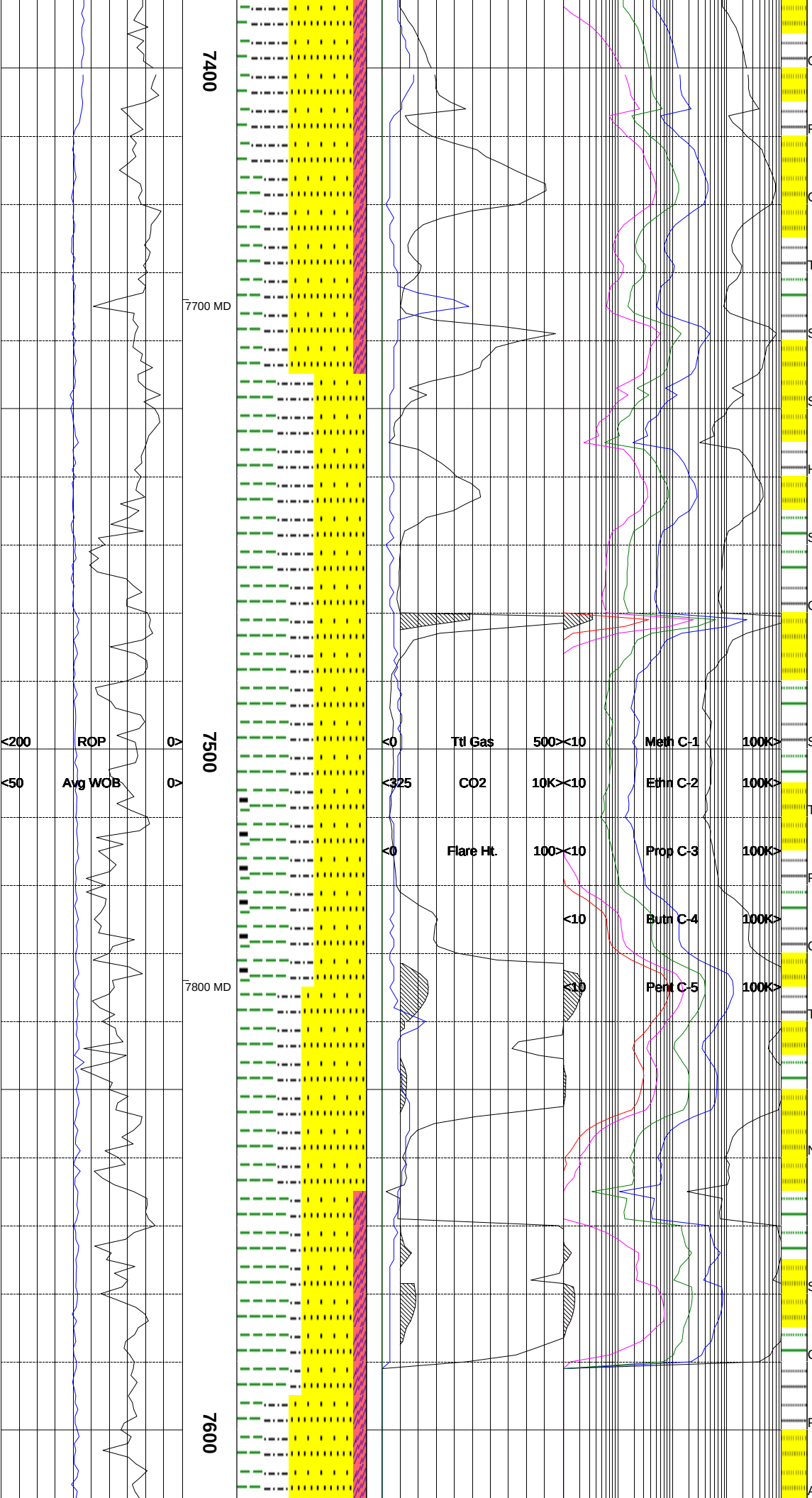
TABULAR TO WEDGELIKE CUTTINGS; LUSTER

RANGES FROM EARTHY TO DULL; TEXTURE IS

SILTY TO GRITTY; THIN STRUCTURE.

SANDSTONE = TRANSLUCENT TO WHITE TO

LIGHT GRAY; QUARTZ FRAMEWORK WITH SOME



CRYSTAL CLEAR SILICA WICH INDICATES

FRACTURING AND ABOUT 10% BLACK LITHIC

CLASTS; FINE TO MEDIUM SIZED WITH FAIR

TO WELL SORTING; SUBROUNDED TO

SUBANGULAR WITH MODERATE TO LOW

SPHERICITY; FIRMLY FRIABLE TO MODERATE

HARDNESS WITH SOME LOOSE GRAINS;

STRONG REACTION WITH HCL SUGGESTS

CALCITE CEMENT; PYRITE AS ACCESSORY.

SHALE = LIGHT GRAY TO PALE BLUE; BRITTLE

TO CRUNCHY TENACITY; FRACTURES FROM

PLANAR TO IREGULAR; SCALY TO TABULAR

CUTTINGS; DULL LUSTER; SMOOTH TEXTURE;

THIN STRUCTURE.

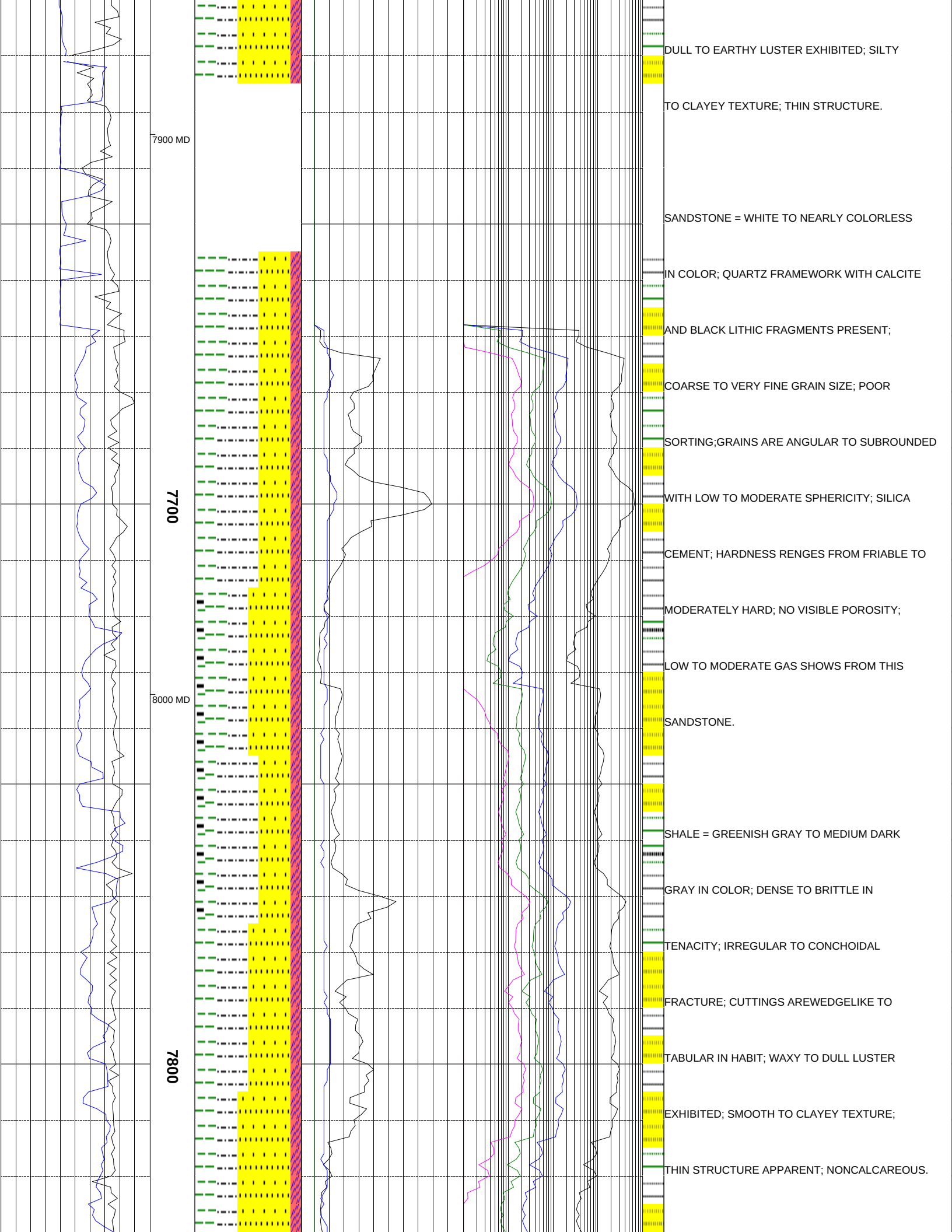
NOTE = LOST COMPLETE RETURNS @ 7856'.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY IN

COLOR; TOUGH TO DENSE IN TENACITY;

PLANAR TO IRREGULAR FRACTURE; CUTTINGS

ARE NODULAR TO WEDGELIKE IN APPEARANCE;



DULL TO EARTHY LUSTER EXHIBITED; SILTY

TO CLAYEY TEXTURE; THIN STRUCTURE.

SANDSTONE = WHITE TO NEARLY COLORLESS

IN COLOR; QUARTZ FRAMEWORK WITH CALCITE

AND BLACK LITHIC FRAGMENTS PRESENT;

COARSE TO VERY FINE GRAIN SIZE; POOR

SORTING;GRAINS ARE ANGULAR TO SUBROUNDED

WITH LOW TO MODERATE SPHERICITY; SILICA

CEMENT; HARDNESS RENGES FROM FRIABLE TO

MODERATELY HARD; NO VISIBLE POROSITY;

LOW TO MODERATE GAS SHOWS FROM THIS

SANDSTONE.

SHALE = GREENISH GRAY TO MEDIUM DARK

GRAY IN COLOR; DENSE TO BRITTLE IN

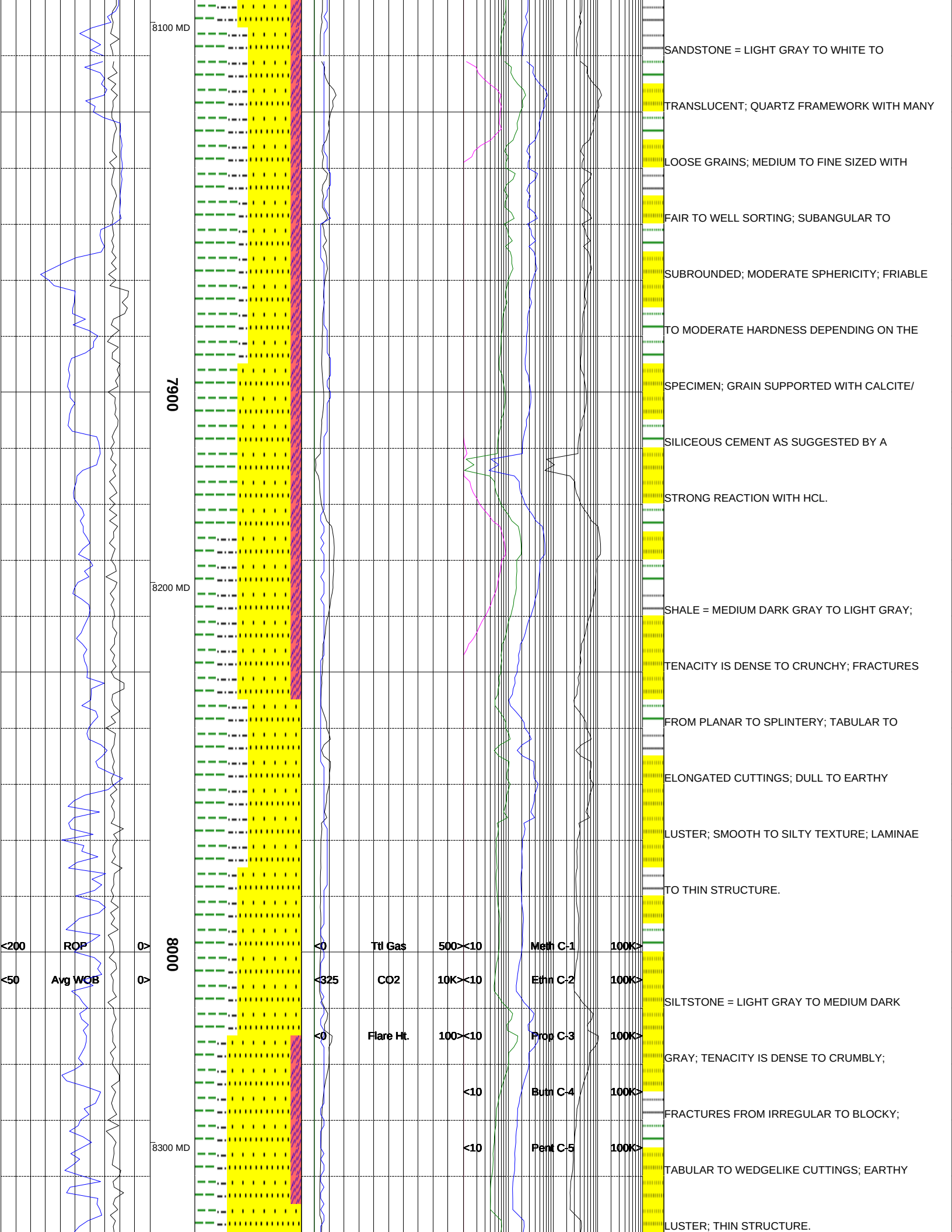
TENACITY; IRREGULAR TO CONCHOIDAL

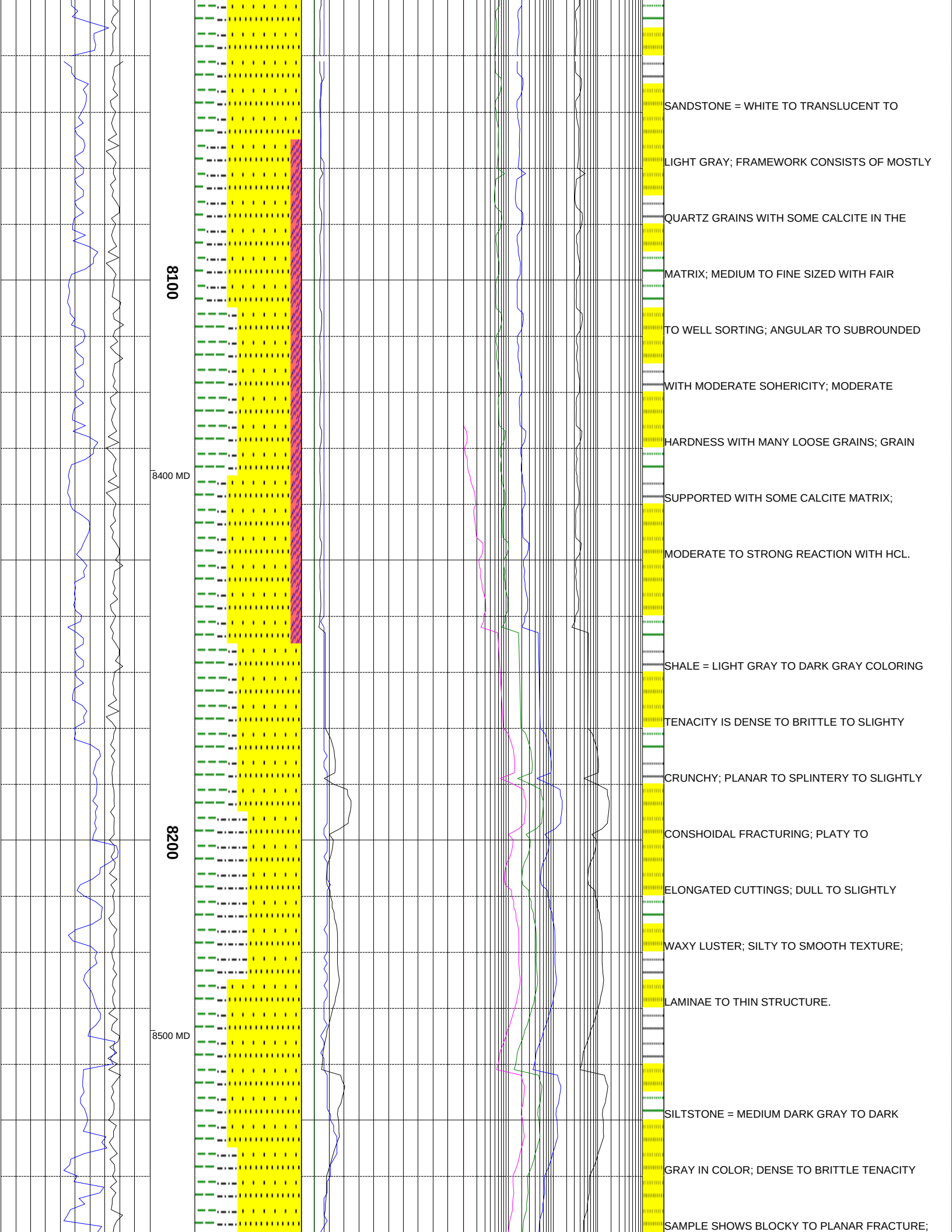
FRACTURE; CUTTINGS AREWEDGELIKE TO

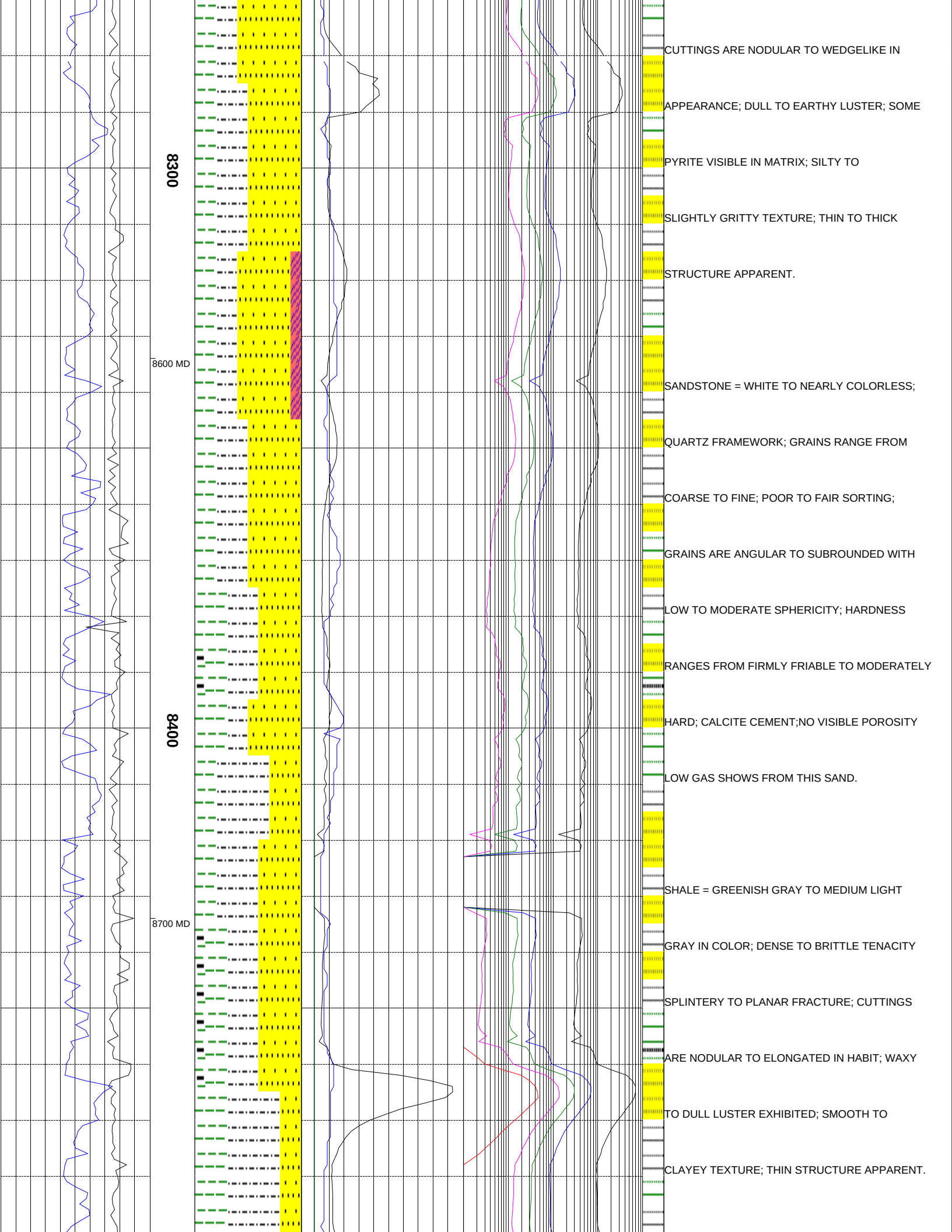
TABULAR IN HABIT; WAXY TO DULL LUSTER

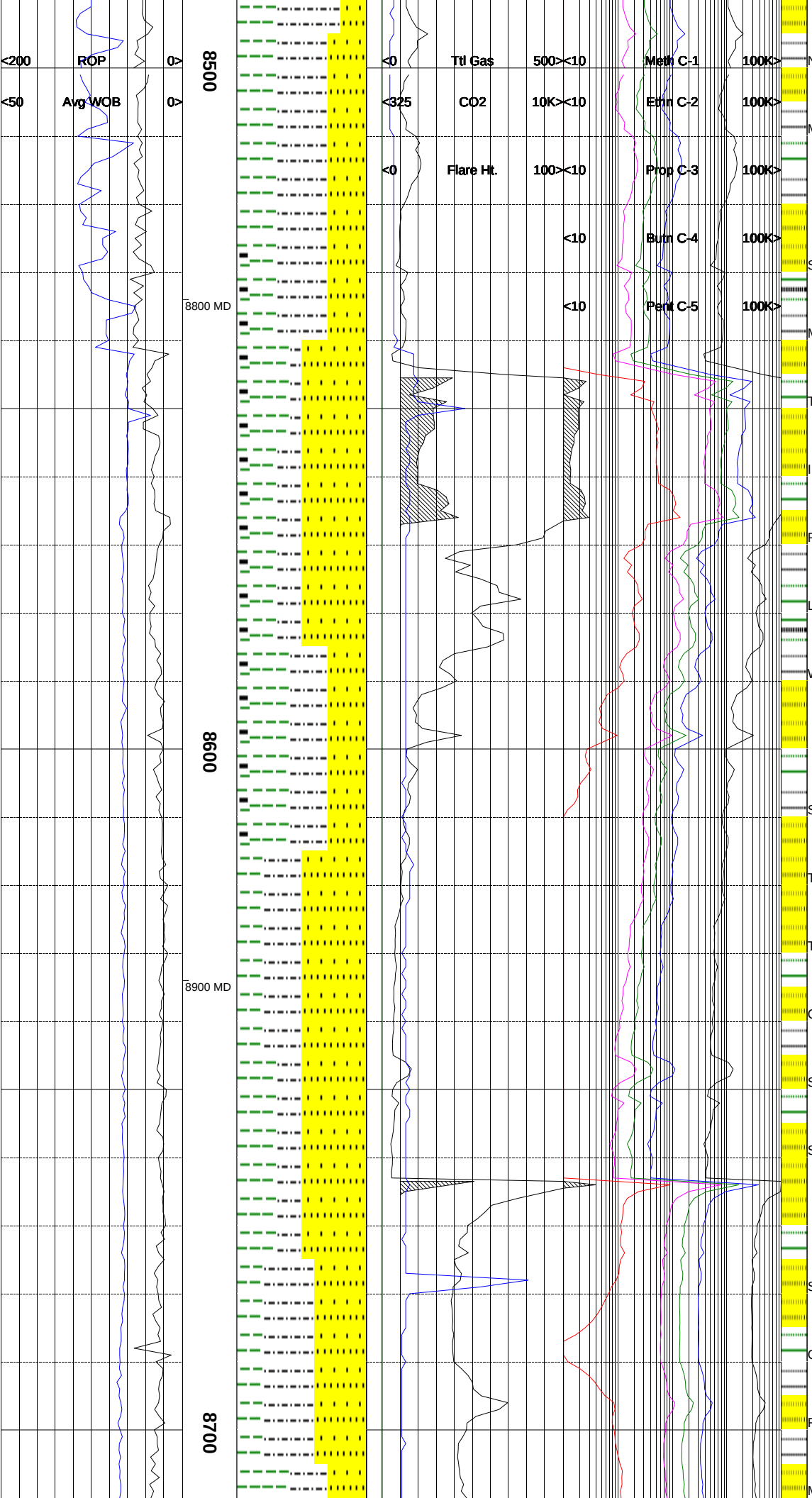
EXHIBITED; SMOOTH TO CLAYEY TEXTURE;

THIN STRUCTURE APPARENT; NONCALCAREOUS.


8100 MD
7900
8200 MD
8000
8300 MD
<200
ROP
0>
<50
Avg WOB
0>
<0
Ttl Gas
500><10
Meth C-1
100K>
<325
CO2
10K><10
Etnn C-2
100K>
<0
Flare Ht.
100><10
Prop C-3
100K>
<10
Butn C-4
100K>
<10
Pent C-5
100K>
SANDSTONE = LIGHT GRAY TO WHITE TO
TRANSLUCENT; QUARTZ FRAMEWORK WITH MANY
LOOSE GRAINS; MEDIUM TO FINE SIZED WITH
FAIR TO WELL SORTING; SUBANGULAR TO
SUBROUNDED; MODERATE SPHERICITY; FRIABLE
TO MODERATE HARDNESS DEPENDING ON THE
SPECIMEN; GRAIN SUPPORTED WITH CALCITE/
SILICEOUS CEMENT AS SUGGESTED BY A
STRONG REACTION WITH HCL.
SHALE = MEDIUM DARK GRAY TO LIGHT GRAY;
TENACITY IS DENSE TO CRUNCHY; FRACTURES
FROM PLANAR TO SPLINTERY; TABULAR TO
ELONGATED CUTTINGS; DULL TO EARTHY
LUSTER; SMOOTH TO SILTY TEXTURE; LAMINAE
TO THIN STRUCTURE.
SILTSTONE = LIGHT GRAY TO MEDIUM DARK
GRAY; TENACITY IS DENSE TO CRUMBLY;
FRACTURES FROM IRREGULAR TO BLOCKY;
TABULAR TO WEDGELIKE CUTTINGS; EARTHY
LUSTER; THIN STRUCTURE.


8100
8400 MD
8200
8500 MD
SANDSTONE = WHITE TO TRANSLUCENT TO
LIGHT GRAY; FRAMEWORK CONSISTS OF MOSTLY
QUARTZ GRAINS WITH SOME CALCITE IN THE
MATRIX; MEDIUM TO FINE SIZED WITH FAIR
TO WELL SORTING; ANGULAR TO SUBROUNDED
WITH MODERATE SOHERICITY; MODERATE
HARDNESS WITH MANY LOOSE GRAINS; GRAIN
SUPPORTED WITH SOME CALCITE MATRIX;
MODERATE TO STRONG REACTION WITH HCL.
SHALE = LIGHT GRAY TO DARK GRAY COLORING
TENACITY IS DENSE TO BRITTLE TO SLIGHTY
CRUNCHY; PLANAR TO SPLINTERY TO SLIGHTLY
CONSHOIDAL FRACTURING; PLATY TO
ELONGATED CUTTINGS; DULL TO SLIGHTLY
WAXY LUSTER; SILTY TO SMOOTH TEXTURE;
LAMINAE TO THIN STRUCTURE.
SILTSTONE = MEDIUM DARK GRAY TO DARK
GRAY IN COLOR; DENSE TO BRITTLE TENACITY
SAMPLE SHOWS BLOCKY TO PLANAR FRACTURE;


8300
8600 MD
8400
8700 MD
CUTTINGS ARE NODULAR TO WEDGELIKE IN
APPEARANCE; DULL TO EARTHY LUSTER; SOME
PYRITE VISIBLE IN MATRIX; SILTY TO
SLIGHTLY GRITTY TEXTURE; THIN TO THICK
STRUCTURE APPARENT.
SANDSTONE = WHITE TO NEARLY COLORLESS;
QUARTZ FRAMEWORK; GRAINS RANGE FROM
COARSE TO FINE; POOR TO FAIR SORTING;
GRAINS ARE ANGULAR TO SUBROUNDED WITH
LOW TO MODERATE SPHERICITY; HARDNESS
RANGES FROM FIRMLY FRIABLE TO MODERATELY
HARD; CALCITE CEMENT;NO VISIBLE POROSITY
LOW GAS SHOWS FROM THIS SAND.
SHALE = GREENISH GRAY TO MEDIUM LIGHT
GRAY IN COLOR; DENSE TO BRITTLE TENACITY
SPLINTERY TO PLANAR FRACTURE; CUTTINGS
ARE NODULAR TO ELONGATED IN HABIT; WAXY
TO DULL LUSTER EXHIBITED; SMOOTH TO
CLAYEY TEXTURE; THIN STRUCTURE APPARENT.



NOTE = INTERMEDIATE TD REACHED AT 8806'

MD ON 10/9/2009 AT 11:55 AM.

SANDSTONE = WHITE TO TRANSLUCENT TO

MEDIUM LIGHT GRAY; QUARTZ FRAMEWORK WITH

TRACE AMOUNTS OF CARBONACEOUS SHALE

IMBEDDED; FINE TO COARSE GRAINED WITH

POOR SORTING; ANGULAR TO SUBANGULAR WITH

LOW SPHERICITY; FIRMLY FRAIBLE; CALCITE

WITH GRAIN SUPPORT.

SHALE = MEDIUM DARK GRAY TO LIGHT GRAY;

TENACITY IS BRITTLE TO CRUNCHY; PLANAR

TO SPLINTERY FRACTURING; PLATY TO SCALY

CUTTINGS; LUSTER IS DULL TO EARTHY;

SMOOTH TEXTURE; LAMINAE TO THIN

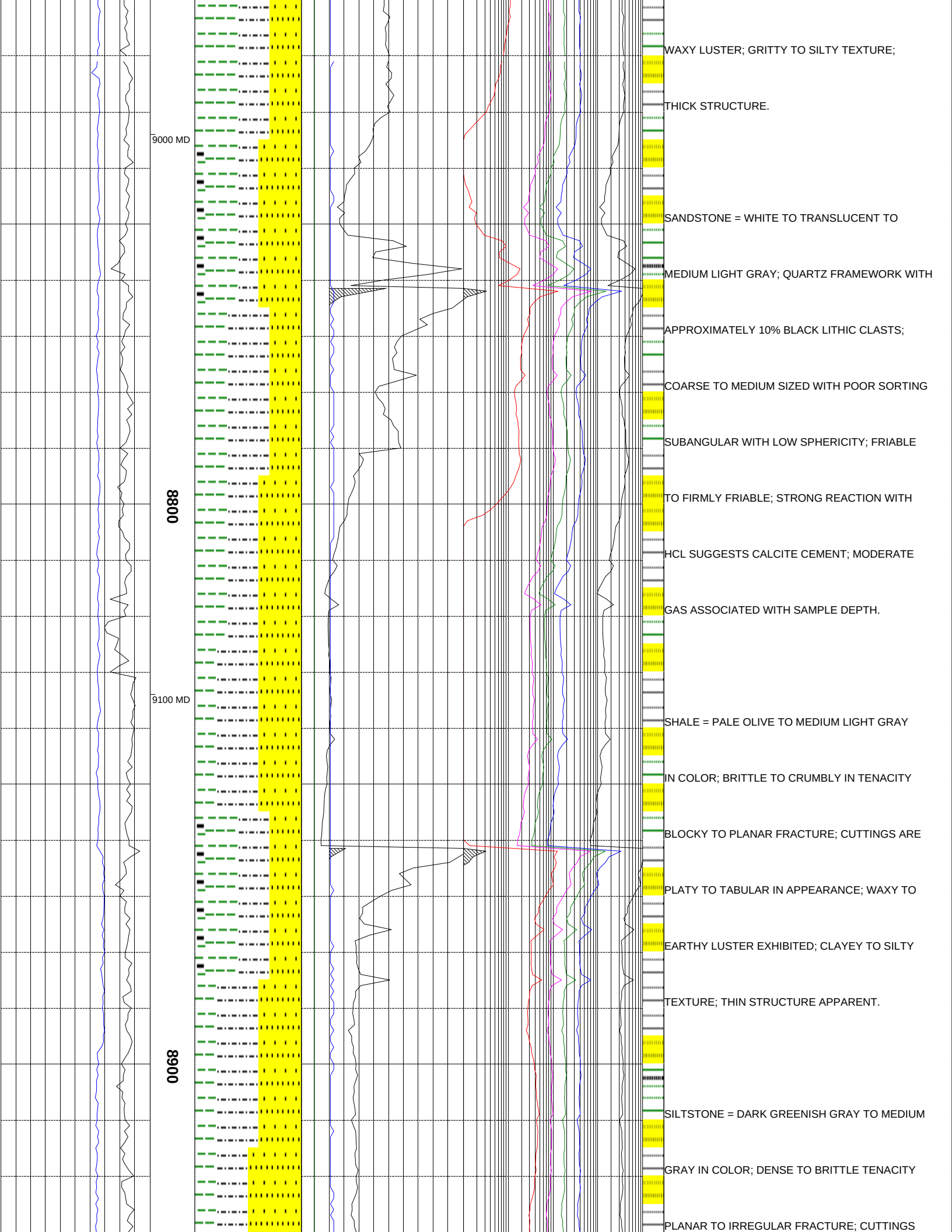
STRUCTURE.

SILTSTONE = BROWNISH GRAY TO MEDIUM DARK

GRAY; TOUGH TO DENSE TENACITY; FRACTURES

FROM IRREGULAR TO BLOCKY; CUTTINGS ARE

MASSIVE TO TABULAR; LUSTER IS EARTHY TO



WAXY LUSTER; GRITTY TO SILTY TEXTURE;

THICK STRUCTURE.

SANDSTONE = WHITE TO TRANSLUCENT TO

MEDIUM LIGHT GRAY; QUARTZ FRAMEWORK WITH

APPROXIMATELY 10% BLACK LITHIC CLASTS;

COARSE TO MEDIUM SIZED WITH POOR SORTING

SUBANGULAR WITH LOW SPHERICITY; FRIABLE

TO FIRMLY FRIABLE; STRONG REACTION WITH

HCL SUGGESTS CALCITE CEMENT; MODERATE

GAS ASSOCIATED WITH SAMPLE DEPTH.

SHALE = PALE OLIVE TO MEDIUM LIGHT GRAY

IN COLOR; BRITTLE TO CRUMBLY IN TENACITY

BLOCKY TO PLANAR FRACTURE; CUTTINGS ARE

PLATY TO TABULAR IN APPEARANCE; WAXY TO

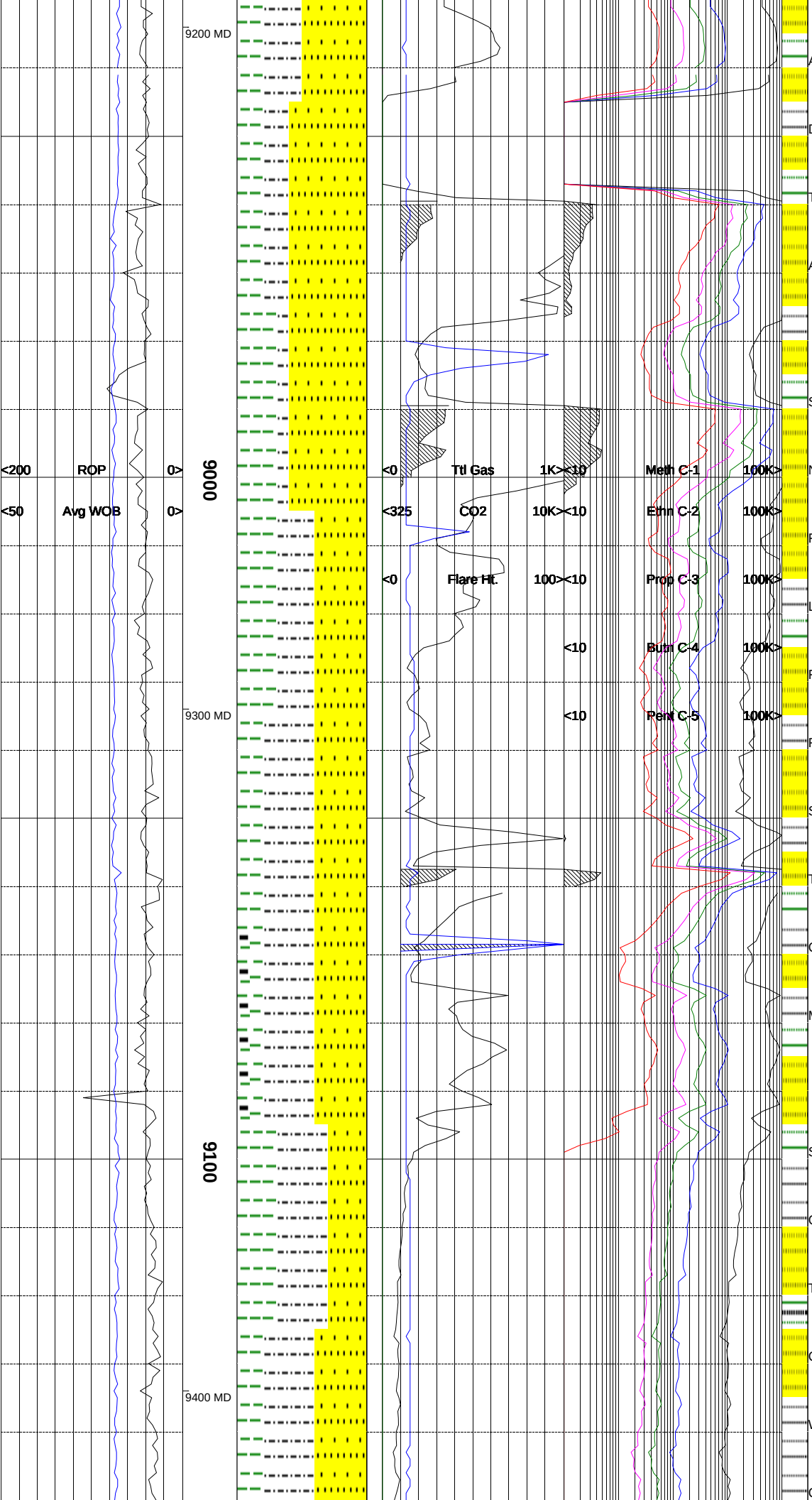
EARTHY LUSTER EXHIBITED; CLAYEY TO SILTY

TEXTURE; THIN STRUCTURE APPARENT.

SILTSTONE = DARK GREENISH GRAY TO MEDIUM

GRAY IN COLOR; DENSE TO BRITTLE TENACITY

PLANAR TO IRREGULAR FRACTURE; CUTTINGS



ARE FLAKY TO WEDGELIKE IN APPEARANCE;

DULL TO EARTHY LUSTER EXHIBITED; SILTY

TO GRITTY TEXTURE; THIN STRUCTURE

APPARENT; NO DISCERNIBLE ACCESSORIES.

SANDSTONE = BLUISH WHITE TO WHITE TO

NEARLY TRANSLUCENT IN COLOR; QUARTZ

FRAMEWORK WITH APPROXIMATELY 5% BLACK

LITHIC FRAGMENTS; GRAINS ARE COARSE TO

FINE IN SIZE; FAIR SORTING; GRAINS ARE

ROUNDED TO SUBANGULAR WITH MODERATE

SPHERICITY; HARDNESS RANGES FROM FRIABLE

TO MODRATELY HARD; SILICA CEMENT; SOME

CALCITE GRAINS VISIBLE IN THE SAMPLE;

MODERATE TO HIGH GAS SHOWS IN THIS SAND.

SHALE = MEDIUM LIGHT GRAY TO MEDIUM DARK

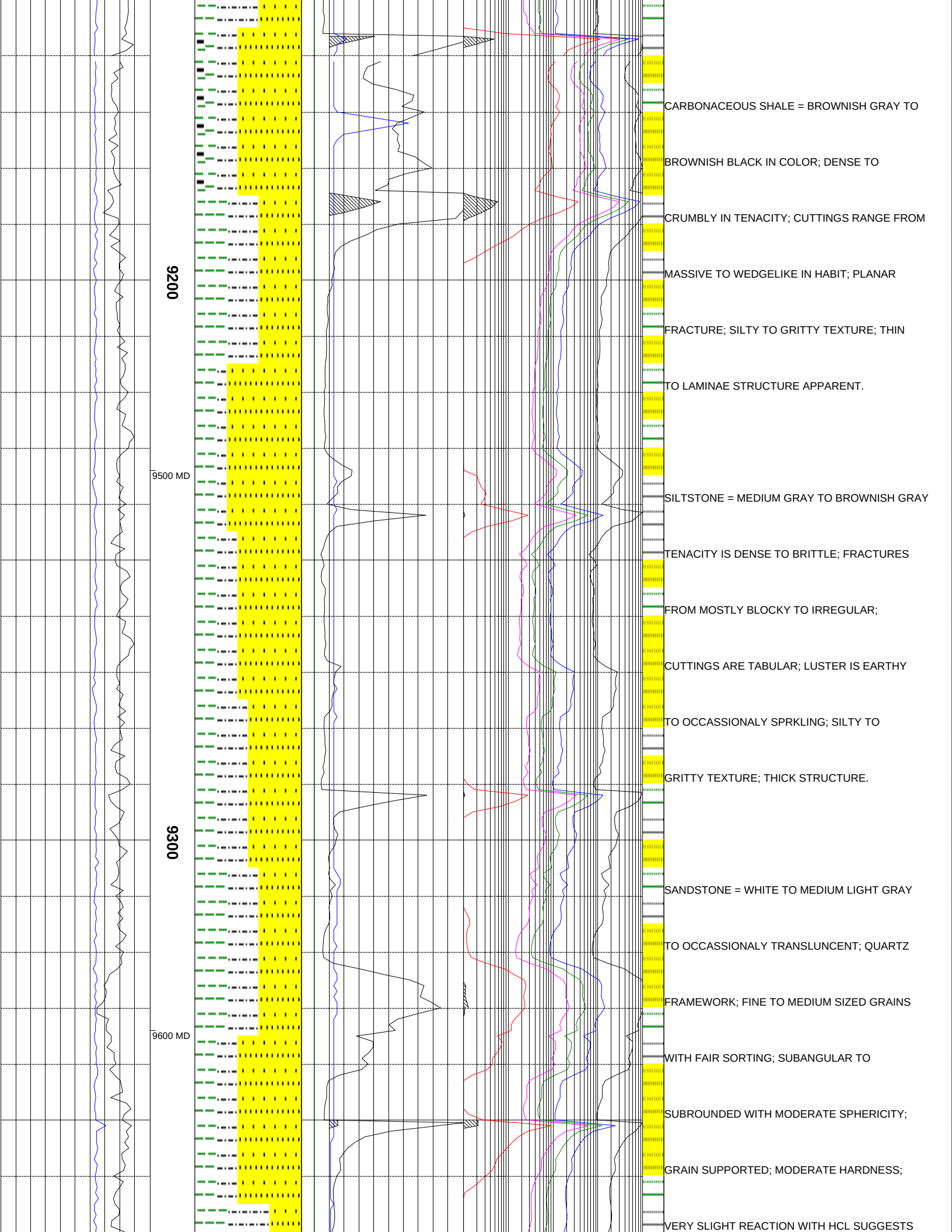
GRAY IN COLOR; BRITTLE TO CRUMBLY IN

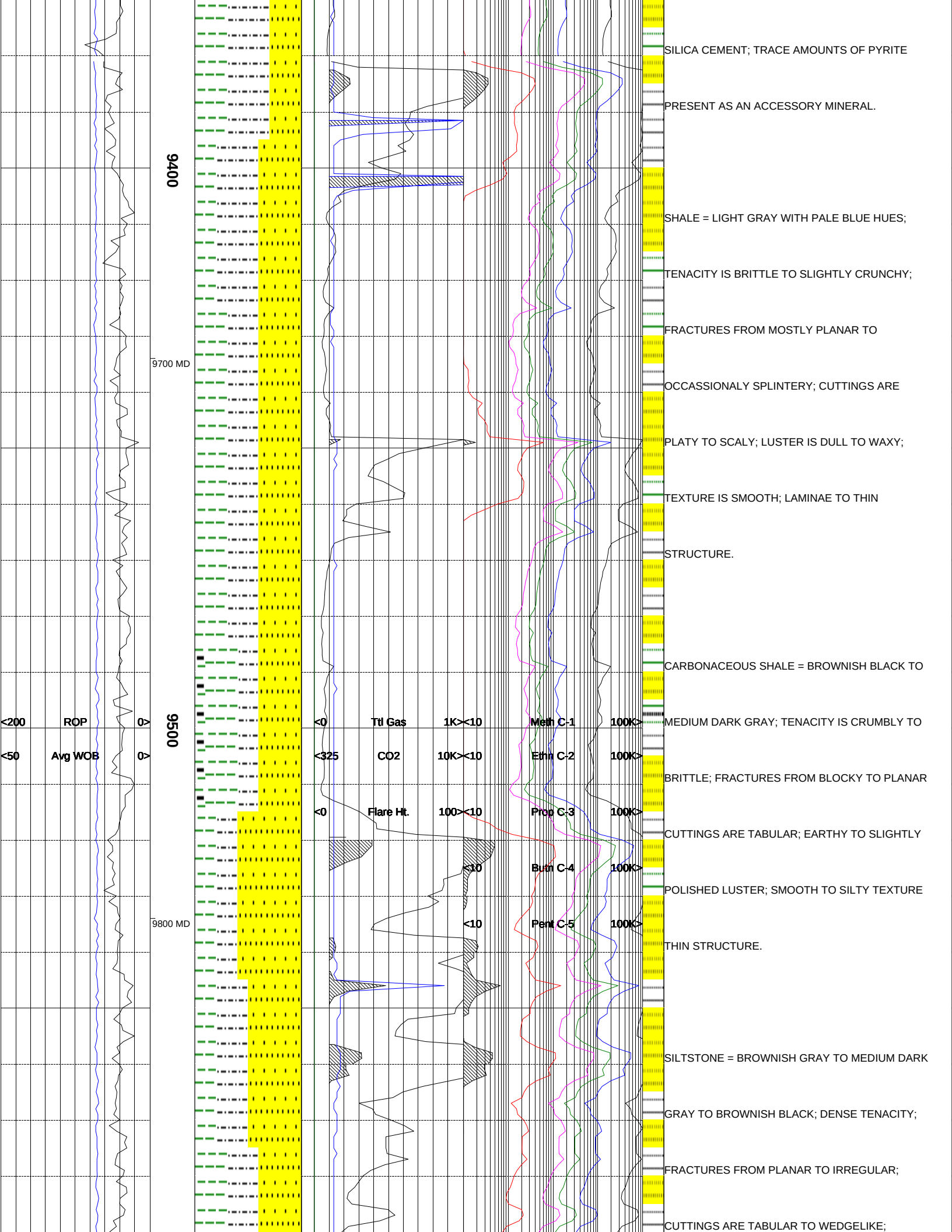
TENACITY; IRREGULAR TO PLANAR FRACTURE;

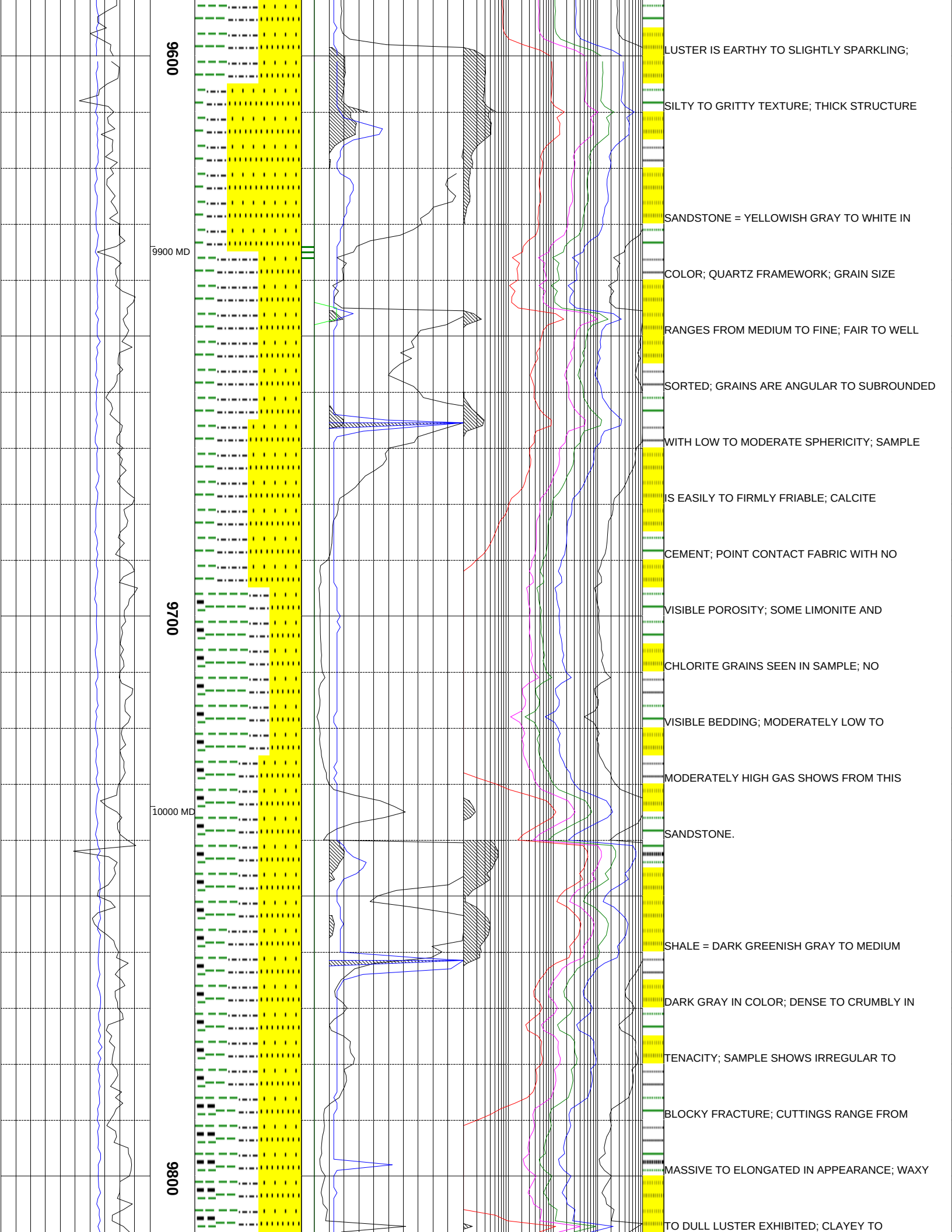
CUTTINGS ARE FLAKY TO TABULAR IN HABIT;

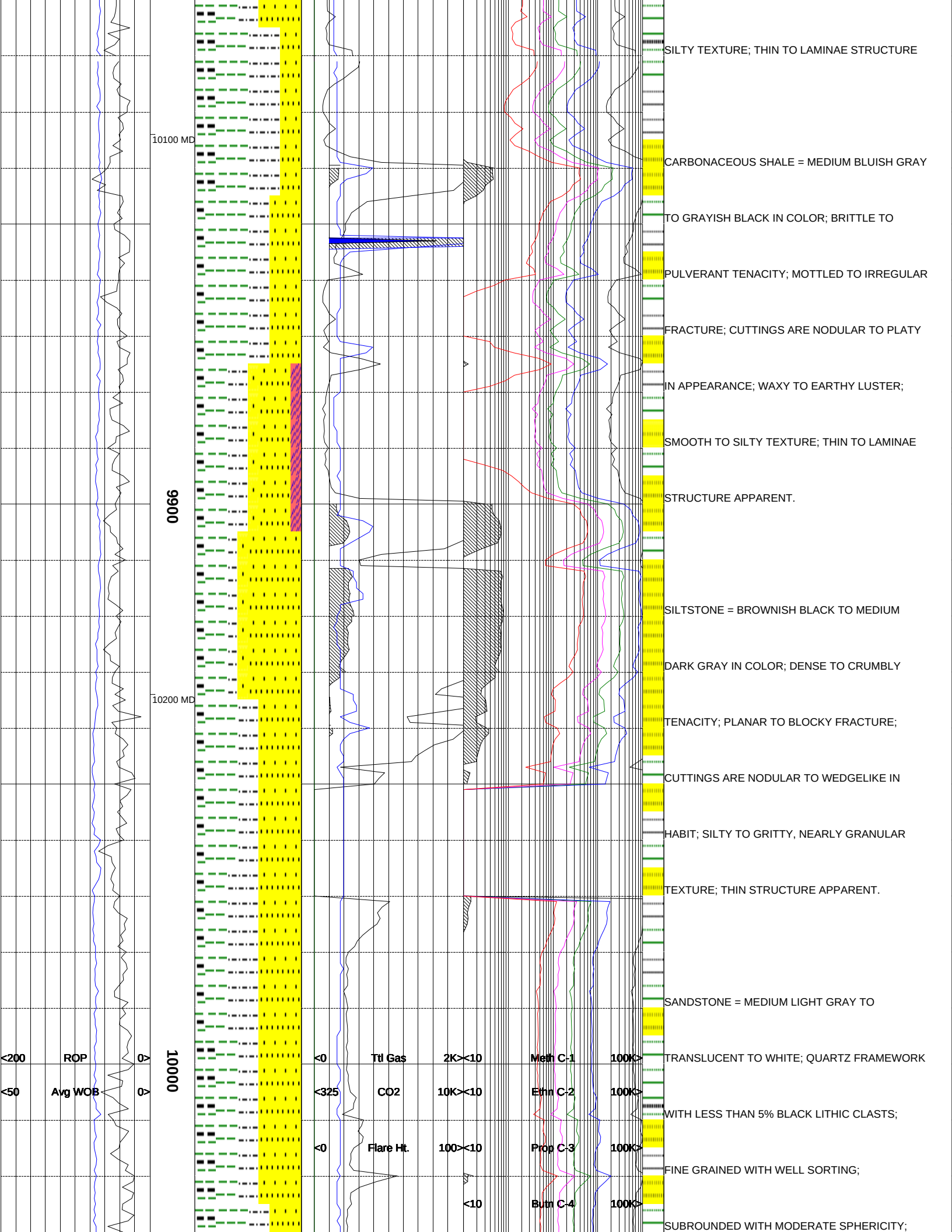
WAXY TO DULL LUSTER EXHIBITED; SMOOTH TO

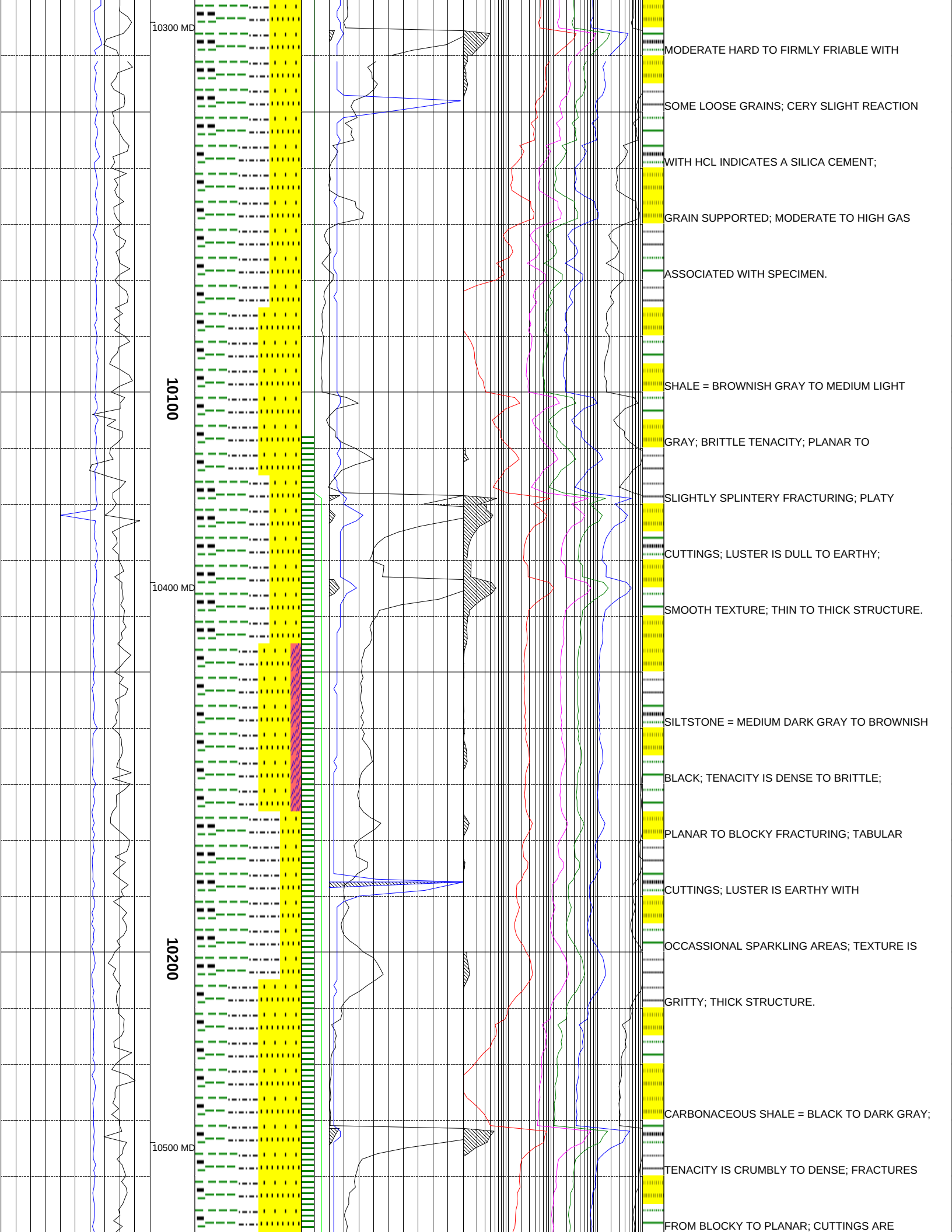
CLAYEY TEXTURE; THIN STRUCTURE APPARENT.

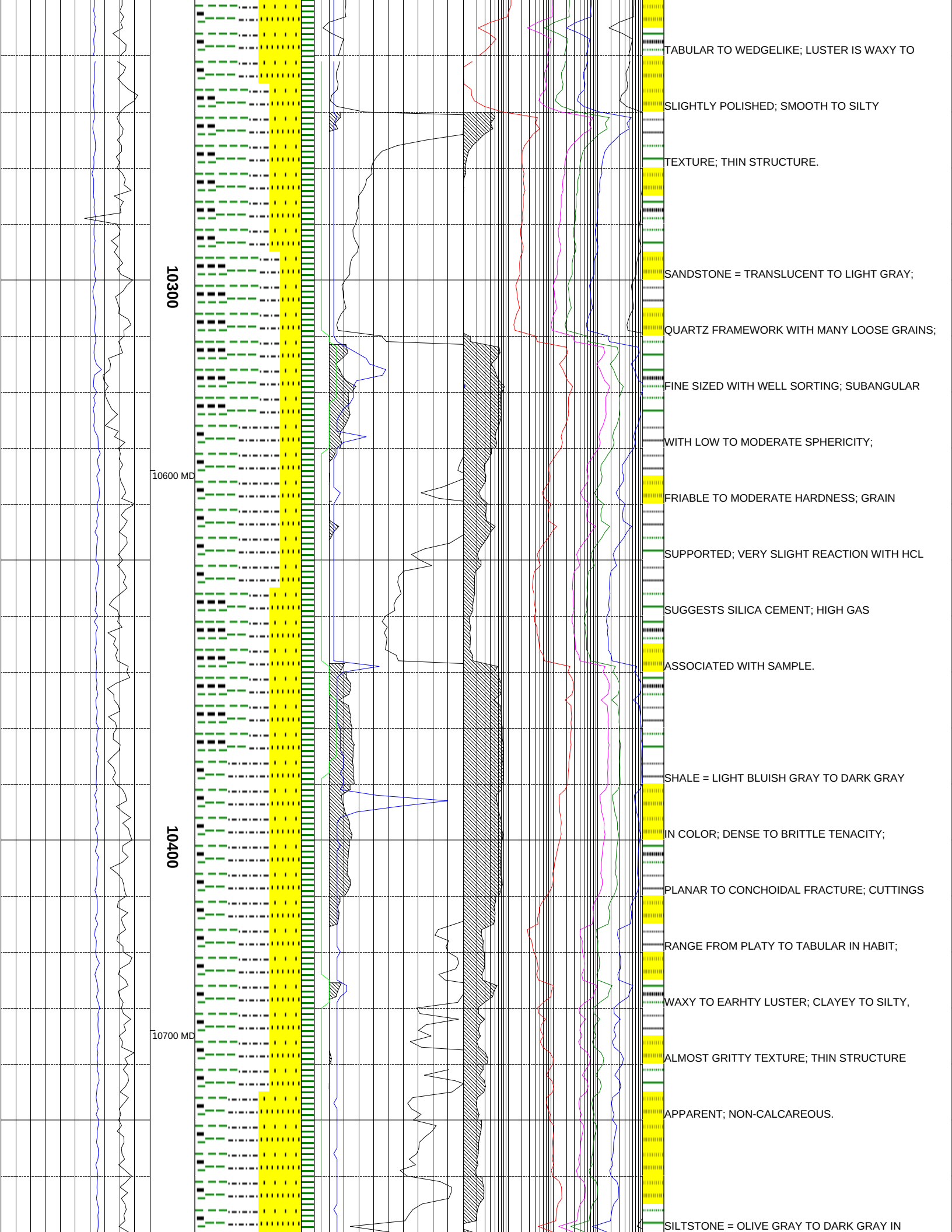

9200
9500 MD
9300
9600 MD
CARBONACEOUS SHALE = BROWNISH GRAY TO
BROWNISH BLACK IN COLOR; DENSE TO
CRUMBLY IN TENACITY; CUTTINGS RANGE FROM
MASSIVE TO WEDGELIKE IN HABIT; PLANAR
FRACTURE; SILTY TO GRITTY TEXTURE; THIN
TO LAMINAE STRUCTURE APPARENT.
SILTSTONE = MEDIUM GRAY TO BROWNISH GRAY
TENACITY IS DENSE TO BRITTLE; FRACTURES
FROM MOSTLY BLOCKY TO IRREGULAR;
CUTTINGS ARE TABULAR; LUSTER IS EARTHY
TO OCCASSIONALY SPRKLING; SILTY TO
GRITTY TEXTURE; THICK STRUCTURE.
SANDSTONE = WHITE TO MEDIUM LIGHT GRAY
TO OCCASSIONALY TRANSLUNCENT; QUARTZ
FRAMEWORK; FINE TO MEDIUM SIZED GRAINS
WITH FAIR SORTING; SUBANGULAR TO
SUBROUNDED WITH MODERATE SPHERICITY;
GRAIN SUPPORTED; MODERATE HARDNESS;
VERY SLIGHT REACTION WITH HCL SUGGESTS


9400
9700 MD
9500
9800 MD
<200 ROP 0>
<50 Avg WOB 0>
<0 Ttl Gas 1K><10
<325 CO2 10K><10
<0 Flare Ht. 100><10
<10
<10
Meth C-1 100K>
Eth C-2 100K>
Prop C-3 100K>
Bum C-4 100K>
Pent C-5 100K>
SILICA CEMENT; TRACE AMOUNTS OF PYRITE
PRESENT AS AN ACCESSORY MINERAL.
SHALE = LIGHT GRAY WITH PALE BLUE HUES;
TENACITY IS BRITTLE TO SLIGHTLY CRUNCHY;
FRACTURES FROM MOSTLY PLANAR TO
OCCASSIONALY SPLINTERY; CUTTINGS ARE
PLATY TO SCALY; LUSTER IS DULL TO WAXY;
TEXTURE IS SMOOTH; LAMINAE TO THIN
STRUCTURE.
CARBONACEOUS SHALE = BROWNISH BLACK TO
MEDIUM DARK GRAY; TENACITY IS CRUMBLY TO
BRITTLE; FRACTURES FROM BLOCKY TO PLANAR
CUTTINGS ARE TABULAR; EARTHY TO SLIGHTLY
POLISHED LUSTER; SMOOTH TO SILTY TEXTURE
THIN STRUCTURE.
SILTSTONE = BROWNISH GRAY TO MEDIUM DARK
GRAY TO BROWNISH BLACK; DENSE TENACITY;
FRACTURES FROM PLANAR TO IRREGULAR;
CUTTINGS ARE TABULAR TO WEDGELIKE;


9600
9900 MD
9700
10000 MD
9800
LUSTER IS EARTHY TO SLIGHTLY SPARKLING;
SILTY TO GRITTY TEXTURE; THICK STRUCTURE
SANDSTONE = YELLOWISH GRAY TO WHITE IN
COLOR; QUARTZ FRAMEWORK; GRAIN SIZE
RANGES FROM MEDIUM TO FINE; FAIR TO WELL
SORTED; GRAINS ARE ANGULAR TO SUBROUNDED
WITH LOW TO MODERATE SPHERICITY; SAMPLE
IS EASILY TO FIRMLY FRIABLE; CALCITE
CEMENT; POINT CONTACT FABRIC WITH NO
VISIBLE POROSITY; SOME LIMONITE AND
CHLORITE GRAINS SEEN IN SAMPLE; NO
VISIBLE BEDDING; MODERATELY LOW TO
MODERATELY HIGH GAS SHOWS FROM THIS
SANDSTONE.
SHALE = DARK GREENISH GRAY TO MEDIUM
DARK GRAY IN COLOR; DENSE TO CRUMBLY IN
TENACITY; SAMPLE SHOWS IRREGULAR TO
BLOCKY FRACTURE; CUTTINGS RANGE FROM
MASSIVE TO ELONGATED IN APPEARANCE; WAXY
TO DULL LUSTER EXHIBITED; CLAYEY TO


10100 MD
9900
10200 MD
10000
<200 ROP 0>
<50 Avg WOB 0>
<0 Ttl Gas 2K><10 Meth C-1 100K>
<325 CO2 10K><10 Ethn C-2 100K>
<0 Flare Ht. 100><10 Prop C-3 100K>
<10 Butn C-4 100K>
SILTY TEXTURE; THIN TO LAMINAE STRUCTURE
CARBONACEOUS SHALE = MEDIUM BLUISH GRAY
TO GRAYISH BLACK IN COLOR; BRITTLE TO
PULVERANT TENACITY; MOTTLED TO IRREGULAR
FRACTURE; CUTTINGS ARE NODULAR TO PLATY
IN APPEARANCE; WAXY TO EARTHY LUSTER;
SMOOTH TO SILTY TEXTURE; THIN TO LAMINAE
STRUCTURE APPARENT.
SILTSTONE = BROWNISH BLACK TO MEDIUM
DARK GRAY IN COLOR; DENSE TO CRUMBLY
TENACITY; PLANAR TO BLOCKY FRACTURE;
CUTTINGS ARE NODULAR TO WEDGELIKE IN
HABIT; SILTY TO GRITTY, NEARLY GRANULAR
TEXTURE; THIN STRUCTURE APPARENT.
SANDSTONE = MEDIUM LIGHT GRAY TO
TRANSLUCENT TO WHITE; QUARTZ FRAMEWORK
WITH LESS THAN 5% BLACK LITHIC CLASTS;
FINE GRAINED WITH WELL SORTING;
SUBROUNDED WITH MODERATE SPHERICITY;


10300 MD
MODERATE HARD TO FIRMLY FRIABLE WITH
SOME LOOSE GRAINS; CERY SLIGHT REACTION
WITH HCL INDICATES A SILICA CEMENT;
GRAIN SUPPORTED; MODERATE TO HIGH GAS
ASSOCIATED WITH SPECIMEN.
10100
SHALE = BROWNISH GRAY TO MEDIUM LIGHT
GRAY; BRITTLE TENACITY; PLANAR TO
SLIGHTLY SPLINTERY FRACTURING; PLATY
CUTTINGS; LUSTER IS DULL TO EARTHY;
10400 MD
SMOOTH TEXTURE; THIN TO THICK STRUCTURE.
SILTSTONE = MEDIUM DARK GRAY TO BROWNISH
BLACK; TENACITY IS DENSE TO BRITTLE;
PLANAR TO BLOCKY FRACTURING; TABULAR
CUTTINGS; LUSTER IS EARTHY WITH
10200
OCCASSIONAL SPARKLING AREAS; TEXTURE IS
GRITTY; THICK STRUCTURE.
CARBONACEOUS SHALE = BLACK TO DARK GRAY;
10500 MD
TENACITY IS CRUMBLY TO DENSE; FRACTURES
FROM BLOCKY TO PLANAR; CUTTINGS ARE



TABULAR TO WEDGELIKE; LUSTER IS WAXY TO

SLIGHTLY POLISHED; SMOOTH TO SILTY

TEXTURE; THIN STRUCTURE.

SANDSTONE = TRANSLUCENT TO LIGHT GRAY;

QUARTZ FRAMEWORK WITH MANY LOOSE GRAINS;

FINE SIZED WITH WELL SORTING; SUBANGULAR

WITH LOW TO MODERATE SPHERICITY;

FRIABLE TO MODERATE HARDNESS; GRAIN

SUPPORTED; VERY SLIGHT REACTION WITH HCL

SUGGESTS SILICA CEMENT; HIGH GAS

ASSOCIATED WITH SAMPLE.

SHALE = LIGHT BLUISH GRAY TO DARK GRAY

IN COLOR; DENSE TO BRITTLE TENACITY;

PLANAR TO CONCHOIDAL FRACTURE; CUTTINGS

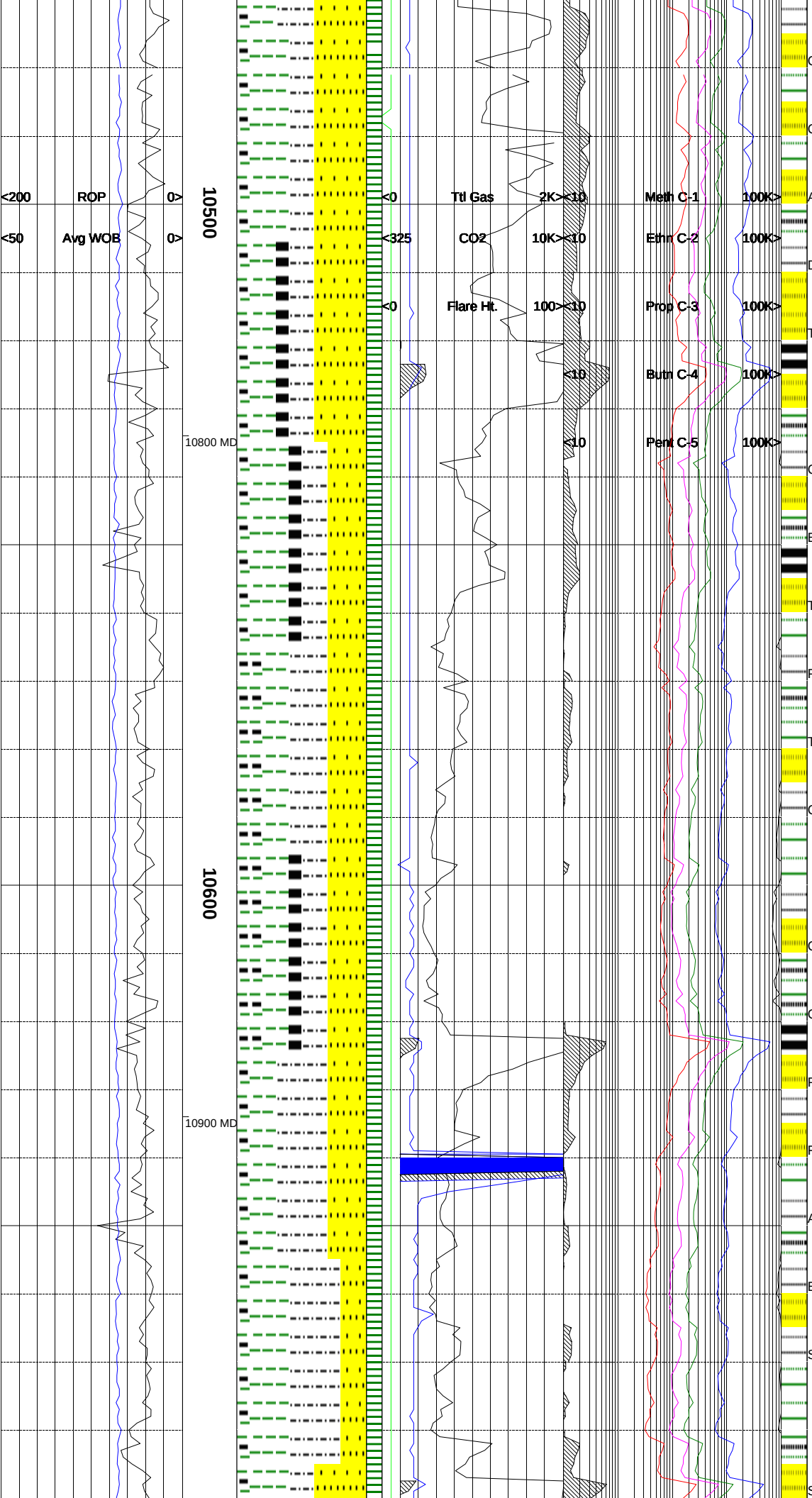
RANGE FROM PLATY TO TABULAR IN HABIT;

WAXY TO EARHTY LUSTER; CLAYEY TO SILTY,

ALMOST GRITTY TEXTURE; THIN STRUCTURE

APPARENT; NON-CALCAREOUS.

SILTSTONE = OLIVE GRAY TO DARK GRAY IN



COLOR; TOUGH TO BRITTLE IN TENACITY;

CONCHOIDAL TO BLOCKY FRACTURE; CUTTINGS

ARE NODULAR TO WEDGELIKE IN APPEARANCE;

DULL TO EARTHY LUSTER EXHIBITED; SILTY

TO GRITTY TEXTURE; THIN STRUCTURE.

COAL = GRAYISH BLACK TO BLACK IN COLOR;

BRITTLE TO CRUNCHY IN TENACITY; HACKLY

TO IRREGULAR FRACTURE; CUTTINGS ARE

PLATY TO FLAKY IN APPEARANCE; METALLIC

TO GREASY LUSTER EXHIBITED; SMOOTH TO

CLAYEY TEXTURE; THIN STRUCTURE APPARENT.

CARBONACEOUS SHALE = BROWNISH BLACK TO

GRAYISH BLACK IN COLOR; BRITTLE TO

PULVERANT IN TENACITY; PLANAR TO BLOCKY

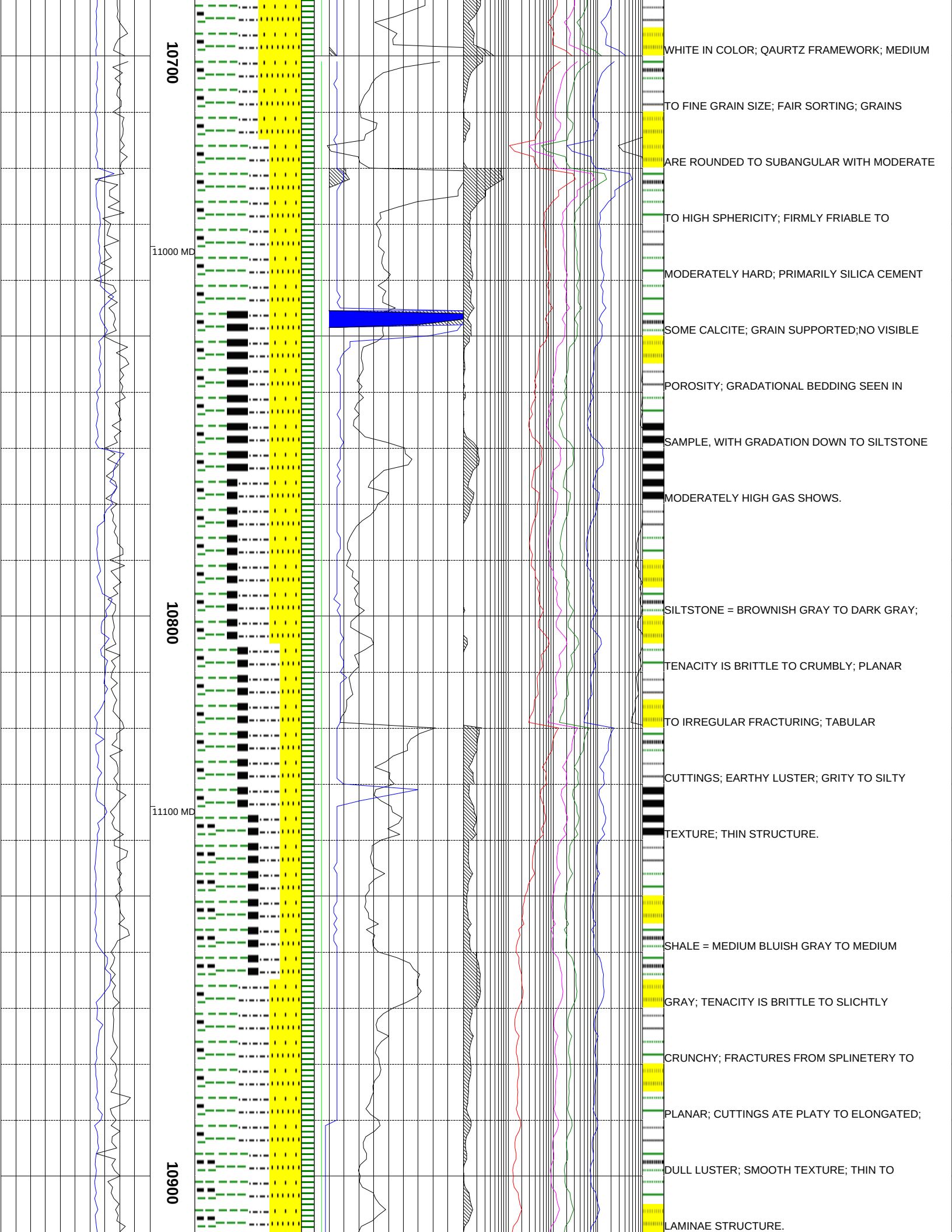
FRACTURE; CUTTINGS ARE PLATY TO SCALY IN

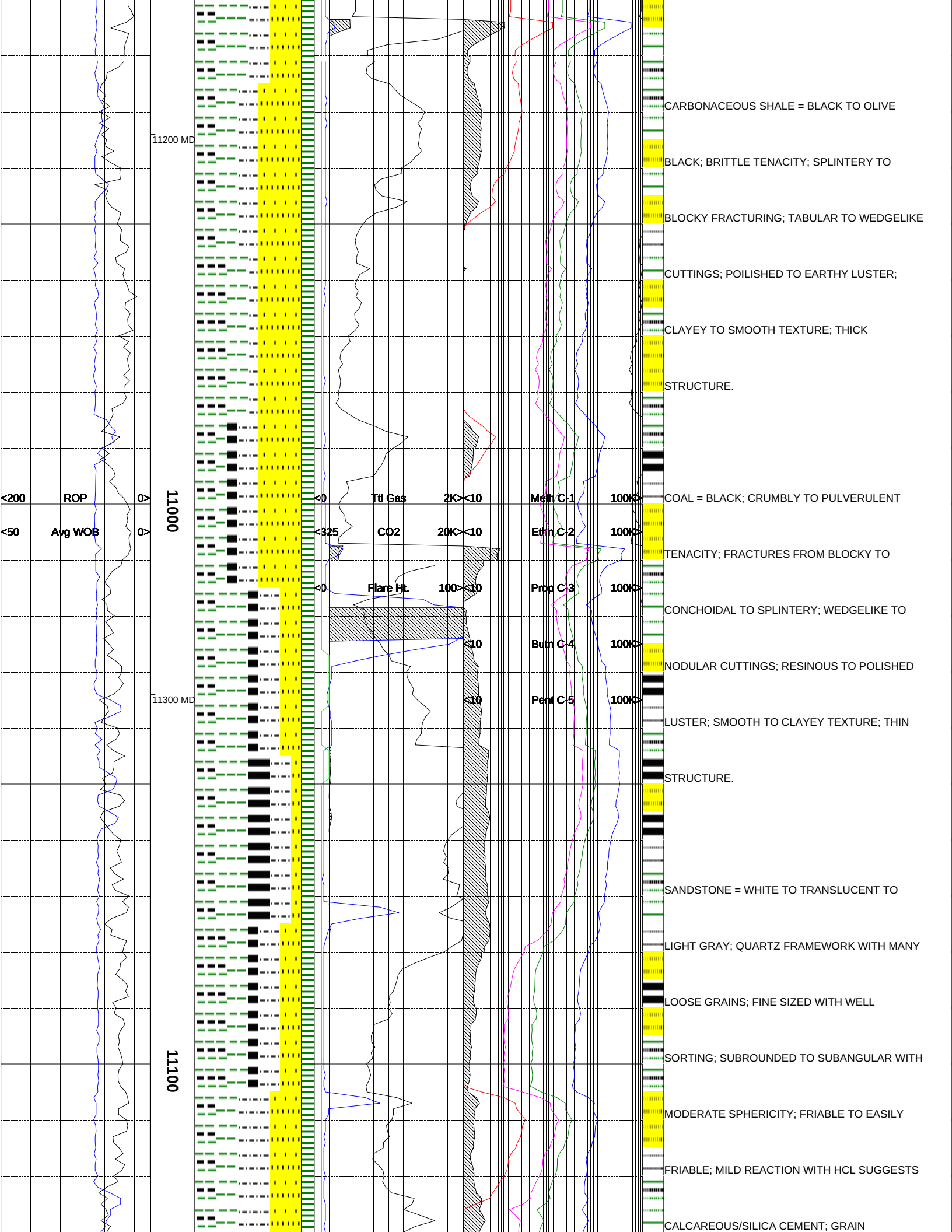
APPEARANCE; WAXY TO EARTHY LUSTER

EXHIBITED; CLAYEY TO SILTY TEXTURE; THIN

STRUCTURE APPARENT.

SANDSTONE = PALE YELLOWISH BROWN TO


10700
11000 MD
10800
11100 MD
10900
WHITE IN COLOR; QAURTZ FRAMEWORK; MEDIUM
TO FINE GRAIN SIZE; FAIR SORTING; GRAINS
ARE ROUNDED TO SUBANGULAR WITH MODERATE
TO HIGH SPHERICITY; FIRMLY FRIABLE TO
MODERATELY HARD; PRIMARILY SILICA CEMENT
SOME CALCITE; GRAIN SUPPORTED;NO VISIBLE
POROSITY; GRADATIONAL BEDDING SEEN IN
SAMPLE, WITH GRADATION DOWN TO SILTSTONE
MODERATELY HIGH GAS SHOWS.
SILTSTONE = BROWNISH GRAY TO DARK GRAY;
TENACITY IS BRITTLE TO CRUMBLY; PLANAR
TO IRREGULAR FRACTURING; TABULAR
CUTTINGS; EARTHY LUSTER; GRITY TO SILTY
TEXTURE; THIN STRUCTURE.
SHALE = MEDIUM BLUISH GRAY TO MEDIUM
GRAY; TENACITY IS BRITTLE TO SLICHTLY
CRUNCHY; FRACTURES FROM SPLINETERY TO
PLANAR; CUTTINGS ATE PLATY TO ELONGATED;
DULL LUSTER; SMOOTH TEXTURE; THIN TO
LAMINAE STRUCTURE.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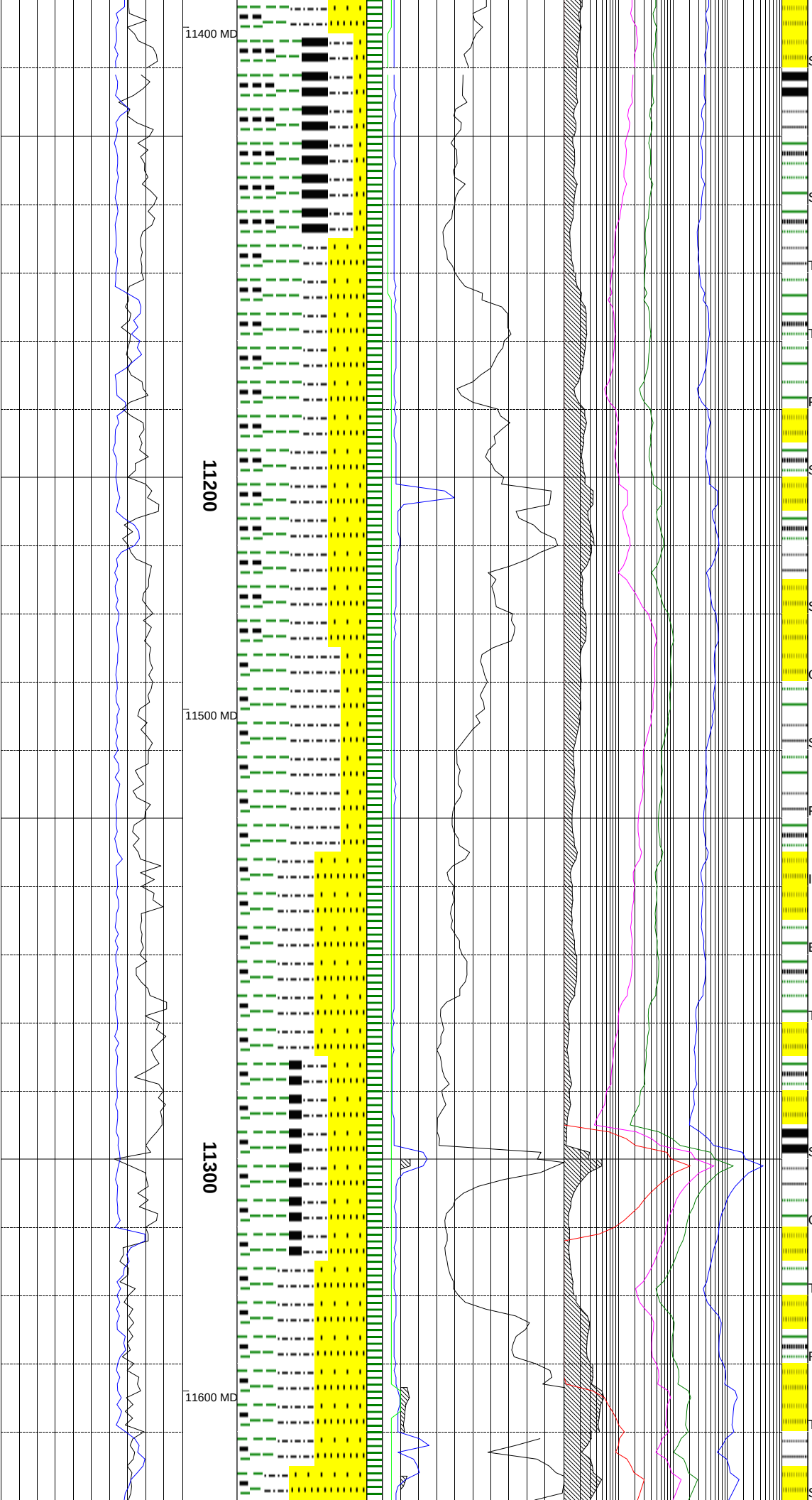
<0 Flare Ht. 100><10 Prop C-3 100K>
<10 Buta C-4 100K>
<10 Pent C-5 100K>
CARBONACEOUS SHALE = BLACK TO OLIVE
BLACK; BRITTLE TENACITY; SPLINTERY TO
BLOCKY FRACTURING; TABULAR TO WEDGELIKE
CUTTINGS; POILISHED TO EARTHY LUSTER;
CLAYEY TO SMOOTH TEXTURE; THICK
STRUCTURE.
COAL = BLACK; CRUMBLY TO PULVERULENT
TENACITY; FRACTURES FROM BLOCKY TO
CONCHOIDAL TO SPLINTERY; WEDGELIKE TO
NODULAR CUTTINGS; RESINOUS TO POLISHED
LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN
STRUCTURE.
SANDSTONE = WHITE TO TRANSLUCENT TO
LIGHT GRAY; QUARTZ FRAMEWORK WITH MANY
LOOSE GRAINS; FINE SIZED WITH WELL
SORTING; SUBROUNDED TO SUBANGULAR WITH
MODERATE SPHERICITY; FRIABLE TO EASILY
FRIABLE; MILD REACTION WITH HCL SUGGESTS
CALCAREOUS/SILICA CEMENT; GRAIN

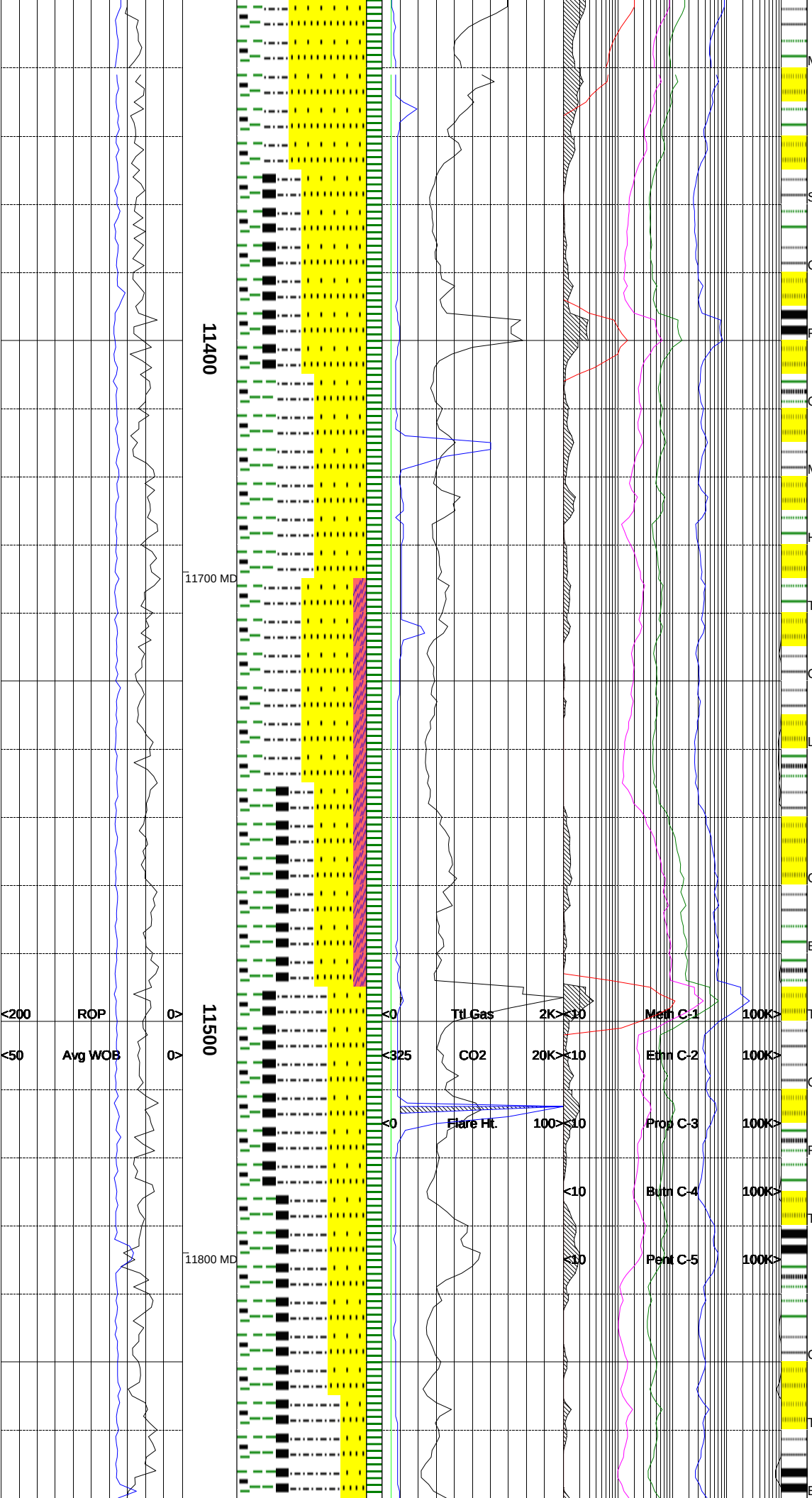


SUPPORTED.

SILTSTONE = BROWNISH GRAY TO OLIVE GRAY TO MEDIUM GRAY; BRITTLE TO CRUNCHY TENACITY; PLANAR FRACTURING; TABULAR TO PLATY CUTTINGS; EARTHY TO WAXY LUSTER; SILTY TO GRITTY TEXTURE; THIN STRUCTURE.

SILTSTONE = DARK GREENISH GRAY TO DARK GRAY IN COLOR; TOUGH TO BRITTLE TENACITY SAMPLE SHOWS IRREGULAR TO PLANAR FRACTURE; CUTTINGS ARE SCALY TO TEBULAR IN APPEARANCE; DULL TO FROSTED LUSTER EXHIBITED; SILTY TO SLIGHTLY GRANULAR TEXTURE; THIN STRUCTURE APPARENT.

SHALE = VERY LIGHT GRAY TO MEDIUM LIGHT GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; PLANAR FRACTURE; CUTTINGS ARE PLATY TO ELONGATED IN APPEARANCE; WAXY TO DULL LUSTER EXHIBITED; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE APPARENT;

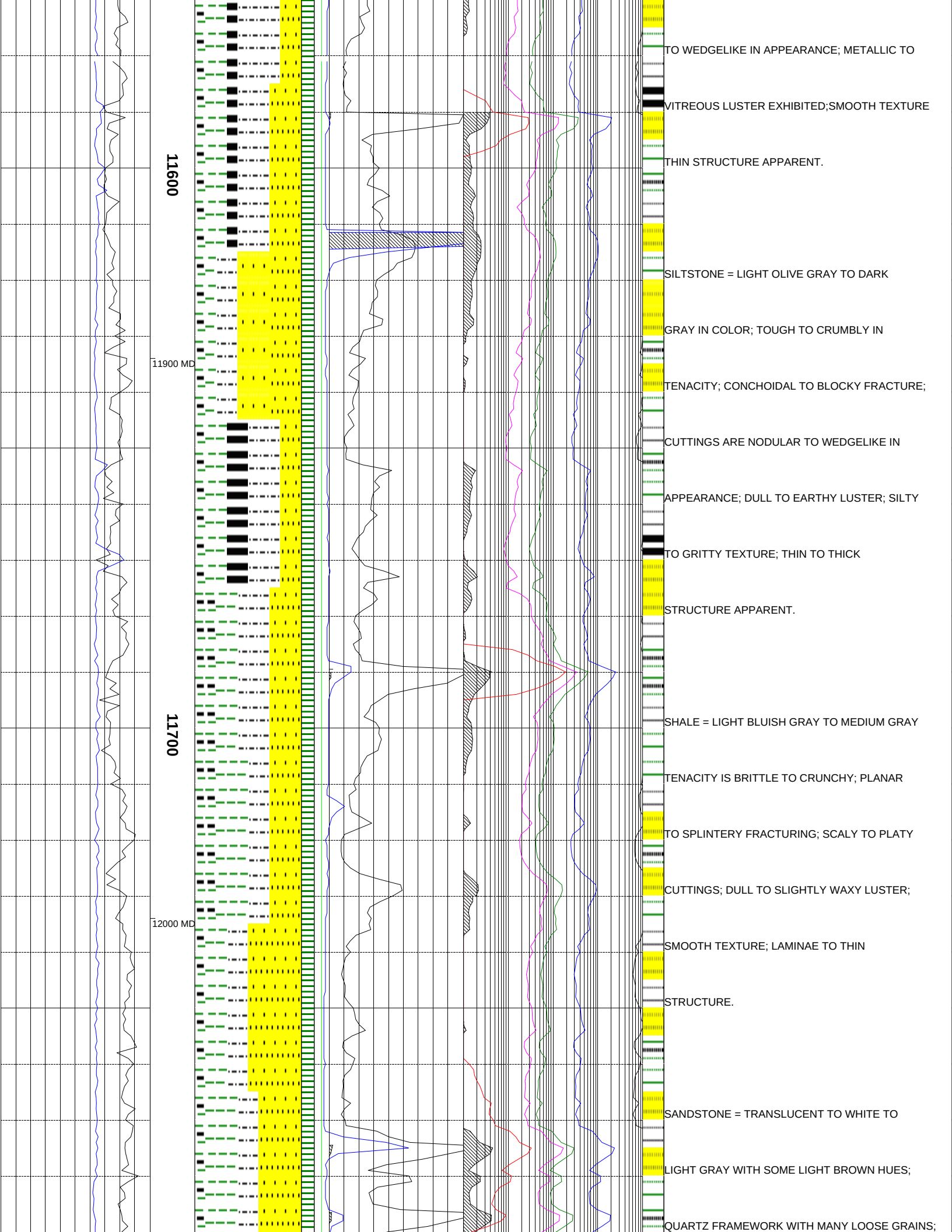


MICA PRESENT AS AN ACCESSORY MINERAL.

SANDSTONE = VERY PALE ORANGE TO WHITE IN COLOR; QUARTZ FRAMEWORK; COARSE TO FINE GRAIN SIZE; POOR TO FAIR SORTING; GRAINS ARE ANGULAR TO SUBROUNDED WITH MODERATE SPHERICITY; FIRMLY FRIABLE TO HARD; ABUNDANT LOOSE GRAINS IN SAMPLE TRAY; SILICA CEMENT; NO VISIBLE POROSITY OR BEDDING; PYRITE VISIBLE IN MATRIX; LOW TO MODERATE GAS SHOWS.

CARBONACEOUS SHALE = GRAYISH BLACK TO BLACK IN COLOR; BRITTLE TO CRUMBLY IN TENACITY; HACKLY TO PLANAR FRACTURE; CUTTINGS ARE PLATY TO TABULAR IN HABIT; RESINOUS TO WAXY LUSTER EXHIBITED;SMOOTH TO SILTY TEXTURE; THIN STRUCTURE.

COAL = GRAYISH BLACK IN COLOR; BRITTLE TO PULVERANT IN TENACITY; MOTTLED TO BLOCKY FRACTURE; CUTTINGS ARE ELONGATED



TO WEDGELIKE IN APPEARANCE; METALLIC TO

VITREOUS LUSTER EXHIBITED;SMOOTH TEXTURE

THIN STRUCTURE APPARENT.

SILTSTONE = LIGHT OLIVE GRAY TO DARK

GRAY IN COLOR; TOUGH TO CRUMBLY IN

TENACITY; CONCHOIDAL TO BLOCKY FRACTURE;

CUTTINGS ARE NODULAR TO WEDGELIKE IN

APPEARANCE; DULL TO EARTHY LUSTER; SILTY

TO GRITTY TEXTURE; THIN TO THICK

STRUCTURE APPARENT.

SHALE = LIGHT BLUISH GRAY TO MEDIUM GRAY

TENACITY IS BRITTLE TO CRUNCHY; PLANAR

TO SPLINTERY FRACTURING; SCALY TO PLATY

CUTTINGS; DULL TO SLIGHTLY WAXY LUSTER;

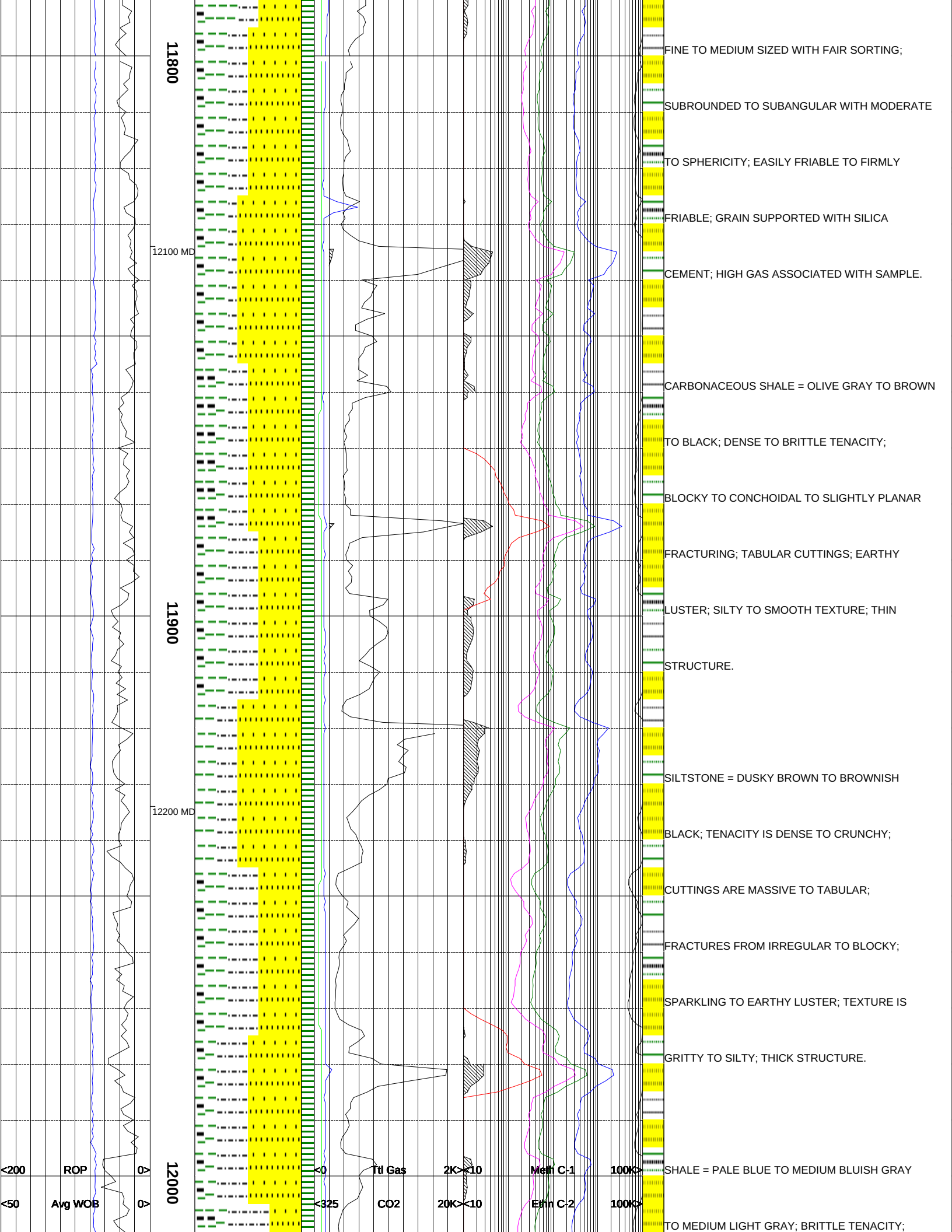
SMOOTH TEXTURE; LAMINAE TO THIN

STRUCTURE.

SANDSTONE = TRANSLUCENT TO WHITE TO

LIGHT GRAY WITH SOME LIGHT BROWN HUES;

QUARTZ FRAMEWORK WITH MANY LOOSE GRAINS;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Meth C-1
100K>
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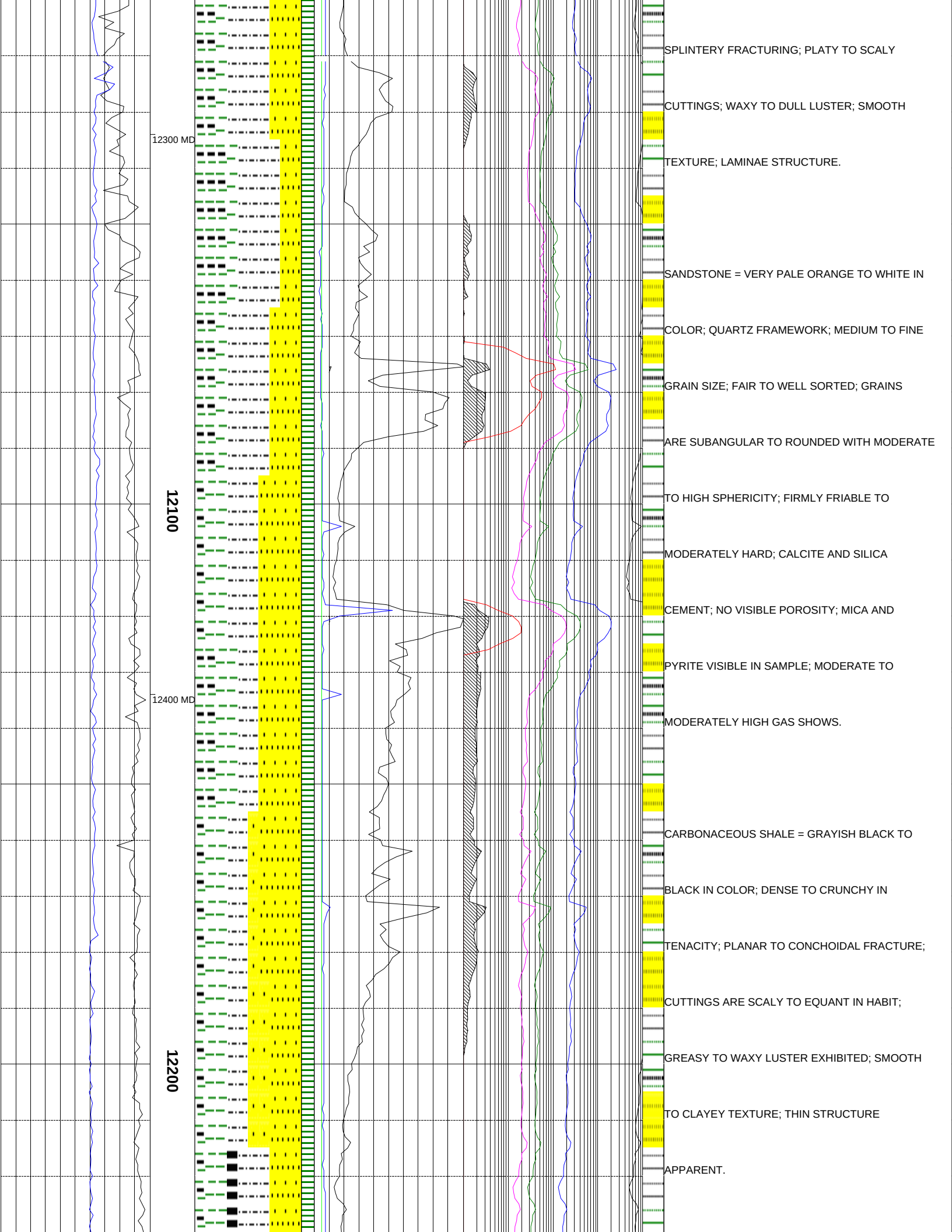
CO2
20K><10
Ethn C-2
100K>
FINE TO MEDIUM SIZED WITH FAIR SORTING;
SUBROUNDED TO SUBANGULAR WITH MODERATE
TO SPHERICITY; EASILY FRIABLE TO FIRMLY
FRIABLE; GRAIN SUPPORTED WITH SILICA
CEMENT; HIGH GAS ASSOCIATED WITH SAMPLE.
CARBONACEOUS SHALE = OLIVE GRAY TO BROWN
TO BLACK; DENSE TO BRITTLE TENACITY;
BLOCKY TO CONCHOIDAL TO SLIGHTLY PLANAR
FRACTURING; TABULAR CUTTINGS; EARTHY
LUSTER; SILTY TO SMOOTH TEXTURE; THIN
STRUCTURE.
SILTSTONE = DUSKY BROWN TO BROWNISH
BLACK; TENACITY IS DENSE TO CRUNCHY;
CUTTINGS ARE MASSIVE TO TABULAR;
FRACTURES FROM IRREGULAR TO BLOCKY;
SPARKLING TO EARTHY LUSTER; TEXTURE IS
GRITTY TO SILTY; THICK STRUCTURE.
SHALE = PALE BLUE TO MEDIUM BLUISH GRAY
TO MEDIUM LIGHT GRAY; BRITTLE TENACITY;



SPLINTERY FRACTURING; PLATY TO SCALY

CUTTINGS; WAXY TO DULL LUSTER; SMOOTH

TEXTURE; LAMINAE STRUCTURE.

SANDSTONE = VERY PALE ORANGE TO WHITE IN

COLOR; QUARTZ FRAMEWORK; MEDIUM TO FINE

GRAIN SIZE; FAIR TO WELL SORTED; GRAINS

ARE SUBANGULAR TO ROUNDED WITH MODERATE

TO HIGH SPHERICITY; FIRMLY FRIABLE TO

MODERATELY HARD; CALCITE AND SILICA

CEMENT; NO VISIBLE POROSITY; MICA AND

PYRITE VISIBLE IN SAMPLE; MODERATE TO

MODERATELY HIGH GAS SHOWS.

CARBONACEOUS SHALE = GRAYISH BLACK TO

BLACK IN COLOR; DENSE TO CRUNCHY IN

TENACITY; PLANAR TO CONCHOIDAL FRACTURE;

CUTTINGS ARE SCALY TO EQUANT IN HABIT;

GREASY TO WAXY LUSTER EXHIBITED; SMOOTH

TO CLAYEY TEXTURE; THIN STRUCTURE

APPARENT.