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Bakersfield, CA  
(661) 328-1595  
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(337) 364-2322  
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## Drilling Dynamics MD

**COMPANY** ExxonMobil Production

**WELL** PCU 197-34A3

**FIELD** PICEANCE CREEK UNIT

**REGION** ROCKY MOUNTAINS

**COORDINATES** LAT: 39.918037  
LONG: -108.276941

**ELEVATION** G.L.: 6490.8'  
RKB: 30.2'

**COUNTY, STATE** RIO BLANCO, CO

**API INDEX** 051031154200

**SPUD DATE** 02/27/2010

**CONTRACTOR** HELMERICH AND PAYNE

**CO. REP.** J. THOMAS

**RIG/TYPE** HP 325 / FLEX 4S

**LOGGING UNIT** MLU 48

**GEOLOGISTS** M. GROSS  
D. NEW

**ADD. PERSONS**

**CO. GEOLOGIST** MELISSA SAURBORN

### LOG INTERVAL

### CASING DATA

**DEPTHS:** 3858' TO 12800'

**DATES:** 06/15/2010 TO 07/31/2010

**SCALE:** 1" = 100'

10.75" AT 3853'

7.00" AT 8731'

AT

AT

### MUD TYPES

### HOLE SIZE

SPUD MUD TO 3858'

LSND TO 12800'

TO

TO

14.75" TO 3858'

9.875" TO 8750'

6.125" TO 12800'

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	

Lithology

<0 Ttl Gas 1K>  
units

<0 CO2 10K>  
ppm

<0 Flare Ht. 100>  
ft

Depth

<200 Avg RPM 0><150 ROP 0><400 MSE 0>

ft/hr

psi

<30K Avg Torque 0><50 Avg WOB 0>

FTLBS klbs

MGS

Remarks  
Survey Data, Mud Reports, Other Info.

3400

3500

3600

3700

3800

3900

4000

4100

4200

4300

ALL ROCK COLORS ARE REFERENCED TO THE GSA ROCK COLOR CHART. ROCK CONSTITUENTS ARE DESCRIBED WET AND LISTED IN ORDER OF MOST ABUNDANT TO LEAST ABUNDANT WITH RESPECT TO PERCENTAGE IN SAMPLE. DEPTH IS REFERENCED TO RKB.

CONNECTION GASES AS WELL AS TRIP GASES AND DOWNTIME GASES ARE NOTED ON THE LOG. LARGE CONNECTION GASES WHICH APPEAR ON THE MUDLOG USUALLY REFLECT UPHOLE GAS INTERVALS BLEEDING INTO THE BOREHOLE DURING CONNECTIONS.

GAS CHROMATOGRAPHY EQUIPMENT IS CALIBRATED TO A TEST GAS COMPOSED OF:  
METHANE = 10000 PPM  
ETHANE = 1000 PPM  
PROPANE = 1000 PPM  
I-BUTANE = 1000 PPM  
N-BUTANE = 1000 PPM  
I-PENTANE = 1000 PPM  
N-PENTANE = 1000 PPM

WHEN THE MUD IS RUN THROUGH THE MGS (MUD GAS SEPERATOR) THE INTERVAL IS MARKED ON THE LOG IN THE SLIDE COLUMN AND NOTED ON THE LOG.

ALL SANDSTONE INTERVALS ARE EXAMINED FOR SAMPLE FLUORESCENCE IN THE UV SCOPE AND FOR HYDROCARBON FLUORESCENCE AND MINOR FLUORESCENCE FROM POSSIBLE FRACTURE FILL. ALL FLUORESCENCE IS NOTED ON THE MUDLOG.

10.75" SURFACE CASING WAS SET AT 3853'. DRILLED 10' OF NEW FORMATION AND PERFORM F.I.T. - GOOD. DRILL AHEAD.

SURVEY @ 3728' MD: INC 24.16 AZI 108.32 TVD 3474.44'

EPOCH WELL SERVICES COMMENCED FULL LOGGING ON 06/16/2010 AT 3858'

06/16/2010  
NB#2 HUGES 504ZX 9.875" PDC  
JETS 2x12.4x13. IN @ 3858'

DAY TOUR

SHALE = VERY PALE GRAY, YELLOWISH GRAY; SOFT TO MODERATELY FIRM TENACITY; PLANAR TO IRREGULAR FRACTURE; WEDGELIKE TO PLATY CUTTINGS HABIT; DULL EARTHY TO SEMI WAXY LUSTER; GRADES TO PALE YELLOWISH GRAY SILTSTONE; SOME CLAY WASHES OUT DURING CLEANING PROCESS.

SHALE = PALE TO MODERATE YELLOWISH GRAY MOTTLED WITH LIGHT GRAY; PLATY TO SCALY TO TABULAR CUTTINGS HABIT; PLANAR TO HACKLY FRACTURE; DULL EARTHY LUSTER; MASSIVE STRUCTURE; CRUNCHY TO CRUMBLY TENACITY; TRACE AMOUNTS OF NAHCOLITE IN SAMPLE.

SILTSTONE = LIGHT GRAY TO PALE YELLOWISH GRAY; BLOCKY TO IRREGULAR FRACTURE; PLATY TO WEDGELIKE TO SCALY CUTTINGS HABIT; SILTY TO SUCROSIC TEXTURE; GRADES TO LIGHT GRAY SANDSTONE; SPARKLING TO SEMI EARTHY LUSTER; THINLY INTERBEDDED WITH SHALE.

SANDSTONE = OFF WHITE TO LIGHT GRAY TO MEDIUM GRAY; FRIABLE TO MODERATE HARD; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT AND MINOR AMT OF KAOLIN; 2-4% DARK LITHIC MATERIAL; TR AMOUNT OF NAHCOLITE IN SAMPLE; ANGULAR TO SUBROUND; LOW TO MODERATE SPHERICITY; FAIRLY SORTED; VERY FINE TO UPPER FINE GRAIN; TRACE ACCESSORY MINERAL OF MICRO PYRITE.

SHALE = PALE TO MODERATE YELLOWISH GRAY MOTTLED WITH LIGHT GRAY; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; IRREGULAR TO SPLINTERY FRACTURE; EARTHY LUSTER; MASSIVE STRUC; FIRM TO CRUNCHY TENACITY.

SHALE = PALE TO MODERATE YELLOWISH GRAY TO LIGHT GRAY MOTTLED WITH DUSKY RED; BLOCKY TO PLANAR TO HACKLY FRACTURE; PLATY TO WEDGELIKE TO SEMI ELONGATED CUTTINGS HABIT; CLAYEY TO SEMI SILTY TEXTURE; DULL EARTHY LUSTER; GRADES TO PALE YELLOWISH GRAY SILTSTONE.

<0 Ttl Gas 100>  
CO2 10K>  
Flare Ht. 100>

<200 Avg RPM 0><150 ROP 0><400 MSE 0>

<30K Avg Torque 0><50 Avg WOB 0>

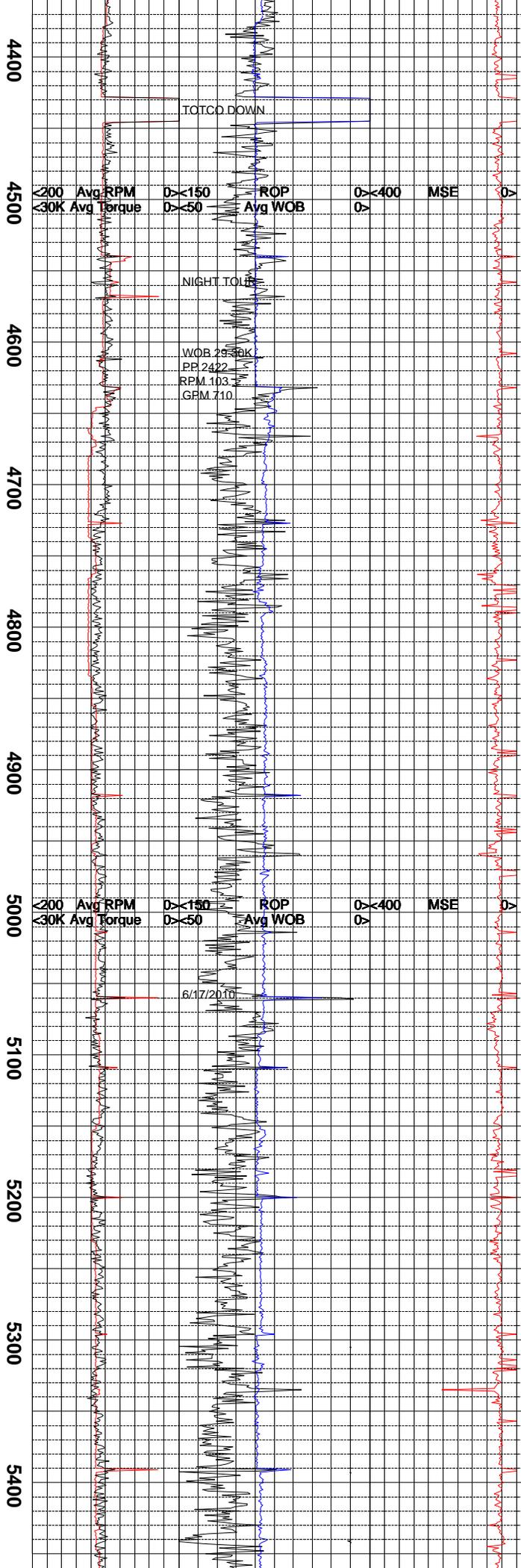
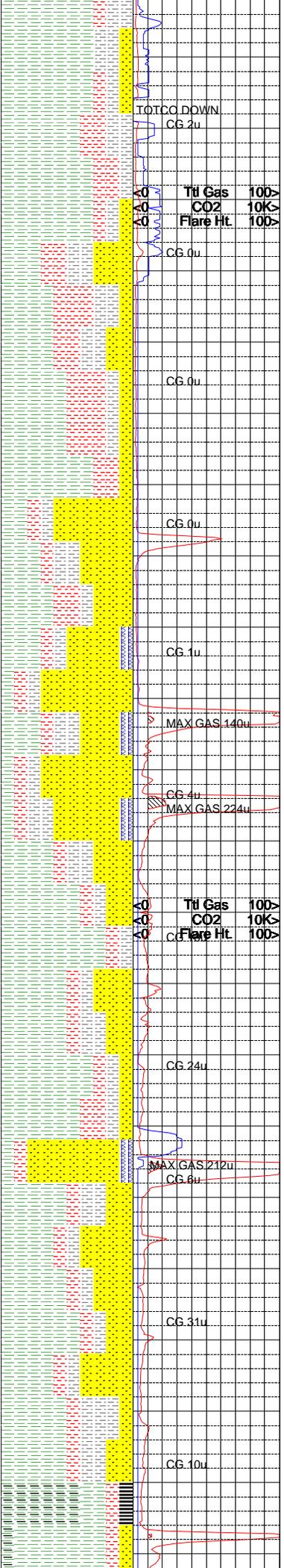
<0 Ttl Gas 100>  
CO2 10K>  
Flare Ht. 100>

<200 Avg RPM 0><150 ROP 0><400 MSE 0>

<30K Avg Torque 0><50 Avg WOB 0>

CALIB GAS EQUIPMENT.

CG 1u



SILTSTONE = LIGHT GRAY TO PALE YELLOWISH GRAY; HACKLY TO IRREGULAR TO PLANAR FRACTURE; PLATY TO SCALY TO TABULAR CUTTINGS HABIT; SILTY TO SEMI GRITTY TEXTURE; SPARKLING TO SLIGHT EARTHY LUSTER; THINLY INTERBEDDED WITH PALE YELLOWISH GRAY SILTSTONE.

SHALE = MODERATE YELLOWISH GRAY TO LIGHT GRAY MOTTLED WITH GRAYISH RED; PLATY TO WEDGELIKE CUTTINGS HABIT; EARTHY LUSTER; CLAYEY TO MATTE TEXTURE; TRACE ACCESSORY MINERAL OF MICA; SOFT TO FIRM TENACITY.

SHALE = MODERATE YELLOWISH GRAY TO PALE YELLOWISH GRAY TO LIGHT GRAY; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; CLAY TO SLIGHTLY SILTY TEXTURE; SPLINTERY TO PLANAR TO IRREGULAR FRACTURE; DULL EARTHY LUSTER; GRADES TO SILTSTONE.

SANDSTONE = MODERATE YELLOWISH GRAY, GRAYISH WHITE, PALE BROWN TO PALE BROWNISH GRAY; UPPER VERY FINE TO UPPER FINE; MODERATELY WELL SORTED; MODERATELY HIGH SPHERICITY; SOFT TO EASILY FRIABLE; ARGILLACEOUS WITH TRACE TO MODERATE CALCAREOUS CEMENT; MOSTLY GRAIN SUPPORTED WITH ABUNDANT MATRIX; INTERSTICES VERY WELL FILLED; NO CUT; NO FLUORESCENCE; POOR VISIBLE POROSITY.

SHALE = MODERATE GRAYISH YELLOW TO DARK YELLOWISH ORANGE, REDDISH PURPLE TO MODERATE RED, VERY LIGHT GRAY TO MEDIUM LIGHT GRAY, GREENISH GRAY TO LIGHT BLUISH GRAY; VERY SOFT TO MODERATELY TOUGH; HACKLY TO IRREGULAR FRACTURE; CUTTINGS IRREG TO RARE WEDGELIKE; DULL; SMOOTH TO SLIGHTLY SILTY TEXTURE; STRUCTURE PREDOMINANTLY MASSIVE WITH SOME COLOR SWIRLING; NO FLUORESCENCE.

SILTSTONE = LIGHT GRAY, MODERATE YELLOW GRAY, LIGHT TO MODERATE BROWN; SOFT TO MODERATELY FIRM TENACITY; CUTTINGS HABIT MASSIVE TO IRREGULAR; LUSTER DULL; TEXT SILTY TO VERY SLIGHTLY SANDY; MASS STRUC

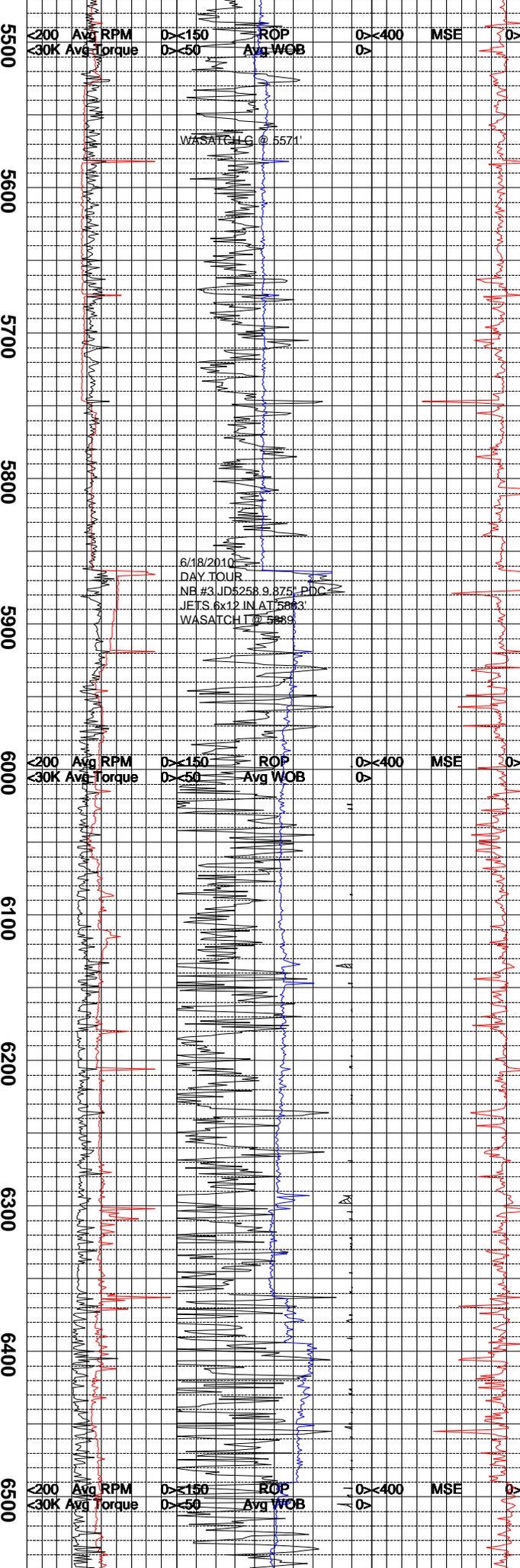
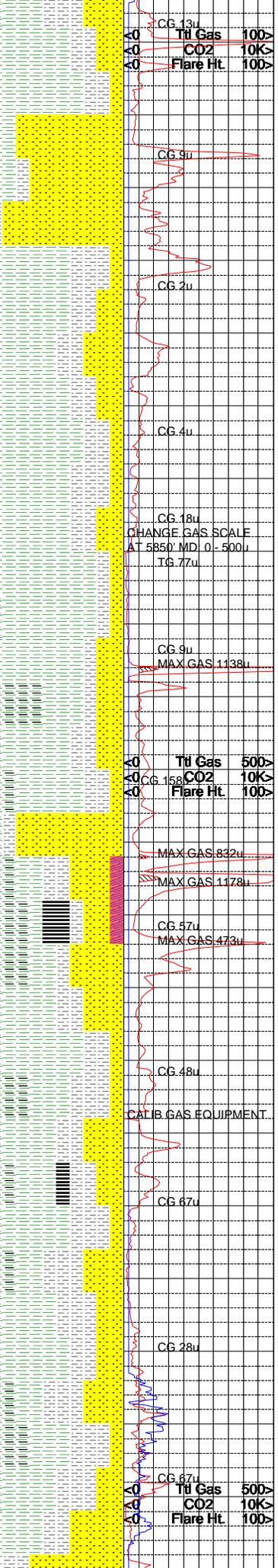
SANDSTONE = WHITE TO VERY LIGHT GRAY; SLIGHTLY SPECKLED APPEARANCE DUE TO <1% DARK FINE LITHICS; FRAMEWORK PREDOMINANTLY COLORLESS TRANSPARENT TO TRANSLUCENT QUARTZ; UPPER VERY FINE TO UPPER FINE; MODERATELY TO MODERATELY WELL SORTED; SUB ANGULAR TO SUB ROUND; SHPERICITY MODERATELY HIGH; EASILY TO FIRMLY FRIABLE; GRAIN SUPPORTED; CEMENT CALCAREOUS W/ MODERATE REACTION TO HCL; INTERSTICES MODERATELY WELL FILLED; NO CUT; NO FLOURESCENCE; MODERATE TO POOR VISIBLE POROSITY; ASSOCIATED GAS SHOWS 140 UNITS AND 223 UNITS.

SHALE = LIGHT TO MEDIUM GRAY, MODERATE YELLOWISH GRAY TO MODERATE YELLOWISH BROWN, LIGHT TO MODERATE RED, DARK GRAY; MODERATELY SOFT TO CRUNCHY TENACITY; FRACTURE IRREGULAR TO HACKLY; CUTTINGS HABIT MASSIVE TO OCCASIONAL WEDGELIKE; LUSTER DULL WITH SOME EARTHY; TEXTURE SMOOTH TO VERY SLIGHTLY SILTY; STRUCTURE PREDOMINATELY MASSIVE W/ RARE V THIN VARVE LIKE LAMINATIONS; SOME MINERAL FLUORESCENCE OBSERVED.

SANDSTONE = WHITEISH GRAY TO VERY LIGHT GRAY, PALE BROWN TO MODERATE BROWN, MODERATE RED TO REDDISH PURPLE; UPPER VERY FINE TO UPPER FINE; MODERATE WELL SORTED; SUB ANGULAR TO SUB ROUNDED; MODERATELY SOFT TO RARE FIRMLY FRIABLE; CEMENT ARGILLACEOUS W/ MODERATE CALC COMPONENT; PREDOM GRAIN SUPPORTED W/ FAIR AMOUNT OF MATRIX MATERIAL; INTERSTICES WELL FILLED; NO CUT; NO FLUORES; POOR TO MODERATELY POOR VISIBLE POROSITY

SHALE = LIGHT GRAY TO MODERATE GRAY, MODERATE GRAYISH YELLOW TO GREENISH GRAY, LIGHT TO MODERATE BROWN; CRUMBLY TO CRUNCHY TENACITY; FRACTURE HACKLY TO IRREGULAR SOME NEAR PLANAR; CUTTINGS HABIT MASSIVE TO IRREGULAR WITH OCCAS WEDGELIKE; LUSTER DULL; TEXTURE SMOOTH TO SLIGHTLY SILTY; STRUCTURE MASSIVE.

CARBONACEOUS SHALE = BLACKISH BROWN TO BROWNISH BLACK, BLACK; SOFT TO CRUMBLY WITH OCCASIONAL CRUNCHY TENACITY; FRACTURE PLANNAR TO IRREGULAR; CUTTINGS HAB MASSIVE TO SOMEWHAT BLOCKY; LUSTER RESINOUS TO DULL WITH RARE WELL DEVELOPED BLACK VITREOUS COAL LAMINAE; TEXTURE SMOOTH; VERY THINLY LAMINATED STRUCTURE WITH COMMON PLANNAR PARTING; COMMON TO ABUNDANT PYRITE; COMMON MODERATE TO SLOW OUTGASSING OF BOTH CARBONACEOUS SHALES AND THIN LAMINAE OF COALS.



SHALE = MEDIUM GRAY TO LIGHT GRAY WITH SOME DARK GRAY; PLATY TO WEDGELIKE TO SCALY CUTTINGS HABIT; SPLINTERY TO SEMI HACKLY FRACTURE; CLAYEY TO SILTY TEXT; EARTHY TO WAXY LUSTER; GRADES TO LIGHT GRAY SILTSTONE; CRUNCHY TO HARD TENACITY.

WASATCH G SANDSTONE = TRANSPARENT TO OPAQUE; PREDOMINANTLY LOOSE GRAINS WITH SOME PRESERVED SANDSTONE SPECIMENS; VERY FINE TO UPPER FINE GRAIN WITH MINOR MEDIUM GRAINS; MOD TO HIGH SPHERICITY; FAIR TO WELL SORTED; MODERATE FROSTING; PRESERVED SPECIMENS WITH SILICA AND CALCITE CEMENT WITH SOME KAOLIN; OFF WHITE TO VERY LIGHT GRAY WITH TR LIGHT GREENISH GRAY; 1-3% CARBONACEOUS SHALE/ COAL FLECKS; FRIABLE TO MODERATE HARD; ROUND TO SUBANGULAR; TRACE ACCESSORY MINERALS OF AGGREGATE PYRITE AND CHLORITE MICAS; GRADES TO LIGHT GRAY SILTSTONE.

SHALE = MEDIUM GRAY TO DUSKY RED; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; SILTY TO CLAYEY TEXTURE; GRADES TO LIGHT GRAY SILTSTONE; IRREGULAR TO ANGULAR TO PLANAR FRACTURE; DULL EARTHY LUSTER; MASSIVE STRUCTURE WITH THIN INTERBEDDING OF SILTSTONE.

SILTSTONE = LIGHT GRAY TO GRAYISH RED; HACKLY TO IRREGULAR TO BLOCKY FRACTURE; TABULAR TO PLATY CUTTINGS HABIT; SILTY T TO GRITTY TEXTURE; GRADES TO LIGHT GRAY SANDSTONE; SPARKLING LUSTER.

NOTE: TOH TO L/D MWD TOOLS AT 5863'. P/U NEW BHA #3. THH. LOSE RETURNS AT 5780'. REGAIN FULL RETURNS PRIOR TO DRILLING AHEAD.

SHALE = MEDIUM GRAY TO DARK GRAY WITH MINOR OLIVE GRAY; PLATY TO TABULAR TO SCALY CUTTINGS HABIT; SPLINTERY TO PLANAR TO IRREGULAR FRACTURE; SLIGHTLY SILTY TO MATTE TEXTURE; DULL EARTHY LUSTER; GRADES TO MEDIUM GRAY SILTSTONE.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY MOTTLED WITH DARK GRAY; PLATY TO FLAKY TO WEDGELIKE CUTTINGS HABIT; THINLY INTERBEDDED W/ THIN COAL LAMINAE AND OLIVE GRAY SILTSTONE; IRREGULAR TO HACKLY TO ANGULAR FRACTURE; MATTE TO SILTY TEXTURE; EARTHY TO SLIGHT VITREOUS LUSTER; TR ACCESSORY MINERAL OF PYRITIC VEINING IN SAMPLE FRAGMENTS.

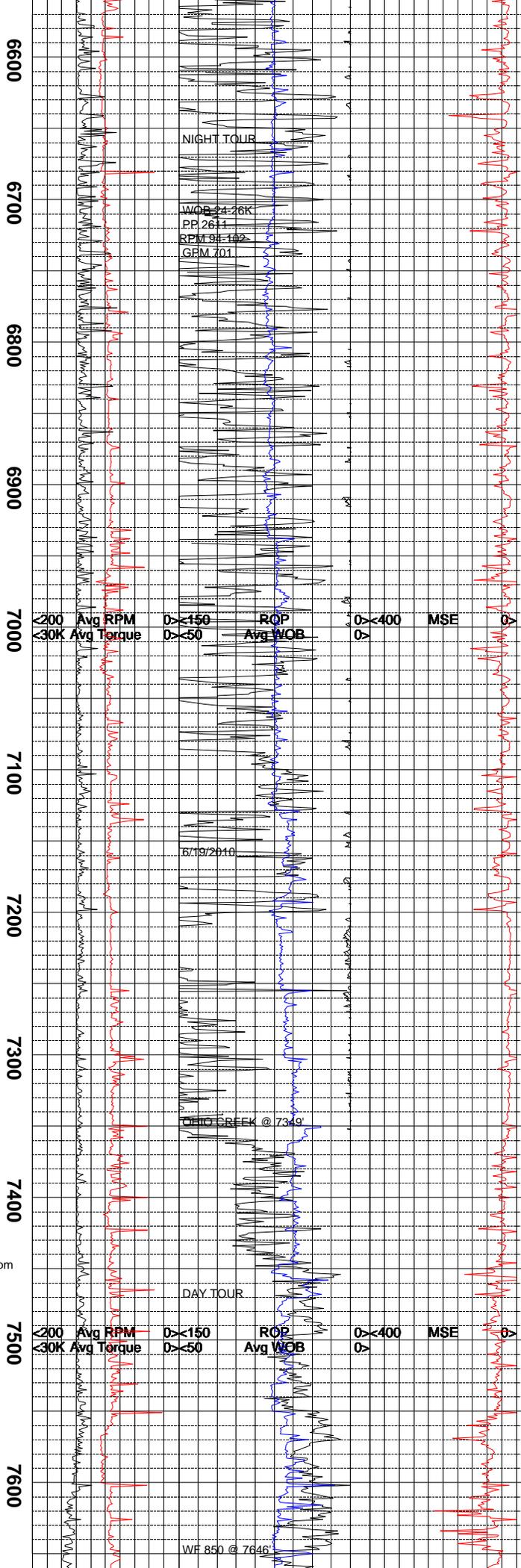
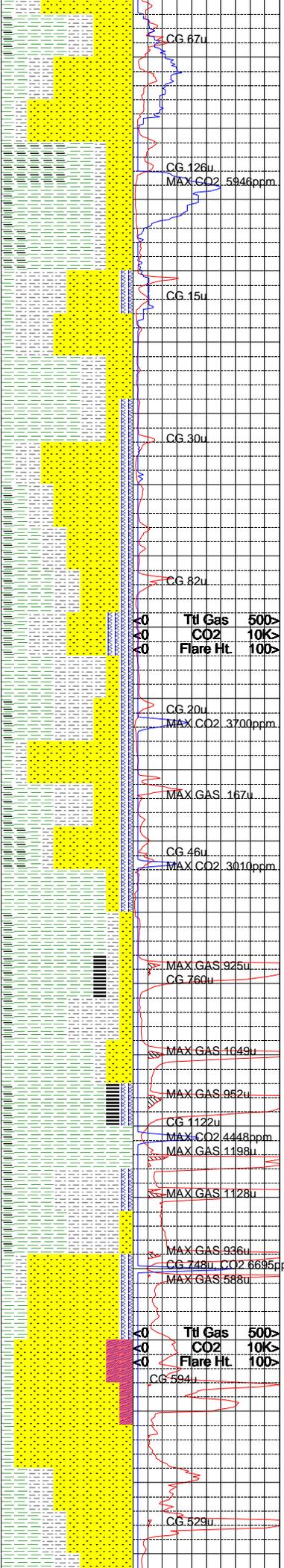
COAL = BLACK TO BROWNISH BLACK; BLOCKY TO CONCHOIDAL TO SPLINTERY FRACTURE; TABULAR TO WEDGELIKE TO PLATY CUTTINGS HABIT; SMOOTH TO CLAYEY TEXTURE; SOME PYRITIC VEINING ALONG FRACTURE FACES; VISIBLE DEGASSING OF SAMPLE FRAGMENTS; THINLY INTERBEDDED WITH CARBONACEOUS SHALE AND SANDSTONE.

SHALE = MEDIUM GRAY TO DARK GRAY TO OLIVE GRAY; PLATY TO SCALY TO ELONGATED CUTTINGS HABIT; IRREGULAR TO PLANAR TO SPLINTERY FRACTURE; SILTY TO MATTE TEXT; EARTHY TO SLIGHT SPARKLING LUSTER; GRADE TO MEDIUM GRAY SILTSTONE; TRACE AMOUNTS OF PYRITE AND CARBONACEOUS FLECKS IN SAMPLE FRAGMENTS.

SILTSTONE = MEDIUM GRAY TO OLIVE GRAY TO DARK GRAY; IRREGULAR TO BLOCKY TO HACKLY FRACTURE; SPARKLING LUSTER; TRACE LOOSE GRAINS IN SAMPLE FRAGMENTS; SILTY TO GRITTY TO SUCROSIC TEXTURE; GRADES TO LIGHT GRAY SANDSTONE; CRUNCHY TO HARD TENACITY.

SANDSTONE = LIGHT GRAY TO LIGHT OLIVE GRAY TO OFF WHITE; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT AND TRACE KAOLIN CEMENT; SUBANGULAR TO SUBROUND; VERY FINE TO UPPER FINE GRAIN; LOW TO MODERATE SPHERICITY; FAIR TO MODERATELY WELL SORTED; TRACE AMOUNTS OF FRAMBOIDAL AND AGGREGATE PYRITE; TR ACCESSORY MINERAL OF CHLORITE MICA; THINLY INTERBEDDED WITH CARBONACEOUS SHALE AND COAL LAMINAE; MODERATELY HARD TO HARD; NO VISIBLE HYDROCARBON INDICATORS.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO DARK GRAY; PLANAR TO SPLINTERY TO HACKLY FRACTURE; TRACE COAL LAMINAE INTERBEDDED IN SAMPLE FRAGMENTS; ELONGATED TO PLATY TO WEDGELIKE CUTTINGS HABIT; MATTE TO SMOOTH TEXTURE; EARTHY TO VITREOUS LUSTER; TRACE THIN PYRITIC VEINING ON SOME SAMPLE SPECIMENS.



SHALE = MEDIUM GRAY TO DARK GRAY TO OLIVE GRAY; PLATY TO SCALY TO TABULAR CUTTINGS HABIT; MATTE TO SILTY TEXTURE; EARTHY TO SLI SPARKLING LUSTER; GRADES TO LIGHT GRAY SILTSTONE; CRUNCHY TO HARD TENACITY; THINLY INTERBEDDED WITH SILTSTONE AND CARBONACEOUS SHALE.

SANDSTONE = WHITE TO WHITEISH GRAY TO LIGHT MEDIUM GRAY; FRAMEWORK COLORLESS TRANSLUCENT TO TRANSPARENT QUARTZ, LOWER VERY FINE TO UPPER FINE WITH RARE LOWER MEDIUM; MODERATELY TO MODERATELY WELL SORTED; SUB ANGULAR TO SUB ROUNDED; SPHERICITY MODERATELY HIGH; MODERATELY SOFT TO OCCASIONAL FIRMLY FRIABLE; CALCAREOUS WITH MINOR ARGILLACEOUS COMPONENT SHOWING MOD TO FAIRLY STRONG REACTION TO HCL; GRAIN SUPPORTED; INTERSTICES MODERATELY WELL TO WELL FILLED; <1% DARK, FINE LITHICS; COMMON PYRITE LOOSE AND AS OCCASIONAL CEMENT; RARE CHLORITE; NO CUT; NO FLUORESCENCE; POOR VISIBLE POROSITY.

SHALE = LIGHT TO MODERATE GRAY, LIGHT TO MODERATE BROWN, MODERATE YELLOWISH GRAY, MODERATE REDDISH BROWN; CRUNCHY TO MODERATELY SOFT WITH SOME SLIGHTLY BRITTLE; CUTTINGS HABIT MASSIVE TO IRREG WITH OCCASIONAL WEDGELIKE; DULL LUSTER; SMOOTH TO SLIGHTLY SILTY TEXTURE; STRUC GENERALLY MASSIVE WITH OCCASIONAL FLECKS CARBONACEOUS MATERIAL AND RARE SMALL PIECES (POSSIBLY DETRITAL) CARB SHALE.

SILTSTONE = LIGHT TO MEDIUM GRAY, LIGHT BROWN TO MODERATE BROWN, LIGHT REDDISH BROWN; CRUMBLY TO CRUNCHY TENACITY; FRACTURE HACKLY TO SLIGHTLY PLANAR; CUTTINGS HABIT MASSIVE; LUSTER EARTHY TO DULL; TEXTURE SILTY; MASSIVE STRUCTURE.

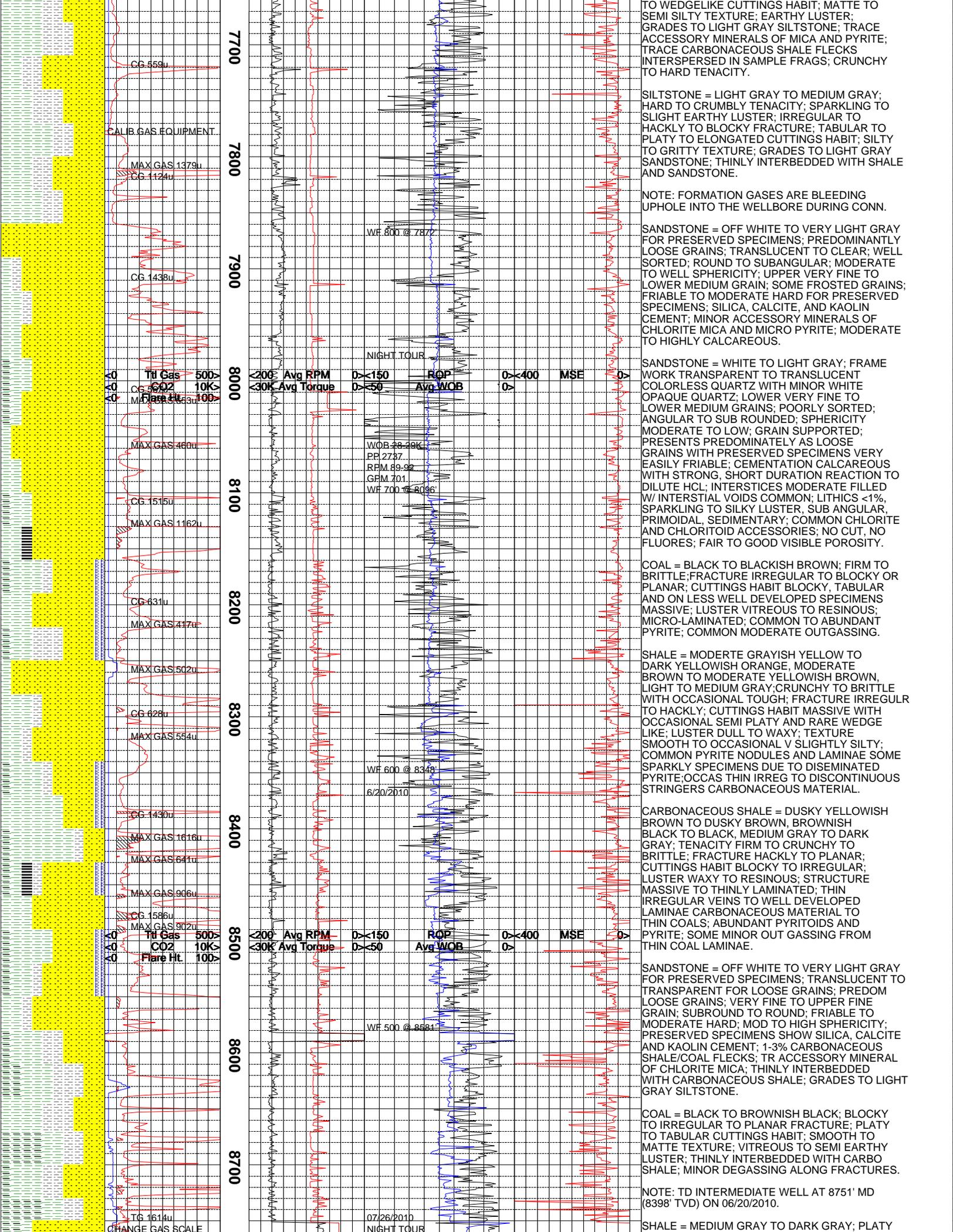
SHALE = LIGHT TO MEDIUM GRAY, MODERATE GRAYISH YELLOW TO DARK YELLOWISH ORANGE, OLIVE GRAY TO GREENISH GRAY, MODERATE TO DUSKY BROWN; CRUNCHY TO TOUGH AND BRITTLE; FRACTURE HACKLY TO SEMI PLANAR; CUTTINGS MASSIVE TO COMMON WEDGELIKE; LUSTER DULL; TEXTURE SMOOTH TO SLIGHTLY SILTY; STRUCTURE MASSIVE WITH OCCASIONAL FLECKS AND STRINGER OF CARBONACEOUS MATERIAL.

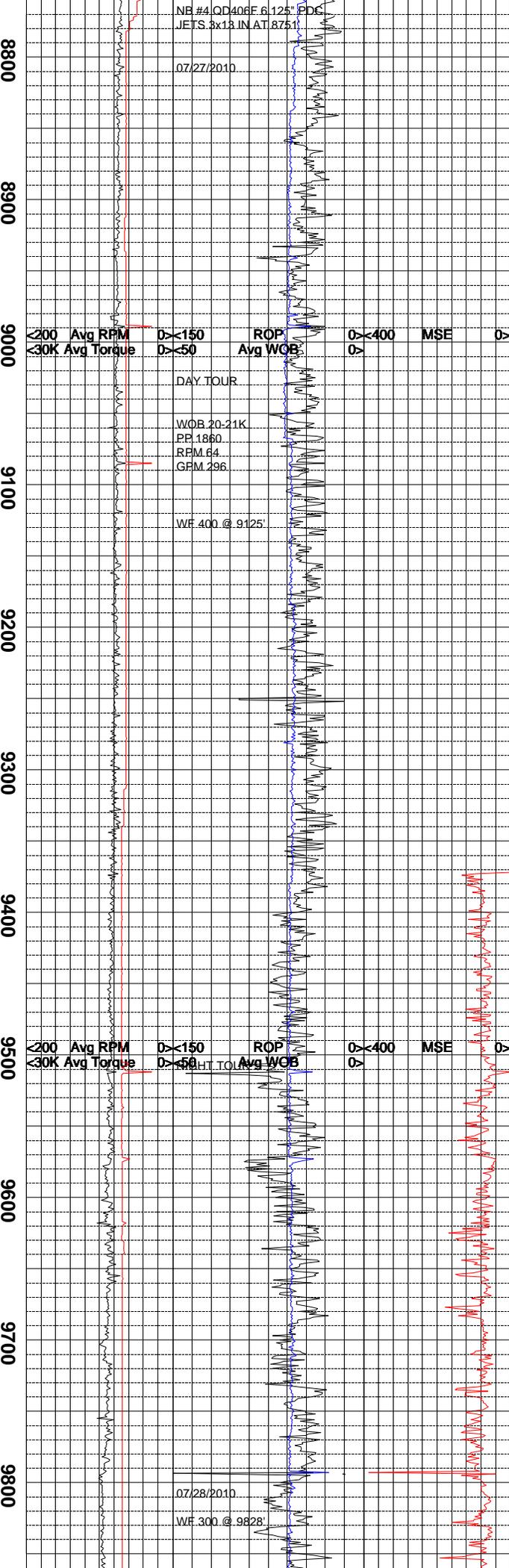
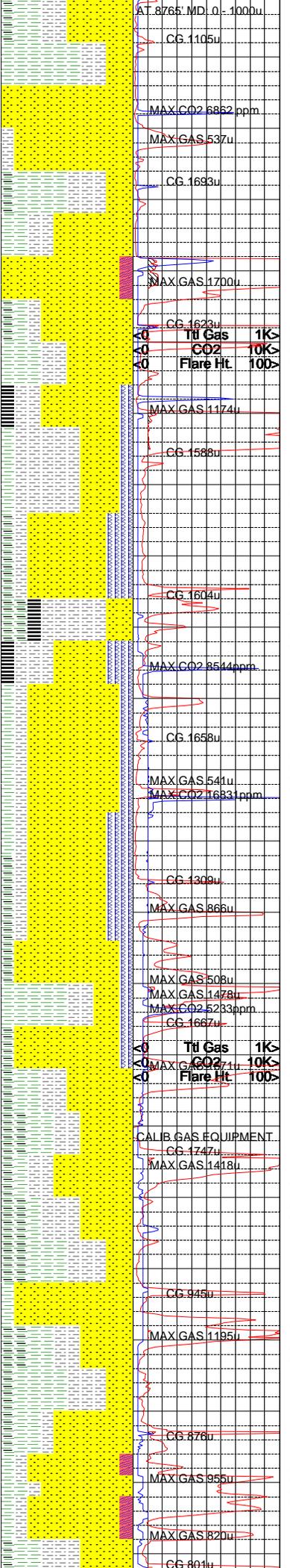
SANDSTONE = WHITE TO WHITEISH GRAY TO LIGHT GRAY; FRAMEWORK COLORLESS/ WHITE TRANSPARENT TO TRANSLUCENT QUARTZ; LOWER FINE TO LOWER MEDIUM; MODERATE SORTING; SUB ANGULAR TO SUB ROUNDED; VERY EASILY FRIABLE TO MODERATELY FRIABL WITH ABUNDANT LOOSE GRAINS; CEMENT CALCAREOUS WITH STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED; INTERSTICES MOSTLY WELL FILLED; RARE THIN LAMINAE TO STRINGERS OF CARBONACEOUS MATERIAL; COMMON PYRITE LOOSE IN SAMPLE AND AS OCCASIONAL CEMENT COMMON CHLORITE AND CHLORITOID MINERALS AS ACCESSORIES; NO CUT; RARE TO OCCASIONAL MINERAL FLUORESCENCE; POOR TO MODERATELY POOR VISIBLE POROSITY

CARBONACEOUS SHALE = DUSKY YELLOWISH BROWN TO MODERATE BROWN; GRAYISH BROWN TO MOTTLED BROWN AND GRAY; COMMON FLECKS OF CARBONACEOUS MATERIAL IN GRAY SPECIMENS TO THIN LAMINAE OF WELL DEVELOPED LAMINAE WITH SOME OF THESE LAMINAE HAVING MODERATE TO SLOW OUTGASSING EVIDENT; COMMON PYRITE AND PYRITIDS AS LAMINAE, NODULES AND LOOSE IN SAMPLE; FRACTURE IRREGULAR TO SLIGHTLY BLOCKY; CUTTINGS HABIT MASSIVE TO SLIGHT BLOCKY; LUSTER DULL TO RESINOUS; TEXTURE SLIGHTLY SILTY AND FLAKY; STRUCTURE MASS TO VERY FINELY LAMINATED IN OCCASIONAL SPECIMENS.

SANDSTONE = OFF WHITE TO LIGHT GRAY TO MEDIUM GRAY; PREDOMINANTLY GRAIN SUPPORT WITH SILICA, CALCITE AND KAOLIN CEMENT; SUBANGULAR TO ROUND; MODERATE TO HIGH SPHERICITY; FRIABLE TO MODERATELY HARD; VERY FINE GRAIN TO UPPER FINE GRAIN SOME LOOSE MEDIUM GRAIN; 1-3% CARBONACEOUS SHALE/COAL FLECKS; MINOR ACCESSORY MINERALS OF CHLORITE MICA AND AGGREGATE PYRITE; 5-7% CHLORITIZED SANDSTONE FRAG; ABUNDANT LOOSE GRAINS; TRANSLUCENT TO TRANSPARENT; ROUND TO SUBANGULAR; WELL SORTED; MODERATE TO HIGH SPHERICITY; 10-20% FRACTURE FILL AS CALCITE IN CRYSTALLINE FORM; MOSTLY CLEAR WITH SOME OPAQUE GRAINS; STRIATIONS APPARENT ON FRACTURE FACE; CUBIC TO IRREGULAR FRAC.

SHALE = MEDIUM GRAY TO LIGHT GRAY WITH MINOR LIGHT OLIVE GRAY; PLATY TO SCALY





AT 8765' MD: 0 - 1000u  
 CG. 1105u  
 MAX CO2 6862 ppm  
 MAX GAS 537u  
 CG. 1693u  
 MAX GAS 1700u  
 CG. 1623u  
 Tid Gas 1K  
 CO2 10K  
 Flare Ht 100  
 MAX GAS 1174u  
 CG. 1588u  
 CG. 1604u  
 MAX CO2 8544 ppm  
 CG. 1658u  
 MAX GAS 541u  
 MAX CO2 16831 ppm  
 CG. 1309u  
 MAX GAS 866u  
 MAX GAS 508u  
 MAX GAS 1478u  
 MAX CO2 52333 ppm  
 CG. 1667u  
 Tid Gas 1K  
 CO2 10K  
 Flare Ht 100  
 CALIB GAS EQUIPMENT  
 CG. 1747u  
 MAX GAS 1418u  
 CG. 945u  
 MAX GAS 1195u  
 CG. 876u  
 MAX GAS 955u  
 CG. 801u

NB #1 QD406F 6.125' PDC  
 JETS 3x13 IN AT 875'  
 07/27/2010  
 DAY TOUR  
 WOB 20-21K  
 RFM 64  
 GPM 296  
 WF 400 @ 9125'  
 07/28/2010  
 WF 300 @ 9828'

<200 Avg RPM >150 ROP >400 MSE >  
 <30K Avg Torque >50 Avg WOB >

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY OVERALL; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT; SOME KAOLIN PRESENT IN SAMPLE; 2-4% COAL/ CARBONACEOUS SHALE FLECKS; TRACE AMTS OF PYRITE; SUB ROUND TO SUB ANGULAR; FAIR TO WELL SORTED; MOD SPHERICITY; VERY FINE TO UPPER FINE GRAIN; FIRM FRIABLE TO HARD; MINOR AMOUNTS OF LOOSE FINE GRAIN SAND; TRANSLUCENT TO CLEAR; MINOR SURFACE ABRASION ON SOME SAMPLE FRAGMENTS; TRACE FRACTURE FILL AT SAMPLE 8970'; IRREGULAR TO CUBIC CALCITE CRYSTALS.

NOTE: UPHOLE FORMATION GASES BLEEDING INTO WELLBORE DURING CONNECTION.

SANDSTONE = WHITE, LIGHT GRAY, MEDIUM GRAY; MEDIUM TO VERY FINE GRAINED; FAIR TO POORLY SORTED; SUB ANGULAR TO SUB ROUNDED; LOW TO MODERATE SPHERICITY; FIRM TO SOFT; CEMENTATION HIGHLY CALC WITH MODERATE KAOLINITIC COMPONENT; PREDOMINANTLY GRAIN SUPPORTED; NO FLUORESCENCE.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY; DENSE TO BRITTLE; IRREGULAR TO PLANAR MASSIVE CUTTINGS HABIT; EARTHY LUSTER; GRITTY TO GRANULAR; MASSIVE TO WITH TRACE LENSES OF CARBONACEOUS MATERIAL.

COAL = BLACK TO DARK GRAY; BRITTLE TO CRUNCHY; BLOCKY TO HACKLY FRACTURE; MASSIVE TO WEDGELIKE CUTTINGS HABIT; GREASY TO EARTHY LUSTER; SMOOTH TO SILTY; MASSIVE TO THIN STRUCTURE; MODERATE OUTGASSING.

SILTSTONE = MEDIUM GRAY TO GRAYISH RED; TOUGH TO MODERATELY CRUMBLY; FRACTURE BLOCKY TO IRREGULAR; MASSIVE TO WEDGE LIKE; SILTY TO ABRASIVE TEXTURE; EARTHY LUSTER; SILTY WITH SOME GRITTIENESS; MASSIVE WITH SOME THIN LENSES OF CARBONACEOUS MATERIAL; TRACE PYRITE AS THIN DISCONTINUOUS LENSES.

SANDSTONE = WHITE, LIGHT GRAY, PALE RED, TO GRAYISH RED; MEDIUM TO FINE GRAINED; POOR TO FAIR SORTING; SUBANGULAR TO SUBROUND; MODERATE SPHERICITY; MODERATE HARD TO FRIABLE; ARGILLACEOUS CEMENT W/ WEAK CALC COMPONENT; GRAIN SUPPORT; GRAIN SIZE COARSENING WITH DEPTH; NO FLUORESCENCE.

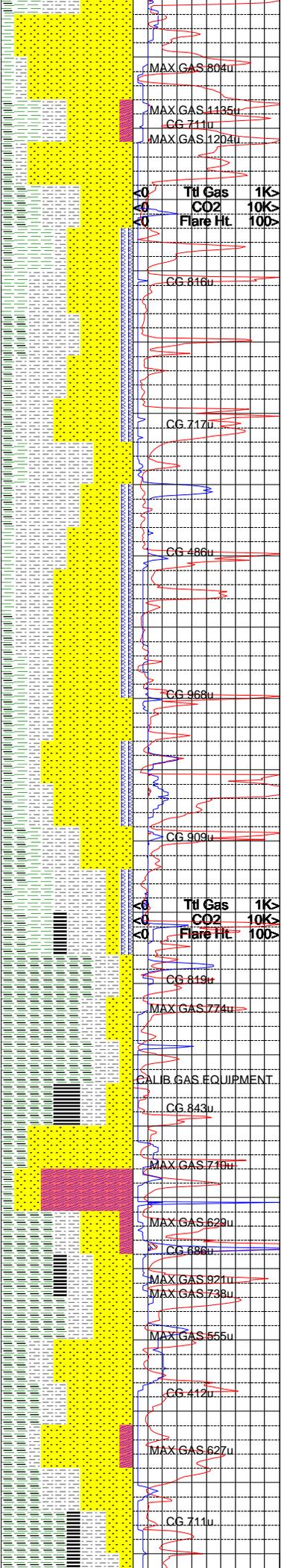
CARBONACEOUS SHALE = DRK GRAY TO GRAYISH BLACK, BLACKISH BROWN TO DUSKY BROWN; TOUGH TO CRUMBLY; IRREGULAR FRACTURE; MASSIVE TO TABULAR CUTTINGS HABIT; DULL TO METALLIC LUSTER; GRITTY TO SOME MATTE TEXTURE; THIN TO MASSIVE STRUCTURE WITH TRACE THIN LAMMINAE COALS AND PYRITE.

SHALE = MEDIUM GRAY TO DARK GRAY; BLOCKY TO PLANAR TO SPLINTERLY FRACTURE; PLATY TO TABULAR TO WEDGELIKE CUTTINGS HABIT; MATTE TO SILTY TEXTURE; GRADES TO MEDIUM GRAY SILTSTONE; THIN CARBONACEOUS SHALE LAMINAE INTERBEDDED IN SAMPLE FRAGMENTS; DULL EARTHY LUSTER.

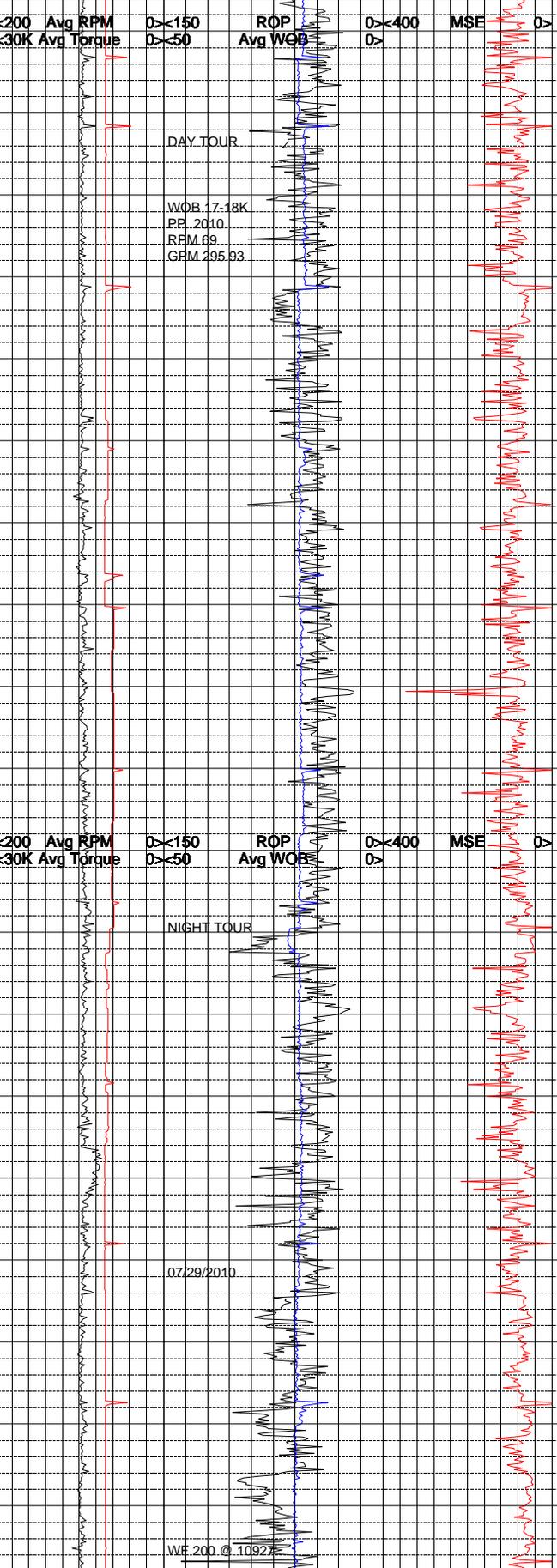
SILTSTONE = MEDIUM GRAY TO LIGHT OLIVE GRAY; IRREGULAR TO SPLINTERLY FRACTURE; SILTY TO GRITTY TEXTURE; SPARKLING TO EARTHY LUSTER; TRACE AMOUNTS OF DARK CARBONACEOUS MATERIAL IN SAMPLE FRAGS; PLATY TO SCALY TO SEMI TABULAR CUTTINGS HABIT.

SANDSTONE = LIGHT OLIVE GRAY TO LIGHT GRAY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND SOME CALCITE CEMENT; MINOR AMOUNTS OF KAOLIN; VERY FINE TO UPPER FINE GRAIN; SUB ANGULAR TO SUB ROUND; FAIR SORTING; MOD TO WELL SPHERICITY; TR CARBONACEOUS SHALE/COAL FLECKS IN SAMPLE FRAGMENTS; THINLY COAL LAMINAE IN SOME SAMPLE SPECIMENS; TRACE AMOUNTS OF FRAGMENTED PYRITE; MINOR AMOUNTS OF LOOSE GRAINS WITHIN SAMPLE; TRANSLUCENT TO TRANSPARENT; FIRM FRIABLE TO HARD; GRADES TO LIGHT GRAY SILTSTONE; TRACE AMOUNTS OF FRACTURE FILL IN SAMPLE AT DEPTH; IRREGULAR TO PLANAR TO CUBIC; CLEAR TO OPAQUE; POSSIBLE LOSS OF FLOW; DRILL BREAK AND INCREASE IN GAS DUE TO FRACTURE FILL.

SHALE = MEDIUM GRAY TO DARK GRAY; PLATY



9900  
10000  
10100  
10200  
10300  
10400  
10500  
10600  
10700  
10800  
10900



TO WEDGE LIKE CUTTINGS HABIT; MATTE TO SILTY TEXTURE; DULL EARTH TO SLIGHTLY SPARKLING LUSTER; SPLINTERY TO BLOCKY TO IRREGULAR FRACTURE; GRADES TO MEDIUM GRAY SILTSTONE; THINLY INTERBEDDED WITH CARBONACEOUS LAMINAE.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO DARK GRAY; PLATY TO SCALY TO WEDGE LIKE CUTTINGS HABIT; SLIGHTLY SILTY TEXTURE; IRREGULAR TO PLANAR TO SPLINTERY FRACTURE; THIN INTERBEDDED LAMINAE OF COAL; NO VISIBLE DEGASSING IN SAMPLES; EARTHY TO SLIGHT VITREOUS LUSTER.

SANDSTONE = WHITE, LIGHT GRAY, PALE RED TO GRAYISH RED; PREDOMINANTLY GRAIN SUPPORTED WITH MINOR ARGILLACEOUS MATRIX; MEDIUM TO VERY FINE GRAINED; POORLY TO FAIRLY WELL SORTED; ANGULAR TO SUBROUNDED GRAINS; LOW TO MODERATE SPHERICITY; CALCITE CEMENT WITH LESSER ARGILLACEOUS COMPONENT; INTERSTICIES FILLED WITH ARGILLACEOUS MATERIAL; FINER SANDSTONE SHOWS THIN LENSES OF PYRITE AND BLACK CARBONACEOUS MATERIAL; BIOTITE IS COMMON ACCESSORY MINERAL; NO FLUORESCENCE.

SILTSTONE = LIGHT GRAY, MEDIUM GRAY, PALE RED TO GRAYISH RED; TOUGH TO CRUMBLY; IRREGULAR, PLANAR TO EARTHY FRACTURE; MASSIVE TO WEDGE LIKE CUTTINGS HABIT; DULL TO EARTHY LUSTER; THIN LENSES AND BEDDING SURFACES CONTAIN PYRITE AND BLACK CARBONACEOUS MATERIAL.

CARBONACEOUS SHALE = BLACK TO DARK GRAY; TOUGH TO CRUMBLY; IRREGULAR TO PLANAR FRACTURE; CUTTINGS HABIT MASSIVE, EQUANT TO WEDGE LIKE; METALLIC, SPARKLING TO EARTHY LUSTER; GRITTY TO SUCROSIC TEXTURE; NO VISIBLE DEGASSING IN SAMPLES.

SHALE = LIGHT GRAY, MEDIUM GRAY, GRAYISH YELLOW GREEN TO PALE GREEN; DENSE TO BRITTLE; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO WEDGE LIKE CUTTINGS HABIT; WAXY TO EARTHY LUSTER; SMOOTH TO GRITTY TEXTURE; GRADATIONAL TO SILTSTONE WITH LENSES TO DISSEMINATED FRAGMENTS OF CARBONACEOUS MATERIAL.

SILTSTONE = GRAYISH BROWN TO DARK DUSKY BROWN SOME BROWNISH BLACK, MODERATE GRAYISH WHITE, FAIRLY SOFT TO CRUMBLY TENACITY WITH RARE CRUNCHY SPECIMENS; FRACTURE HACKLY TO SUB PLANAR; CUTTINGS HABIT MASSIVE WITH COMMON WEDGE LIKE; LUSTER DULL WITH SOME SPECKLED DUE TO FAIRLY RARE DARK PARTICULATES AND COMMON EARTHY; TEXTURE SILTY TO SLIGHT GRITTY; STRUCTURE MASSIVE; ASSOCIATED WITH VERY THINLY INTERBEDDED SHALES AND CARBONACEOUS SHALES AND SOME VERY THIN SANDSTONES.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO DARK GRAY; PLATY TO FLAKY TO ELONGATED CUTTINGS HABIT; PLANAR TO IRREGULAR TO SPLINTERY FRACTURE; DULL EARTHY LUSTER; THINLY INTERBEDDED WITH COAL LAMINAE; TRACE DEGASSING ALONG COAL LAMINAE CONTACTS; MATTE TO SILTY TEXTURE.

COAL = BLACK TO BROWNISH BLACK; BLOCKY TO SPLINTERY TO PLANAR FRACTURE; PLATY TO TABULAR TO ELONGATED CUTTINGS HABIT; SMOOTH TO MATTE TEXTURE; VITREOUS TO EARTHY LUSTER; SOME VISIBLE DEGASSING ALONG FRACTURES IN COAL SAMPLE FRAGS; THINLY INTERBEDDED WITH CARBONACEOUS SHALE.

FRACTURE FILL = TRANSLUCENT TO CLEAR; IRREGULAR TO CUBIC TO SPLINTERY FRAC; TABULAR TO FLAKY TO PLATY CUTTINGS HABIT; ABUNDANT CRYSTALLINE STRUCTURE IN SAMPLE; MINOR ABRASION ON SOME SAMPLE SPECIMENS; 8% INCREASE IN FLOW ASSOCIATE WITH SAMPLE; SAMPLE PREDOMINANTLY LOOSE GRAINS.

SANDSTONE = OLIVE GRAY TO LIGHT GRAY TO OFF WHITE; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE AND MINOR KAOLIN CEMENT; VERY FINE TO UPPER FINE GRAIN; FAIR SORTING; MODERATE SPHERICITY; TRACE ACCESSORY MINERAL OF MICRO PYRITE FRAGS; THINLY INTERBEDDED COAL LAMINAE IN SOME SAMPLE SPECIMENS; SUBROUND TO SUBANG; GRADES TO LIGHT OLIVE GRAY SILTSTONE; MODERATE HARD TO HARD TO FIRM FRIABLE; NO VISIBLE HYDROCARBON INDICATORS; TRACE AMOUNTS OF FRACTURE FILL IN SAMPLE; BLOCKY TO PLANAR FRACTURE; TABULAR CUTTINGS HABIT; CLEAR TO OPAQUE.

SILTSTONE = OLIVE GRAY TO MEDIUM GRAY;

DAY TOUR  
WOB 17-18K  
PR 2010  
RPM 69  
GPM 295.93

NIGHT TOUR

07/29/2010

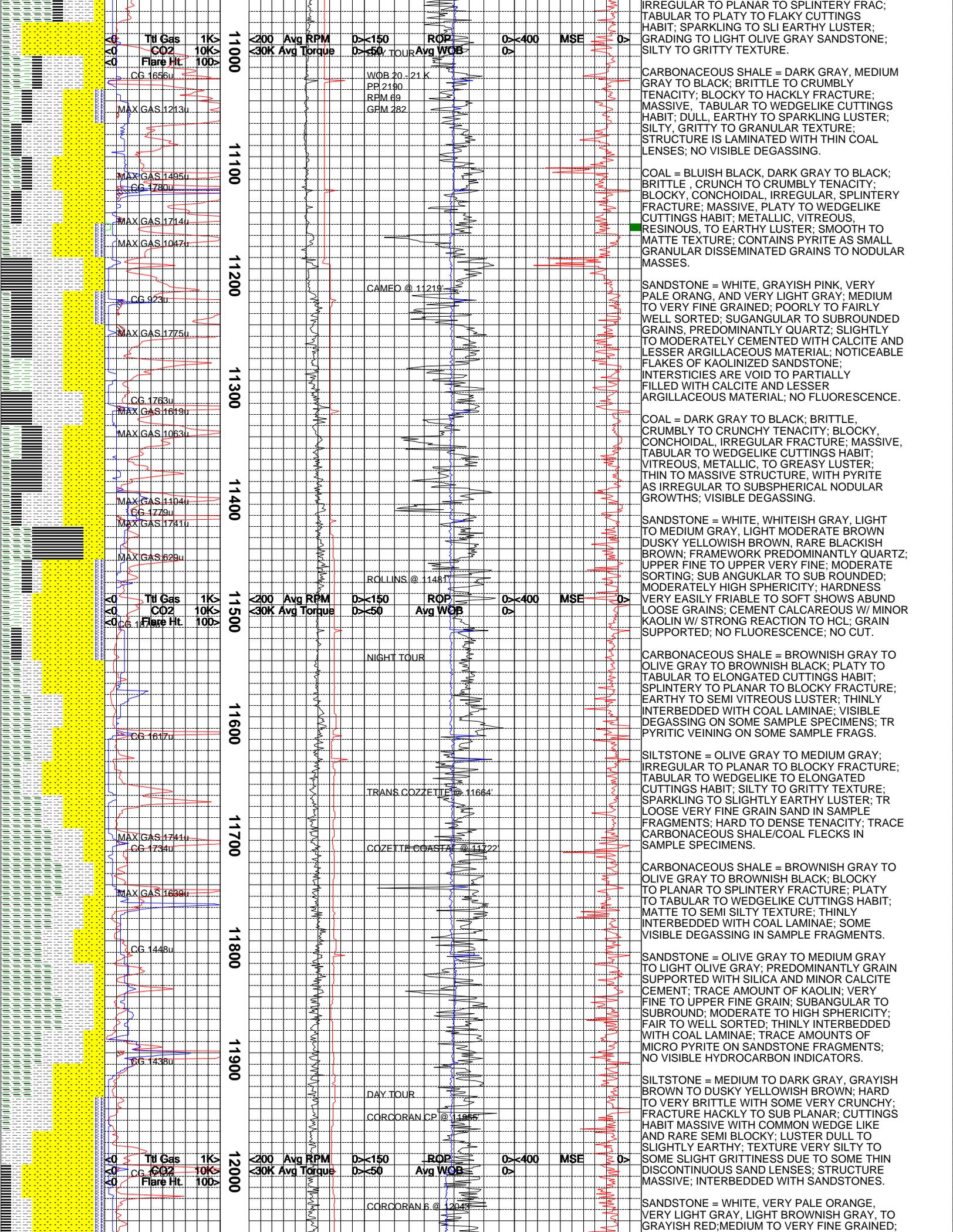
WF 200 @ 10922

MAX GAS 804u  
MAX GAS 1435u  
CG 711u  
MAX GAS 1204u  
Ttl Gas 1K  
CO2 10K  
Flare Ht 100  
CG 816u  
CG 717u  
CG 486u  
CG 968u  
CG 909u  
CG 819u  
MAX GAS 774u  
CALIB. GAS EQUIPMENT  
CG 843u  
MAX GAS 719u  
MAX GAS 629u  
CG 686u  
MAX GAS 921u  
MAX GAS 738u  
MAX GAS 555u  
CG 412u  
MAX GAS 627u  
CG 711u

<200 Avg RPM >150 ROP >400 MSE >  
<30K Avg Torque >50 Avg WOB >

Ttl Gas 1K  
CO2 10K  
Flare Ht 100

<200 Avg RPM >150 ROP >400 MSE >  
<30K Avg Torque >50 Avg WOB >



Tid Gas 1K  
CO2 10K  
Flare Ht 100

<200 Avg RPM >150 ROP >400 MSE >  
<30K Avg Torque >50 Avg WOB >

IRREGULAR TO PLANAR TO SPLINTERY FRAC;  
TABULAR TO PLATY TO FLAKY CUTTINGS  
HABIT; SPARKLING TO SLI EARTHY LUSTER;  
GRADING TO LIGHT OLIVE GRAY SANDSTONE;  
SILTY TO GRITTY TEXTURE.

CG 1656u  
MAX GAS 1213u

WOB 20 - 21 K  
PP 2190  
RPM 69  
GFM 282

CARBONACEOUS SHALE = DARK GRAY, MEDIUM  
GRAY TO BLACK; BRITTLE TO CRUMBLY  
TENACITY; BLOCKY TO HACKLY FRACTURE;  
MASSIVE, TABULAR TO WEDGELIKE CUTTINGS  
HABIT; DULL, EARTHY TO SPARKLING LUSTER;  
SILTY, GRITTY TO GRANULAR TEXTURE;  
STRUCTURE IS LAMINATED WITH THIN COAL  
LENSES; NO VISIBLE DEGASSING.

CG 1780u  
MAX GAS 1495u

COAL = BLuish BLACK, DARK GRAY TO BLACK;  
BRITTLE, CRUNCH TO CRUMBLY TENACITY;  
BLOCKY, CONCHOIDAL, IRREGULAR, SPLINTERY  
FRACTURE; MASSIVE, PLATY TO WEDGELIKE  
CUTTINGS HABIT; METALLIC, VITREOUS,  
RESINOUS, TO EARTHY LUSTER; SMOOTH TO  
MATTE TEXTURE; CONTAINS PYRITE AS SMALL  
GRANULAR DISSEMINATED GRAINS TO NODULAR  
MASSES.

CG 923u  
MAX GAS 1775u

CAMEO @ 11219

SANDSTONE = WHITE, GRAYISH PINK, VERY  
PALE ORANG, AND VERY LIGHT GRAY; MEDIUM  
TO VERY FINE GRAINED; POORLY TO FAIRLY  
WELL SORTED; SUBANGULAR TO SUBROUNDED  
GRAINS, PREDOMINANTLY QUARTZ; SLIGHTLY  
TO MODERATELY CEMENTED WITH CALCITE AND  
LESSER ARGILLACEOUS MATERIAL; NOTICEABLE  
FLAKES OF KAOLINIZED SANDSTONE;  
INTERSTICES ARE VOID TO PARTIALLY  
FILLED WITH CALCITE AND LESSER  
ARGILLACEOUS MATERIAL; NO FLUORESCENCE.

CG 1763u  
MAX GAS 11619u

COAL = DARK GRAY TO BLACK; BRITTLE,  
CONCHOIDAL, IRREGULAR FRACTURE; MASSIVE,  
TABULAR TO WEDGELIKE CUTTINGS HABIT;  
VITREOUS, METALLIC, TO GREASY LUSTER;  
THIN TO MASSIVE STRUCTURE, WITH PYRITE  
AS IRREGULAR TO SUBSPHERICAL NODULAR  
GROWTHS; VISIBLE DEGASSING.

CG 1779u  
MAX GAS 1063u

SANDSTONE = WHITE, WHITEISH GRAY, LIGHT  
TO MEDIUM GRAY, LIGHT MODERATE BROWN  
DUSKY YELLOWISH BROWN, RARE BLACKISH  
BROWN; FRAMEWORK PREDOMINANTLY QUARTZ;  
UPPER FINE TO UPPER VERY FINE; MODERATE  
SORTING; SUB ANGULAR TO SUB ROUNDED;  
MODERATELY HIGH SPHERICITY; HARDNESS  
VERY EASILY FRIABLE TO SOFT SHOWS ABUND  
LOOSE GRAINS; CEMENT CALCAREOUS W/ MINOR  
KAOLIN W/ STRONG REACTION TO HCL; GRAIN  
SUPPORTED; NO FLUORESCENCE; NO CUT.

CG 1104u  
MAX GAS 1741u

ROLLINS @ 11481

CARBONACEOUS SHALE = BROWNISH GRAY TO  
OLIVE GRAY TO BROWNISH BLACK; PLATY TO  
TABULAR TO ELONGATED CUTTINGS HABIT;  
SPLINTERY TO PLANAR TO BLOCKY FRACTURE;  
EARTHY TO SEMI VITREOUS LUSTER; THINLY  
INTERBEDDED WITH COAL LAMINAE; VISIBLE  
DEGASSING ON SOME SAMPLE SPECIMENS; TR  
PYRITIC VEINING ON SOME SAMPLE FRAGS.

CG 629u  
MAX GAS 1741u

NIGHT TOUR

SILTSTONE = OLIVE GRAY TO MEDIUM GRAY;  
IRREGULAR TO PLANAR TO BLOCKY FRACTURE;  
TABULAR TO WEDGELIKE TO ELONGATED  
CUTTINGS HABIT; SILTY TO GRITTY TEXTURE;  
SPARKLING TO SLIGHTLY EARTHY LUSTER; TR  
LOOSE VERY FINE GRAIN SAND IN SAMPLE  
FRAGMENTS; HARD TO DENSE TENACITY; TRACE  
CARBONACEOUS SHALE/COAL FLECKS IN  
SAMPLE SPECIMENS.

CG 1734u  
MAX GAS 1639u

TRANS COZZETTE @ 11664

CARBONACEOUS SHALE = BROWNISH GRAY TO  
OLIVE GRAY TO BROWNISH BLACK; BLOCKY  
TO PLANAR TO SPLINTERY FRACTURE; PLATY  
TO TABULAR TO WEDGELIKE CUTTINGS HABIT;  
MATTE TO SEMI SILTY TEXTURE; THINLY  
INTERBEDDED WITH COAL LAMINAE; SOME  
VISIBLE DEGASSING IN SAMPLE FRAGMENTS.

CG 1448u  
MAX GAS 1438u

COZZETTE COASTAL @ 11722

SANDSTONE = OLIVE GRAY TO MEDIUM GRAY  
TO LIGHT OLIVE GRAY; PREDOMINANTLY GRAIN  
SUPPORTED WITH SILICA AND MINOR CALCITE  
CEMENT; TRACE AMOUNT OF KAOLIN; VERY  
FINE TO UPPER FINE GRAIN; SUBANGULAR TO  
SUBROUND; MODERATE TO HIGH SPHERICITY;  
FAIR TO WELL SORTED; THINLY INTERBEDDED  
WITH COAL LAMINAE; TRACE AMOUNTS OF  
MICRO PYRITE ON SANDSTONE FRAGMENTS;  
NO VISIBLE HYDROCARBON INDICATORS.

CG 1438u  
MAX GAS 1438u

DAY TOUR

SILTSTONE = MEDIUM TO DARK GRAY, GRAYISH  
BROWN TO DUSKY YELLOWISH BROWN; HARD  
TO VERY BRITTLE WITH SOME VERY CRUNCHY;  
FRACTURE HACKLY TO SUB PLANAR; CUTTINGS  
HABIT MASSIVE WITH COMMON WEDGE LIKE  
AND RARE SEMI BLOCKY; LUSTER DULL TO  
SLIGHTLY EARTHY; TEXTURE VERY SILTY TO  
SOME SLIGHT GRITTIENESS DUE TO SOME THIN  
DISCONTINUOUS SAND LENSES; STRUCTURE  
MASSIVE; INTERBEDDED WITH SANDSTONES.

CG 1438u  
MAX GAS 1438u

CORCORAN CP @ 11955

SANDSTONE = WHITE, VERY PALE ORANGE,  
VERY LIGHT GRAY, LIGHT BROWNISH GRAY, TO  
GRAYISH RED; MEDIUM TO VERY FINE GRAINED;

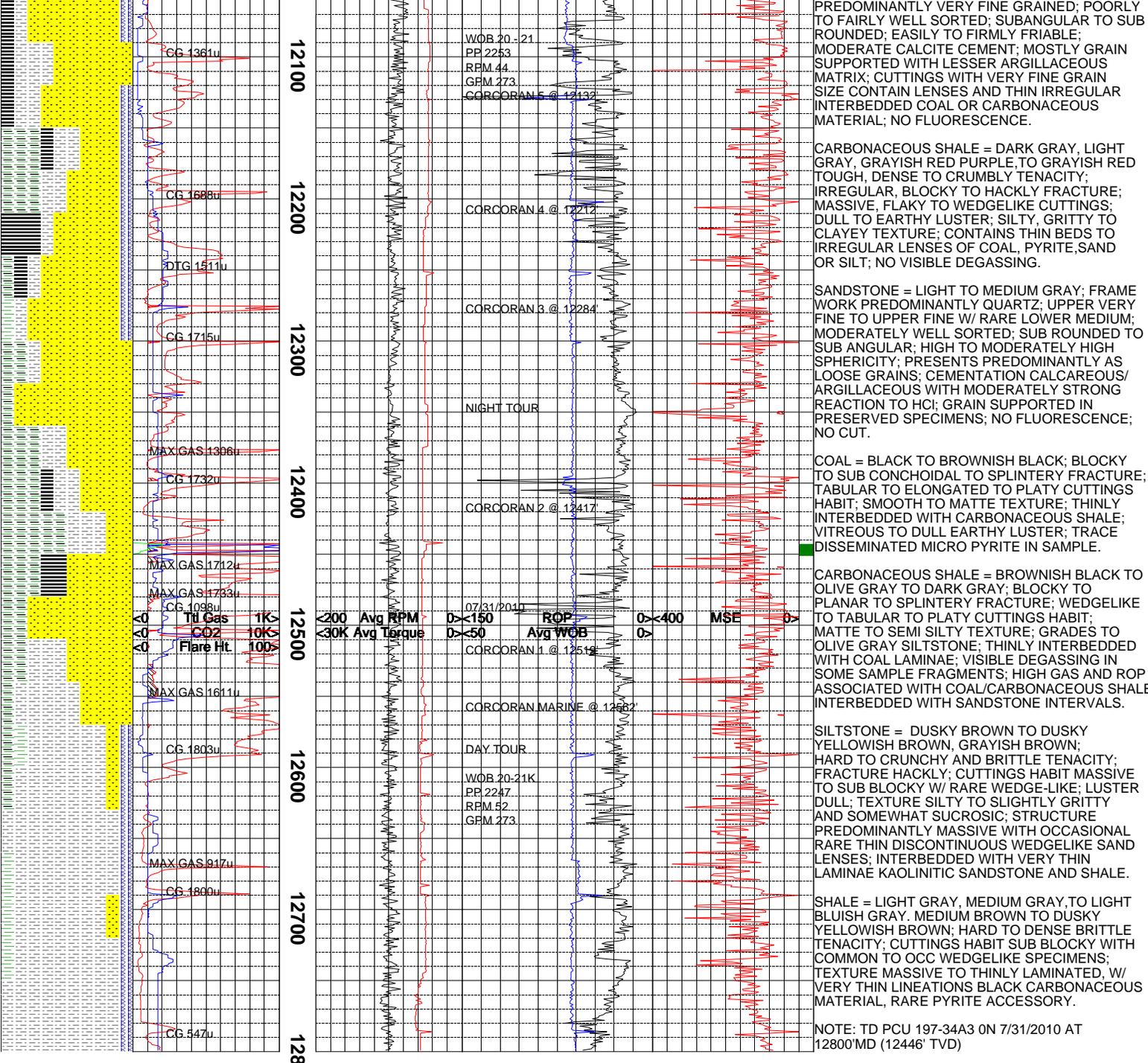
CG 1438u  
MAX GAS 1438u

CORCORAN S @ 12043

Tid Gas 1K  
CO2 10K  
Flare Ht 100

<200 Avg RPM >150 ROP >400 MSE >  
<30K Avg Torque >50 Avg WOB >

SANDSTONE = WHITE, VERY PALE ORANGE,  
VERY LIGHT GRAY, LIGHT BROWNISH GRAY, TO  
GRAYISH RED; MEDIUM TO VERY FINE GRAINED;



The log data, interpretations and recommendation provided by Epoch are inferences and assumptions based on measurements of drilling fluids. Such inferences and assumptions are not infallible and reasonable professionals may differ. Epoch does not represent or warrant the accuracy, correctness or completeness of any log data, interpretations, recommendations or information provided by Epoch, its officers, agents or employees. Epoch does not and cannot guarantee the accuracy of any such interpretation of the log data, interpretations or recommendations and Company is fully responsible for all decisions and actions it takes based on such log data, interpretations and recommendations.

