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
WELL	PCU 296-5A6
FIELD	PICEANCE CREEK
REGION	ROCKIES
COORDINATES	LAT: 39.912044
	LONG: -108.198659
ELEVATION	G.L.:7294'
	RKB: 30.2'
COUNTY, STATE	RIO BLANCO, CO
API INDEX	051031124000
SPUD DATE	2/28/2011
CONTRACTOR	HELMERICH _PAYNE
CO. REP.	C. CURTIS/M. HUDON
RIG/TYPE	FLEX 4S / HP 321
LOGGING UNIT	MLO31
GEOLOGISTS	M. GROSS
	B. SMELSER
ADD. PERSONS	D. NEW
CO. GEOLOGIST	C. ALBA

LOG INTERVAL

DEPTHS:	4885'	**TO**	14007'
DATES:	03/01/2011	**TO**	3/22/2011
SCALE:	1" = 100'		

MUD TYPES

SPUD MUD	**TO**	4885'
LSND	**TO**	14007'
	TO	
	TO	

CASING DATA

16.00"	**AT**	119'
10.75"	**AT**	4870'
7.00"	**AT**	10543'
	AT	

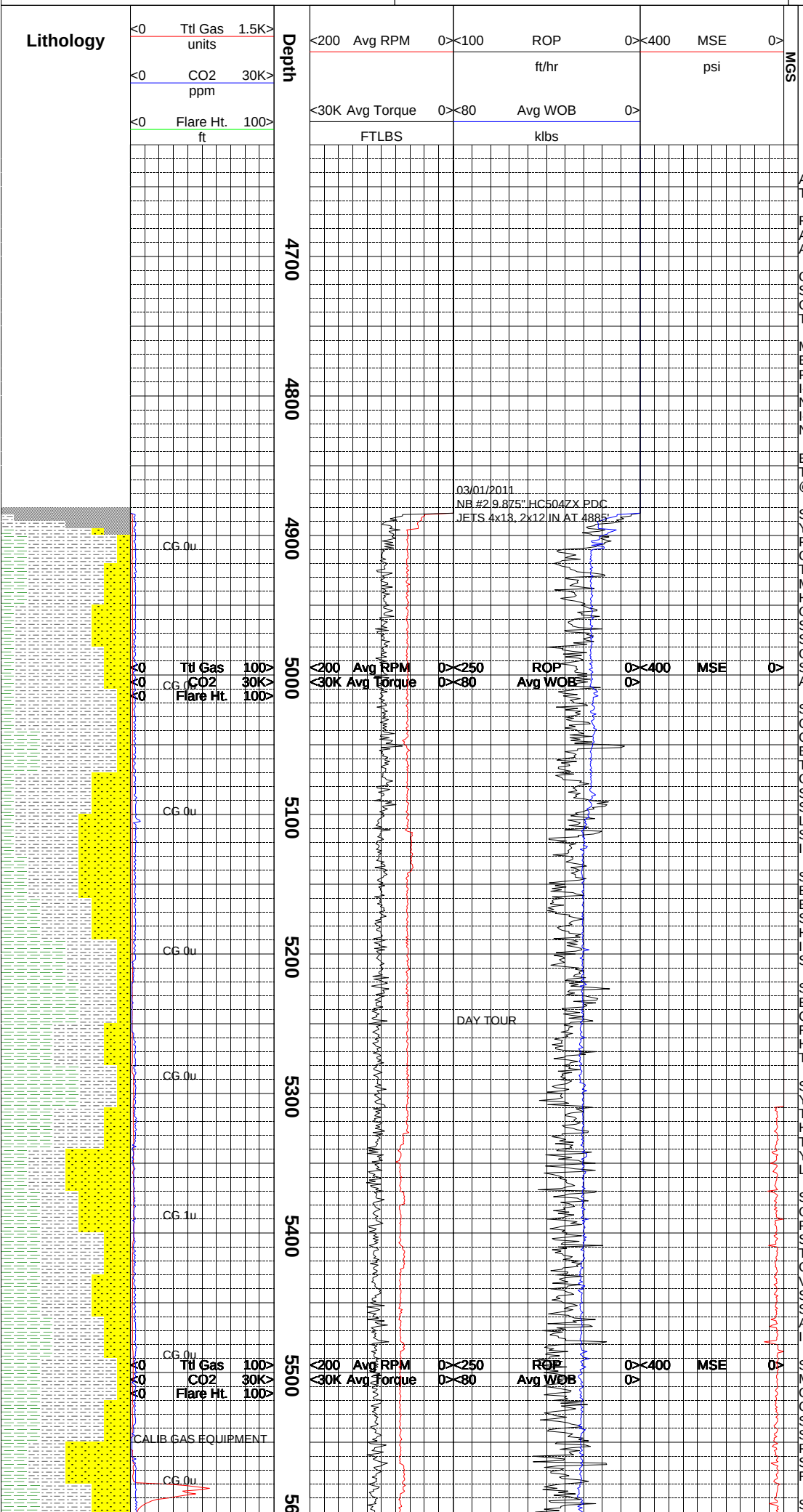
HOLE SIZE

14.75"	**TO**	4885'
9.875"	**TO**	10586'
6.125"	**TO**	14007'
	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
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.

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 COMPOSED OF THE FOLLOWING:

METHANE = 9,990 PPM
ETHANE = 1,010 PPM
PROPANE = 980 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 THE PCU 296-5A6 WELL ON 03/01/2011 @ 4885' MD.

SILTSTONE = LIGHT BROWN TO MODERATE YELLOWISH BROWN TO GRAYISH ORANGE TO PALE YELLOWISH BROWN TO A GRAYISH RED; CRUMBLY TO CRUNCHY TO PULVERULENT TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO PLATY TO TABULAR CUTTINGS HABIT; EARTHY TO DULL LUSTER; SILTY TO GRITTY TEXTURE WITH SOME SAMPLES BEING SLIGHTLY GRANULAR; NO VISIBLE BEDDING STRUCTURES IN THE SAMPLE; SILTSTONE GRADES TO A VERY LIGHT TO LIGHT GRAY SHALE; INTERBEDDED WITH SOME SANDSTONE AND SHALE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO GRAY IN COLOR WITH SOME GRADING TO A GRAYISH ORANGE OR YELLOWISH BROWN; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE WITH SOME SAMPLES GRADING TO A MORE SILTY TEXTURE; LAMINAE STRUCTURE VISIBLE IN SOME SAMPLES; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

SHALE = LIGHT GRAY TO PALE YELLOWISH BROWN; MATTE TO CLAYEY TEXTURE; DULL EARTHY LUSTER; PLATY TO WEDGELIKE TO SCALY CUTTINGS HABIT; IRREGULAR TO HACKLY TO PLANAR FRACTURE; THINLY INTERBEDDED WITH SANDSTONE AND SILTSTONE.

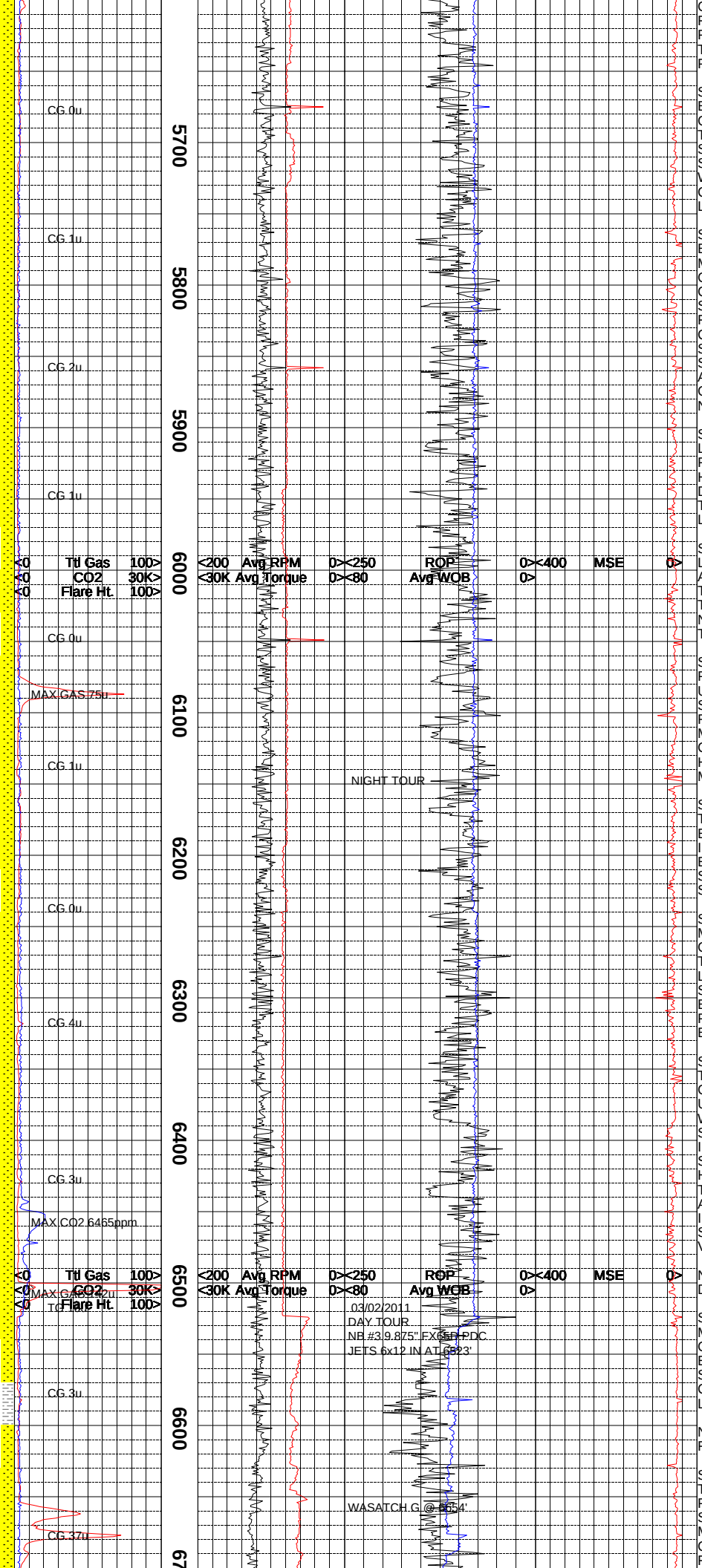
SILTSTONE = PALE TO MODERATE YELLOWISH BROWN MOTTLED WITH LIGHT GRAY; HARD TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURE; WEDGELIKE TO TABULAR CUTTINGS HABIT; SPARKLING TO EARTHY LUSTER; SILTY TO SUCROSIC TO GRITTY TEXTURE.

SHALE = PALE YELLOWISH BROWN TO MOD YELLOWISH BROWN TO LIGHT MEDIUM GRAY; TABULAR TO PLATY TO WEDGELIKE CUTTINGS HABIT; MATTE TO CLAYEY TEXTURE; EARTHY TO DULL LUSTER; GRADES TO MODERATE YELLOWISH BROWN SILTSTONE MOTTLED WITH LIGHT GRAY; CRUMBLY TO FIRM TENACITY.

SANDSTONE = OFF WHITE TO PALE YELLOWISH GRAY MOTTLED WITH VERY LIGHT GRAY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT; HIGH REACTION TO HCl; 1-2% DARK LITHIC FRAGMENTS; GRADES TO PALE YELLOWISH GRAY SILTSTONE; VERY FINE TO FINE GRAIN; MODERATE TO LOW SPHERICITY; FAIRLY SORTED; ANGULAR TO SUBROUND; MODERATE HARD TO HARD; NO ACCESSORY MINERAL; NO VISIBLE HYDROCARB INDICATORS.

SILTSTONE = PALE YELLOWISH BROWN TO MODERATE YELLOWISH BROWN MOTTLED WITH GRAYISH RED AND LIGHT GRAY; HARD TO CRUNCHY TENACITY; GRITTY TO SILTY TEXT; SPARKLING LUSTER; GRADES TO LIGHT GRAY SANDSTONE; PLANAR TO BLOCKY TO HACKLY FRACTURE; WEDGELIKE TO TABULAR TO SCALY CUTTINGS HABIT; TRACE LOOSE VERY FINE GRAIN SAND IN SAMPLE FRAGMENTS.

SHALE = PALE YELLOWISH BROWN TO LIGHT



GRAY; PLANAR TO SPLINTERY TO BLOCKY FRACTURE; ELONGATED TO WEDGELIKE TO PLATY CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; DULL EARTHY LUSTER; GRADES TO PALE YELLOWISH GRAY SILTSTONE.

SILTSTONE = MODERATE TO PALE YELLOWISH BROWN MOTTLED WITH LIGHT GRAY AND GRAYISH RED; HARD TO CRUNCHY TENACITY; TRACE LOOSE VERY FINE SAND GRAINS IN SAMPLE FRAGMENTS; GRADES TO LIGHT GRAY SANDSTONE; BLOCKY TO IRREGULAR FRACT; WEDGELIKE TO FLAKY TO SLIGHT NODULAR CUTTINGS HABIT; SPARKLING TO EARTHY LUSTER; GRITTY TO SILTY TEXTURE.

SANDSTONE = OFF WHITE TO PALE YELLOWISH BROWN MOTTLED WITH LIGHT GRAY AND MODERATE YELLOWISH BROWN; PREDOM GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT; MODERATE HARD TO VERY HARD; SUBANGULAR TO SUBROUND; VERY FINE TO FINE GRAIN; TRACE ACCESSORY MINERAL OF CHLORITE MICA; 1-3% LITHIC FRAGMENTS IN SAMPLE SPECIMENS; LOW TO MODERATE SPHERICITY; FAIR TO WELL SORTED; MINOR AMOUNTS OF LOOSE VERY FINE GRAIN SAND; GRADES TO PALE YELLOWISH GRAY SILTSTONE; NO VISIBLE HYDROCARBON INDICATORS.

SHALE = MODERATE YELLOWISH BROWN TO LIGHT GRAY MOTTLED WITH GRAYISH RED; PLATY TO ELONGATE TO WEDGELIKE CTNGS HABIT; MATTE TO SLIGHTLY SILTY TEXTURE; DULL EARTHY LUSTER; PLANAR TO SPLINTERY TO HACKLY FRACTURE; GRADES TO MOTTLED LIGHT GRAY SILTSTONE.

SILTSTONE = PALE YELLOWISH BROWN TO LIGHT GRAY MOTTLED WITH GRAYISH RED AND MODERATE YELLOWISH BROWN; BLOCKY TO IRREGULAR TO PLANAR FRACTURE; HARD TO FIRM TENACITY; WEDGELIKE TO SEMI NODULAR TO PLATY CUTTINGS HABIT; GRITTY TO SUCROSIC TEXT; GRADES TO SANDSTONE.

SANDSTONE = OFF WHITE TO TRANSPARENT; PREDOMINANTLY LOOSE GRAIN; VERY FINE TO UPPER FINE GRAIN; OPAQUE TO CLEAR; WELL SORTED; MODERATE TO HIGH SPHERICITY; ROUND TO SUBANGULAR; MINOR FROSTING; MINOR PRESERVED SPECIMENS; SILICA AND CALCITE CEMENT; FIRM FRIABLE TO MODERATE HARD; TR ACCESSORY MINERAL OF CHLORITE MICA; MODERATE TO HIGH REACTION TO HCl.

SHALE = MODERATE YELLOW TO DUSKY YELLOW TO LIGHT GRAY TO BROWNISH GRAY IN COLOR; BRITTLE TO CRUMBLY TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TO SLIGHTLY SILTY TEXTURE; LAMINAE BEDDING STRUCTURE VISIBLE IN SOME SAMPLES.

SILTSTONE = PALE YELLOWISH BROWN TO MODERATE YELLOWISH BROWN MOTTLED WITH GRAYISH ORANGE TO GRAYISH RED; IRREGULAR TO BLOCKY FRACTURE; EARTHY TO DULL LUSTER; CRUMBLY TO CRUNCHY TENACITY; SILTY TO GRITTY TEXTURE W/ SOME SAMPLES BEING SLIGHTLY GRANULAR; MASSIVE TO PLATY TO TABULAR CUTTINGS; NO VISIBLE BEDDING STRUCTURES IN THE SAMPLE.

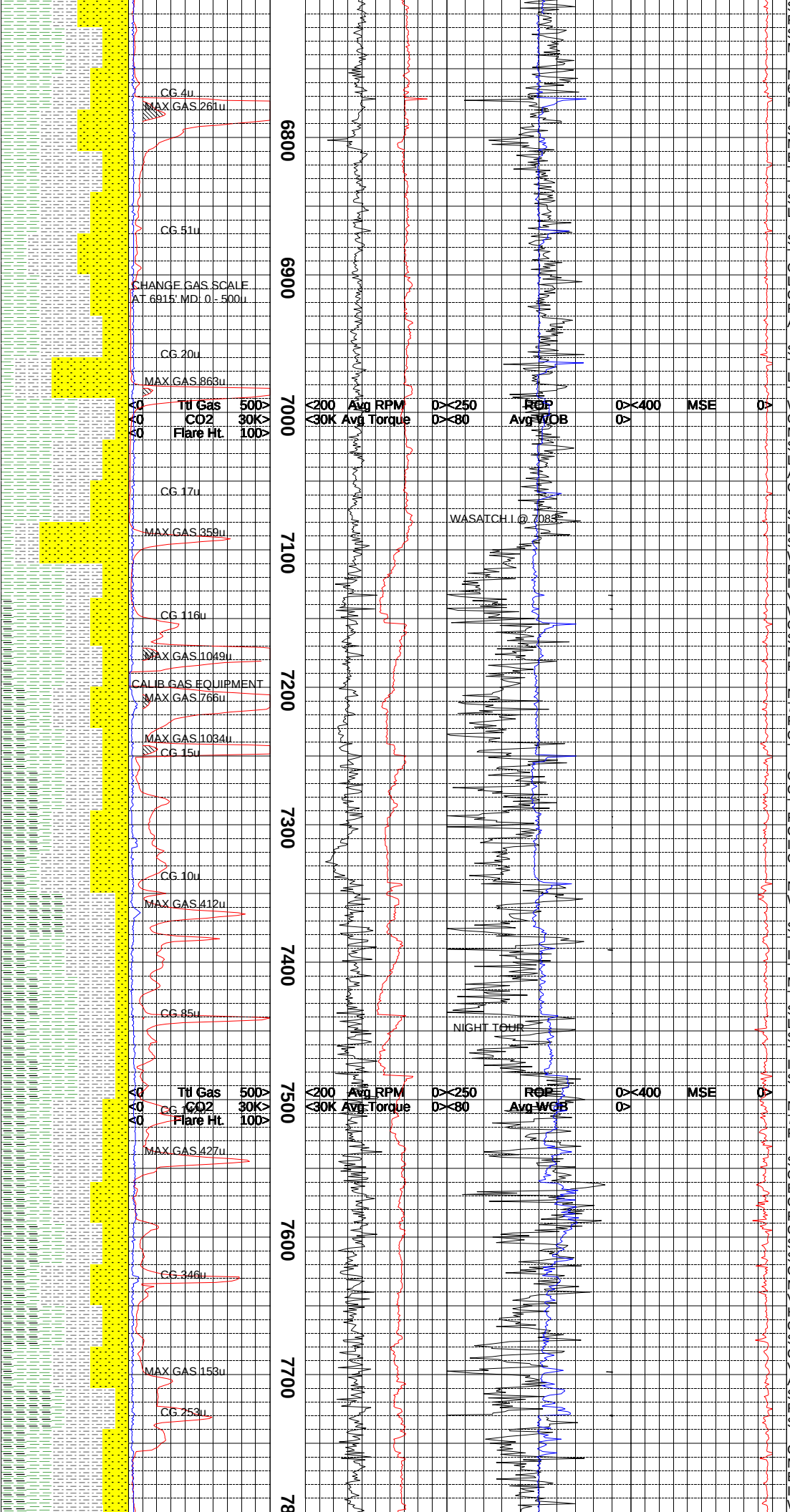
SANDSTONE = SLIGHTLY WHITE TO LIGHT GRAY TO MEDIUM GRAY TO BROWNISH GRAY TO GRAYISH RED IN COLOR; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; WELL TO FAIR TO SLIGHTLY POOR SORTING IN SOME SAMPLES; SUBROUND TO SUBANGULAR IN ANGULARITY; HIGH TO MODERATE SPHERICITY; MODERATELY HARD TO FRIABLE HARDNESS; SLIGHT TO MODERATE REACTION TO A 10% HCL SOLUTION INDICATING SILICA AND CALCITE CEMENTATION; LITHIC CLASTS INCLUDED RANGE FROM 10% -30%; GRAIN SUPPORTED; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

NOTE = TRIP OUT OF THE HOLE TO LAY DOWN DIRECTIONAL TOOLS @ 6523' MD.

SHALE = LIGHT GRAY TO MEDIUM GRAY MOTTLED WITH PALE YELLOWISH BROWN AND GRAYISH RED; PLATY TO TABULAR TO SEMI ELONGATED CUTTINGS HABIT; MATTE TO SILTY TEXTURE; DULL EARTHY LUSTER; CRUNCHY TO FIRM TENACITY; GRADES TO LIGHT GRAY SILTSTONE.

NOTE: PARTIAL DROP IN FLOW AT 6676'. FULL RETURNS AT 6700'

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY TO DUSKY GREEN; HARD TO MODERATE HARD; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA CEMENT; SUBROUND TO SUBANGULAR; MODERATE SPHERICITY; VERY FINE TO FINE GRAIN; 2-4% DARK LITHIC FLECKS IN SAMPLE FRAGMENTS; HIGH AMOUNT OF LOOSE GRAIN



SAND THROUGH GAS SHOW; CLEAR TO OPAQUE; ROUND TO SUBANGULAR; HIGH TO MODERATE SPHERICITY; MINOR AMOUNTS OF CHLORITE MICA AND CHLORITIZATION OF SANDSTONE.

NOTE: PARTIAL DROP IN FLOW AT 6770' AND 6800'. QUICK RECOVERY BACK TO FULL RETURNS.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY MOTTLED WITH GRAYISH RED TO DUSKY RED; BLOCKY TO IRREGULAR FRACTURE; GRITTY TO SUCROSIC TO SILTY TEXTURE; TABULAR TO NODULAR TO WEDGELIKE CUTTINGS HABIT; SPARKLING TO EARTHY LUSTER; GRADES TO LIGHT GRAY SANDSTONE.

SILTSTONE = MEDIUM GRAY TO DUSKY RED TO LIGHT GRAY; NODULAR TO WEDGELIKE CUTTINGS HABIT; SPARKLING TO SEMI EARTHY LUSTER; GRITTY TO ABRASIVE TO MINOR GRANULAR TEXTURE; IRREGULAR TO HACKLY FRACTURE; THINLY INTERBEDDED WITH SHALE AND SANDSTONE.

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY TO LIGHT GREENISH GRAY; PREDOMINANTLY LOOSE GRAIN; TRANSLUCENT TO CLEAR; MOD TO HIGH SPHERICITY; SUBROUND TO SUBANG; WELL SORTED; SOME FROSTING ON SAMPLE GRAINS; VERY FINE TO UPPER FINE GRAIN; MINOR PRESERVED SPECIMEN CEMENTED WITH SILICA AND MINOR KAOLIN; 2-4% DARK LITHIC FLECKS IN SAMPLE FRAGMENTS; TRACE ACCESSORY MINERAL OF MICRO PYRITE AND CHLORITE MICA WITH MINOR CHLORITIZATION.

SANDSTONE = OFF WHITE TO MEDIUM GRAY TO LIGHT GRAY; ROUND TO SUBANGULAR; WELL SORTED; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND KAOLIN CEMENT; MINOR REACTION TO HCl; 1-3% DARK LITHIC FLECKS IN SAMPLE FRAGMENTS; MODERATE HARD TO VERY HARD; GRADATION AND INTERBEDDED WITH LIGHT GRAY SILTSTONE; TRACE LAMINAE OF COAL/CARBONACEOUS SHALE IN SOME SAMPLE FRAGMENTS; TRACE ACCESSORY MINERAL OF CHLORITE MICA AND PYRITE ON FRACTURE SURFACE.

NOTE: PARTIAL DROP IN FLOW AT 7142', 7233', AND 7306' WITH FAIRLY QUICK RECOVERY OF FULL RETURNS. SHORT LOSS OF RETURNS AT 7343' WITH QUICK RECOVERY TO FULL RETURNS.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO DARK GRAY; MATTE TO CLAYEY TEXTURE; PLANAR TO SPLINTERY TO HACKLY FRACTURE; ELONGATED TO TABULAR TO PLATY CUTTINGS HABIT; THIN LAMINAE OF COAL INTERBEDDED; VISIBLE DEGASSING ALONG CONTACTS AND FRACTURES.

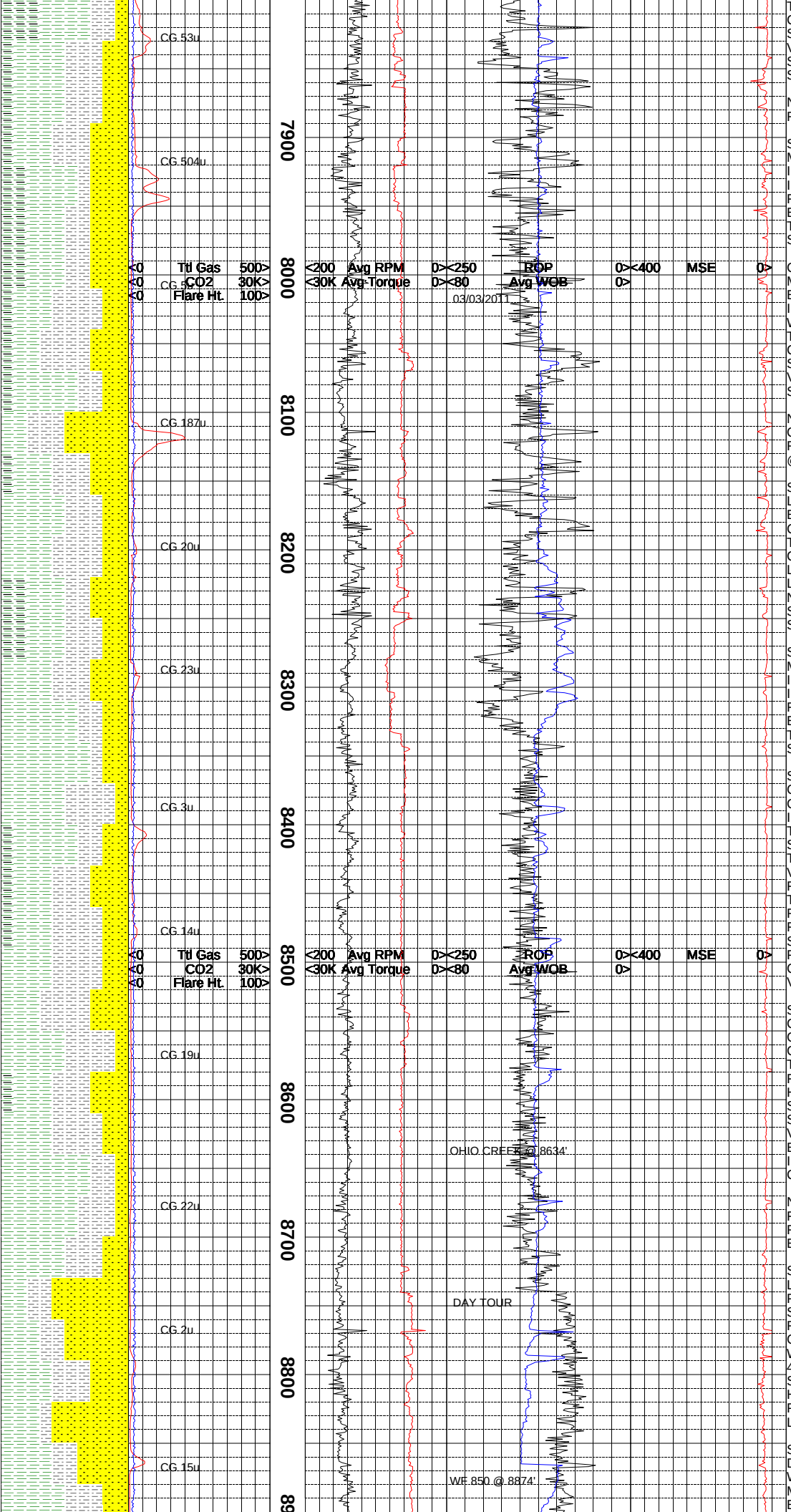
NOTE: PARTIAL DROP IN FLOW AT 7352', WITH QUICK RECOVERY TO FULL RETURNS.

SILTSTONE = MEDIUM GRAY TO BROWNISH GRAY TO LIGHT OLIVE GRAY TO MODERATE YELLOW IN COLOR; TOUGH TO DENSE TO BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO TABULAR CUTTINGS HABIT; DULL TO EARTHY LUSTER; SILTY TO GRITTY TO SLIGHTLY GRANULAR TEXTURE; THIN TO LAMINAE BEDDING STRUCTURE VISIBLE IN SOME SAMPLES; TRACE PYRITE VISIBLE IN THE SAMPLE AS AN ACCESSORY MINERAL; INTERBEDDED WITH SHALE, CARBONACEOUS SHALE AND SOME SANDSTONE.

NOTE: PARTIAL DROP IN FLOW @ 7550' AND 7577'. LOSE FULL RETURNS @ 7607' WITH FULL RETURNS BY 7650'.

SANDSTONE = WHITE TO OFF WHITE TO LIGHT GRAY TO MEDIUM LIGHT GRAY TO LIGHT BLUISH GRAY TO GREENISH GRAY TO A GRAYISH BLUE GREEN COLOR; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; VERY WELL TO FAIR SORTING; SUBROUND TO SUBANGULAR; HIGH TO MODERATE SPHERICITY; SOME FROSTED AND POLISHED GRAINS DUE TO MECHANICAL ABRASION; MODERATELY HARD TO FRIABLE HARDNESS; VIGOROUS REACTION WITH A 10% SOLUTION OF HCL INDICATING CALCITE CEMENTATION; GRAIN SUPPORTED; PYRITE FOUND IN THE SAMPLE AS AN ACCESSORY MINERAL; BEDDING CONTACTS BETWEEN SANDSTONE AND SILTSTONE VISIBLE IN THE SAMPLE; VEINS OF PYRITE ALSO VISIBLE IN SHALE AND CARBONACEOUS SHALE IN THE SAMPLE; LITHIC FRAGMENTS RANGE FROM <10% TO 20% IN THE SANDSTONE SAMPLES.

CARBONACEOUS SHALE = GRAYISH BLACK TO MEDIUM DARK GRAY IN COLOR; DENSE TO BRITTLE TO CRUMBLY TENACITY; PLANAR TO IRREGULAR FRACTURE; MASSIVE TO PLATY TO WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL



TO WAXY TO GREASY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE BEDDING STRUCTURE VISIBLE IN THE SAMPLE; PYRITE VISIBLE IN VEINS AND LOOSE IN THE SAMPLE; SOME SAMPLES OF CARBONACEOUS SHALE OBSERVED DEGASSING.

NOTE: PARTIAL RETURNS @ 7915' WITH FULL RETURNS @ 7950'.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY TO LIGHT BROWNISH GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO BLADED CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE STRUCTURE VISIBLE IN THE SAMPLE.

CARBONACEOUS SHALE = GRAYISH BLACK TO MEDIUM DARK GRAY IN COLOR; DENSE TO BRITTLE TO CRUMBLY TENACITY; PLANAR TO IRREGULAR FRACTURE; MASSIVE TO PLATY TO WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL TO WAXY TO GREASY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE BEDDING STRUCTURE VISIBLE IN THE SAMPLE; PYRITE VISIBLE IN VEINS AND LOOSE IN THE SAMPLE.

NOTE: PARTIAL RETURNS @ 8067' WITH LOSS OF FULL RETURNS @ 8077'. REGAIN PARTIAL RETURNS @ 8103' AND REGAIN FULL RETURNS @ 8160'.

SILTSTONE = MEDIUM DARK GRAY TO MEDIUM LIGHT GRAY TO BROWNISH GRAY TO MEDIUM BLUISH GRAY TO LIGHT BLUISH GRAY IN COLOR; TOUGH TO DENSE TENACITY; BLOCKY TO IRREGULAR FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; DULL TO EARTHY TO WAXY LUSTER; SILTY TO GRITTY TEXTURE; THIN TO LAMINAE STRUCTURE PRESENT IN THE SAMPLE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE; INTERBEDDED WITH SANDSTONE, SHALE AND CARBONACEOUS SHALE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY TO LIGHT BROWNISH GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO BLADED CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE STRUCTURE VISIBLE IN THE SAMPLE.

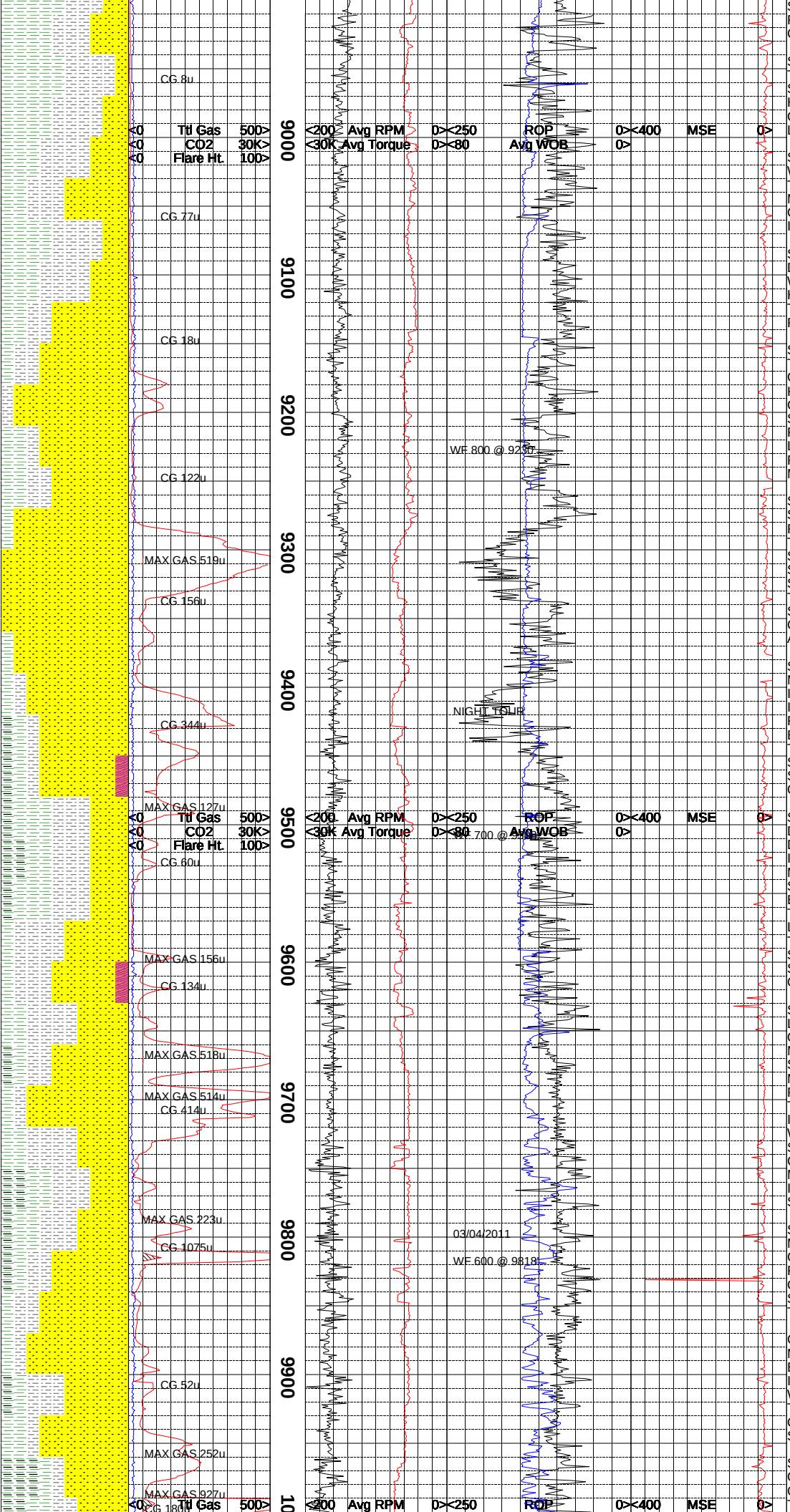
SANDSTONE = WHITE TO OFF WHITE TO LIGHT GRAY TO MEDIUM LIGHT GRAY TO MEDIUM GRAY TO GRAYISH BLUE TO GRAYISH RED IN COLOR; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; WELL TO FAIR SORTING; SUBROUND TO SUBANGULAR; HIGH TO MODERATE SPHERICITY; FROSTED GRAINS VISIBLE IN THE SAMPLE; HARDNESS RANGES FROM EASILY FRIABLE TO FIRMLY FRIABLE TO MODERATELY HARD; GRAIN SUPPORTED; REACTION TO A 10% HCL SOLUTION RANGES FROM MODERATE TO SLIGHT INDICATING BOTH SILICA AND CALCITE CEMENTATION; TRACE PYRITE VISIBLE IN THE SAMPLE; BEDDING CONTACTS BETWEEN SANDSTONE AND SILTSTONE VISIBLE ON SOME SAMPLES.

SILTSTONE = MEDIUM GRAY TO MEDIUM DARK GRAY TO MEDIUM BLUISH GRAY TO BROWNISH GRAY TO GRAYISH RED WITH SOME YELLOWISH GRAY SAMPLES; TOUGH TO DENSE TO CRUNCHY TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; EARTHY TO DULL TO GREASY LUSTER; SILTY TO GRITTY TEXTURE; THIN BEDDING STRUCTURES VISIBLE IN THE SAMPLE; PYRITE VISIBLE AS AN ACCESSORY MINERAL FOUND BOTH LOOSE AND INTERBEDDED IN SAMPLES; INTERBEDDED WITH SANDSTONE, SHALE AND CARBONACEOUS SHALE.

NOTE: DROP IN FLOW @ 8766' WITH LOSS OF FULL RETURNS @ 8785'. REGAIN PARTIAL RETURNS @ 8787' AND REGAIN FULL RETURNS BY 8860'.

SANDSTONE = OFF WHITE TO MEDIUM GRAY TO LIGHT GRAY WITH MINOR CHLORITIZATION; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND TRACE KAOLIN; NON TO SLIGHT REACTION TO HCl; VERY FINE TO UPPER FINE GRAIN; SUBANGULAR TO SUBROUND; FAIR TO WELL SORTED; LOW TO MODERATE SPHERICITY; 4-7% CARBONACEOUS MATERIAL FLECKS IN SAMPLE FLECKS; MODERATE HARD TO VERY HARD; TRACE ACCESSORY MINERALS OF MICRO PYRITE AND CHLORITE MICA; GRADES TO LIGHT MEDIUM GRAY SILTSTONE.

SHALE = MEDIUM GRAY TO LIGHT GRAY TO DARK GRAY; PLATY TO ELONGATE TO SEMI WEDGELIKE CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; SPLINTERY TO PLANAR TO BLOCKY FRACTURE; GRADES TO MEDIUM GRAY



SILTSTONE; TRACE CARBONACEOUS SHALE FLECKS IN SAMPLE FRAGMENTS; HARD TO CRUNCHY TENACITY.

SILTSTONE = MEDIUM GRAY TO LIGHT GRAY TO VERY DUSKY RED; GRITTY TO GRANULAR TO SILTY TEXTURE; IRREGULAR TO BLOCKY TO HACKLY FRACTURE; WEDGELIKE TO TABULAR CUTTINGS HABIT; SPARKLING TO EARTHY LUSTER; GRADES TO LIGHT GRAY SANDSTONE.

SHALE = MEDIUM GRAY TO DARK GRAY MOTTLED WITH LIGHT GRAY AND GRAYISH RED; PLATY TO TABULAR TO ELONGATED CUTTINGS HABIT; MATTE TO SILTY TEXTURE; GRADES TO LIGHT GRAY SILTSTONE; EARTHY TO DULL LUSTER; IRREGULAR TO PLANAR TO ANGULAR FRACTURE.

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

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY TO MEDIUM LIGHT GRAY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND MINOR KAOLIN CEMENT; 3-6% CARBONACEOUS SHALE/ COAL FLECKS IN SAMPLE FRAGMENTS; WELL SORTED; SUBROUND TO SUBANGULAR; VERY FINE TO UPPER FINE GRAIN; GRADATION TO LIGHT GRAY SILTSTONE; MOD SPHERICITY; FRIABLE TO MODERATE HARD; TR ACCESSORY MINERAL OF MICRO PYRITE.

SANDSTONE = OFF WHITE TO CLEAR; WELL SORTED; PREDOMINANTLY LOOSE GRAIN; VERY FINE TO UPPER FINE GRAIN; TRANSLUCENT TO TRANSPARENT; MINOR FROSTING; ROUND TO SUBANGULAR; SOME PRESERVED SPECIMENS SHOW PREDOMINANT GRAIN SUPPORT WITH SILICA AND MINOR KAOLIN CEMENT; FRIABLE TO FIRM FRIABLE; 2-5% CARBONACEOUS SHALE/COAL FLECKS IN SAMPLE FRAGMENTS; GRADES TO LIGHT GRAY SILTSTONE; HIGH GAS ASSOCIATED WITH FRIABLE SANDSTONE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY TO LIGHT BROWNISH GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO BLADED CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE STRUCTURE VISIBLE IN THE SAMPLE; TRACE PYRITE VISIBLE IN THE SAMPLE AS AN ACCESSORY MINERAL; EVIDENCE OF FRACTURE FILL SOME SAMPLES.

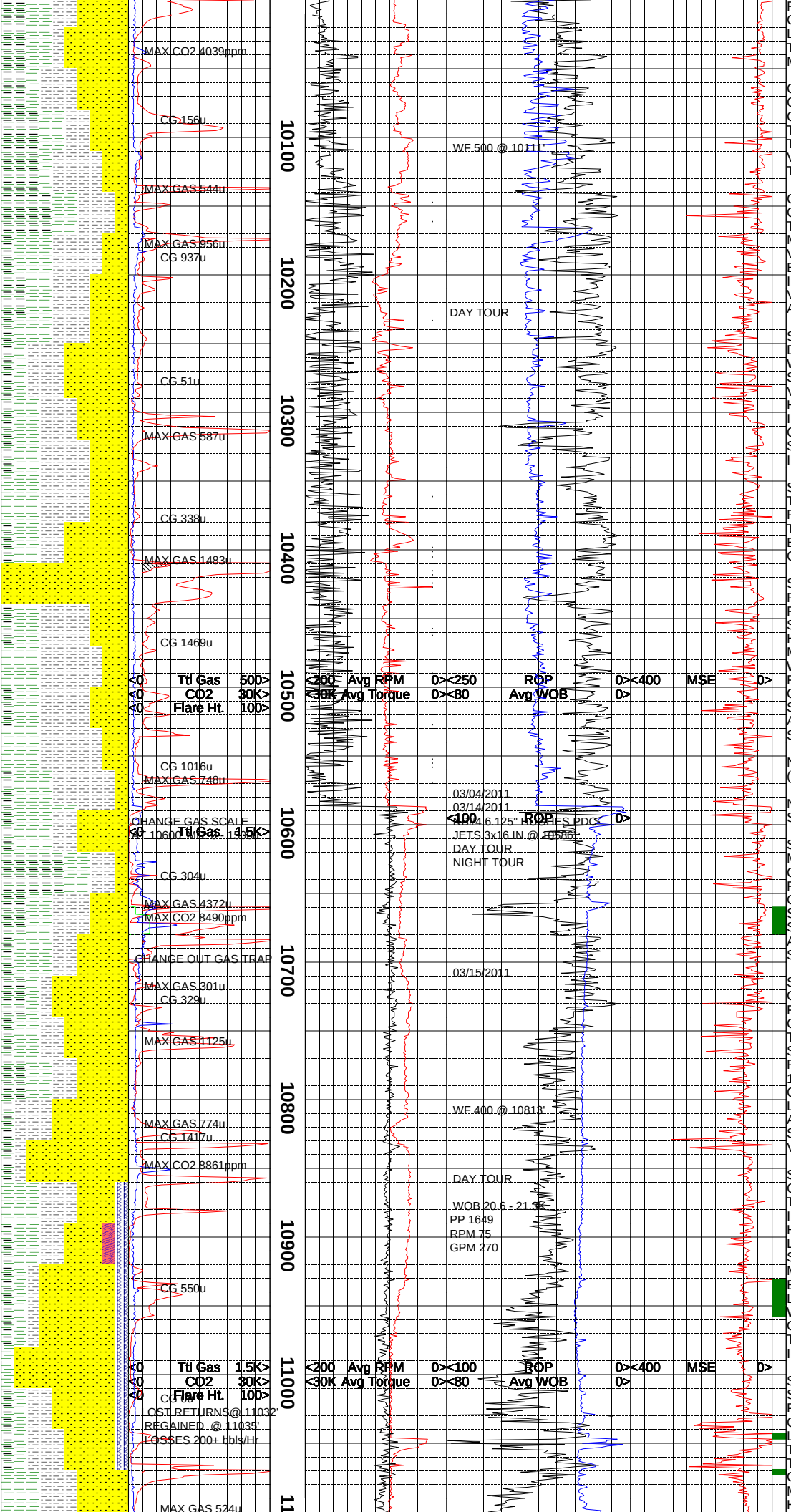
SILTSTONE = LIGHT GRAY TO MEDIUM GRAY TO DARK GRAY TO A GRAYISH BROWN COLOR; DENSE TO BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY TO WEDGELIKE TO SLIGHTLY BLADED CUTTINGS HABIT; DULL TO EARTHY TO GREASY LUSTER; SILTY TO GRITTY TO SLIGHTLY GRANULAR IN TEXTURE; THIN TO LAMINAE BEDDING STRUCTURES VISIBLE IN THE SAMPLE; BEDDING CONTACT BETWEEN SANDSTONE AND SILTSTONE VISIBLE IN THE SAMPLE; CALCITE VEIN VISIBLE IN A SAMPLE OF SANDSTONE.

SANDSTONE = WHITE TO OFF WHITE TO VERY LIGHT GRAY TO MEDIUM GRAY IN COLOR; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; WELL TO FAIR SORTING; SUBROUND TO SUB ANGULAR; HIGH TO MODERATE SPHERICITY; SOME FROSTED AND POLISHED GRAINS; MANY LOOSE GRAINS IN THE SAMPLE; FRIABLE TO MODERATELY HARD IN HARDNESS; LOW TO MODERATE REACTION WITH A 10% SOLUTION OF HCL; CALCITE WITH SOME SILICA CEMENTATION; LOW LITHIC CONTENT OF ABOUT 10%; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE; INTERBEDDED WITH SILTSTONE AND SOME SHALE AND CARBONACEOUS SHALE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO BLADED CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; LAMINAE TO THIN STRUCTURE VISIBLE IN THE SAMPLE.

CARBONACEOUS SHALE = GRAYISH BLACK TO MEDIUM DARK GRAY IN COLOR; DENSE TO BRITTLE TO CRUMBLY TENACITY; PLANAR TO IRREGULAR FRACTURE; MASSIVE TO PLATY TO WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL TO WAXY TO GREASY LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE BEDDING STRUCTURE VISIBLE IN THE SAMPLE.

SILTSTONE = MEDIUM LIGHT GRAY TO MEDIUM GRAY TO MEDIUM DARK GRAY TO A BROWNISH GRAY COLOR; TOUGH TO BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO BLOCKY TO PLANAR



FRACTURE; MASSIVE TO PLATY TO BLADED CUTTINGS HABIT; EARTHY TO DULL TO WAXY LUSTER; SILTY TO GRITTY TEXTURE; LAMINAE TO NO VISIBLE STRUCTURE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

CARBONACEOUS SHALE = MED DARK GRAY TO GRAYISH BLACK; DENSE TO BRITTLE TO CRUMBLY TENACITY; SMOOTH TO CLAYEY TEXTURE; PLANAR TO IRREGULAR FRACTURE; THIN TO LAMINAE BEDDING STRUCTURE VISIBLE IN THE SAMPLE; MASSIVE TO PLATY TO WEDGELIKE CUTTINGS HABIT.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE GRAY TO BROWNISH BLACK; PLATY TO TABULAR TO ELONGATED CUTTINGS HABIT; MATTE TO CLAYEY TEXTURE; EARTHY TO SEMI VITREOUS LUSTER; PLANAR TO SPLINTERY TO BLOCKY FRACTURE; THIN LAMINAE OF COAL INTERBEDDED IN SAMPLE FRAGMENTS; VISIBLE SIGNS OF DEGASSING ALONG CONTACT AND FRACTURES.

SANDSTONE = OFF WHITE TO LIGHT GRAY TO DARK GRAY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND KAOLIN CEMENT; WELL SORTED; FAIR TO MODERATE SPHERICITY; VERY FINE TO FINE GRAIN; FIRM FRIABLE TO HARD; THIN CARBONACEOUS MATERIAL LAMINAE INTERBEDDED WITH SAMPLE FRAGMENTS; 3-5% CARBONACEOUS SHALE/COAL FLECKS IN SAMPLE SPECIMENS; HIGH GAS ASSOCIATED WITH INTERBEDDED COAL AND SANDSTONE INTERVAL.

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

SANDSTONE = OFF WHITE TO TRANSPARENT; PREDOMINANTLY LOOSE GRAIN; SOFT TO FIRM FRIABLE; CLEAR TO OPAQUE; ROUND TO SUBANGULAR; WELL SORTED; MODERATE TO HIGH SPHERICITY; VERY FINE TO LOWER MEDIUM GRAIN; MINOR PRESERVED SPECIMENS WITH SILICA AND KAOLIN CEMENT; EASILY FRIABLE TO MODERATE HARD; TRACE AMOUNTS OF CARBONACEOUS SHALE/COAL FLECKS IN SAMPLE FRAGMENTS; SOFT SANDSTONE ASSOCIATED WITH HIGH GAS; PRESERVED SAMPLES GRADE TO LIGHT GRAY SILTSTONE.

NOTE: TD INTERMEDIATE SECTION @ 10586' (10254' TVD) ON 03/04/2011

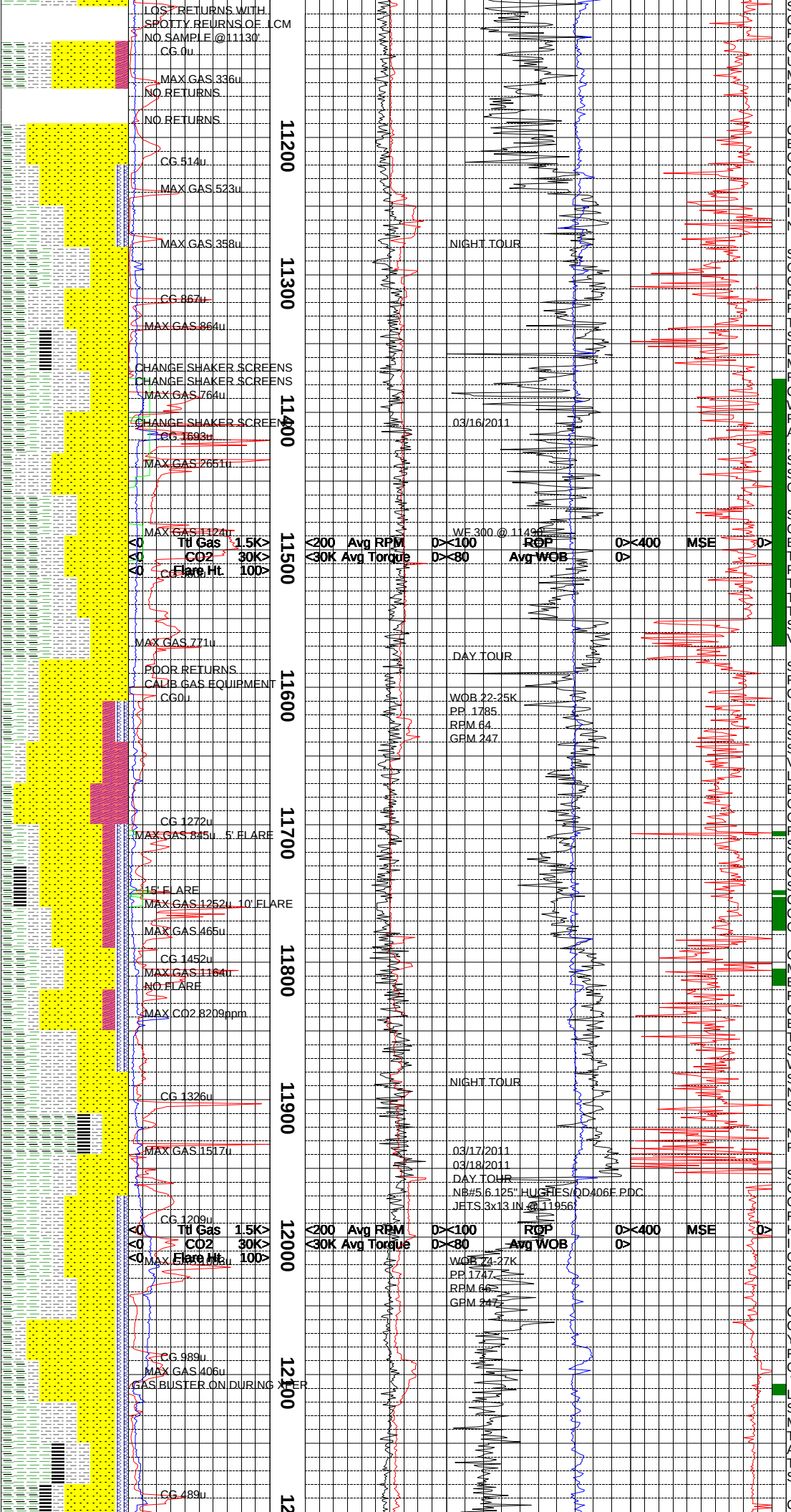
NOTE: RETURN TO DRILLING PRODUCTION SECTION ON 03/14/2011

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM LIGHT GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; NO VISIBLE STRUCTURE PRESENT IN THE SAMPLE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

SANDSTONE = WHITE TO OFF WHIT TO LIGHT GRAY TO MEDIUM GRAY IN COLOR; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; WELL TO FAIR SORTING; HIGH TO MODERATE SPHERICITY; SUBANGULAR TO SUBROUND ANGULARITY; SOME FROSTED TO POLISHED GRAINS; HIGHLY REACTIVE WITH A 10% HCL SOLUTION INDICATING CALCITE CEMENTATION; GRAIN SUPPORTED; 10-20% LITHIC CLASTS INCLUDED IN THE SAMPLE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE; NO VISIBLE BEDDING STRUCTURES VISIBLE IN THE SAMPLE.

SILTSTONE = MEDIUM TO DARK GRAY, OLIVE GRAY, OCCASIONAL BROWNISH GRAY; CRUNCHY TO MODERATELY HARD TENACITY; FRACTURE IRREGULAR TO SUB CONCHOIDAL; CUTTINGS HABIT SOMEWHAT BLOCKY TO OCSIONAL IRREG; LUSTER DULL TO EARTHY WITH SLIGHTLY SUCROSIC APPEARANCE; TEXTURE SILTY TO MODERATELY GRITTY; RARE TO OCCASIONAL ENTRAINED FINE SAND GRAINS AS DISCONTIN LENSES; STRUCTURE PREDOMINANTLY MASSIVE WITH RARE COLOR GRADATIONS; RARE TRACES OF CARBONACEOUS PLANT FRAGMENTS, SLIGHT TO MODERATELY CALCAREOUS; THINLY INTERBEDDED WITH SANDSTONE.

SANDSTONE = WHITE TO WHITISH GRAY WITH SLIGHTLY PEPPERED APPEARANCE; FRAMEWORK PREDOMINANTLY TRANSLUCENT WHITE TO COLORLESS QUARTZ WITH <5% DARK LITHICS; LOWER VERY FINE TO UPPER FINE; MODERATE TO MODERATELY WELL SORTED; SUB ANGULAR TO SUB ROUNDED; MODERATE SPHERICITY WITH OCCASIONAL PRISMOIDAL GRAINS; SOFT TO MODERATELY FIRMLY FRIABLE; CEMENTATION HIGHLY CALCAREOUS; MOST SPECIMENS GRAIN



SUPPORTED WITH SOME MINOR ARGILLACEOUS COMPONENT; INTERSTICAL VOIDS FAIRLY WELL FILLED; NO EVIDENCE OF BEDDING; [LITHIC CLASTS = DARK GRAY TO GRAYISH BLACK; UPPER FINE TO LOWER MEDIUM; ANGULAR; MODERATELY SOFT; POSSIBLE REWORKED SEDIMENTS, SHALE]; NO CUT; NO FLUORESCENCE.

CARBONACEOUS SHALE = BLACK TO GRAYISH BLACK; CRUNCHY TO BRITTLE TENACITY; SUB CONCHOIDAL TO SUB BLOCKY FRACTURE; CUTTINGS HABIT SMALL ELONGATED TO LARGER THIN TABULAR, BRIGHT METALLIC LUSTER; VERY THINLY LAMINATED STRUCTURE; INTERBEDDED W/ POORLY CONSOLIDATED SAND; NO ACCESSORY MINERALS.

SANDSTONE = WHITE TO OFF WHITE TO LIGHT GRAY TO MEDIUM GRAY TO MEDIUM BLUISH GRAY IN COLOR; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; WELL TO FAIR TO SLIGHTLY POOR SORTING; SUBROUND TO SUBANGULAR; HIGH TO MODERATE SPHERICITY; SOME FROSTED GRAINS PRESENT DUE TO MECHANICAL ABRASION; FRIABLE TO MODERATELY HARD HARDNESS; HIGHLY REACTIVE WITH A 10% SOLUTION OF HCL; CALCITE CEMENTATION; GRAIN SUPPORTED WITH BETWEEN 10-20% LITHIC CLASTS WITH A FEW SAMPLES HAVING UPWARDS OF 30%; NO ACCESSORY MINERALS PRESENT IN THE SAMPLE ; NO BEDDING STRUCTURES VISIBLE IN THE SAMPLE; INTERBEDDED WITH SILTSTONE, SHALE AND CARBONACEOUS SHALE; MANY LOOSE GRAINS IN THE SAMPLE.

SILTSTONE = MEDIUM LIGHT GRAY TO MEDIUM GRAY TO DARK GRAY IN COLOR; DENSE TO BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY TO TABULAR CUTTINGS HABIT; EARTHY TO DULL TO SLIGHTLY WAXY LUSTER; SILTY TO GRITTY TO SLIGHTLY GRANULAR TEXTURE; THIN TO LAMINAE STRUCTURE VISIBLE IN SOME SAMPLES; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

SANDSTONE = LIGHT GRAY TO WHITISH GRAY; FRAMEWORK TRANSPARENT COLORLESS QUARTZ TO TRANSLUCENT WHITE QUARTZ; UPPER VERY FINE TO UPPER FINE; WELL SORTED; SUB ROUNDED TO SUB ANGULAR; SOME MINOR PITTING AND FROSTING OF GRAIN SURFACES, HIGH TO MODERATELY HIGH SPHER; VERY SOFT PRESENTS PREDOMINANTLY AS LOOSE GRAINS WITH PRESERVED SPECIMENS BEING VERY EASILY FRIABLE; CEMENT HIGHLY CALCAREOUS WITH MINOR ARGILLACEOUS COMPONENT; INTERSTICES WELL TO MODERATE FILLED; BEDDING MASSIVE; ASSOCIATED WITH SLIGHT TO ABUNDANT FRACTURE FILL AS CALCITE CLEAVAGE RHOMBS TO RARE "WATER CLEAR" TABULAR CALCITE CRYSTALS AND RARE SPARRY FRAGS; INCREASING CARBONACEOUS CONTENT WITH SOME VERY THIN COALS; OCCASIONAL LIGHT CARBON STAINING AT GRAIN EDGES; NO FLUORESCENCE; NO CUT.

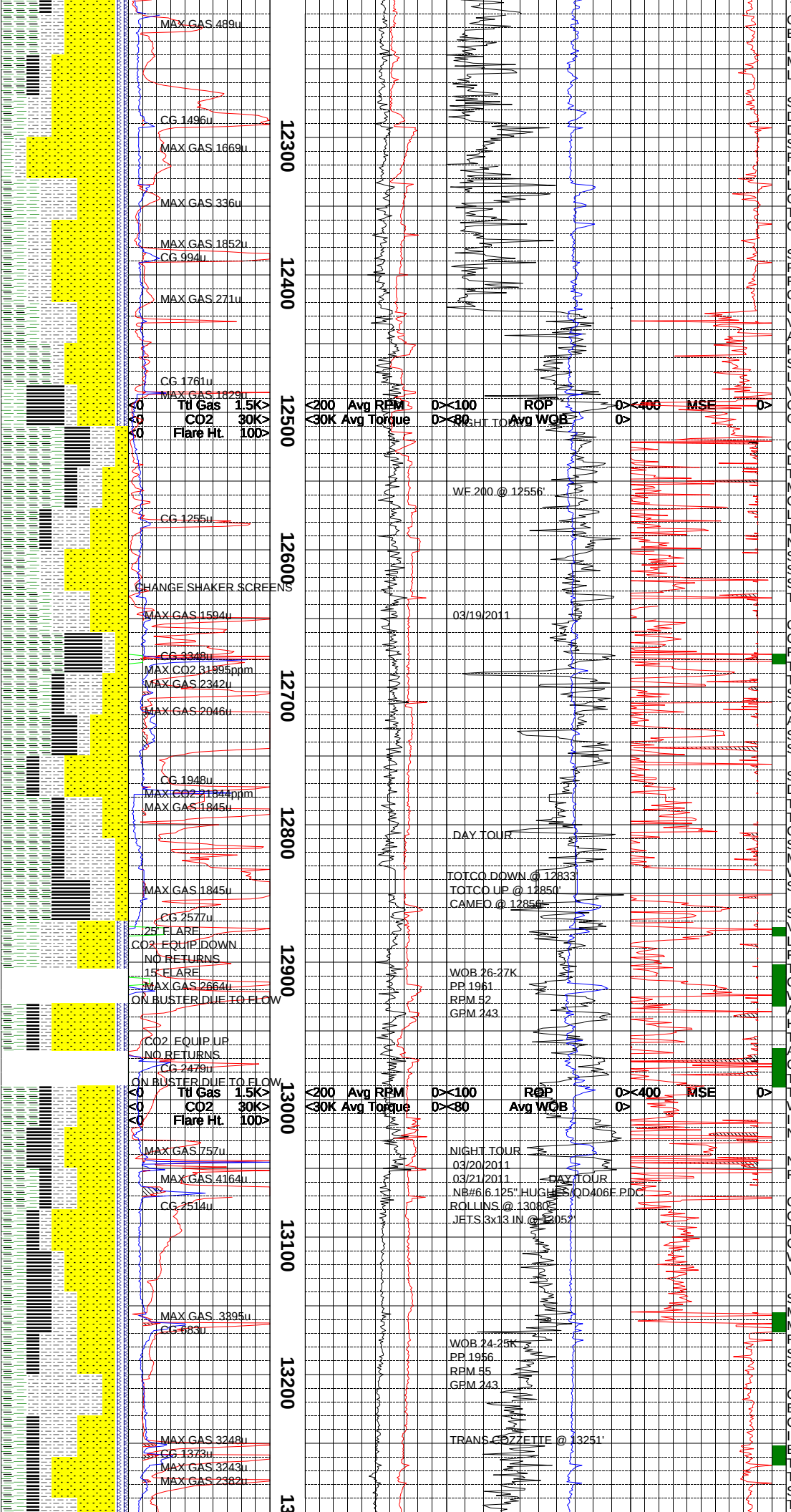
CARBONACEOUS SHALE = BLACKISH GRAY TO MEDIUM GRAY; BLACKISH BROWN; CRUNCHY TO BRITTLE TENACITY W/ OCCASIONAL CRUMBLY; FRACTURE IRREGULAR TO SUB CONCHOIDAL; CUTTINGS HABIT IRREGULAR TO OCCASIONAL BLOCKY; LUSTER RESINOUS TO VITREOUS; THINLY LAMINATED; RARE MINOR OUTGASSING; SOME SPECIMENS SHOW THIN LAMINAE OF WELL DEVELOPED COAL; INTERBEDDED WITH SANDSTONE, SILTSTONE AND SOME SHALE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE.

NOTE = TRIP- NEW BIT @ 11956' 3/16/2011
RETURN TO DRILLING 3/18/2011

SHALE = MEDIUM TO DARK GRAY, BROWNISH GRAY, BLACKISH GRAY, OCCASIONAL LIGHT GRAY; CRUNCHY TO MODERATELY TOUGH; FRACTURE HACKLY TO SUB PLANAR; CUTTINGS HABIT TABULAR TO WEDGELIKE WITH COMMON IRREGULAR; LUSTER MOSTLY DULL WITH OCCASIONAL WAXY TO RESINOUS; TEXTURE SMOOTH TO VERY SLIGHTLY SILTY; STRUCTURE PREDOMINANTLY MASSIVE.

CARBONACEOUS SHALE = BLACKISH BROWN TO GRAYISH BROWN, BROWNISH BLACK TO DUSKY YELLOWISH BROWN; CRUNCHY TO BRITTLE; FRACTURE HACKLY TO SOMEWHAT BLOCK WITH OCCASIONAL TO CONCHOIDAL; CUTTINGS HAB TABULAR TO BLOCKY W/ COMMON IRREGULAR; LUSTER DULL TO WAXY; TEXTURE PREDOMINANT SMOOTH WITH OCCASIONAL SILTINESS; STRUCT MASSIVE TO FINELY LAMINATED; COMMON THIN LAMINAE OF CARBONACEOUS MATERIAL AND CARBON STAINING WITH OCCASIONAL THIN LAMINAE OF WELL DEVELOPED COALS SHOWING MINOR TO MODERATE OUTGASSING.

COAL = BLACK TO BROWNISH BLACK; CRUNCHY



TO BRITTLE TENACITY; FRACTURE BLOCKY TO OCCASIONAL CONCHOIDAL; CUTTINGS HABIT BLOCKY TO TABULAR W/ COMMON IRREGULAR; LUSTER RESINOUS TO VITREOUS WITH SOME METALLIC SPECIMENS; STRUCTURE VERY THIN LAMINATIONS; MINOR OUTGASSING COMMON.

SILTSTONE = MODERATE TO GRAY1SH BROWN, DARK YELLOWISH BROWN TO GRAYISH ORANGE, DARK DUSKY BROWN; MODERATELY FIRM TO SOMEWHAT CRUNCHY W/ OCCASIONAL CRUMBLY; FRACTURE IRREGULAR TO HACKLY; CUTTINGS HABIT MASSIVE TO IRREGULAR TO WEDGELIKE; LUSTER DULL; TEXTURE SILTY TO SLIGHTLY GRITTY; STRUCTURE MASSIVE WITH OCCASION THIN DISCONTINUOUS STINGERS AND LAMINAE OF CARBONACEOUS MATERIAL.

SANDSTONE = WHITE TO WHITISH GRAY, VERY PALE ORANGE TO LIGHT MODERATE BROWN; FRAME WORK TRANSPARENT COLORLESS QUARTZ TO TRANSLUCENT COLORLESS QUARTZ; UPPER VERY FINE TO UPPER FINE; WELL TO VERY WELL SORTED; SUB ROUNDED TO SUB ANGULAR; SPHERICITY MODERATELY HIGH TO HIGH; VERY MINOR SUPERFICIAL ABRASION; SOFT TO VERY SOFT PRESENTING AS MOSTLY LOOSE GRAINS; PRESERVED SPECIMENS ARE VERY EASILY FRIABLE; HIGHLY TO MODERATE CALCAREOUS CEMENT; GRAIN SUPPORTED; OCC CARBONACEOUS LAMINAE; NO FLUORES.

CARBONACEOUS SHALE = GRAYISH BLACK TO DARK GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY TO WEDGELIKE TO BLADED CUTTINGS HABIT; EARTHY TO DULL TO GREASY LUSTER; SMOOTH TO CLAYEY; LAMINAE TO THIN STRUCTURE PRESENT IN THE SAMPLE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE; THIN COAL STRINGERS VISIBLE IN SOME SAMPLES OF CARBONACEOUS SHALE AND SANDSTONE; COAL OBSERVED DEGASSING IN THE SAMPLE.

COAL = BLACK IN COLOR; PULVERULENT TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT; WAXY TO GREASY TO RESINOUS LUSTER; SMOOTH TEXTURE; THIN TO LAMINAE BEDDING STRUCTURE VISIBLE IN THE SAMPLE; COAL OBSERVED DEGASSING IN THE SAMPLE; NO ACCESSORY MINERALS VISIBLE IN THE SAMPLE; INTERBEDDED WITH CARBONACEOUS SHALE, SANDSTONE AND SOME SILTSTONE.

SILTSTONE = DUSKY YELLOWISH BROWN TO DUSKY BROWN, MODERATE REDDISH BROWN TO GRAYISH BROWN; SOFT TO BARELY FIRM TENACITY; FRACTURE IRREGULAR TO CRUMBLY; CUTTINGS HABIT MASSIVE; LUSTER DULL; SLIGHT SILTY TO SLIGHT GRITTY TEXTURE; MASSIVE STRUCTURE; THINLY INTERBEDDED WITH CARBONACEOUS SHALE, COAL AND SANDSTONE.

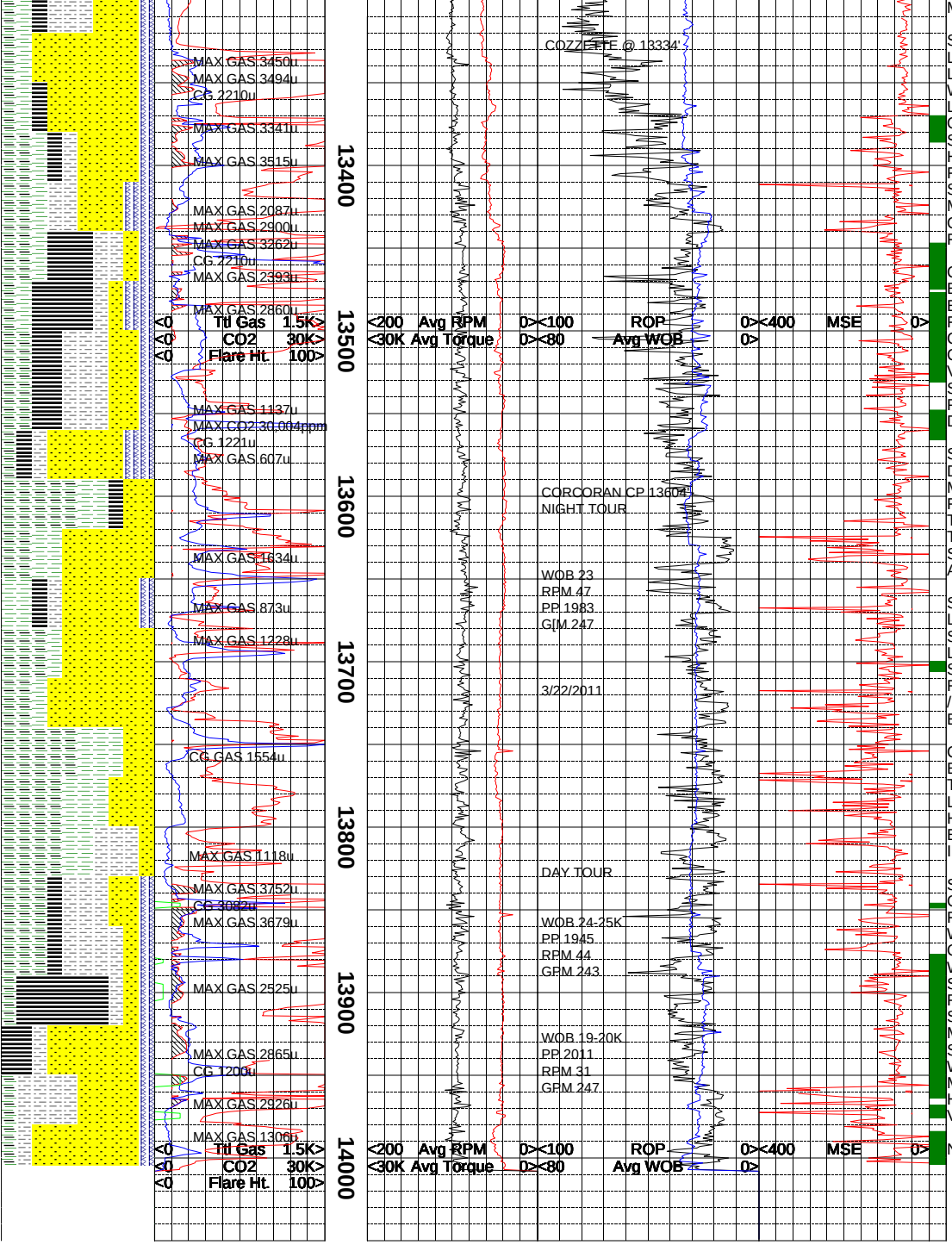
SANDSTONE = WHITE TO WHITISH GRAY, VERY PALE ORANGE TO GRAYISH ORANGE, LIGHT GRAY TO MEDIUM GRAYISH BROWN; FRAMEWORK PREDOMINANTLY COLORLESS TRANSPARENT TO TRANSLUCENT WHITISH QUARTZ GRAINS; UPPER VERY FINE TO UPPER WELL TO MODERATELY WELL SORTED; SUB ANGULAR TO SUB ROUNDED; MODERATE TO HIGH SPHERICITY; MODERATELY SOFT TO MODERATELY EASILY FRIABLE WITH ABUNDANT LOOSE GRAINS; CALCAREOUS CEMENT W/ MODERATELY STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED; THIN TO LAMINAE CARBONACEOUS BEDDING WITHIN SOME SANDSTONE SAMPLES TO THIN INTERBEDDED COALS; NO FLUORESCENCE; NO CUT.

NOTE = BIT TRIP @ 13052' ON 03/19/2011
RETURN TO DRILLING ON 3/21/2011

COAL = BLACK TO BROWNISH BLACK, OCCAS GRAYISH BLACK; CRUMBLY TO BRITTLE; IRREG TO BLOCKY, RARE CONCHOIDAL FRACTURE; CUTTINGS HABIT BLOCKY TO TABULAR TO SOME WHAT IRREGULAR; LUSTER RESINOUS TO VITREOUS; STRUCTURE FINELY LAMINATED.

SILTSTONE = DUSKY YELLOWISH BROWN TO MED YELLOWISH BROWN, BLACKISH BROWN; MODERATELY HARD TO MODERATELY SOFT; FRACTURE IRREGULAR; LUSTER DULL; SILTY TO SLIGHLY GRITTY TEXTURE; MASSIVE STRUCTURE.

CARBONACEOUS SHALE = DUSKY YELLOWISH BROWN TO BROWNISH BLACK TO BLACK; MOD CRUMBLY TO BRITTLE TENACITY; FRACTURE IRREGULAR TO SUB CONCHOIDAL WITH COMMON BLOCKY; CUTTINGS HABIT MASSIVE TO BLOCKY TO TABULAR; LUSTER DULL TO RESINOUS; TEXTURE SMOOTH TO VERY SLIGHTLY SILTY; STRUCTURE MASSIVE WITH THIN LAMINAE TO FINELY DISSEMINATED CARBONACEOUS



MATERIAL.

SANDSTONE = WHITE TO WHITISH GRAY, LIGHT GRAY TO PALE ORANGISH GRAY, VERY LIGHT MODERATE YELLOWISH BROWN; FRAME WORK PREDOMINANTLY WHITISH GRAY TRANS LUCENT QUARTZ TO COLORLESS TRANSPARENT QUARTZ; LOWER TO UPPER FINE; WELL SORTED SUB ROUND TO SUB ANGULAR; MODERATELY HIGH SPHERICITY; EASILY FRIABLE TO MOD FRIABLE; CALC/SILICA CEMENTATION; GRAIN SUPPORTED WITH MINOR KAOLIN; INTERSTICES MODERATELY FILLED; CARBON STAINING AT GRAIN EDGES; MINOR DULL YELLOWISH FLUORESCENCE; NO CUT.

COAL = BLACK TO OLIVE BLACK, BLACKISH BROWN TO BLUISH BLACK; CRUNCHY TO BRITTLE WITH COMMON SOMEWHAT CRUMBLY; FRACTURE IRREGULAR, BLOCKY, CONCHOIDAL; CUTTINGS HABIT BLOCKY TO TABULAR WITH COMMON WEDGELIKE SPECIMENS; LUSTER VITREOUS TO RESINOUS; TEXT. HOMOGENOUS STRUCTURE THINLY LAMINATED SOME PLANAR PARTING EVIDENT; COMMON VIGOROUS LONG DURATION OUTGASSING FROM MOST SPECIMENS.

SILTSTONE = DUSKY YELLOWISH BROWN TO DUSKY BROWN, MODERATE REDDISH BROWN; MODERATELY FIRM TO VERY SLIGHTLY SOFT; FRACTURE HACKLY TO IRREGULAR; WEDGELIKE TO FLAKY CUTTINGS HABIT; SMOOTH GRADING TO GRITTY TEXTURE; NO STRUCTURE; SOME SPECKLED BLACK COALY / LITHIC / CARBON-ACEOUS SHALE IMBEDDED; TRACE BROWNISH

SANDSTONE = LIGHT GRAYISH BLUE, GRAYISH LIGHT BROWN; SOME CLEAR TO TRANSLUCENT, SOME SALT AND PEPPER APPEARANCE; DOM LOWER FINE GRAIN; FAIR TO SUB WELL SORTED DOM SUB ANGULAR GRADING TO SUB ROUND; EASILY FRIABLE TO FRIABLE; CLAYEY / SILICA MATRIX CEMENT; TRACE SPECKLED BLACK CARBONACEOUS SHALE IMBEDDED.

CARBONACEOUS SHALE = BROWNISH BLACK, BLACKISH GRAY, BROWNISH GRAY; CRUMBLY TO CRUNCHY; SOME SLIGHTLY WAXY, DULL LUSTER; OCC WEDGELIKE, PLATY CUTTINGS HABIT; SMOOTH GRADING TO GRITTY TEXTURE; BLACK SPECKLED COALY / LITHIC LAMINATE, IMBEDDED; TRACE DEGASSING IN SAMPLE TRAY

SANDSTONE = WHITISH GRAY TO LIGHT GRAY, OCCASIONAL VERY PALE ORANGE; FRAMEWORK COLORLESS TRANSPARENT TO WHITISH GRAY TO WHITE TRANSLUCENT QUARTZ; UPPER TO LOWER FINE; MODERATELY WELL TO WELL SORTED; SUB ROUNDED TO SUBANGULAR; MODERATELY HIGH SPHERICITY; RARE MINOR PITTING OF GRAIN SURFACES; SOFT TO EASILY FRIABLE WITH OCCASIONAL MODERATELY FRIABLE TO MODERATELY HARD SPECIMENS; HIGHLY CALCAREOUS CEMENT W/ MINOR ARGILLACEOUS COMPONENT SHOWS MODERATE TO BARELY STRONG REACTION TO HCL; GRAIN SUPPORTED; SOME INTERSTICIAL VOIDS; NO FLUORESCENCE; NO CUT.

NOTE: TD WELL ON 3/22/2011 @ 14007'MD