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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

Drilling Dynamics MD

COMPANY ExxonMobil Production
WELL FRU197-33B3
FIELD Piceance Creek
REGION Rockies
COORDINATES 39.921374000
05108282504000
ELEVATION G.L.:6549.8'
RKB: 30.2'
COUNTY, STATE Rio Blanco, CO
API INDEX 051031143300
SPUD DATE 05/24/2010
CONTRACTOR HE
CO. REP. Chad Jarvis
RIG/TYPE HP321
LOGGING UNIT MLU#31
GEOLOGISTS Barbara Delaney
Chad Record
ADD. PERSONS Mike Franco
Mark Gross
CO. GEOLOGIST Chris Alba

LOG INTERVAL

CASING DATA

DEPTHS: 4550' TO 12720'
DATES: 05/25/2010 TO 06/03/2010
SCALE: 1" = 100'

16" AT 150'
10.75" AT 4537'
4.5" AT 12701'
AT

MUD TYPES

HOLE SIZE

WATER-BASED TO 4550'
LSND TO 12720'
TO
TO

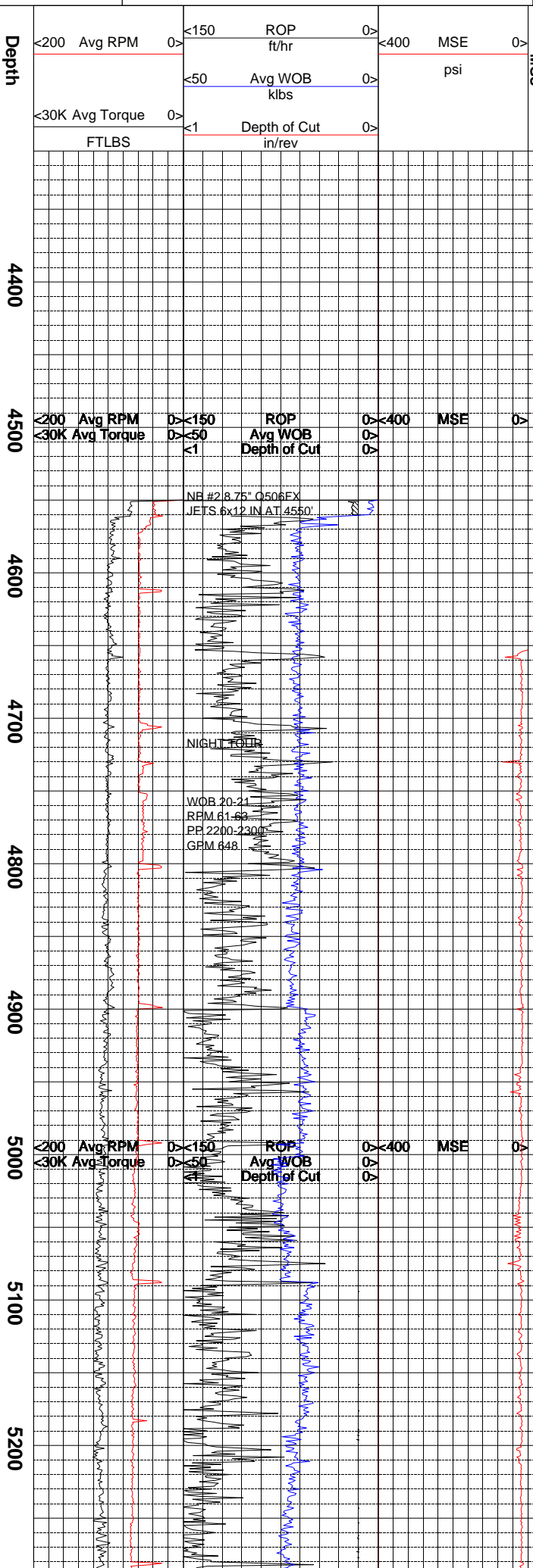
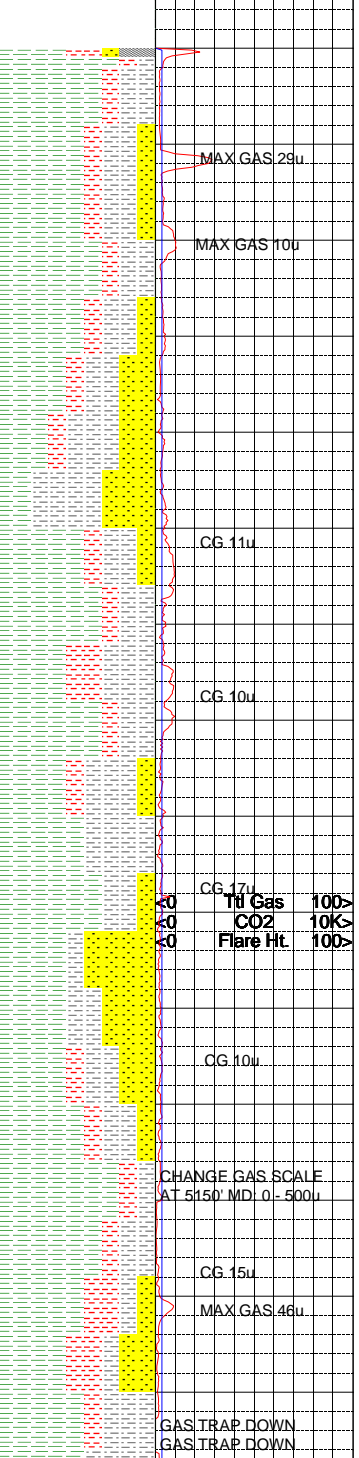
14.75" TO 4550'
9.5" TO 9855'
7.875" TO 12720'
TO

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 2K>	Depth	<200 Avg RPM 0>	<150 ROP 0>	<400 MSE 0>
	<330 CO2 20K>		<50 Avg WOB 0>	psi	
	<0 Flare Ht. 100>		<30K Avg Torque 0>	<1 Depth of Cut 0>	
			FTLBS	in/rev	



Remarks
Survey Data, Mud Reports, Other Info.

ALL SAMPLE COLOR DESCRIPTIONS REFERENCED TO THE G.S.A. ROCK COLOR CHART.

ROCK CHARACTERISTICS AND CONSTITUENTS ARE LISTED FROM MOST ABUNDANT TO LEAST ABUNDANT PERCENTAGE OF SAMPLE.

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

METHANE = 10,000 PPM
ETHANE = 1,000 PPM
PROPANE = 1,000 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 ON 5/25/2010 @ 4550' MD.

SHALE = MODERATE YELLOWISH BROWN TO MEDIUM GRAY; PLATY TO SCALY TO TABULAR CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; EARTHY TO WAXY LUSTER; GRADES TO LIGHT GRAY SILTSTONE; NO VISIBLE STRUCTURE.

SHALE = LIGHT YELLOWISH BROWN TO MOD YELLOWISH BROWN WITH PALE BROWNISH GRAY; IRREGULAR TO PLANAR TO HACKLY FRACTURE; PLATY TO FLAKY TO WEDGELIKE CUTTINGS HABIT; MATTE TO CLAYEY TEXTURE; EARTHY LUSTER.

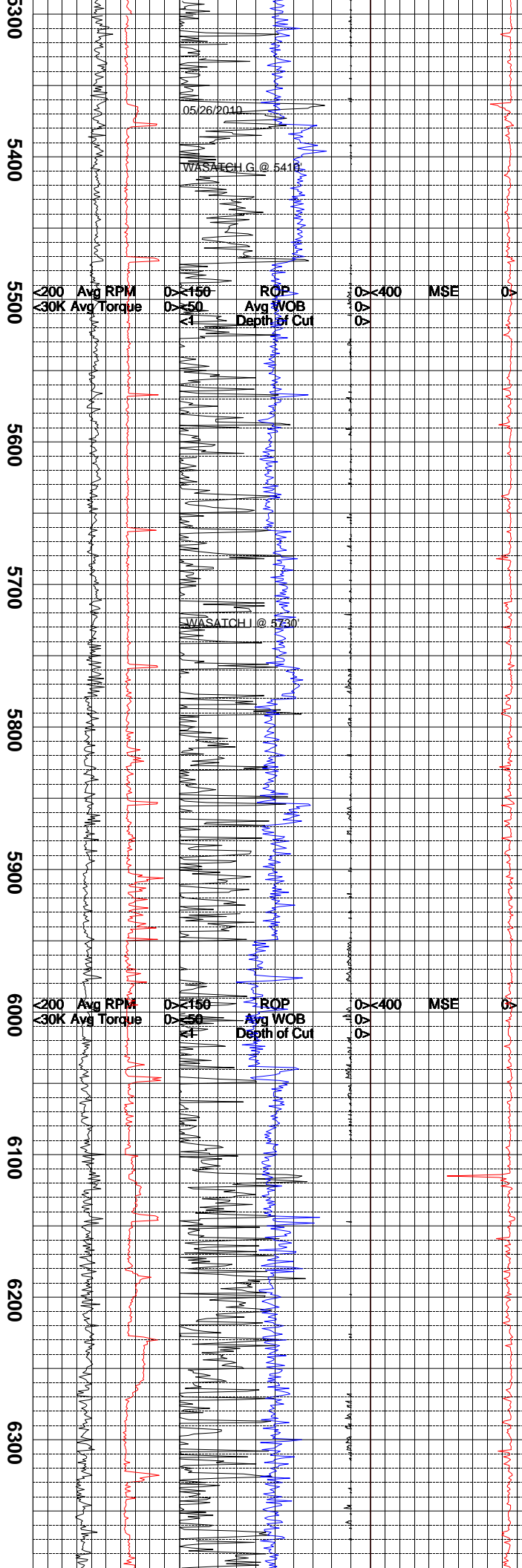
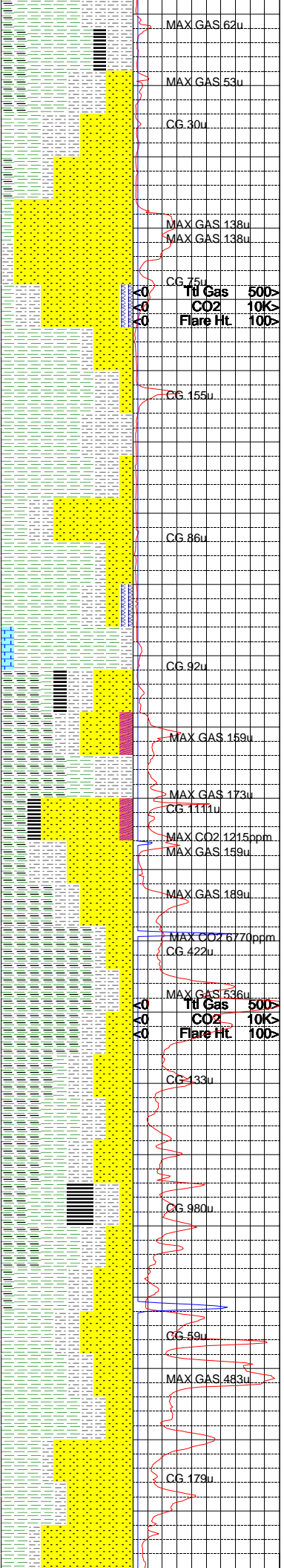
SILTSTONE = VERY LIGHT GRAY TO LIGHT BLuish GRAY TO LIGHT GREENISH GRAY; CRUMBLY TO BRITTLE TENACITY; PREDOMINATE HACKLY TO IRREGULAR FRACTURING; PLATY TO FLAKY TO OCCASIONALLY NODULAR CUTTING HABIT; DULL EARTHY TO SEMI FROSTED TO SLIGHT GREASY LUSTER; GRITTY TO SILTY LUSTER; VISIBLE NACHOLITE CRYSTALS IN THE SAMPLE.

SANDSTONE = LIGHT BROWNISH GRAY TO LIGHT GRAY TO SLIGHT YELLOWISH GRAY; MOSTLY QUARTZ FRAMEWORK WITH 5-6% DARK LITHICS VISIBLE IN SAMPLE; VERY COARSE TO SLIGHT GRANULAR TO SEMI MEDIUM GRAIN SIZE; FAIR TO POOR SORTED; ANGULAR TO SUBANGULAR GRAINS; MODERATE TO LOW SPHERICITY; GRAINS HAVE A SLIGHT PITTED APPEARANCE; FIRM FRIABLE TO FRIABLE; CALCITE CEMENTATION DUE TO HIGH REACTION IN DILUTE HCl; GRAIN SUPPORTED; 1-3% NACHOLITE CRYSTALS VISIBLE IN SAMPLE; 1% CALCITE FRACTURES VISIBLE; 5-6% VISIBLE PALESOLS VISIBLE IN SAMPLE.

SHALE = VERY LIGHT GRAY TO PALE BLUE TO YELLOWISH GRAY; SAMPLE HAS A MOTTLED APPEARANCE; BRITTLE TO CRUMBLY TENACITY; PLANAR TO SLIGHT BLOCKY TO SEMI SPLINTER-Y FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO SEMI BLADED IN HABIT; SLIGHT GREASY TO SEMI DULL EARTHY LUSTER; SEMI SILTY TO PREDOMINATELY CLAYEY TO SMOOTH TEXTURE; 7-8% PALESOLS STILL VISIBLE IN SAMPLE.

PALESOL = LIGHT BROWNISH GRAY TO MODERATE REDDISH BROWN TO PALE REDDISH BROWN; CRUNCHY TO CRUMBLY TO SEMI BRITTLE TENACITY; PLANAR TO HACKLY TO OCCASIONALLY SPLINTER-Y FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO PREDOMINATELY NODULAR IN HABIT; SEMI DULL TO SPARKLING TO SEMI FROSTED LUSTER; GRANULAR TO GRITTY TO OCCASIONALLY SILTY IN TEXTURE; VISIBLE NACHOLITE IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT BROWNISH GRAY TO SEMI YELLOWISH GRAY; CRUMBLY TO CRUNCHY TO OCCASIONALLY STIFF TENACITY; PREDOMINATELY HACKLY TO SEMI PLANAR TO OCCASIONALLY SPLINTER-Y FRACTURING; CUTTINGS TEND TO BE PLATY TO WEDGELIKE TO ELONGATED TABULAR IN HABIT; FROSTED TO SLIGHT SPARKLING TO SEMI DULL LUSTER; SILTY TO OCCASIONALLY CLAYEY TO GRITTY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.



COAL = MEDIUM DARK GRAY TO DARK GRAY TO GREENISH BLACK; MOSTLY BITUMINOUS COAL; STIFF TO CRUNCHY TENACITY; IRREGULAR TO CONCHOIDAL TO OCCASIONALLY SPLINTERY FRACTURING; CUTTINGS TEND TO BE BLADED TO SEMI WEDGE-LIKE TO OCCASIONALLY NODULAR IN HABIT; DULL EARTHY TO SEMI SPARKLING TO GREASY TO PREDOMINATELY WAXY LUSTER; SMOOTH TO OCCASIONALLY GRITTY TO MATTE TEXTURE; VISIBLE DEGASSING IN MOST OF SAMPLE.

WASATCH G SANDSTONE = TRANSLUCENT TO WHITE TO VERY LIGHT GRAY; MOSTLY QUARTZ FRAMEWORK WITH 1-3% DARK LITHICS VISIBLE; GRANULAR TO VERY COARSE TO COARSE GRAIN SIZE; FAIR TO WELL SORTED; SUB-ANGULAR TO SUB ROUND GRAINS; GRAIN SUPPORTED; UNCONSOLIDATED GRAINS DUE TO BIT ACTION; FIRM FRIABLE TO FRIABLE; CALCITE CEMENTATION DUE TO MODERATE TO HIGH REACTION IN DILUTE HCl; NO VISIBLE HYDROCARBONS IN SAMPLE; GRAINS HAVE A SLIGHT POLISH APPEARANCE; NO VISIBLE ACCESSORY MINERALS IN THE SAMPLE.

SHALE = LIGHT BROWN TO YELLOWISH GRAY TO GRAYISH YELLOW GREEN; BRITTLE TO CRUMBLY TO SEMI CRUNCHY TENACITY; PREDOMINATELY PLANAR TO SEMI HACKLY FRACTURING; CUTTINGS TEND TO BE WEDGE-LIKE TO SEMI TABULAR TO PREDOMINATELY PLATY IN HABIT; DULL EARTHY TO SLIGHT GREASY LUSTER; MATTE TO CLAYEY TO OCCASIONALLY SMOOTH TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

SILTSTONE = VERY LIGHT GRAY TO LIGHT BROWNISH GRAY TO LIGHT OLIVE GRAY; STIFF TO CRUNCHY TO SEMI BRITTLE TENACITY; HACKLY TO OCCASIONALLY PLANAR TO SEMI IRREGULAR FRACTURING; CUTTINGS TEND TO BE PLATY TO TABULAR TO SEMI WEDGE-LIKE IN HABIT; SLIGHT GREASY TO DULL EARTHY TO SEMI FROSTED LUSTER; SILTY TO SLIGHT GRITTY TO OCCASIONALLY CLAYEY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

CARBONACEOUS SHALE = OLIVE GRAY TO MEDIUM DARK GRAY TO BROWNISH GRAY; CRUNCHY TO CRUMBLY TO OCCASIONALLY BRITTLE TENACITY; IRREGULAR TO SLIGHT BLOCKY TO SEMI HACKLY FRACTURING; PLATY TO FLAKY TO ELONGATED TABULAR CUTTINGS HABIT; SLIGHT GREASY TO SEMI FROSTED TO DULL EARTHY LUSTER; GRITTY TO SILTY TO OCCASIONALLY SMOOTH TEXTURE; THINLY BEDDED CARBONACEOUS MATERIAL; VISIBLE PYRITE IN CARBONACEOUS MATERIAL; VISIBLE DEGASSING IN MOST OF SAMPLE.

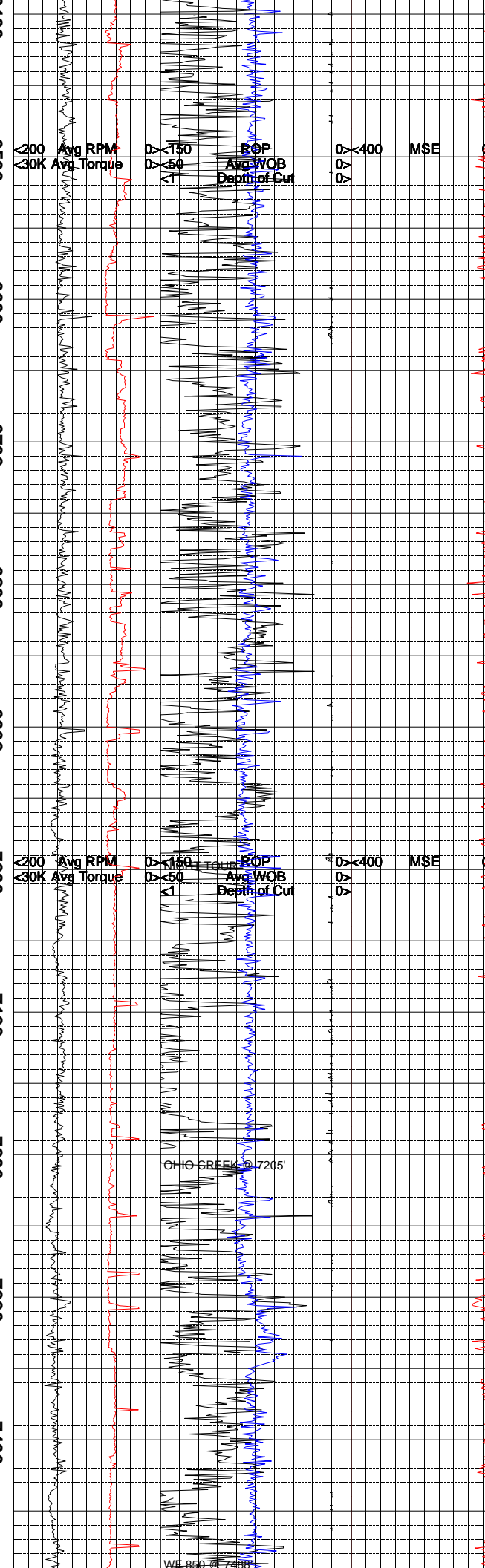
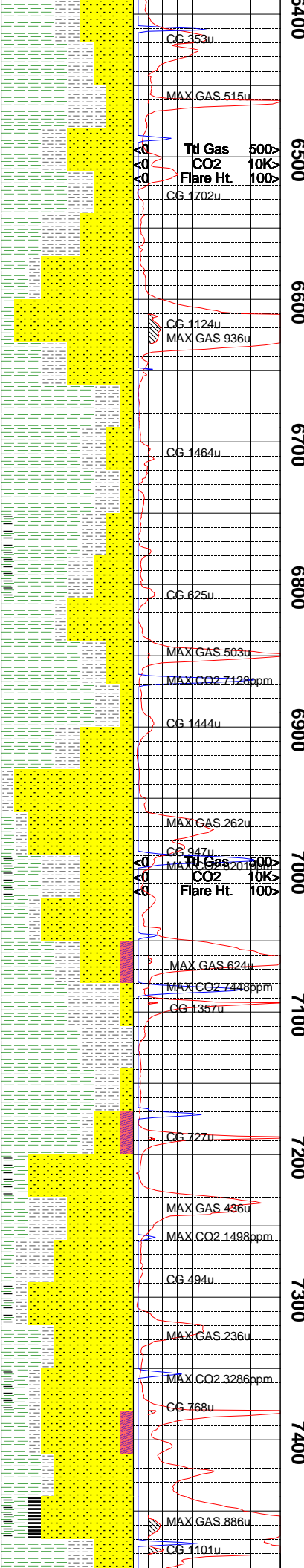
SANDSTONE = VERY LIGHT GRAY TO SLIGHT WHITE TO TRANSLUCENT; MOSTLY QUARTZ FRAMEWORK WITH 3-4% DARK LITHICS VISIBLE IN SAMPLE; VERY COARSE TO COARSE TO MEDIUM GRAIN SIZE; SUBANGULAR TO SUB-ROUND GRAINS; MOD TO LOW SPHERICITY; GRAINS HAVE A POLISHED APPEARANCE; MOD HARD TO HARD; TRACE AMOUNTS OF LOOSE GRAINS; THINLY INTERBEDDED WITH COAL/CARBONACEOUS SHALE LAMINAE; SILICA AND CALCITE CEMENT; HIGHLY CALCAREOUS IN HCl SOLUTION.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO DARK GRAY; PLATY TO FLAKY TO TABULAR CUTTINGS HABIT; SILTY TO SLI CLAYEY TEXTURE; THINLY INTERBEDDED WITH COAL LAMINAE; HACKLY TO SPLINTERY TO PLANAR FRACTURE; EARTHY TO VITREOUS LUSTER; POOR FISSILITY; TRACE ACCESSORY MINERAL OF PYRITE.

COAL = BLACK TO BROWNISH BLACK; BLOCKY TO SEMI CONCHOIDAL TO SPLINTERY FRAC; TABULAR TO ELONGATED TO PLATY CUTTINGS HABIT; VITREOUS TO EARTHY LUSTER; THINLY INTERBEDDED WITH CARBONACEOUS SHALE; MINOR DEGASSING IN SOME SAMPLE FRAGS.

SHALE = MEDIUM GRAY TO DARK GRAY; PLATY TO FLAKY TO WEDGE LIKE CUTTINGS HABIT; MATTE TO SLIGHTLY SILTY TEXTURE; DULL EARTHY LUSTER; GRADES TO MEDIUM GRAY SILTSTONE; PLANAR TO SPLINTERY TO IRREG FRACTURES; TRACE CARBONACEOUS FLECKS IN SAMPLE FRAGMENTS.

SANDSTONE = OFF WHITE TO MEDIUM GRAY TO LIGHT GRAY; MODERATE HARD TO HARD; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND SOME CALCITE CEMENT; 3-5% CARBONACEOUS SHALE/COAL FLECKS IN SAMPLE FRAGMENTS; LOWER VERY FINE TO UPPER FINE GRAIN; SUB ANGULAR TO SUB ROUND; FAIR TO WELL SORTED; MODERATE SPHERICITY; TRACE FRAMBOIDAL PYRITE ON MINOR SAMPLE FRAGS; TRACE LOOSE CLEAR TO OPAQUE GRAINS; NO VISIBLE HYDROCARBONS.



SHALE = MEDIUM GRAY TO LIGHT GRAY WITH MINOR DARK GRAY; PLANAR TO HACKLY TO IRREGULAR FRACTURE; TABULAR TO WEDGELIKE CUTTINGS HABIT; EARTHY TO SEMI WAXY LUSTER; GRADES TO LIGHT GRAY SILTSTONE; MATTE TO SLIGHTLY SILTY TEXTURE.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY; IRREGULAR TO PLANAR TO BLOCKY FRACTURE; WEDGELIKE TO PLATY TO FLAKY CUTTINGS HABIT; SPARKLING TO SLI EARTHY LUSTER; GRADES TO LIGHT GRAY SANDSTONE; HARD TO CRUNCHY TENACITY.

SANDSTONE = VERY LIGHT GRAY TO OFF WHITE TO MEDIUM GRAY; MOD HARD TO VERY HARD; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND MINOR KAOLIN CEMENT; FAIR TO WELL SORTED; MODERATE SPHERICITY; VERY FINE TO UPPER FINE GRAIN; 1-3% CARB SHALE/COAL FLECKS INTERSPERSED IN SAMPLE FRAGMENTS; TRACE ACCESSORY MINERAL OF PYRITE AND CHLORITIZED SANDSTONE; GRADES TO LIGHT GRAY SILTSTONE; TRACE AMOUNTS OF LOWER MEDIUM GRAIN SAND; HIGHLY FRIABLE SANDSTONE ASSOCIATED WITH HIGH ROP AND HIGH GAS.

SHALE = MEDIUM GRAY TO LIGHT GRAY WITH SOME DARK GRAY; PLATY TO SCALY TO SLIGHT TALULAR CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; DULL EARTHY TO WAXY LUSTER; GRADES TO LIGHT GRAY SILTSTONE; PLATY TO IRREGULAR TO SPLINTERY FRACTURE.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY; IRREGULAR TO PLANAR TO BLOCKY FRACTURE; SPARKLING TO SEMI EARTHY LUSTER; CRUNCHY TO STIFF TENACITY; THINLY INTERBEDDED WITH SILTSTONE; PLATY TO SCALY TO SEMI WEDGELIKE CUTTINGS HABIT.

SHALE = MEDIUM GRAY TO DARK GRAY WITH MINOR LIGHT GRAY; PLATY TO SCALY TO TABULAR CUTTINGS HABIT; MATTE TO SLIGHT SILTY TEXTURE; HACKLY TO BLOCKY TO IRREGULAR FRACTURE; DULL EARTHY TO WAXY LUSTER; GRADES TO LIGHT GRAY SILTSTONE.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY; BLOCKY TO IRREGULAR FRACTURE; CRUNCHY TO CRUMBLY TENACITY; SPARKLING TO SEMI EARTHY LUSTER; SILTY TO GRITTY TEXTURE; GRADES TO LIGHT GRAY SANDSTONE; THINLY INTERBEDDED WITH MEDIUM GRAY SHALE.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO MEDIUM DARK GRAY; CRUNCHY TO CRUMBLY TENACITY; IRREGULAR TO PLANAR TO SLIGHT BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY IN HABIT; DULL EARTHY TO SLIGHT SPARKLING TO FROSTED LUSTER; SILTY TO GRITTY TEXTURE; VISIBLE BANDS OF CARBONACEOUS MATERIAL.

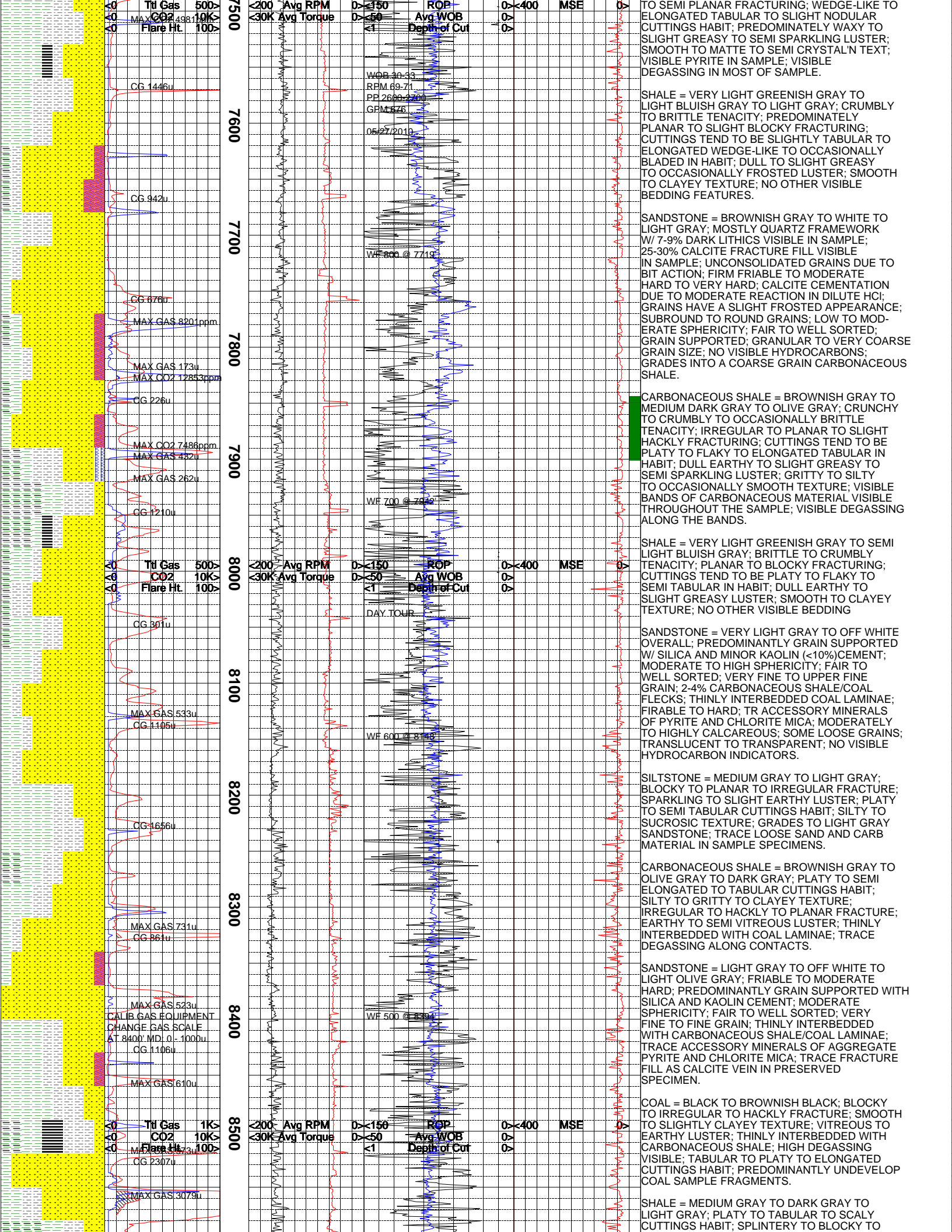
SHALE = VERY LIGHT GRAY TO LIGHT BROWNISH GRAY; PREDOMINATELY BRITTLE TO CRUMBLY TO SLIGHT CRUNCHY TENACITY; PLANAR TO SLIGHT BLOCKY TO OCCASIONALLY HACKLY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO ELONGATED TABULAR IN HABIT; DULL EARTHY TO SLIGHT GREASY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES; VISIBLE PYRITE CRYSTALS IN THE SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT BROWNISH GRAY; CRUNCHY TO STIFF TEN; IRREGULAR TO PREDOMINATELY HACKLY FRACTURING; PLATY TO FLAKY CUTTINGS HABIT; DULL TO SLIGHT FROSTED LUSTER; SILTY TO GRITTY TEXTURE; NO OTHER VISIBL BEDDING FEATURES.

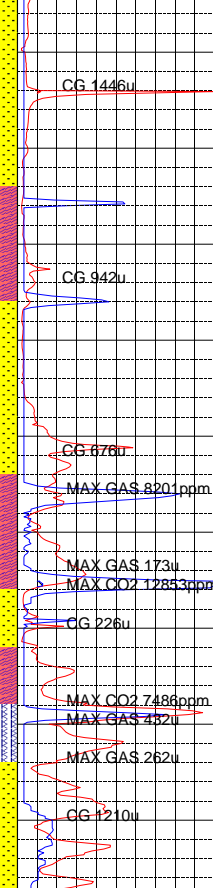
OHIO CREEK SANDSTONE = TRANSLUCENT TO WHITE TO VERY LIGHT GRAY; CHLORITE VISIBLE IN SAMPLE; MOSTLY QUARTZ FRAMEWORK WITH 5-6% DARK LITHICS VISIBLE IN SAMPLE; GRANULAR TO VERY COARSE TO COARS GRAIN SIZE; POOR TO FAIR TO OCCASIONALLY WELL SORTED; LOW TO MODERATE SPHERICITY; GRAINS HAVE A POLISH APPEARANCE; FIRM FRIABLE TO FRIABLE; UNCONSOLIDATED GRAIN DUE TO BIT ACTION; GRAIN SUPPORTED; CALCITE CEMENTATION DUE TO MODERATE REACTION IN DILUTE HCl; NO VISIBLE HYDRO CARBONS IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT BLUISH GRAY TO LIGHT GRAY; BRITTLE TO CRUMBLY TENACITY; PREDOMINATELY PLANAR TO SLIGHT BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY IN HABIT; SLIGHT GREASY TO DULL EARTHY LUSTER; CLAYEY TO SMOOTH TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

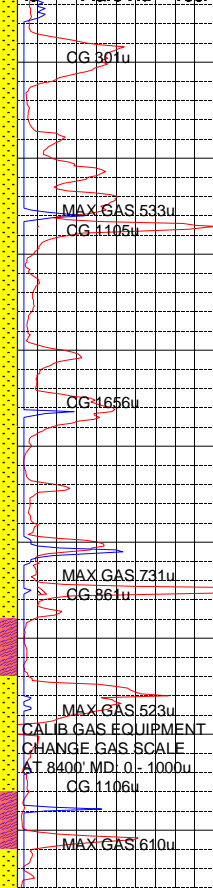
COAL = BLACK TO OLIVE BLACK TO BROWNISH BLACK; CRUNCHY TO STIFF TO SLIGHT MALLEABLE TENACITY; IRREGULAR TO BLOCKY



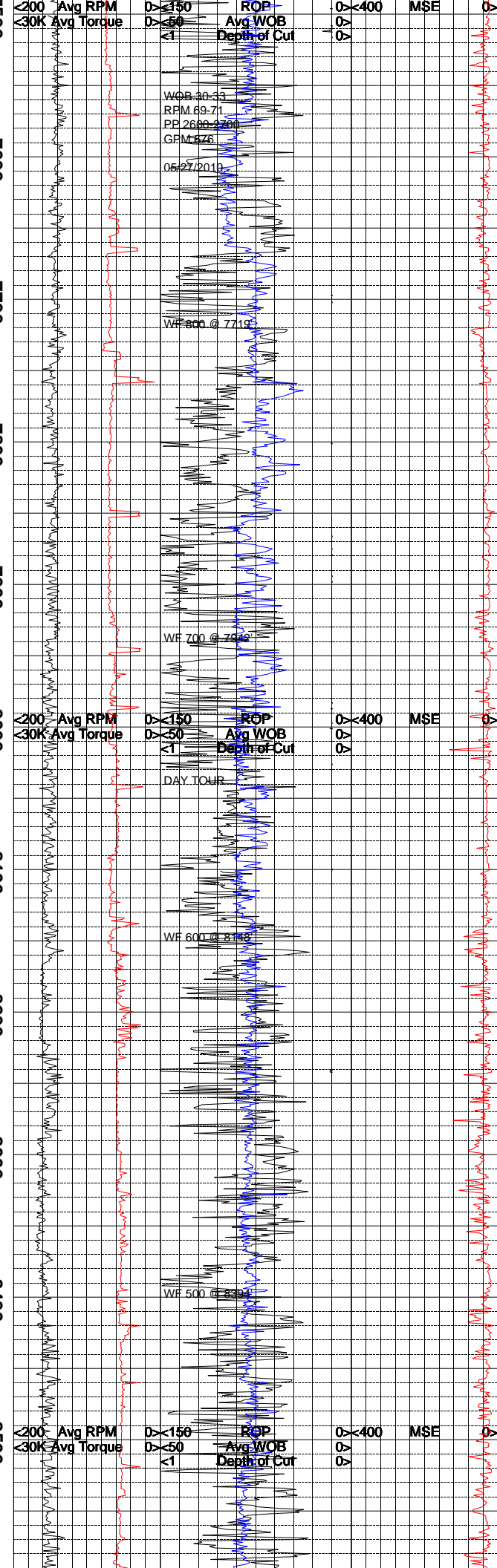
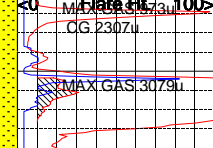
Tf Gas 500Y
CO2 10KY
Flare Hit 100Y



Tf Gas 500Y
CO2 10KY
Flare Hit 100Y



Tf Gas 1KY
CO2 10KY
Flare Hit 100Y



TO SEMI PLANAR FRACTURING; WEDGE-LIKE TO ELONGATED TABULAR TO SLIGHT NODULAR CUTTINGS HABIT; PREDOMINATELY WAXY TO SLIGHT GREASY TO SEMI SPARKLING LUSTER; SMOOTH TO MATTE TO SEMI CRYSTAL'N TEXT; VISIBLE PYRITE IN SAMPLE; VISIBLE DEGASSING IN MOST OF SAMPLE.

SHALE = VERY LIGHT GREENISH GRAY TO LIGHT BLuish GRAY TO LIGHT GRAY; CRUMBLY TO BRITTLE TENACITY; PREDOMINATELY PLANAR TO SLIGHT BLOCKY FRACTURING; CUTTINGS TEND TO BE SLIGHTLY TABULAR TO ELONGATED WEDGE-LIKE TO OCCASIONALLY BLADED IN HABIT; DULL TO SLIGHT GREASY TO OCCASIONALLY FROSTED LUSTER; SMOOTH TO CLAYEY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

SANDSTONE = BROWNISH GRAY TO WHITE TO LIGHT GRAY; MOSTLY QUARTZ FRAMEWORK W/ 7-9% DARK LITHICS VISIBLE IN SAMPLE; 25-30% CALCITE FRACTURE FILL VISIBLE IN SAMPLE; UNCONSOLIDATED GRAINS DUE TO BIT ACTION; FIRM FRIABLE TO MODERATE HARD TO VERY HARD; CALCITE CEMENTATION DUE TO MODERATE REACTION IN DILUTE HCl; GRAINS HAVE A SLIGHT FROSTED APPEARANCE; SUBROUND TO ROUND GRAINS; LOW TO MODERATE SPHERICITY; FAIR TO WELL SORTED; GRAIN SUPPORTED; GRANULAR TO VERY COARSE GRAIN SIZE; NO VISIBLE HYDROCARBONS; GRADES INTO A COARSE GRAIN CARBONACEOUS SHALE.

CARBONACEOUS SHALE = BROWNISH GRAY TO MEDIUM DARK GRAY TO OLIVE GRAY; CRUNCHY TO CRUMBLY TO OCCASIONALLY BRITTLE TENACITY; IRREGULAR TO PLANAR TO SLIGHT HACKLY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO ELONGATED TABULAR IN HABIT; DULL EARTHY TO SLIGHT GREASY TO SEMI SPARKLING LUSTER; GRITTY TO SILTY TO OCCASIONALLY SMOOTH TEXTURE; VISIBLE BANDS OF CARBONACEOUS MATERIAL VISIBLE THROUGHOUT THE SAMPLE; VISIBLE DEGASSING ALONG THE BANDS.

SHALE = VERY LIGHT GREENISH GRAY TO SEMI LIGHT BLuish GRAY; BRITTLE TO CRUMBLY TENACITY; PLANAR TO BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO SEMI TABULAR IN HABIT; DULL EARTHY TO SLIGHT GREASY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO OTHER VISIBLE BEDDING

SANDSTONE = VERY LIGHT GRAY TO OFF WHITE OVERALL; PREDOMINANTLY GRAIN SUPPORTED W/ SILICA AND MINOR KAOLIN (<10%) CEMENT; MODERATE TO HIGH SPHERICITY; FAIR TO WELL SORTED; VERY FINE TO UPPER FINE GRAIN; 2-4% CARBONACEOUS SHALE/COAL FLECKS; THINLY INTERBEDDED COAL LAMINAE; FIRABLE TO HARD; TR ACCESSORY MINERALS OF PYRITE AND CHLORITE MICA; MODERATELY TO HIGHLY CALCAREOUS; SOME LOOSE GRAINS; TRANSLUCENT TO TRANSPARENT; NO VISIBLE HYDROCARBON INDICATORS.

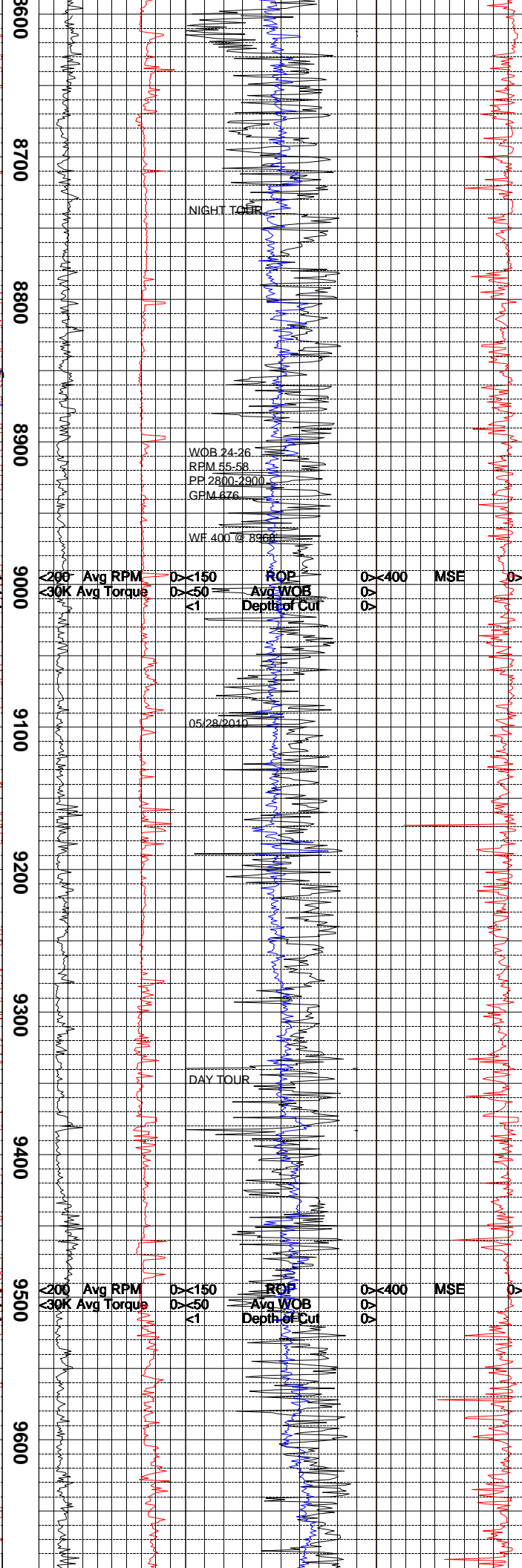
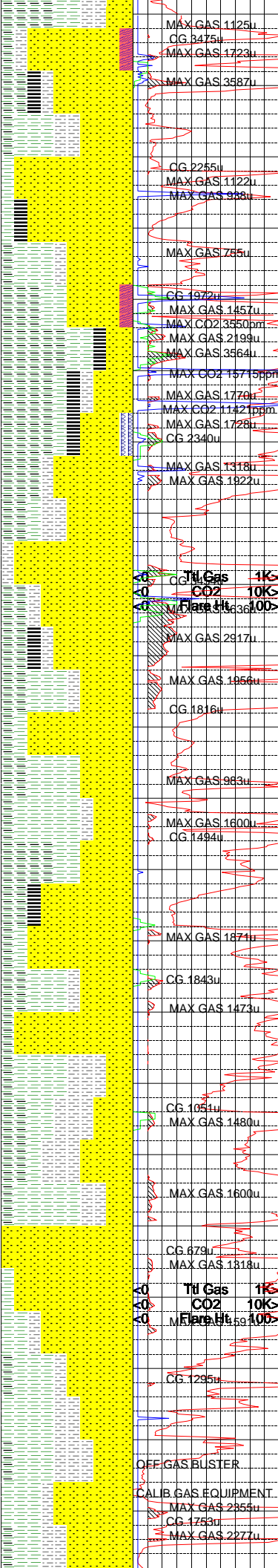
SILTSTONE = MEDIUM GRAY TO LIGHT GRAY; BLOCKY TO PLANAR TO IRREGULAR FRACTURE; SPARKLING TO SLIGHT EARTHY LUSTER; PLATY TO SEMI TABULAR CUTTINGS HABIT; SILTY TO SUCROSC TEXTURE; GRADES TO LIGHT GRAY SANDSTONE; TRACE LOOSE SAND AND CARB MATERIAL IN SAMPLE SPECIMENS.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO DARK GRAY; PLATY TO SEMI ELONGATED TO TABULAR CUTTINGS HABIT; SILTY TO GRITTY TO CLAYEY TEXTURE; IRREGULAR TO HACKLY TO PLANAR FRACTURE; EARTHY TO SEMI VITREOUS LUSTER; THINLY INTERBEDDED WITH COAL LAMINAE; TRACE DEGASSING ALONG CONTACTS.

SANDSTONE = LIGHT GRAY TO OFF WHITE TO LIGHT OLIVE GRAY; FRIABLE TO MODERATE HARD; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND KAOLIN CEMENT; MODERATE SPHERICITY; FAIR TO WELL SORTED; VERY FINE TO FINE GRAIN; THINLY INTERBEDDED WITH CARBONACEOUS SHALE/COAL LAMINAE; TRACE ACCESSORY MINERALS OF AGGREGATE PYRITE AND CHLORITE MICA; TRACE FRACTURE FILL AS CALCITE VEIN IN PRESERVED SPECIMEN.

COAL = BLACK TO BROWNISH BLACK; BLOCKY TO IRREGULAR TO HACKLY FRACTURE; SMOOTH TO SLIGHTLY CLAYEY TEXTURE; VITREOUS TO EARTHY LUSTER; THINLY INTERBEDDED WITH CARBONACEOUS SHALE; HIGH DEGASSING VISIBLE; TABULAR TO PLATY TO ELONGATED CUTTINGS HABIT; PREDOMINANTLY UNDEVELOP COAL SAMPLE FRAGMENTS.

SHALE = MEDIUM GRAY TO DARK GRAY TO LIGHT GRAY; PLATY TO TABULAR TO SCALY CUTTINGS HABIT; SPLINTERY TO BLOCKY TO



IRREGULAR FRACTURE; GRADES TO LIGHT GRAY SILTSTONE; CLAYEY TO MATTE TEXTURE; TR CARBONACEOUS LAMINAE IN SOME SAMPLE FRAGMENTS; EARTHY TO FLAT LUSTER.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY; IRREGULAR TO ANGULAR TO PLANAR FRACTURE; ELONGATED TO SCALY TO FLAKY CUTTINGS HABIT; SILTY TO SUCROSIK TEXTURE; TRACE LOOSE SAND GRAINS IN SAMPLE SPECIMENS; GRADES TO LIGHT GRAY SANDSTONE.

SANDSTONE = VERY LIGHT GRAY TO LIGHT BROWNISH GRAY TO TRANSLUCENT; MOSTLY QUARTZ FRAMEWORK WITH 9-12% DARK LITHICS VISIBLE IN SAMPLE; GRANULAR TO VERY COARSE TO COARSE GRAIN SIZE; POOR TO PREDOMINATELY WELL TO FAIR SORTED; GRAIN HAVE A SLIGHT POLISH APPEARANCE; LOW TO MODERATE SPHERICITY; SUBANGULAR TO SUBROUND GRAINS; A FEW UNCONSOLIDATED GRAINS DUE TO BIT ACTION; GRAIN SUPPORT; FIRM FRIABLE TO MODERATE HARD TO HARD; CALCITE CEMENTATION DUE TO MODERATE REACTION IN DILUTE HCl; NO VISIBLE HYDRO-CARBONS IN SAMPLE; CALCITE FRACTURED FILL VISIBLE IN COARSE GRAIN SANDSTONES

SHALE = LIGHT BLuish GRAY TO LIGHT GRAY TO OCCASIONAL LIGHT YELLOWISH GRAY; BRITTLE TO CRUMBLY TO SLIGHT CRUNCHY TENACITY; PREDOMINATELY PLANAR TO SEMI HACKLY TO OCCASIONALLY BLOCKY FRAC; CUTTINGS TEND TO BE PLATY TO FLAKY TO OCCASIONALLY BLADED IN HABIT; DULL EARTH TO SLIGHT GREASY TO SEMI WAXY LUSTER; SLI SILTY TO SMOOTH TO CLAYEY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

CARBONACEOUS SHALE = OLIVE GRAY TO BROWNISH GRAY TO BROWNISH BLACK; BRITTLE TO CRUMBLY TO SLIGHT CRUNCHY TENACITY; PLANAR TO PREDOMINATELY HACKLY TO SEMI BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO SLIGHT WEDGELIKE IN HABIT; VISIBLE BANDS OF CARBONACEOUS MATERIAL VISIBLE IN SAMPLE; VISIBLE PYRITE; FROSTED TO SLIGHT GREASY TO SEMI WAXY LUSTER; GRITTY TO SLIGHT GRANULAR TEXTURE.

SANDSTONE = VERY LIGHT BROWNISH GRAY TO WHITE TO SEMI TRANSLUCENT; MOSTLY QUARTZ FRAMEWORK WITH 5-6% DARK LITHICS VISIBLE IN SAMPLE; COARSE TO MEDIUM TO FINE GRAIN; POOR TO FAIR TO WELL SORTED; SUBANGULAR TO SUBROUND GRAINS; MODERATE TO HIGH SPHERICITY; GRAINS HAVE A SLIGHT PITTED APPEARANCE; FIRM FRIABLE TO HARD TO MODERATE HARD; GRAIN SUPPORTED; CALCITE CEMENTATION DUE TO MODERATE REACTION IN DILUTE HCl; NO VISIBLE HYDRO CARBONS IN THE SAMPLE.

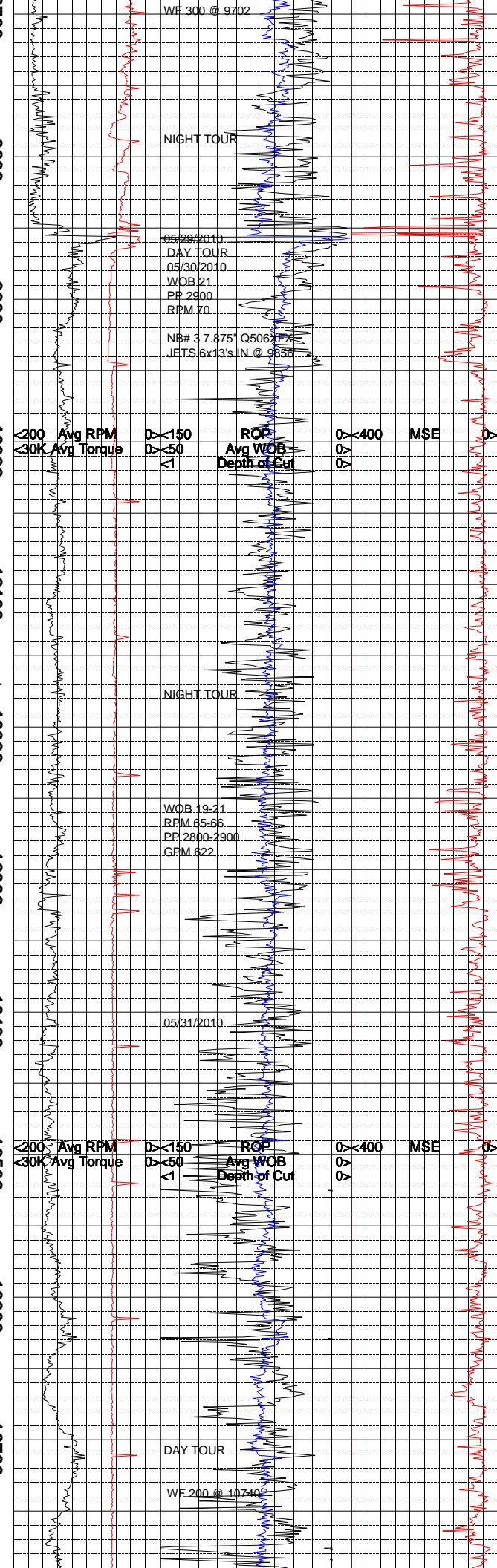
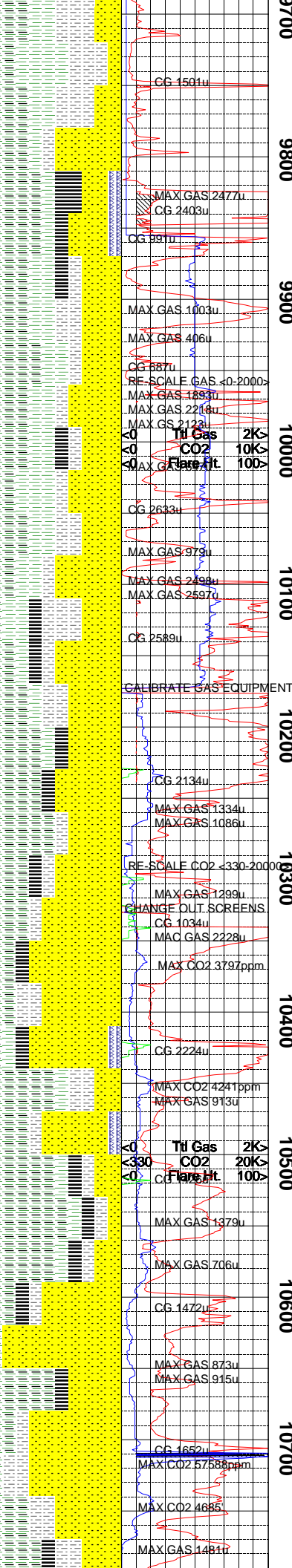
COAL = GRAYISH BLACK TO OLIVE BLACK TO BROWNISH BLACK; CRUNCHY TO STIFF TO SEMI BRITTLE TEN; CONCHODIAL TO SPLINTERY FRACTURING; CUTTINGS TEND TO BE WEDGE-LIKE TO SLIGHTLY TABULAR TO SEMI BLADED IN HABIT; DULL TO SPARKLING TO SLIGHT GREASY TO SEMI WAXY LUSTER; SMOOTH TO MATTE TO CRYSTAL'N TEXTURE; VISIBLE PYRITE; VISIBLE DEGASSING IN A FEW SAMPLE.

SILTSTONE = MEDIUM GRAY TO LIGHT GRAY; BLOCKY TO PLANAR TO IRREGULAR FRACTURE; SPARKLING TO SLIGHT EARTHY LUSTER; GRADE TO LIGHT GRAY SANDSTONE; SILTY TO GRITTY TEXTURE; HARD TENACITY; TABULAR TO ELONGATED TO SCALY CUTTINGS HABIT; THIN INTERBEDDING WITH SHALE AND SANDSTONE.

SANDSTONE = LIGHT GRAY TO OFF WHITE TO LIGHT OLIVE GRAY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND MINOR KAOLIN CEMENT; FRIABLE TO MODERATE HARD; MOD TO WELL SPHERICITY; VERY FINE TO UPPER FINE GRAIN; TRACE ACCESSORY MINERAL OF PYRITE; 3-5% CARBONACEOUS SHALE/COAL FLECKED IN SAMPLE FRAGMENTS; THINLY INTERBEDDED WITH COAL LAMINAE AND CARBONACEOUS SHALE; MINOR AMOUNTS OF LOOSE LOWER FINE GRAIN; CLEAR TO OPAQUE; SUBROUND TO SUBANGULAR; NO VISIBLE HYDROCARBON INDICATORS.

SHALE = MEDIUM GRAY TO DARK GRAY TO OLIVE GRAY; BLOCKY TO PLANAR TO IRREG FRACTURE; ELONGATED TO PLATY TO SCALY CUTTINGS HABIT; EARTHY TO WAXY LUSTER; THINLY INTERBEDDED WITH SILTSTONE; MATTE TO SLIGHTLY SUCROSIK TEXTURE; TRACE CARBONACEOUS SHALE LAMINAE IN SAMPLE FRAGMENTS.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO DARK GRAY; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; MATTE TO SLIGHTLY SILTY TEXTURE; EARTHY LUSTER;



GRADES TO OLIVE GRAY SILTSTONE; THINLY INTERBEDDED WITH COAL LAMINAE; CRUNCHY TO CRUMBLY TENACITY; NO VISIBLE DEGASSING IN SAMPLE FRAGMENTS.

NOTE: UP HOLE GASES BLEEDING INTO WELL BORE DURING CONNECTIONS. UP HOLE GASES APPEAR ON LOG AT CONNECTION DEPTHS.

SHALE = VERY LIGHT GREENISH GRAY; BRITTLE TO CRUMBLY TENACITY; PREDOMINATELY PLANAR FRACTURING; CUTTINGS TEND TO BE PLATY IN HABIT; DULL EARTHY LUSTER; CLAYEY TEXTURE.

TOOH FOR NEW BIT ON 05/28/2010.

COAL = BLACK; CRUMBLY TO PULVERULENT TENACITY; IRREGULAR FRACTURING; NODULAR TO WEDGELIKE CUTTINGS; RESINOUS TO POLISHED LUSTER; SMOOTH TO CLAYEY TO SLIGHTLY SILTY TEXTURE; THIN STRUCTURE; HIGH GAS ASSOCIATED.

SANDSTONE = WHITE TO MEDIUM GRAY TO OCCASIONALLY TRANSLUCENT; QUARTZ DOMINATE FRAMEWORK WITH APPROXIMATELY 5-10% BLACK LITHIC CLASTS INTERBEDDED WITHIN MATRIX; FINE TO COARSE GRAINED WITH POOR SORTING ANGULAR TO SUBANGULAR WITH LOW SPHERICITY; MODERATE HARDNESS; CALCITE CEMENT WITH TRACE KAOLINITE IN MATRIX.

CARBONACEOUS SHALE = BROWNISH BLACK TO BLACK TO OCCASIONALLY BROWNISH BLACK; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SLIGHTLY BLOCKY FRACTURING; WEDGELIKE CUTTINGS; EARTHY TO WAXY LUSTER; CLAYEY TO SILTY TEXTURE; THIN STRUCTURE.

SILTSTONE = MEDIUM DARK GRAY TO BROWNISH GRAY TO OLIVE GRAY; BRITTLE TO CRUMBLY TENACITY; IRREGULAR FRACTURING; TABULAR TO WEDGELIKE CUTTINGS; DULL TO EARTHY LUSTER; GRITTY TO SILTY TEXTURE; THIN STRUCTURE; GRADING FROM SANDSTONE.

SANDSTONE = VERY LIGHT GRAY TO LIGHT BROWNISH GRAY; MOSTLY QUARTZ FRAMEWORK WITH 4-6% DARK LITHICS VISIBLE IN SAMPLE; FAIR TO POORLY SORTED; SUBROUND ROUND GRAINS; MODERATE TO LOW SPHERICITY; GRAINS HAVE A SLIGHT FROSTED APPEARANCE; FRIABLE TO FIRM FRIABLE; GRAIN SUPPORT; CALCITIC CEMENTATION DUE TO MODERATE REACTION IN DILUTE HCl; VERY COARSE TO COARSE GRAIN; GRADES INTO A GRITTY TO GRANULAR CARBONACEOUS SHALE; NO VISIBLE HYDROCARBONS IN SAMPLE.

CARBONACEOUS SHALE = MEDIUM DARK GRAY TO GRAYISH BLACK TO BROWNISH BLACK; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO HACKLY TO OCCASIONALLY SPLINTERY FRACTURING; CUTTINGS TEND TO BE PLATY TO PREDOMINATELY WEDGELIKE IN HABIT; DULL TO SLIGHTLY GREASY TO SEMI FROSTED LUSTER; GRITTY TO SILTY TEXTURE; VISIBLE DEGASSING ALONG CARBONACEOUS MATERIAL; THIN BEDS OF CARBONACEOUS MATERIAL VISIBLE IN SAMPLE.

SHALE = LIGHT GREENISH GRAY TO LIGHT BLuish GRAY TO LIGHT GRAY; BRITTLE TO SLIGHT CRUNCHY TENACITY; PREDOMINATELY PLANAR TO SEMI BLOCKY TO SLIGHT HACKLY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO ELONGATED TABULAR IN HABIT; DULL EARTHY TO SEMI GREASY LUSTER; CLAYEY TO SMOOTH TEXTURE; NO OTHER VISIBLE BEDDING FEATURES PRESENT IN SAMPLE.

COAL = GRAYISH BLACK TO BROWNISH BLACK; CRUNCHY TO STIFF TO SLIGHT MALLEABLE TENACITY; IRREGULAR TO CONCHODIAL TO SEMI PLANAR FRACTURING; DULL EARTHY TO SLIGHT GREASY TO PREDOMINATELY WAXY LUSTER; VISIBLE DEGASSING IN MOST OF SAMPLE; VISIBLE PYRITE CRYSTALS; GRITTY TO SMOOTH TO MATTE TEXTURE.

SILTSTONE = LIGHT BROWNISH GRAY TO LIGHT GRAY; CRUNCHY TO STIFF TENACITY; HACKLY TO SEMI PLANAR FRACTURING; CUTTINGS TEND TO BE WEDGELIKE TO TABULAR IN HABIT; SILTY TO GRITTY TEXTURE; GRADES INTO A COARSE GRAIN SANDSTONE.

SANDSTONE = WHITE TO TRANSLUCENT TO VERY LIGHT GRAY; VERY COARSE TO COARSE TO MEDIUM GRAIN SIZE; MOSTLY QUARTZ FRAMEWORK WITH 2-3% DARK LITHICS VISIBLE IN SAMPLE; FAIR TO WELL SORTED; ROUND TO SUBROUND; MODERATE SPHERICITY; MODERATE HARD TO HARD; CALCITE CEMENT WITH MODERATE REACTION WITH HCl; MATRIX SUPPORTED.

CARBONACEOUS SHALE = BLACK TO GRAYISH BLACK; DENSE TO BRITTLE TENACITY; IRREGULAR TO BLOCKY TO OCCASIONALLY CONCHODIAL FRACTURING; TABULAR TO WEDGELIKE CUTTING

WF 300 @ 9702

CG 1501u

MAX GAS 2477u
CG 2403u

CG 991u

MAX GAS 1003u

MAX GAS 406u

CG 887u

RE-SCALE GAS <0-2000>

MAX GAS 1893u

MAX GAS 2216u

MAX GAS 2123u

CG 2633u

MAX GAS 979u

MAX GAS 2498u

MAX GAS 2597u

CG 2589u

CALIBRATE GAS EQUIPMENT

CG 2134u

MAX GAS 1334u

MAX GAS 1086u

RE-SCALE CO2 <330-2000>

MAX GAS 1299u

CHANGE OUT SCREENS

CG 1034u

MAX GAS 2228u

MAX CO2 3797ppm

CG 2224u

MAX CO2 4241ppm

MAX GAS 913u

MAX GAS 1379u

MAX GAS 706u

CG 1472u

MAX GAS 873u

MAX GAS 915u

CG 4652u

MAX CO2 5758ppm

MAX CO2 4685

MAX GAS 1481u

CG 1462u

MAX CO2 5758ppm

MAX CO2 4685

MAX GAS 1481u

CG 1462u

MAX CO2 5758ppm

MAX CO2 4685

NIGHT TOUR

05/29/2010

DAY TOUR

05/30/2010

WOB 21

PP 2900

RPM 70

NB# 3.7.875' Q50621 X

JETS 6x13's IN @ 9856

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

<30K Avg Torque > >50 Avg WOB <400 MSE >

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<30K Avg Torque > >50 Avg WOB <400 MSE >

<30K Avg Torque > >50 Avg WOB <400 MSE >

WOB 19-21

RPM 65-66

PP 2800-2900

GFM 622

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

<30K Avg Torque > >50 Avg WOB <400 MSE >

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

<30K Avg Torque > >50 Avg WOB <400 MSE >

05/31/2010

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

<30K Avg Torque > >50 Avg WOB <400 MSE >

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

<30K Avg Torque > >50 Avg WOB <400 MSE >

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<30K Avg Torque > >50 Avg WOB <400 MSE >

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<30K Avg Torque > >50 Avg WOB <400 MSE >

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

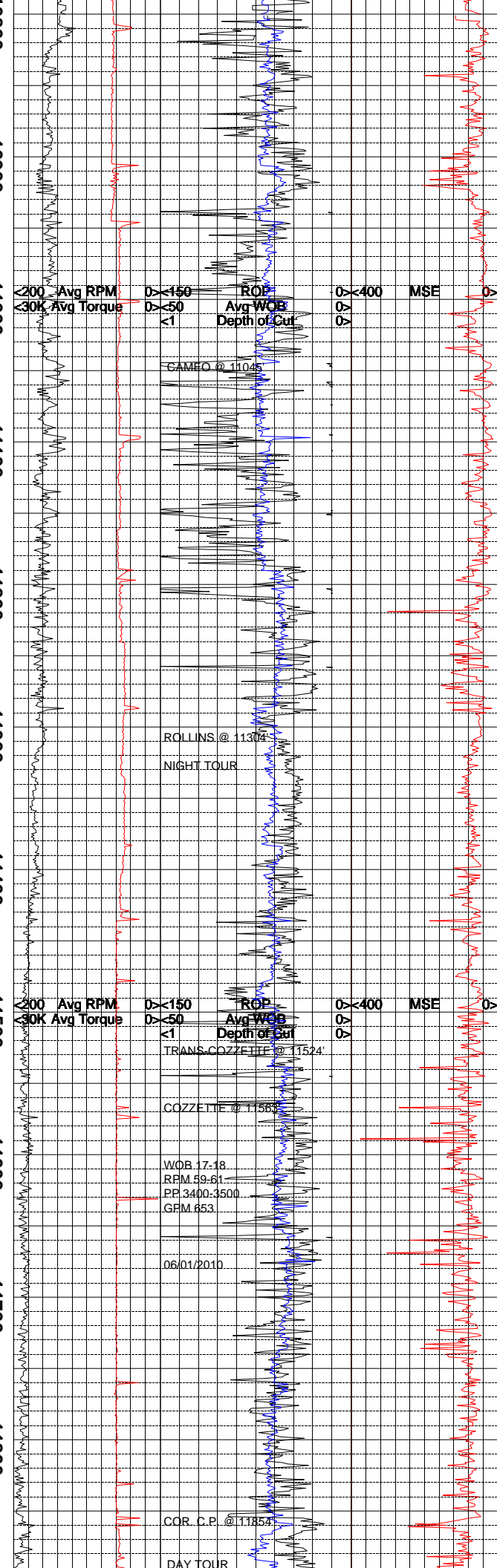
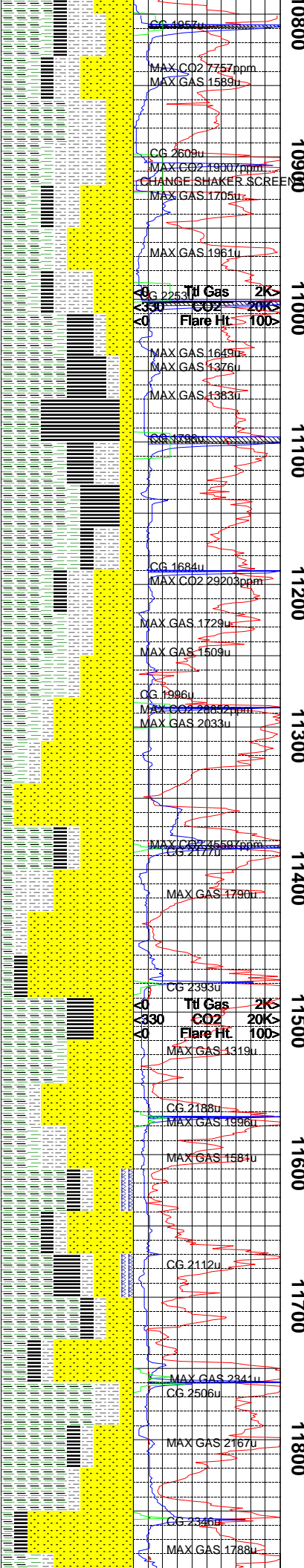
<30K Avg Torque > >50 Avg WOB <400 MSE >

DAY TOUR

WF 200 @ 10740

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

<30K Avg Torque > >50 Avg WOB <400 MSE >



HABIT; POLISHED TO EARTHLY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SANDSTONE AND SILTSTONE.

COAL = BLACK; CRUMBLY TO BRITTLE TENACITY; BLOCKY TO IRREGULAR FRACTURING; NODULAR TO OCCASIONALLY WEDGELIKE CUTTINGS EARTHLY TO RESINOUS TO POLISHED LUSTER; CLAYEY TO SMOOTH TEXTURE; THIN STRUCTURE HIGH GAS ASSOCIATED.

SILTSTONE = BROWNISH GRAY TO MEDIUM DARK GRAY TO OCCASIONALLY MEDIUM LIGHT GRAY; BRITTLE TO OCCASIONALLY CRUMBLY TENACITY; BLOCKY TO IRREGULAR FRACTURING; TABULAR CUTTINGS; EARTHLY WITH A SLIGHT SPARKLING LUSTER; GRITTY TO SILTY TEXTURE; GRADING FROM SANDSTONE.

SHALE = MEDIUM LIGHT GRAY WITH A SLIGHT MEDIUM BLuish GRAY HUE; BRITTLE TENACITY PLANAR FRACTURING; PLATY TO SCALY CUTTINGS; WAXY TO DULL LUSTER; SMOOTH TEXTURE; LAMINAE STRUCTURE.

COAL = BLACK; IRREGULAR TO BLOCKY FRACTURING; NODULAR TO TABULAR CUTTINGS; EARTHLY TO RESINOUS LUSTER; CLAYEY TO SILTY TEXTURE; THIN STRUCTURE; INTERBEDDED WITH CARBONACEOUS SHALE; HIGH GAS ASSOCIATED.

SANDSTONE = BROWNISH GRAY TO MEDIUM GRAY; DOMINATE QUARTZ FRAMEWORK; FINE TO VERY FINE GRAINED; WELL TO VERY WELL SORTED; ROUND TO SUBROUND WITH MODERATE SPHERICITY; MODERATE HARDNESS; CALCITE CEMENTATION WITH A WEAK TO MODERATE REACTION WITH HCL; GRAIN SUPPORTED; TRACE AMOUNTS OF PYRITE AS AN ACCESSORY; INTERBEDDED WITH CARBONACEOUS SHALE AND COAL.

CARBONACEOUS SHALE = BROWNISH BLACK TO GRAYISH BLACK TO BLACK; DENSE TO OCCASIONALLY PLANAR FRACTURING; TABULAR TO WEDGELIKE CUTTINGS; POLISHED TO EARTHLY LUSTER; SMOOTH TO SILTY TEXTURE; THICK STRUCTURE; HIGH GAS ASSOCIATED.

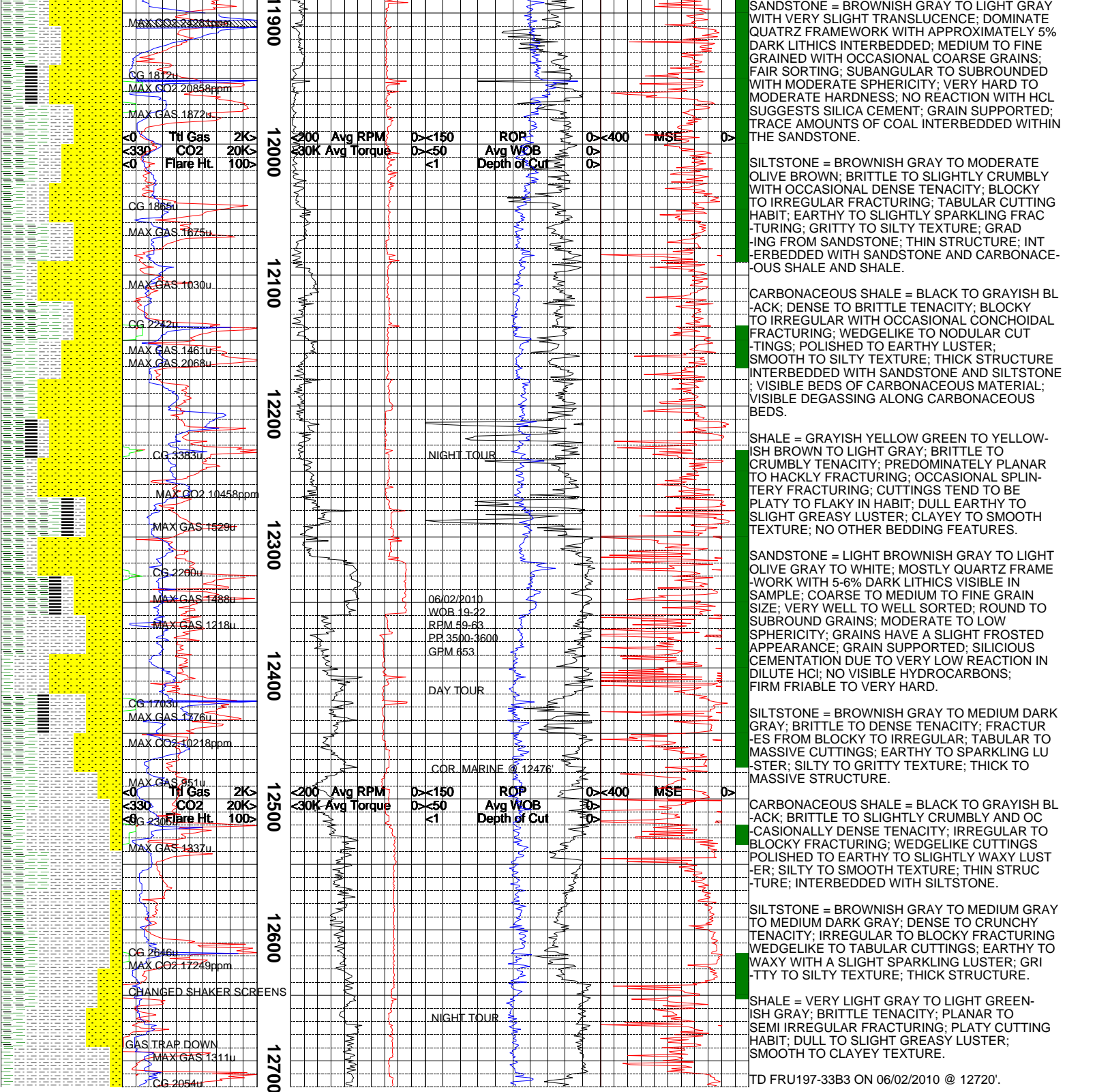
ROLLINS SANDSTONE = WHITE TO TRANSLUCENT TO VERY LIGHT GRAY; 2-3% DARK LITHICS VISIBLE IN SAMPLE; MOSTLY QUARTZ FRAMEWORK; GRADES INTO A FINE GRAIN SILTSTONE; GRAINS HAVE A SLIGHT FROSTED APPEARANCE; COARSE TO MEDIUM TO FINE GRAIN; SUBROUND TO ROUND GRAINS; MODERATE TO HIGH SPHERICITY; WELL TO VERY WELL SORTED; UNCONSOLIDATED GRAINS DUE TO BIT ACTION; FIRM FRIABLE TO MODERATE HARD TO VERY HARD; CALCITIC CEMENTATION DUE TO LOW TO MODERATE REACTION IN DILUTE HCl; NO VISIBLE HYDROCARBONS IN SAMPLE; GRAINS SUPPORTED; MASSIVE BEDS.

COAL = GRAYISH BLACK TO BROWNISH BLACK TO DARK MEDIUM GRAY; STIFF TO CRUNCHY TENACITY; PREDOMINATELY CONCHODIAL TO BLOCKY TO IRREGULAR FRACTURING; CUTTINGS TEND TO BE PLATY TO MASSIVE TO WEDGELIKE TO SEMI BLADED IN HABIT; DULL TO SLIGHT FROSTED TO SEMI SPARKLING TO GREASY LUSTER; SMOOTH TO MATTE TO SEMI CLAYEY TEXTURE; VISIBLE PYRITE; VISIBLE BANDS OF CARBONACEOUS MATERIAL; VISIBLE DEGASSING IN 75% OF SAMPLE.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO MEDIUM DARK GRAY; CRUMBLY TO CRUNCHY TO SLIGHT BRITTLE TENACITY; IRREGULAR TO PREDOMINATELY HACKLY TO SEMI BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO TABULAR TO SEMI WEDGE-LIKE IN HABIT; DULL TO SLIGHT FROSTED TO SEMI GREASY LUSTER; GRITTY TO GRANULAR TO SILTY TEXTURE; VISIBLE BANDS OF CARBONACEOUS MATERIAL IN SAMPLE; VISIBLE DEGASSING IN A FEW SAMPLE PIECES.

SANDSTONE = VERY LIGHT BROWNISH GRAY TO WHITE TO TRANSLUCENT; MOSTLY QUARTZ FRAMEWORK WITH 2-3% DARK LITHICS VISIBLE IN SAMPLE; SUB-ROUND TO ROUND TO OCCASIONALLY SUBANGULAR; VERY COARSE TO MEDIUM TO FINE GRAIN SIZE; NO VISIBLE HYDROCARBONS; CALCITE CEMENTATION DUE TO MODERATE REACTION IN DILUTE HCl; GRAIN SUPPORTED; UNCONSOLIDATED GRAINS DUE TO BIT ACTION; FIRM FRIABLE TO MODERATE HARD; MODERATE TO LOW SPHERICITY; THIN BEDS OF COAL VISIBLE IN SAMPLE; GRAINS HAVE A SLIGHT POLISH APPEARANCE.

CARBONACEOUS SHALE = BROWNISH GRAY TO LIGHT OLIVE GRAY; CRUNCHY TO CRUMBLY TO BRITTLE TENACITY; SLIGHT PLANAR TO SEMI HACKLY FRACTURING; CUTTINGS TEND TO BE PLATY TO TABULAR IN HABIT; SEMI DULL TO SLIGHT SPARKLING LUSTER; SILTY TO CLAYEY



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