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	FRU 197-28A8
FIELD	FREEDOM CREEK UNIT
REGION	ROCKIES
COORDINATES	LAT: 39.934571000
	LON: 108.295879000
ELEVATION	GL = 6082'
	KB = 6109'
COUNTY, STATE	RIO BLANCO, CO
API INDEX	051031163100
SPUD DATE	05/06/2010
CONTRACTOR	HELMRICH AND PAYNE
CO. REP.	RICKY T OWENS
RIG/TYPE	215 / FLEX 3
LOGGING UNIT	MLU 051
GEOLOGISTS	GEORGE BAKER
	BRENDA MARSH
ADD. PERSONS	BILL JOHANNING
	DEVIN CLAAR
CO. GEOLOGIST	MELAINE A. BIGGS

LOG INTERVAL

DEPTHS:	3,441'	**TO**	12,275'
DATES:	5/04/2010	**TO**	5/23/2010
SCALE:	1" = 100'		

MUD TYPES

LSND	**TO**	12,275'
	TO	
	TO	
	TO	

CASING DATA

16.0"	**AT**	119'
10.75"	**AT**	3,441'
	AT	
	AT	

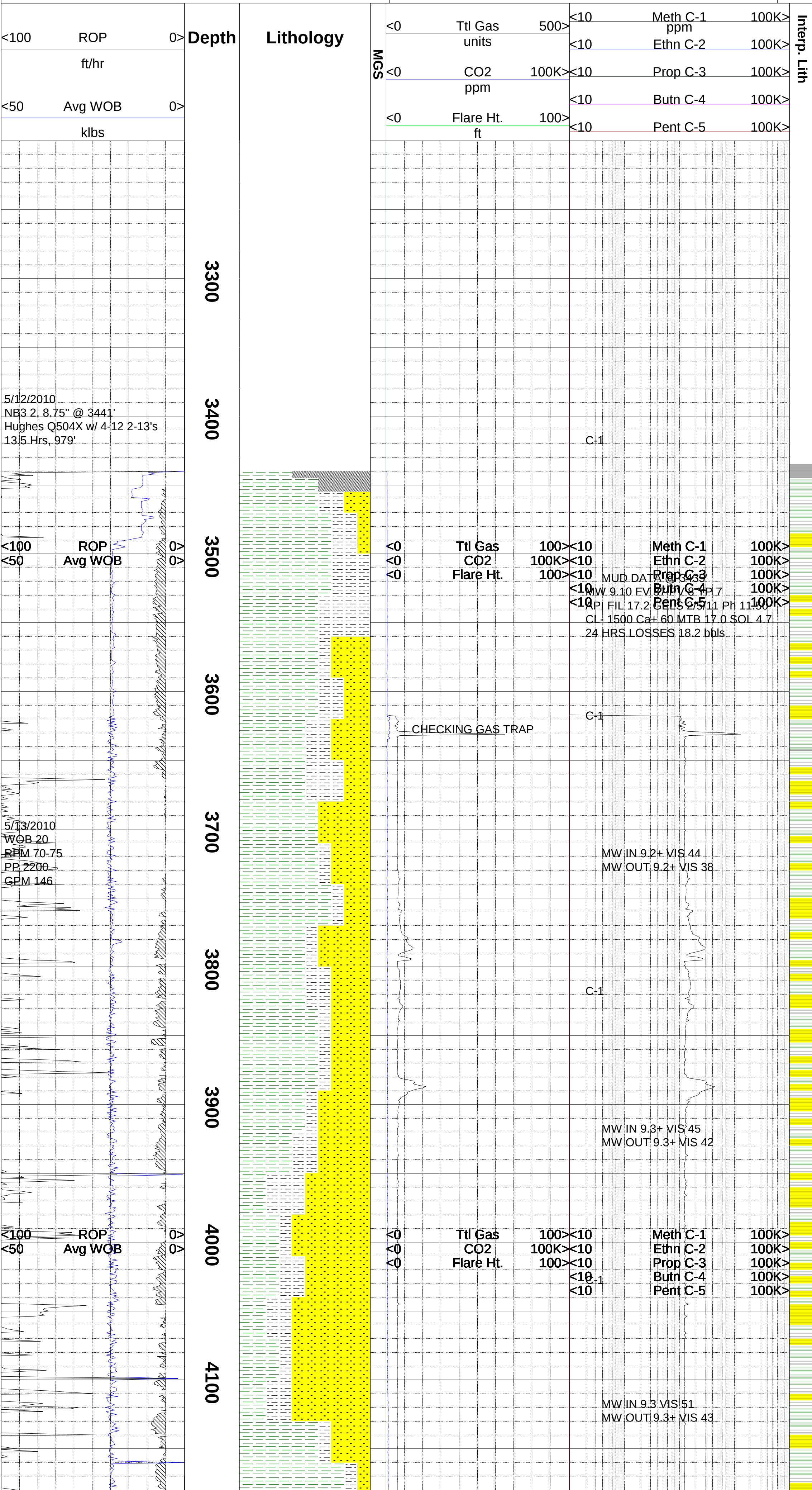
HOLE SIZE

14.75"	**TO**	3,441'
8.75"	**TO**	12,275'
	TO	
	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		

ALTERED ZONE	CHERT - GLASSY	FELSIC SILIC DIKE	MARL - CALC	SANDSTONE
ANDESITE	CHERT - PORCEL	FOSSIL	METAMORPHICS	SANDSTONE-TUFFACEOUS
ANHYDRITE	CHERT - TIGER STRIPE	GABBRO	MUDSTONE	SERICITIZATION
BASALT	CHERT - UNDIFF	GLASSY TUFF	OBSIDIAN	SERPENTINE
BENTONITE	CLAY	GRANITE	PALEOSOL	SHALE
BIOTITIZATION	CLAY-MUDSTONE	GRANITE WASH	PHOSPHATE	SHALE TUFFACEOUS
BRECCIA	CLYST-TUFFACEOUS	GRANODIORITE	PORCELANITE	SHELL FRAGMENTS
CALCARENITE	CHLORITIZATION	GYPSUM	PORCELANEOUS CLYST	SIDERITE
CALCAREOUS TUFF	COAL	HALITE	PYRITE	SILICIFICATION
CALCILUTITE	CONGLOMERATE	HORNBL-QTZ-DIO	PYROCLASTICS	SILTSTONE
CARBONATES	CONGL. SAND	IGNEOUS (ACIDIC)	QUARTZ DIORITE	SILTST-TUFFACEOUS
CARBONACEOUS MAT	CONGL. SANDSTONE	IGNEOUS (BASIC)	QUARTZ LATITE	TUFF
CARBONACEOUS SH	COQUINA	INTRUSIVES	QUARTZ MONZONITE	VOLCANICLASTICS SEDS
CEMENT CONTAM.	DACITE	KAOLINITIC	RECRYSTALLIZED CALCITE	VOLCANICS
CHALK	DIATOMITE	LIMESTONE	RHYOLITE	
CRYSTALLINE TUFF	DIORITE	LITHIC TUFF	SALT	
CHERT - ARGILL	DOLOSTONE	MARL - DOLO	SAND	



Remarks

Survey Data, Mud Reports, Other Info.

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, ALL SAMPLE DEPTHS ARE REFERENCED TO RKB.

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

CO2 IS CALIBRATED TO A TEST GAS COMPOSED OF 100000 PPM

CONNECTION GAS, TRIP GAS, AND WIPER GAS ARE NOTED ON THE MUDLOG, FLARE HEIGHTS AND DEPTHS OF GAS BUSTER USAGE ARE ALSO NOTED.

EARLY CONNECTION GASES REPRESENTING UP HOLE GAS INTERVALS BLEEDING INTO THE BOREHOLE ARE COMMON IN THE PRODUCTION INTERVAL.

EVIDENCE OF FRACTURE FILL IS NOTED ON THE LOG USING THE LITHOLOGY SYMBOL FOR METAMORPHICS. THE 10% DOES NOT REPRESENT 10% FRACTURE FILL IN SAMPLE. IT ONLY INDICATES THAT FRACTURE FILL HAS BEEN OBSERVED OVER THE INTERVAL.

CANRIG WELL SERVICE COMMENCED LOGGING OPERATION ON 05/12/2010 @ 18:30 HRS AT A DEPTH OF 3,441'

SURVEY DATA AT 3441 MD
INCL: 9.99
AZIM: 249.12
TVD: 3426.62

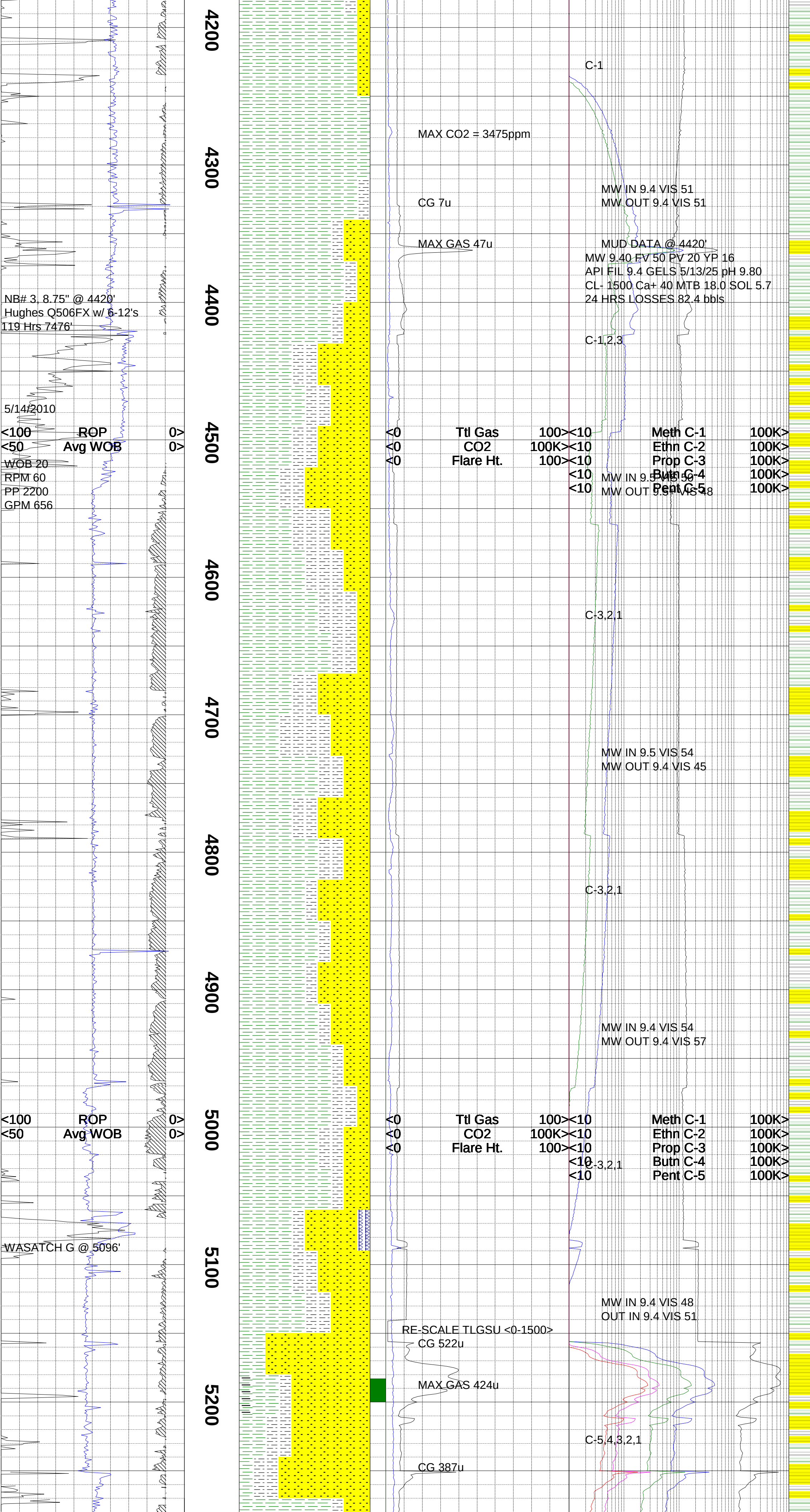
SHALE = MODERATE YELLOWISH BROWN, LIGHT BLUISH GRAY, SOME MODERATE HUES; CRUNCHY TO BRITTLE TENACITY; PLANAR, SUB BLOCKY FRACTURE; TABULAR, WEDGELIKE SLIGHT PLATY CUTTINGS HABIT; DULL, SEMI WAXY LUSTER; SMOOTH GRADING TO SILTY TEXTURE; TRACES PRYITE IMBEDDED.

SILTSTONE = LIGHT BROWNISH GRAY, LIGHT BROWN, TRACE LIGHT GRAYISH TAN; CRUNCHY TO CRUMBLY TENACITY; IRREGULAR, SUB BLOCKY FRACTURE; FLAKY TO SUB MASSIVE CUTTINGS HABIT; DULL RESINOUS LUSTER; SILTY GRADNG TO GRITTY TEXTURE; TRACE LIGHT SHALE IMBEDDED.

SANDSTONE = LIGHT BROWNISH YELLOW STAIN, SOME CLEAR TO TRANSLUCENT, PEPPER APPEA-RANCE DUE TO BLACK LITHIC, DOMINATELY QUARTZ FRAMEWORK, UPPER VERY FINE TO FINE GRAIN; POOR SORTING; FRIABLE TO FIRM AND HARD, SUB ANGULAR, SOME SUB ROUND, LOW SPHERICITY; LIGHT BROWN CLAYEY CEMENT, WEAK REACTION TO DELUTED HCL; VERY POOR INTERGRANULAR POROSITY, TRACE LIGHT GRAY,BLACK SPECKLED LITHIC IMBEDDED.

SHALE = LIGHT YELLOWISH BROWN, TRACE LIGHT GRAYISH BROWN, HUES OF YELLOWISH GRAY; CRUNCHY, CRUMBLY SOME SLIGHTLY HARD; DOMINATELY SUB BLOCKY, SLIGHT IRREGULAR FRACTURE; WEDGELIKE TO TABULAR, SUB MASSIVE CUTTINGS HABIT; TRACE OF CAVINGS IN SHAKER; DULL SUB EARTHY, SOME WAXY LUSTER; SMOOTH, CLAYEY TRACE GRADING TO SILTY TEXTURE; TRACE SILTSTONE / SANDSTONE IMBEDDED.

SHALE = YLWISH BRN, LT GRY, HUES OF BRWN OCC HUES OF BRWNISH PURP; STIFF TO SUB MALLEABLE/SUB CRUMBLY TENACITY WITH IRREGULAR TO HACKLY FRACTURE; SUB WEDGELIKE TO ELONGATED/BLADED CUTTINGS HABIT OCC SUB TABULAR; APPEARS SL MOTTLED IN PLACES; EARTHY TO SMOOTH TEXTURE WITH DULL TO SUB WAXY/WAXY LUSTER; SL TO MODERATE REACTION TO DILUTE HCL; TRACE LIMESTONE IN SAMPLE.



SHALE = YLWISH BRN, LT BRN, HUES OF GRY OCC HUES OF BRWNISH PURP; DENSE TO SUB CRUMBLY TENACITY WITH IRREGULAR TO HACKLY FRACTURE; SUB WEDGELIKE TO SUB MASSIVE TO SUB TABULAR CUTTINGS HABIT ; OFTEN APPEARS SL MOTTLED; EARTHY OCC SL GRITTY TO SMOOTH TEXTURE WITH DULL TO SUB WAXY/WAXY LUSTER; TRACE NAHCOLITE IN SAMPLE; TRACE PYRITE.

SANDSTONE = VERY LT GRY, GRY, GRY WITH HUES OF YLW AND OCC REDDISH BRWN; FIRM TO HARD; UPPER MEDIUM TO UPPER FINE GRAINED; INDIVIDUAL GRAINS ARE TRANSL TO OPAQUE; LOW SPHERICITY POORLY SORTED; SL TO MODERATELY CALCAREOUS; DOMINANTLY GRAIN SUPPORTED. SL TO NO INCREASE IN DITCH GAS.

SHALE = LIGHT YELLOWISH BROWN, TRACE LIGHT GRAY YELLOWISH HUES; DENSE TO SUB CRUMBLY TRACE CRUNCHY TENACITY; SUB BLOCKY, BLOCKY SLIGHT IRREGULAR FRACTURE; FLAKY TO SUB MASSIVE CUTTINGS HABIT; DULL EARTHY, SUB WAXY GRADING TO WAXY LUSTER; SILTY TO SMOOTH TEXTURE; TRACE VERY FINE SILTSTONE GRADING TO A THIN SANDSTONE IMBEDDED.

SHALE = LIGHT YELLOWISH BROWN, LIGHT GRAYISH BLUISH PURPLE, LIGHT YELLOWISH GRAY; DENSE, SOME SUB CRUNCHY TO CRUMBLY TENACITY; SUB BLOCKY, BLOCKY, TRACE PLANAR, IRREGULAR IN PART FRACTURE WEDGELIKE, SUB PLATY, SPLINTERY IN PART CUTTINGS HABIT; EARTHY TO DULL, SUB WAXY LUSTER W/ RESINOUS IMBEDDED SILTSTONE SMOOTH, CLAYEY, GRADING TO GRITTY TEXTURE; TRACE VERY FINE SAND-STONE / SILTSTONE INTERBEDDED LAMINATE. VERY LOW GAS SHOW IN THIS SECTION OF THE WELL, 4-6 UNITS.

SANDSTONE = CLEAR, SOME OFF WHITE, DOMINANTLY YELLOWISH BROWN STAIN; QUARTZ FRAME WORK; VERY FINE TO FINE GRAIN; POOR SORTED; DOM SUB ANGULAR, SOME GRADING TO SUB ROUND, LOW SPHERI-CITY; FRIABLE TO HARD; CONSOLIDATED; CALCAREOUS / CLAYEY CEMENT, TRACE SILICA MATRIX CEMENT; OVERALL POOR VISUAL INTERGRANULAR POROSITY; LOW REACTION TO DILUTED HCL; SOME SALT AND PEPPER APPEARANCE WITH DARK GRAY / BLACK SPECKLED LITHICS;NO COAL / CARBON-ACEOUS SHALE IN SAMPLE TRAY.

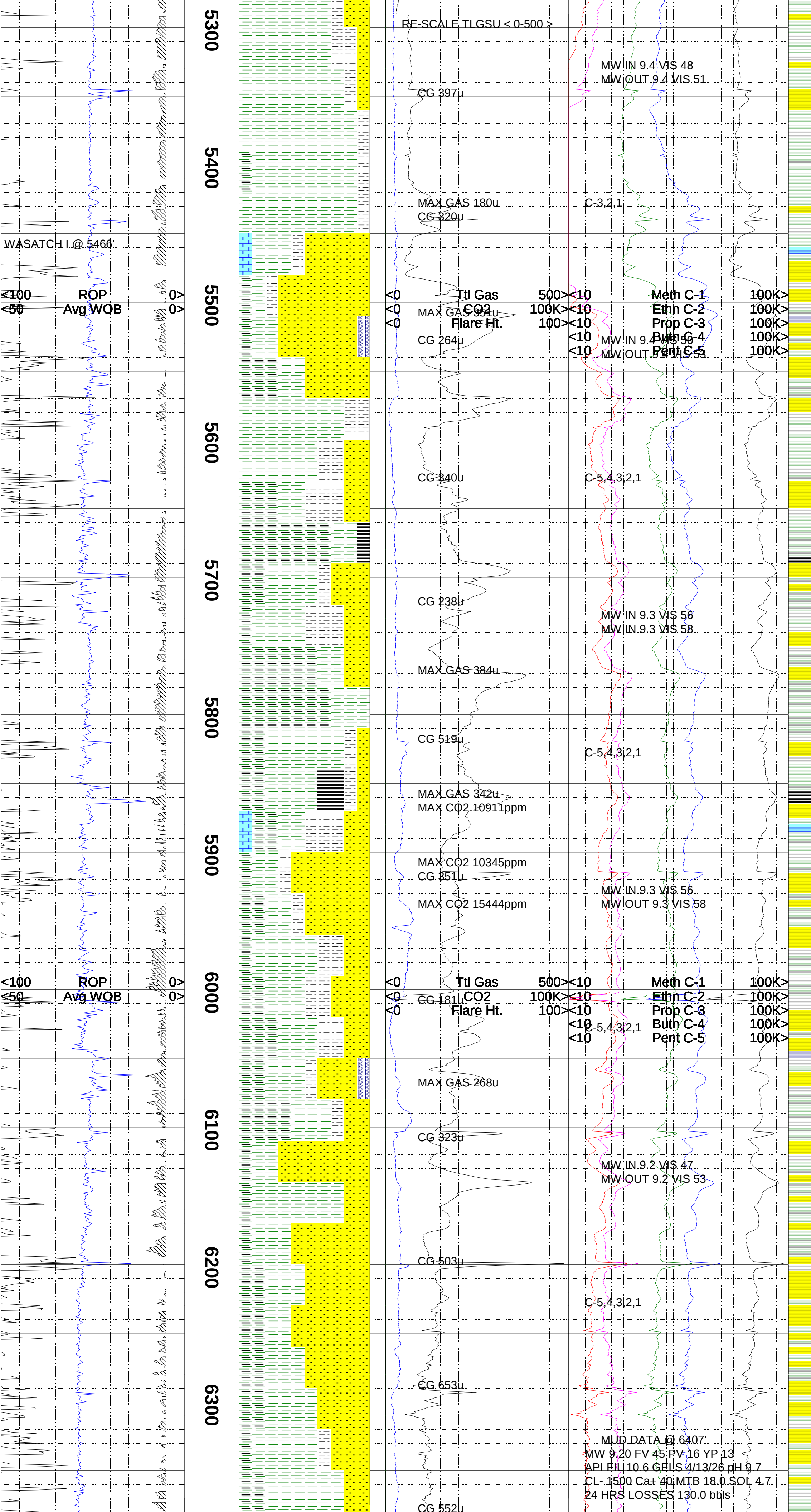
SHALE = YELLOWISH BROWN, LIGHT GRAYISH BROWN, VARIOUS SHADES OF PURPLISH GRAY; DENSE, SUB CRUMBLY, SOME CRUNCHY TENACITY; SUB BLOCKY, BLOCKY, TRACE SPLINTERY FRAGMENTS, IRREGULAR FRACTURE; TABULAR, PLATY TO SUB MASSIVE CUTTINGS HABIT; DULL EARTHY, SL WAXY LUSTER IN PART; SMOOTH CLAYEY GRADING TO GRITTY TEXTURE; TRACE SILTSTONE GRADING TO SANDSTONE LAMINATE / IMBEDDED.

SHALE = MODERATE YELLOWISH BROWN, LIGHT GRAYISH BROWN, SOME PURPLISH GRAY HUES; DENSE, SOME CRUMBLY TO CRUNCHY TENACITY; SUB BLOCKY, BLOCKY, IRREGULAR IN PART FRACTURE; FLAKY, SOME PLATY TO SUB MASSIVE CUTTINGS HABITS; DOMINANTLY DULL EARTHY LUSTER, WITH SOME SUB WAXY LUSTER; SMOOTH TO SL GRITTY TEXTURE; TRACE LIGHT BROWN VERY FINE SILTSTONE IMBEDDED / LAMINATE; LOW GAS READINGS, NO CARBONACEOUS SHALE IN SAMPLE TRAY.

SILTSTONE = LIGHT YELLOWISH BROWN, LIGHT BROWN; CRUMBLY TO BRITTLE TENACITY; SUB BLOCKY TO BLOCKY FRACTURE; WEDGELIKE PLATY CUTTINGS HABIT; DULL LUSTER; SILTY TO GRITTY TEXTURE; SOME GRADING TO SANDSTONE.

SHALE = LT GRY, GRY, GRYISH BRWN. SOME YLW BRWN /YLW GRY MOTTLED AND OCC PURP HUES; FIRM TO DENSE TENACITY; MASSIVE TO SUB TABULAR CUTTINGS HABIT WITH IRREGULAR TO HACKLY FRACTURE; TRACE FRACTURE FILL IN PLACES; DULL TO WAXY LUSTER WITH SMOOTH TO SL EARTHY TEXTURE.

SANDSTONE = LT GRY, GRY WITH GRNISH HUES OCC REDDISH BRWN HUES; UPPER MEDIUM TO FINE GRAINED; DOMINANTLY CONSOLIDATED IN A CALC/CLAY MATRIX OCC SILICEOUS; SOME GREENISH HUES ATTRIBUTED TO CHLOIRITIZATION; INDIVIDUAL GRAINS ARE SUB ANGULAR TO SUB ROUND WITH LOW TO OCC MODERATE SPHERICITY; MODERATELY TO WELL SORTED WITHIN CLUSTERS, BUT POORLY SORTED WITH VARYING GRAIN SIZES IN OVERALL SAMPLE; GRADES TO VERY FINE GRAINED SANDSTONE IN PLACES; OCC



INCREASE IN DITCH GAS; STRONG TO MODERATE REACTION TO DILUTE HCL.

SHALE = MEDIUM TO LT GRY; OCCASIONAL CARBONACEOUS MATERIAL AND LAMINAE; DENSE TO CRUNCHY TENACITY WITH IRREGULAR FRACTURE; SUB TABULAR TO MASSIVE OCC WEDGELIKE CUTTINGS HABIT; SMOOTH WAXY TEXTURE; GREASY TO DULL LUSTER. TRACE LIMESTONE IN SAMPLE.

CARBONACEOUS SHALE = DARK BRWN WITH HUES OF BLACK; CRUNCHY TO DENSE TENACITY SUB BLCKY TO SUB PLATY CUTTING HABIT WITH SUB PLANAR TO IRREGULAR OCC HACKLY FRACTURE; EARTHY TO SMOOTH TEXTURE; DULL TO OCC SUB RESINOUS/SUB VITREOUS LUSTER; SLIGHT INCREASE IN DITCH GAS; SL PYRITIC IN PLACES. NO VISIBLE DEGASSING IN SAMPLE TRAY.

LIMESTONE = LT BRWN, DARK BUFF; DENSE TO FIRM TENACITY; SUB WEDGELIKE TO SL BLADED CUTTINGS HABIT; SCALY WAXY LUSTER WITH SMOOTH TEXTURE; VIOLENT REACTION TO DILUTE HCL.

SHALE = GRY, LT GRY, DARK GRY; DENSE TO TOUGH TENACITY; SUB MASSIVE TO SUB TABULAR CUTTINGS HABIT, OCCASIONALLY WEDGELIKE IN PLACES; IRREGULAR TO HACKLY FRACTURE; DULL TO WAXY LUSTER WITH SMOOTH TO SL GRITTY TEXTURE WHERE GRADING TO AND INTERBEDDED WITH SILTSTONES. NO VISIBLE STRUCTURES.

COAL = BLACK VERY DARK BRWN WITH HUES OF BLACK; DENSE TO CRUNCHY TENACITY; SUB TABULAR TO MASSIVE TO PLATY IN PLACES; IRREGULAR TO PLANAR FRACTURE; SMOOTH TO SL EARTHY TEXTURE WITH SUB VITREOUS TO DULL LUSTER; SL PYRITIC IN PLACES; SOME VISIBLE DEGASSING IN SAMPLE TRAY. MARKED TO MODERATE INCREASE IN DITCH GAS

CARBONACEOUS SHALE = DARK BRWN WITH HUES OF BLACK; CRUNCHY TO DENSE TENACITY SUB BLCKY TO SUB PLATY CUTTING HABIT WITH SUB PLANAR TO IRREGULAR OCC HACKLY FRACTURE; EARTHY TO SMOOTH TEXTURE; DULL TO OCC SUB WAXY / SUB VITREOUS LUSTER; SLIGHT INCREASE IN DITCH GAS; SL PYRITIC IN PLACES. NO VISIBLE DEGASSING IN SAMPLE TRAY.

SHALE = GRY, LT GRY, DARK GRY; DENSE TO CRUNCHY TENACITY; SUB MASSIVE TO SUB TABULAR CUTTINGS HABIT, OCCASIONALLY WEDGELIKE IN PLACES; IRREGULAR TO HACKLY FRACTURE; DULL EARTHY TO WAXY LUSTER WITH SMOOTH TO SL GRITTY TEXTURE IN PLACES; COMMONLY GRADES TO AND INTERBEDDED WITH CARBONACEOUS SHALE AND SILTSTONE; OCC LAMINAE IN PLACES.

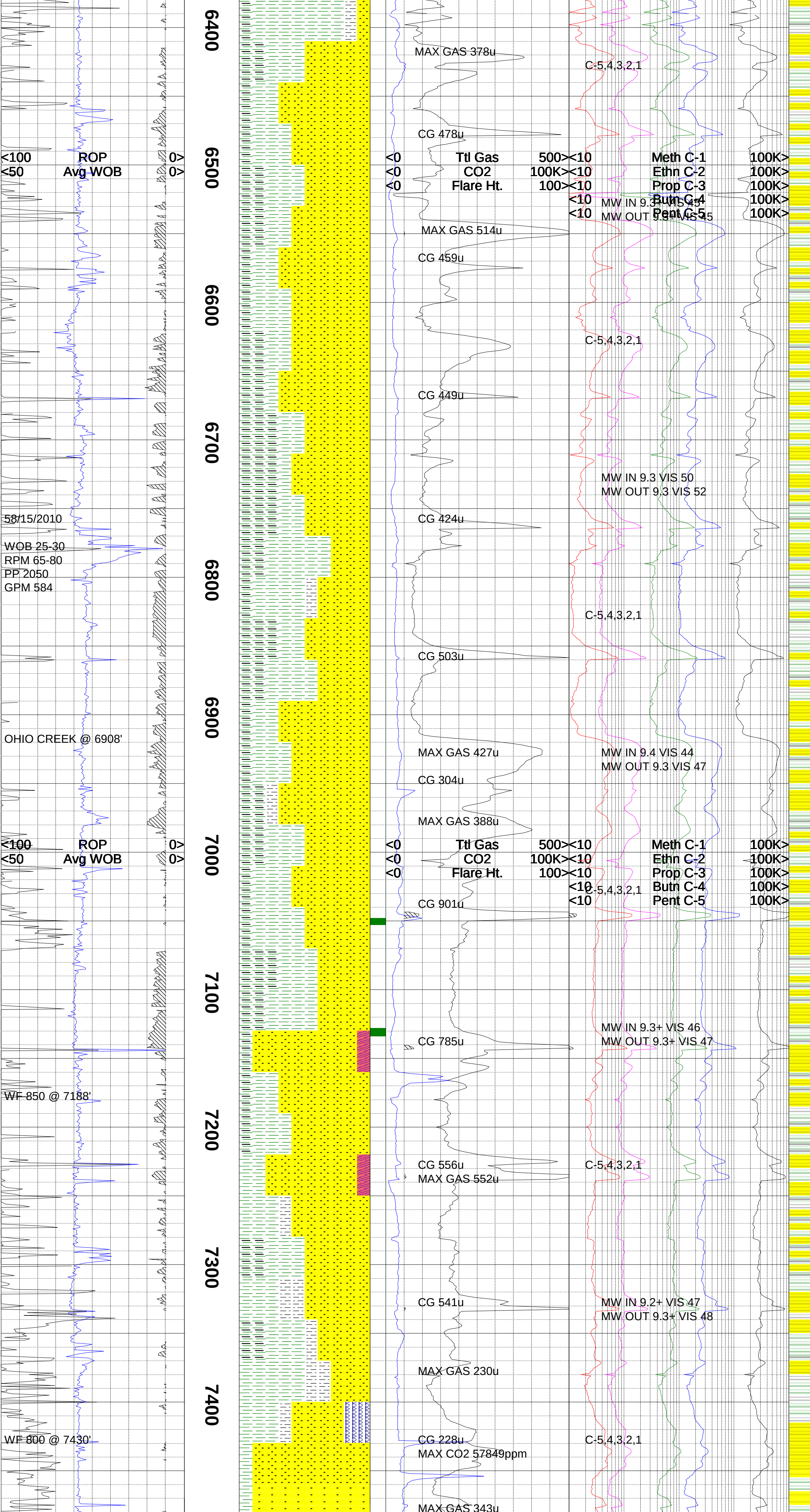
CARNOBACEOUS SHALE = DARK BRWN WITH HUES OF BLACK; CRUNCHY TO DENSE TENACITY SUB BLCKY TO PLATY CUTTINGS HABIT WITH SUB PLANAR TO IRREGULAR OCC HACKLY FRACTURE; EARTHY TO SMOOTH TEXTURE; DULL TO OCC SUB WAXY / SUB VITREOUS LUSTER; SLIGHT INCREASE IN DITCH GAS; SL TO MODERATELY PYRITIC.

LIMESTONE = LT BRWN, BUFF, DRK BRWN FIRM TENACITY; SUB WEDGELIKE TO SL BLADED CUTTINGS HABIT; SCALY TO SUB WAXY LUSTER WITH SMOOTH TEXTURE; VIOLENT REACTION TO DILUTE HCL.

SHALE = GRY, LT GRY, DARK GRY OCC BRWN HUES; DENSE TO CRUMBLY, OCC SUB SECTILE WHERE HYDRATED; VARIES BETWEEN LIMEY SHALE AND SHALEY LIME; SMOOTH TO WAXY TEXTURE WITH DULL LUSTER; IRREGULAR FRACTURE; MODERATE TO STRONG REACTION TO DILUTE HCL.

CARBONACEOUS SHALE = DARK BROWNISH GRAY, OFF BLACKISH BROWN, SOME DUSKY BROWN; DENSE TO CRUMBLY, OCC CRUNCHY TENACITY; PLANAR, SUB BLOCKY/ BLOCKY FRACTURE; TABULAR, SUB MASSIVE CUTTING HABIT; DULL EARTHY, GRADING TO GREASY LUSTER; SILTY GRADING TO GRITTY TEXTURE; TRACE OF DEGASSING IN SAMPLE TRAY; SOME BLACK COALY SPECKLED LAMINATE / IMBEDDED

SHALE = MODERATE DARK GRAY WITH BROWNISH HUES, SOME LIGHT BROWNISH GRAY; CRUNCHY, CRUMBLY TO DENSE TENACITY; PLANAR, TRACE SPLINTERY, SUB BLOCKY FRACTURE; PLATY SUB BLOCKY / MASSIVE, TRACE FLAKY CUTTINGS HABIT; DULL, SUB WAXY / WAXY, LUSTER; GRITTY TO SILTY TEXTURE; TRACE MODERATE TO HIGH REACTION TO DILUTED HCL, SOME TRACE OF LIMEY SHALE / SHALEY LIME; TRACE BLACK CARBONACEOUS SHALE/ COALY SPECKLED IMBEDDED/LAMINATE.



SANDSTONE = LIGHT GRAYISH BLUE, MODERATE GRAY, TRACE GRAYISH OFF WHITE W/ SALT AN PEPPER APPEARANCE; DOMINATE QUARTZ FRAMEWORK; UPPER VERY FINE TO LOWER FINE GRAIN; POOR TO FAIRLY SORTED, DOMINANTLY CONSOLIDATED, SUB BLOCKY CLUSTERS; SUB ANGULAR GRADING TO SUB ROUND; LOW TO MOD SPHERICITY; FRIABLE, AND HARD; MODERATE GRAY CLAY /CALCAREOUS CEMENT, TRACE SILICA MATRIX CEMENT, WEAK HCL REACTION; POOR TO FAIR INTERGRANULAR POROSITY; TRACE BLACK CARBONACEOUS SHALE/COALY SPECKLED IMBEDDED.

CARBONACEOUS SHALE = DARK BROWNISH GRAY, BROWNISH BLACK, DARK GRAY BROWN W/ BLACK SPECKS; TABULAR, SOME WEDGELIKE OCC SUB BLOCKY CUTTIGS HABIT; SUB BLOCKY BLOCKY FRACTURES; DULL SLIGHT WAXY, EARTHY IN PART LUSTER; SILKY TO GRITTY TEXTURE; TRACE BLACK SPECKLED COALY IMBEDDED / LAMINATE; SOME SPECKLE PYRITE IMBEDDED.

SHALE = DARK GRAY, OCC MODERATE GRAYISH BLUE, SOME GRADING TO BLACK/BLUE; DENSE, BRITTLE TENACITY; SPLINTERY, SOME SUB BLOCKY, PLANAR FRACTURE; ELONGATED, WEDGELIKE W/ OCC SUB MASSIVE CUTTINGS HABIT; DULL, EARTHY, SUB WAXY/WAXY LUSTER; CLAYEY TO GRITTY TEXTURE; TRACES WEAK REACTION TO DILUTED HCL / LIMEY SHALE; TRACE BLACK CARBONACEOUS SHALE LAMINATE.

CARBONACEOUS SHALE = DARK BROWNISH BLACK, DARK GRAYISH BLACK/BROWN, OCC HUES OF OFF BLACK; DENSE TO CRUMBLY TENACITY; PLATY TO SUB BLOCKY FRACTURE; WEDGELIKE, TABULAR, SOME FLAKY CUTTINGS HABIT; DULL, WAXY LUSTER, SILTY GRADING TO GRITTY TEXTURE; TRACE PYRITIC SPECKLED IMBEDDED.

OHIO CREEK SANDSTONE = LIGHT OFF BLUISH GRAY, SOME OFF WHITE; LIGHT GRAY, OCC SALT AND PEPPER APPEARANCE; TRACE CLEAR AND TRANSLUCENT CEMENTED IN SMALL CLUSTERS; VERY FINE TO FINE GRAIN; POOR TO FAIR SORTED, DOM SUB ANGULAR SOME SUB ROUND, LOW TO MOD SPHERICITY; FRIABLE IN PART; CLAYEY/CALCAREOUS CEM, SOME SILICA MATRIX CEMENT, LOW REACTION TO HCL. SPECKLED DARK LITHIC AND MAFIC IMBEDDED.

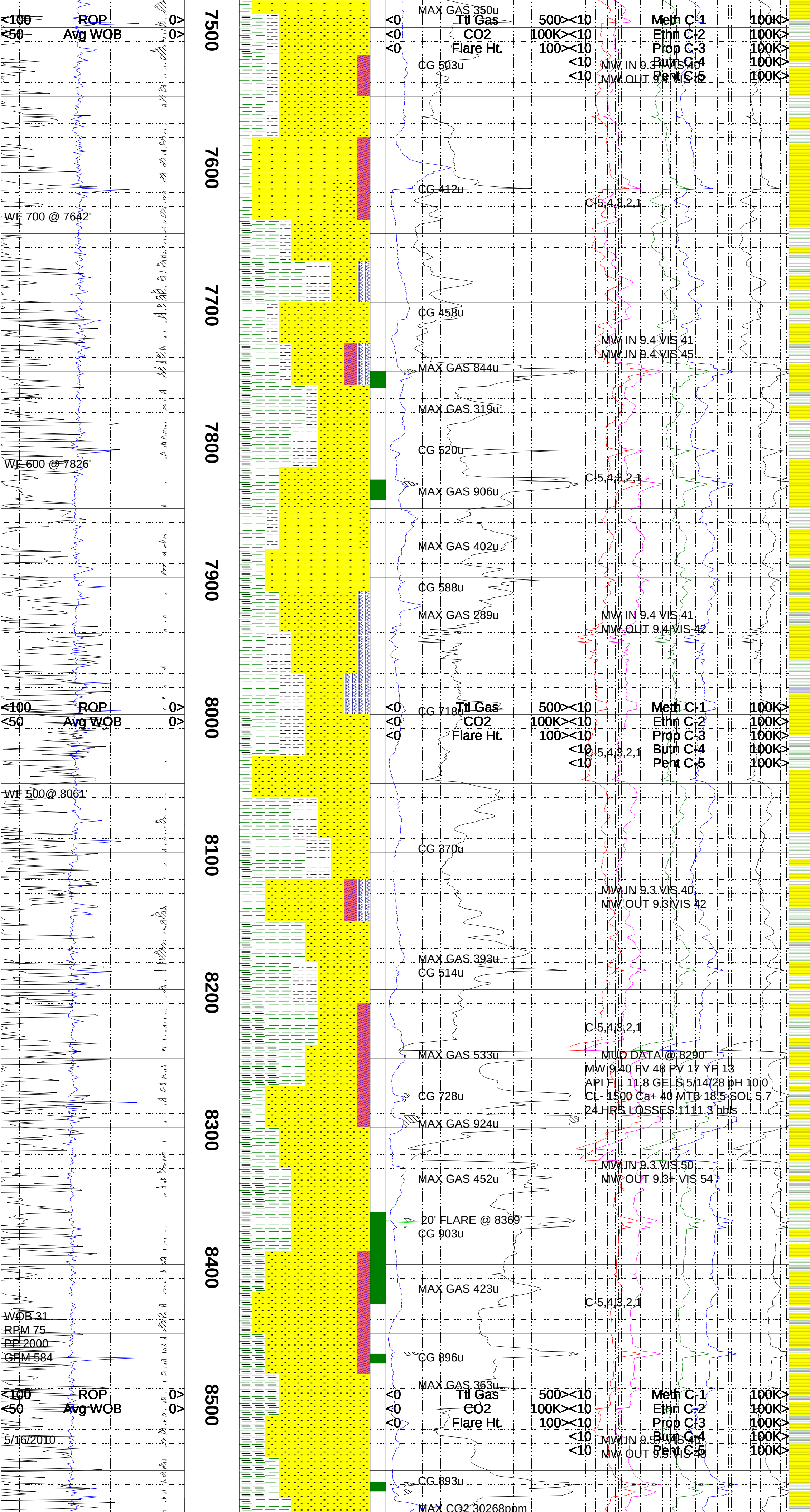
SANDSTONE = LIGHT BLUISH GRAY, CLEAR TO TRANSLUCENT, SUB BLOCKY CLUSTERS, SALT AND PEPPER APPEARANCE, VERY FINE GRADING TO FINE GRAIN; POOR TO FAIR SORT ING; DOM SUB ANGULAR / SOME SUB ROUND, LOW TO MOD SPHERICITY; FRIABLE IN PART; CLAYEY/SILICA MATRIX CEMENT, SOME CALCAREOUS CEMENT, MOD HCL REACTION; SPECKLED LITHIC/ MAFIC AND CARBONACEOUS SHALE IMBEDDED.

SANDSTONE = LIGHT OFF WHITE/GRAY, TRACE BLUISH GRAY, SOME CLEAR TO TRANSLUCENT GRAINS, FEW LOOSE GRAINS, OCC SALT AND PEPPER APPEARANCE; QUARTZ FRAMEWORK; FAIR SORTED; DOMINANTLY SUB ANGULAR, UPPER VERY FINE TO LOWER FINE GRAIN; LOW TO MODERATE SPHERICITY; FRIABLE TO HARD; DOMINANTLY CONSOLIDATED, OCC LOOSE INDIVIDUAL GRAINS OR SMALL CLUSTERS, CLAYEY/SILICA CEMENT, SOME CALCAREOUS CEMENT, WEAK HCL REACTION; POOR TO FAIR VISUAL INTERGRANULAR POROSITY; TRACE COARSE CALCITE CRYSTALS IN SAMPLE TRAY,MAY INDICATE PRESENTS OF A FRACTURE TRACE BLACK SPECKLED LITHIC / CARBONACEOUS SHALE IMBEDDED.

CARBONACEOUS SHALE = DARK BRWN WITH HUES OF BLACK; CRUNCHY TO DENSE TENACITY SUB BLCKY TO SUB PLATY CUTTING HABIT WITH SUB PLANAR TO IRREGULAR OCC HACKLY FRACTURE; EARTHY TO SMOOTH TEXTURE; DULL TO OCC SUB WAXY / SUB VITREOUS LUSTER; SLIGHT INCREASE IN DITCH GAS; SL PYRITIC IN PLACES. NO VISIBLE DEGASSING IN SAMPLE TRAY.

SHALE = GRY, LT GRY, DARK GRY; DENSE TO CRUNCHY TENACITY; SUB MASSIVE TO SUB TABULAR CUTTINGS HABIT, OCCASIONALLY WEDGELIKE IN PLACES; IRREGULAR TO HACKLY FRACTURE; DULL EARTHY TO WAXY LUSTER WITH SMOOTH TO SL GRITTY TEXTURE IN PLACES.

SANDSTONE = OFF WHT, LT GRY; UPPER MEDIUM TO FINE GRAINED; MODERATELY FRIABLE; INDIVIDUAL GRAINS ARE SUB ANGULAR TO SUB ROUND WITH MODERATE TO LOW SPHERICITY; TRANSPARENT TO OPAQUE WITH CLUSTERS HAVING A SALT AND PEPPER APPEARANCE; DOMINANTLY WELL



SORTED; ACCESSORIES INCLUDE DARK LITHIC AND MAFIC FRAGMENTS APPROX 3%; CONSOLIDATED CLUSTERS ARE GRAIN SUPPORTED IN A CALC/CLAY MATRIX. MODERATE TO MARKED INCREASE IN DITCH GAS MODERATE TO STRONG REACTION TO DILUTE HCL.

SANDSTONE = OFF WHT, LT GRY; UPPER MEDIUM TO OCC FINE GRAINED; VERY FRIABLE; INDIVIDUAL GRAINS ARE SUB ANGULAR TO SUB ROUND WITH MODERATE TO LOW SPHERICITY; TRANSPARENT TO OPAQUE; DOMINANTLY UNCONSOLIDATED MOST LIKELY A RESULT OF BIT ACTION; VERY CLEAN WITH LITTLE TO NO ACCESSORIES; OVERALL POORLY SORTED.

SHALE = GRY, LT GRY, GRYISH BRWN, LT BRWN; FIRM TO DENSE TENACITY WITH SUB TABULAR TO SUB WEDGELIKE OCC BLADED CUTTINGS HABIT; IRREGULAR TO OCC HACKLY FRACTURE; DULL EARTHY TO WAXY LUSTER WITH SMOOTH TO SL GRITTY TEXTURE IN PLACES; COMMONLY GRADES TO AND INTERBEDDED WITH CARBONACEOUS SHALE AND SILTSTONE; SOME CARBONACEOUS MATERIAL; SLIGHTLY PYRITIC IN PLACES.

SANDSTONE = TRANSPARENT TO OPAQUE; UPPER MEDIUM TO FINE GRAINED; SUB ROUND TO SUB ANGULAR; MODERATE SPHERICITY; WELL SORTED; VERY FRIABLE DOMINANTLY UNCONSOLIDATED; CLUSTER ARE UNCOMMON; WHEN CONSOLIDATED GRAIN SUPPORTED IN A CALC CEMENT;RARE FINER GRAINED SPECIMENS HAVE A CALC/CLAY MATRIX; OVERALL VERY CLEAN WITH NO ACCESSORY MINERALS IN CLUSTERS; STRONG REACTION TO DILUTE HCL; MARKED TO MODERATE INCREASE IN DITCH GAS.

SHALE = GRY, LT GRY, GRYISH BRWN, LT BRWN; FIRM TO DENSE TENACITY WITH SUB TABULAR TO SUB WEDGELIKE OCC BLADED CUTTINGS HABIT; IRREGULAR TO OCC HACKLY FRACTURE; DULL EARTHY TO WAXY LUSTER WITH SMOOTH TO SL GRITTY TEXTURE IN PLACES; COMMONLY GRADES TO AND INTERBEDDED WITH CARBONACEOUS SHALE AND SILTSTONE.

SANDSTONE = TRANSPARENT TO OPAQUE; UPPER MEDIUM TO FINE GRAINED; SUB ROUND TO SUB ANGULAR; MODERATE SPHERICITY; WELL SORTED; VERY FRIABLE DOMINANTLY UNCONSOLIDATED; CLUSTER ARE UNCOMMON; WHEN CONSOLIDATED GRAIN SUPPORTED IN A CALC CEMENT; OVERALL VERY CLEAN; MARKED TO MODERATE INCREASE IN DITCH GAS.

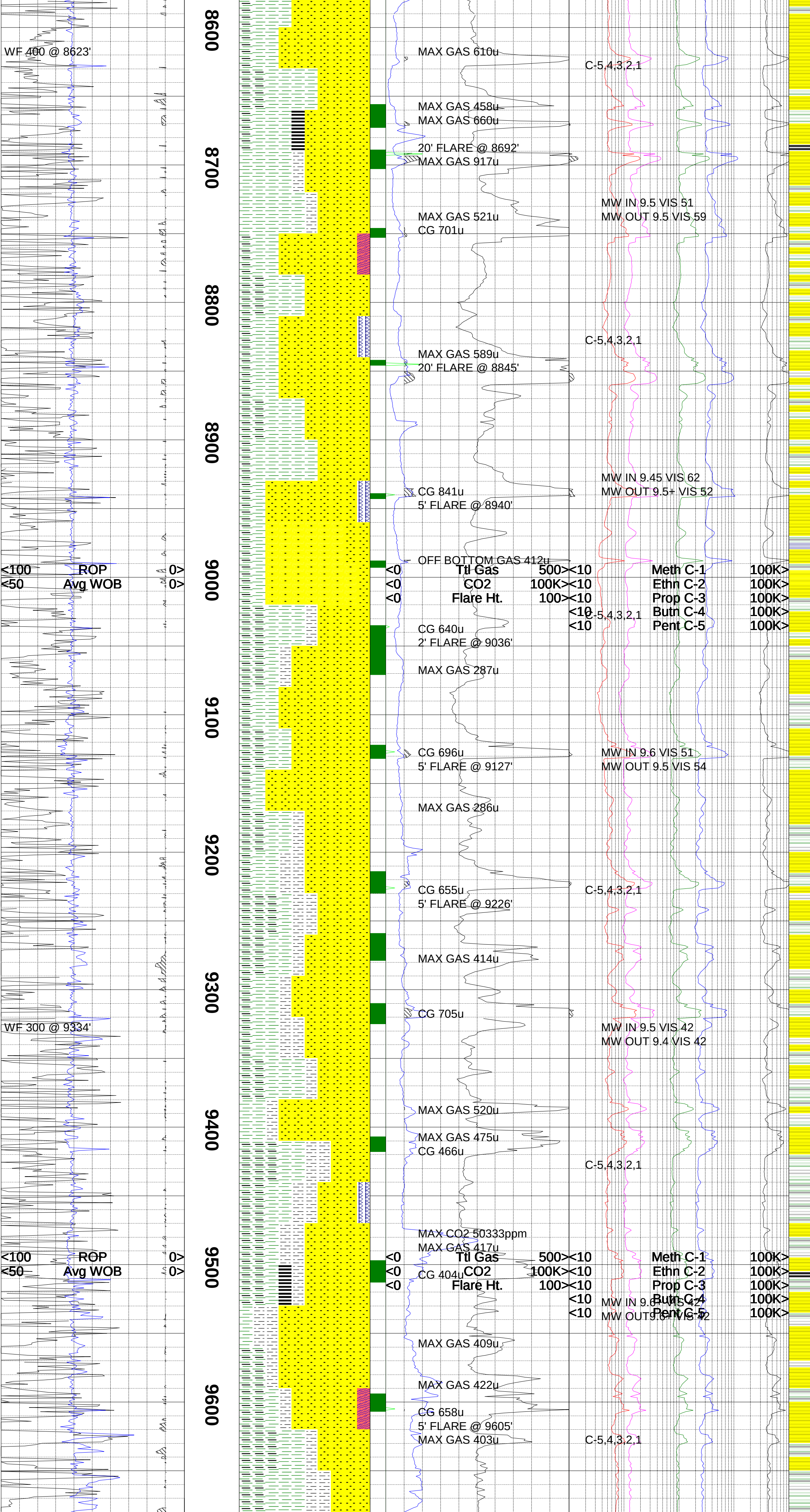
CARBONACEOUS SHALE = MODERATE DARK BROWN DARK GRAYISH BROWN, TRACE BLACKISH BROWN TRACE PYRITE IMBEDDED; BRITTLE TO CRUMBLY TENACITY; SUB BLOCKY, BLOCKY SL IRREGULAR FRACTURE; SUB WEDGELIKE, TABULAR CUTTINGS HABIT; DULL EARTHY SUB WAXY LUSTER; GRITTY WITH SOME GRANULAR TEXTURE; TRACE BLACK COALY LAMINATE/IMBEDDED TRACE DEGASSING IN SAMPLE TRAY.

SHALE = MOD DARK GRAYISH BLACK, DARK GRAY, SOME VARIOUS HUES OF GRAY; CRUMBLY, CRUNCHY W/ SOME BRITTLE TENACITY; SUB BLOCKY, BLOCKY SLIGHT IRREGULAR FRACTURE; SUB WEDGELIKE, TABULAR CUTTING HABIT; SUB WAXY/WAXY OCC EARTHY LUSTER; SMOOTH TO GRITTY TEXTURE.

SANDSTONE = CLEAR TO TRANSLUCENT, ABUNDANT LOOSE GRAINS, SOME SMALL CLUSTERS, BLUISH OFF WHITE, SOME SALT AND PEPPER APPEARANCE; VERY FINE TO FINE GRAIN; FAIR TO WELL SORTED; SUB ANGULAR GRADING TO SUBROUND; LOW TO MODERATE SPHERICITY; TRACE FROSTED GRAINS; VERY FRIABLE, LOOSE GRAINS POSSIBLE DUE TO PDC BIT; SILICA MATRIX CEMENT, WEAK GRAIN SUPPORT, TRACE CALCAREOUS CEMENT. WEAK DILUTED HCL REACTION; GOOD VISUAL INTERGRANULAR POROSITY; TRACE COARSE CALCITE CRYSTALS; OCC BLACK SPECKLED CARBONACEOUS SHALE IMBEDDED.

SANDSTONE = ABUNDANT LOOSE INDIVIDUAL GRAINS, CLEAR TO TRANSLUCENT, LIGHT GRAY BLUISH GRAY, SOME SALT AND PEPPER APPEARANCE; VERY FINE TO FINE GRAIN; WEL SORTED; DOM SUB ANGULAR GRADING TO SUB ROUND, MOD SPHERICITY; SMALL CLUSTERS POSSIBLY DUE TO PDC BIT; EASILY FRIABLE, WEAK GRAIN SUPPORT, SILICA MATRIX CEMENT TRACE CLAYEY/CALC CEMENT, WEAK HCL REACTION, GOOD VISUAL INTERGRANULAR POROSITY; TRACE BLACK/DARK GRAY LITHIC-CARBONACEOUS SHALE SPECKS IMBEDDED; SLIGHT INCREASE IN BACKGROUND GAS.

SANDSTONE = OFF WHITE, GRAYISH WHITE,



TRACE INDIVIDUAL GRAINS; UPPER VERY FINE TO FINE GRAIN; POOR TO FAIR SORTED; SUB ANGULAR IN PART, TRACE SUB ROUND; MOD SPHERICITY; FRIABLE TO HARD; CLAYEY / CALCAREOUS CEMENT, SOME SILICA MATRIX CEMENT; FAIR GRAIN SUPPORT; FAIR VISUAL INTERGRANULAR POROSITY; SALT AND PEPPER APPEARANCE, DARK GRAYISH TO BLACK LITHIC CARBONACEOUS SHALE/COALY SPECKLED IMBEDDED/LAMINATE.

SHALE = MOD DARK GRAY, LIGHT GRAY, LIGHT WHITE GRAY; DENSE, CRUMBLY CRUNCHY TENACITY; SUB BLOCKY, PLANAR SPLINTERY FRACTURE; WEDGELIKE, TABULAR CUTTINGS HABIT; DULL, WAXY, SUB WAXY LUSTER; SMOOTH TO GRITTY TEXTURE; TRACE BLACK CARBONACEOUS SHALE LAMINATE; TRACE WHITE KAOLIN IN SAMPLE TRAY.

SANDSTONE = SOME LOOSE GRAINS, CLEAR TO TRANSLUCENT, SUB ROUNDED, WEAK SUPPORT, SMALL CLUSTERS, LIGHT GRAYISH BLUE. OFF WHITE W/ SALT AND PEPPER APPEARANCE; SUB ANGULAR IN PART; MOD SPHERICITY, FRIABLE TO HARD; CLAYEY/CALC CEMENT, SOME SILICA MATRIX CEMENT; FAIR TO GOOD VISUAL INTERGRANULAR POROSITY; TRACE BLACK SPECKLED CARBONACEOUS SHALE COALY IMBEDDED.

SHALE = GRY, LT GRY, DARK GRY; DENSE TO CRUNCHY TENACITY; SUB MASSIVE TO SUB TABULAR CUTTINGS HABIT, OCCASIONALLY WEDGELIKE IN PLACES; IRREGULAR TO HACKLY FRACTURE; DULL EARTHY TO WAXY LUSTER WITH SMOOTH TO SL GRITTY TEXTURE IN PLACES.

SANDSTONE = TRANSPARENT TO OPAQUE; FINE TO UPPER FINE GRAINED; SUB ROUND TO SUB ANGULAR; MODERATE SPHERICITY; WELL SORTED; VERY FRIABLE DOMINANTLY UNCONSOLIDATED; CLUSTER ARE UNCOMMON; WHEN CONSOLIDATED GRAIN SUPPORTED IN A CALC CEMENT; PREDOMINANTLY CLEAN WITH LITTLE TO NO ACCESSORY MINERALS IN UNCOMMON CLUSTERS; STRONG REACTION TO DILUTE HCL; MODERATE INCREASE IN DITCH GAS.

CARBONACEOUS SHALE = DARK BRWN WITH HUES OF BLACK; CRUNCHY TO DENSE TENACITY SUB BLCKY TO SUB PLATY CUTTING HABIT WITH SUB PLANAR TO IRREGULAR OCC HACKLY FRACTURE; EARTHY TO SMOOTH TEXTURE; DULL TO OCC SUB WAXY / SUB VITREOUS LUSTER; SLIGHT INCREASE IN DITCH GAS; NO VISIBLE DEGASSING IN SAMPLE TRAY. COMMONLY INTERBEDDED WITH AND GRADING TO SILT AND SHALE.

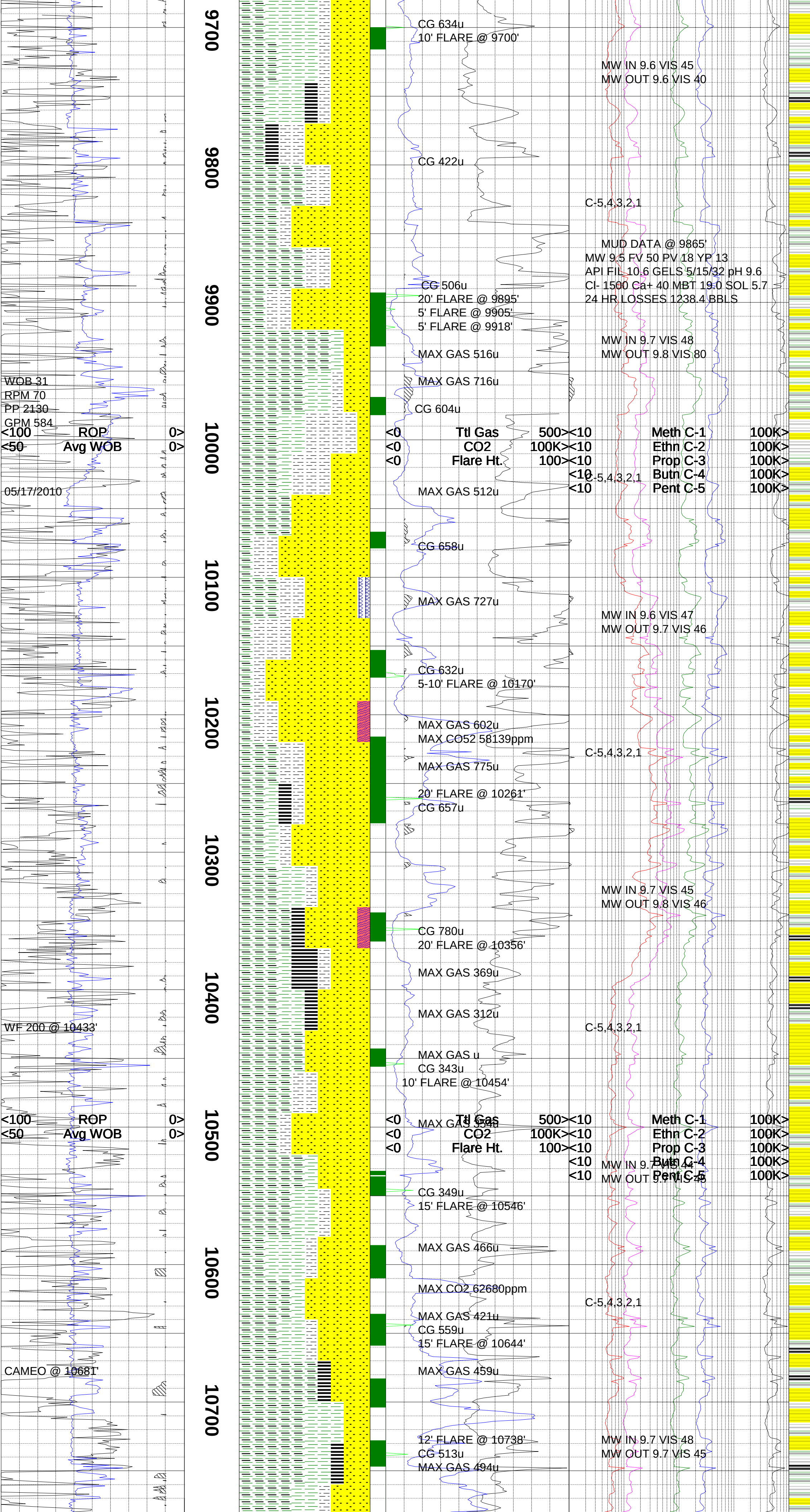
SILTSTONE= GRY, DARK GRY, GRYISH BRWN DENSE FIRM TENACITY; SUB MASSIVE TO SUB TABULAR TO BLADED CUTTINGS HABIT, OCC WEDGELIKE IN PLACES; IRREGULAR TO HACKLY FRACTURE; DULL EARTHY TO SUB SPARKLY LUSTER WITH EARTHY TO GRITTY TEXTURE.

SANDSTONE = ABUNDANT LOOSE GRAINS CLEAR TO TRANSLUCENT, LIGHT GRAY, HUES OF BRWNISH GRY, OCC SALT AND PEPPER; FINE TO VRY FINE GRAINED AND WELL SORTED SUB ANGULAR TO SUB ROUND WITH LOW TO MODERATE SPHERICITY; MODERATELY TO EASILY FRIABLE; SILICEOUS, CLAYEY AND CALCAREOUS CEMENT; OCC IMBEDDED CARBONACEOUS MATERIAL; SL TO MODERATE INCREASE IN DITCH GAS.

CARBONACEOUS SHALE = DARK BRWN WITH HUES OF BLACK; CRUNCHY TO DENSE TENACITY SUB BLCKY TO SUB PLATY CUTTING HABIT WITH SUB PLANAR TO IRREGULAR OCC HACKLY FRACTURE; EARTHY TO SMOOTH TEXTURE; DULL TO OCC SUB WAXY / SUB VITREOUS/ GREASY LUSTER; NO VISIBLE DEGASSING IN SAMPLE TRAY.

COAL = BLACK; VERY DARK BRWN TO BLACK WHERE GRADING FROM CARBONACEOUS SHALE TO COAL; SUB WEDGELIKE TO SUB MASSIVE CUTTINGS HABIT; OCC PLATY IN PLACES; IRREGULAR FRACTURE; PLANAR WHERE PLATY; GREASY TO SUB VITREOUS/WAXY LUSTER WITH SMOOTH TO SL EARTHY TEXTURE; MODERATE TO MARKED INCREASE IN DITCH GAS; OCC VISIBLE DEGASSING IN SAMPLE TRAY.

SANDSTONE = LT GRY, OFF WHT WITH HUES OF LT BRWN; FINE TO VERY FINE GRAINED; INDIVIDUAL GRAINS TRASNL TO OPAQUE; SUB ANGULAR TO SUB ROUND WITH LOW TO OCC MODERATE SPHERICITY IN PLACES; MODERATELY TO EASILY FRIABLE; DOMINANTLY SMALL CLUSTERS; GRAIN SUPPORTED IN A CALC/CLAY AND SILICEOUS MATRIX; STRONG REACTION TO DILUTE HCL; MODERATE INCREASE IN DITCH GAS.



COAL = BLACK; TOUGH TO DENSE TENACITY; BLOCKY TO SLIGHTLY SPLINTERY FRACTURE; PLATY TO ELONGATED CUTTINGS HABIT; RESINOUS TO GREASY LUSTER; SMOOTH TEXTURE; THIN STRUCTURE; VERY THINLY BEDDED.

CARBONACEOUS SHALE = DARK GRAY TO GRAYISH BLACK; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURE; PLATY TO FLAKY CUTTINGS HABIT; WAXY TO DULL LUSTER; SMOOTH TO SLIGHTLY SILTY TEXTURE THIN STRUCTURE; ALTERNATING LAYERS WITH SANDSTONE AND SILTSTONE AND OCC COAL.

SANDSTONE = VARI-COLORED TO CLEAR AND TRANSLUCENT GRAINS; MAINLY LOOSE GRAINS WITH FEW POROUS CLUSTERS THROUGHOUT; WHEN IN CLUSTERS VERY FRIABLE AND CRUMBLY; FINE TO UPPER VERY FINE GRAINED SUB ROUND TO ROUNDED; MODERATE TO LOW SPHERICITY; MODERATE INCREASE IN DITCH GAS; LOW REACTION TO DILUTE HCL; SILICEOUS CEMENTATION TO GRAIN SUPPORTED OR LOOSE GRAINS; MODERATE GRIND ACTION FROM BIT; THINLY INTERBEDDED WITH CARBONACEOUS SHALE AND OCCASSIONAL BEDS OF SHALE OR SILTSTONE.

CARBONACEOUS SHALE = DARK GRAY TO GRAYISH BLACK AND SOMETIMES MOTTLED WITH A LIGHT GRAY; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; PLATY TO MASSIVE CUTTTINGS HABIT; WAXY TO DULL LUSTER; SMOOTH TO SLIGHTLY SILTY TEXTURE; APPEARS TO GRADE INTO SHALE; IT ALTERNATES LAYERS WITH SANDSTONE AND SHALE.

SHALE= DARK GRAY TO DARK BROWNISH GRAY; TOUGH TO CRUNCHY TEXTURE; IRREGULAR TO PLANAR FRACUTRE; PLATY CUTTINGS HABIT; DULL TO SLIGHTLY SPARKLING LUSTER; THIN STRUCTURE; THINLY BEDDED BETWEEN CARB. SHALE AND SANDSTONE.

SANDSTONE = WHITE TO LIGHT GRAY WITH HUES OF YELLOW AND BROWN; SOME CLEAR TO OPAQUE GRAINS; MIXTURE OF TIGHT NON-FRIABLE CLUSTERS AND LOOSE GRAINS; UPPER VERY FINE GRAINED; FAIR SORTING; SUB ANGULAR TO SUB ROUNDED; LOW SPHERICITY; HIGHLY REACTIVE TO DILUTE HCL; CALCAREOUS CEMENTATION; TRACE AMT OF FRACTURE FILL FOUND BETWEEN 10220' AND 10250' MD; SLIGHT INCREASE IN DITCH GAS DURING SANDSTONE LAYERS; THIN ALTERNATING BEDS.

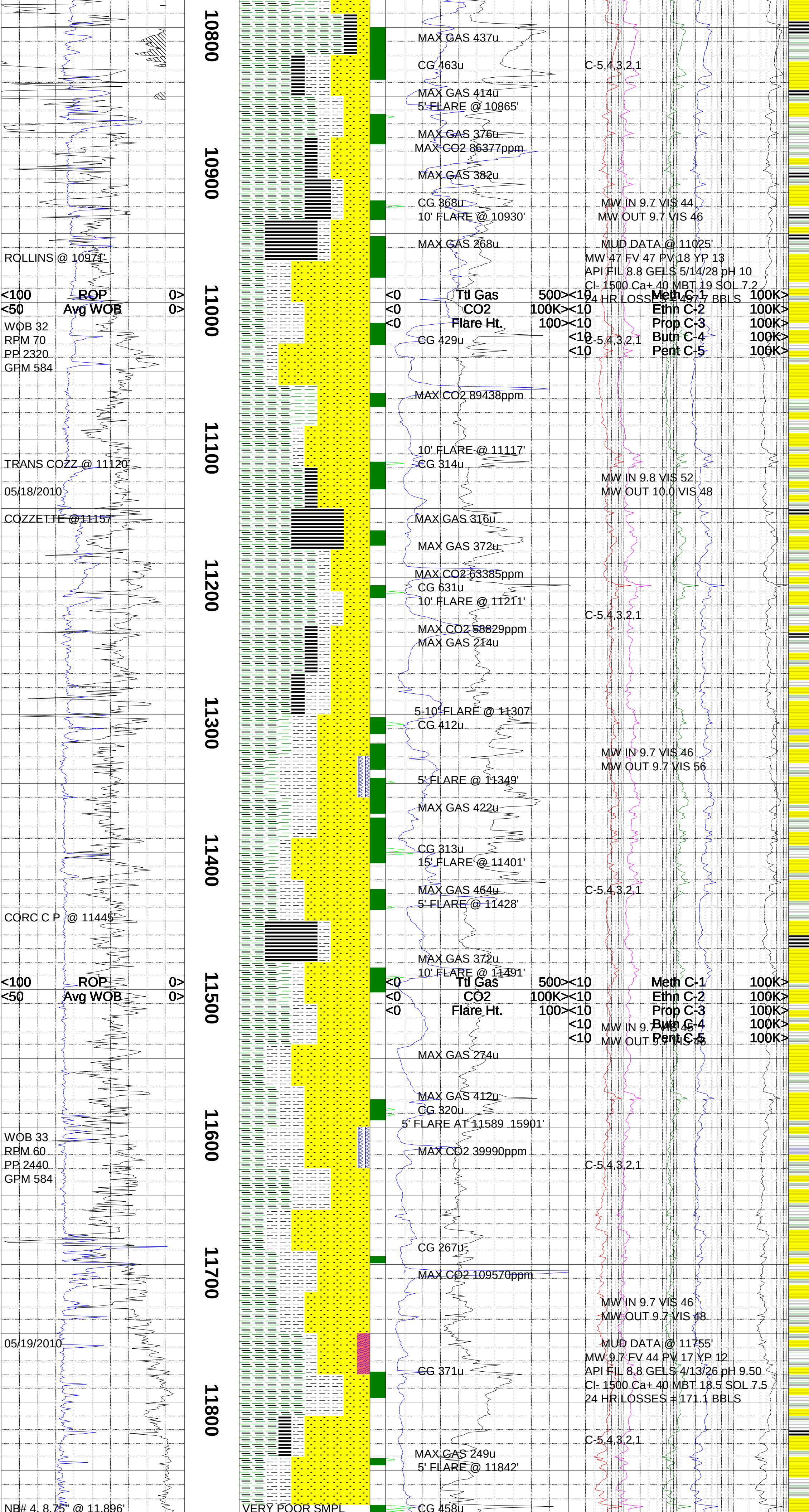
CARBONACEOUS SHALE = DARK GRAY TO GRAYISH BLACK; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; WAXY TO DULL LUSTER; SMOOTH TO SLIGHTLY SILTY TEXTURE THIN STRUCTURE; APPEARS TO GRADE TO COAL IN PLACES; SLIGHT COAL LAMINATIONS ON SOME SPECIMENS.

COAL = BLACK; VERY DARK BRWN; SUB WEDGELIKE TO SUB PLATY CUTTINGS HABIT OCC BLADED IN PLACES; IRREGULAR FRACTURE, PLANAR FRACTURE WITH PLATY CUTTINGS; GREASY TO SUB VITREOUS LUSTER WITH SMOOTH TO SLIGHTLY EARTHY TEXTURE; MODERATE TO MARKED INCREASE IN DITCH GAS.

SANDSTONE = OFF WHT WITH HUES OF BUFF; LT GRY WITH HUES OF BRWN; FINE TO UPPER FINE GRAINED; DOMINANTLY CONSOLIDATED AND GRAIN SUPPORTED IN A SL CALCAREOUS AND CLAY CEMENT; OCC SILICEOUS; INDIVIDUAL GRAINS ARE TRANSP TO OPAQUE; SUB ANGULAR TO SUB ROUND WITH LOW TO OCC MODERATE SPHERICITY; MODERATELY TO WELL SORTED; OCC STAINING IN PLACES.

CARBONACEOUS SHALE = DARK BRWN WITH HUES OF BLACK; CRUNCHY TO DENSE TENACITY SUB BLCKY TO SUB PLATY CUTTING HABIT WITH SUB PLANAR TO IRREGULAR OCC HACKLY FRACTURE; EARTHY TO SMOOTH TEXTURE; DULL TO OCC SUB WAXY / SUB VITREOUS LUSTER; MODERATE INCREASE IN DITCH GAS SOME DARKER IMBEDDED CARBONACEOUS MATERIAL AND LAMINAE; VISIBLE DEGASSING IN SAMPLE TRAY.

COAL = BLACK, OCC VERY DARK BROWN; GRADES FROM COAL TO CARBONACEOUS SHALE IN PLACES; SUB WEDGELIKE TO SUB MASSIVE CUTTINGS HABIT; OCC PLATY IN PLACES; IRREGULAR FRACTURE; PLANAR WHERE PLATY; GREASY TO SUB VITREOUS/WAXY LUSTER WITH SMOOTH TO SL EARTHY TEXTURE; MODERATE TO MARKED INCREASE IN DITCH GAS; VISIBLE DEGASSING IN SAMPLE TRAY.



SILTSTONE = MEDIUM TO DARK BROWNISH GRY WITH HUES OF BRWN AND OCC BLACK; CRUNCHY TO DENSE TOUGH TENACITY WITH IRREGULAR FRACTURE; SUB MASSIVE TO SUB WEDGELIKE CUTTINGS HABIT; EARTHY GRITTY TEXTURE; DULL EARTHY VERY OCC SPARKLY LUSTER; NO VISIBLE STRUCTURES; GRADES TO SILTY SANDSTONE AND CARBONACEOUS SHALE.

COAL = BLACK, VERY HARD TO STIFF TENACITY; BLOCKY TO HACKLY TO SPLINTERY FRACTURE; RESINOUS TO GREASY LUSTER; SMOOTH TO SLIGHTLY ABRASIVE TEXTURE; THIN STRUCTURE. SOME VISIBLE DEGASSING IN SAMPLE TRAY.

SANDSTONE = WHITE TO LIGHT GRAY WITH CLEAR AND TRANSLUCENT GRAINS; FINE TO VERY FINE GRAINED; FAIR TO WELL SORTED; SUB ANGULAR TO SUB ROUNDED GRAINS; MODERATE TO LOW SPHERICITY; HIGHLY REACTIVE TO DILUTE HCL; CALC CEMENTATION AND GRAIN SUPPORTED; ABUNDANT LOOSE GRAINS WITHIN SAMPLE; SLIGHT ELEVATION IN DITCH GAS AND A REDUCTION IN ROP.

CARBONACEOUS SHALE = DARK GRAY TO GRAYISH BLACK; TOUGH TO DENSE TENACITY; IRREGULAR TO PLANAR FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; TRACE COAL LAMINATIONS ON SOME CARBONACEUS SHALE IN SAMPLE TRAY WHICH INDICATES GRADATION TO COAL.

COAL = BLACK, HARD AND CRUNCHY TENACITY; IRREGULAR TO SPLINTERY FRACTURE; HACKLY CUTTINGS HABIT; THIN STRUCTURE; VISIBLE DEGASSING IN SAMPLE TRAY.

CARBONACEOUS SHALE = DARK BROWN DARK GRAYISH BROWN TO GRAYISH BLACK; TOUGH TO DENSE TO SLIGHTLY BRITTLE TENACITY; IRREGULAR TO OCC PLANAR FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; WAXY TO DULL LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; VISIBLY DEGASSING IN SAMPLE TRAY.

SILTSTONE = MEDIUM TO DARK BROWNISH GRY WITH HUES OF BRWN AND OCC BLACK; CRUNCHY TO DENSE TOUGH TENACITY WITH IRREGULAR FRACTURE; SUB MASSIVE TO SUB WEDGELIKE CUTTINGS HABIT; EARTHY GRITTY TEXTURE; DULL EARTHY VERY OCC SPARKLY LUSTER; NO VISIBLE STRUCTURES; GRADES TO SILTY SANDSTONE AND CARBONACEOUS SHALE.

CARBONACEOUS SHALE = DARK BRWN TO GRAYISH BLACK; CRUNCHY TO DENSE TENACITY MASSIVE TO PLATY CUTTINGS HABIT WITH IRREGULAR TO PLANAR FRACTURE; DULL TO GREASY LUSTER WITH SMOOTH TO SL EARTHY TEXTURE; COMMON DARKER COAL LAMINATIONS IN SOME SPECIMENS; GRADES TO COAL AND NEAR COAL.

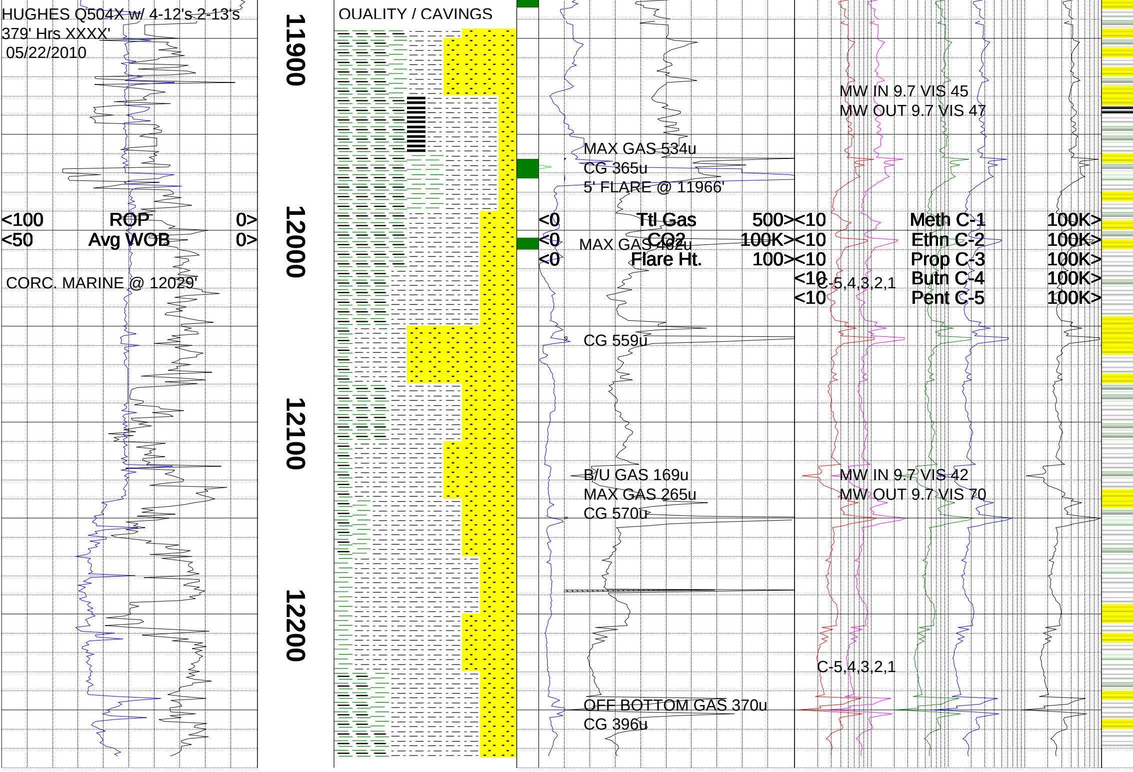
SANDSTONE = OFF WHT WITH HUES OF BUFF; LT GRY WITH HUES OF BRWN; FINE TO UPPER FINE GRAINED; DOMINANTLY CONSOLIDATED AND GRAIN SUPPORTED IN A SL CALCAREOUS AND CLAY CEMENT; OCC SILICEOUS; INDIVIDUAL GRAINS ARE TRANSP TO OPAQUE; SUB ANGULAR TO SUB ROUND WITH LOW TO OCC MODERATE SPHERICITY; MODERATELY TO WELL SORTED. MODERATE TO STRONG REACTION TO DILUTE HCL.

CARBONACEOUS SHALE = DARK GRY TO DARK GRYISH BROWN SME GRYISH BLACK; TOUGH TO DENSE TO CRUNCHY/ BRITTLE TENACITY; IRREGULAR TO OCC PLANAR FRACTURE; SUB TABULAR TO PLATY CUTTINGS HABIT; WAXY TO DULL EARTHY LUSTER WITH SMOOTH TO SLIGHTLY GRITTY TEXTURE; GRADES TO A CARBONACEOUS SILTSTONE IN PLACES. OCC VISIBLE DEGASSING IN SAMPLE TRAY.

SILTSTONE = DARK BROWN TO DARK GRAYISH BROWN; TOUGH TO DENSE TENACITY; IRREG TO BLOCKY TO SLIGHTLY HACKLY FRACTURE; MASSIVE TO TABULAR CUTTINGS HABIT; DULL TO SLIGHTLY SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; THIN STRUCTURE.

CARBONACEOUS SHALE = DARK GRAY TO DARK BROWN WITH HUES OF BLACK; TOUGH TO BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; WAXY TO DULL LUSTER; SILTY TEXTURE.

NOTE= TRIP OUT OF HOLE FOR BIT AT 11896' MEASURED DEPTH 05/19/2010 @ 11:24 HRS. RESUMED DRILLING AHEAD 05/21/10 AT 23:40 HRS.



NOTE: FIRST SAMPLE AT 11900 WAS OF POOR QUALITY: DOMINANTLY CAVINGS.

CARBONACEOUS SHALE = DARK GRAY TO GRAYISH BLACK WITH COAL LAMINATIONS THROUGHOUT; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; WAXY TO SLIGHTLY VITREOUS TO DULL LUSTER; THIN STRUCTURE; SOME VISIBLE DEGASSING.

SILTSTONE = DARK BROWN TO DARK GRAYISH BROWN; TOUGH TO DENSE TENACITY; IRREG TO BLOCKY TO SLIGHTLY HACKLY FRACTURE; MASSIVE TO TABULAR CUTTINGS HABIT; DULL LUSTER; SILTY TO SLIGHTLY GRITTY TEXTURE.

CARBONACEOUS SHALE = DARK GRY TO DARK GRYISH BROWN SME BRWNISH BLACK; DENSE TO CRUNCHY TENACITY WITH IRREGULAR TO OCC PLANAR FRACTURE; SUB TABULAR TO SUB PLATY CUTTINGS HABIT; DULL EARTHY TO WAXY LUSTER WITH SMOOTH TO SLIGHTLY GRITTY TEXTURE; GRADES TO A CARBONACEOUS SILTSTONE AND SHALE IN PLACES.

NOTE = TOTAL DEPTH 12275' MD / 12251 TVD REACHED 05/22/2010 AT 14:01HRS.