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(281) 784-5500
Bakersfield, CA
(661) 328-1595
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MUDLOG TVD

COMPANY ExxonMobil Production
WELL FRU197-33B1
FIELD PICEANCE CREEK
REGION ROCKIES
COORDINATES 39.921453000
-108.282474000
ELEVATION GL: 6459.5'
RKB: 30.2'
COUNTY, STATE RIO BLANCO, CO
API INDEX 051031142800
SPUD DATE 06/19/2010
CONTRACTOR HP
CO. REP. CANDANCE CURTIS
RIG/TYPE HP321
LOGGING UNIT MLU#31
GEOLOGISTS B.DELANEY
C.RECORD
ADD. PERSONS M.FRANCO
CO. GEOLOGIST CHRIS ALBA

LOG INTERVAL

CASING DATA

DEPTHS: 4083' TO 12912'
DATES: 06/19/2010 TO 07/01/2010
SCALE: 1" = 100'

16" AT 150'
10.75" AT 4077'
5" AT 12890'
AT

MUD TYPES

HOLE SIZE

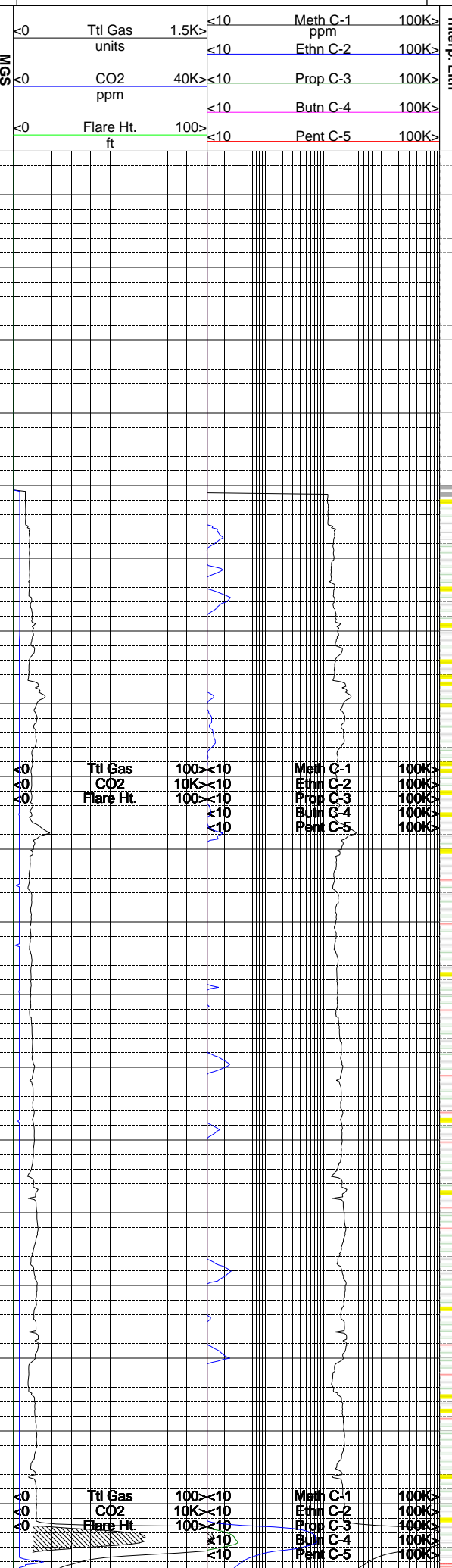
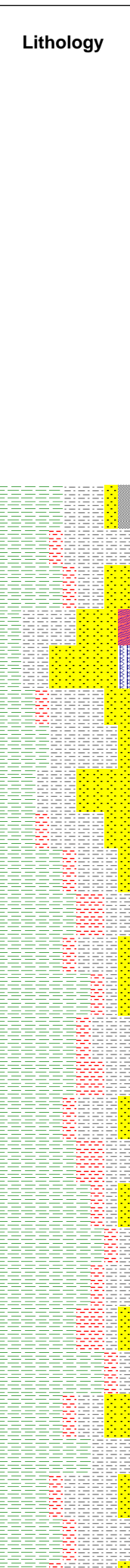
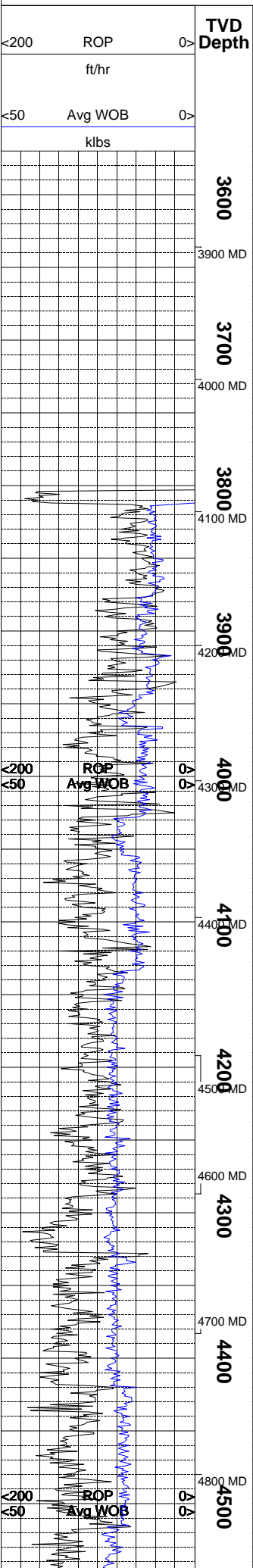
WATER-BASED TO 4083'
LSND TO 12912'
TO
TO

14.75" TO 3934'
8.75" TO 11147'
7.875" TO 12912'
TO

ABBREVIATIONS

<i>NB</i> NEWBIT	<i>PV</i> PLASTIC VISCOSITY	<i>LC</i> LOST CIRCULATION
<i>RRB</i> RERUN BIT	<i>YP</i> YIELD POINT	<i>CO</i> CIRCULATE OUT
<i>CB</i> CORE BIT	<i>FL</i> FLUID LOSS	<i>NR</i> NO RETURNS
<i>WOB</i> WEIGHT ON BIT	<i>CL</i> PPM CLORIDE ION	<i>TG</i> TRIP GAS
<i>RPM</i> ROTARY REV/MIN	<i>Rm</i> MUD RESISTIVITY	<i>SG</i> SURVEY GAS
<i>PP</i> PUMP PRESSURE	<i>Rmf</i> FILTRATE RESISTIVITY	<i>WG</i> WIPER GAS
<i>SPM</i> STROKES/MIN	<i>PR</i> POOR RETURNS	<i>CG</i> CONNECTION GAS
<i>MW</i> MUD WEIGHT	<i>LAT</i> LOGGED AFTER TRIP	
<i>VIS</i> FUNNEL VISCOSITY	<i>LAS</i> LOGGED AFTER SURVEY	

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



Remarks
Survey Data, Mud Reports, Other Info.

SHALE = VERY LIGHT GREENISH GRAY TO LIGHT BLUISH GRAY TO YELLOWISH MOTTLED APPEARANCE ON MOST OF SAMPLE; BRITTLE TO CRUMBLY TENACITY; PREDOMINATELY PLANAR TO SLIGHT HACKLY TO SEMI BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY IN HABIT; DULL EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

SANDSTONE = LIGHT GREENISH GRAY TO WHITE TO TRANSLUCENT; CHLORITE CRSTALS VISIBLE IN SAMPLE; MOSTLY QUARTZ FRAMEWORK WITH 1-2% DARK LITHICS VISIBLE IN SAMPLE; COARSE TO MEDIUM TO FINE GRAIN; POOR TO FAIR SORTED; SUBANGULAR TO ANGULAR GRAIN S; MODERATE TO HIGH SPHERICITY; GRAINS HAVE SLIGHT POLISH APPEARANCE; FIRM FRIABLE TO MODERATE HARD; CALCITE CEMENTATION DUE TO HIGH REACTION IN DILUTE HCI; NO VISIBLE HYDROCARBONS IN THE SAMPLE; VISIBLE CALCITE FRACTURE-FILL; GRAIN SUPPORTED.

SILTSTONE = VERY LIGHT GRAY TO LIGHT BLUISH GRAY; NACHOLITE CRYSTALS ARE VISIBLE IN THE SAMPLE; CRUNCHY TO STIFF TENACITY; IRREGULAR TO SLIGHT HACKLY TO SEMI PLANAR FRACTURING; CUTTINGS TEND TO BE WEDGE LIKE TO SEMI ELONGATED TABULAR IN HABIT; SLIGHT FROSTED TO SEMI DULL EARTHY LUSTER; GRITTY TO SILTY TEXTURE; VISIBLE 10% PALEOSOLS IN SAMPLE.

CLAYSTONE = VERY LIGHT BROWNISH GRAY TO LIGHT YELLOWISH GRAY; BRITTLE TO MALLEABLE TENACITY; NO VISIBLE FRACTURES; CUTTINGS TEND TO BE NODULAR TO MASSIVE TO SEMI PLATY IN HABIT; DULL EARTHY TO SEMI GREASY LUSTER; CLAYEY TO SMOOTH TO SEMI MATTE TEXTURE; NO OTHER VISIBLE BEDDING FEATURES; 5-10% PALEOSOLS VISIBLE IN SAMPLE.

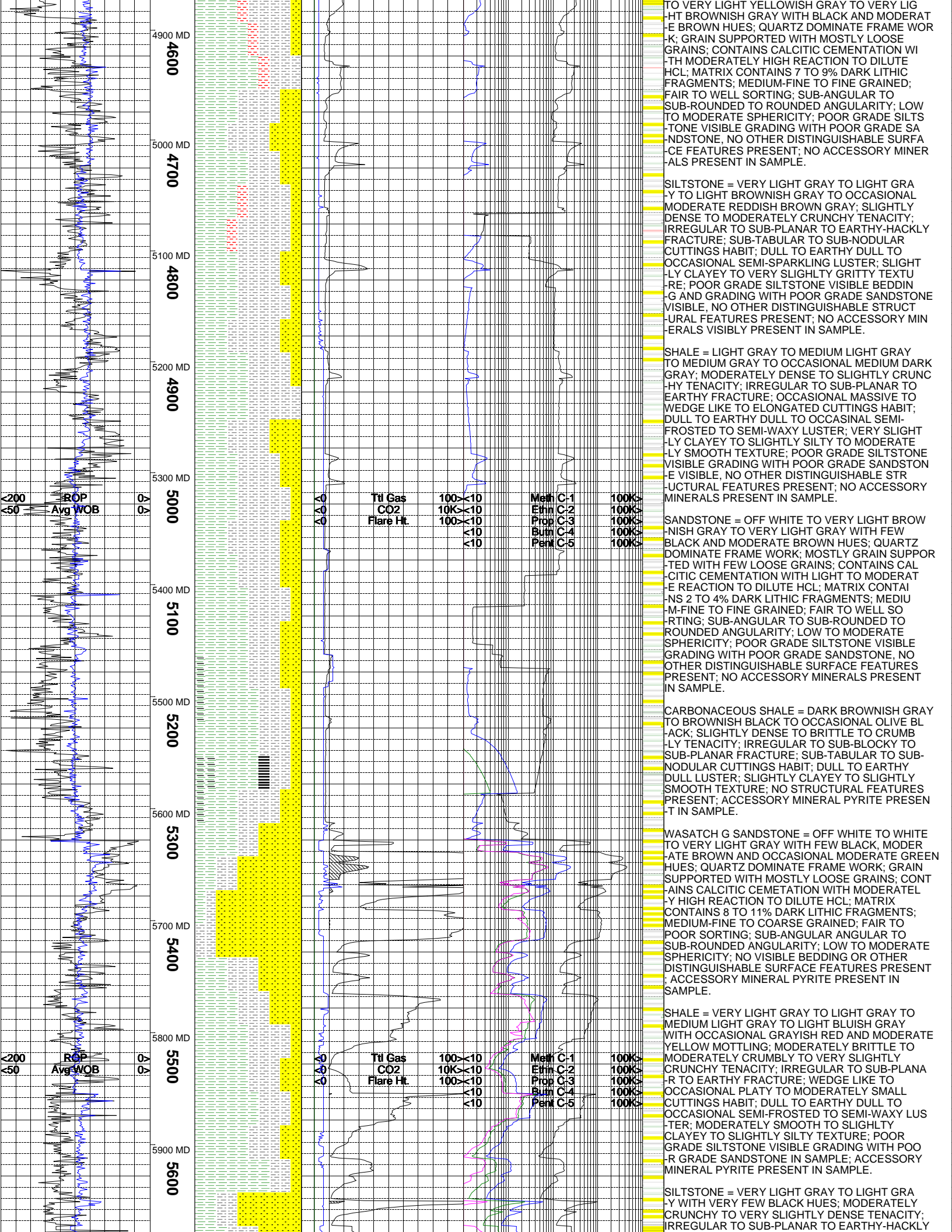
SHALE = PALE YELLOWISH BROWN TO LIGHT OLIVE GRAY TO YELLOWISH GRAY; MOTTLED APPEARANCE IS PRESENT THROUGH OUT THE SAMPLE; BRITTLE TO CRUMBLY TENACITY; PREDOMINATELY PLANAR TO SLIGHT HACKLY TO SEMI BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY IN HABIT; DULL EARTHY TO SLIGHT GREASY LUSTER; CLAYEY TO SMOOTH TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

SILTSTONE = PALE YELLOWISH BROWN TO LIGHT GRAY TO OCCASIONALLY LIGHT BLUISH GRAY; CRUNCHY TO CRUMBLY TENACITY; IRREGULAR TO PLANAR TO SEMI HACKLY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO PREDOMINATELY WEDGE-LIKE IN HABIT; DULL EARTHY TO SLIGHTLY WAXY TO SEMI FROSTED LUSTER; GRITTY TO GRANULAR TO PREDOMINATELY SILTY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

CLAYSTONE = VERY LIGHT YELLOWISH GRAY TO VERY LIGHT BROWNISH GRAY; BRITTLE TO CRUMBLY TO MALLEABLE TENACITY; NO VISIBLE FRACTURES; CUTTINGS TEND TO BE MASSIVE TO NODULAR IN HABIT; GREASY LUSTER; CLAYEY TO SMOOTH TEXTURE; NO OTHER VISIBLE BEDDING FEATURES; 4-5% VISIBLE CRYSTALS OF NACHOLITE IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO OCCASIONAL MEDIUM LIGHT GRAY; MODERATELY BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; WEDGE LIKE TO SUB-PLATY TO VERY SMALL CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-WAXY TO SEMI-FROSTED LUSTER; MODERATELY SMOOTH TO SEMI-CLAYEY TO SEMI-SILTY TEXTURE; NO VISIBLE LAMINAE OR OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY



4900 MD
4600
5000 MD
4700
5100 MD
4800
5200 MD
4900
5300 MD
5000
5400 MD
5100
5500 MD
5200
5600 MD
5300
5700 MD
5400
5800 MD
5500
5900 MD
5600

200
50
ROP
Avg WOB

Ttl Gas	100x10	Meth	C-1	100Kx
CO2	10Kx10	Ethn	C-2	100Kx
Flare Ht	100x10	Prop	C-3	100Kx
	<10	Burn	C-4	100Kx
	<10	Penl	C-5	100Kx

TO VERY LIGHT YELLOWISH GRAY TO VERY LIGHT BROWNISH GRAY WITH BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; GRAIN SUPPORTED WITH MOSTLY LOOSE GRAINS; CONTAINS CALCITIC CEMENTATION WITH MODERATELY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 7 TO 9% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO FINE GRAINED; FAIR TO WELL SORTING; SUB-ANGULAR TO SUB-ROUNDED TO ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTS TONE VISIBLE GRADING WITH POOR GRADE SANDSTONE. NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRAY TO LIGHT BROWNISH GRAY TO OCCASIONAL MODERATE REDDISH BROWN GRAY; SLIGHTLY DENSE TO MODERATELY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE BEDDING AND GRADING WITH POOR GRADE SANDSTONE VISIBLE, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERALS VISIBLY PRESENT IN SAMPLE.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO MEDIUM GRAY TO OCCASIONAL MEDIUM DARK GRAY; MODERATELY DENSE TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO ELONGATED CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; VERY SLIGHTLY CLAYEY TO SLIGHTLY SILTY TO MODERATELY SMOOTH TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE VISIBLE, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

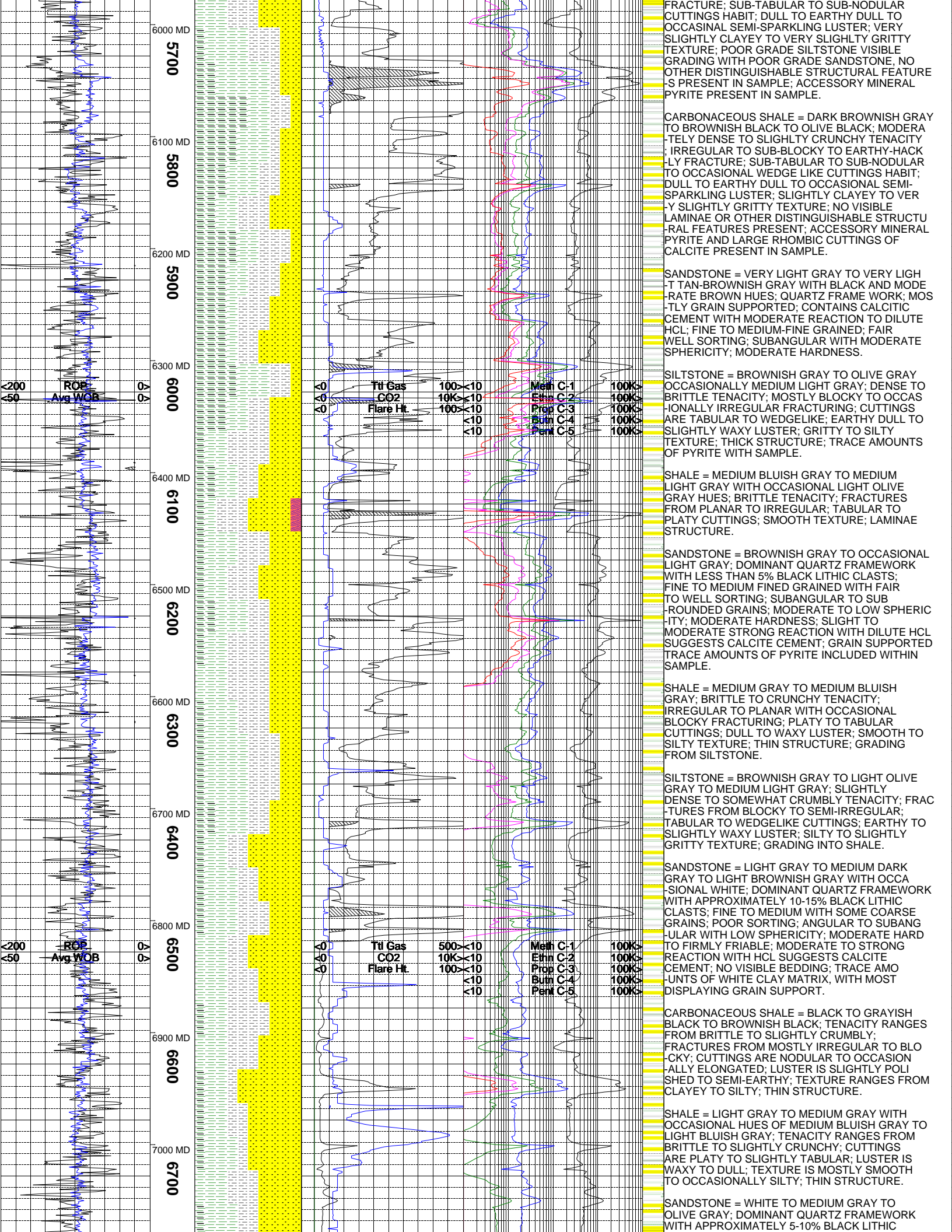
SANDSTONE = OFF WHITE TO VERY LIGHT BROWNISH GRAY TO VERY LIGHT GRAY WITH FEW BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; MOSTLY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; CONTAINS CALCITIC CEMENTATION WITH LIGHT TO MODERATE REACTION TO DILUTE HCL; MATRIX CONTAINS 2 TO 4% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO FINE GRAINED; FAIR TO WELL SORTING; SUB-ANGULAR TO SUB-ROUNDED TO ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE. NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

CARBONACEOUS SHALE = DARK BROWNISH GRAY TO BROWNISH BLACK TO OCCASIONAL OLIVE BLACK; SLIGHTLY DENSE TO BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT; DULL TO EARTHY DULL LUSTER; SLIGHTLY CLAYEY TO SLIGHTLY SMOOTH TEXTURE; NO STRUCTURAL FEATURES PRESENT; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

WASATCH G SANDSTONE = OFF WHITE TO WHITE TO VERY LIGHT GRAY WITH FEW BLACK, MODERATE BROWN AND OCCASIONAL MODERATE GREEN HUES; QUARTZ DOMINATE FRAME WORK; GRAIN SUPPORTED WITH MOSTLY LOOSE GRAINS; CONTAINS CALCITIC CEMENTATION WITH MODERATELY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 8 TO 11% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; NO VISIBLE BEDDING OR OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM LIGHT GRAY TO LIGHT BLuish GRAY WITH OCCASIONAL GRAYISH RED AND MODERATE YELLOW MOTTLING; MODERATELY BRITTLE TO MODERATELY CRUMBLY TO VERY SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY FRACTURE; WEDGE LIKE TO OCCASIONAL PLATY TO MODERATELY SMALL CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERATELY SMOOTH TO SLIGHTLY CLAYEY TO SLIGHTLY SILTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE IN SAMPLE; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRAY WITH VERY FEW BLACK HUES; MODERATELY CRUNCHY TO VERY SLIGHTLY DENSE TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY



6000 MD
5700
6100 MD
5800
6200 MD
5900
6300 MD
6000
6400 MD
6100
6500 MD
6200
6600 MD
6300
6700 MD
6400
6800 MD
6500
6900 MD
6600
7000 MD
6700

200
50
ROB
Avg WOB

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

Ttl Gas 500x<10
CO2 10Kx<10
Flare Ht 100x<10
Meth C-1 100Kx<100
Ethn C-2 100Kx<100
Prop C-3 100Kx<100
Butn C-4 100Kx<100
Pent C-5 100Kx<100

FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; VERY SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURE S PRESENT IN SAMPLE; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

CARBONACEOUS SHALE = DARK BROWNISH GRAY TO BROWNISH BLACK TO OLIVE BLACK; MODERATELY DENSE TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO OCCASIONAL WEDGE LIKE CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; NO VISIBLE LAMINAE OR OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; ACCESSORY MINERAL PYRITE AND LARGE RHOMBIC CUTTINGS OF CALCITE PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT GRAY TO VERY LIGHT TAN-BROWNISH GRAY WITH BLACK AND MODERATE BROWN HUES; QUARTZ FRAME WORK; MOSTLY GRAIN SUPPORTED; CONTAINS CALCITIC CEMENT WITH MODERATE REACTION TO DILUTE HCL; FINE TO MEDIUM-FINE GRAINED; FAIR WELL SORTING; SUBANGULAR WITH MODERATE SPHERICITY; MODERATE HARDNESS.

SILTSTONE = BROWNISH GRAY TO OLIVE GRAY OCCASIONALLY MEDIUM LIGHT GRAY; DENSE TO BRITTLE TENACITY; MOSTLY BLOCKY TO OCCASIONALLY IRREGULAR FRACTURING; CUTTINGS ARE TABULAR TO WEDGELIKE; EARTHY DULL TO SLIGHTLY WAXY LUSTER; GRITTY TO SILTY TEXTURE; THICK STRUCTURE; TRACE AMOUNTS OF PYRITE WITH SAMPLE.

SHALE = MEDIUM BLuish GRAY TO MEDIUM LIGHT GRAY WITH OCCASIONAL LIGHT OLIVE GRAY HUES; BRITTLE TENACITY; FRACTURES FROM PLANAR TO IRREGULAR; TABULAR TO PLATY CUTTINGS; SMOOTH TEXTURE; LAMINAE STRUCTURE.

SANDSTONE = BROWNISH GRAY TO OCCASIONAL LIGHT GRAY; DOMINANT QUARTZ FRAMEWORK WITH LESS THAN 5% BLACK LITHIC CLASTS; FINE TO MEDIUM FINED GRAINED WITH FAIR TO WELL SORTING; SUBANGULAR TO SUB-ROUNDED GRAINS; MODERATE TO LOW SPHERICITY; MODERATE HARDNESS; SLIGHT TO MODERATE STRONG REACTION WITH DILUTE HCL SUGGESTS CALCITE CEMENT; GRAIN SUPPORTED TRACE AMOUNTS OF PYRITE INCLUDED WITHIN SAMPLE.

SHALE = MEDIUM GRAY TO MEDIUM BLuish GRAY; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR WITH OCCASIONAL BLOCKY FRACTURING; PLATY TO TABULAR CUTTINGS; DULL TO WAXY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; GRADING FROM SILTSTONE.

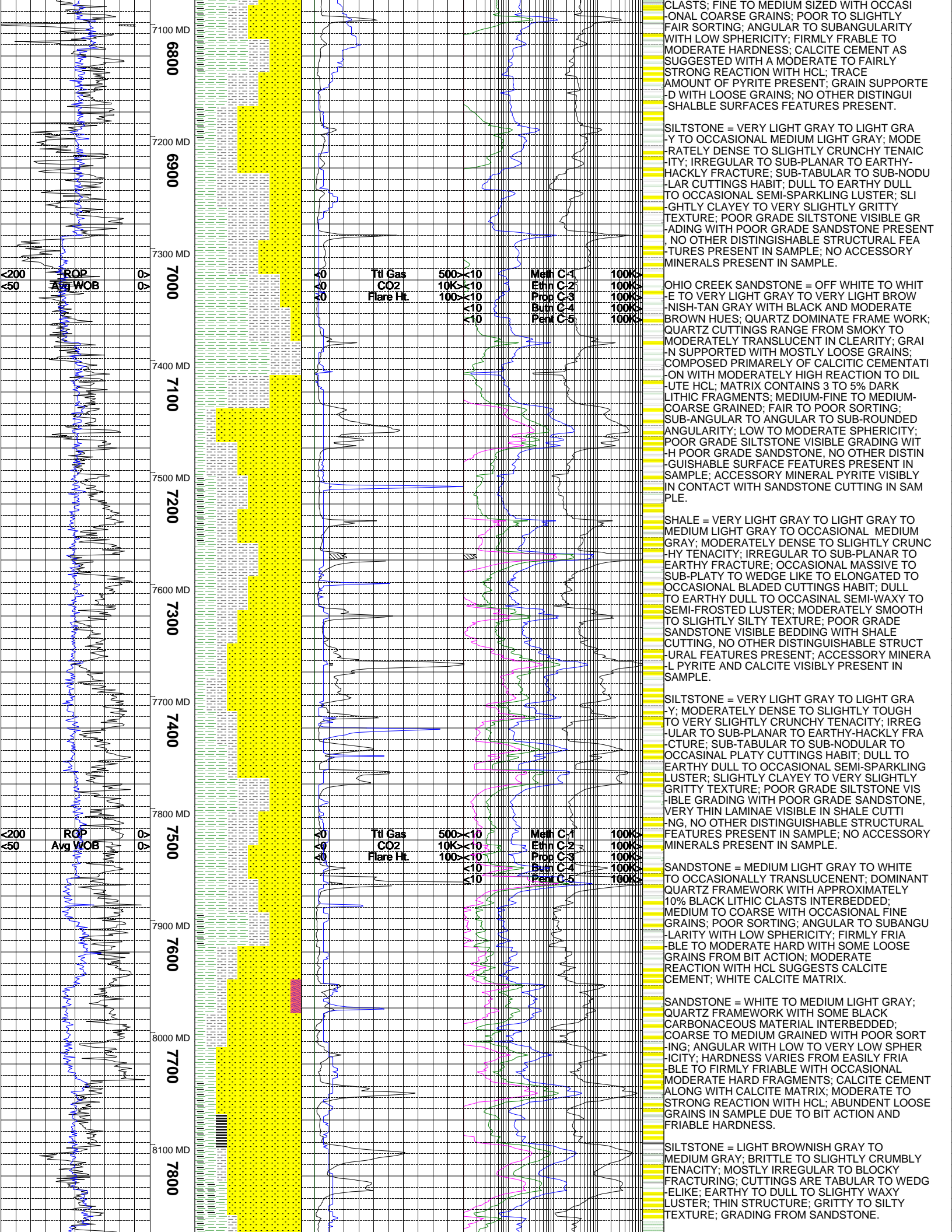
SILTSTONE = BROWNISH GRAY TO LIGHT OLIVE GRAY TO MEDIUM LIGHT GRAY; SLIGHTLY DENSE TO SOMEWHAT CRUMBLY TENACITY; FRACTURES FROM BLOCKY TO SEMI-IRREGULAR; TABULAR TO WEDGELIKE CUTTINGS; EARTHY TO SLIGHTLY WAXY LUSTER; SILTY TO SLIGHTLY GRITTY TEXTURE; GRADING INTO SHALE.

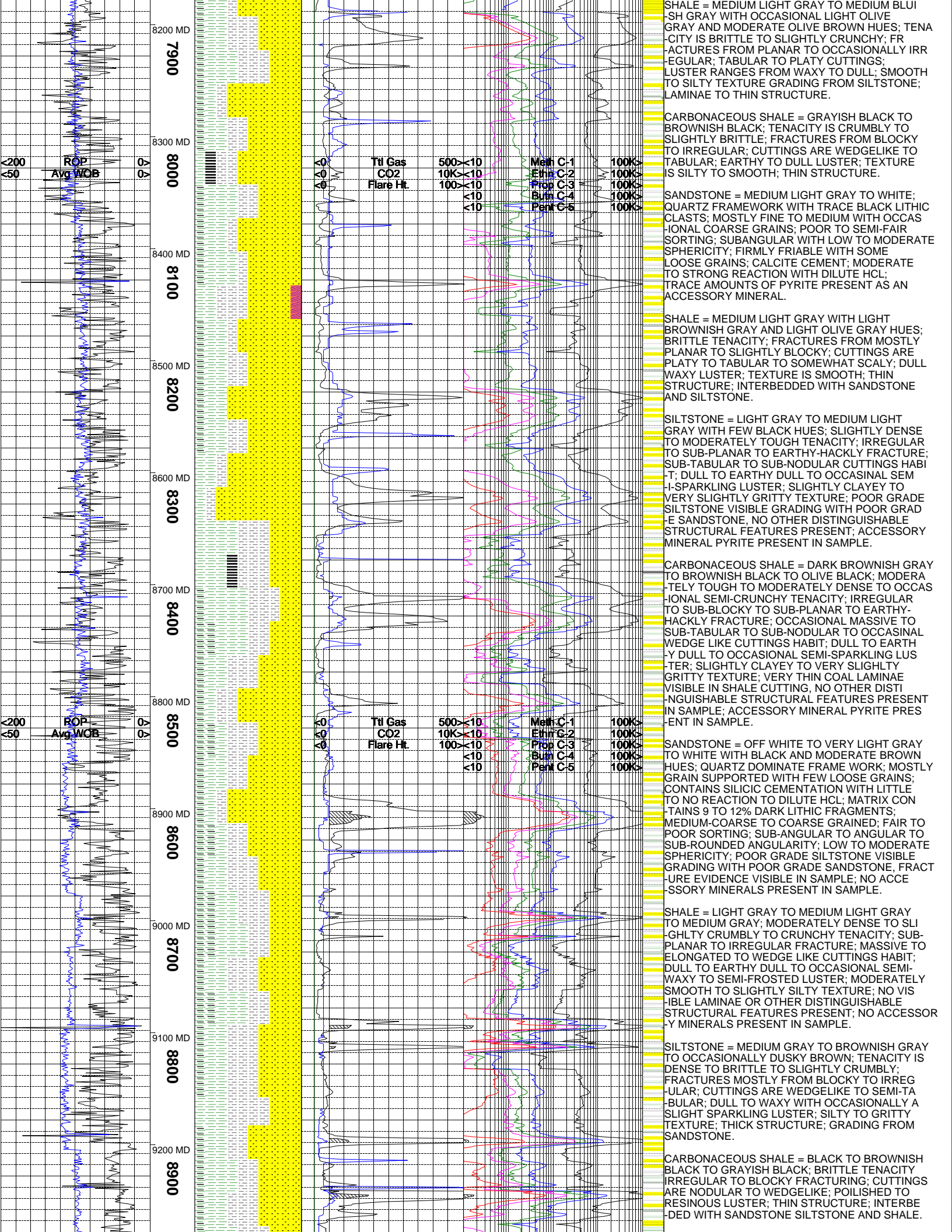
SANDSTONE = LIGHT GRAY TO MEDIUM DARK GRAY TO LIGHT BROWNISH GRAY WITH OCCASIONAL WHITE; DOMINANT QUARTZ FRAMEWORK WITH APPROXIMATELY 10-15% BLACK LITHIC CLASTS; FINE TO MEDIUM WITH SOME COARSE GRAINS; POOR SORTING; ANGULAR TO SUBANGULAR WITH LOW SPHERICITY; MODERATE HARD TO TO FIRMLY FRIABLE; MODERATE TO STRONG REACTION WITH HCL SUGGESTS CALCITE CEMENT; NO VISIBLE BEDDING; TRACE AMOUNTS OF WHITE CLAY MATRIX, WITH MOST DISPLAYING GRAIN SUPPORT.

CARBONACEOUS SHALE = BLACK TO GRAYISH BLACK TO BROWNISH BLACK; TENACITY RANGES FROM BRITTLE TO SLIGHTLY CRUMBLY; FRACTURES FROM MOSTLY IRREGULAR TO BLOCKY; CUTTINGS ARE NODULAR TO OCCASIONALLY ELONGATED; LUSTER IS SLIGHTLY POLISHED TO SEMI-EARTHY; TEXTURE RANGES FROM CLAYEY TO SILTY; THIN STRUCTURE.

SHALE = LIGHT GRAY TO MEDIUM GRAY WITH OCCASIONAL HUES OF MEDIUM BLuish GRAY TO LIGHT BLuish GRAY; TENACITY RANGES FROM BRITTLE TO SLIGHTLY CRUNCHY; CUTTINGS ARE PLATY TO SLIGHTLY TABULAR; LUSTER IS WAXY TO DULL; TEXTURE IS MOSTLY SMOOTH TO OCCASIONALLY SILTY; THIN STRUCTURE.

SANDSTONE = WHITE TO MEDIUM GRAY TO OLIVE GRAY; DOMINANT QUARTZ FRAMEWORK WITH APPROXIMATELY 5-10% BLACK LITHIC





8200 MD
7900
8300 MD
8000
8400 MD
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8500 MD
8200
8600 MD
8300
8700 MD
8400
8800 MD
8500
8900 MD
8600
9000 MD
8700
9100 MD
8800
9200 MD
8900

Ttl Gas	500	<10	Meth C-1	100%
CO2	10K	<10	Ethn C-2	100%
Flare Ht	100	<10	Prop C-3	100%
		<10	Burn C-4	100%
		<10	Penl C-5	100%

SHALE = MEDIUM LIGHT GRAY TO MEDIUM BLUI
-SH GRAY WITH OCCASIONAL LIGHT OLIVE
GRAY AND MODERATE OLIVE BROWN HUES; TENA
-CITY IS BRITTLE TO SLIGHTLY CRUNCHY; FR
-ACTURES FROM PLANAR TO OCCASIONALLY IRR
-REGULAR; TABULAR TO PLATY CUTTINGS;
LUSTER RANGES FROM WAXY TO DULL; SMOOTH
TO SILTY TEXTURE GRADING FROM SILTSTONE;
LAMINAE TO THIN STRUCTURE.

CARBONACEOUS SHALE = GRAYISH BLACK TO
BROWNISH BLACK; TENACITY IS CRUMBLY TO
SLIGHTLY BRITTLE; FRACTURES FROM BLOCKY
TO IRREGULAR; CUTTINGS ARE WEDGELIKE TO
TABULAR; EARTHY TO DULL LUSTER; TEXTURE
IS SILTY TO SMOOTH.

SANDSTONE = MEDIUM LIGHT GRAY TO WHITE;
QUARTZ FRAMEWORK WITH TRACE BLACK LITHIC
CLASTS; MOSTLY FINE TO MEDIUM WITH OCCAS
-IONAL COARSE GRAINS; POOR TO SEMI-FAIR
SORTING; SUBANGULAR WITH LOW TO MODERATE
SPHERICITY; FIRMLY FRIABLE WITH SOME
LOOSE GRAINS; CALCITE CEMENT; MODERATE
TO STRONG REACTION WITH DILUTE HCL;
TRACE AMOUNTS OF PYRITE PRESENT AS AN
ACCESSORY MINERAL.

SHALE = MEDIUM LIGHT GRAY WITH LIGHT
BROWNISH GRAY AND LIGHT OLIVE GRAY HUES;
BRITTLE TENACITY; FRACTURES FROM MOSTLY
PLANAR TO SLIGHTLY BLOCKY; CUTTINGS ARE
PLATY TO TABULAR TO SOMEWHAT SCALY; DULL
WAXY LUSTER; TEXTURE IS SMOOTH; THIN
STRUCTURE; INTERBEDDED WITH SANDSTONE
AND SILTSTONE.

SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT
GRAY WITH FEW BLACK HUES; SLIGHTLY DENSE
TO MODERATELY TOUGH TENACITY; IRREGULAR
TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE;
SUB-TABULAR TO SUB-NODULAR CUTTINGS HABI
-T; DULL TO EARTHY DULL TO OCCASINAL SEM
-I-SPARKLING LUSTER; SLIGHTLY CLAYEY TO
VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE
SILTSTONE VISIBLE GRADING WITH POOR GRAD
-E SANDSTONE, NO OTHER DISTINGUISHABLE
STRUCTURAL FEATURES PRESENT; ACCESSORY
MINERAL PYRITE PRESENT IN SAMPLE.

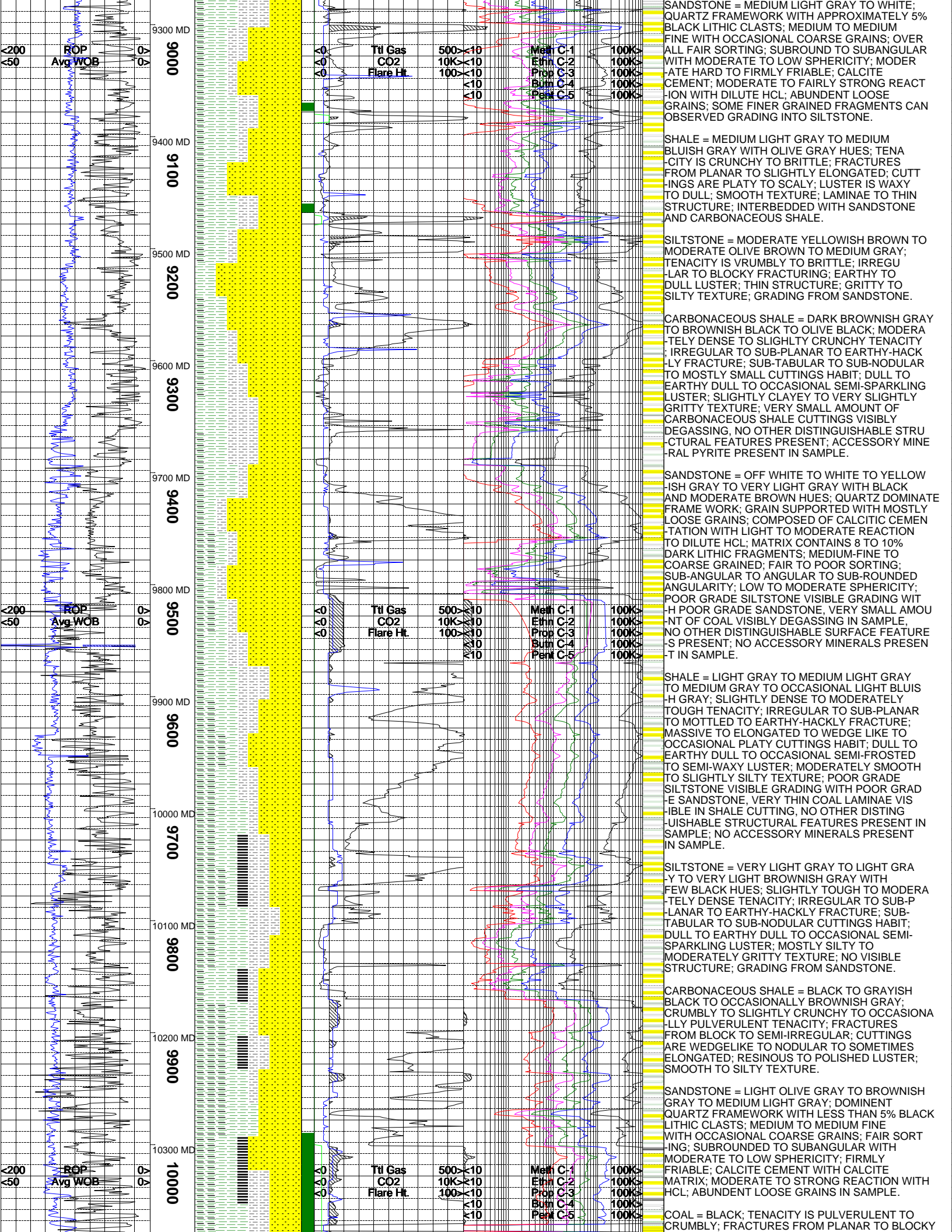
CARBONACEOUS SHALE = DARK BROWNISH GRAY
TO BROWNISH BLACK TO OLIVE BLACK; MODERA
-TELY TOUGH TO MODERATELY DENSE TO OCCAS
-IONAL SEMI-CRUNCHY TENACITY; IRREGULAR
TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY-
HACKLY FRACTURE; OCCASIONAL MASSIVE TO
SUB-TABULAR TO SUB-NODULAR TO OCCASINAL
WEDGE LIKE CUTTINGS HABIT; DULL TO EARTH
-Y DULL TO OCCASIONAL SEMI-SPARKLING LUS
-TER; SLIGHTLY CLAYEY TO VERY SLIGHTLY
GRITTY TEXTURE; VERY THIN COAL LAMINAE
VISIBLE IN SHALE CUTTING, NO OTHER DISTI
-NGUISHABLE STRUCTURAL FEATURES PRESENT
IN SAMPLE; ACCESSORY MINERAL PYRITE PRES
-ENT IN SAMPLE.

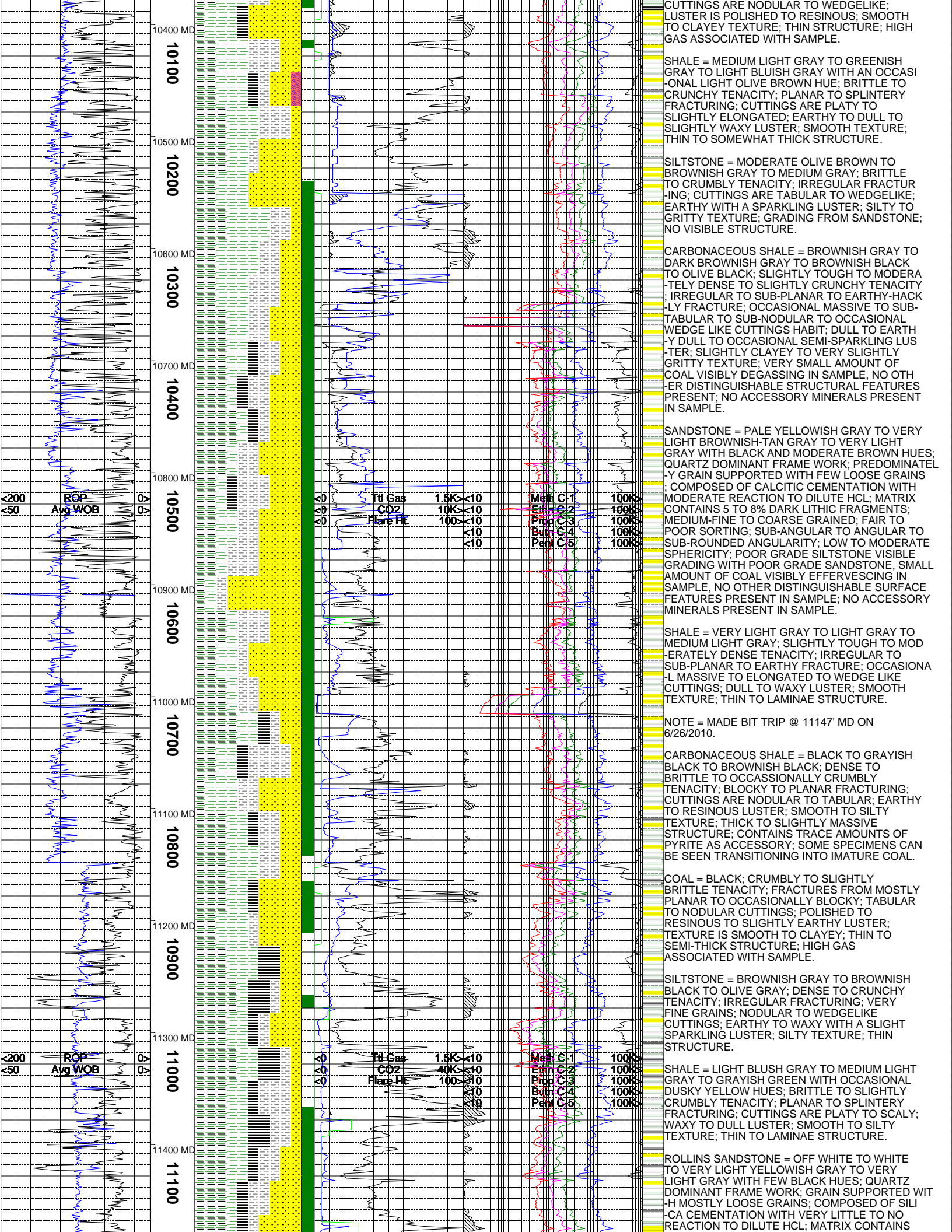
SANDSTONE = OFF WHITE TO VERY LIGHT GRAY
TO WHITE WITH BLACK AND MODERATE BROWN
HUES; QUARTZ DOMINATE FRAME WORK; MOSTLY
GRAIN SUPPORTED WITH FEW LOOSE GRAINS;
CONTAINS SILICIC CEMENTATION WITH LITTLE
TO NO REACTION TO DILUTE HCL; MATRIX CON
-TAINS 9 TO 12% DARK LITHIC FRAGMENTS;
MEDIUM-COARSE TO COARSE GRAINED; FAIR TO
POOR SORTING; SUB-ANGULAR TO ANGULAR TO
SUB-ROUNDED ANGULARITY; LOW TO MODERATE
SPHERICITY; POOR GRADE SILTSTONE VISIBLE
GRADING WITH POOR GRADE SANDSTONE, FRACT
-URE EVIDENCE VISIBLE IN SAMPLE; NO ACCES
-SSORY MINERALS PRESENT IN SAMPLE.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY
TO MEDIUM GRAY; MODERATELY DENSE TO SLI
-GHTLY CRUMBLY TO CRUNCHY TENACITY; SUB-
PLANAR TO IRREGULAR FRACTURE; MASSIVE TO
ELONGATED TO WEDGE LIKE CUTTINGS HABIT;
DULL TO EARTHY DULL TO OCCASIONAL SEMI-
WAXY TO SEMI-FROSTED LUSTER; MODERATELY
SMOOTH TO SLIGHTLY SILTY TEXTURE; NO VIS
-IBLE LAMINAE OR OTHER DISTINGUISHABLE
STRUCTURAL FEATURES PRESENT; NO ACCESSOR
-Y MINERALS PRESENT IN SAMPLE.

SILTSTONE = MEDIUM GRAY TO BROWNISH GRAY
TO OCCASIONALLY DUSKY BROWN; TENACITY IS
DENSE TO BRITTLE TO SLIGHTLY CRUMBLY;
FRACTURES MOSTLY FROM BLOCKY TO IRREG
-ULAR; CUTTINGS ARE WEDGELIKE TO SEMI-TA
-BULAR; DULL TO WAXY WITH OCCASIONALLY A
SLIGHT SPARKLING LUSTER; SILTY TO GRITTY
TEXTURE; THICK STRUCTURE; GRADING FROM
SANDSTONE.

CARBONACEOUS SHALE = BLACK TO BROWNISH
BLACK TO GRAYISH BLACK; BRITTLE TENACITY
IRREGULAR TO BLOCKY FRACTURING; CUTTINGS
ARE NODULAR TO WEDGELIKE; POLISHED TO
RESINOUS LUSTER; THIN STRUCTURE; INTERBE
-DED WITH SANDSTONE SILTSTONE AND SHALE.





10400 MD
10100
10500 MD
10200
10600 MD
10300
10700 MD
10400
10800 MD
10500
10900 MD
10600
11000 MD
10700
11100 MD
10800
11200 MD
10900
11300 MD
11000
11400 MD
11100

200
50
ROP
Avg WOB

Ttl Gas 1.5K x 10
CO2 10K x 10
Flare Ht 100 x 10

Meth C-1 100K
Eth C-2 100K
Prop C-3 100K
But C-4 100K
Pen C-5 100K

200
50
ROP
Avg WOB

Ttl Gas 1.5K x 10
CO2 40K x 10
Flare Ht 100 x 10

Meth C-1 100K
Eth C-2 100K
Prop C-3 100K
But C-4 100K
Pen C-5 100K

CUTTINGS ARE NODULAR TO WEDGELIKE; LUSTER IS POLISHED TO RESINOUS; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE; HIGH GAS ASSOCIATED WITH SAMPLE.

SHALE = MEDIUM LIGHT GRAY TO GREENISH GRAY TO LIGHT BLuish GRAY WITH AN OCCASIONAL LIGHT OLIVE BROWN HUE; BRITTLE TO CRUNCHY TENACITY; PLANAR TO SPLINTERY FRACTURING; CUTTINGS ARE PLATY TO SLIGHTLY ELONGATED; EARTHY TO DULL TO SLIGHTLY WAXY LUSTER; SMOOTH TEXTURE; THIN TO SOMEWHAT THICK STRUCTURE.

SILTSTONE = MODERATE OLIVE BROWN TO BROWNISH GRAY TO MEDIUM GRAY; BRITTLE TO CRUMBLY TENACITY; IRREGULAR FRACTURING; CUTTINGS ARE TABULAR TO WEDGELIKE; EARTHY WITH A SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; GRADING FROM SANDSTONE; NO VISIBLE STRUCTURE.

CARBONACEOUS SHALE = BROWNISH GRAY TO DARK BROWNISH GRAY TO BROWNISH BLACK TO OLIVE BLACK; SLIGHTLY TOUGH TO MODERATELY DENSE TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; OCCASIONAL MASSIVE TO SUB-TABULAR TO SUB-NODULAR TO OCCASIONAL WEDGE LIKE CUTTINGS HABIT; DULL TO EARTH-Y DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; VERY SMALL AMOUNT OF COAL VISIBLY DEGASSING IN SAMPLE, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = PALE YELLOWISH GRAY TO VERY LIGHT BROWNISH-TAN GRAY TO VERY LIGHT GRAY WITH BLACK AND MODERATE BROWN HUES; QUARTZ DOMINANT FRAME WORK; PREDOMINATELY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; COMPOSED OF CALCITIC CEMENTATION WITH MODERATE REACTION TO DILUTE HCL; MATRIX CONTAINS 5 TO 8% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, SMALL AMOUNT OF COAL VISIBLY EFFERVESCING IN SAMPLE, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM LIGHT GRAY; SLIGHTLY TOUGH TO MODERATELY DENSE TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO ELONGATED TO WEDGE LIKE CUTTINGS; DULL TO WAXY LUSTER; SMOOTH TEXTURE; THIN TO LAMINAE STRUCTURE.

NOTE = MADE BIT TRIP @ 11147' MD ON 6/26/2010.

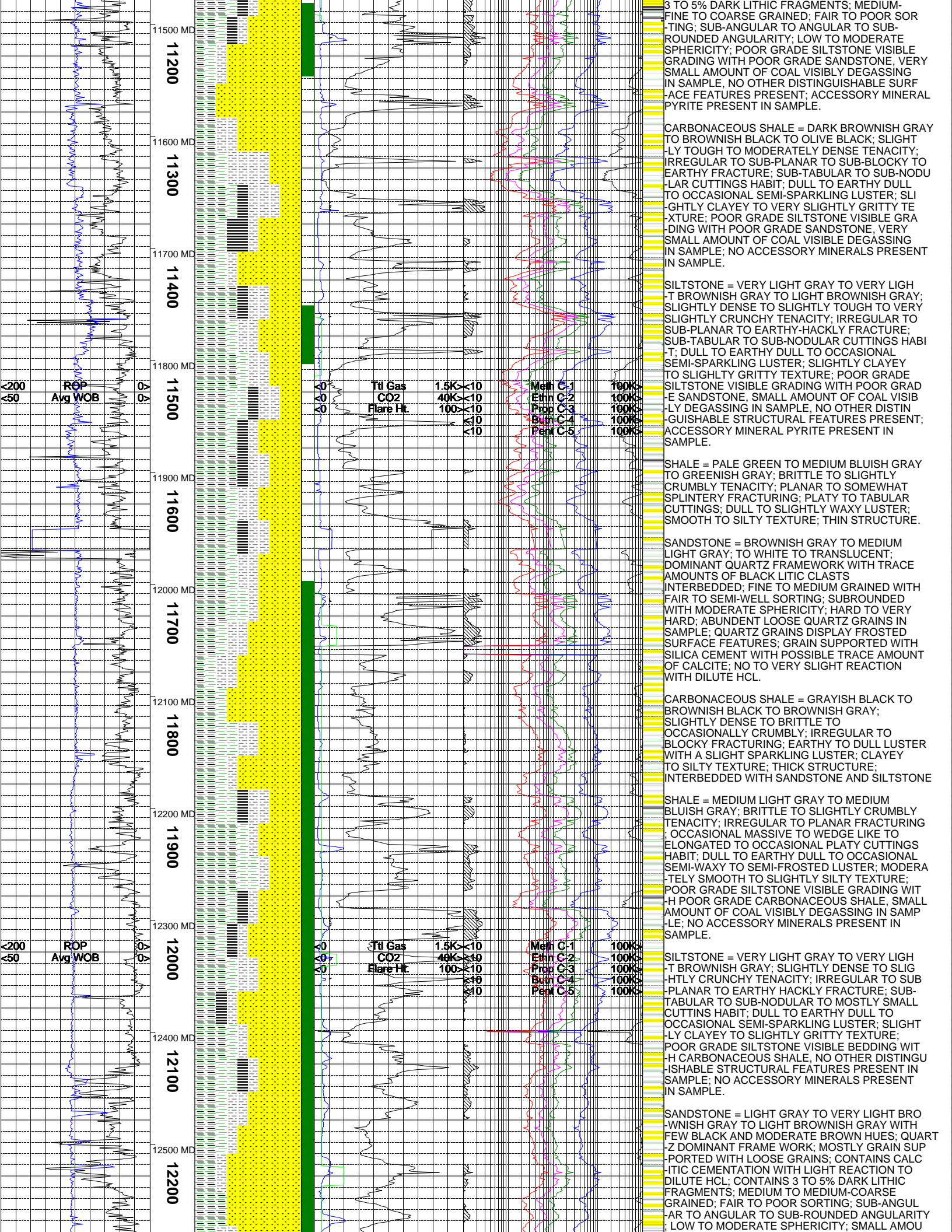
CARBONACEOUS SHALE = BLACK TO GRAYISH BLACK TO BROWNISH BLACK; DENSE TO BRITTLE TO OCCASIONALLY CRUMBLY TENACITY; BLOCKY TO PLANAR FRACTURING; CUTTINGS ARE NODULAR TO TABULAR; EARTHY TO RESINOUS LUSTER; SMOOTH TO SILTY TEXTURE; THICK TO SLIGHTLY MASSIVE STRUCTURE; CONTAINS TRACE AMOUNTS OF PYRITE AS ACCESSORY; SOME SPECIMENS CAN BE SEEN TRANSITIONING INTO IMATURE COAL.

COAL = BLACK; CRUMBLY TO SLIGHTLY BRITTLE TENACITY; FRACTURES FROM MOSTLY PLANAR TO OCCASIONALLY BLOCKY; TABULAR TO NODULAR CUTTINGS; POLISHED TO RESINOUS TO SLIGHTLY EARTHY LUSTER; TEXTURE IS SMOOTH TO CLAYEY; THIN TO SEMI-THICK STRUCTURE; HIGH GAS ASSOCIATED WITH SAMPLE.

SILTSTONE = BROWNISH GRAY TO BROWNISH BLACK TO OLIVE GRAY; DENSE TO CRUNCHY TENACITY; IRREGULAR FRACTURING; VERY FINE GRAINS; NODULAR TO WEDGELIKE CUTTINGS; EARTHY TO WAXY WITH A SLIGHT SPARKLING LUSTER; SILTY TEXTURE; THIN STRUCTURE.

SHALE = LIGHT BLUSH GRAY TO MEDIUM LIGHT GRAY TO GRAYISH GREEN WITH OCCASIONAL DUSKY YELLOW HUES; BRITTLE TO SLIGHTLY CRUMBLY TENACITY; PLANAR TO SPLINTERY FRACTURING; CUTTINGS ARE PLATY TO SCALY; WAXY TO DULL LUSTER; SMOOTH TO SILTY TEXTURE; THIN TO LAMINAE STRUCTURE.

ROLLINS SANDSTONE = OFF WHITE TO WHITE TO VERY LIGHT YELLOWISH GRAY TO VERY LIGHT GRAY WITH FEW BLACK HUES; QUARTZ DOMINANT FRAME WORK; GRAIN SUPPORTED WITH MOSTLY LOOSE GRAINS; COMPOSED OF SILICA CEMENTATION WITH VERY LITTLE TO NO REACTION TO DILUTE HCL; MATRIX CONTAINS



11500 MD
11200
11600 MD
11300
11700 MD
11400
11800 MD
11500
11900 MD
11600
12000 MD
11700
12100 MD
11800
12200 MD
11900
12300 MD
12000
12400 MD
12100
12500 MD
12200

200
50
ROP
Avg WOB

Ttl Gas	1.5K < 10	Meth C-1	100K >
CO2	40K < 10	Ethn C-2	100K >
Flare Ht	100 < 10	Prog C-3	100K >
		Burn C-4	100K >
		Penl C-5	100K >

3 TO 5% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE. VERY SMALL AMOUNT OF COAL VISIBLY DEGASSING IN SAMPLE; NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

CARBONACEOUS SHALE = DARK BROWNISH GRAY TO BROWNISH BLACK TO OLIVE BLACK; SLIGHTLY TOUGH TO MODERATELY DENSE TENACITY; IRREGULAR TO SUB-PLANAR TO SUB-BLOCKY TO EARTHY FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE. VERY SMALL AMOUNT OF COAL VISIBLY DEGASSING IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO VERY LIGHT BROWNISH GRAY TO LIGHT BROWNISH GRAY; SLIGHTLY DENSE TO SLIGHTLY TOUGH TO VERY SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE. SMALL AMOUNT OF COAL VISIBLY DEGASSING IN SAMPLE. NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

SHALE = PALE GREEN TO MEDIUM BLUISH GRAY TO GREENISH GRAY; BRITTLE TO SLIGHTLY CRUMBLY TENACITY; PLANAR TO SOMEWHAT SPLINTERY FRACTURING; PLATY TO TABULAR CUTTINGS; DULL TO SLIGHTLY WAXY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE.

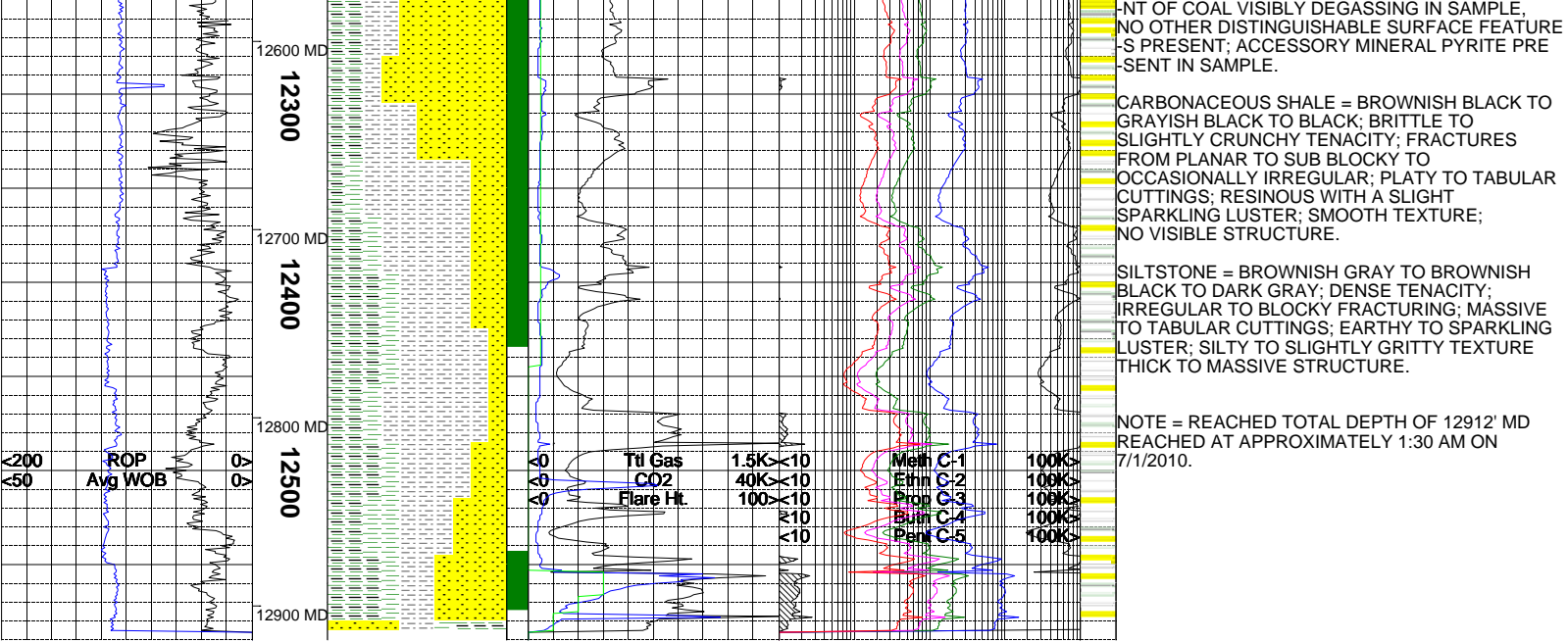
SANDSTONE = BROWNISH GRAY TO MEDIUM LIGHT GRAY; TO WHITE TO TRANSLUCENT; DOMINANT QUARTZ FRAMEWORK WITH TRACE AMOUNTS OF BLACK LITHIC CLASTS INTERBEDDED; FINE TO MEDIUM GRAINED WITH FAIR TO SEMI-WELL SORTING; SUBROUNDED WITH MODERATE SPHERICITY; HARD TO VERY HARD; ABUNDANT LOOSE QUARTZ GRAINS IN SAMPLE; QUARTZ GRAINS DISPLAY FROSTED SURFACE FEATURES; GRAIN SUPPORTED WITH SILICA CEMENT WITH POSSIBLE TRACE AMOUNT OF CALCITE; NO TO VERY SLIGHT REACTION WITH DILUTE HCL.

CARBONACEOUS SHALE = GRAYISH BLACK TO BROWNISH BLACK TO BROWNISH GRAY; SLIGHTLY DENSE TO BRITTLE TO OCCASIONALLY CRUMBLY; IRREGULAR TO BLOCKY FRACTURING; EARTHY TO DULL LUSTER WITH A SLIGHT SPARKLING LUSTER; CLAYEY TO SILTY TEXTURE; THICK STRUCTURE; INTERBEDDED WITH SANDSTONE AND SILTSTONE

SHALE = MEDIUM LIGHT GRAY TO MEDIUM BLUISH GRAY; BRITTLE TO SLIGHTLY CRUMBLY TENACITY; IRREGULAR TO PLANAR FRACTURING; OCCASIONAL MASSIVE TO WEDGE LIKE TO ELONGATED TO OCCASIONAL PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-WAXY TO SEMI-FROSTED LUSTER; MODERATELY SMOOTH TO SLIGHTLY SILTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE CARBONACEOUS SHALE. SMALL AMOUNT OF COAL VISIBLY DEGASSING IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO VERY LIGHT BROWNISH GRAY; SLIGHTLY DENSE TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO MOSTLY SMALL CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE BEDDING WITH CARBONACEOUS SHALE. NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = LIGHT GRAY TO VERY LIGHT BROWNISH GRAY TO LIGHT BROWNISH GRAY WITH FEW BLACK AND MODERATE BROWN HUES; QUARTZ DOMINANT FRAMEWORK; MOSTLY GRAIN SUPPORTED WITH LOOSE GRAINS; CONTAINS CALCITIC CEMENTATION WITH LIGHT REACTION TO DILUTE HCL; CONTAINS 3 TO 5% DARK LITHIC FRAGMENTS; MEDIUM TO MEDIUM-COARSE GRAINED; FAIR TO MEDIUM-COARSE SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; SMALL AMOUNT OF COAL VISIBLY DEGASSING IN SAMPLE.



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