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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 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

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

Legend of geological symbols and patterns including: 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.

<150	ROP	>
ft/hr		
<50	Avg WOB	>
klbs		

Depth

Lithology

<0	Ttl Gas	2K	<10	Meth C-1	100K
	units		<10	Ethn C-2	100K
<330	CO2	20K	<10	Prop C-3	100K
	ppm		<10	Butn C-4	100K
<0	Flare Ht.	100	<10	Pent C-5	100K
	ft				

Interp. Lith

**Remarks**  
**Survey Data, Mud Reports, Other Info.**

<150	ROP	>
<50	Avg WOB	>

4400

Lithology

<0	Ttl Gas	100	<10	Meth C-1	100K
	CO2	10K	<10	Ethn C-2	100K
	Flare Ht.	100	<10	Prop C-3	100K
			<10	Butn C-4	100K
			<10	Pent C-5	100K

Interp. Lith

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 COMPLIED 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

NB #2.8.75" Q508EX  
 JETS 6x12 IN AT 4550'

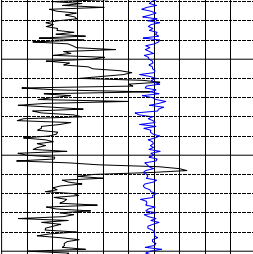
4500

Lithology

<0	Ttl Gas	100	<10	Meth C-1	100K
	CO2	10K	<10	Ethn C-2	100K
	Flare Ht.	100	<10	Prop C-3	100K
			<10	Butn C-4	100K
			<10	Pent C-5	100K

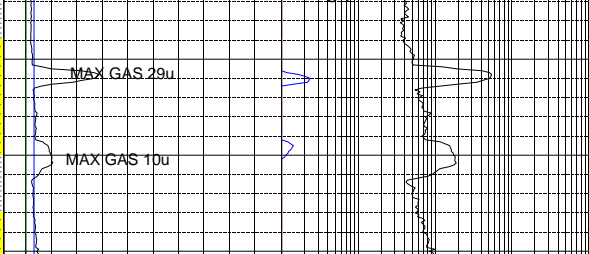
Interp. Lith

EPOCH WELL SERVICES COMMENCED LOGGING ON 5/25/2010 @ 4550' MD.



4600

Lithology



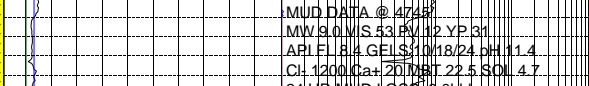
Interp. Lith

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.

NIGHT TOOL

4700

Lithology



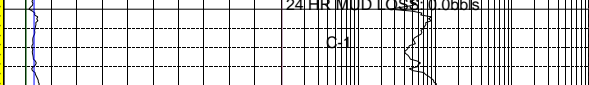
Interp. Lith

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.

WOB 20-21  
 RPM 61-69  
 PPI 2200-2300  
 GEM 648

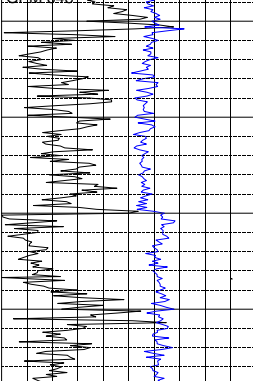
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Lithology



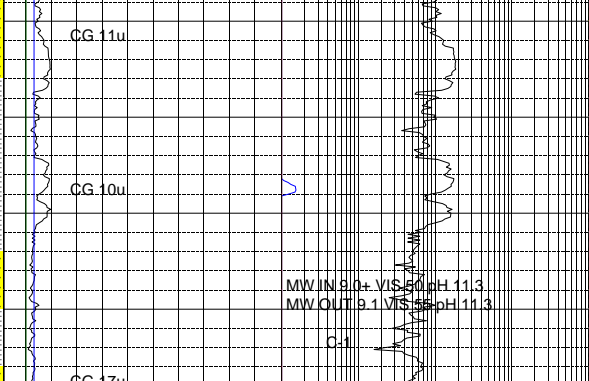
Interp. Lith

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.



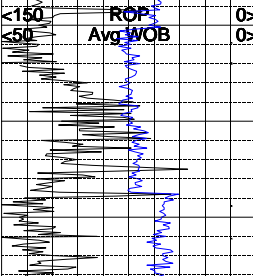
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Lithology



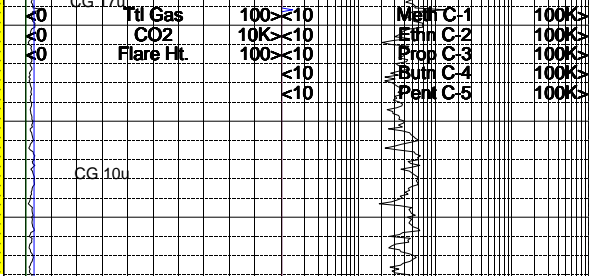
Interp. Lith

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.



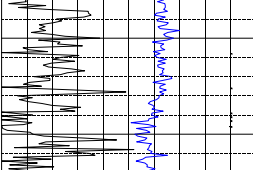
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Lithology



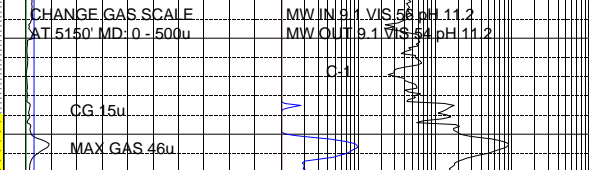
Interp. Lith

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 PREDOMINATELY NODULAR IN HABIT; SEMI DULL TO SPARKLING TO SEMI FROSTED LUSTER; GRANULAR TO GRITTY TO OCCASIONALLY SILTY IN TEXTURE; VISIBLE NACHOLITE IN SAMPLE.



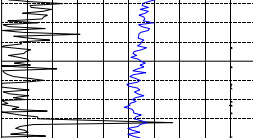
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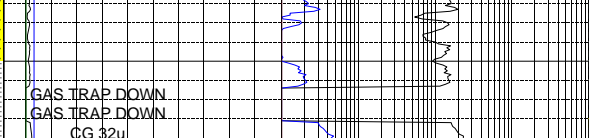
Interp. Lith

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.



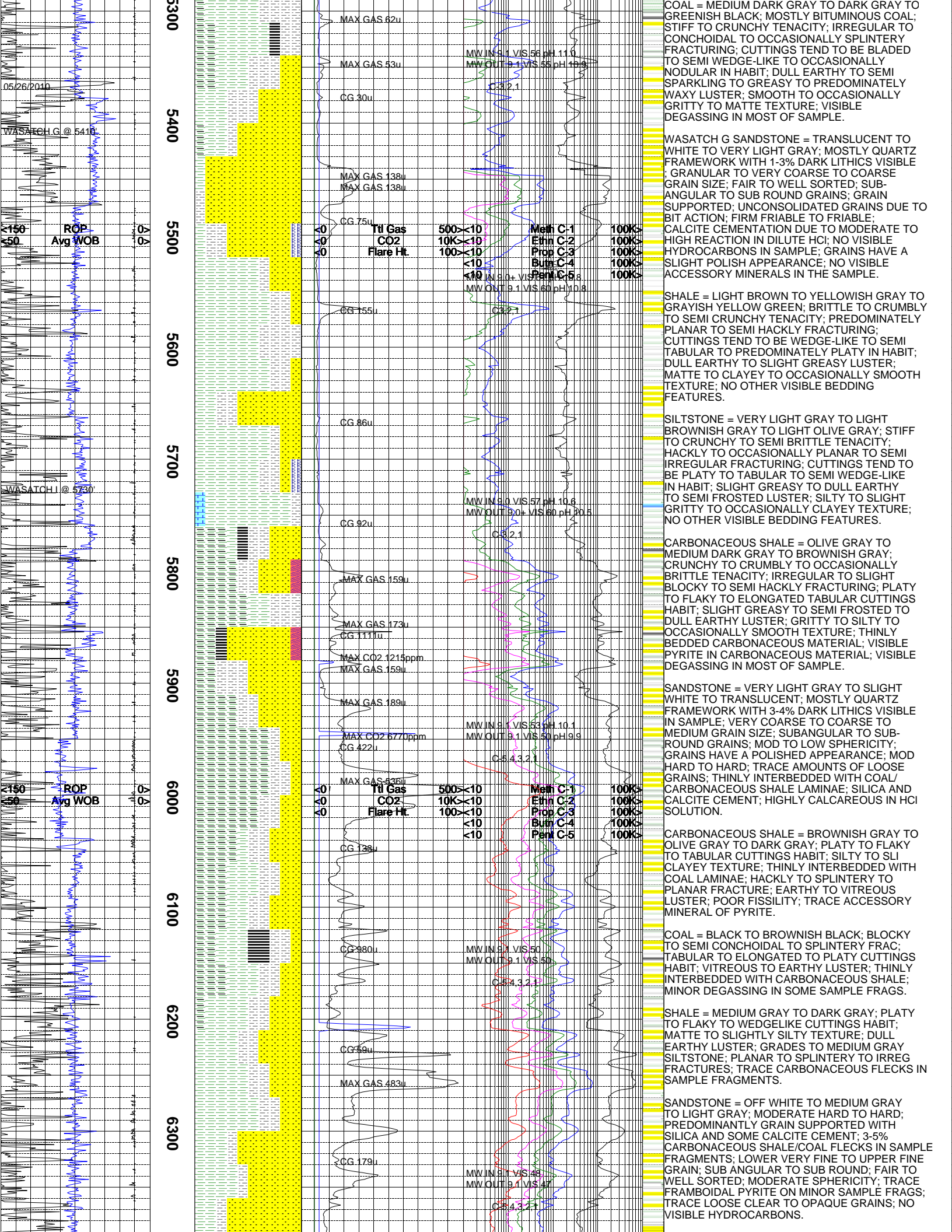
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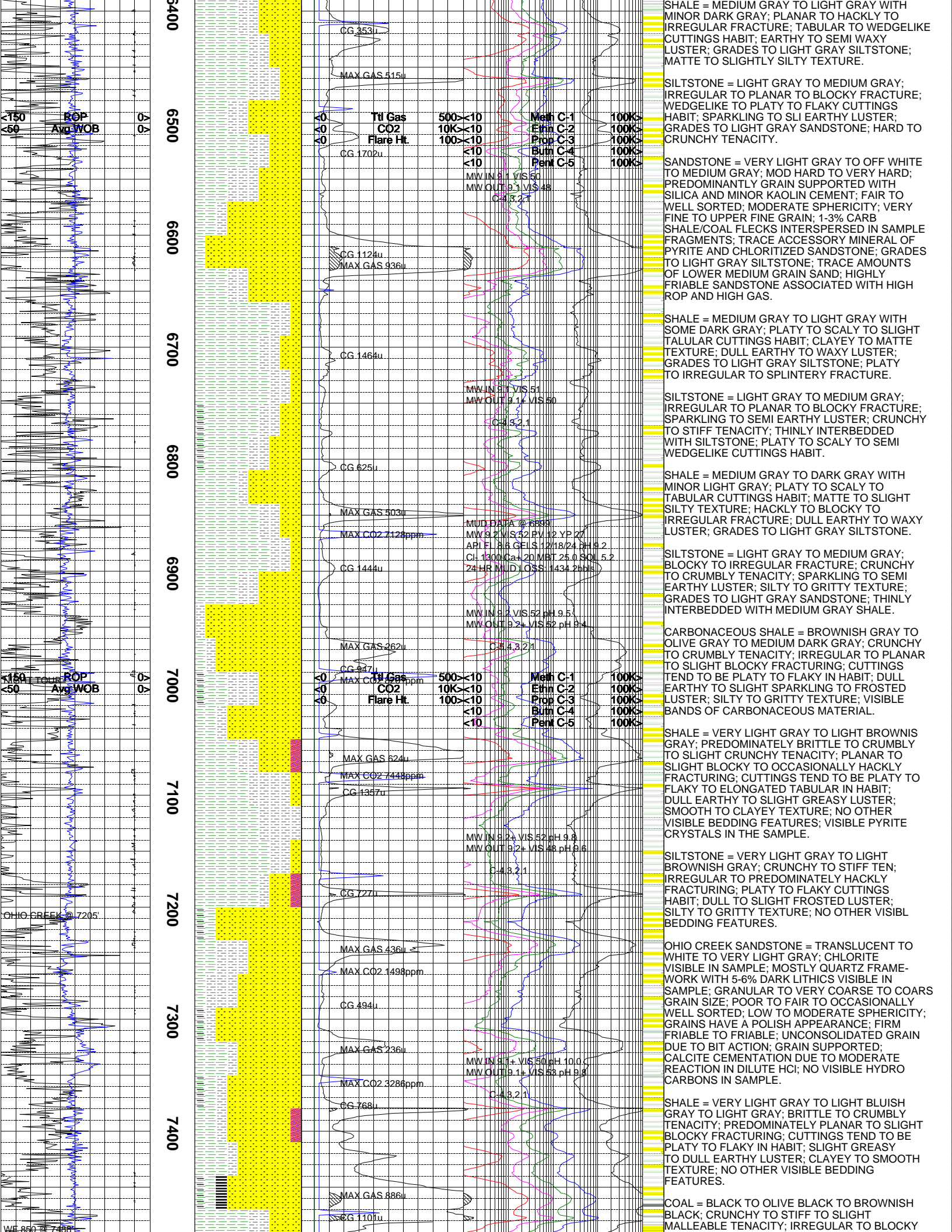
Lithology



Interp. Lith

GAS TRAP DOWN  
 GAS TRAP DOWN  
 CG 32u





SHALE = MEDIUM GRAY TO LIGHT GRAY WITH IRREGULAR FRACTURE; 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 FRACTURE; 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.

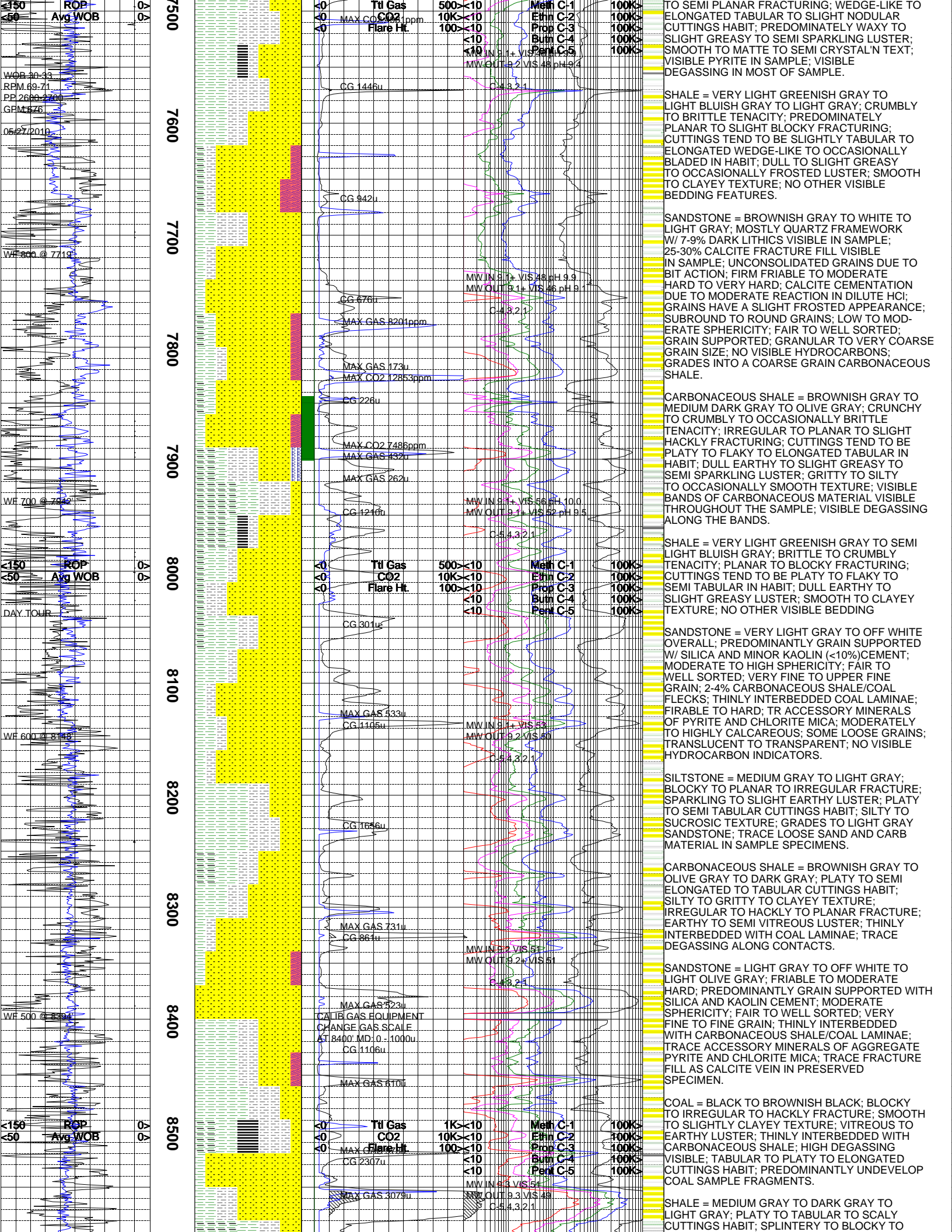
SHALE = VERY LIGHT GRAY TO LIGHT BROWNISH GRAY; PREDOMINATELY BRITTLE TO CRUMBLY TO SLIGHT CRUNCHY TENACITY; PLANAR TO SLIGHT BLOCKY TO OCCASIONALLY HACKLY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO ELONGATED TABULAR IN HABIT; DULL EARTHY TO SLIGHT GREASY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO OTHER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



ROP  
Avg WOB

WOB 30-33  
RPM 69-71  
PP 2600-2700  
GPM 476

05/27/2018

WF 800 @ 7719'

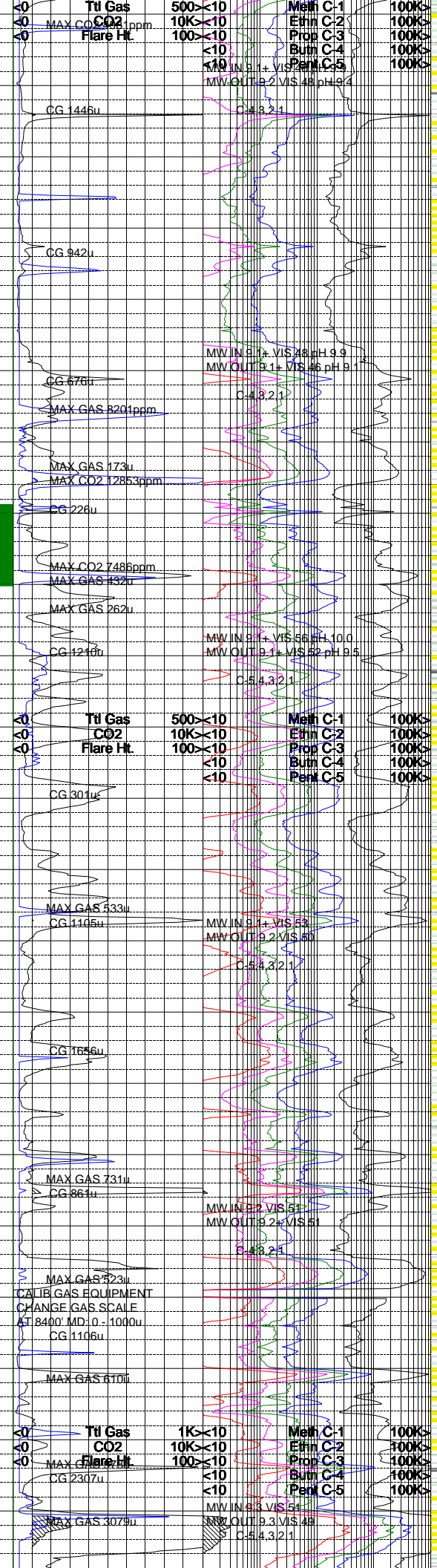
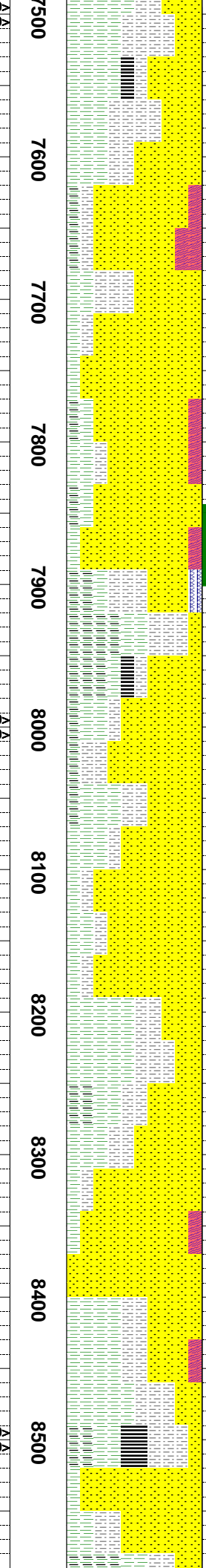
WF 700 @ 7542'

WF 600 @ 8145'

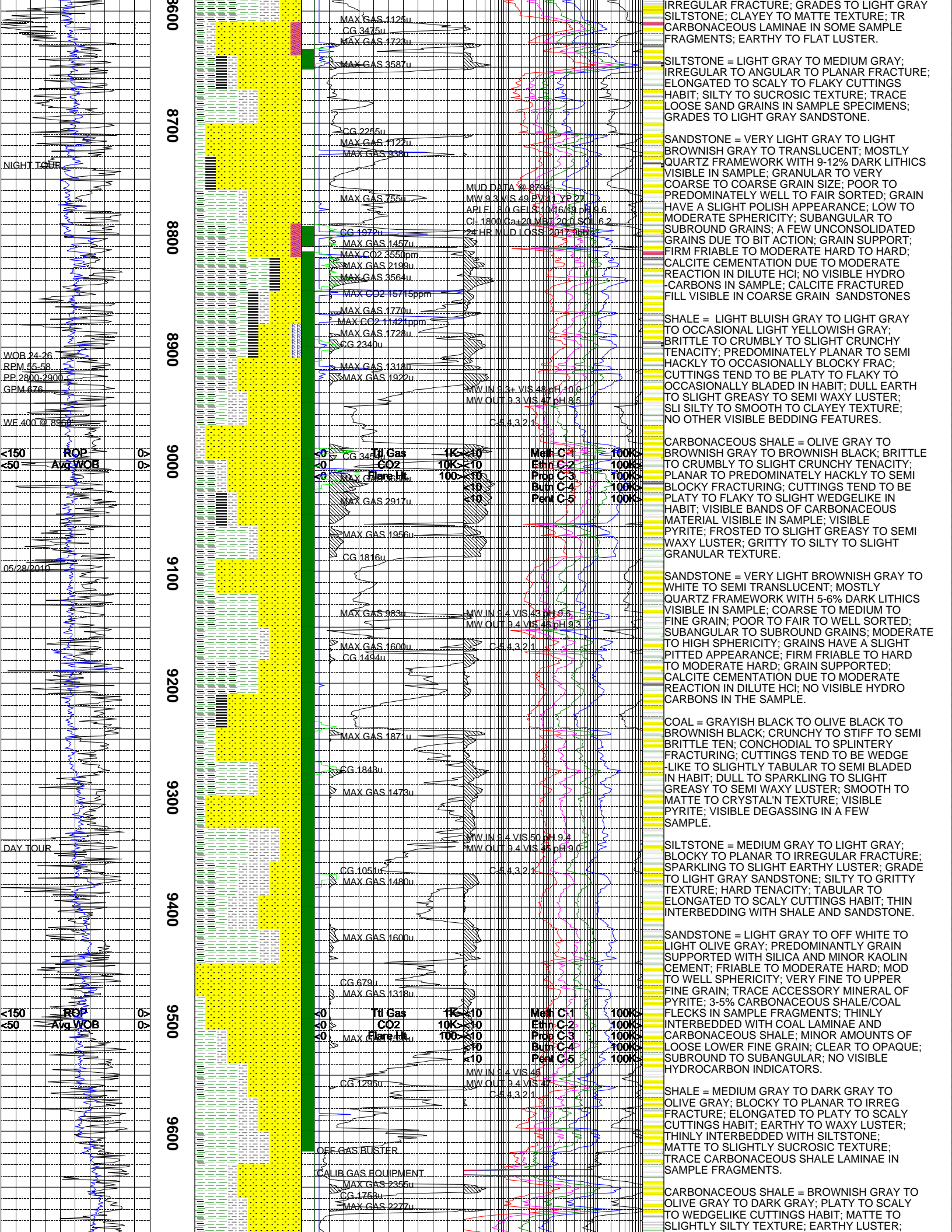
WF 500 @ 8394'

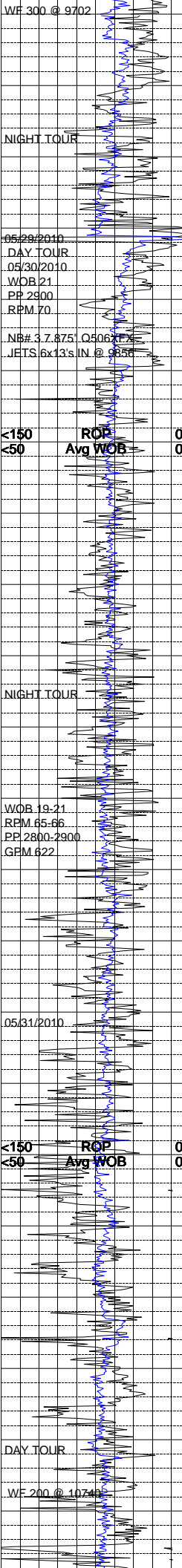
ROP  
Avg WOB

500  
7600  
7700  
7800  
7900  
8000  
8100  
8200  
8300  
8400  
8500

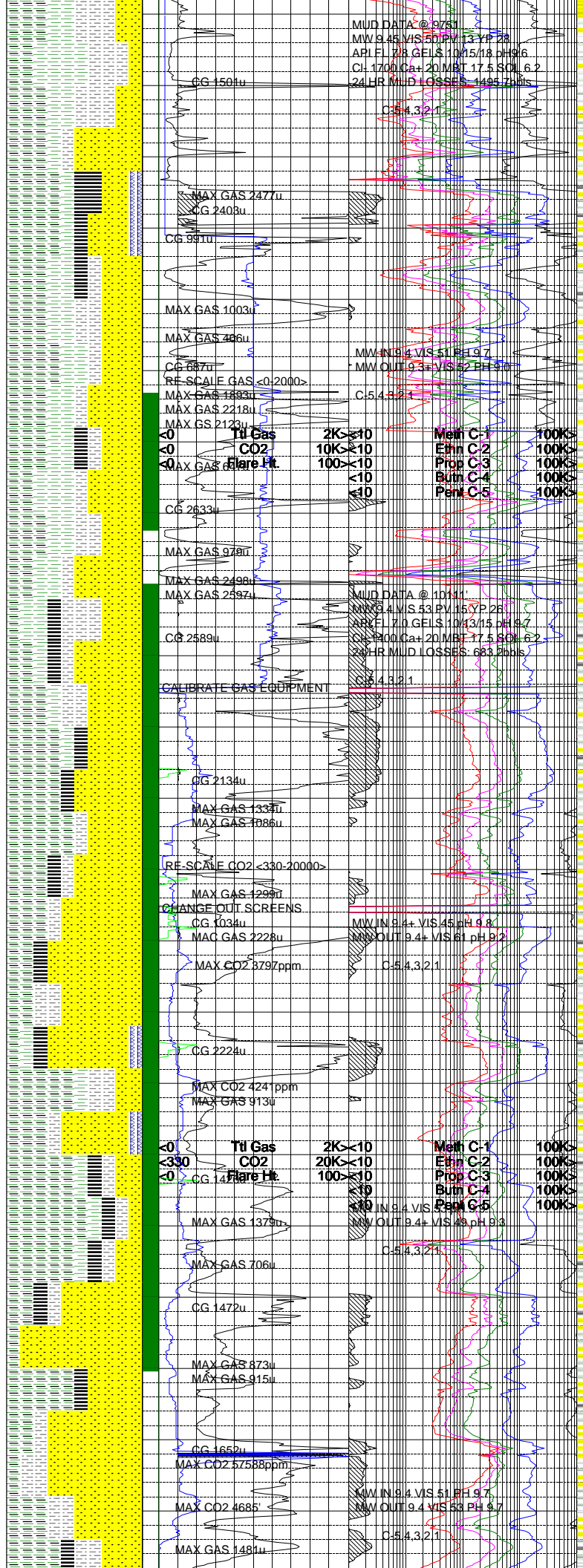


TO SEMI PLANAR FRACTURING; WEDGE-LIKE TO ELONGATED TABULAR TO SLIGHT NODULAR CUTTINGS HABIT; PREDOMINATELY WAXY TO SLIGHT GREASY TO SEMI SPARKLING LUSTER; SMOOTH TO MATTE TO SEMI CRYSTAL'N TEXT; VISIBLE PYRITE IN SAMPLE; VISIBLE DEGASSING IN MOST OF SAMPLE.





9700  
9800  
9900  
10000  
10100  
10200  
10300  
10400  
10500  
10600  
10700



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 WEDGE LIKE 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 = GRAYISH BLACK TO BLACK TO OCCASIONALLY BROWNISH BLACK; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SLIGHTLY BLOCKY FRACTURING; WEDGE LIKE 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 WEDGE LIKE 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 GRAY 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 WEDGE LIKE IN HABIT; DULL TO SLIGHT 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.

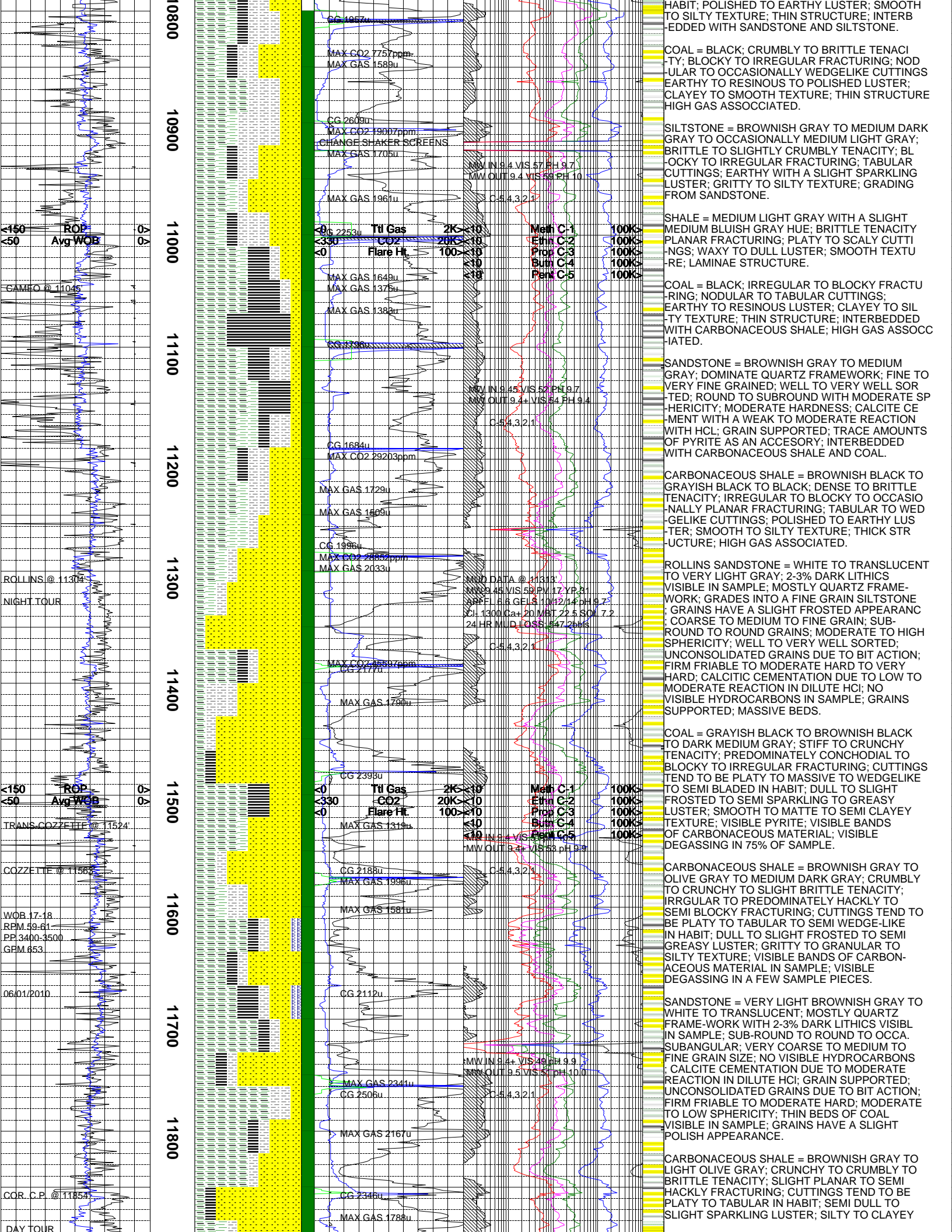
COAL = GRAYISH BLACK TO BROWNISH BLACK; CRUNCHY TO STIFF TO SLIGHT MALLEABLE TENACITY; IRREGULAR TO CONCHODIAL TO SEMI PLANAR FRACTURING; DULL EARTHY TO SLIGHT GREASY TO PREDOMINATELY WAXY LUSTER; VISIBLE DEGASSING IN MOST OF SAMPLE; VISIBLE PYRITE CRYSTALS; GRITTY TO SMOOTH TO MATTE TEXTURE.

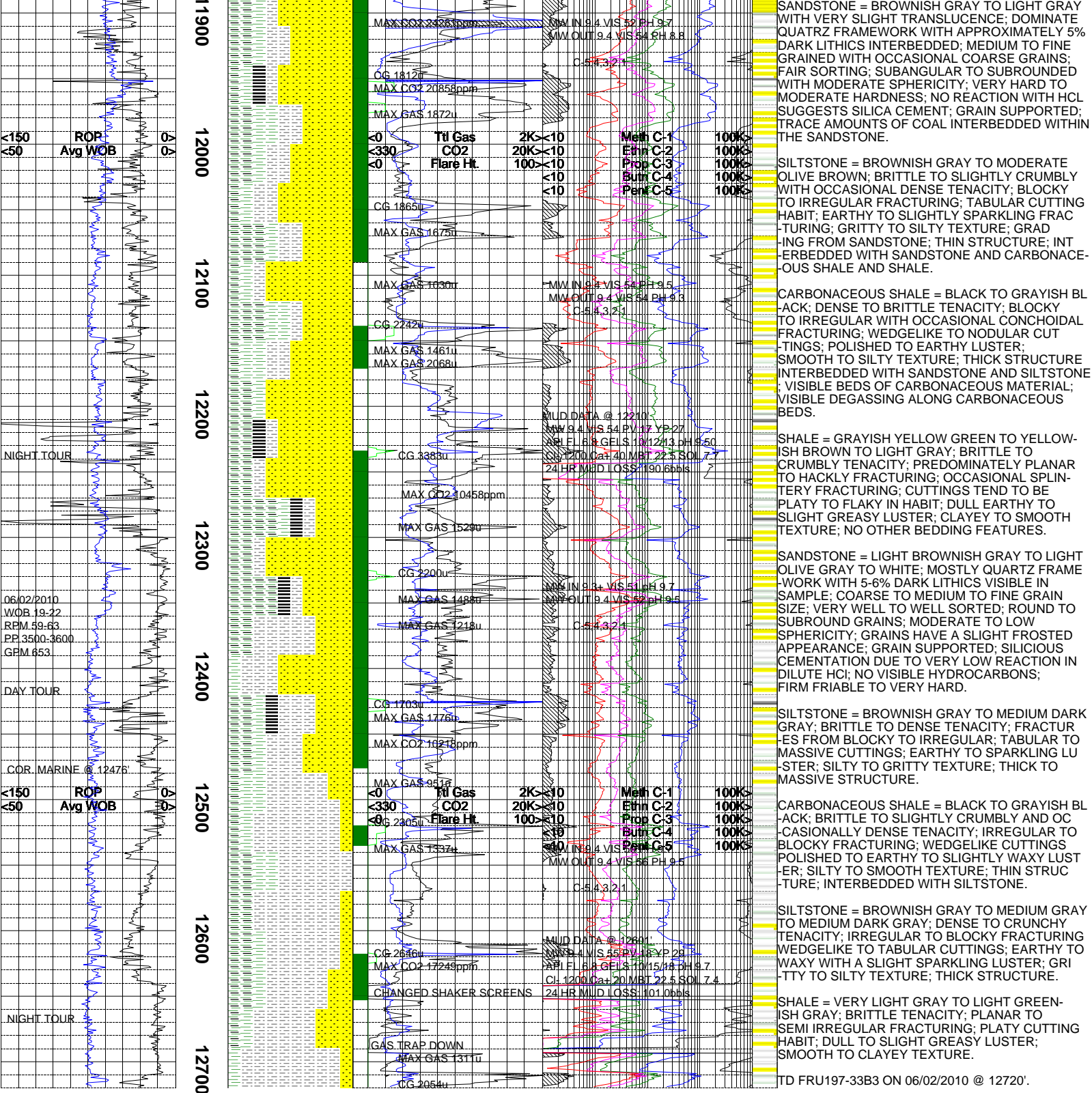
SILTSTONE = LIGHT BROWNISH GRAY TO LIGHT GRAY; CRUNCHY TO STIFF TENACITY; HACKLY TO SEMI PLANAR FRACTURING; CUTTINGS TEND TO BE WEDGE LIKE TO TABULAR IN HABIT; SILTY TO GRITTY TEXTURE; GRADES INTO A COARSE GRAIN SANDSTONE.

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 WEDGE LIKE CUTTING

<0	Ttl Gas	2K	<10	Mean C-1	100K
<0	CO2	10K	<10	Eth C-2	100K
<0	Flare Ht	100	<10	Prop C-3	100K
<0		<10	<10	Bum C-4	100K
<0		<10	<10	Perm C-5	100K





SANDSTONE = BROWNISH GRAY TO LIGHT GRAY WITH VERY SLIGHT TRANSLUCENCE; DOMINATE QUATRZ FRAMEWORK WITH APPROXIMATELY 5% DARK LITHICS INTERBEDDED; MEDIUM TO FINE GRAINED WITH OCCASIONAL COARSE GRAINS; FAIR SORTING; SUBANGULAR TO SUBROUNDED WITH MODERATE SPHERICITY; VERY HARD TO MODERATE HARDNESS; NO REACTION WITH HCL SUGGESTS SILICA CEMENT; GRAIN SUPPORTED; TRACE AMOUNTS OF COAL INTERBEDDED WITHIN THE SANDSTONE.

SILTSTONE = BROWNISH GRAY TO MODERATE OLIVE BROWN; BRITTLE TO SLIGHTLY CRUMBLY WITH OCCASIONAL DENSE TENACITY; BLOCKY TO IRREGULAR FRACTURING; TABULAR CUTTING HABIT; EARTHY TO SLIGHTLY SPARKLING FRACTURING; GRITTY TO SILTY TEXTURE; GRADING FROM SANDSTONE; THIN STRUCTURE; INTERBEDDED WITH SANDSTONE AND CARBONACEOUS SHALE AND SHALE.

CARBONACEOUS SHALE = BLACK TO GRAYISH BLACK; DENSE TO BRITTLE TENACITY; BLOCKY TO IRREGULAR WITH OCCASIONAL CONCHOIDAL FRACTURING; WEDGELIKE TO NODULAR CUTTINGS; POLISHED TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THICK STRUCTURE INTERBEDDED WITH SANDSTONE AND SILTSTONE; VISIBLE BEDS OF CARBONACEOUS MATERIAL; VISIBLE DEGASSING ALONG CARBONACEOUS BEDS.

SHALE = GRAYISH YELLOW GREEN TO YELLOWISH BROWN TO LIGHT GRAY; BRITTLE TO CRUMBLY TENACITY; PREDOMINATELY PLANAR TO HACKLY FRACTURING; OCCASIONAL SPLINTERY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY IN HABIT; DULL EARTHY TO SLIGHT GREASY LUSTER; CLAYEY TO SMOOTH TEXTURE; NO OTHER BEDDING FEATURES.

SANDSTONE = LIGHT BROWNISH GRAY TO LIGHT OLIVE GRAY TO WHITE; MOSTLY QUARTZ FRAMEWORK WITH 5-6% DARK LITHICS VISIBLE IN SAMPLE; COARSE TO MEDIUM TO FINE GRAIN SIZE; VERY WELL TO WELL SORTED; ROUND TO SUBROUND GRAINS; MODERATE TO LOW SPHERICITY; GRAINS HAVE A SLIGHT FROSTED APPEARANCE; GRAIN SUPPORTED; SILICIOUS CEMENTATION DUE TO VERY LOW REACTION IN DILUTE HCl; NO VISIBLE HYDROCARBONS; FIRM FRIABLE TO VERY HARD.

SILTSTONE = BROWNISH GRAY TO MEDIUM DARK GRAY; BRITTLE TO DENSE TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR; TABULAR TO MASSIVE CUTTINGS; EARTHY TO SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; THICK TO MASSIVE STRUCTURE.

CARBONACEOUS SHALE = BLACK TO GRAYISH BLACK; BRITTLE TO SLIGHTLY CRUMBLY AND OCCASIONALLY DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURING; WEDGELIKE CUTTINGS POLISHED TO EARTHY TO SLIGHTLY WAXY LUSTER; SILTY TO SMOOTH TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SILTSTONE.

SILTSTONE = BROWNISH GRAY TO MEDIUM GRAY TO MEDIUM DARK GRAY; DENSE TO CRUNCHY TENACITY; IRREGULAR TO BLOCKY FRACTURING WEDGELIKE TO TABULAR CUTTINGS; EARTHY TO WAXY WITH A SLIGHT SPARKLING LUSTER; GRITTY TO SILTY TEXTURE; THICK STRUCTURE.

SHALE = VERY LIGHT GRAY TO LIGHT GREENISH GRAY; BRITTLE TENACITY; PLANAR TO SEMI IRREGULAR FRACTURING; PLATY CUTTING HABIT; DULL TO SLIGHT GREASY LUSTER; SMOOTH TO CLAYEY TEXTURE.

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