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

Mudlog TVD

COMPANY EXXONMOBIL
WELL PCU 296-5A6
FIELD PICEANCE CREEK
REGION ROCKIES
COORDINATES LAT: 39.912044
LONG: -108.198659
ELEVATION G.L.:7294'
RKB: 30.2'
COUNTY, STATE RIO BLANCO, CO
API INDEX 051031124000
SPUD DATE 2/28/2011
CONTRACTOR HELMERICH_PAYNE
CO. REP. C. CURTIS/M. HUDON
RIG/TYPE FLEX 4S / HP 321
LOGGING UNIT MLO31
GEOLOGISTS M. GROSS
B. SMELSER
ADD. PERSONS D. NEW
CO. GEOLOGIST C. ALBA

LOG INTERVAL

CASING DATA

DEPTHS: 4885' TO 14007'
DATES: 03/01/2011 TO 3/22/2011
SCALE: 1" = 100'

16.00" AT 119'
10.75" AT 4870'
7.00" AT 10543'
AT

MUD TYPES

HOLE SIZE

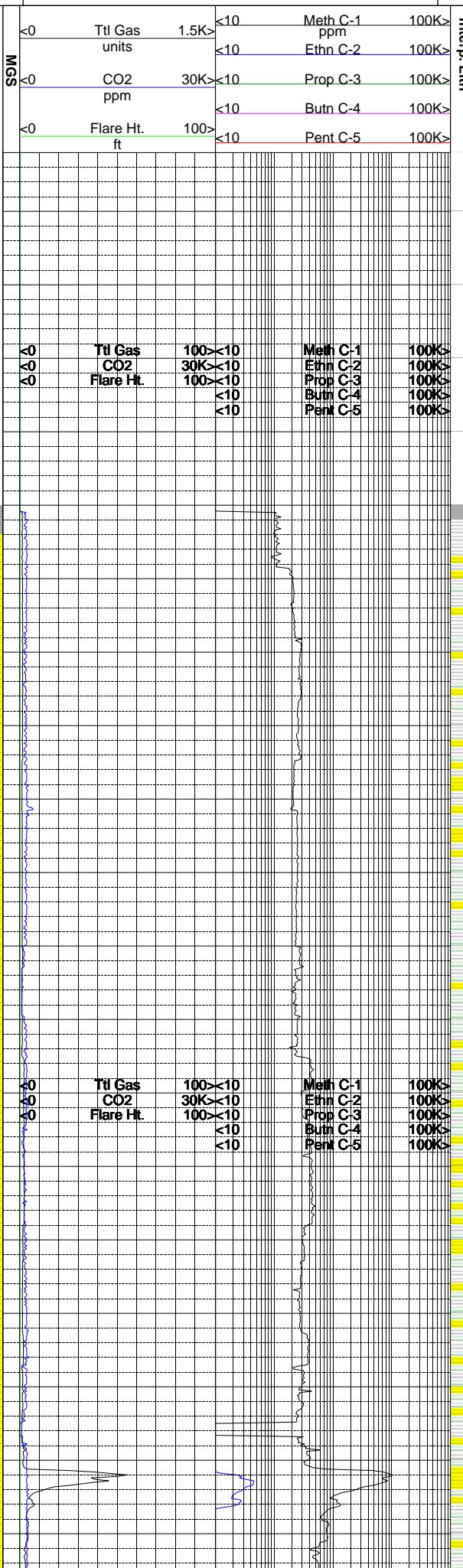
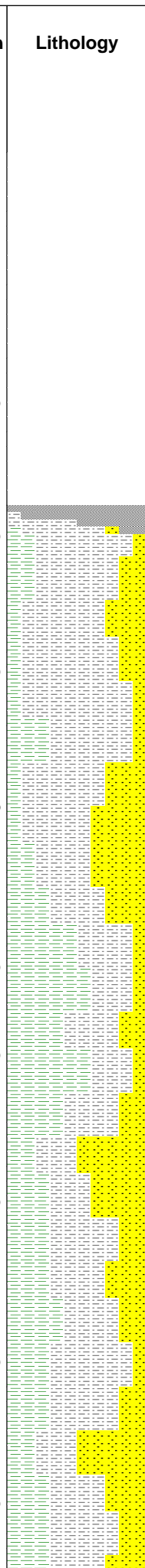
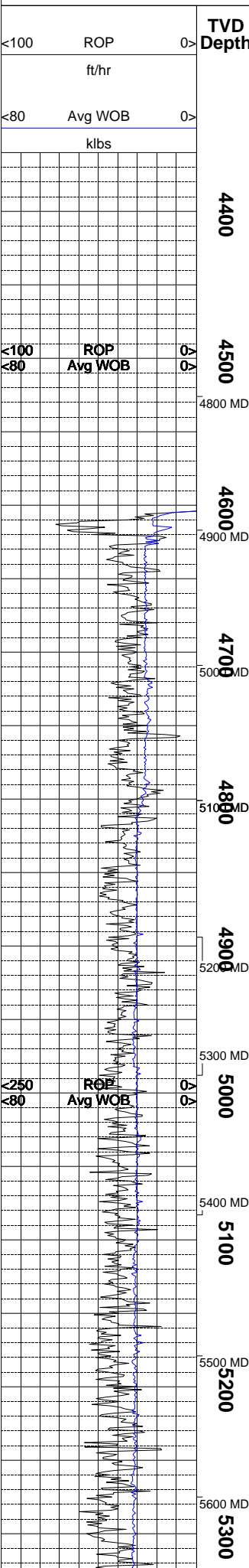
SPUD MUD TO 4885'
LSND TO 14007'
TO
TO

14.75" TO 4885'
9.875" TO 10586'
6.125" TO 14007'
TO

ABBREVIATIONS

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

- 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, SAND, SANDSTONE, SANDSTONE-TUFFACEOUS, SERICITIZATION, SERPENTINE, SHALE, SHALE TUFFACEOUS, SHELL FRAGMENTS, SIDERITE, SILICIFICATION, SILTSTONE, SILTST-TUFFACEOUS, TUFF, VOLCANICLASTICS SEDS, VOLCANICS



Interp. Lith

Remarks
Survey Data, Mud Reports, Other Info.

GAS CALIBRATED TO S.P.L.W.A. STANDARDS (2% ME = 100 UNITS). GAS CHROMATOGRAPHY EQUIPMENT CALIBRATED TO A TEST GAS COMPOSED OF THE FOLLOWING:

METHANE = 9,990 PPM
 ETHANE = 1,010 PPM
 PROPANE = 980 PPM
 I-BUTANE = 1,000 PPM
 N-BUTANE = 1,000 PPM
 I-PENTANE = 1,000 PPM
 N-PENTANE = 1,000 PPM

EPOCH WELL SERVICES COMMENCED LOGGING THE PCU 296-5A6 WELL ON 03/01/2011 @ 4885' MD.

SILTSTONE = LIGHT BROWN TO MODERATE YELLOWISH BROWN TO GRAYISH ORANGE TO PALE YELLOWISH BROWN TO A GRAYISH RED; CRUMBLY TO CRUMBLY TO PULVERULENT TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO PLATY TO TABULAR CUTTINGS HABIT; EARTHY TO DULL LUSTER; SILTY TO GRITTY TEXTURE WITH SOME SAMPLES BEING SLIGHTLY GRANULAR; NO VISIBLE BEDDING STRUCTURES IN THE SAMPLE; SILTSTONE GRADES TO A VERY LIGHT TO LIGHT GRAY SHALE; INTERBEDDED WITH SOME SANDSTONE AND SHALE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO GRAY IN COLOR WITH SOME GRADING TO A GRAYISH ORANGE OR YELLOWISH BROWN; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE WITH SOME SAMPLES GRADING TO A MORE SILTY TEXTURE; LAMINAE STRUCTURE VISIBLE IN SOME SAMPLES; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

SHALE = LIGHT GRAY TO PALE YELLOWISH BROWN; MATTE TO CLAYEY TEXTURE; DULL EARTHY LUSTER; PLATY TO WEDGELIKE TO SCALY CUTTINGS HABIT; IRREGULAR TO HACKLY TO PLANAR FRACTURE; THINLY INTERBEDDED WITH SANDSTONE AND SILTSTONE.

SILTSTONE = PALE TO MODERATE YELLOWISH BROWN MOTTLED WITH LIGHT GRAY; HARD TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURE; WEDGELIKE TO TABULAR CUTTINGS HABIT; SPARKLING TO EARTHY LUSTER; SILTY TO SUCROSIC TO GRITTY TEXTURE.

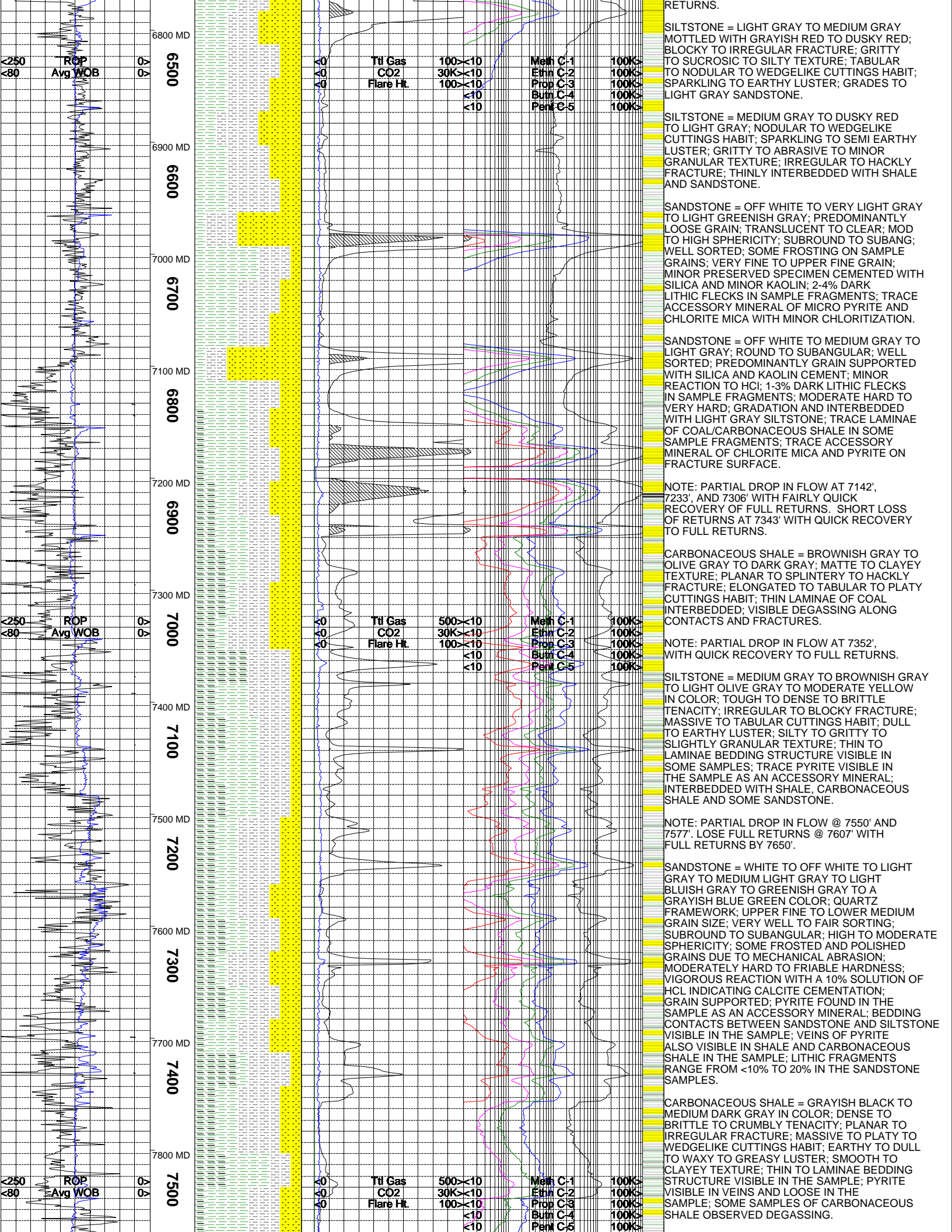
SHALE = PALE YELLOWISH BROWN TO MOD YELLOWISH BROWN TO LIGHT MEDIUM GRAY; TABULAR TO PLATY TO WEDGELIKE CUTTINGS HABIT; MATTE TO CLAYEY TEXTURE; EARTHY TO DULL LUSTER; GRADES TO MODERATE YELLOWISH BROWN SILTSTONE MOTTLED WITH LIGHT GRAY; CRUMBLY TO FIRM TENACITY.

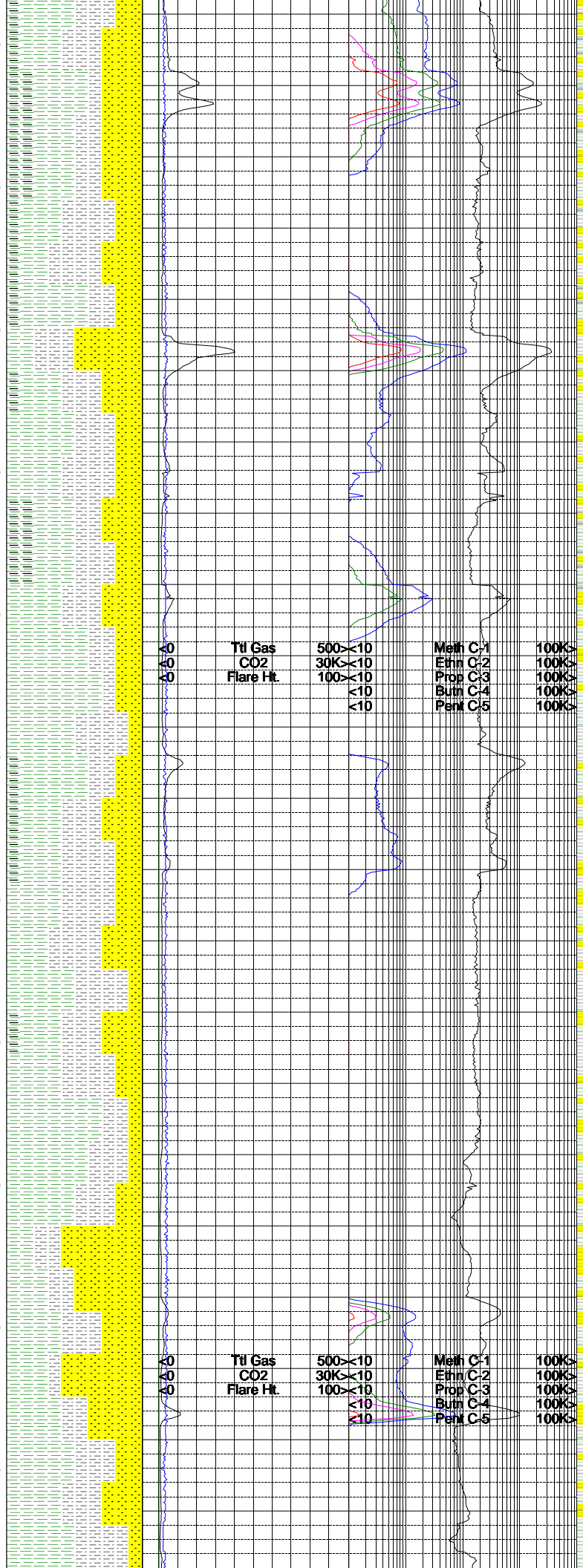
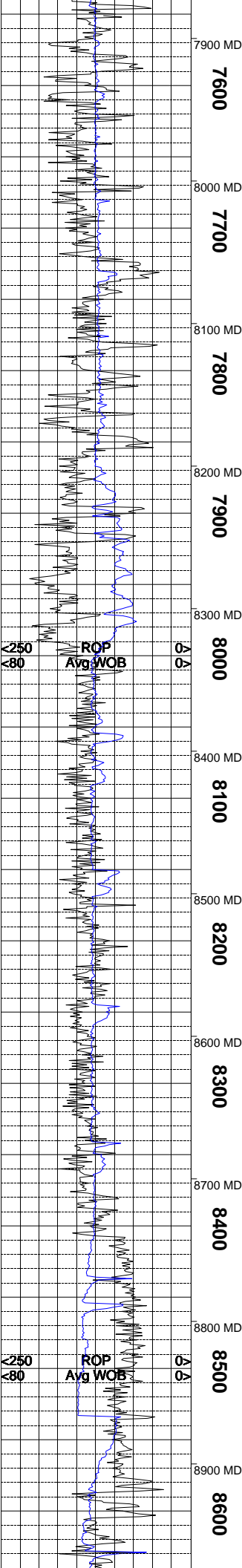
SANDSTONE = OFF WHITE TO PALE YELLOWISH GRAY MOTTLED WITH VERY LIGHT GRAY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT; HIGH REACTION TO HCl; 1-2% DARK LITHIC FRAGMENTS; GRADES TO PALE YELLOWISH GRAY SILTSTONE; VERY FINE TO FINE GRAIN; MODERATE TO LOW SPHERICITY; FAIRLY SORTED; ANGULAR TO SUBROUND; MODERATE HARD TO HARD; NO ACCESSORY MINERAL; NO VISIBLE HYDROCARB INDICATORS.

SILTSTONE = PALE YELLOWISH BROWN TO MODERATE YELLOWISH BROWN MOTTLED WITH GRAYISH RED AND LIGHT GRAY; HARD TO CRUMBLY TENACITY; GRITTY TO SILTY TEXT; SPARKLING LUSTER; GRADES TO LIGHT GRAY SANDSTONE; PLANAR TO BLOCKY TO HACKLY FRACTURE; WEDGELIKE TO TABULAR TO SCALY CUTTINGS HABIT; TRACE LOOSE VERY FINE GRAIN SAND IN SAMPLE FRAGMENTS.

SHALE = PALE YELLOWISH BROWN TO LIGHT GRAY; PLANAR TO SPLINTERY TO BLOCKY FRACTURE; ELONGATED TO WEDGELIKE TO PLATY CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; DULL EARTHY LUSTER; GRADES TO PALE YELLOWISH GRAY SILTSTONE.

SILTSTONE = MODERATE TO PALE YELLOWISH





NOTE: PARTIAL RETURNS @ 7915' WITH FULL RETURNS @ 7950'.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY TO LIGHT BROWNISH GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO BLADED CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE STRUCTURE VISIBLE IN THE SAMPLE.

CARBONACEOUS SHALE = GRAYISH BLACK TO MEDIUM DARK GRAY IN COLOR; DENSE TO BRITTLE TO CRUMBLY TENACITY; PLANAR TO IRREGULAR FRACTURE; MASSIVE TO PLATY TO WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL TO WAXY TO GREASY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE BEDDING STRUCTURE VISIBLE IN THE SAMPLE; PYRITE VISIBLE IN VEINS AND LOOSE IN THE SAMPLE.

NOTE: PARTIAL RETURNS @ 8067' WITH LOSS OF FULL RETURNS @ 8077'. REGAIN PARTIAL RETURNS @ 8103' AND REGAIN FULL RETURNS @ 8160'.

SILTSTONE = MEDIUM DARK GRAY TO MEDIUM LIGHT GRAY TO BROWNISH GRAY TO MEDIUM BLUISH GRAY TO LIGHT BLUISH GRAY IN COLOR; TOUGH TO DENSE TENACITY; BLOCKY TO IRREGULAR FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; DULL TO EARTHY TO WAXY LUSTER; SILTY TO GRITTY TEXTURE; THIN TO LAMINAE STRUCTURE PRESENT IN THE SAMPLE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE; INTERBEDDED WITH SANDSTONE, SHALE AND CARBONACEOUS SHALE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY TO LIGHT BROWNISH GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO BLADED CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE STRUCTURE VISIBLE IN THE SAMPLE.

SANDSTONE = WHITE TO OFF WHITE TO LIGHT GRAY TO MEDIUM LIGHT GRAY TO MEDIUM GRAY TO GRAYISH BLUE TO GRAYISH RED IN COLOR; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; WELL TO FAIR SORTING; SUBROUND TO SUBANGULAR; HIGH TO MODERATE SPHERICITY; FROSTED GRAINS VISIBLE IN THE SAMPLE; HARDNESS RANGES FROM EASILY FRIABLE TO FIRMLY FRIABLE TO MODERATELY HARD; GRAIN SUPPORTED; REACTION TO A 10% HCL SOLUTION RANGES FROM MODERATE TO SLIGHT INDICATING BOTH SILICA AND CALCITE CEMENTATION; TRACE PYRITE VISIBLE IN THE SAMPLE; BEDDING CONTACTS BETWEEN SANDSTONE AND SILTSTONE VISIBLE ON SOME SAMPLES.

SILTSTONE = MEDIUM GRAY TO MEDIUM DARK GRAY TO MEDIUM BLUISH GRAY TO BROWNISH GRAY TO GRAYISH RED WITH SOME YELLOWISH GRAY SAMPLES; TOUGH TO DENSE TO CRUNCHY TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; EARTHY TO DULL TO GREASY LUSTER; SILTY TO GRITTY TEXTURE; THIN BEDDING STRUCTURES VISIBLE IN THE SAMPLE; PYRITE VISIBLE AS AN ACCESSORY MINERAL FOUND BOTH LOOSE AND INTERBEDDED IN SAMPLES; INTERBEDDED WITH SANDSTONE, SHALE AND CARBONACEOUS SHALE.

NOTE: DROP IN FLOW @ 8766' WITH LOSS OF FULL RETURNS @ 8785'. REGAIN PARTIAL RETURNS @ 8787' AND REGAIN FULL RETURNS BY 8860'.

SANDSTONE = OFF WHITE TO MEDIUM GRAY TO LIGHT GRAY WITH MINOR CHLORITIZATION; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND TRACE KAOLIN; NON TO SLIGHT REACTION TO HCl; VERY FINE TO UPPER FINE GRAIN; SUBANGULAR TO SUBROUND; FAIR TO WELL SORTED; LOW TO MODERATE SPHERICITY; 4-7% CARBONACEOUS MATERIAL FLECKS IN SAMPLE FLECKS; MODERATE HARD TO VERY HARD; TRACE ACCESSORY MINERALS OF MICRO PYRITE AND CHLORITE MICA; GRADES TO LIGHT MEDIUM GRAY SILTSTONE.

SHALE = MEDIUM GRAY TO LIGHT GRAY TO DARK GRAY; PLATY TO ELONGATE TO SEMI WEDGELIKE CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; SPLINTERY TO PLANAR TO BLOCKY FRACTURE; GRADES TO MEDIUM GRAY SILTSTONE; TRACE CARBONACEOUS SHALE FLECKS IN SAMPLE FRAGMENTS; HARD TO CRUNCHY TENACITY.

SILTSTONE = MEDIUM GRAY TO LIGHT GRAY TO VERY DUSKY RED; GRITTY TO GRANULAR TO SILTY TEXTURE; IRREGULAR TO BLOCKY TO

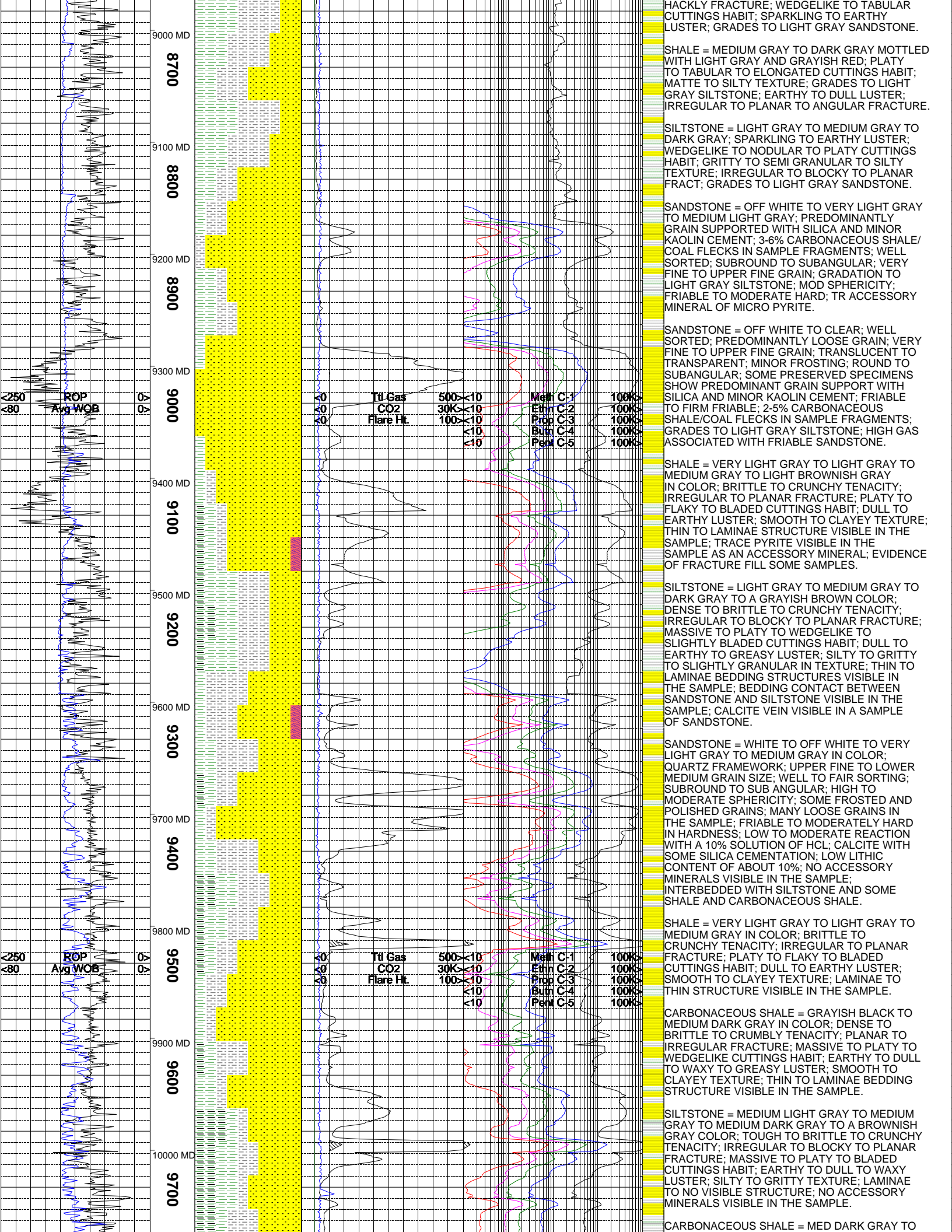
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ROP
Avg WOB

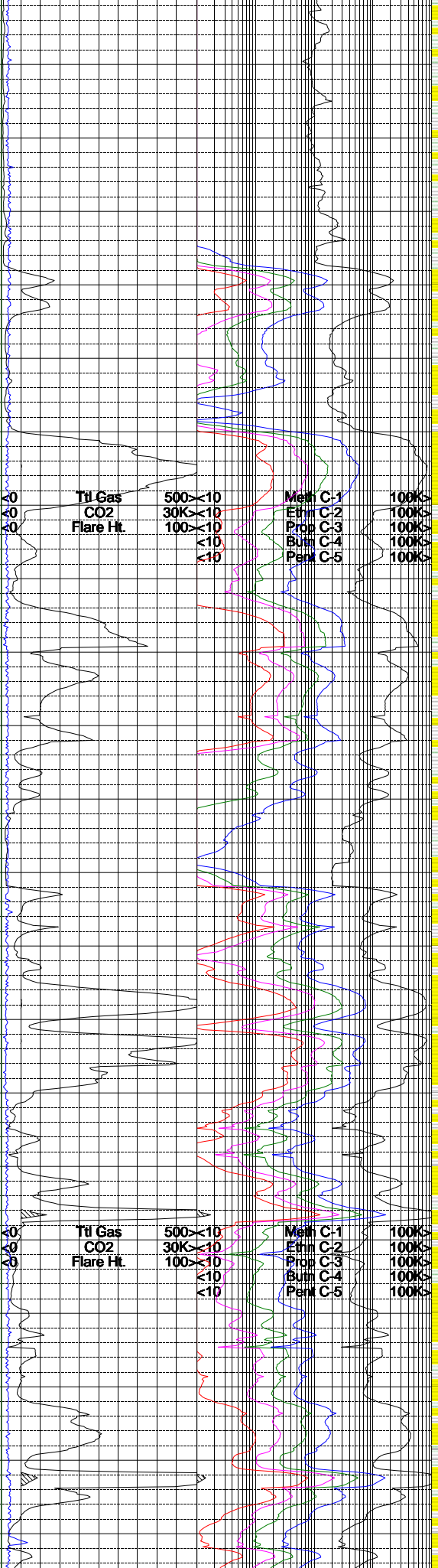
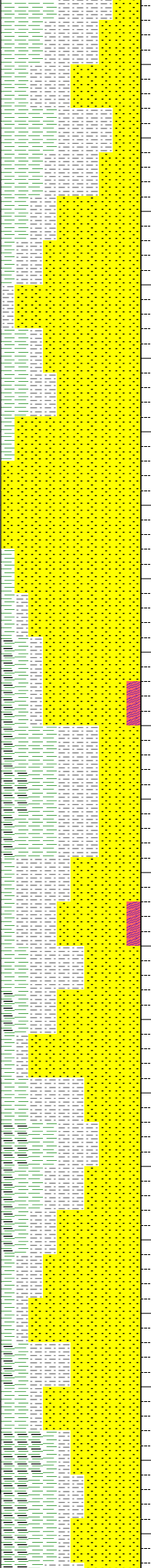
7900 MD
7600
8000 MD
7700
8100 MD
7800
8200 MD
7900
8300 MD
8000
8400 MD
8100
8500 MD
8200
8600 MD
8300
8700 MD
8400
8800 MD
8500
8900 MD
8600

Ttl Gas 500 $\times 10$
CO2 30K $\times 10$
Flare Ht. 100 $\times 10$
<math>< 10</math>
<math>< 10</math>

Meth C:1 100K
Ethn C:2 100K
Prop C:3 100K
Burn C:4 100K
Perm C:5 100K



9000 MD
8700
9100 MD
8800
9200 MD
8900
9300 MD
9000
9400 MD
9100
9500 MD
9200
9600 MD
9300
9700 MD
9400
9800 MD
9500
9900 MD
9600
10000 MD
9700



HACKLY FRACTURE; WEDGELIKE TO TABULAR CUTTINGS HABIT; SPARKLING TO EARTHY LUSTER; GRADES TO LIGHT GRAY SANDSTONE.

SHALE = MEDIUM GRAY TO DARK GRAY MOTTLED WITH LIGHT GRAY AND GRAYISH RED; PLATY TO TABULAR TO ELONGATED CUTTINGS HABIT; MATTE TO SILTY TEXTURE; GRADES TO LIGHT GRAY SILTSTONE; EARTHY TO DULL LUSTER; IRREGULAR TO PLANAR TO ANGULAR FRACTURE.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY TO DARK GRAY; SPARKLING TO EARTHY LUSTER; WEDGELIKE TO NODULAR TO PLATY CUTTINGS HABIT; GRITTY TO SEMI GRANULAR TO SILTY TEXTURE; IRREGULAR TO BLOCKY TO PLANAR FRACT; GRADES TO LIGHT GRAY SANDSTONE.

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY TO MEDIUM LIGHT GRAY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND MINOR KAOLIN CEMENT; 3-6% CARBONACEOUS SHALE/ COAL FLECKS IN SAMPLE FRAGMENTS; WELL SORTED; SUBROUND TO SUBANGULAR; VERY FINE TO UPPER FINE GRAIN; GRADATION TO LIGHT GRAY SILTSTONE; MOD SPHERICITY; FRIABLE TO MODERATE HARD; TR ACCESSORY MINERAL OF MICRO PYRITE.

SANDSTONE = OFF WHITE TO CLEAR; WELL SORTED; PREDOMINANTLY LOOSE GRAIN; VERY FINE TO UPPER FINE GRAIN; TRANSLUCENT TO TRANSPARENT; MINOR FROSTING; ROUND TO SUBANGULAR; SOME PRESERVED SPECIMENS SHOW PREDOMINANT GRAIN SUPPORT WITH SILICA AND MINOR KAOLIN CEMENT; FRIABLE TO FIRM FRIABLE; 2-5% CARBONACEOUS SHALE/COAL FLECKS IN SAMPLE FRAGMENTS; GRADES TO LIGHT GRAY SILTSTONE; HIGH GAS ASSOCIATED WITH FRIABLE SANDSTONE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY TO LIGHT BROWNISH GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO BLADED CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE STRUCTURE VISIBLE IN THE SAMPLE; TRACE PYRITE VISIBLE IN THE SAMPLE AS AN ACCESSORY MINERAL; EVIDENCE OF FRACTURE FILL SOME SAMPLES.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY TO DARK GRAY TO A GRAYISH BROWN COLOR; DENSE TO BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY TO WEDGELIKE TO SLIGHTLY BLADED CUTTINGS HABIT; DULL TO EARTHY TO GREASY LUSTER; SILTY TO GRITTY TO SLIGHTLY GRANULAR IN TEXTURE; THIN TO LAMINAE BEDDING STRUCTURES VISIBLE IN THE SAMPLE; BEDDING CONTACT BETWEEN SANDSTONE AND SILTSTONE VISIBLE IN THE SAMPLE; CALCITE VEIN VISIBLE IN A SAMPLE OF SANDSTONE.

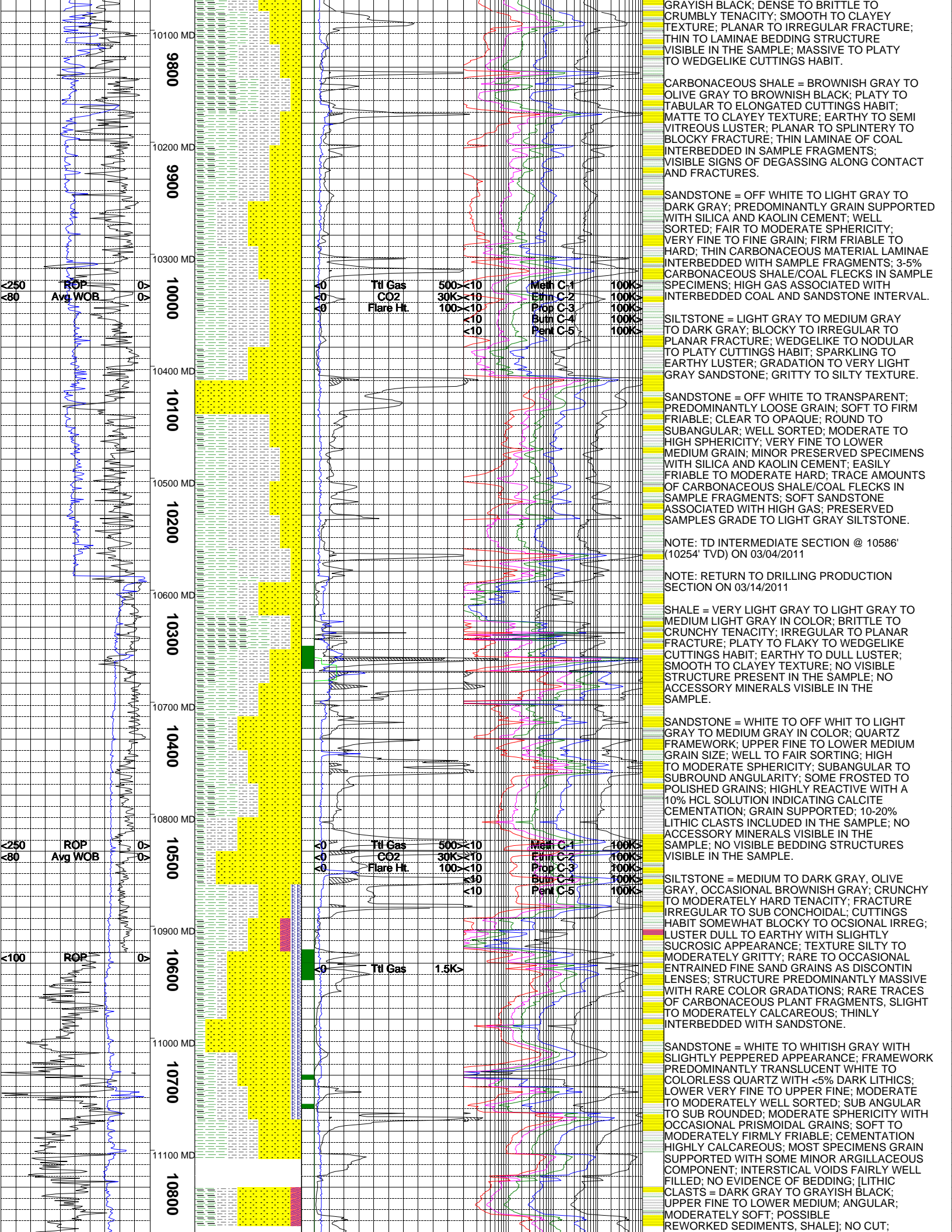
SANDSTONE = WHITE TO OFF WHITE TO VERY LIGHT GRAY TO MEDIUM GRAY IN COLOR; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; WELL TO FAIR SORTING; SUBROUND TO SUB ANGULAR; HIGH TO MODERATE SPHERICITY; SOME FROSTED AND POLISHED GRAINS; MANY LOOSE GRAINS IN THE SAMPLE; FRIABLE TO MODERATELY HARD IN HARDNESS; LOW TO MODERATE REACTION WITH A 10% SOLUTION OF HCL; CALCITE WITH SOME SILICA CEMENTATION; LOW LITHIC CONTENT OF ABOUT 10%; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE; INTERBEDDED WITH SILTSTONE AND SOME SHALE AND CARBONACEOUS SHALE.

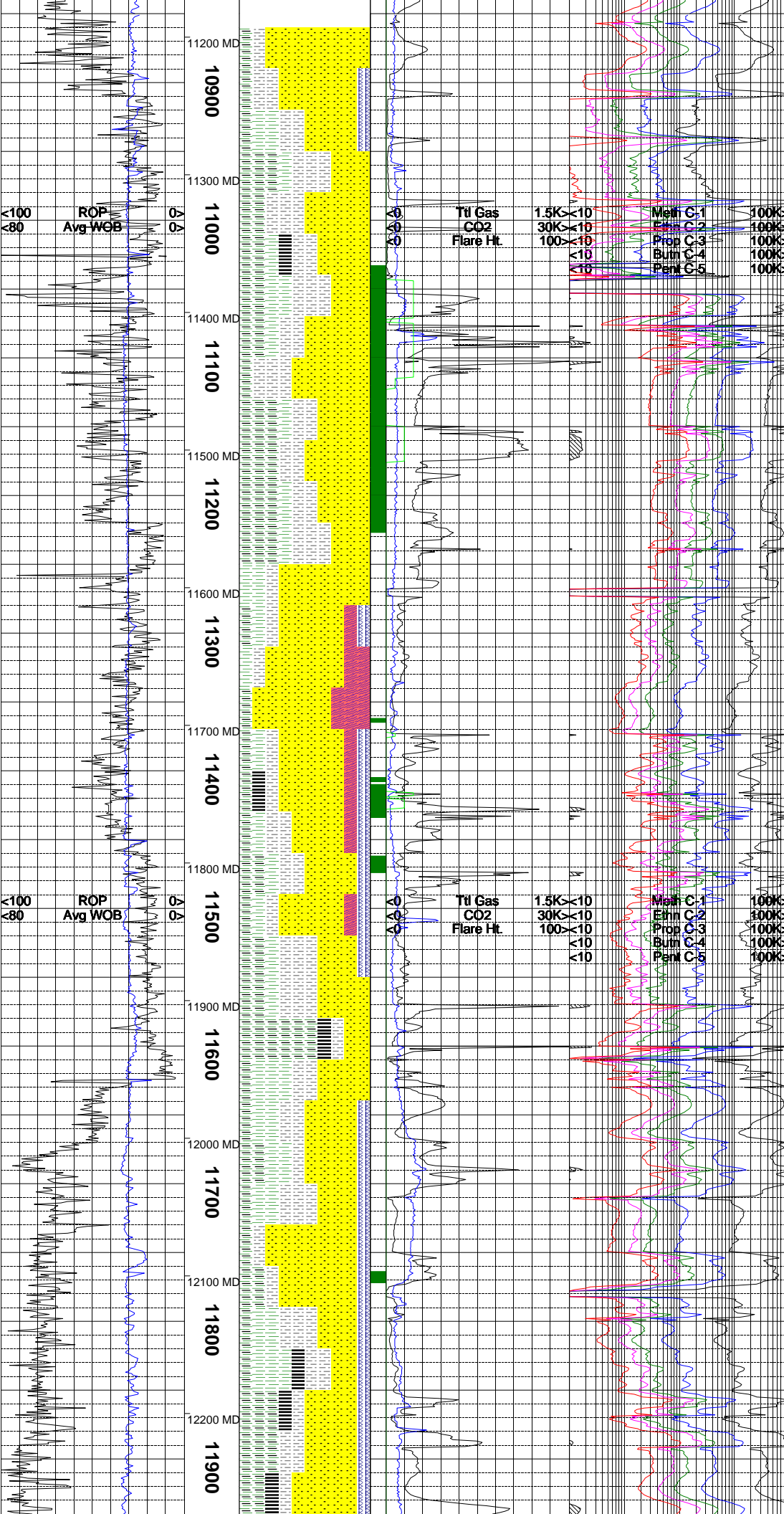
SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO BLADED CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; LAMINAE TO THIN STRUCTURE VISIBLE IN THE SAMPLE.

CARBONACEOUS SHALE = GRAYISH BLACK TO MEDIUM DARK GRAY IN COLOR; DENSE TO BRITTLE TO CRUMBLY TENACITY; PLANAR TO IRREGULAR FRACTURE; MASSIVE TO PLATY TO WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL TO WAXY TO GREASY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE BEDDING STRUCTURE VISIBLE IN THE SAMPLE.

SILTSTONE = MEDIUM LIGHT GRAY TO MEDIUM GRAY TO MEDIUM DARK GRAY TO A BROWNISH GRAY COLOR; TOUGH TO BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY TO BLADED CUTTINGS HABIT; EARTHY TO DULL TO WAXY LUSTER; SILTY TO GRITTY TEXTURE; LAMINAE TO NO VISIBLE STRUCTURE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

CARBONACEOUS SHALE = MED DARK GRAY TO





CARBONACEOUS SHALE = BLACK TO GRAYISH BLACK; CRUNCHY TO BRITTLE TENACITY; SUB CONCHOIDAL TO SUB BLOCKY FRACTURE; CUTTINGS HABIT SMALL ELONGATED TO LARGER THIN TABULAR, BRIGHT METALLIC LUSTER; VERY THINLY LAMINATED STRUCTURE; INTERBEDDED W/ POORLY CONSOLIDATED SAND; NO ACCESSORY MINERALS.

SANDSTONE = WHITE TO OFF WHITE TO LIGHT GRAY TO MEDIUM GRAY TO MEDIUM BLuish GRAY IN COLOR; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; WELL TO FAIR TO SLIGHTLY POOR SORTING; SUBROUND TO SUBANGULAR; HIGH TO MODERATE SPHERICITY; SOME FROSTED GRAINS PRESENT DUE TO MECHANICAL ABRASION; FRIABLE TO MODERATELY HARD HARDNESS; HIGHLY REACTIVE WITH A 10% SOLUTION OF HCL; CALCITE CEMENTATION; GRAIN SUPPORTED WITH BETWEEN 10-20% LITHIC CLASTS WITH A FEW SAMPLES HAVING UPWARDS OF 30%; NO ACCESSORY MINERALS PRESENT IN THE SAMPLE ; NO BEDDING STRUCTURES VISIBLE IN THE SAMPLE; INTERBEDDED WITH SILTSTONE, SHALE AND CARBONACEOUS SHALE; MANY LOOSE GRAINS IN THE SAMPLE.

SILTSTONE = MEDIUM LIGHT GRAY TO MEDIUM GRAY TO DARK GRAY IN COLOR; DENSE TO BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY TO TABULAR CUTTINGS HABIT; EARTHY TO DULL TO SLIGHTLY WAXY LUSTER; SILTY TO GRITTY TO SLIGHTLY GRANULAR TEXTURE; THIN TO LAMINAE STRUCTURE VISIBLE IN SOME SAMPLES; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

SANDSTONE = LIGHT GRAY TO WHITISH GRAY; FRAMEWORK TRANSPARENT COLORLESS QUARTZ TO TRANSLUCENT WHITE QUARTZ; UPPER VERY FINE TO UPPER FINE; WELL SORTED; SUB ROUNDED TO SUB ANGULAR; SOME MINOR PITTING AND FROSTING OF GRAIN SURFACES, HIGH TO MODERATELY HIGH SPHER; VERY SOFT PRESENTS PREDOMINANTLY AS LOOSE GRAINS WITH PRESERVED SPECIMENS BEING VERY EASILY FRIABLE; CEMENT HIGHLY CALCAREOUS WITH MINOR ARGILLACEOUS COMPONENT; INTERSTICES WELL TO MODERATE FILLED; BEDDING MASSIVE; ASSOCIATED WITH SLIGHT TO ABUNDANT FRACTURE FILL AS CALCITE CLEAVAGE RHOMBS TO RARE "WATER CLEAR" TABULAR CALCITE CRYSTALS AND RARE SPARRY FRAGS; INCREASING CARBONACEOUS CONTENT WITH SOME VERY THIN COALS; OCCASIONAL LIGHT CARBON STAINING AT GRAIN EDGES; NO FLUORESCENCE; NO CUT.

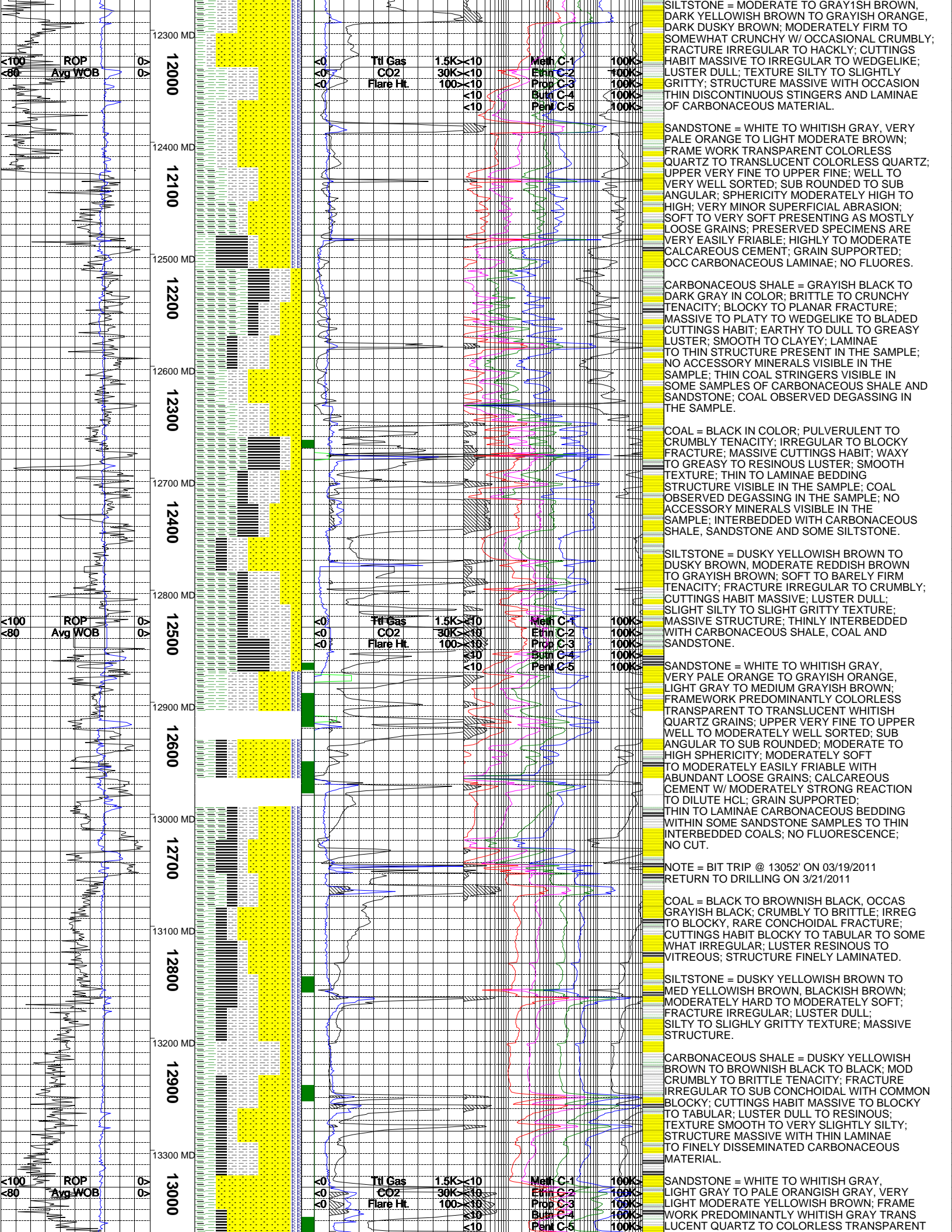
CARBONACEOUS SHALE = BLACKISH GRAY TO MEDIUM GRAY; BLACKISH BROWN; CRUNCHY TO BRITTLE TENACITY W/ OCCASIONAL CRUMBLY; FRACTURE IRREGULAR TO SUB CONCHOIDAL; CUTTINGS HABIT IRREGULAR TO OCCASIONAL BLOCKY; LUSTER RESINOUS TO VITREOUS; THINLY LAMINATED; RARE MINOR OUTGASSING; SOME SPECIMENS SHOW THIN LAMINAE OF WELL DEVELOPED COAL; INTERBEDDED WITH SANDSTONE, SILTSTONE AND SOME SHALE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

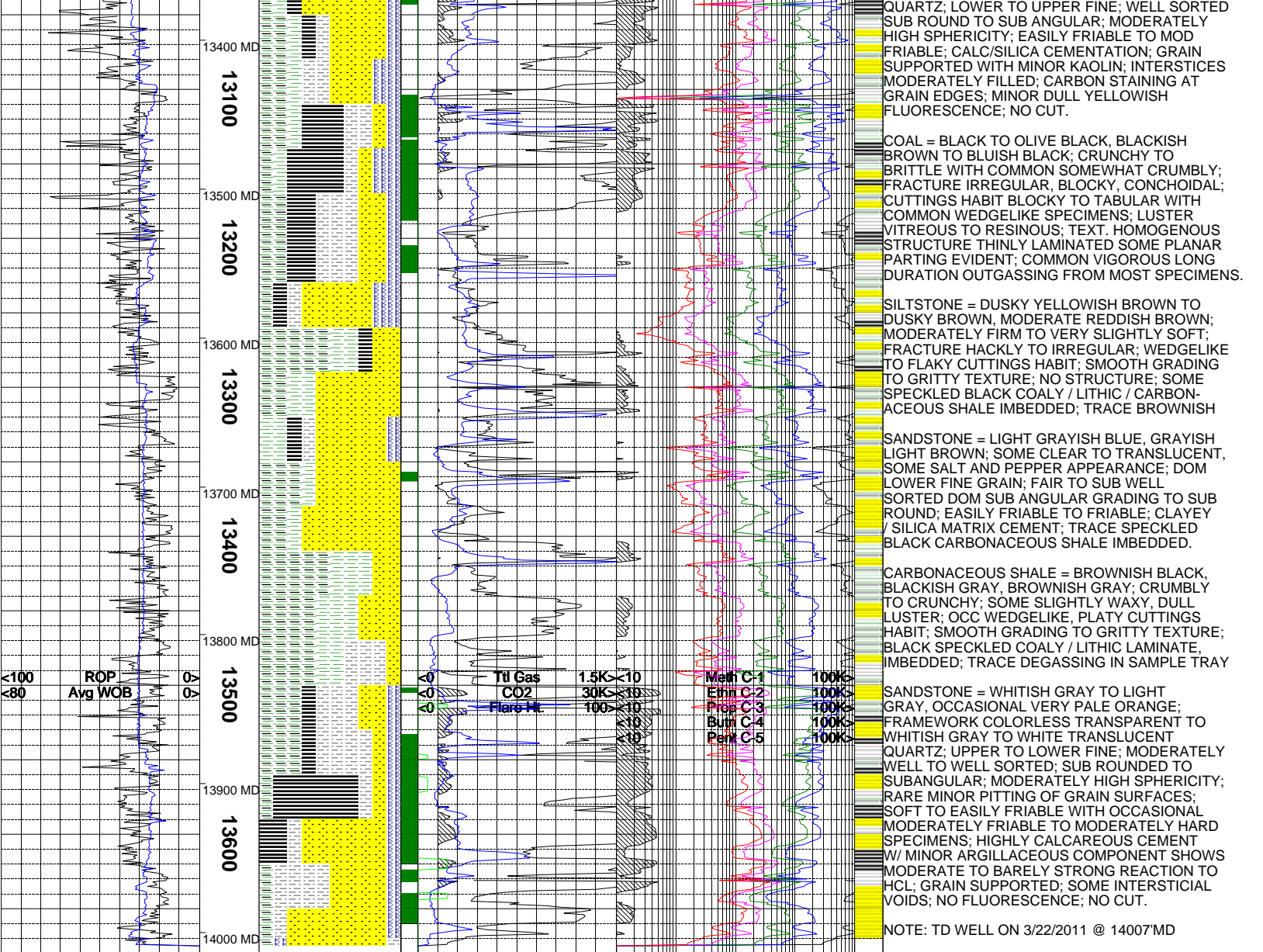
NOTE = TRIP- NEW BIT @ 11956' 3/16/2011 RETURN TO DRILLING 3/18/2011

SHALE = MEDIUM TO DARK GRAY, BROWNISH GRAY, BLACKISH GRAY, OCCASIONAL LIGHT GRAY; CRUNCHY TO MODERATELY TOUGH; FRACTURE HACKLY TO SUB PLANAR; CUTTINGS HABIT TABULAR TO WEDGELIKE WITH COMMON IRREGULAR; LUSTER MOSTLY DULL WITH OCCASIONAL WAXY TO RESINOUS; TEXTURE SMOOTH TO VERY SLIGHTLY SILTY; STRUCTURE PREDOMINANTLY MASSIVE.

CARBONACEOUS SHALE = BLACKISH BROWN TO GRAYISH BROWN, BROWNISH BLACK TO DUSKY YELLOWISH BROWN; CRUNCHY TO BRITTLE; FRACTURE HACKLY TO SOMEWHAT BLOCK WITH OCCASIONAL TO CONCHOIDAL; CUTTINGS HABIT TABULAR TO BLOCKY W/ COMMON IRREGULAR; LUSTER DULL TO WAXY; TEXTURE PREDOMINANT SMOOTH WITH OCCASIONAL SILTINESS; STRUCTURE MASSIVE TO FINELY LAMINATED; COMMON THIN LAMINAE OF CARBONACEOUS MATERIAL AND CARBON STAINING WITH OCCASIONAL THIN LAMINAE OF WELL DEVELOPED COALS SHOWING MINOR TO MODERATE OUTGASSING.

COAL = BLACK TO BROWNISH BLACK; CRUNCHY TO BRITTLE TENACITY; FRACTURE BLOCKY TO OCCASIONAL CONCHOIDAL; CUTTINGS HABIT BLOCKY TO TABULAR W/ COMMON IRREGULAR; LUSTER RESINOUS TO VITREOUS WITH SOME METALLIC SPECIMENS; STRUCTURE VERY THIN LAMINATIONS; MINOR OUTGASSING COMMON.





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