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## MUDLOG TVD

**COMPANY** ExxonMobil Production  
**WELL** PCU296-5A05  
**FIELD** PICEANCE CREEK  
**REGION** ROCKYS  
**COORDINATES** 39.911890000 Deg N  
108.198602000 Deg W  
**ELEVATION** 7295.9'

**COUNTY, STATE** RIO BLANCO, CO  
**API INDEX** 051031124400  
**SPUD DATE** 11/14/2009  
**CONTRACTOR** HE  
**CO. REP.** CANDICE CURTIS

**RIG/TYPE** 321, FLEX 4  
**LOGGING UNIT** 31  
**GEOLOGISTS** C. RECORD / B. SMELSER  
M. FRANCO  
**ADD. PERSONS** M. PIPER  
R. McCANE  
**CO. GEOLOGIST** CHRIS ALBA

### LOG INTERVAL

**DEPTHS:** 4400' **TO** 13721'  
**DATES:** 11/11/2010 **TO** 11/28/2010  
**SCALE:** 1"=100'

### CASING DATA

16.00" **AT** 150'  
10.75" **AT** 4662'  
7.00" **AT** 9954'  
4.5" **AT** 13700'

### MUD TYPES

WATER BASED **TO** 13721'  
**TO**  
**TO**  
**TO**

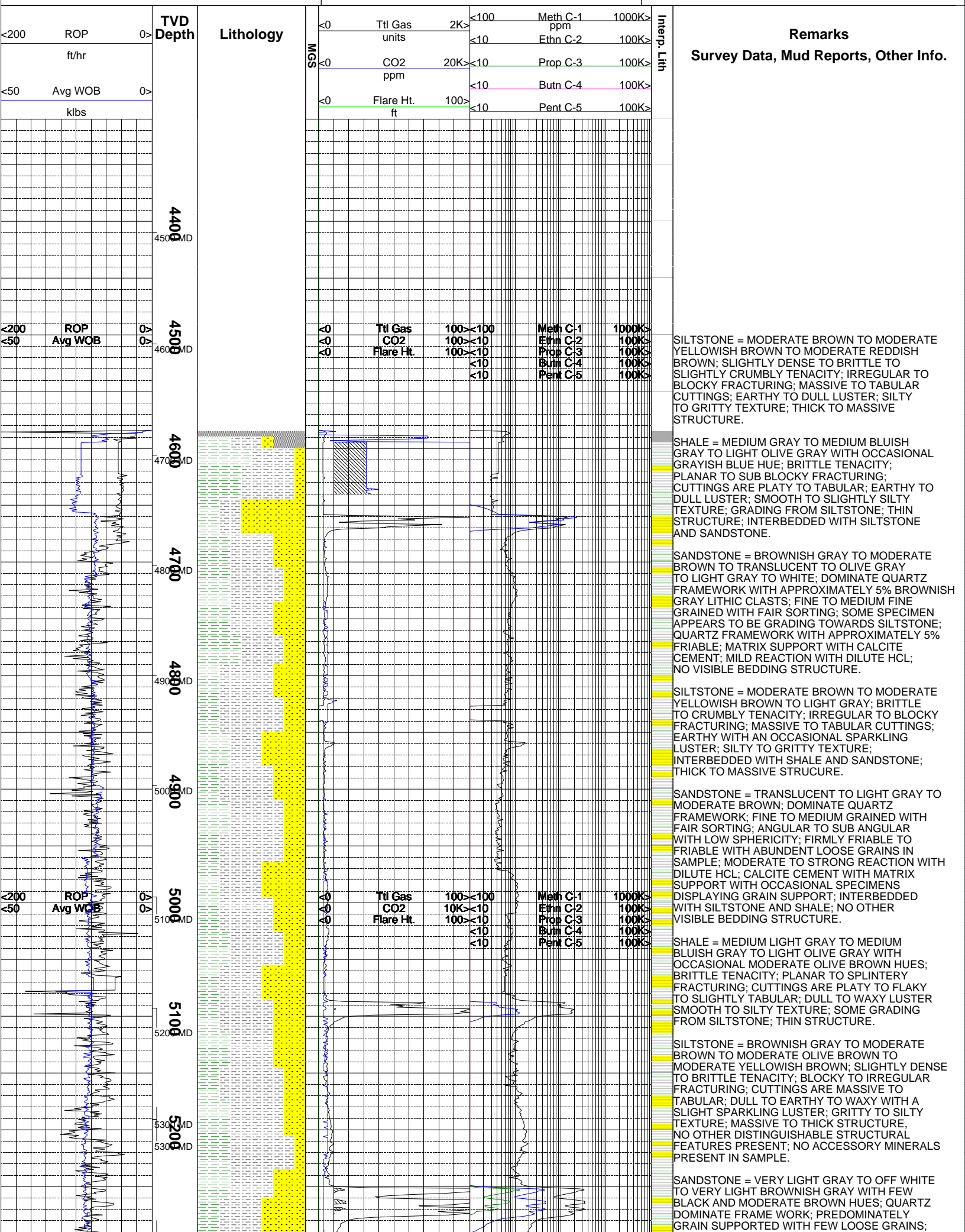
### HOLE SIZE

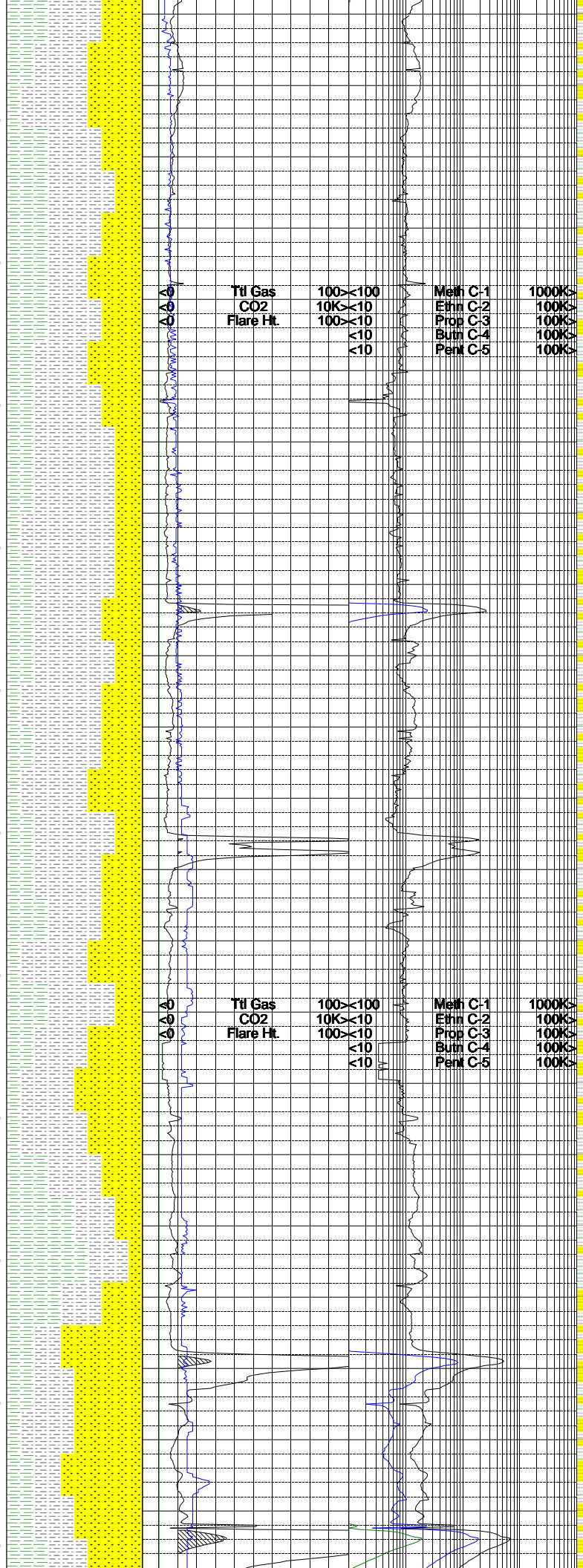
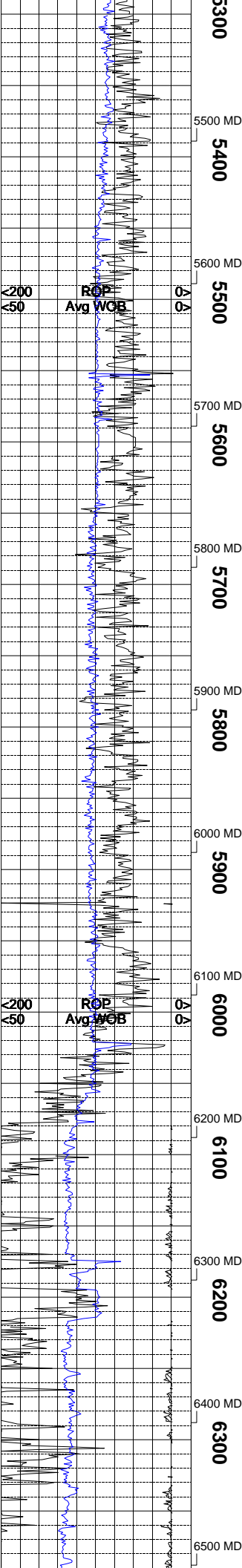
14.75" **TO** 4677'  
9.875" **TO** 9967'  
6.125" **TO** 13721'  
**TO**

### 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		





CONSISTS OF CALCITIC CEMENTATION WITH LIGHT TO MODERATE REACTION TO DILUTE HCL; MATRIX CONTAINS 3 TO 5% DARK LITHIC FRAGMENTS; FINE TO MEDIUM-COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO SUB-ROUNDED TO ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTS -TONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, AND BEDDING WITH POOR GRADE SHALE, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM GRAY IN COLOR; VERY SLIGHTLY DENSE TO SLIGHTLY CRUMBLY TO SLIGHTLY BRITTLE TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONA -L MASSIVE TO WEDGE LIKE TO SUB-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERATELY SMOOTH TO SLIGHTLY CLAYEY TO VERY SLIGHTLY SILTY TEXTURE; POOR GRADE SILTSTONE VISIBLE BEDDING WITH POOR GRADE SALE, POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTON -E, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES VISIBLY PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO VERY LIGH -T BROWNISH GRAY TO OCCASIONAL PALE YELL -OWISH ORANGE TO LIGHT BROWN IN COLOR; MODERATELY CRUMBLY TO VERY SLIGHTLY BRITTLE TO OCCASIONAL VERY SLIGHTLY DENS -E 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 VERY SLIGHTLY SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, NO LAMINAE OR OTHER DISTINGUISHABLE STRUCT -URAL FEATURES PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = LIGHT BROWNISH GRAY TO LIGHT PALE REDDISH BROWN TO OCCASIONAL VERY LIGHT GRAY WITH FEW BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; PREDOMINATELY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; CONSISTS OF CALCITIC CEMEN -TATION WITH MODERATE TO HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 3 TO 5% DARK LITHIC FRAGMENTS; FINE TO MEDIUM-COARSE GRAINED; FAIR TO MODERATELY POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, POOR GRADE SILTSTONE VISIBLE BEDDING WITH POOR GRADE SHALE, NO OTHER DISTINGUISHAB -LE SURFACE FEATURES PRESENT; NO ACCESSO -RY MINERALS PRESENT IN SAMPLE.

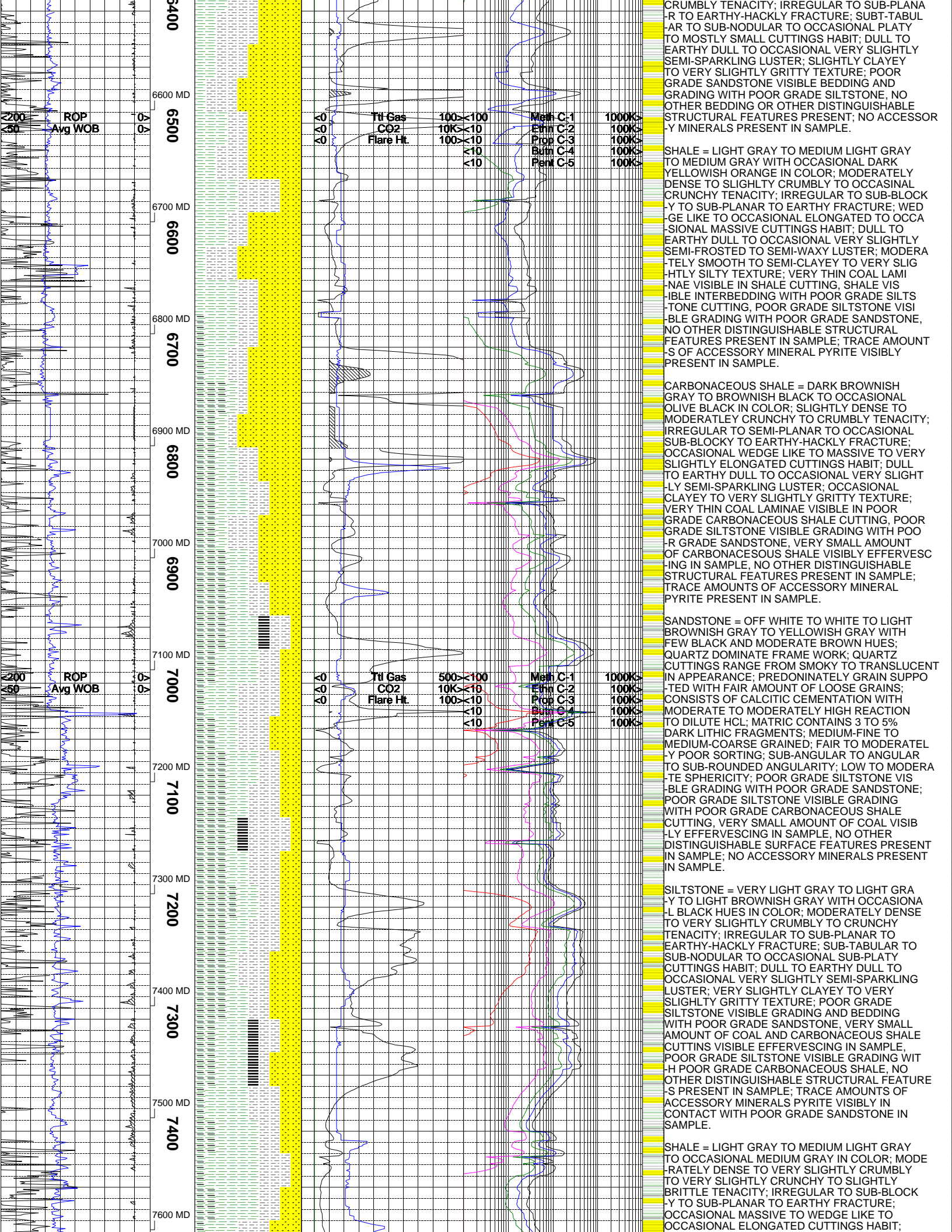
NOTE: DRILLED TO 6132', POOH TO REMOVE DIRECTIONAL TOOLS ON 11/12/2010.

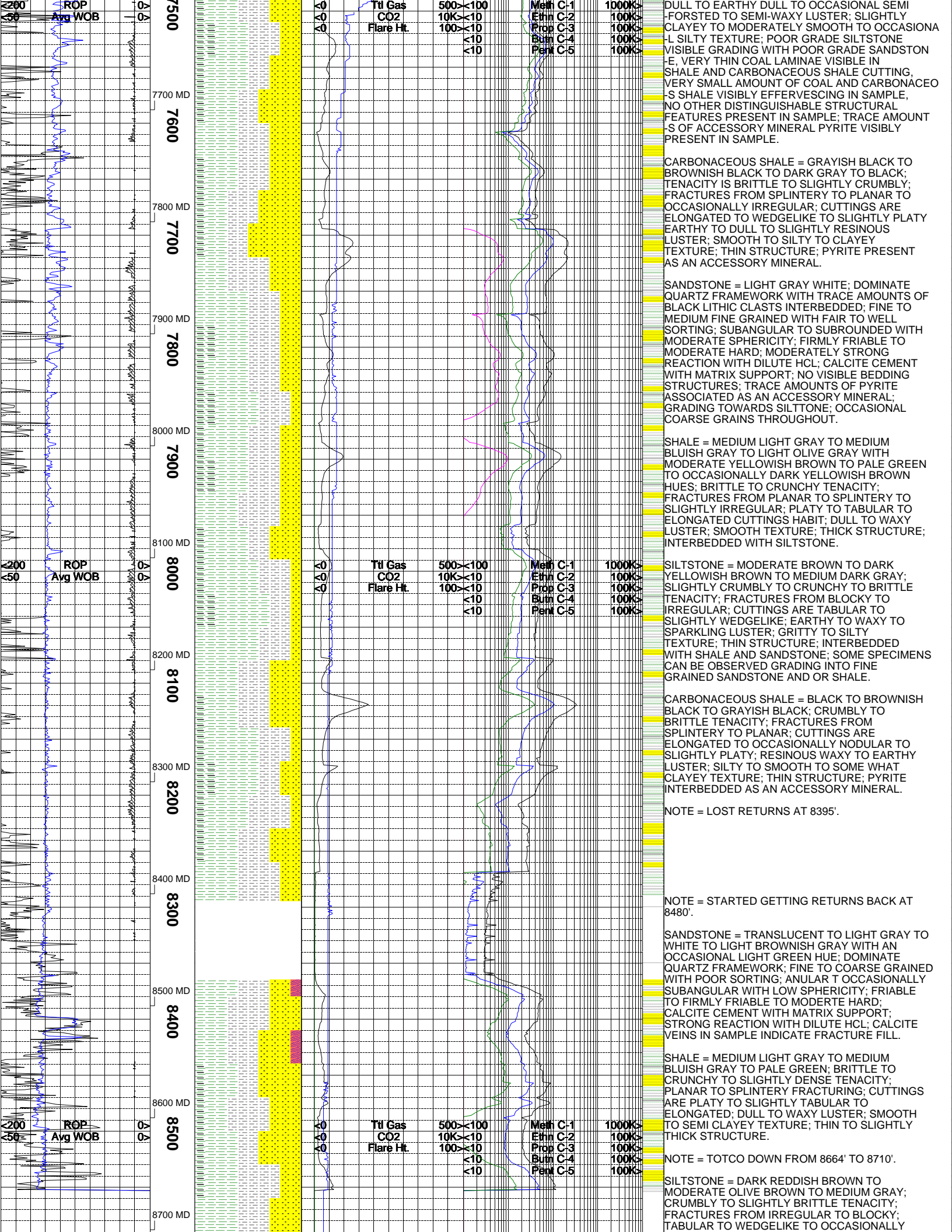
SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM GRAY IN COLOR; MODERATELY DENSE TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO OCCASIONAL ELONGATED CUTTI -NGS HABIT; DULL TO EARTHY DULL TO OCCAS -IONAL SEMI-WAXY TO SEMI-FROSTED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

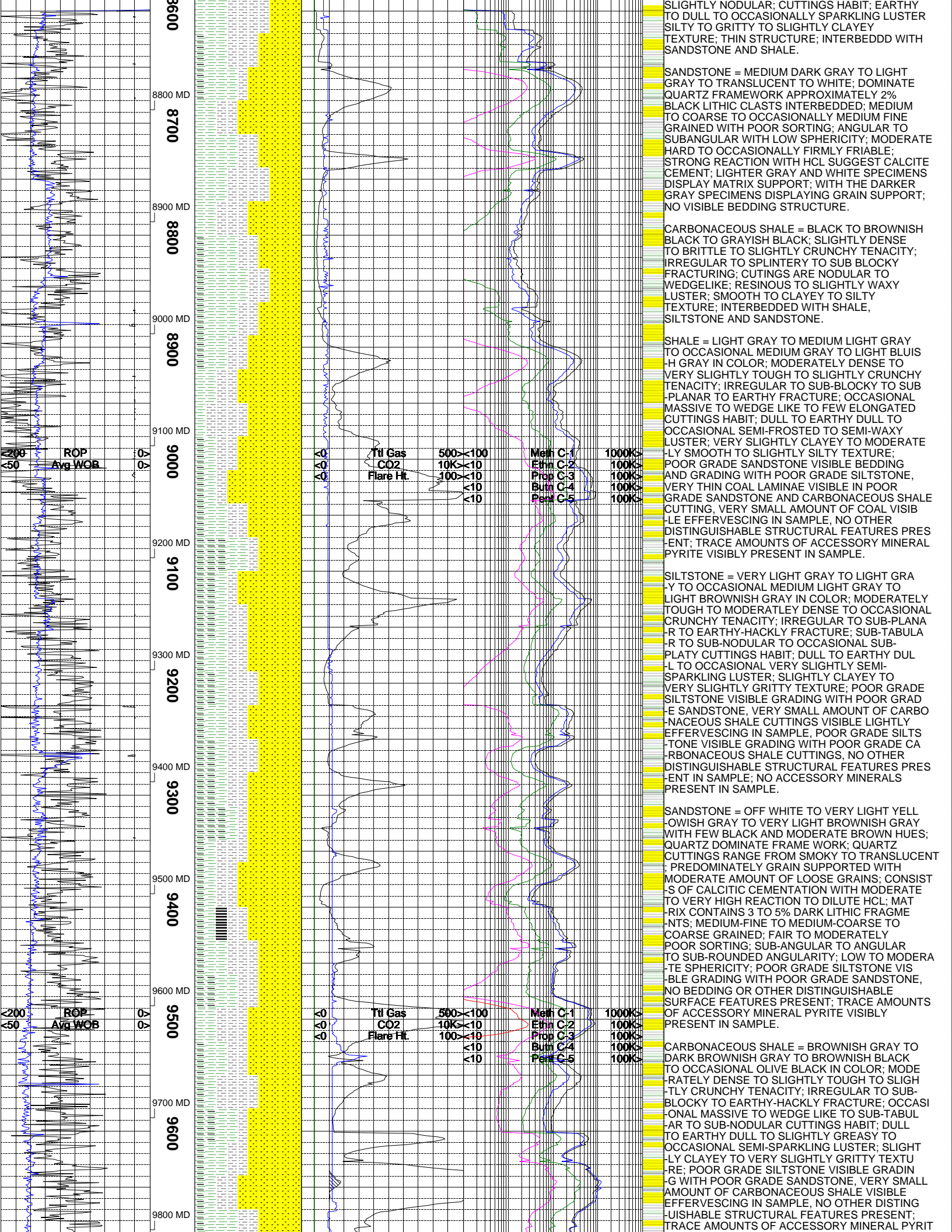
WASATCH G SANDSTONE = OFF WHITE TO WHITE TO VERY LIGHT GRAY WITH OCCASIONAL BLACK MODERATE BROWN, AND OCCASIONAL BRILLIANT GREEN HUES; QUARTZ DOMINATE FRAME WORK; QUARTZ CUTTINGS RANGE FROM SMOKY TO TRANSLUCENT; PREDOMINATELY GRAIN SUPPORT -ED WITH FAIR AMOUNT OF LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATE TO MODERATELY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 1 TO 3% DARK LITHIC FRAGMENTS; FINE TO MEDIUM-FINE TO MEDIUM-COARSE GRAINED; MODERATELY FAIR TO POOR SORTING; SUB-ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, VERY SMALL AMOUNT OF COAL VISIBLY EFFERVESCIN -G IN SAMPLE, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT IN SAMPLE; TRAC -E AMOUNTS OF ACCESSORY MINERAL PYRITE VISIBLY PRESENT IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRA -Y TO OCCASIONAL MODERATE REDDISH BROWN IN COLOR; MODERATELY DENSE TO SLIGHTLY

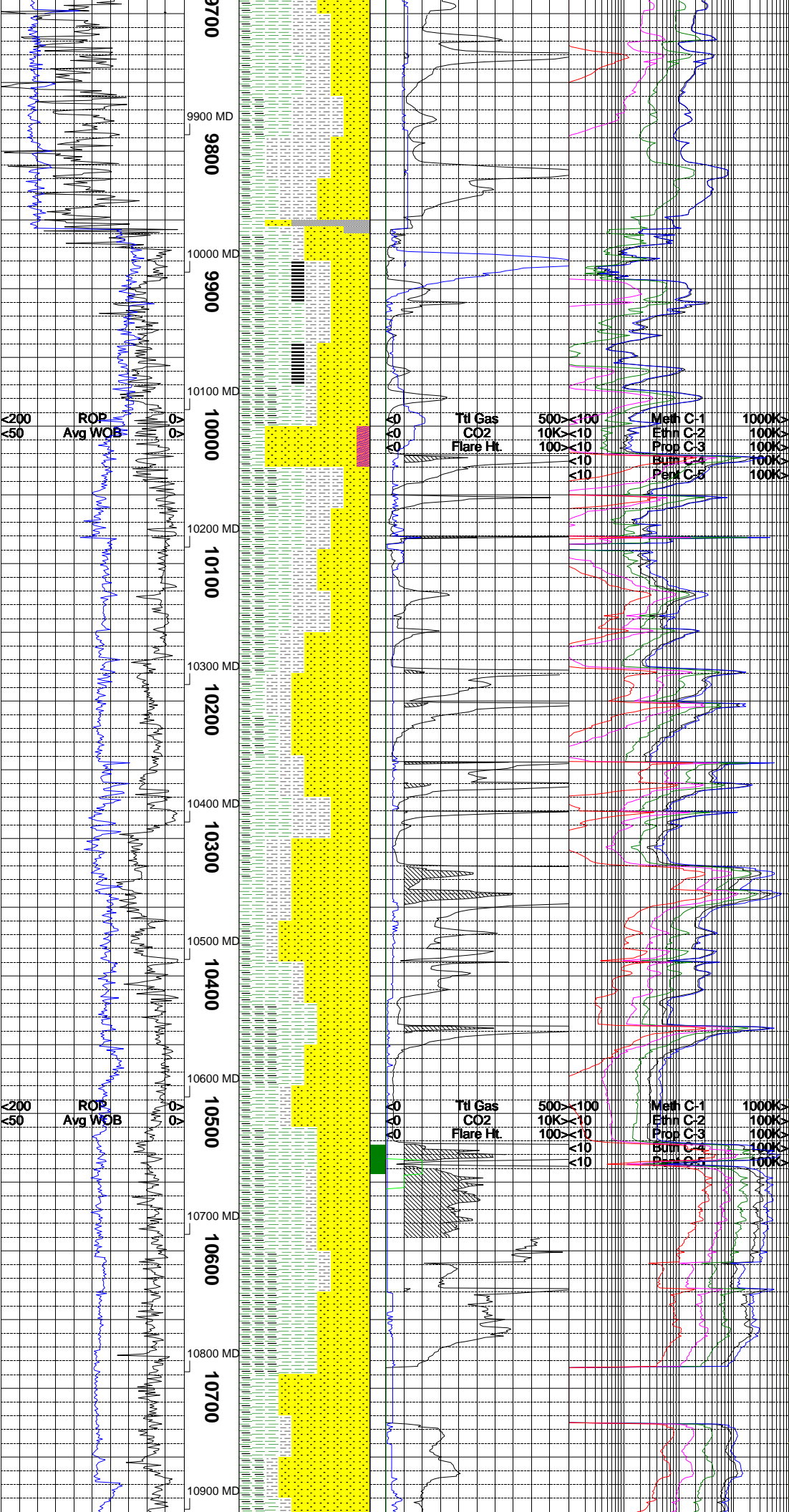












E VISIBLY PRESENT IN CONTACT WITH CARON  
ACEOUS SHALE CUTTING IN SAMPLE.

NOTE = DRILLED INTERMEDIATE TD @ 9967'  
ON 11/14/2010

NOTE = STARTED DRILLING THE PRODUCTION  
SECTION ON 11/22/2010 AT APPROXIMATELY  
8:00 AM.

SANDSTONE = WHITE TO MEDIUM LIGHT GRAY  
WITH SOME TRANSLUCENCE; QUARTZ FRAMEWORK  
WITH ABOUT 5% DARK GRAY AND BLACK LITHIC  
CLASTS INTERBEDDED; FINE TO COARSE GRAIN  
SIZE WITH POOR SORTING; ANGULAR TO  
SUBANGULAR WITH LOW SPHERICITY; MODERATE  
HARD TO FIRMLY FRIABLE; MATRIX SUPPORT;  
CALCITE CEMENT; MODERATE TO STRONG  
REACTION WITH DILUTE HCL; TRACES OF  
KAOLINITE IN SOME OF THE SPECIMENS; NO  
VISIBLE BEDDING STRUCTURE.

CARBONACEOUS SHALE = DARK GRAY TO  
GRAYISH BLACK TO OLIVE BLACK; DENSE TO  
BRITTLE TENACITY; FRACTURES FROM PLANAR  
TO SLIGHTLY BLOCKY TO OCCASIONALLY  
SPLINTERY; CUTTINGS ARE PLATY TO TABULAR  
RESINOUS TO EARTHY TO OCCASIONALLY WAXY  
LUSTER; SMOOTH TEXTURE; THIN STRUCTURE;  
TRACE AMOUNTS OF PYRITE PRESENT ON SOME  
OF THE SPECIMENS AS AN ACCESSORY MINERAL

SHALE = MEDIUM GRAY TO MEDIUM BLUISH  
GRAY; SLIGHTLY DENSE TO BRITTLE TO  
CRUNCHY TENACITY; FRACTURES FROM PLANAR  
TO SPLINTERY; CUTTINGS ARE PLATY TO  
ELONGATED; WAXY DULL TO EARTHY LUSTER;  
SMOOTH TEXTURE; THIN STRUCTURE;  
INTERBEDDED WITH CARBONACEOUS SHALE  
AND SANDSTONE.

SILTSTONE = BROWNISH GRAY TO LIGHT OLIVE  
GRAY TO MEDIUM GRAY; DENSE TO CRUNCHY  
TENACITY; FRACTURES FROM BLOCKY TO  
IRREGULAR TO OCCASIONALLY PLANAR;  
CUTTINGS ARE TABULAR TO WEDGELIKE; WAXY  
TO EARTHY TO DULL WITH AN OCCASIONAL  
SPARKLING LUSTER; THIN TO SLIGHTLY THICK  
STRUCTURE; OBSERVED THIN LAYERS OF  
CARBONACEOUS SHALE AND TRACE AMOUNTS OF  
COAL INTERBEDDED.

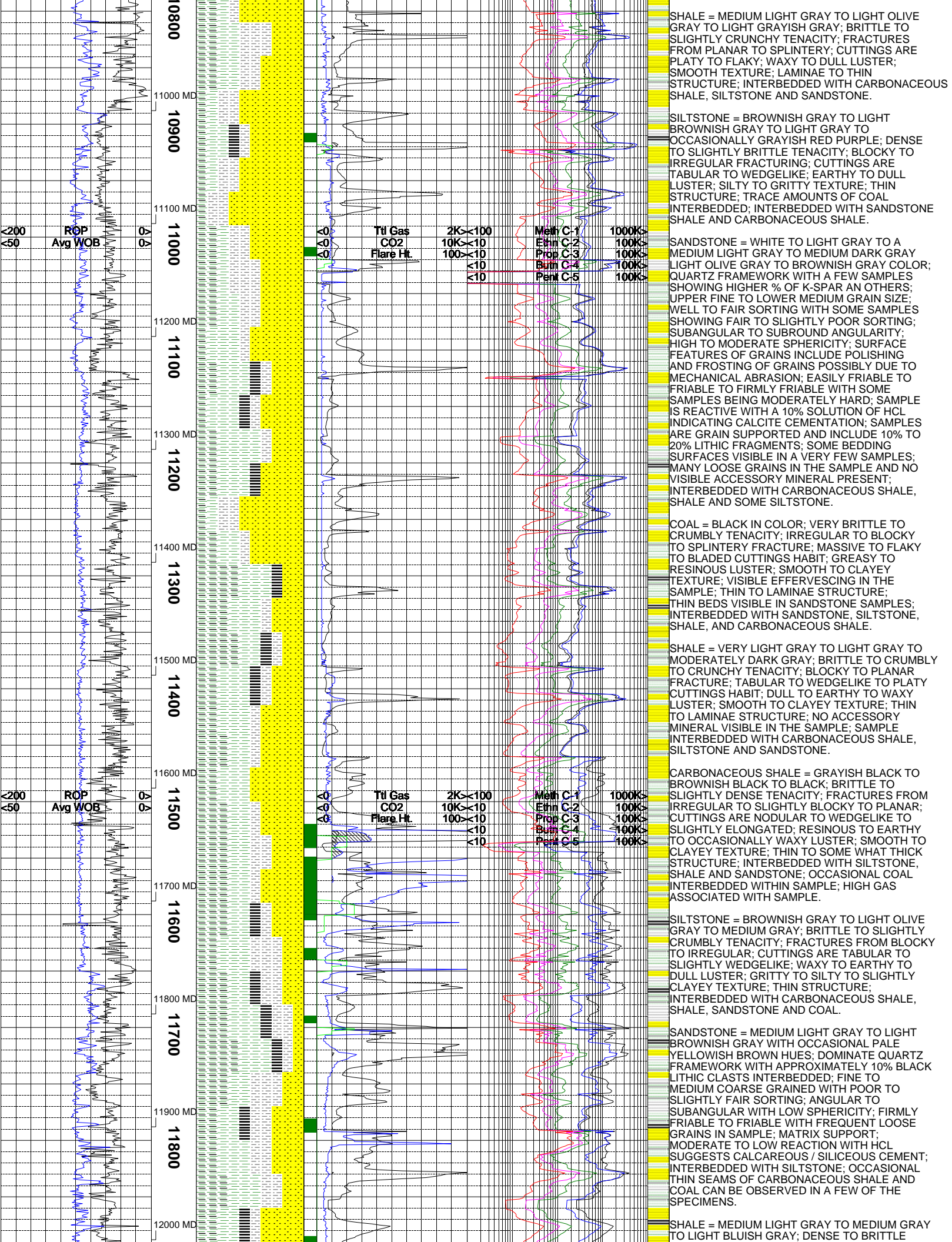
SANDSTONE = WHITE TO LIGHT GRAY WITH  
OCCASIONAL TRANSLUCENT GRAINS; DOMINATE  
QUARTZ FRAMEWORK WITH APPROXIMATELY 10%  
BLACK LITHIC CLASTS INTERBEDDED; FINE TO  
MEDIUM GRAINED WITH OCCASIONAL COARSE  
GRAINS; FAIR TO SEMI WELL SORTED;  
SUBROUND TO SUBANGULAR WITH MODERATE  
SPHERICITY; MODERATE HARD TO FIRMLY  
FRIABLE TO OCCASIONALLY EASILY FRIABLE;  
MATRIX SUPPORT WITH CALCITE CEMENT;  
STRONG REACTION WITH HCL; INTERBEDDED  
CARBONACEOUS SHALE AND SILTSTONE.

CARBONACEOUS SHALE = BLACK TO A VERY  
DARK GRAY COLOR; TOUGH TO DENSE TO  
BRITTLE TENACITY; IRREGULAR TO BLOCKY  
TO WEDGELIKE TO BLADED CUTTINGS HABIT;  
EARTHY TO DULL TO OCCASIONALLY GREASY TO  
WAXY LUSTER; SMOOTH TO CLAYEY TEXTURE;  
NO VISIBLE STRUCTURE PRESENT IN THE  
SAMPLE; NO ACCESSORY MINERALS VISIBLE  
IN THE SAMPLE.

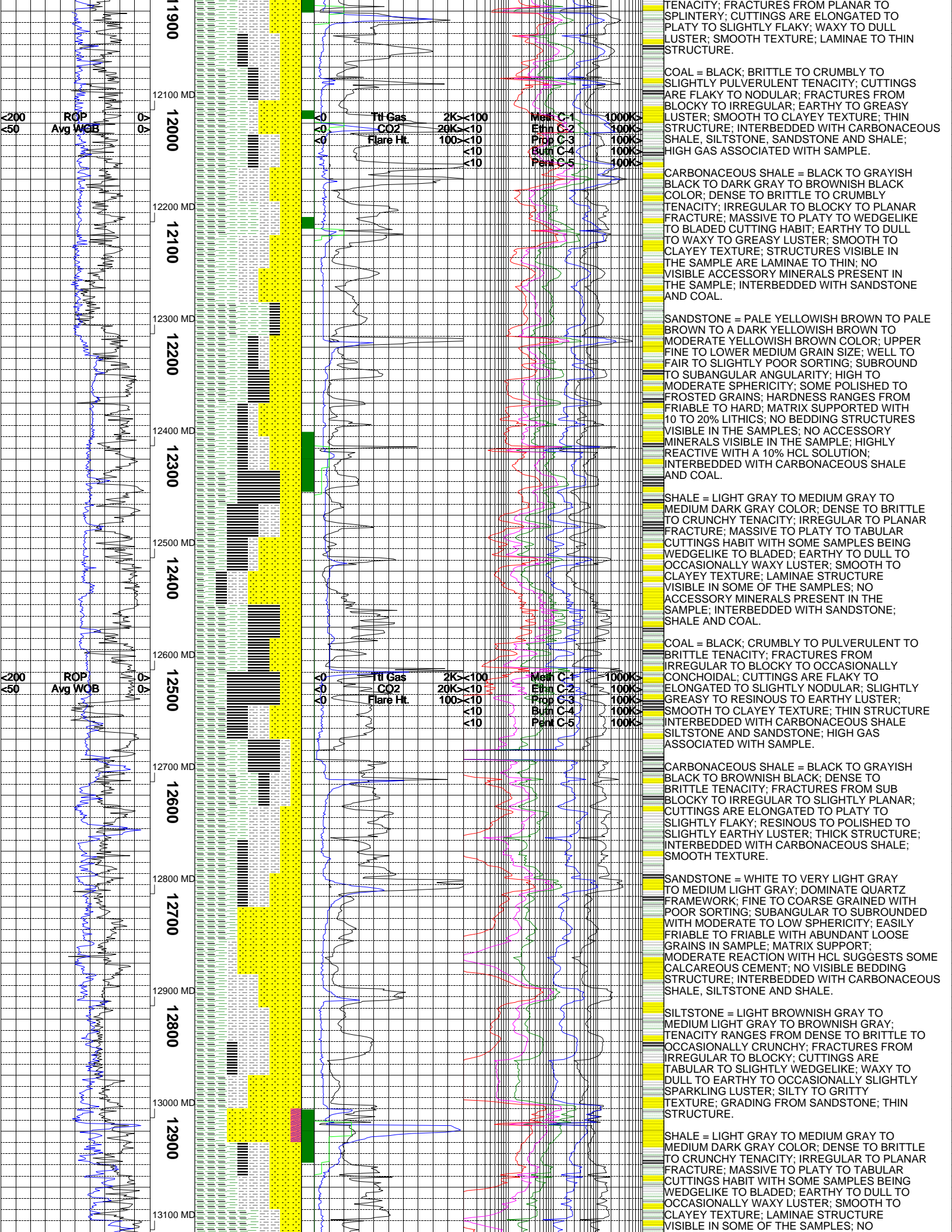
SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO  
MODERATELY DARK GRAY; BRITTLE TO CRUMBLY  
TO CRUNCHY TENACITY; BLOCKY TO PLANAR  
FRACTURE; TABULAR TO WEDGELIKE TO PLATY  
CUTTINGS HABIT; DULL TO EARTHY TO WAXY  
LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN  
TO LAMINAE STRUCTURE; NO ACCESSORY  
MINERAL VISIBLE IN THE SAMPLE; SAMPLE  
INTERBEDDED WITH CARBONACEOUS SHALE  
AND SANDSTONE.

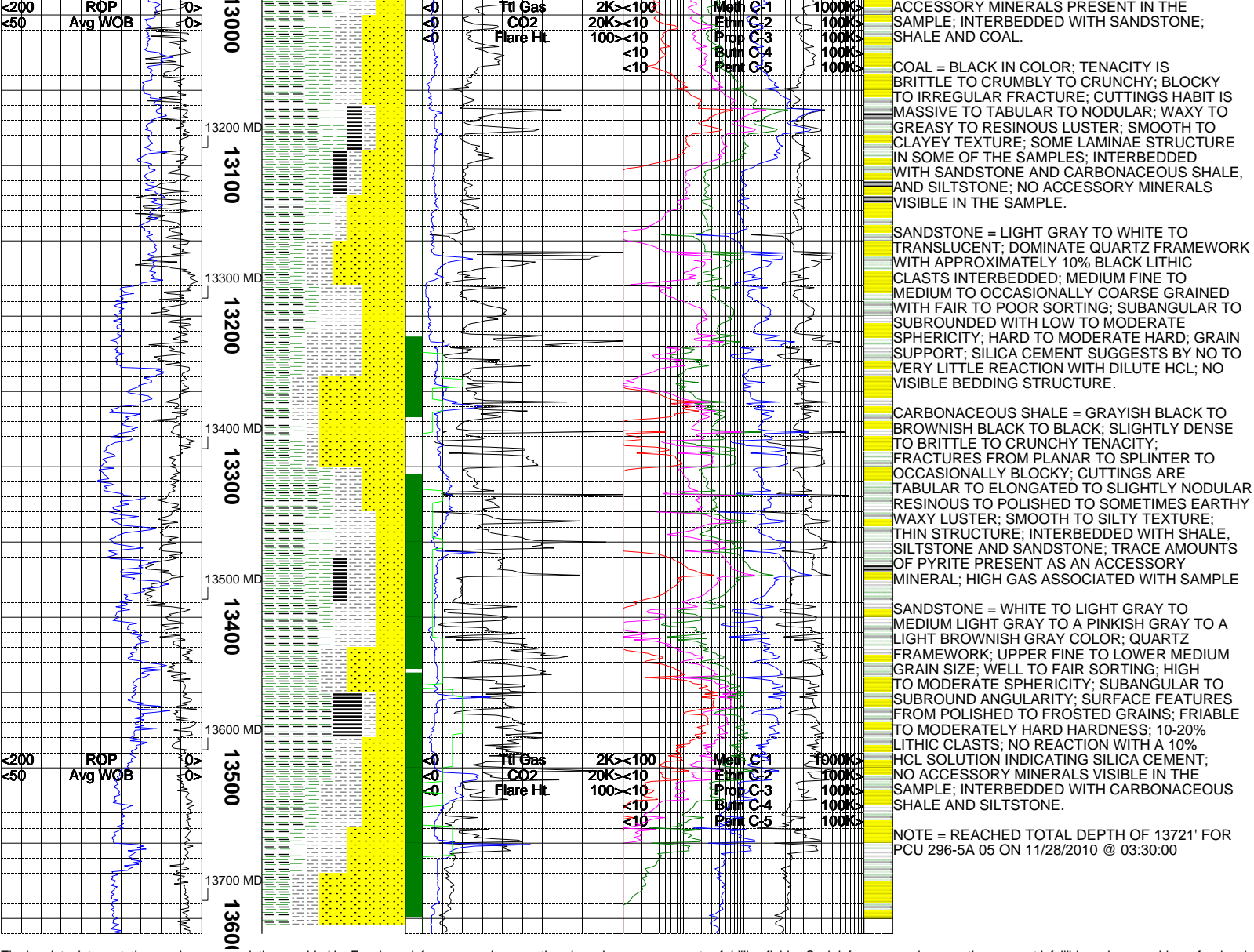
SANDSTONE = WHITE TO VERY LIGHT GRAY TO  
TRANSLUCENT; DOMINATE QUARTZ FRAMEWORK  
WITH TRACE CALCITE AMOUNTS; FINE TO  
COARSE GRAINED WITH POOR SORTING;  
ANGULAR TO SUBANGULAR WITH LOW  
SPHERICITY; GRAINS DISPLAY FROSTED  
SURFACE FEATURES; FIRMLY FRIABLE TO  
EASILY FRIABLE; ABUNDANT LOOSE GRAINS IN  
SAMPLE; KAOLINITIC AND CALCAREOUS CEMENT  
WITH MATRIX SUPPORT; STRONG REACTION  
WITH DILUTE HCL; NO VISIBLE BEDDING  
STRUCTURES; SOME CARBONACEOUS SHALE  
INTERBEDDED.

CARBONACEOUS SHALE = BROWNISH BLACK TO  
GRAYISH BLACK TO OLIVE BLACK; TENACITY  
RANGES FROM BRITTLE TO CRUMBLY;  
FRACTURES FROM IRREGULAR TO PLANAR TO  
SPLINTERY TO OCCASIONALLY BLOCKY;  
CUTTINGS ARE TABULAR TO WEDGELIKE;  
EARTHY TO WAXY TO SLIGHTLY RESINOUS  
LUSTER; SMOOTH TEXTURE; THIN STRUCTURE;  
INTERBEDDED WITH SANDSTONE, SILTSTONE  
AND SHALE.









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