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

MUDLOG TVD

COMPANY	ExxonMobil Corporation
WELL	PCU 296-5A04
FIELD	Piceance Creek
REGION	Rockies
COORDINATES	39.911931000 108.198593000
ELEVATION	7295.8'
COUNTY, STATE	Rio Blanco, CO
API INDEX	051031124500
SPUD DATE	11/09/2009
CONTRACTOR	Helmerich and Payne
CO. REP.	Candice Curtis/Mark Hudon
RIG/TYPE	Flex 4/Rig 321
LOGGING UNIT	031
GEOLOGISTS	Chad Record, Mike Franco, Bart Smelser, Mark Gross
ADD. PERSONS	Mickey Piper, Robert McCane
CO. GEOLOGIST	Chris Alba

LOG INTERVAL

DEPTHS:	4705'	TO	13757'
DATES:	10/31/2010	TO	12/08/2010
SCALE:	1" = 100'		

CASING DATA

16"	AT	150'
10.75"	AT	4616'
7.00"	AT	9992'
4.50"	AT	13735'

MUD TYPES

Water Based	TO	13757'
	TO	
	TO	
	TO	

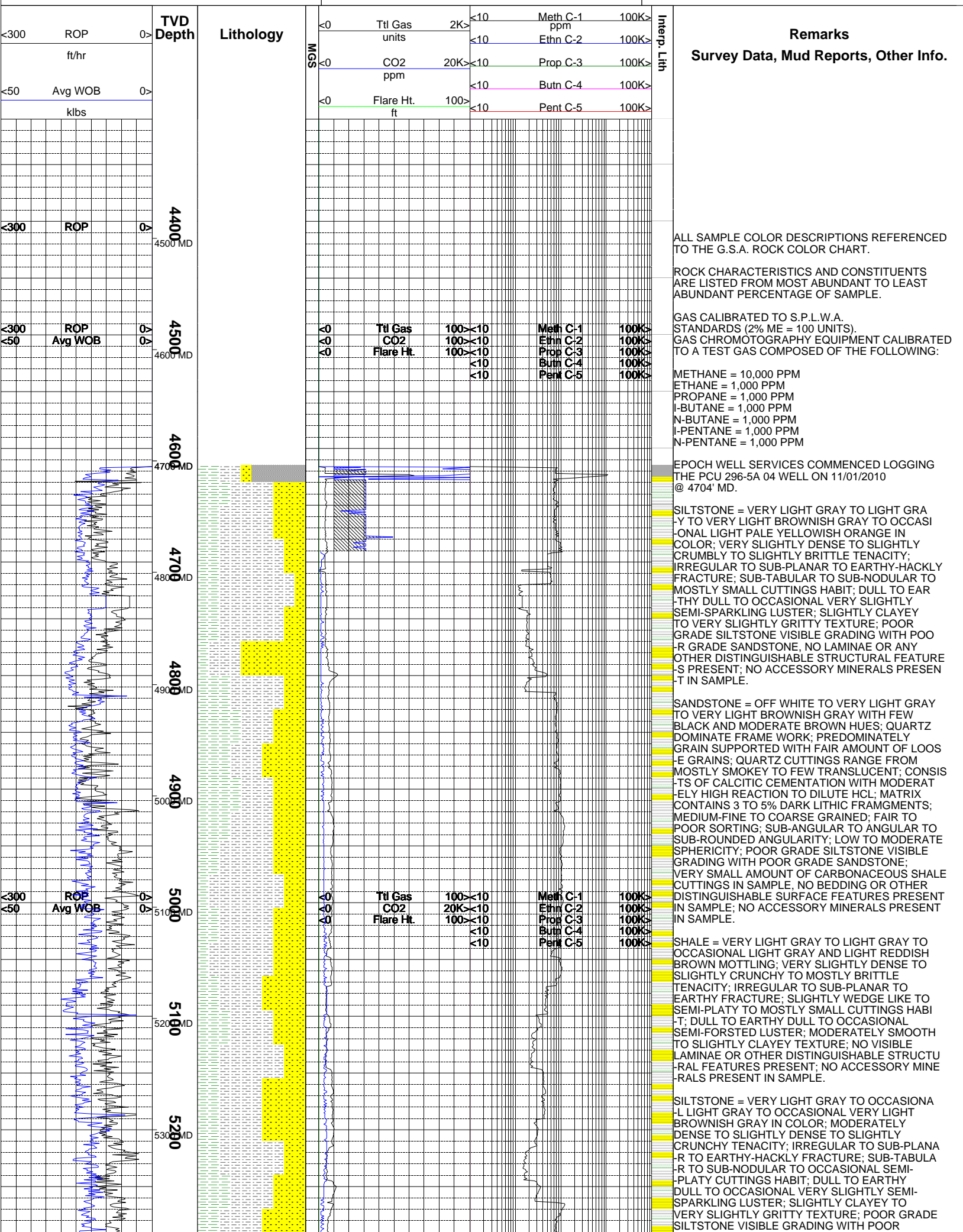
HOLE SIZE

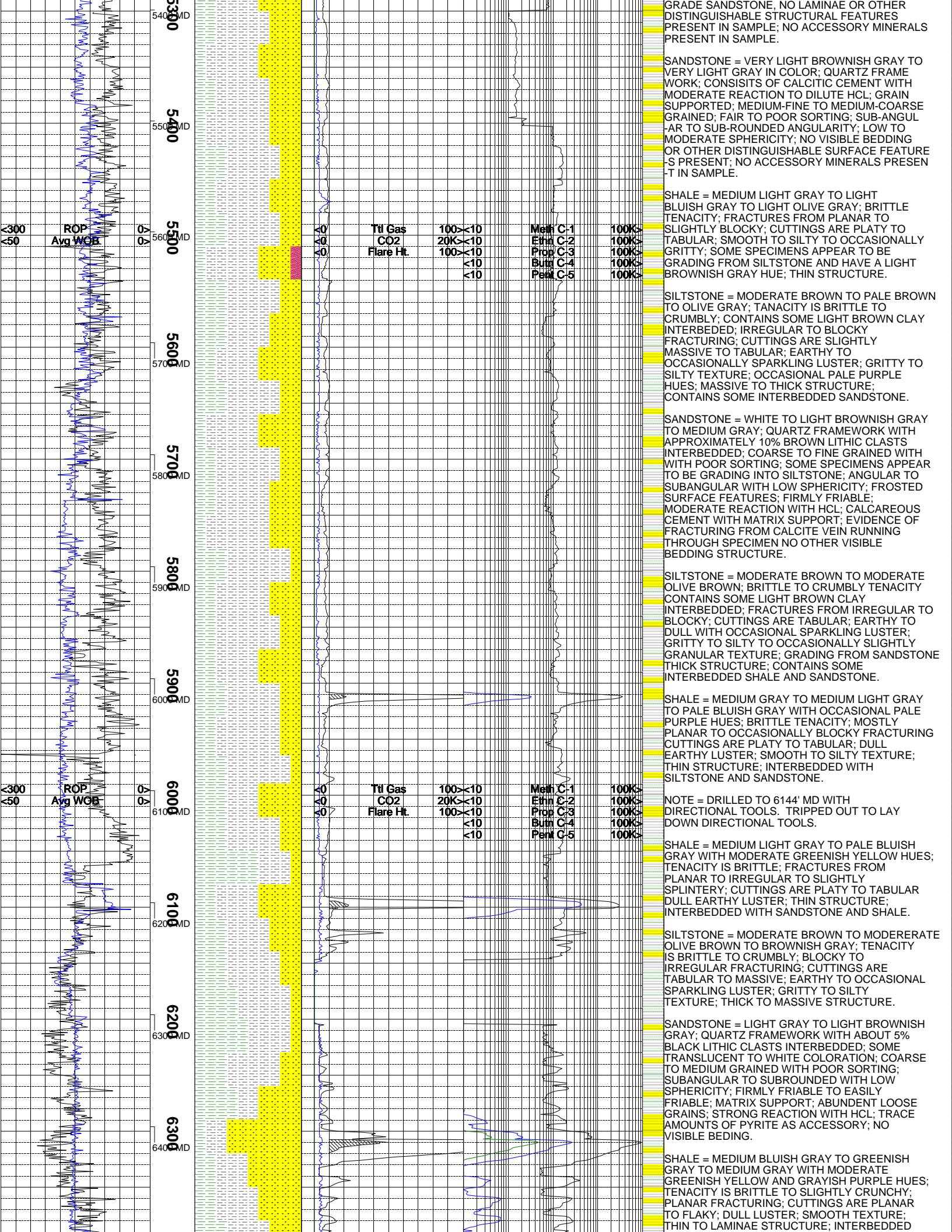
14.75"	TO	4704'
9.875"	TO	10004'
6.125"	TO	13757'
	TO	

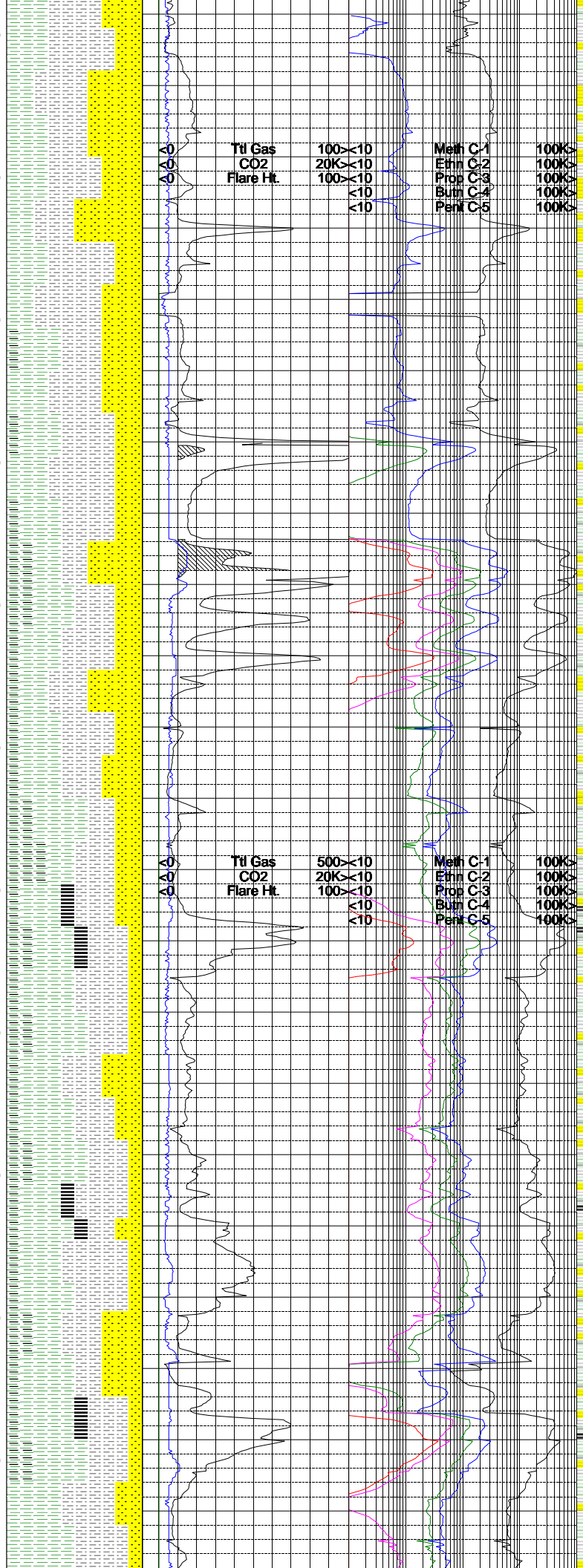
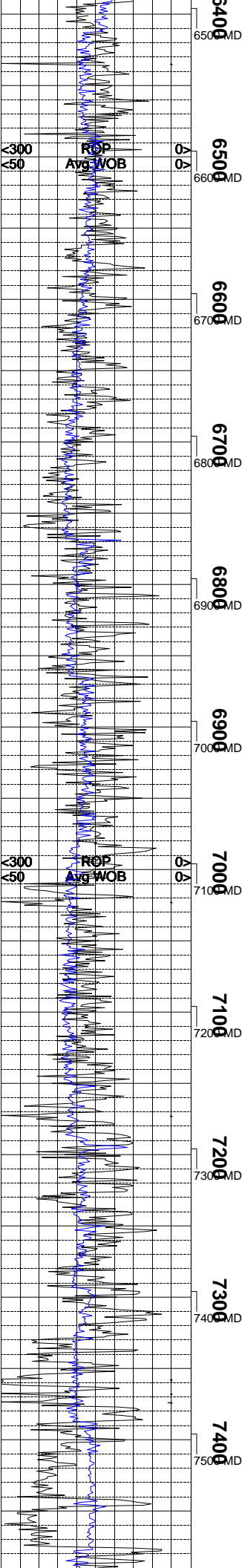
ABBREVIATIONS

<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	KAOLINITIC	RECRYSTALLIZED CALCITE	VOLCANICS
CHALK	DIATOMITE	LIMESTONE	RHYOLITE	
CRYSTALLINE TUFF	DIORITE	LITHIC TUFF	SALT	
CHERT - ARGILL	DOLOSTONE	MARL - DOLO	SAND	







WITH SILTSTONE AND SANDSTONE.

SANDSTONE = WHITE TO LIGHT GRAY TO GREEN ISH GRAY TO TRANSLUCENT; DOMINATE QUARTZ FRAMEWORK WITH LESS THAN 5% BLACK LITHIC CLASTS INTERBEDDED; MEDIUM TO FINE GRAINED WITH FAIR TO POOR SORTING; SUNROUNDED TO SUBANGULAR WITH LOW TO MODERATE SPHERICITY; FIRMLY FRIABLE TO MODERATE HARDNESS; CALCITE CEMENT; MODERATE TO STRONG REACTION WITH DILUTE HCL.

SILTSTONE = MODERATE BROWN TO DARK REDDISH BROWN TO BROWNISH GRAY; TENACITY IS BRITTLE TO CRUMBLY TO OCCASIONALLY SLIGHTLY DENSE; FRACTURES FROM MOSTLY BLOCKY TO IRREGULAR; CUTTINGS ARE TABULAR; SILTY TO GRITTY TEXTURE; GRADING FROM SANDSTONE; THICK STRUCTURE; INTERBEDDED WITH SANDSTONE AND SHALE.

SHALE = PALE BLUE TO GREENISH GRAY TO MEDIUM GRAY; BRITTLE TO SLIGHTLY CRUNCHY TENACITY; FRACTURES FROM PLANAR TO SPLINTERY; CUTTINGS ARE PLATY TO SLIGHTLY ELONGATED; DULL WAXY LUSTER; SMOOTH TO OCCASIONALLY SILTY TEXTURE; SOME SPECIMENS APPEAR TO BE GRADING FROM SILTSTONE; THIN STRUCTURE.

CARBONACEOUS SHALE = BRONISH BLACK TO GRAYISH BLACK TO DARK GRAY; TENACITY IS BRITTLE TO OCCASIONALLY CRUMBLY; IRREGULAR TO PLANAR TO SPLINTERY FRACTURING; CUTTINGS ARE WEDGELIKE TO PLANAR; EARTHY DULL TO WAXY LUSTER; SMOOTH TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SHALE AND SILTSTONE AND SANDSTONE; TRACE AMOUNTS OF PYRITE PRESENT AS AN ACCESSORY.

SANDSTONE = TRANSLUCENT TO WHITE TO LIGHT GRAY TO BROWNISH GRAY AND OCCASIONALLY GRAYISH BLUE GRAY; DOMINATE QUARTZ FRAMEWORK WITH LESS THAN 5% BLACK LITHIC CLASTS; TRACE AMOUNTS OF KSPAR; MOSTLY MEDIUM TO FINE WITH OCCASIONAL COARSE GRAINS; FAIR TO POOR SORTING; SUBROUNDED TO SUBANGULAR WITH LOW SPHERICITY; FIRMLY FRIABLE; CALCITE MATRIX SUPPORT; STRONG REACTION WITH HCL; NO VISIBLE BEDDING STRUCTURE; SOME FINE GRAINED SPECIMENS APPEAR TO BE GRADING TOWARDS SILTSTONE.

SILTSTONE = MEDIUM GRAY TO BROWNISH GRAY BRITTLE TO SLIGHTLY DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURING; CUTTINGS ARE TABULAR; EARTHY WITH A SLIGHT SPARKLING LUSTER; SILTY TO GRITTY TEXTURE.

SHALE = MEDIUM DARK GRAY TO OLIVE GRAY; BRITTLE TO SLIGHTLY DENSE TENACITY; PLANAR TO SPLINTERY FRACTURING; CUTTINGS ARE PLATY; WAXY TO DULL LUSTER; SMOOTH TO OCCASIONALLY SILTY TEXTURE; THICK STRUCTURE; INTERBEDDED WITH SILTSTONE AND SANDSTONE.

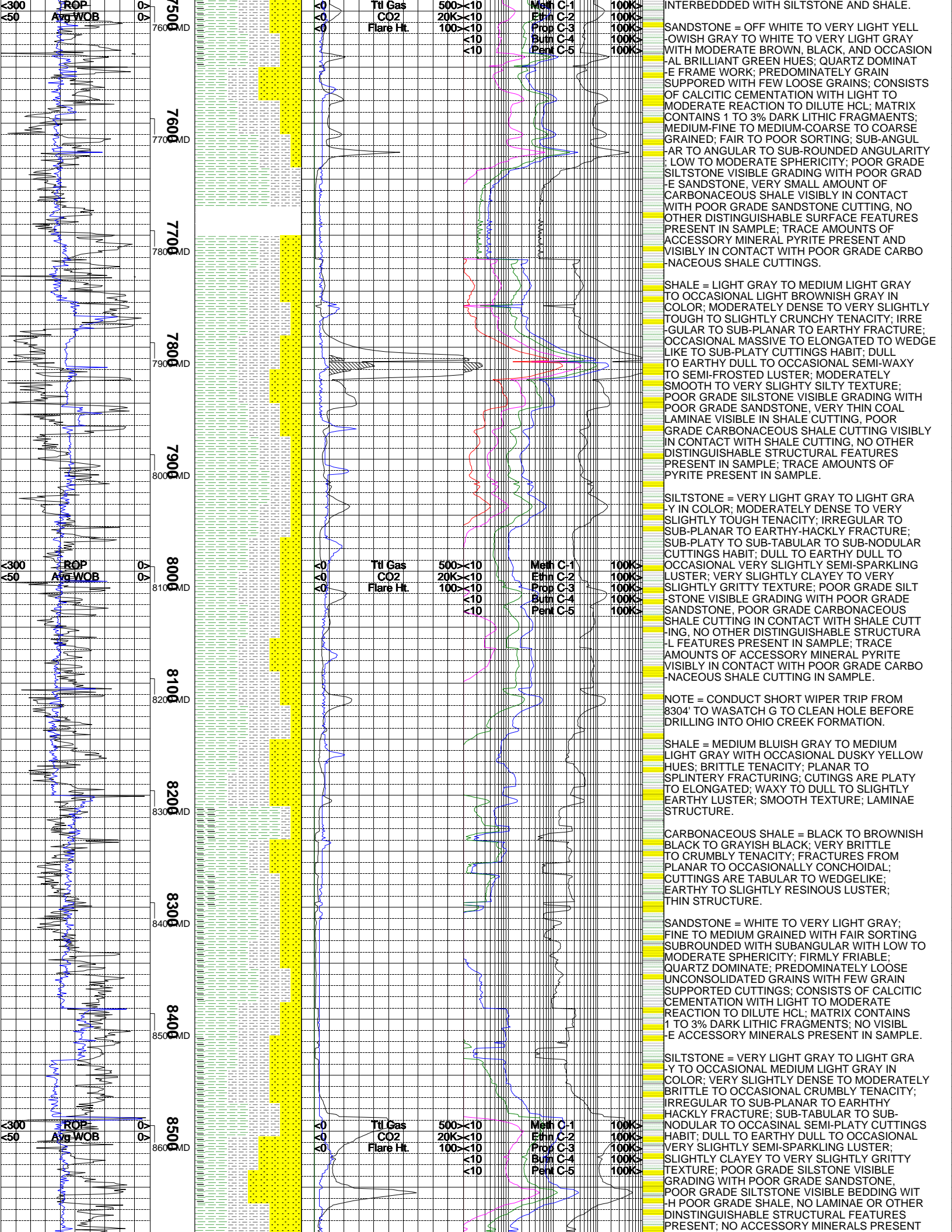
COAL = BLACK; CRUMBLY TO PULVERULENT TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR; CUTTINGS ARE NODULAR TO WEDGELIKE; RESINOUS TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE INTERBEDDED WITH SILTSTONE AND SHALE AND CARBONACEOUS SHALE AND SANDSTONE.

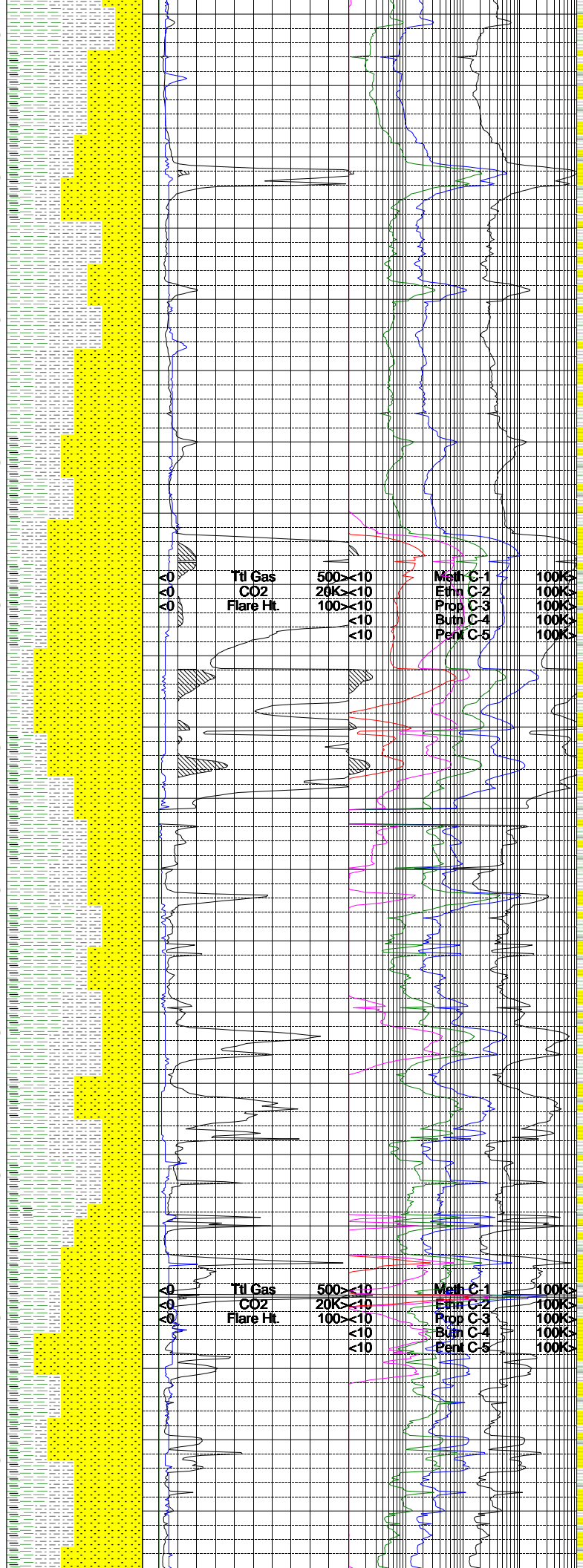
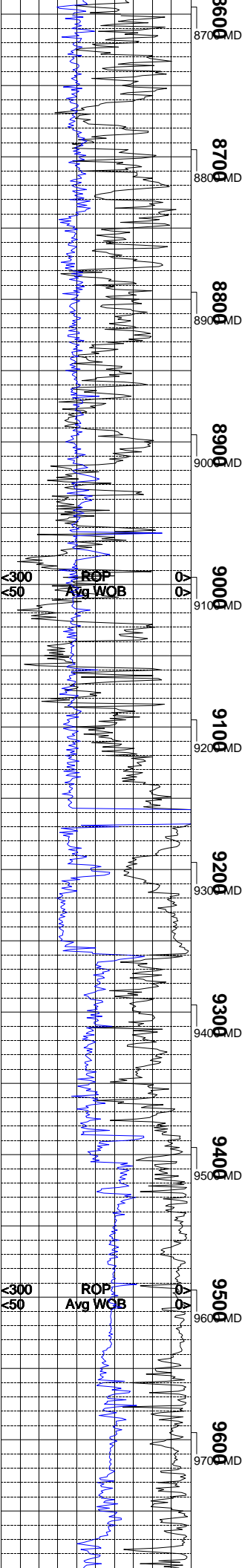
SANDSTONE = WHITE TO LIGHT GRAY TO MEDIUM GRAY; QUARTZ FRAMEWORK; FINE TO MEDIUM FINE GRAINED; WELL SORTED; SUBROUNDED TO SUBANGULAR WITH MODERATE SPHERICITY; MODERATE HARD TO FIRMLY FRIABLE; CALCITE MATRIX SUPPORT; SOME LOOSE GRAINS PRESENT IN SAMPLE; TRACE AMOUNTS OF PYRITE AS ACCESSORY MINERAL.

SHALE = MEDIUM GRAY TO MEDIUM DARK GRAY TO OLIVE GRAY; DENSE TO BRITTLE TENACITY; FRACTURES FROM PLANAR TO SPLINTERY; PLATY CUTTINGS HABIT; DULL WAXY LUSTER; SMOOTH TEXTURE THAT OCCASIONALLY GRADES TOWARDS SILTSTONE; THICK STRUCTURE.

SILTSTONE = MEDIUM GRAY TO BROWNISH GRAY TO MODERATE OLIVE BROWN; DENSE TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR; CUTTINGS ARE TABULAR; EARTHY TO WAXY WITH A SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; THICK STRUCTURE; INTERBEDDED WITH SHALE, CARBONACEOUS SHALE AND SANDSTONE.

CARBONACEOUS SHALE = GRAYISH BLACK TO BROWNISH BLACK TO DARK GRAY; TENACITY IS BRITTLE TO SLIGHTLY CRUMBLY; PLANAR TO SPLINTERY FRACTURING; CUTTINGS ARE PLATY TO ELONGATED; EARTHY TO RESINOUS LUSTER; SMOOTH TEXTURE; THIN STRUCTURE;





IN SAMPLE.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM GRAY WITH OCCASIONAL LIGHT GRAY AND PALE RED PURPLE MOTTLING IN COLOR; SLIGHTLY DENSE TO OCCASIONAL CRUMBLY TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO OCCASIONAL ELONGATED TO SEMI-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERATELY SMOOTH TO VERY SLIGHTLY SILTY TEXTURE; POOR GRADE SANDSTONE VISIBLE GRADING AND INTERBEDDING WITH POOR GRADE SILTSTONE, NO LAMINAE OR OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; TRACE AMOUNTS OF ACCESSORY MINERAL PYRITE VISIBLY IN CONTACT WITH POOR GRADE SANDSTONE CUTTING IN SAMPLE.

CARBONACEOUS SHALE = DARK BROWNISH GRAY TO BROWNISH BLACK TO OCCASIONAL OLIVE BLACK IN COLOR; MODERATELY DENSE TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO MOSTLY SMALL CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL VERY SLIGHTLY SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, POOR GRADE SILTSTONE VISIBLE BEDDING WITH POOR GRADE SHALE, NO LAMINAE OR OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; TRACE AMOUNTS OF ACCESSORY MINERAL PYRITE VISIBLY IN CONTACT WITH POOR GRADE CARBONACEOUS SHALE CUTTING.

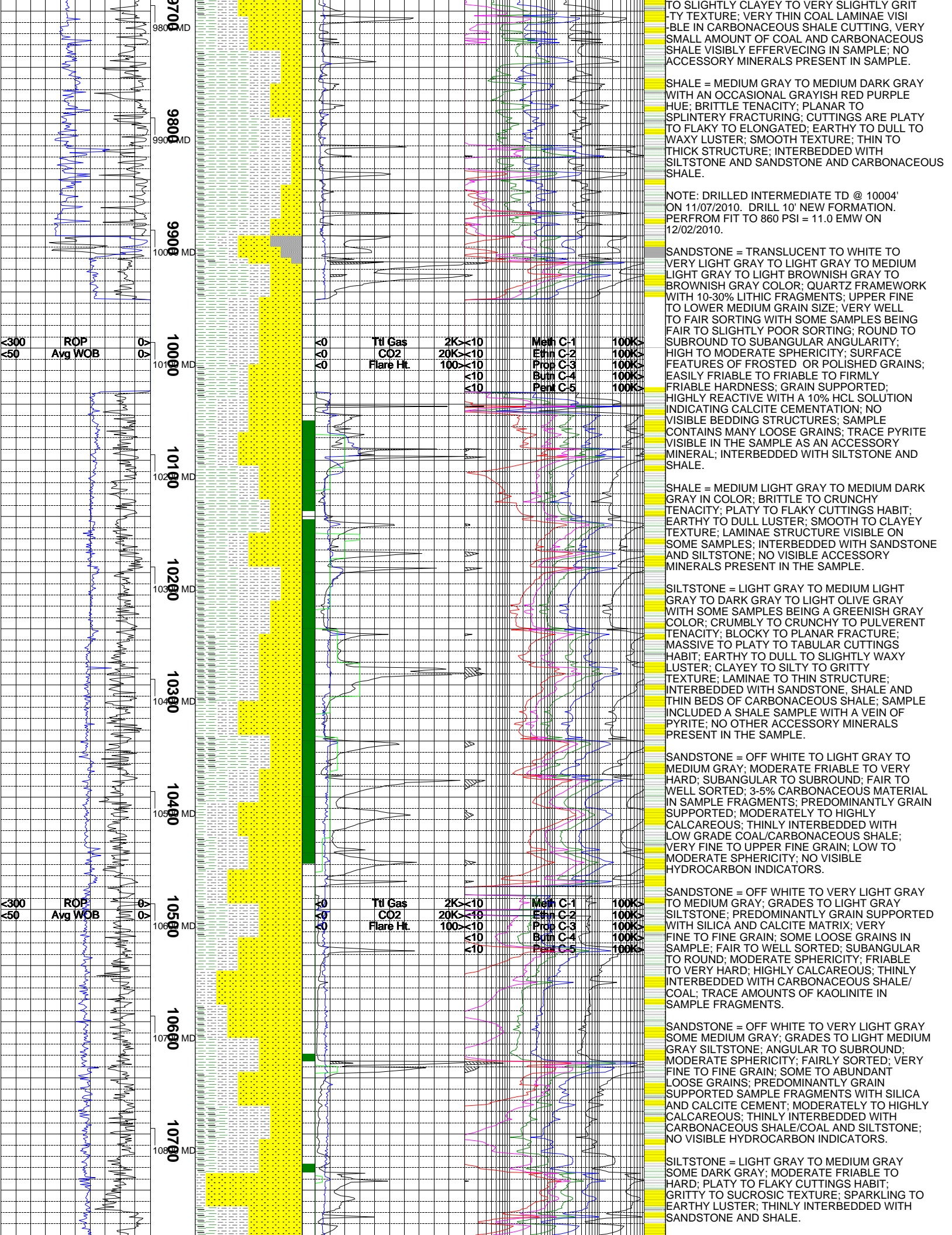
SANDSTONE = OFF WHITE TO WHITE TO VERY LIGHT GRAY TO TRANSLUCENT WITH FEW BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; PREDOMINATELY UNCONSOLIDATED LOOSE GRAINS WITH FEW GRAIN SUPPORTED CUTTINGS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATE TO MODERATELY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 3 TO 5% DARK LITHIC FRAGMENTS; QUARTZ CUTTINGS RANGE FROM SMOKY TO MOSTLY TRANSLUCENT; MEDIUM-FINE TO COARSE GRAIN SIZED; FAIR TO POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, SMALL AMOUNT OF CARBONACEOUS SHALE IN VISIBLE CONTACT WITH POOR GRADE SANDSTONE, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; TRACE AMOUNTS OF ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

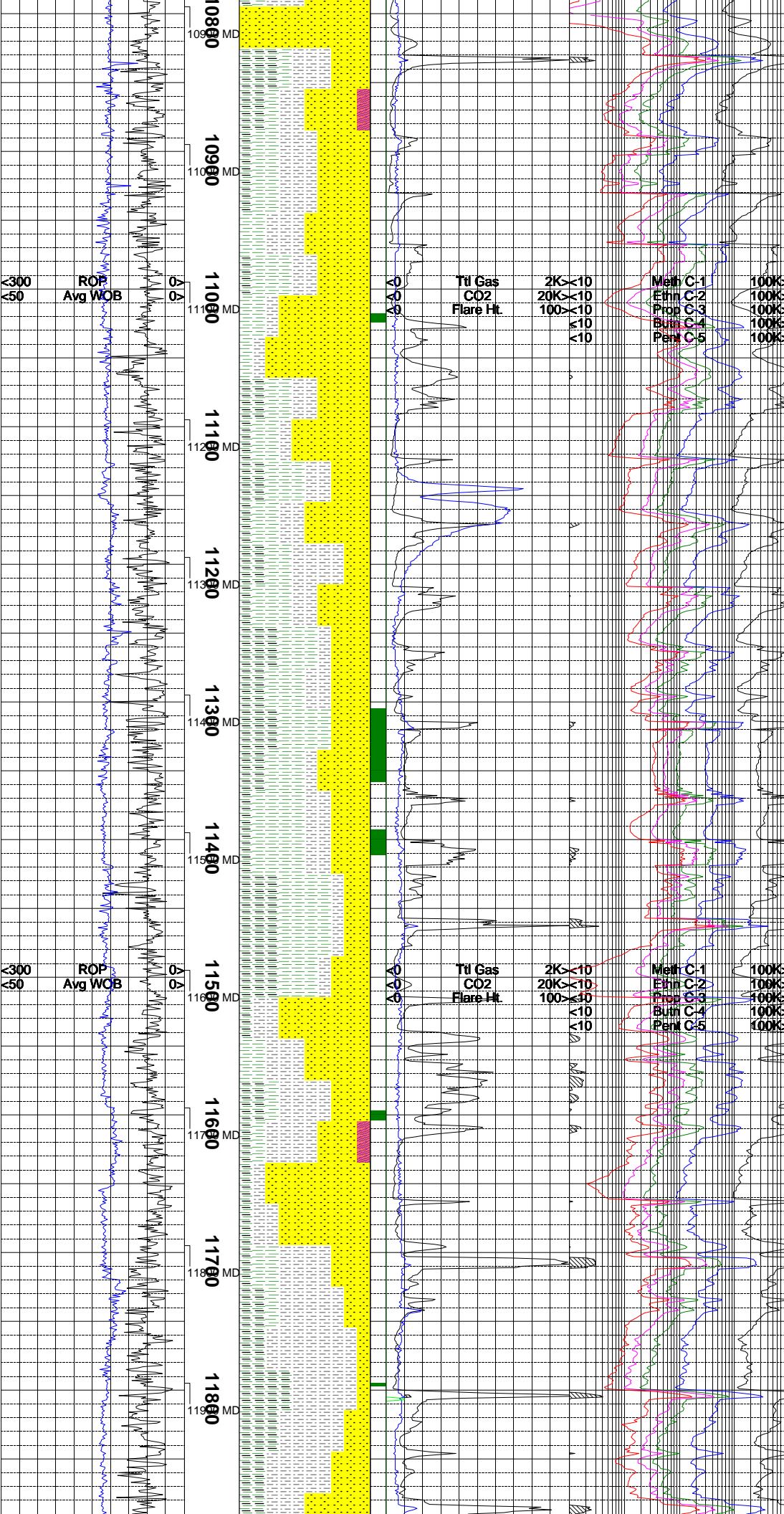
SHALE = MEDIUM DARK GRAY TO MEDIUM GRAY TO OLIVE GRAY TO MEDIUM BLuish GRAY WITH OCCASIONAL GRAYISH RED PURPLE HUES; SLIGHTLY DENSE TO BRITTLE TO CRUNCHY TENACITY; PLANAR FRACTURING; CUTTINGS ARE PLATY TO TABULAR TO ELONGATED; DULL TO EARTHY DULL TO OCCASIONAL SEMI-WAXY TO SEMI-FROSTED LUSTER; MODERATELY SMOOTH TO VERY SLIGHTLY SLIGHTLY TO SLIGHTLY CLAYEY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, VERY THIN COAL LAMINAE VISIBLE IN SHALE CUTTING, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERALS VISIBLY PRESENT IN SAMPLE.

SILTSTONE = DARK REDDISH BROWN TO MODERATE OLIVE BROWN TO MEDIUM DARK GRAY TO BROWNISH GRAY; DENSE TO SLIGHTLY BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURING; CUTTINGS ARE TABULAR TO WEDGELIKE; WAXY TO DULL WITH AN OCCASIONAL SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; THICK STRUCTURE.

SANDSTONE = TRANSLUCENT TO VERY LIGHT GRAY TO WHITE; DOMINATE QUARTZ FRAMEWORK WITH APPROXIMATELY 5-10% BLACK LITHIC CLASTS INTERBEDDED; MEDIUM FINE TO MEDIUM GRAINED WITH FAIR SORTING; SUBANGULAR TO SUBROUNDED WITH LOW SPHERICITY; FIRMLY FRIABLE WITH ABUNDANT LOOSE GRAINS; CALCITE CEMENT; MATRIX SUPPORT; STRONG REACTION WITH HCL; TRACE AMOUNTS OF PYRITE IN SAMPLE AS AN ACCESSORY MINERAL.

CARBONACEOUS SHALE = BROWNISH GRAY TO DARK BROWNISH GRAY TO BROWNISH BLACK IN COLOR; MODERATELY DENSE TO SLIGHTLY CRUMBLY TENACITY; IRREGULAR TO SUB-BLOCKY TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO OCCASIONAL WEDGE LIKE TO ELONGATED CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL VERY SLIGHTLY SEMI-SPARKLING LUSTER; SEMI-SMOOTH





SANDSTONE = OFF WHITE TO VERY LIGHT GRAY TO MEDIUM GRAY; GRADES TO LIGHT GRAY SILTSTONE; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA CEMENT; VERY FINE TO UPPER FINE GRAIN; ABUNDANT LOOSE GRAIN; FAIRLY SORTED; LOW TO MODERATE SPHERICITY; ANGULAR TO SUBROUND; FRIABLE TO MODERATE HARD; THINLY INTERBEDDED W/ CARBONACEOUS SHALE/COAL.

NOTE: HIGH GAS IS BLEEDING INTO THE WELL BORE FROM UP HOLE. CONNECTION GASES OBSERVED ON MUD LOG FROM ABOUT 2150 STROKES.

SHALE = VERY LIGHT GRAY TO MEDIUM LIGHT GRAY TO MEDIUM GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; PLANAR TO IRREGULAR FRACTURE; MASSIVE TO PLATY TO TABULAR TO WEDGELIKE CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE STRUCTURE VISIBLE IN THE SAMPLE; INTERBEDDED WITH SANDSTONE, SILTSTONE AND VERY THIN BEDS OF CARBONACEOUS SHALE; NO ACCESSORY MINERAL FOUND IN THE SAMPLE.

CARBONACEOUS SHALE = DARK GRAY TO ALMOST BLACK TO BLACK IN COLOR; DENSE TO BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURE; PLATY TO WEDGELIKE TO BLADED CUTTINGS HABIT; EARTHY TO DULL TO WAXY TO ALMOST GREASY LUSTER; SMOOTH TO CLAYEY TO SILTY TEXTURE; NO VISIBLE STRUCTURE PRESENT IN THE SAMPLE.

SILTSTONE = COLOR RANGES FROM VERY LIGHT GRAY TO MEDIUM GRAY TO VERY DARK GRAY; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT; EARTHY TO DULL TO GREASY TO SLIGHTLY RESINOUS; SILTY TO GRITTY TO ALMOST GRANULAR TEXTURE; NO VISIBLE STRUCTURE PRESENT IN THE SAMPLE; INTERBEDDED WITH SANDSTONE, SHALE AND CARBONACEOUS SHALE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

SANDSTONE = WHITE TO VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY IN COLOR; QUARTZ FRAMEWORK WITH 10-30% LITHIC FRAGMENTS; UPPER FINE TO LOWER MEDIUM GRAIN SIZE WITH LOOSE GRAINS BEING UPPER MEDIUM; WELL TO FAIR SORTING; SUBANGULAR TO SUBROUND ANGULARITY; HIGH TO MODERATE SPHERICITY; SURFACE FEATURE INCLUDE FROSTED AND POLISHED GRAINS POSSIBLY DUE TO MECHANICAL ABRASION; FRIABLE TO FIRMLY FRIABLE TO MODERATELY HARD HARDNESS; HIGHLY REACTIVE WITH A 10% HCL SOLUTION INDICATING CALCITE CEMENTATION; GRAIN SUPPORTED WITH NO VISIBLE BEDDING SURFACES; INTERBEDDED WITH SHALE AND CARBONACEOUS SHALE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

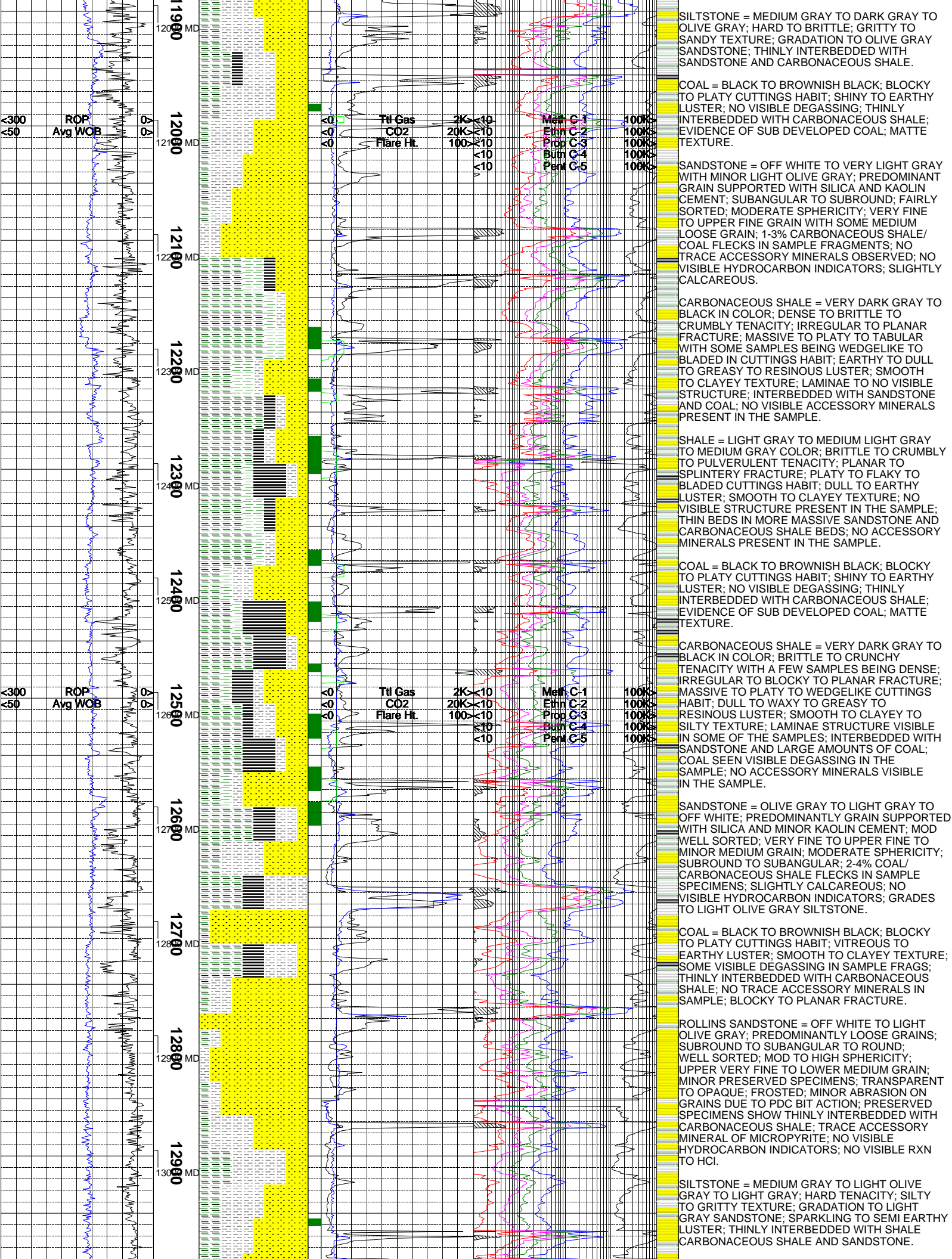
CARBONACEOUS SHALE = DARK GRAY TO ALMOST BLACK TO BLACK IN COLOR; DENSE TO BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURE; PLATY TO WEDGELIKE TO BLADED CUTTINGS HABIT; EARTHY TO DULL TO WAXY TO ALMOST GREASY LUSTER; SMOOTH TO CLAYEY TO SILTY TEXTURE; NO VISIBLE STRUCTURE PRESENT IN THE SAMPLE.

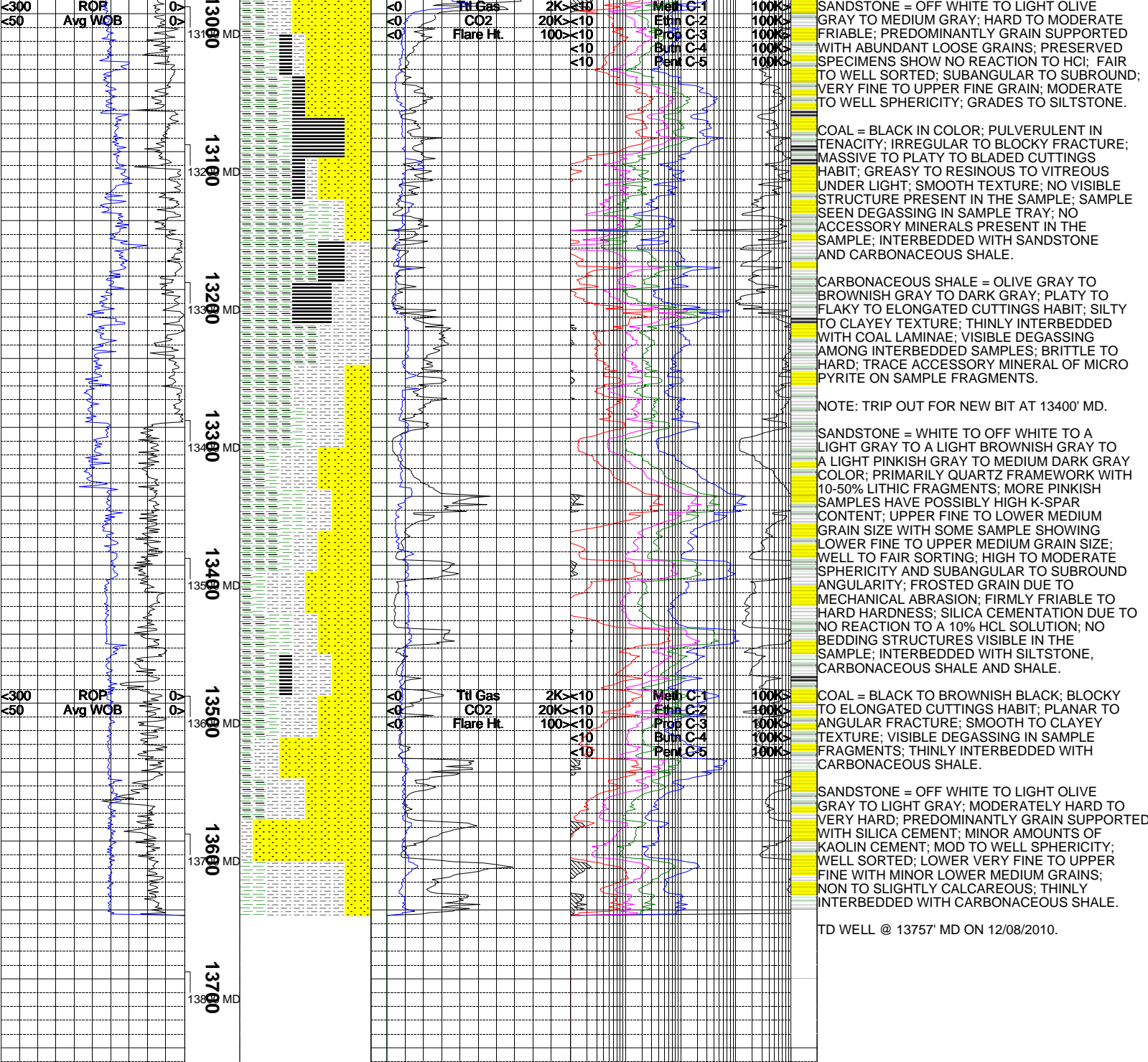
SANDSTONE = OFF WHITE TO LIGHT GRAY TO OLIVE GRAY; FRIABLE TO VERY HARD; FAIR TO WELL SORTED; MODERATE SPHERICITY; VERY FINE TO FINE GRAIN; SUBANGULAR TO ROUND; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA MATRIX; <10% KAOLINITE IN SAMPLE; THINLY INTERBEDDED WITH COAL/ CARBONACEOUS SHALE; SLIGHTLY TO MODERATELY CALCAREOUS.

SILTSTONE = MEDIUM GRAY TO LIGHT GRAY; HARD TO BRITTLE; PLATY TO FLAKY CUTTINGS HABIT; SPARKLING TO EARTHY LUSTER; SILTY TO SUCROSIC TEXTURE; GRADATION AND THIN INTERBEDDING WITH SANDSTONE AND SHALE; TRACE LOOSE SAND GRAINS IN SAMPLE FRAGS;

SANDSTONE = LIGHT OLIVE GRAY TO LIGHT GRAY TO OFF WHITE; FRIABLE TO MODERATE HARD; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND MINOR KAOLINITE CEMENT; ANGULAR TO SUBROUND; FAIR TO WELL SORTED; MODERATE SPHERICITY; VERY FINE TO UPPER FINE GRAIN; GRADATION TO MEDIUM GRAY SILTSTONE; 3-5% CARBONACEOUS SHALE/ COAL FLECKS IN SAMPLE FRAGMENTS; NO VISIBLE HYDROCARBON INDICATORS.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO DARK GRAY; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; BRITTLE TO HARD; SUCROSIC TO MATTE TEXTURE; THINLY INTERBEDDED WITH COAL LAMINAE; GRADATION TO LIGHT OLIVE GRAY SILTSTONE; EARTHY LUSTER.





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