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

MUDLOG MD

LOG INTERVAL

DEPTHS:	4681'	**TO**	13785'
DATES:	02/17/2011	**TO**	04/02/2011
SCALE:	1" = 100'		

MUD TYPES

SPUD MUD	**TO**	4681'
LSND	**TO**	13785'
	TO	
	TO	

CASING DATA

10.75"	**AT**	4652'
7.0"	**AT**	9878'
4.5"	**AT**	
	AT	

HOLE SIZE

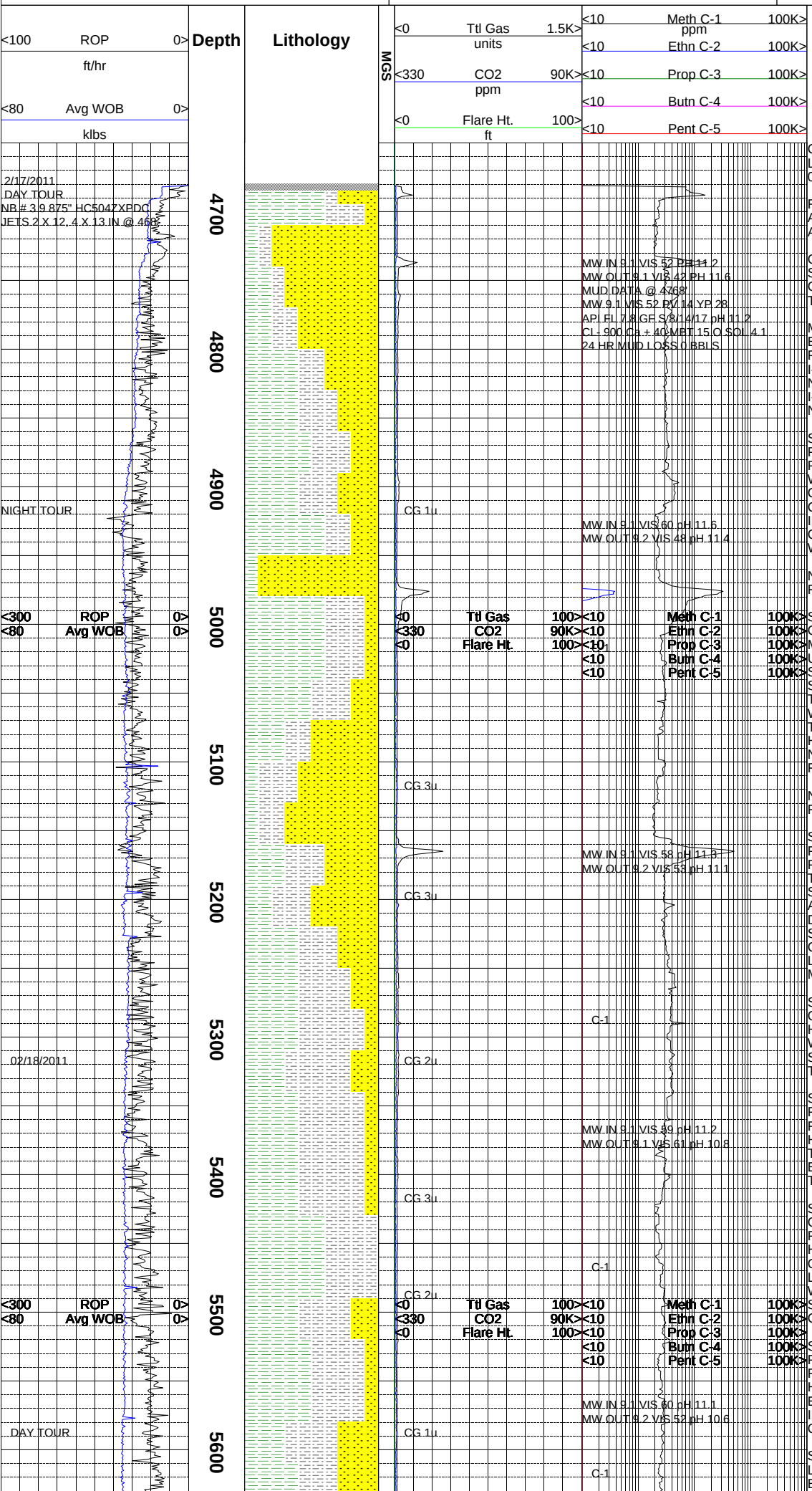
14.75"	**TO**	4681'
9.875"	**TO**	9894'
6.125"	**TO**	13785'
	TO	

COMPANY	EXXONMOBIL
WELL	PCU 296-5A07
FIELD	PICEANCE CREEK
REGION	ROCKIES
COORDINATES	LAT: 39.912003
	LONG: -108.198668
ELEVATION	G.L.: 7294'
	R.K.B: 30.2'
COUNTY, STATE	RIO BLANCE, CO
API INDEX	051031124300
SPUD DATE	11/24/2010
CONTRACTOR	HELMERICH _PAYNE
CO. REP.	M. HUDON
RIG/TYPE	HP 321 / FLEX 4S
LOGGING UNIT	ML031
GEOLOGISTS	C. RECORD,
	B. SMELSER
ADD. PERSONS	M. GROSS
CO. GEOLOGIST	C. ALBA

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



Remarks

Survey Data, Mud Reports, Other Info.

CANRIG DRILLING TECHNOLOGY DML COMMENCED LOGGING THE PCU 296-5A07 WELL ON 02/17/2011 @ 4681' MD.

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 CHROMOTOGRAPHY EQUIPMENT CALIBRATED TO A TEST GAS COMPOSED OF THE FOLLOWING:

METHANE = 10,130 PPM
ETHANE = 1010 PPM
PROPANE = 1,000 PPM
I-BUTANE = 1,000 PPM
N-BUTANE = 1,000 PPM
I-PENTANE = 1,000 PPM
N-PENTANE = 1010 PPM

SHALE = MODERATE YELLOWISH BROWN TO PALE YELLOWISH BROWN TO LIGHT GRAY; PLANAR TO SPLINTERY TO HACKLY FRACTURE; WEDGELIKE LIKE TO TABULAR TO FLAKY CUTTINGS HABIT; EARTHY TO DULL LUSTER; CLAYEY TO SMOOTH TEXTURE; THINLY INTERBEDDED WITH SILTSTONE; SLIGHTLY CALCAREOUS; MINOR CLAYSTONE IN SAMPLE WITH MOST WASHED OUT DURING CLEANING.

NOTE: LOSE PARTIAL RETURNS AT 4959'. REGAIN FULL RETURNS AT 4967'

SANDSTONE = OFF WHILE TO VERY LIGHT GRAY OVERALL; PREDOMIINANTLY LOOSE GRAIN WITH MINOR PRESERVED SAMPLES; VERY FINE TO UPPER FINE GRAIN WITH TRACE MEDIUM GRAIN SAND; WELL SORTED; MODERATE TO HIGH SPHERICITY; ROUND TO SUBANGULAR; CLEAR TO OPAQUE; MINOR PRESERVED SPECIMEN WITH SILICA AND CALCITE CEMENT; MODERATE TO HIGHLY CALCAREOUS; FRIABLE TO MOD HARD; NO VISIBLE HYDROCARBON INDICATORS; NO ACCESSORY MINERALS; TRACE LIMESTONE FRAGMENTS IN SAMPLE.

NOTE: PARTIAL RETURNS @5152' WITH FULL RETURNS @ 5175'.

SANDSTONE = OFF WHITE TO TRANSPARENT; PREDOMINANTLY LOOSE GRAIN WITH MINOR PRESERVED SPECIMENS; LOWER VERY FINE TO UPPER FINE GRAIN; MODERATE TO HIGH SPHERICITY; WELL SORTED; ROUND TO SUB ANGULAR; CLEAR TO OPAQUE; MINOR ABRASION DUE TO PDC BIT ACTION; MINOR PRESERVED SPECIMENS WITH SILICA AND MINOR CALCITE CEMENT; MOD CALCAREOUS; GRADES TO LIGHT GRAY SILTSTONE; FIRM FRIABLE TO MODERATELY HARD.

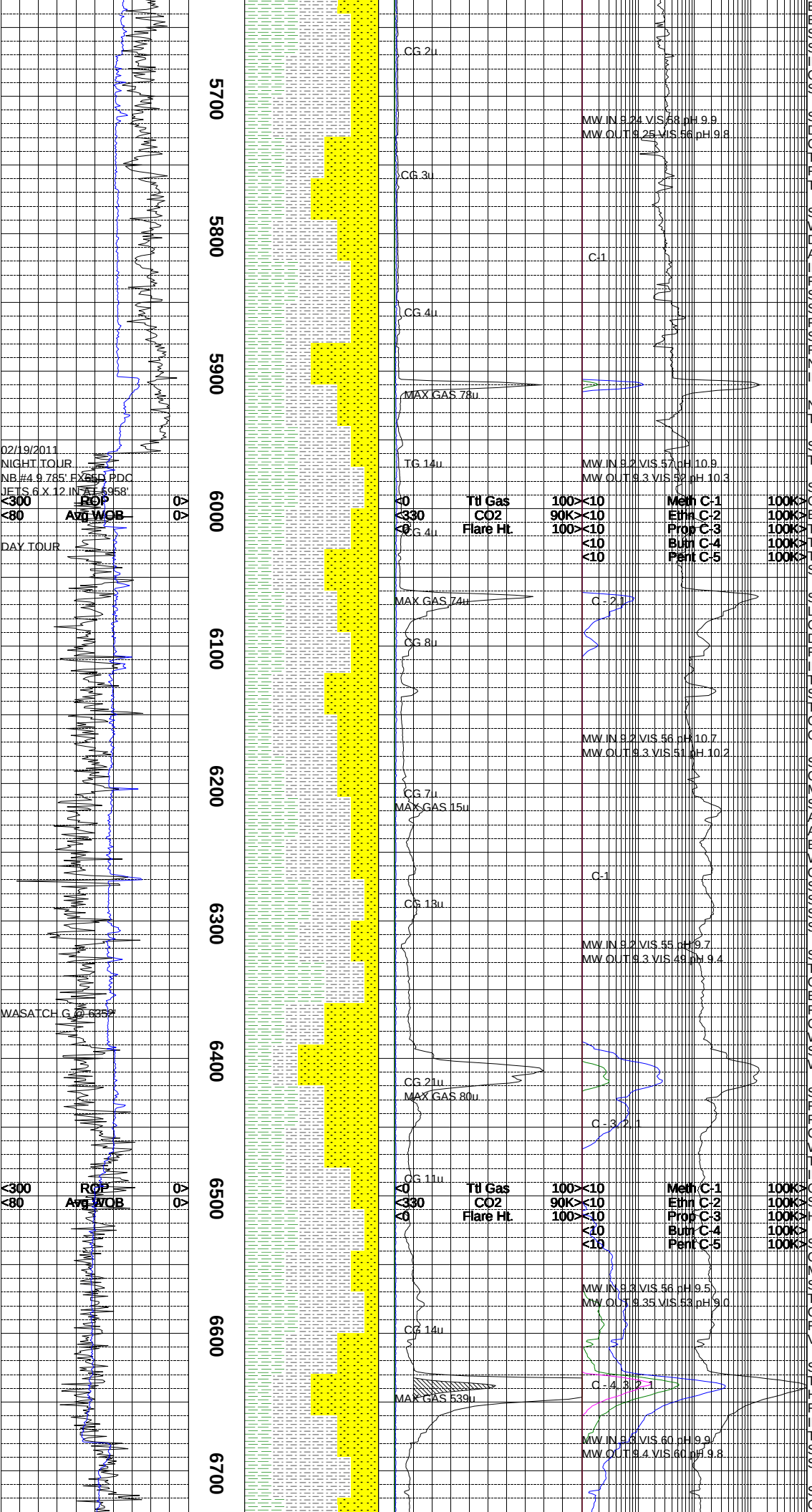
SILTSTONE = PALE YELLOWISH BROWN TO MED GRAY; HARD TO FRIABLE; IRREGULAR TO HACKLY FRACTURE; PLATY TO TABULAR TO WEDGELIKE; GRITTY TO SUCROSIC TEXTURE; SPARKLING TO SLIGHT EARTHY LUSTER; GRADE TO LIGHT GRAY SANDSTONE.

SHALE = MODERATE YELLOWISH BROWN TO PALE YELLOWISH BROWN TO GRAYISH RED; FLAKY TO ELONGATED TO WEDGELIKE CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; GRADES TO PALE YELLOWISH ORANGE SILTSTONE; EARTHY TO DULL LUSTER; FIRM TO CRUMBLY TENACITY.

SILTSTONE = PALE YELLOWISH BROWN TO GRAYISH RED TO MOD YELLOWISH BROWN; PLATY TO FLAKY TO WEDGELIKE CUTTINGS HABIT; SILTY TO GRITTY TO SUCROSIC TEXT; GRADATION AND INTERBEDDED WITH VERY LIGHT GRAY SANDSTONE; THINLY INTERBEDDED WITH MODERATE YELLOWISH BROWN SHALE; SPARKLING LUSTER; TRACE LOOSE VERY FINE GRAIN SAND IN SAMPLE FRAGMENTS.

SHALE = MODERATE YELLOWISH BROWN TO PALE YELLOWISH BROWN W/TRACE GRAYISH RED; PLATY TO ELONGATED TO FLAKY CUTTING HABIT; CLAYEY TO SMOOTH TO MATTE TEXT; EARTHY TO DULL LUSTER; GRADATION AND INTERBEDDED WITH SILTSTONE; CRUMBLY TO CRUNCHY TENACITY.

SILTSTONE = MEDIUM GRAY TO OLIVE GRAY TO LIGHT OLIVE BROWN; TENACITY IS DENSE TO BRITTLE; FRACTURES FROM IRREGULAR TO



BLOCKY; CUTTINGS ARE MASSIVE TO TABULAR; EARTHY TO WAXY TO DULL TO OCCASIONALLY SLIGHTLY SPARKLING LUSTER; GRITTY TO SILTY TEXTURE; THICK STRUCTURE; INTERBEDDED WITH SHALE AND SANDSTONE, OCCASIONAL GRADING TOWARDS FINE GRAINED SANDSTONE.

SHALE = MEDIUM GRAY TO PALE OLIVE WITH DUSKY YELLOW HUES; BRITTLE TO SLIGHTLY CRUMBLY TENACITY; FRACTURES FROM PLANAR TO OCCASIONALLY SPLINTERY; CUTTINGS ARE PLATY TO TABULAR; SMOOTH TEXTURE; THIN TO LAMINAE STRUCTURE.

SANDSTONE = TRANSLUCENT TO LIGHT GRAY TO WHITE WITH SLIGHT MODERATE RED HUES; DOMINATE QUARTZ FRAMEWORK WITH TRACE AMOUNTS OF BLACK LITHIC CLASTS INTERBEDDED; FINE TO MEDIUM GRAINED WITH FAIR TO WELL SORTING; ANGULAR TO SUBANGULAR WITH LOW TO MODERATE SPHERICITY; MODERATE HARD TO FIRMLY FRIABLE WITH ABUNDANT LOOSE GRAINS IN SAMPLE; MATRIX SUPPORT; MODERATE STRONG REACTION WITH HCL SUGGEST CALCITE CEMENT NO VISIBLE BEDDING STRUCTURE; INTERBEDDED WITH SILTSTONE AND SHALE.

NOTE = TRIPPED OUT OF HOLE AT 5958' MD TO LAY DOWN DIRECTIONAL TOOLS.

SURVEY @ 5919': INC 0.09, AZI 349.16
TVD 5819.92'

SHALE = MODERATE YELLOWISH BROWN TO GRAYISH RED TO MEDIUM GRAY; PLATY TO ELONGATED TO SCALY CUTTINGS HABIT; DULL TO EARTHY LUSTER; PLANAR TO SPLINTERY TO ANGULAR FRACTURE; MATTE TO CLAYEY TEXTURE; GRADES TO PALE YELLOWISH BROWN SILTSTONE.

SILTSTONE = MEDIUM GRAY TO OLIVE GRAY TO LIGHT OLIVE BROWN TO OCCASIONAL GRAYISH RED HUES; TENACITY IS BRITTLE TO DENSE TO SLIGHTLY CRUNCHY; FRACTURES FROM BLOCKY TO PLANAR TO SLIGHTLY IRREGULAR; CUTTINGS ARE MASSIVE TO TABULAR; WAXY TO EARTHY WITH A SLIGHT SPARKLING LUSTER; GRITTY TO SILTY TEXTURE WITH SOME SPECIMENS BEING GRANULAR AND GRADING TOWARDS FINE GRAINED SANDSTONE; THICK STRUCTURE.

SANDSTONE = LIGHT OLIVE GRAY TO MEDIUM GRAY TO PALE BROWN TO WHITE WITH MODERATE BROWN TO LIGHT OLIVE BROWN SPECKS; QUARTZ FRAMEWORK WITH APPROXIMATELY 5-10% BLACK LITHIC CLASTS AND 10% MODERATE BROWN TO LIGHT OLIVE BROWN SEDIMENTS; FINE TO MEDIUM GRAINED WITH FAIR TO SEMI WELL SORTING; OCCASIONAL SPECIMENS ARE TRANSLUCENT; SUBROUND TO SUBANGULAR WITH MODERATE SPHERICITY; FIRMLY FRIABLE; MATRIX SUPPORT; STRONG REACTION WITH HCL SUGGESTS CALCITE CEMENT.

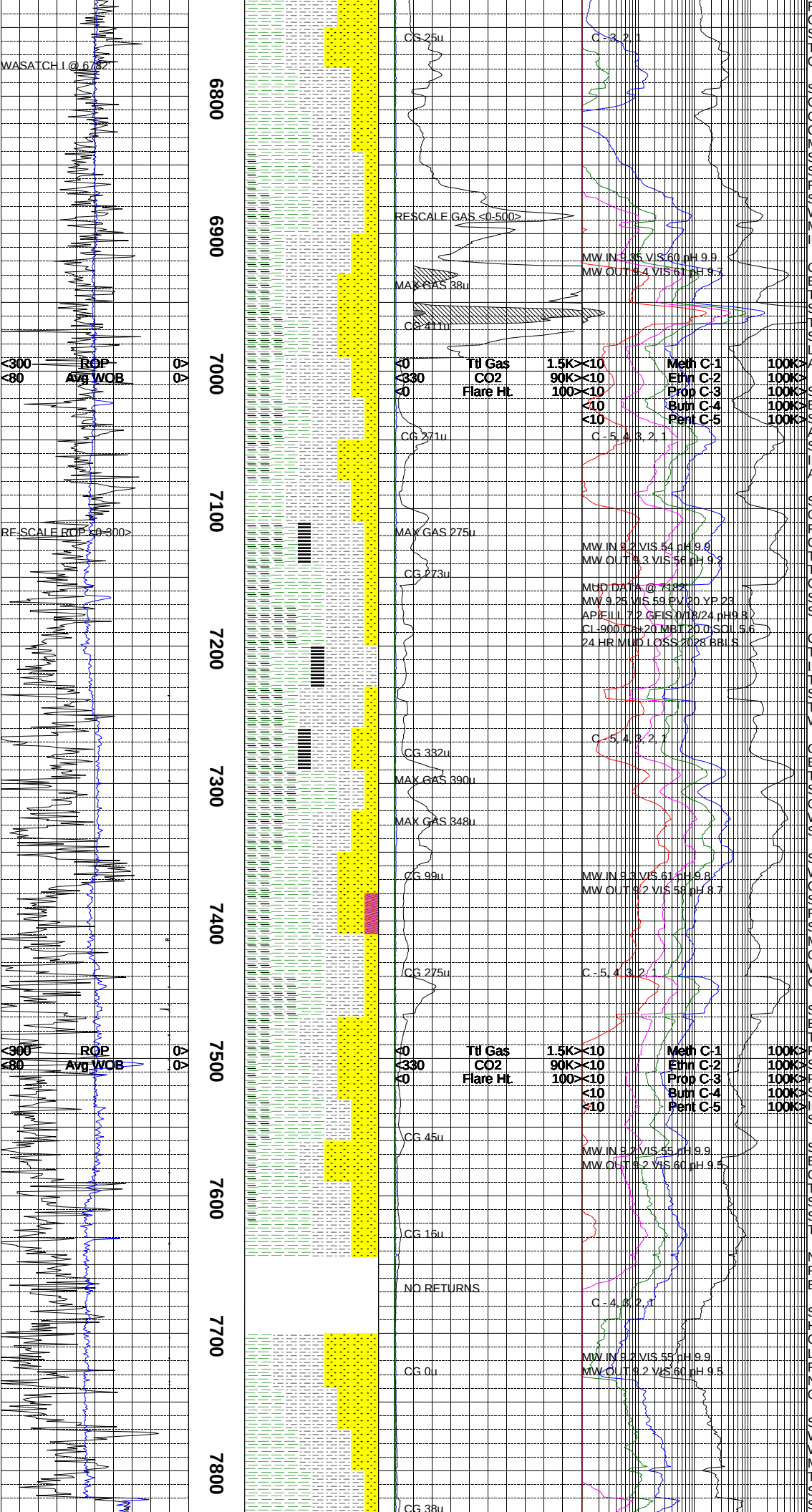
SHALE = MEDIUM LIGHT GRAY TO MEDIUM GRAY TO MEDIUM BLUISH GRAY WITH OCCASIONAL GRAYISH BLUE TO DUSKY YELLOW HUES; BRITTLE TO SLIGHTLY CRUMBLY TENACITY; FRACTURES FROM PLANAR TO SPLINTERY; CUTTINGS ARE PLATY TO TABULAR; DULL TO WAXY LUSTER; SMOOTH TEXTURE; THIN TO SLIGHTLY THICK STRUCTURE; INTERBEDDED WITH SANDSTONE AND SILTSTONE.

SILTSTONE = MODERATE BROWN TO MODERATE RED TO MEDIUM GRAY; BRITTLE TENACITY; FRACTURES FROM IRREGULAR TO BLOCKY; CUTTINGS ARE TABULAR TO SLIGHTLY WEDGELIKE; EARTHY TO DULL LUSTER; GRITTY TO SILTY TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SANDSTONE AND SHALE; OCCASIONAL GRADING TOWARDS FINE GRAINED SANDSTONE; OCCASIONAL SPECIMENS ALSO HAVE A SLIGHT PALE GREEN HUE.

SANDSTONE = WHITE TO LIGHT GRAY TO LIGHT OLIVE GRAY; DOMINATE QUARTZ FRAMEWORK; MEDIUM TO FINE GRAINED WITH FAIR SORTING SUBANGULAR TO SUBROUNDED WITH MODERATE TO LOW SPHERICITY; FIRMLY FRIABLE; CALCITY CEMENT AS INDICATED BY A STRONG REACTION WITH HCL; MATRIX SUPPORT; NO VISIBLE BEDDINGS STRUCTURE.

SHALE = MEDIUM GRAY TO MEDIUM DARK GRAY TO MEDIUM BLUISH GRAY WITH MODERATE RED HUES; BRITTLE TO SLIGHTLY CRUMBLY; FRACTURES FROM PLANAR TO SPLINTERY TO IRREGULAR; CUTTINGS ARE TABULAR TO SCALY TO SLIGHTLY PLATY; DULL TO EARTHY LUSTER SMOOTH TEXTURE; THIN TO SLIGHTLY THICK STRUCTURE.

SILTSTONE = MEDIUM LIGHT GRAY TO MEDIUM GRAY; DENSE TO BRTTLE TENACITY;



FRACTURES FROM IRREGULAR TO BLOCKY; CUTTINGS ARE MASSIVE TO TABULAR; WAXY TO SPARKLING LUSTER; GRITTY TO SILTY TEXTURE; THICK TO MASSIVE STRUCTURE; GRADING TOWARDS FINE GRAINED SANDSTONE.

SANDSTONE = MEDIUM LIGHT GRAY TO MEDIUM GRAY WITH SLIGHT PALE GREEN HUE TO OCCASIONALLY WHITE AND TRANSLUCENT; QUARTZ FRAMEWORK; FINE TO OCCASIONALLY MEDIUM GRAINED WITH WELL SORTING; SUBANGULAR TO SUBROUNDED WITH MODERATE SPHERICITY; MODERATE HARD TO FIRMLY FRIABLE; CALCITE CEMENT SUGGESTED BY A STRONG REACTION WITH HCL; GRAIN SUPPORT WITH OCCASIONAL SPECIMENS DISPLAYING MATRIX SUPPORT; NO VISIBLE BEDDING; INTERBEDDED WITH SILTSTONE AND SHALE.

CARBONACEOUS SHALE = BLACK TO GRAYISH BLACK; DENSE TO BRITTLE TO CRUNCHY TENACITY; FRACTURES FROM PLANAR TO SPLINTERY; CUTTINGS ARE PLATY TO FLAKY TO SLIGHTLY ELONGATED; RESINOUS TO SLIGHTLY EARTHY LUSTER; SMOOTH TEXTURE; LAMINAE TO THIN STRUCTURE; HIGH GAS ASSOCIATED WITH SAMPLE.

SHALE = MEDIUM DARK GRAY TO MEDIUM BLUISH GRAY; BRITTLE TENACITY; PLANAR TO SLIGHTLY SPLINTERY FRACTURING; CUTTINGS ARE PLATY TO SCALY; DULL TO WAXY LUSTER; SMOOTH TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SILTSTONE, SANDSTONE AND CARBONACEOUS SHALE.

SILTSTONE = MEDIUM DARK GRAY TO OLIVE GRAY; DENSE TO SLIGHTLY TOUGH TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR; CUTTINGS ARE MASSIVE TO TABULAR; EARTHY TO SPARKLING LUSTER; GRITTY TO SILTY TEXTURE; MASSIVE TO THICK STRUCTURE; OCCASIONAL SPECIMENS GRADING TOWARDS SHALE; SOME INTERBEDDED CARBONACEOUS SHALE.

COAL = BLACK; BRITTLE TO CRUMBLY TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR; CUTTINGS ARE NODULAR TO FLAKY TO WEDGELIKE; POLISHED TO RESINOUS TO SLIGHTLY EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE; INTERBEDDED WITH CARBONACEOUS SHALE.

CARBONACEOUS SHALE = BROWNISH GRAY TO BROWNISH BLACK TO GRAYISH BLACK; TENACITY TO SLIGHTLY DENSE TO CRUNCHY; SPLINTERY TO OCCASIONALLY CONCHOIDAL; CUTTINGS ARE TABULAR TO PLATY TO WEDGELIKE; SMOOTH TEXTURE; THICK STRUCTURE.

SANDSTONE = MEDIUM LIGHT GRAY TO WHITE WITH APPROXIMATELY 15% BLACK LITHIC CLASTS INTERBEDDED GIVING THE SAMPLE A SALT AND PEPPER LOOK; QUARTZ FRAMEWORK; FINE TO MEDIUM FINE GRAIN SIZE WITH WELL SORTING; SUBROUND TO SUBANGULAR WITH MODERATE SPHERICITY; MODERATE HARDNESS; GRAIN SUPPORT; MODERATE TO LOW REACTION WITH HCL SUGGESTS SILICEOUS CALCAREOUS CEMENT; NO VISIBLE BEDDING STRUCTURE.

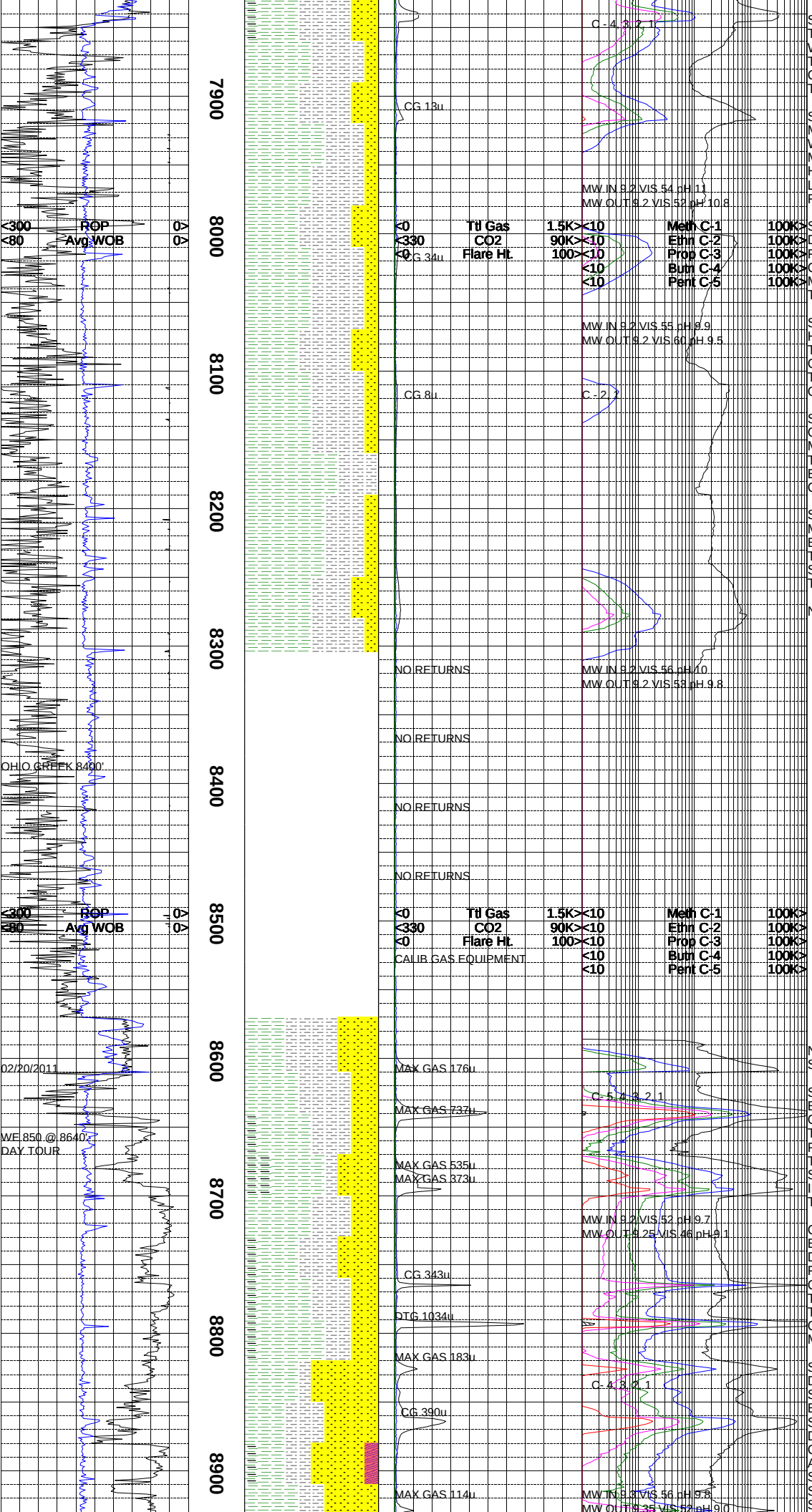
SHALE = MEDIUM LIGHT GRAY TO LIGHT BLUISH GRAY TO MEDIUM DARK GRAY; TENACITY RANGES FROM BRITTLE TO CRUNCHY; FRACTURES FROM PLANAR TO SPLINTERY TO SLIGHTLY BLOCKY; CUTTINGS ARE SCALY TO PLATY TO TABULAR; WAXY TO DULL LUSTER SMOOTH TEXTURE; THIN LAMINAE STRUCTURE INTERBEDDED WITH CARBONACEOUS SHALE, SILTSTONE AND SANDSTONE.

SILTSTONE = MEDIUM LIGHT GRAY TO BROWNISH GRAY; BRITTLE TO SLIGHTLY CRUMBLY TENACITY; FRACTURES FROM PLANAR TO BLOCKY; CUTTINGS ARE TABULAR TO SLIGHTLY WEDGELIKE; EARTHY TO WAXY TO SPARKLING LUSTER; GRITTY TO SILTY TEXTURE; THICK STRUCTURE.

NOTE: LOST RETURNS @ 7805'. REGAINED PARTIAL RETURNS @ 7731' AND FULL RETURNS BY 7917'.

SILTSTONE = MEDIIUM GRAY TO LIGHT GRAY; HARD TO CRUNCHY TENACITY; SILTY TO GRITTY TEXTURE; SPARKLING LUSTER; TRACE LOOSE VERY FINE GRAIN SAND IN SAMPLE FRAGMENTS; WEDGELIKE TO FLAKY TO SEMI NODULAR CUTTINGS HABIT; GRADES TO LIGHT GRAY SANDSTONE.

SHALE = MEDIUM GRAY TO LIGHT GRAY MOTTLE WITH GRAYISH RED; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; EARTHY TO DULL LUSTER; TRACE ACCESSORY MINERAL OF MICAS IN SAMPLE FRAGMENTS; GRADES TO LIGHT GRAY SILTSTONE.



SILTSTONE = MEDIUM GRAY TO GRAYISH RED TO LIGHT GRAY; GRADATION AND INTERBEDDED WITH SANDSTONE; IRREGULAR TO HACKLY TO PLANAR FRACTURE; WEDGELIKE TO SCALY CUTTINGS HABIT; GRITTY TO SUCROSIC TEXT; THINLY INTERBEDDED WITH SHALE.

SHALE = LIGHT GRAY TO MEDIUM GRAY TO MINOR OLIVE GRAY; ELONGATED TO PLATY TO WEDGELIKE CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; SPLINTERY TO PLANAR TO HACKLY FRACTURE; THINLY INTERBEDDED WITH LIGHT GRAY SILTSTONE; TRACE CARBONACEOUS FLECKS IN SAMPLE FRAGMENTS.

SHALE = MEDIUM GRAY TO LIGHT GRAY TO DARK GRAY; PLANAR TO SPLINTERY TO BLOCKY FRACTURE; PLATY TO TABULAR TO ELONGATED CUTTINGS HABIT; DULL TO EARTHY LUSTER; MATTE TO SLIGHTLY SILTY TEXTURE; GRADES TO LIGHT GRAY SILTSTONE.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY HARD TO CRUNCHY TENACITY; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; SILTY TO GRITTY TO SUCROSIC; SPARKLING LUSTER THINLY INTERBEDDED WITH SHALE AND LIGHT GRAY SANDSTONE.

SHALE = MEDIUM GRAY TO LIGHT GRAY TO GRAYISH RED; CRUNCHY TO CRUMBLY TEN; MATTE TO SILTY TEXTURE; WEDGELIKE TO TABULAR TO ELONGATED CUTTINGS HABIT; EARTHY LUSTER; TRACE FLECKS OF CARBONACEOUS SHALE IN SAMPLE FRAGMENTS.

SHALE = MEDIUM GRAY TO LIGHT GRAY WITH MINOR OLIVE GRAY; PLANAR TO SPLINTERY TO BLOCKY FRACTURE; MATTE TO CLAYEY TEXTURE; NO REACTION TO HCL; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; GRADE TO LIGHT GRAY SILTSTONE.

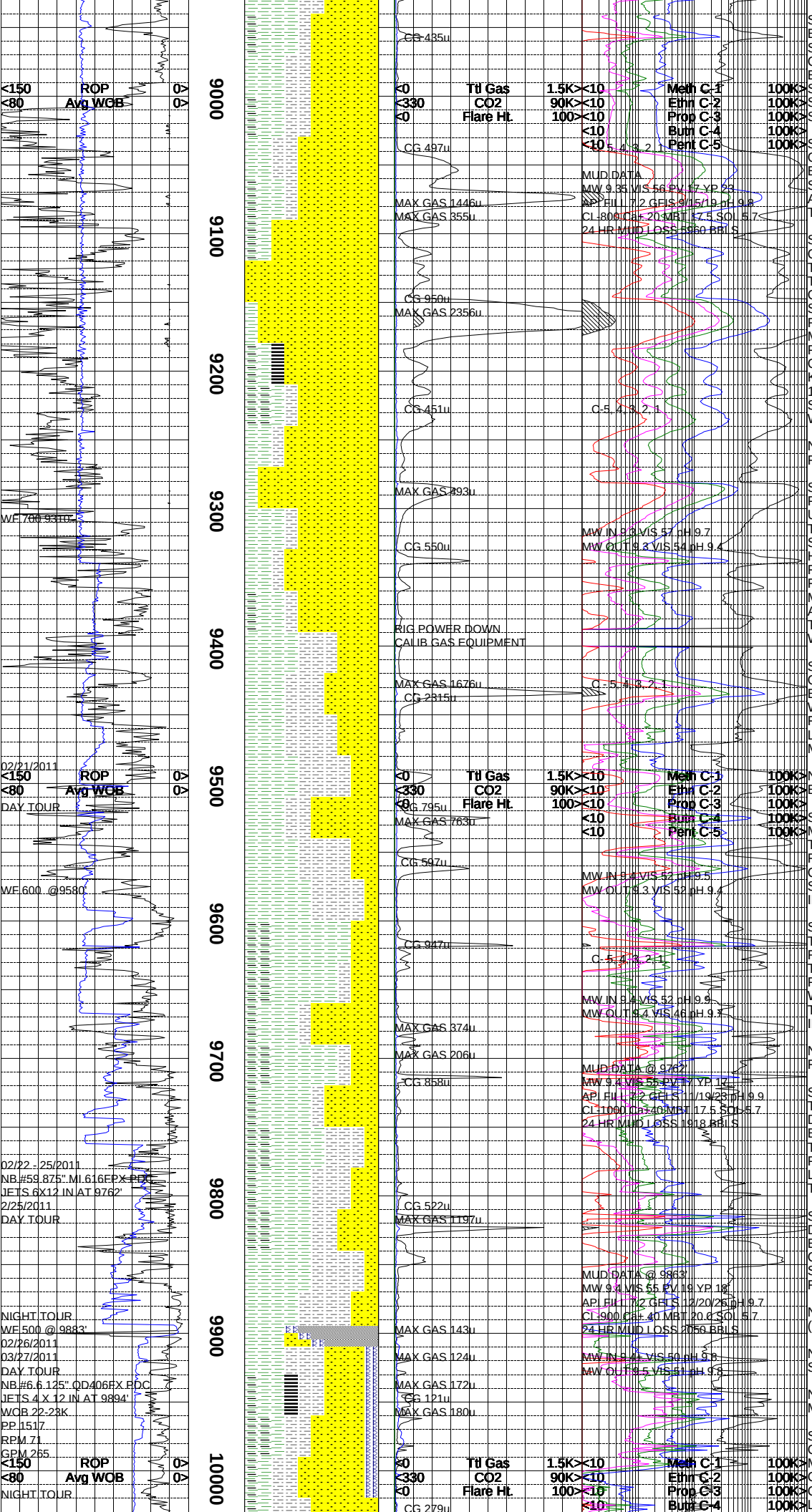
NOTE: LOST RETURNS @8527'.

NOTE: REGAIN PARTIAL RETURNS @ 8587' SAMPLE DEPTH.

SHALE = MEDIUM LIGHT GRAY TO MEDIUM BLUISH GRAY TO OCCASIONALLY GRAYISH BLUE AND MODERATE RED; BRITTLE TO CRUNCHY TENACITY; FRACTURES FROM PLANAR TO SPLINTERY; CUTTINGS ARE PLATY TO SCALY TO TABULAR; WAXY TO DULL LUSTER SMOOTH TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SILTSTONE AND SANDSTONE TRACE AMOUNTS OF CARBONACEOUS SHALE.

CARBONACEOUS SHALE = GRAYISH BLACK TO BROWNISH BLACK; BRITTLE TO SLIGHTLY DENSE TENACITY; FRACTURES FROM PLANAR TO SPLINTERY TO SEMI BLOCKY; CUTTINGS ARE WEDGELIKE TO PLATY; EARTHY TO RESINOUS LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE; TRACE AMOUNTS OF PYRITE PRESENT AS AN ACCESSORY MINERAL.

SANDSTONE = WHITE TO LIGHT GRAY; DOMINATE QUARTZ FRAMEWORK WITH SOME SPECIMENS CONTAINING APPROXIMATELY 10% BLACK LITHIC CLASTS GIVING THE SAMPLE A SALT AND PEPPER LOOK; SOME SPECIMENS DISPLAY A LIGHT GREEN HUE; FINE TO COARSE GRAIN SIZE WITH POOR SORTING; ANGULAR TO SUBANGULAR WITH LOW SPHERICITY; MODERATE HARDNESS; GRAIN SUPPORT; LOW REACTION WITH HCL SUGGESTS SILICEOUS CEMENT.



SILTSTONE = MEDIUM GRAY TO MODERATE BROWN; TENACITY IS DENSE TO BRITTLE TO SLIGHTLY CRUMBLY; IRREGULAR FRACTURING; CUTTINGS ARE TABULAR TO WEDGELIKE; EARTHY TO WAXY TO SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; OCCASIONAL SPECIMENS GRADING TOWARDS FINE GRAINED SANDSTONE; THIN STRUCTURE.

SHALE = MEDIUM GRAY TO MEDIUM BLUISH GRAY TO MODERATE RED TO GREENISH GRAY; BRITTLE TO CRUNCHY TENACITY; PLANAR TO SLIGHTLY SPLINTERY FRACTURING; CUTTINGS ARE PLATY TO SCALY; WAXY LUSTER; SMOOTH TO MATTE TEXTURE.

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY OVERALL; PREDOMINANTLY LOOSE GRAIN WITH TRACE PRESERVED SPECIMENS; VERY FINE TO UPPER FINE GRAIN WITH MINOR MEDIUM GRAIN; TRANSLUCENT TO TRANSPARENT; WELL SORTED; HIGH TO MODERATE SPHERICITY; ROUND TO SUBANGULAR; TRACE ACCESSORY MINERAL OF CHLORITE AND MICRO PYRITE; PRESERVED SPECMENS SHOW PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND TRACE KAOLIN CEMENT; HARD TO FIRM FRIABLE; 1-3% CARBONACEOUS SHALE/COAL FLECKS IN SAMPLE FRAGMENTS; HIGH GAS ASSOCIATED WITH EASILY FRIABLE SANDSTONE

NOTE: PARTAIL DROP IN FLOW @ 9205'. REGAINED FULL RETURNS @ 9225'.

SANDSTONE = OFF WHITE TO TRANSPARENT; PREDOMINANTLY LOOSE GRAIN; VERY FINE TO UPPER FINE GRAIN WITH SOME MEDIUM GRAIN; TRANSPARENT TO TRANSLUCENT; ROUND TO SUBANGULAR; WELL SORTED; MODERATE TO HIGH SPHERICITY; SOME FROSTING ON SAMPLE FRAGMENTS; PRESERVED SAMPLES SHOW FRIABLE TO MOD HARD; 1-3% CARBONACEOUS MATERIAL IN SAMPLE FRAGMENTS; TRACE ACCESSORY MINERAL OF CHLORITE MICA; TRACE SPECIMENS OF CRYSTALLINE QUARTZ WITH ONE END TERMINATED IN SAMPLE.

SHALE = MEDIUM GRAY TO LIGHT GRAY TO OLIVE GRAY; PLANAR TO SPLINTERY TO BLOCKY FRACTURE; ELONGATED TO PLATY TO WEDGELIKE CUTTINGS HABIT; MATTE TO CLAY FLECKS IN SAMPLE FRAGMENTS; GRADES TO LIGHT GRAY SILTSTONE; TRACE ACCESSORY MINERAL OF PYRITE.

NOTE: UPHOLE GASES BLEEDING INTO WELL BORE DURING CONNECTION.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY MOTTLED WITH OLIVE GRAY; HARD TO DENSE TENACITY; PLANAR TO ANGULAR TO IRREGULAR FRACTURE; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; SILTY TO SUCROSIC TEXT; SPARKLING TO EARTHY LUSTER; THINLY INTERBEDDED WITH SANDSTONE AND SHALE.

SHALE = MEDIUM GRAY TO MEDIUM DARK GRAY TO DUSKY YELLOW WITH OCCASIONAL GRAYISH RED PURPLE HUES; CRUNCHY TO BRITTLE TENACITY; FRACTURES FROM SPLINTERY TO PLANAR; CUTTINGS ARE PLATY TO SCALY; WAXY TO DULL LUSTER; SMOOTH TEXTURE; THICK STRUCT; SOME CARBONACEOUS SHALE INTERBEDDED.

NOTE = TRIPPED OUT OF HOLE AT 9762' MD FOR A NEW BIT.

SHALE = MEDIUM GRAY TO MEDIUM DARK GRAY TO GRAYISH PURPLE, OCCASIONAL SPECIMENS DISPLAY A PALE GREEN HUE; DENSE TO BRITTLE TENACITY; IRREGULAR TO PLANAR TO SPLINTERY FRACTURING; CUTTINGS ARE PLANAR TO PLATY TO TABULAR; WAXY TO DULL LUSTER; SMOOTH TO SILTY TEXTURE; THICK STRUCTURE.

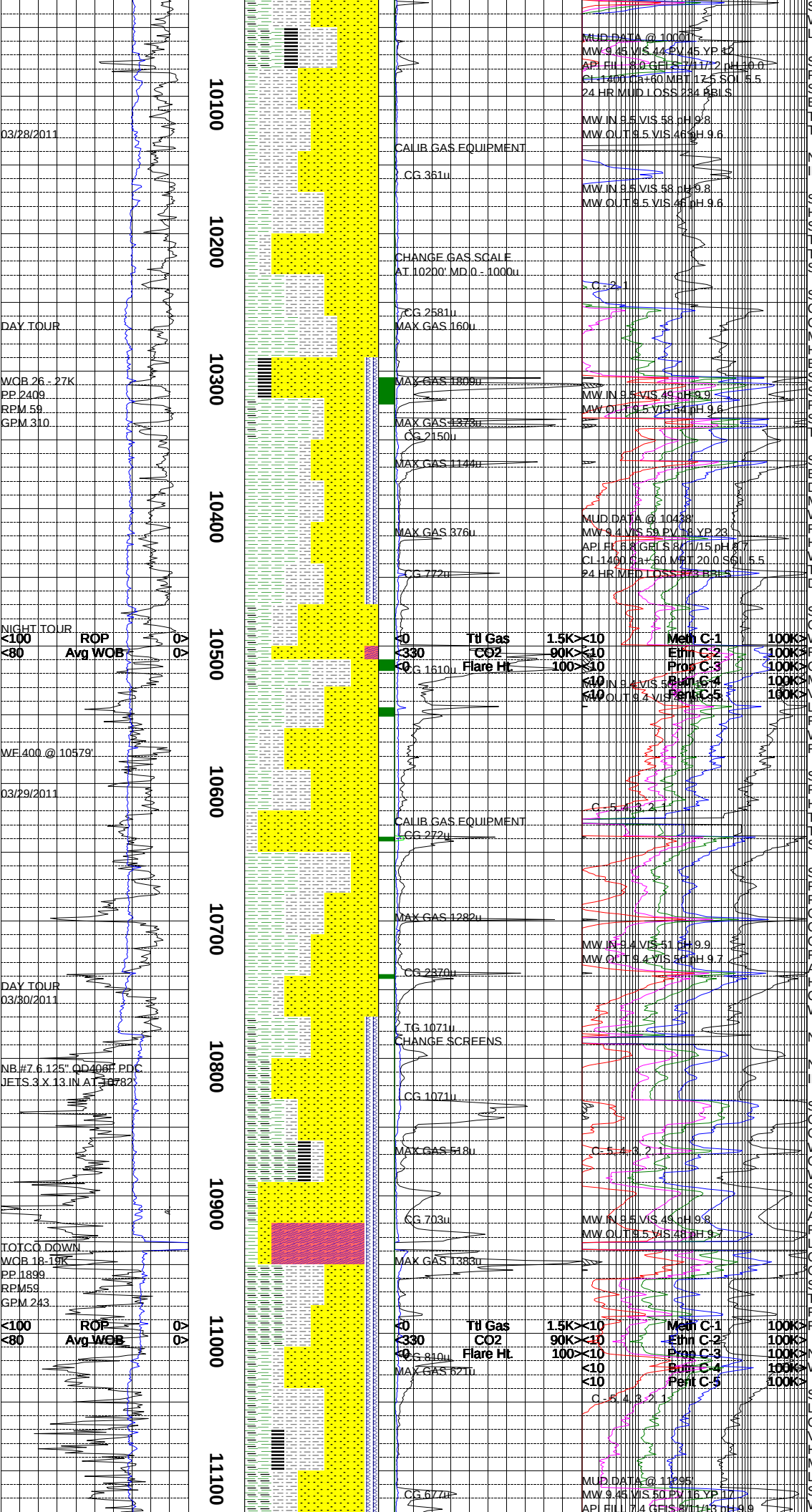
SHALE = MEDIUM GRAY TO LIGHT GRAY TO DARK GRAY; PLATY TO WEDGELIKE TO SEMI ELONGATED CUTTINGS HABIT; MATTE TO SEMI CLAYEY TEXTURE; GRADES TO LIGHT GRAY SILTSTONE; SPLINTERY TO PLANAR TO HACKLY FRACTURE; DULL EARTHY LUSTER.

NOTE: TD INTERMEDIATE SECTION @ 9894' MD (9795' TVD) ON 02/26/2011.

NOTE: RETURN TO DRILLING - PRODUCTION SECTION - ON 03/27/2011.

NOTE: DROP IN FLOW @ 9945' AND 9980' W/ MILD MUD LOSSES.

SHALE = MEDIUM GRAY TO LIGHT GRAY, DARK GRAY TO BROWNISH GRAY, THIN LAMINAE OF MODERATE REDDISH BROWN; BRITTLE TO CRUNCHY; BLOCKISH TO HACKLY FRACTURE; CUTTINGS HABIT SEMI TABULAR TO MASSIVE; LUSTER DULL; TEXTURE SMOOTH TO SLIGHTLY



SILTY; STRUCTURE PREDOMINANTLY MASSIVE WITH SOME SPECIMENS SHOWING THINLY LAMINATED VARVE LIKE COLOR VARIATIONS.

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

NOTE: DROP IN FLOW @ 10138' W/ INCREASE IN MUD LOSSES.

SILTSTONE = MEDIUM GRAY TO LIGHT GRAY; HACKLY TO PLANAR TO IRREGULAR FRACTURE; SPARKLING TO EARTHY LUSTER; WEDGELIKE TO TABULAR TO PLATY CUTTINGS HABIT; SILTY TO GRITTY TEXTURE; TRACE LOOSE SAND IN SAMPLE FRAGMENTS.

SHALE = LIGHT TO MEDIUM GRAY WITH COMMON DARK GRAY TO BROWNISH GRAY; CRUNCHY TO BRITTLE WITH OCCASIONAL MODERATELY HARD SPECIMENS; FRACTURE HACKLY TO SUB CONCHOIDAL; CUTTINGS HABIT BLADED TO SCALY WITH COMMON WEDGE LIKE SPECIMENS; TEXTURE SMOOTH TO SLIGHTLY SILTY; STRUCTURE MOSTLY MASSIVE WITH RARE TO OCCASIONAL SPECIMENS SHOWING THIN LAMINAE AND RARE PLANAR TO PARTIAL PLANAR PARTING.

SILTSTONE = MEDIUM TO LIGHT GRAY, MED. BROWNISH GRAY TO DARK GRAY, RARE MOD. DUSKY YELLOWISH BROWN TO DUSKY BROWN; MODERATELY FIRM TO MODERATELY SOFT WITH OCCASIONAL SPECIMENS VERY SOFT; FRACTURE IRREGULAR TO HACKLY; CUTTINGS HABIT MASSIVE TO IRREGULAR WITH OCCASION WEDGELIKE; LUSTER DULL; TEXTURE SILTY TO SOMEWHAT SMOOTH; RARE VERY THIN DARKER COLORED LAMINATIONS.

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY OVERALL; PREDOMINATLY GRAIN SUPPORTED WITH SILICA AND KAOLIN CEMENT; FIRM FRAIBLE TO HARD; 3-5% COAL/CARBONACEOUS OF LOW GRADE COAL; FAIR TO WELL SORTED; MOD SPHERICITY; SUBROUND TO SUBANGULAR; VERY FINE TO UPPER FINE GRAIN; GRADES TO LIGHT GRAY SILTSTONE; TRACE SPECIMENS OF FRACTURE FILL IN SAMPLE; HIGH GAS ASSOC WITH FRIABLE SANDSTONE WITH TRACE FRACTURE FILL OF CALCITE.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY; PLATY TO ELONGATED TO WEDGELIKE CUTTINGS HABIT; SILTY TO GRITTY TEXTURE; PLANAR TO BLOCKY TO SPLINTERY FRACTURE; GRADES TO LIGHT GRAY SANDSTONE; SPARKLING TO SLIGHT EARTHY LUSTER.

SANDSTONE = WHITE TO LIGHT GRAY, VERY PALE ORANGE TO PALE ORANGISH GRAY; FRAMEWORK TRANSPARENT COLORLESS QUARTZ TO TRANSPARENT COLORLESS QUARTZ TO TRANSLUCENT WHITE TO WHITISH GRAY QUARTZ; LOWER VERY FINE TO UPPER FINE; WELL TO VERY WELL SORTED; SUB ANGULAR TO SUB ROUND GRAINS; MODERATELY HIGH SPHERICITY; SOFT TO MOD HARD; VERY CALCAREOUS; GRAIN SUPPORTED; INTERSTICES WELL FILLED; NO FLOURESCENCE; NO CUT.

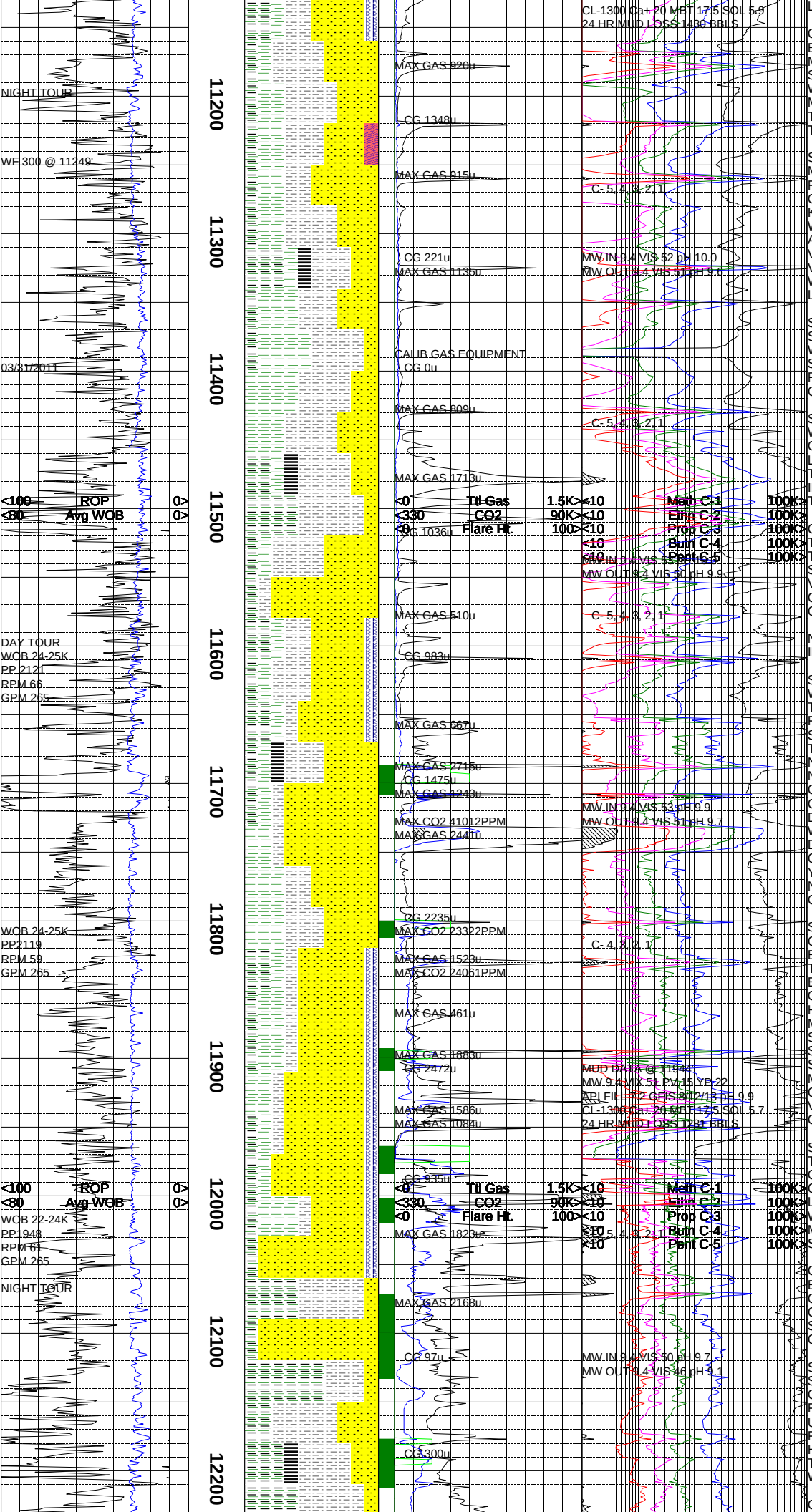
NOTE: BIT TRIP ON 3/29/2011 @ 10782'.

NOTE: DROP IN FLOW @ 10827' W/ INCREASE IN MUD LOSSES.

SANDSTONE = WHITE TO WHITISH GRAY, OCCASIONAL VERY PALE ORANGE TO GRAYISH ORANGE; FRAMEWORK MOSTLY TRANSLUCENT, WHITISH TO TRANSPARENT COLORLESS QUARTZ; UPPER VERY FINE TO UPPER FINE; WELL TO VERY WELL SORTED; SUB ROUND TO SUB ANGULAR; HIGH TO MODERATELY HIGH SPHERICITY; MINOR TO MODERATE FROSTING AND PITTING OF GRAIN SURFACES; MODERATE FRIABLE TO EASILY FRIABLE WITH COMMON LOOSE GRAINS; CEMENT PREDOMINANTLY CALCAREOUS W/MINOR KAOLINITIC COMPONENT; GRAIN SUPPORTED; <1% DARK REWORKED SEDIMENTARY LITHICS; OCCASIONAL VERY THIN FRACTURES EVIDENT; MUCH CALCITE FRACTURE FILL @ 10950'; NO CUT; NO FLUORESCENCE.

NOTE: DROP IN FLOW @ 10909' AND 10933' WITH INCREASE IN MUD LOSSES.

SILTSTONE = MEDIUM GRAY TO LIGHT GRAY, LIGHT YELLOWISH BROWN TO MODERATE GRAYISH ORANGE, PALE BROWNISH GRAY; VERY SOFT TO BARELY FIRM; FRACTURE HACKLY TO IRREGULAR; CUTTINGS HABIT MOSTLY IRREGULAR WITH COMMON WEDGE LIKE; LUSTER DULL; MODERATELY TO SLIGHT SILTINESS; STRUCTURE MOSTLY MASSIVE WITH OCCASIONAL THIN LAMINAE OF VARVE



LIKE COLOR VARIATION.

CARBONACEOUS SHALE = BLACK, BLACKISH BROWN TO BROWNISH BLACK, OLIVE BLACK; MODERATELY SOFT TO CRUMBLY GRADING TO SOMEWHAT CRUNCHY; IRREGULAR TO HACKLY WITH OCCASIONAL SUB BLOCKY; CUT HABIT MASSIVE TO BLOCKY; DULL TO RESINOUS; TEXTURE SMOOTH TO VERY SLIGHTLY SILTY; THINLY LAMINATED STRUCTURE.

SANDSTONE = OFF WHITE TO LIGHT GRAY TO MEDIUM GRAY; FIRM FRIABLE TO HARD; VERY FINE TO UPPER FINE GRAIN; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND SOME KAOLIN CEMENT; SUBANGULAR TO SUBROUND; WELL SORTED; MODERATE SPHERICITY; TRACE AMOUNTS OF CALCITE FRACTURE FILL AS VEINS; TRACE TO MINOR AMOUNTS OF LOOSE VERY FINE GRAIN SAND; THINLY INTERBEDDED WITH THIN LAMINAE OF COAL; GRADES TO LIGHT GRAY SILTSTONE.

SHALE = MEDIUM GRAY TO LIGHT GRAY TO SOME DARK GRAY; PLATY TO ELONGATED TO WEDGELIKE CUTTINGS HABIT; CLAYEY TO SILTY TEXTURE; IRREGULAR TO HACKLY TO PLANAR FRACTURE; EARTHY TO DULL LUSTER; GRADES TO MEDIUM GRAY SILTSTONE.

SILTSTONE = MEDIUM GRAY TO DARK GRAY WITH SOME LIGHT GRAY; GRADES TO MEDIUM GRAY SHALE; THINLY INTERBEDDED WITH LIGHT GRAY SANDSTONE; SILTY TO GRITTY TEXTURE; SPARKLING TO EARTHY LUSTER; IRREGULAR TO BLOCKY FRACTURE; WEDGELIKE TO PLATY TO TABULAR CUTTINGS HABIT.

CARBONACEOUS SHALE = BLACK TO DARK GRAY TO OLIVE GRAY; BLOCKY TO SPLINTERY FRAC; TABULAR TO WEDGELIKE CUTTINGS HABIT; SLI SILTY TO MATTE TEXTURE; EARTHY TO SEMI VITREOUS LUSTER; THINLY INTERBEDDED WITH COAL LAMINAE; VISIBLE DEGASSING ALONG CONTACT WITH COAL SEAMS.

NOTE: DROP IN FLOW @ 11695' W/ INCREASE IN MUD LOSSES.

SANDSTONE = WHITE TO WHITISH GRAY/BLUISH WHITE; FRAMEWORK WHITISH TRANSLUCENT TO COLORLESS TRANSPARENT QUARTZ; VERY FINE TO FINE; WILL TO MODERATELY WELL SORTED; SUB ROUND TO SUB ANGULAR; HIGH TO MODERATELY HIGH SPHERICITY; LITTLE TO NO SURFICIAL ABRASION; FIRMLY FRIABLE TO NEARLY EASILY FRIABLE; CEMENT STRONGLY CALCAREOUS WITH MODERATE ARGILLACEOUS COMPONENT SHOWING STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED; INTERSTICES WELL TO MODERATELY WELL FILLED; <1% DARK, VERY FINE LITHIC CLASTS; RARE CHLORITE ACCESSORY; RARE VERY DULL YELLOWISH TO DULL ORANGE FLUORESCENCE; NO CUT; ASSOCIATED WITH THIN LAMINAE OF COAL SHOWING MODERATE OUT GASSING.

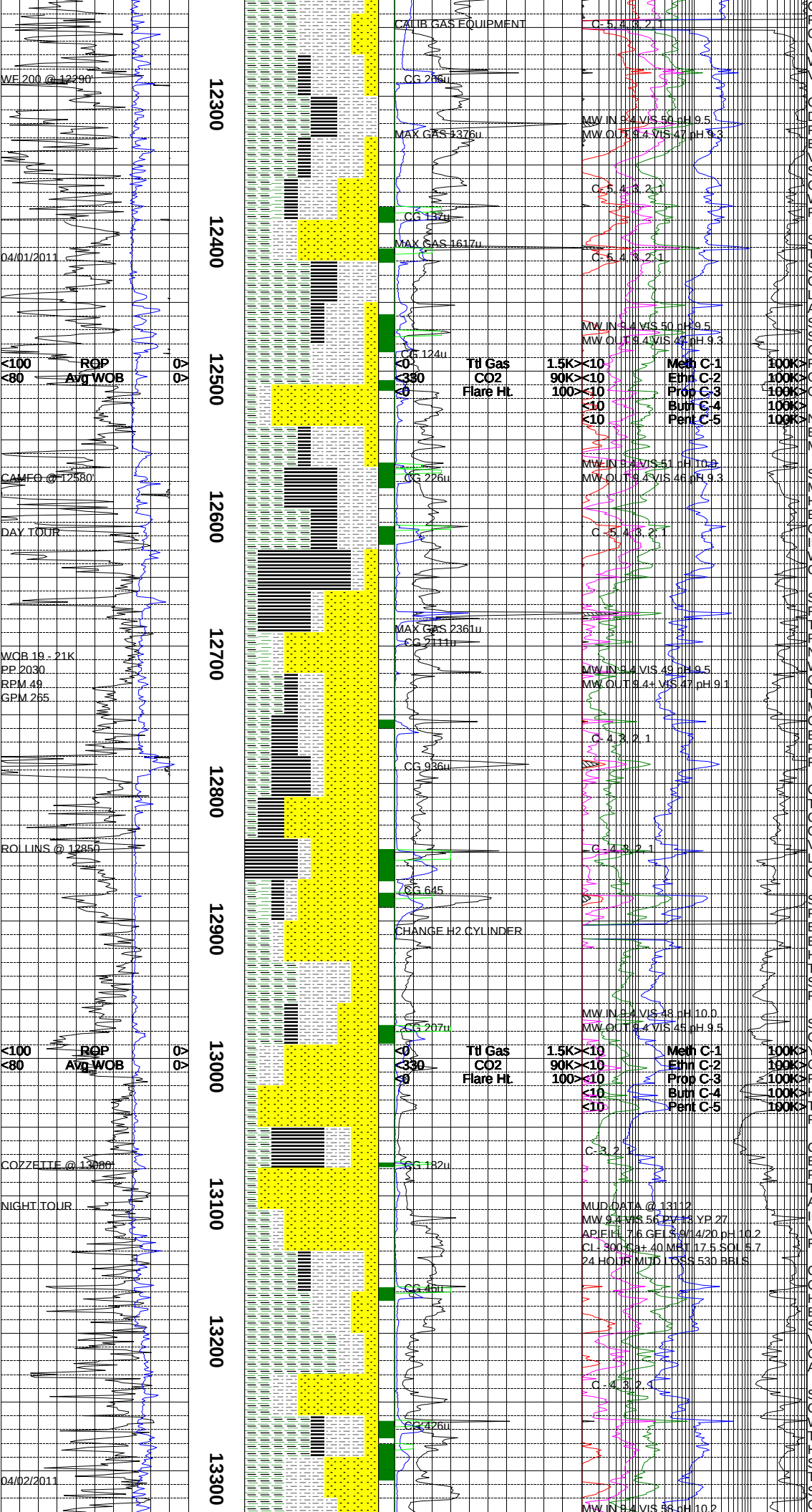
SILTSTONE = MEDIUM TO LIGHT GRAY, GRAYISH BROWN TO MEDIUM YELLOWISH BROWN, LIGHT MODERATE REDDISH BROWN TO VERY PALE ORANGE TO PALE YELLOWISH BROWN; SOFT TO MODERATELY FIRM WITH OCCASIONAL CRUNCHY SPECIMENS; FRACTURE HACKLY TO IRREGULAR; CUTTINGS HABIT MASSIVE WITH COMMON WEDGE LIKE TO OCC SEMI TABULAR; LUSTER DULL; TEXTURE SILTY TO SLIGHTLY GRITTY W/ OCCASIONAL SPECIMENS FAIRLY SMOOTH; STRUCTURE MASSIVE WITH RARE FLECKS OF UN-ORIENTED CARBONACEOUS MATERIAL AND DISCONTINUOUS VERY THIN LAMINAE OF COAL SHOWING MOD. OUT-GASSING.

SHALE = LIGHT TO MEDIUM GRAY, BROWNISH TO YELLOWISH GRAY; MODERATELY SOFT TO CRUNCHY; HACKLY TO IRREGULAR FRACTURE; CUTTINGS HABIT MASSIVE TO WEDGELIKE; LUSTER DULL TO WAXY; TEXTURE SMOOTH WITH RARE VERY SLIGHTLY SILTY; STRUCTURE MASSIVE W/RARE THIN DISCONTINUOUS STRINGERS OF CARBONACEOUS MATERIAL.

CARBONACEOUS SHALE = DUSKY YELLOWISH BROWN TO BROWNISH BLACK, DARK BROWNISH GRAY TO BLACKISH GRAY; CRUNCHY TO TOUGH; CUT HABIT MASSIVE; LUSTER DULL TO WAXY; STRUCTURE THINLY LAMINATE; MODERATE OUT GASSING OBSERVED IN SAMPLE.

SANDSTONE =OFF WHITE TO LIGHT GRAY GRAIN SUPPORTED WITH SILICA AND MINOR KAOLIN CEMENT; 4-6% COAL/CARBONACEOUS SHALE FLECKS IN SAMPLE SPECIMENS; VERY FINE TO UPPER FINE GRAIN; MODERATE SPHERICITY; FAIR TO WELL SORTED; MODERATE HARD TO HARD; SUBROUND TO SUBANGULAR; GRADES TO MEDIUM GRAY SILTSTONE; INTERBEDDED W/COAL AND CARBONACEOUS SHALE LAMINAE.

COAL = BLACK TO BROWNISH BLACK TO DARK



GRAY; BLOCKY TO PLANAR TO SPLINTERY FRACTURE; TABULAR TO ELONGATED TO PLATY CUTTINGS HABIT; SMOOTH TO CLAYEY TEXT; VISIBLE DEGASSING; THINLY INTERBEDDED WITH CARBONACEOUS SHALE AND SANDSTONE; VITREOUS TO EARTHY LUSTER.

CARBONACEOUS SHALE = BROWNISH BLACK TO DARK GRAY TO DARK OLIVE GRAY; BLOCKY TO PLANAR TO ANGULAR FRACTURE; PLATY TO ELONGATED TO TABULAR CUTTINGS HABIT; VITREOUS TO EARTHY LUSTER; CLAYEY TO SLIGHTLY SILTY TEXTURE; CRUNCHY TO SEMI CRUMBLY TENACITY; THINLY INTERBEDDED WITH COAL LAMINAE; VISIBLE DEGASSING FROM SOME SAMPLE FRAGMENTS.

SANDSTONE = OFF WHITE TO LT OLIVE GRAY TO LIGHT GRAY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND MINOR KAOLIN CEMENT; THINLY INTERBEDDED WITH COAL LAMINAE WITH TRACE VISIBLE DEGASSING; TR ACCESSORY MINERAL OF PYRITE; MODERATE SPHERICITY; WELL SORTED; INTERSTICES OF SAMPLE FRAGMENTS FILLED WITH MINOR AMTS OF ARGILLACEOUS MATERIAL; SLIGHT TO MOD REACTION TO HCL; LOWER VERY FINE TO FINE GRAIN; ROUND TO SUBANGULAR; TRACE AMTS OF LOOSE VERY FINE GRAIN SAND.

NOTE: UPHOLE GASES BLEEDING INTO WELL BORE DURING CONNECTION SHOWING UP ON MUDLOG AS PRECONNECTION GASES.

SILTSTONE = OLIVE GRAY TO DARK GRAY TO MEDIUM GRAY; PLANAR TO IRREGULAR TO HACKLY FRACTURE; SPARKLING TO SEMI EARTHY LUSTER; GRITTY TO SUCROSIC TEXT; GRADES TO LIGHT GRAY SANDSTONE AND INTERBEDDED WITH CARBONACEOUS SHALE; WEDGELIKE TO ELONGATED TO TABULAR CUTTINGS HABIT.

SANDSTONE = LIGHT DUSKY BROWN, VERY PALE ORANGE, BLACKISH BROWN; VERY FINE TO FINE; VERY WELL TO WELL SORTED; SUB ROUND TO SUB ANGULAR; FIRMLY FRIABLE TO NEARLY HARD; MODERATELY CALCAREOUS WITH MINOR ARGILLACEOUS AND SILICEOUS COMPONENTS SHOWING MODERATE REACTION TO HCL; GRAIN SUPPORTED; INTERSTICES MODERATELY WELL FILLED W/VISIBLE VOIDS; CARBON STAINING OF CEMENT WITH COALS EDGES COMMON. CONTACTS WITH COALS PRESERVED; DULL WHITE TO YELLOWISH FLUORESCENCE; GOOD QUICK CUT.

COAL = BLACK TO BROWNISH BLACK; CRUNCHY TO BRITTLE; FRAC PLANAR TO CONCHOIDAL; CUTTINGS HABIT BLOCKY, WEDGELIKE, TABULA OCCASIONAL ELONGATE AND PLATY; LUSTER VITREOUS TO RESINOUS; STRUCTURE THINLY LAMINATED TO MASSIVE; COMMON VIGOROUS OUT GASSING FROM ALL SPECIMENS.

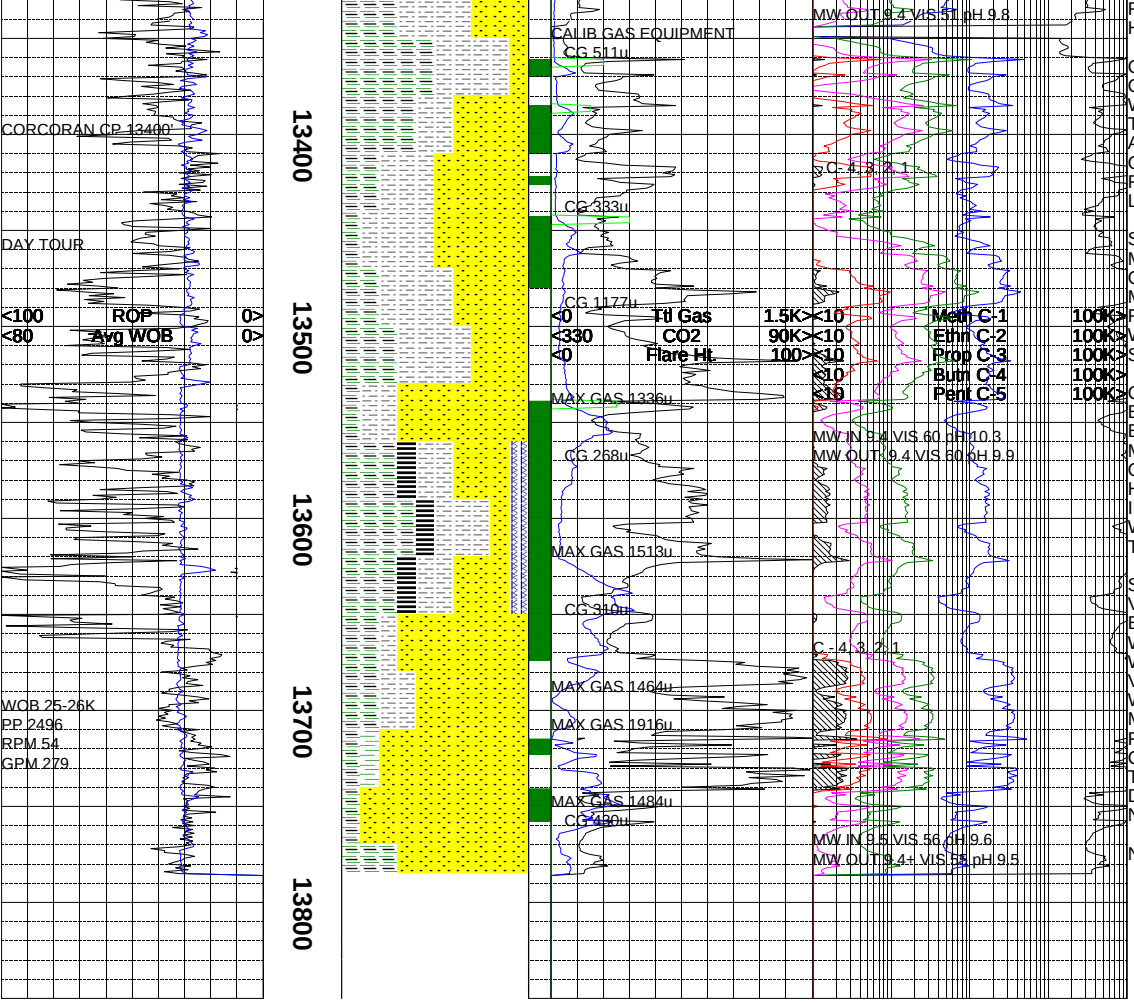
SHALE= YELLOWISH MODERATE BROWN TO PALE YELLOWISH BROWN, DUSKY YELLOWISH BROWN TO DUSKY BROWN, BROWNISH BLACK; BRITTLE TO CRUNCHY TENACITY; FRACTURE HACKLY TO IRREGULAR; CUTTINGS HABIT MASS TO WEDGE LIKE; LUSTER DULL; TEXTURE SMOOTH TO SLIGHTLY SILTY; STRUCTURE PREDOMINATELY MASSIVE.

SILTSTONE = BROWNISH GRAY TO MEDIUM GRAY, LIGHT YELLOWISH BROWN TO DUSKY YELLOWISH BROWN, LIGHT GRAY TO VERY PALE GRAYISH ORANGE; CRUMBLY TO CRUNCHY; FRACTURE HACKLY TO IRREGULAR; CUTTINGS HABIT MASSIVE TO WEDGELIKE; LUSTER DULL; TEXTURE SILTY TO VERY SLIGHTLY SILTY; RARE THIN LAMINAE CARBONACEOUS MATERIAL.

COAL = BLACK TO BROWNISH BLACK TO OLIVE BLACK; BLOCKY TO SEMI CONCHOIDAL TO PLANAR FRACTURE; ELONGATED TO PLATY TO TABULAR CUTTINGS HABIT; TRACE AMOUNTS OF ACCESSORY MINERAL OF MICRO PYRITE; THIN INTERBEDDING WITH CARBONACEOUS SHALE; VISIBLE DEGASSING EVIDENT IN SAMPLE FRAGMENTS; VITREOUS TO EARTHY LUSTER.

CARBONACEOUS SHALE = BROWNISH BLACK TO OLIVE GRAY TO DARK GRAY; SPLINTERY TO HACKLY TO PLANAR FRACTURE; PLATY TO SEMI ELONGATED TO WEDGELIKE CUTTINGS HABIT; SILTY TO MATTE TEXTURE; EARTHY TO SEMI VITREOUS LUSTER; THINLY INTERBEDDED WITH COAL LAMINAE WITH VISIBLE DEGASSING ALONG CONTACTS.

SANDSTONE = OLIVE GRAY TO LIGHT GRAY TO OFF WHITE; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND MINOR KAOLIN CEMENT; NON TO SLIGHTLY CALCAREOUS; MODERATE TO HIGH SPHERICITY; WELL SORTED; ROUND TO SUBANGULAR; VERY FINE TO FINE GRAIN; THINLY INTERBEDDED WITH CARBONACEOUS SHALE/COAL FLECKS; SEDIMENTARY LITHIC CLASTS INTERSPERSED IN SAMPLE FRAGMENTS;



FRIABLE TO MODERATELY HARD; NO VISIBLE HYDROCARBON INDICATORS.

CARBONACEOUS SHALE = BROWNISH BLACK TO OLIVE GRAY TO DARK GRAY; TABULAR TO WEDGELIKE TO PLATY CUTTINGS HABIT; SILTY TO MATTE TEXTURE; SPLINTERY TO PLANAR TO ANGULAR FRACTURE; TR ACCESSORY MINERAL OF PYRITIC VEINING EVIDENT ON SAMPLE FRAGMENTS; THINLY INTERBEDDED WITH COAL LAMINAE WITH TRACE VISIBLE DEGASSING.

SILTSTONE = DUSKY YELLOWISH BROWN TO MODERATE YELLOWISH BROWN, BROWNISH GRAY TO BROWNISH BLACK; CRUNCHY TO MODERATELY CRUMBLY; HACKLY TO IRREGULAR FRACTURE; CUTTINGS HABIT MASSIVE TO SUB WEDGELIKE; LUSTER DULL; TEXTURE SILTY TO SLIGHTLY GRITTY; STRUCTURE MASSIVE.

CARBONACEOUS SHALE = DUSKY YELLOWISH BROWN TO DARK YELLOWISH BROWN, GRAYISH BROWN, DUSKY BROWN TO MODERATE BROWN; MODERATELY FIRM TO MODERATELY SOFT WITH OCCASIONAL CRUMBLY SPECIMENS; FRACTURE HACKLY TO IRREGULAR; CUTTINGS HABIT IRREGULAR TO SLIGHTLY TABULAR TO SLIGHT WEDGELIKE; LUSTER DULL; SLIGHTLY SILTY TEXTURE; THINLY LAMINATED STRUCTURE.

SANDSTONE = WHITE TO WHITISH GRAY, VERY PALE ORANGE TO PALE MODERATE BROWN, LIGHT YELLOWISH BROWN; FRAME WORK PREDOMINANTLY TRANSLUCENT WHITISH TO TRANSPARENT COLORLESS QUARTZ; VERY FINE TO FINE; WELL TO MODERATELY WELL SORTED; SUB ROUND TO SUB ANGULAR; MODERATELY HIGH SPHERICITY; FIRMLY FRIABLE; ARGILLACEOUS CEMENT WITH CALCAREOUS COMPONENT; MOD REATION TO HCL; INTERSTICES WELL FILLED; <1% DARK, VERY FINE LITHIC CLASTS; NO CUT; NO FLUORESCENCE.

NOTE: TD WELL @ 13785' ON 4/02/2011.