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## Drilling Dynamics MD

COMPANY	ExxonMobil Production
WELL	PCU 297-11C6
FIELD	Piceance Creek Unit
REGION	Rocky Mountains
COORDINATES	39.896082 N 108.254572 W
ELEVATION	GL: 6965.3' KB: 6995.5'
COUNTY, STATE	Rio Blanco, CO
API INDEX	051031147200
SPUD DATE	02/12/2010
CONTRACTOR	HP Drilling
CO. REP.	M. Sadler / J. Wood
RIG/TYPE	#326/ Flex-Rig 4
LOGGING UNIT	#36
GEOLOGISTS	J. Kokes / D. Thibodeaux C. Record / J. Keevan
ADD. PERSONS	H. Strickland / J. Yeagar P. Strickland/ D. Lockhart
CO. GEOLOGIST	Chris Alba

### LOG INTERVAL

DEPTHS: 3824' TO 12688'  
DATES: 04/01/2010 TO 06/23/2010  
SCALE: 1" = 100'

### CASING DATA

16" AT 150'  
10 3/4" AT 3809'  
7" AT 8665'  
AT

### MUD TYPES

WATER BASED SPUD MUD TO 3824'  
LSND TO 12688'  
TO  
TO

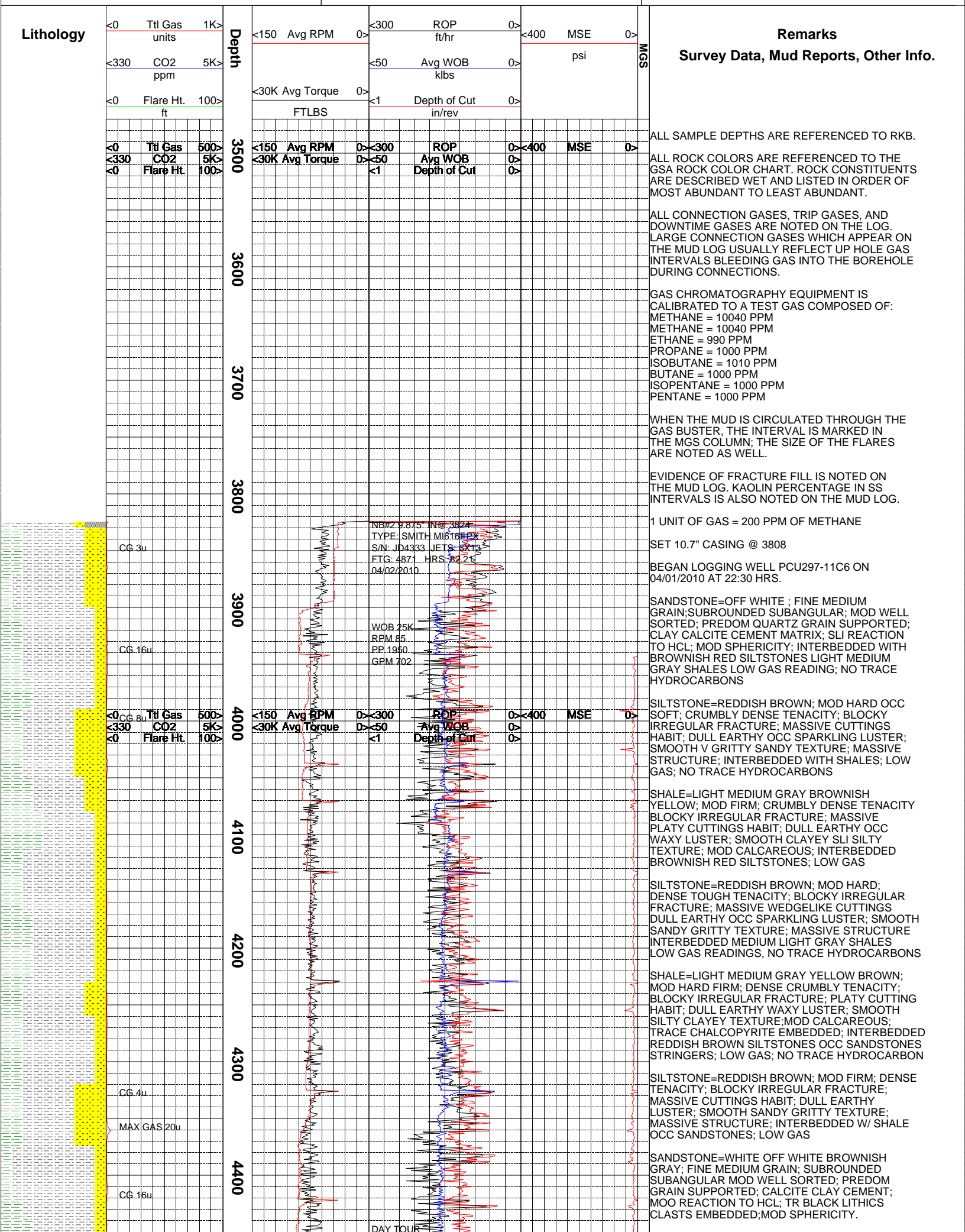
### HOLE SIZE

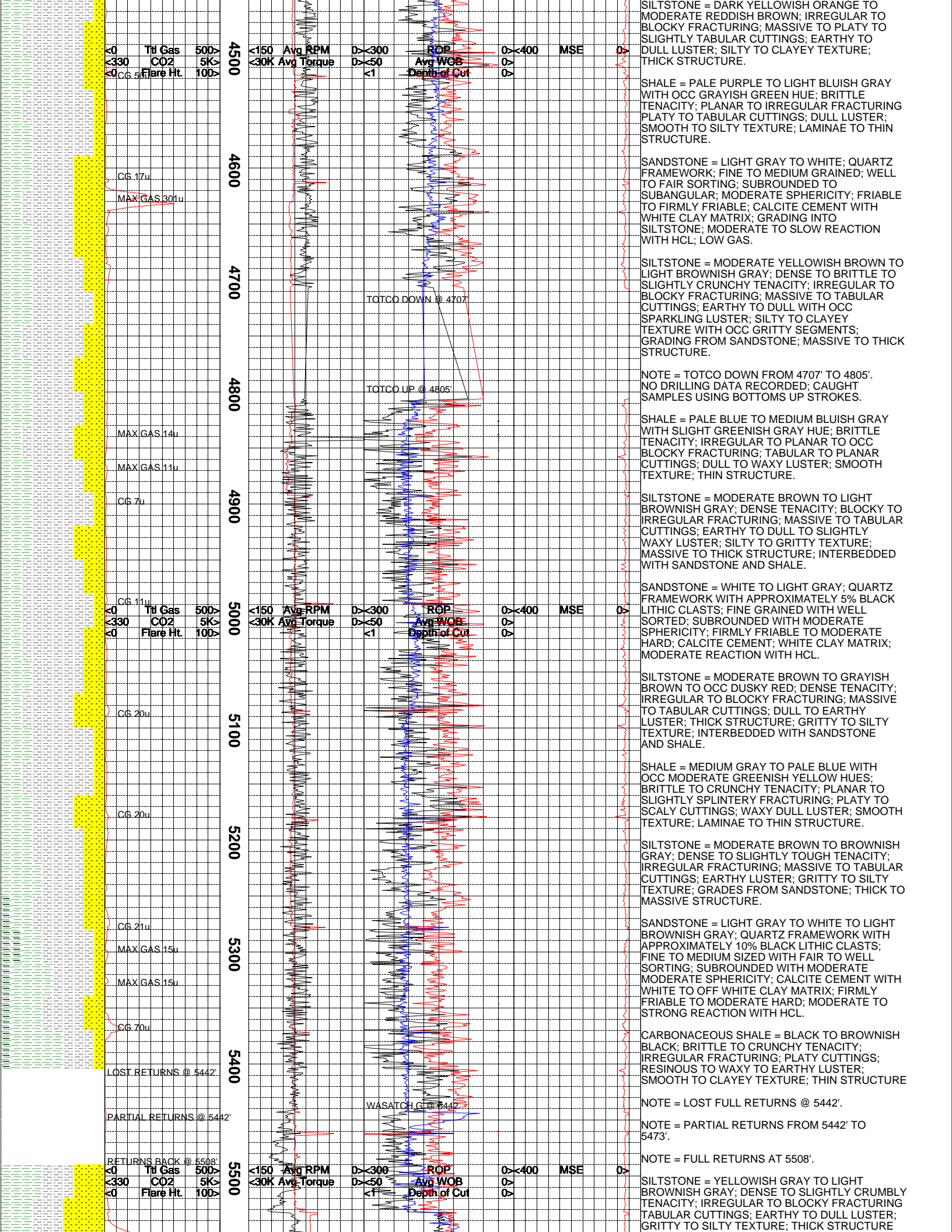
14 3/4" TO 3824'  
9 7/8" TO 8680'  
6 1/8" TO 12688'  
TO

### ABBREVIATIONS

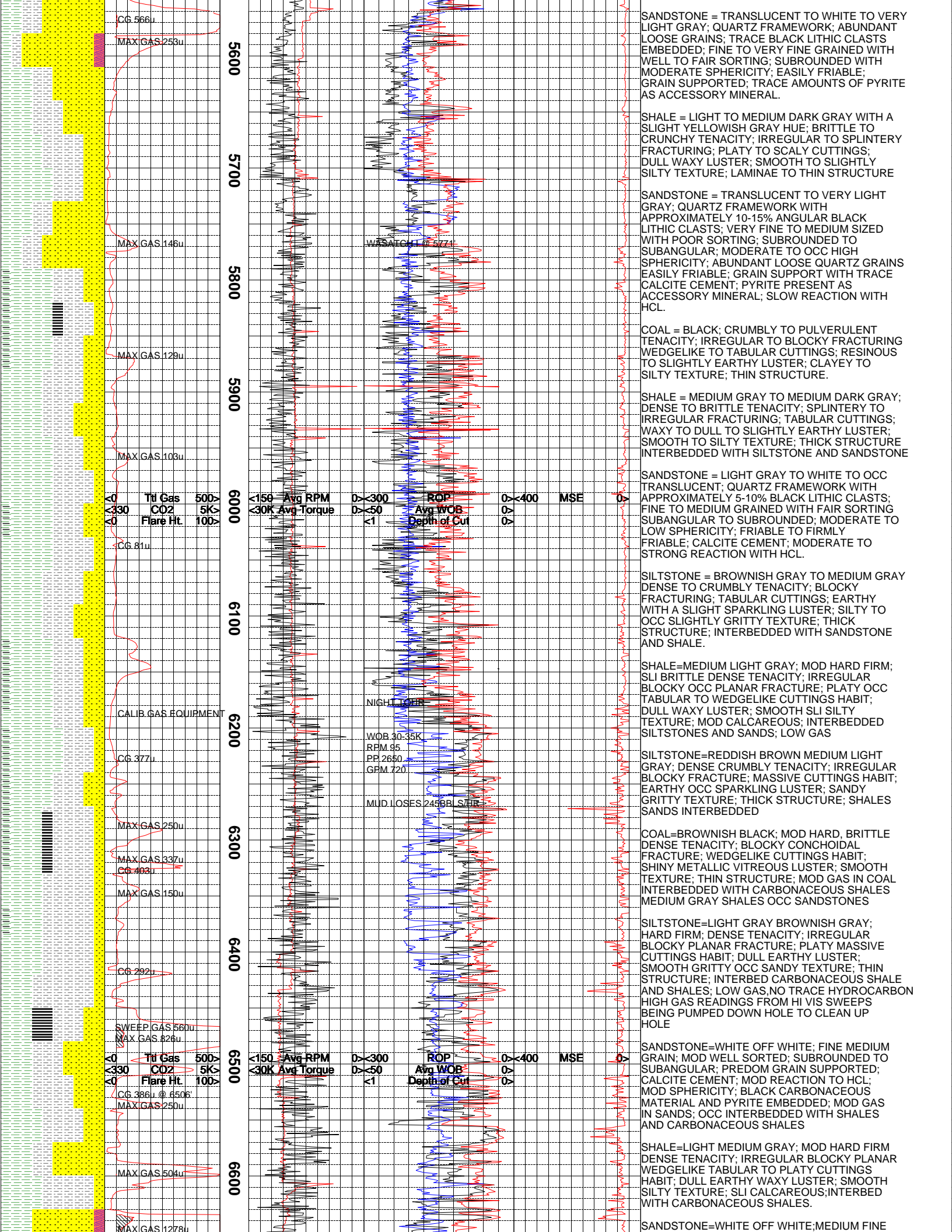
NB	NEWBIT	PV	PLASTIC VISCOSITY	LC	LOST CIRCULATION
RRB	RERUN BIT	YP	YIELD POINT	CO	CIRCULATE OUT
CB	CORE BIT	FL	FLUID LOSS	NR	NO RETURNS
WOB	WEIGHT ON BIT	CL	PPM CLORIDE ION	TG	TRIP GAS
RPM	ROTARY REV/MIN	Rm	MUD RESISTIVITY	SG	SURVEY GAS
PP	PUMP PRESSURE	Rmf	FILTRATE RESISTIVITY	WG	WIPER GAS
SPM	STROKES/MIN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

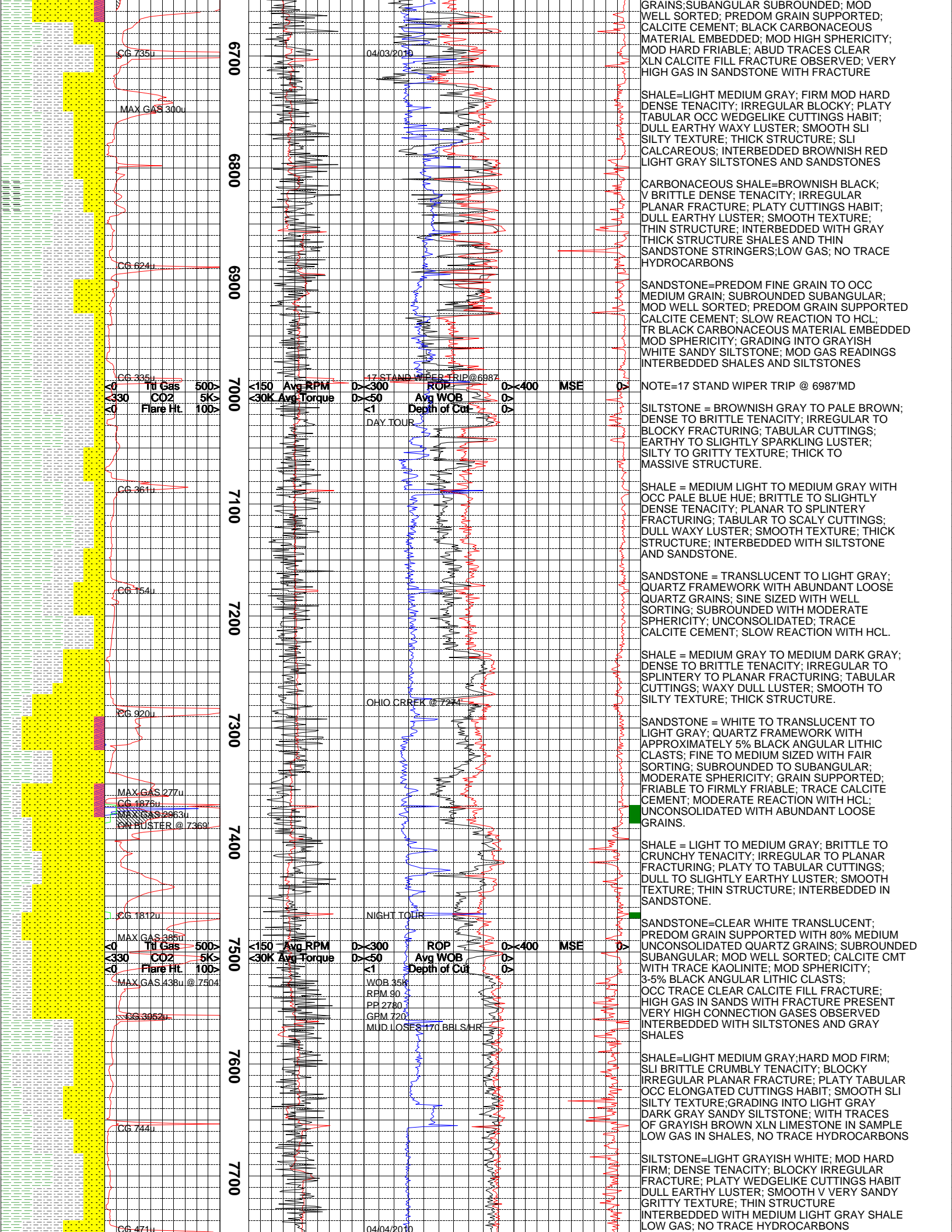
	ALTERED ZONE		CHERT - GLASSY		FELSIC SILIC DIKE		MARL - CALC		SANDSTONE
	ANDESITE		CHERT - PORCEL		FOSSIL		METAMORPHICS		SANDSTONE-TUFFACEOUS
	ANHYDRITE		CHERT - TIGER STRIPE		GABBRO		MUDSTONE		SERICITIZATION
	BASALT		CHERT - UNDIFF		GLASSY TUFF		OBSIDIAN		SERPENTINE
	BENTONITE		CLAY		GRANITE		PALEOSOL		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		

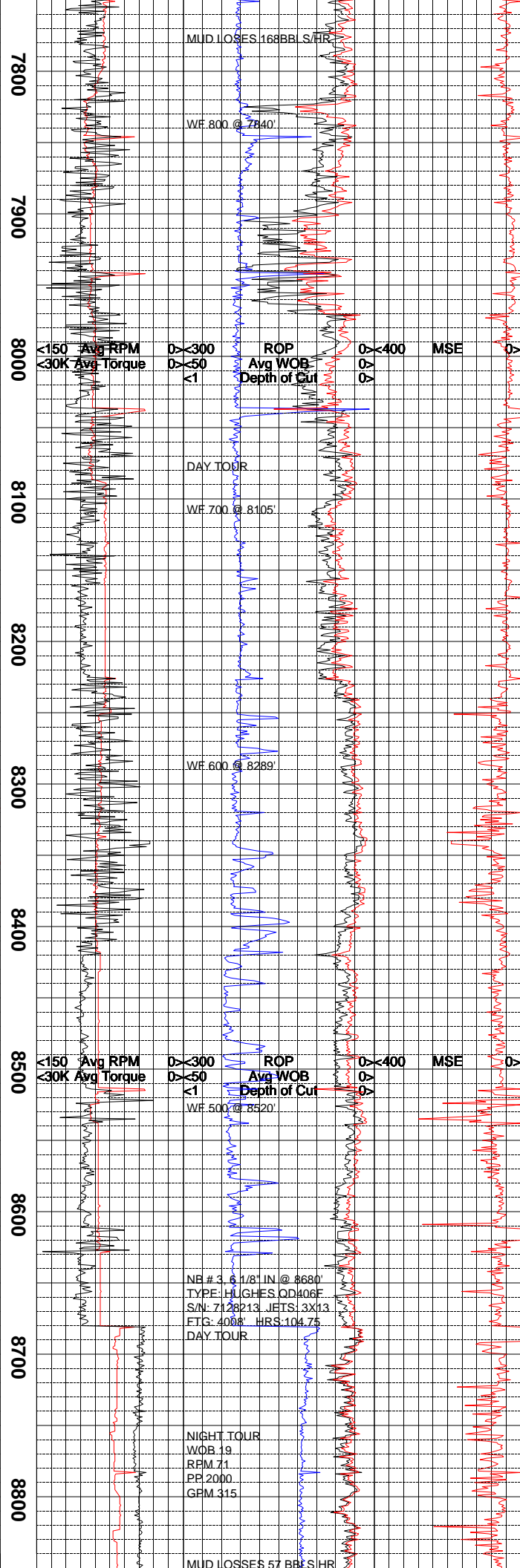
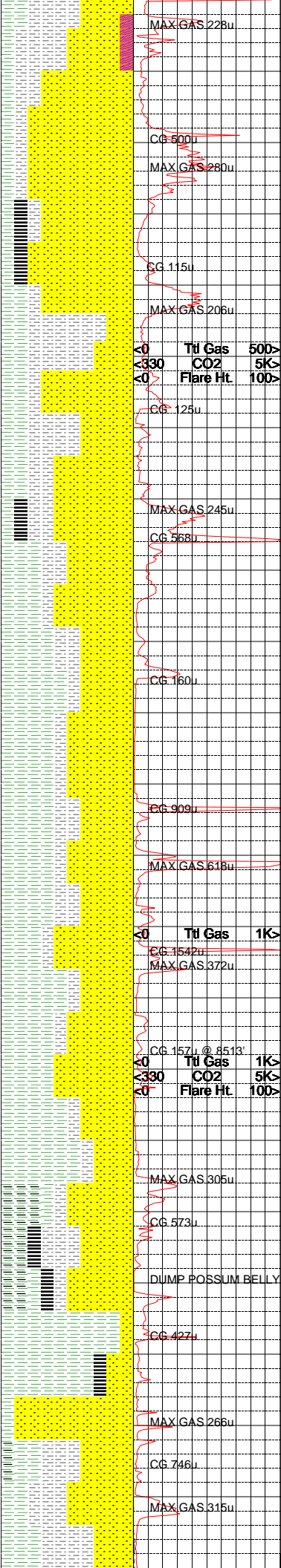












SANDSTONE=OFF WHITE OCC GREENISH GRAY;MOD HARD FRIABLE;PREDOM GRAIN SUPPORTED; SUBROUNDED SUBANGULAR; 1-3% BLACK LITHIC CLASTS EMBED; CALCITE WITH SOME TRACE KAOLINITE; MOD SPHER WITH TRACE CLEAR XLN CALCITE FRACTURE HIGH GAS READINGS IN SANDS WITH FRACTURE PRESENT; INTERBEDDED WITH SANDY SILTST AND MEDIUM DARK GRAY SHALES

SANDSTONE=WHITE CLEAR TRANSLUCENT; PREDOM MEDIUM UNCONSOLIDATED QUARTZ GRAINS; PREDOM GRAIN SUPPORTED; MOD HARD EASILY FRIABLE; CALCITE CEMENT; SLOW MOD REACTION TO HCL; EMBEDDED BLACK LITHIC CLASTS; INTERBEDDED SHALES WITH OCC TR THIN LAMINATED COAL BEDS; HIGH GAS IN SANDS;

SANDSTONE=WHITE OFF WHITE; FINE MEDIUM GRAIN MOD HARD EASILY FRIABLE; PREDOM GRAIN SUPPORTED; ABED LOOSE CLEAR MEDIUM SUBANGULAR QUARTZ; CALCITE CEMENT; TR BLACK ANGULAR LITHIC CLASTS EMBEDDED; OC INTERBEDDED COAL BEDS WITH MEDIUM SHALES REDDISH BROWN SILTSTONES; MOD GAS IN SANDS

SILTSTONE=REDDISH BROWN ; MOD HARD FIRM; SLI BRITTLE CRUMBLY TENACITY; BLOC IRREGULAR FRACTURE; MASSIVE PLATY CUTTINGS HABIT; DULL EARTHY OCC SPARKLING LUSTER; SMOOTH GRITTY TEXTURE; INTERBEDDED LITHIC SANDSTONE AND GRAY SHALE.

SANDSTONE= LIGHT GRAY TO COLORLESS; 90% TO 70% QUARTZ CLASTS WITH BLACK LITHIC FRAGMENTS; MEDIUM UPPER TO FINE UPPER, RARELY GRADES TO VERY FINE; FAIRLY SORTED TO POORLY, OCCASIONALLY BIMODAL; VERY ANGULAR TO ANGULAR, SMALLER GRAINS SUBANGULAR; LOW SPHERICITY; QUARTZ GRAINS FROSTED; EASILY TO FIRM FRIABLE; CALCITE CEMENT; INTERBEDDED SHALE AND SILTSTONE, MINOR COAL SEEN AT THE TOP OF THE SANDSTONE; GAS SEEN AT THE TOP OF THE SANDSTONE.

SANDSTONE = MEDIUM TO LIGHT GRAY, MINOR GRAYISH BROWN; 90% TO 60% QUARTZ CLASTS WITH REMAINDER LITHIC FRAGMENTS; FINE TO VERY FINE GRAINED, VERY MINOR MEDIUM; FAIR TO POOR SORTING; SUBROUNDED TO SUBANGULAR; MODERATE SPHERICITY; VERY TIGHT; GRAIN SUPPORTED; INTERBEDDED WITH AND GRADES INTO SILTSTONE AND INTER-BEDDED WITH GRAY SHALE; VERY LOW GAS.

SANDSTONE = MEDIUM TO LIGHT GRAY; PREDOMINATELY QUARTZ WITH LITHIC FRAGMENTS; FINE TO VERY FINE GRAINED; FAIR TO WELL SORTED; POOR POROSITY; FREQUENTLY INTERBEDDED WITH SILTSTONE AND SHALE.

SHALE = MEDIUM TO LIGHT GRAY, VERY MINOR BLUISH GRAY; BRITTLE TO CRUMBLY; PLANAR FRACTURE; TABULAR TO WEDGELIKE CUTTINGS HABIT; DULL LUSTER; SILTY TO CLAYEY TEXTURE; SLIGHTLY CALCAREOUS; INTER-BEDDED SILTSTONE AND SANDSTONE; MINOR GAS FROM SANDSTONE.

SHALE = MEDIUM TO LIGHT GRAY; BRITTLE TO CRUMBLY; PLANAR TO SUB-BLOCKY FRACTURE; TABULAR TO WEDGELIKE CUTTINGS HABIT; DULL TO EARTHY LUSTER, MINOR SPARKLING; SILTY TO CLAYEY TEXTURE; INTERBEDDED WITH SILTSTONE AND SANDSTONE; LOW BACKGROUND GAS EXCEPT IN SANDSTONE.

SILTSTONE = REDDISH BROWN, LIGHT GRAY TO MEDIUM GRAY; CRUMBLY TO BRITTLE TENACITY; NODULAR TO WEDGELIKE CUTTINGS HABIT; GRITTY TO SILTY TEXTURE; INTER-BEDDED SHALE, CARBONACEOUS SHALE, AND SANDSTONE WITH OCCASIONAL COAL; LOW BACKGROUND GAS.

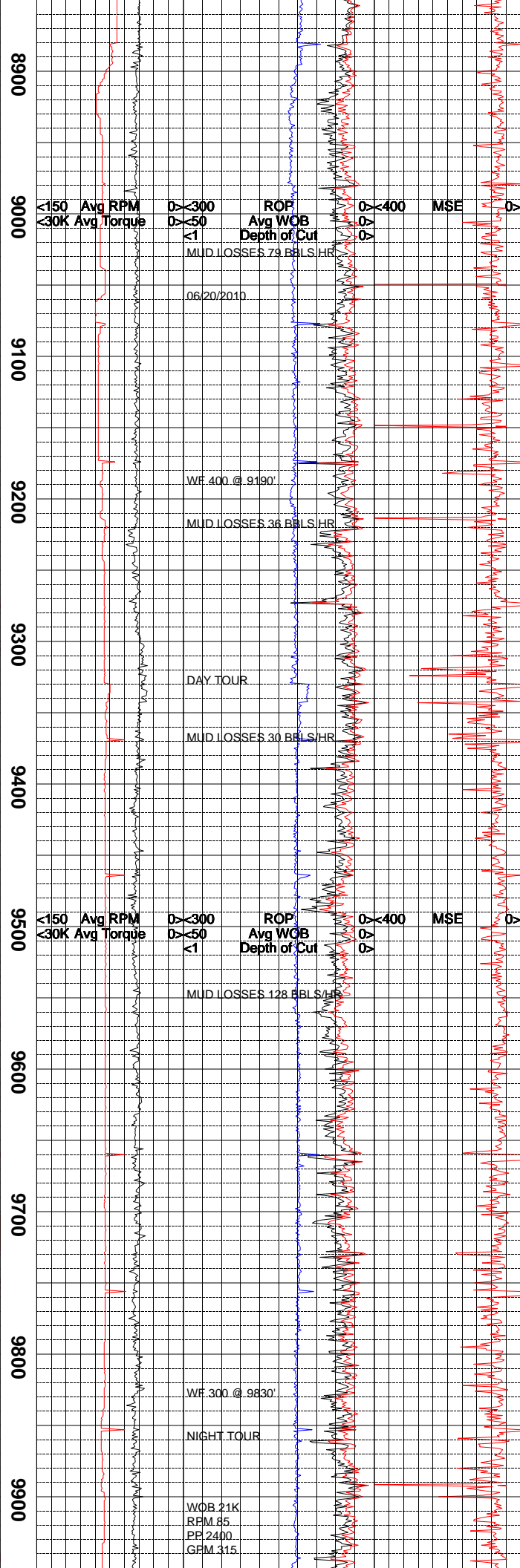
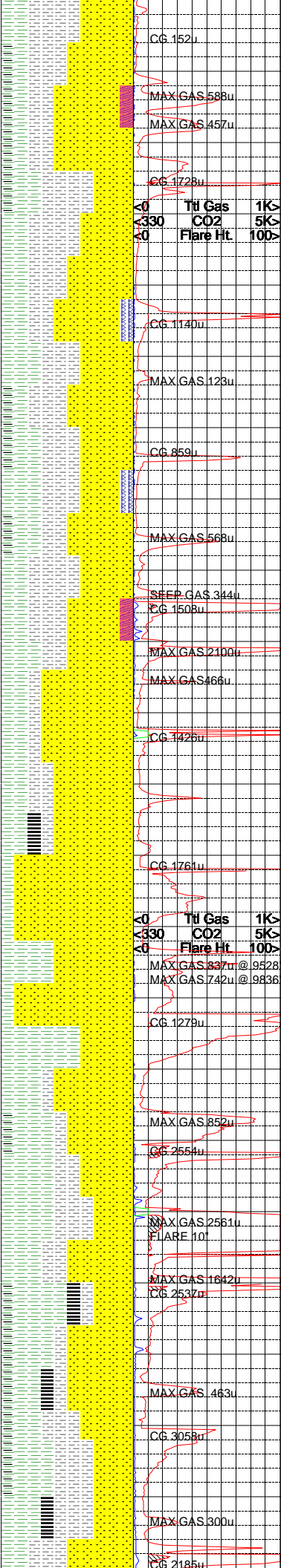
TD INTERMEDIATE AT 8680' ON 04/04/2010.

SET INTERMEDIATE CASING AT 8665'.

SHALE=MEDIUM TO LIGHT GRAY ,MEDIUM BROWN BRITTLE TO HARD TENACITY, BLOCKY, GRITTY TO SILTY TEXTURE SOME SLIGHTLY WAXY LOW BACKGROUND GAS

SANDSTONE = WHITE TO NEARLY TRANSLUCENT IN COLOR; QUARTZ FRAMEWORK; COARSE TO FINE GRAIN SIZE; POOR TO FAIR SORTING; GRAINS ARE ANGULAR TO SUBROUNDED WITH LOW TO MODERATE SPHERICITY; EASILY TO FIRMLY FRIABLE; CALCITE/SILICA CEMENT; WEAK REACTION TO HCL;GRADATIONAL BEDDING INTO SILTSTONE VISIBLE; CHLORITE AND CALCITE GRAINS SEEN IN MATRIX;NO VISIBLE POROSITY; LOW TO MODERATELY LOW





BACKGROUND GAS.

SILTSTONE = LIGHT TO MEDIUM GRAY IN COLOR; DENSE TO BRITTLE TENACITY; PLANAR TO IRREGULAR FRACTURE; CUTTINGS ARE NODULAR TO WEDGE LIKE IN APPEARANCE; DULL TO EARTHY LUSTER EXHIBITED; SILTY TO GRITTY TEXTURE; THIN TO THICK STRUCTURE.

CARBONACEOUS SHALE = MEDIUM BLuish GRAY TO GRAYISH BLACK IN COLOR; BRITTLE TO CRUMBLY TENACITY; FLAKY TO TABULAR CUTTINGS HABIT; RESINOUS TO DULL LUSTER; SMOOTH TEXTURE; THIN STRUCTURE.

SHALE = PALE BLUE TO MEDIUM DARK GRAY IN COLOR; TOUGH TO BRITTLE IN TENACITY; BLOCKY TO CONCHOIDAL FRACTURE; CUTTINGS ARE WEDGE LIKE TO PLATY IN HABIT; WAXY TO SPARKLING LUSTER EXHIBITED; CLAYEY TO SILTY TEXTURE; THIN STRUCTURE; MICA SEEN IN MATRIX.

SANDSTONE = BLuish WHITE TO WHITE IN COLOR; QUARTZ FRAMEWORK WITH ABOUT 5% BLACK LITHIC FRAGMENTS EMBEDDED; MEDIUM TO FINE GRAIN SIZE; FAIR TO WELL SORTED; ROUNDED TO SUBANGULAR GRAINS; MODERATE TO HIGH SPHERICITY; CALCITE CEMENT; CHLORITE GRAINS IN MATRIX; LOW POROSITY; LOW GAS SHOWS.

SILTSTONE = LIGHT TO MEDIUM GRAY IN COLOR; DENSE TO CRUMBLY IN TENACITY; BLOCKY TO PLANAR FRACTURE; CUTTINGS ARE TABULAR TO NODULAR IN HABIT; EARTHY TO DULL LUSTER EXHIBITED; SILTY TO GRITTY TEXTURE; THIN TO THICK STRUCTURE.

SHALE = MEDIUM GRAY TO DARK GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; BLOCKY TO CONCHOIDAL FRACTURE; CUTTINGS ARE FLAKY TO WEDGE LIKE IN HABIT; WAXY TO DULL LUSTER EXHIBITED; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE.

SANDSTONE = WHITE TO SALT AND PEPPER, MEDIUM TO VERY FINE GRAINED, POORLY SORTED, SUBROUNDED TO SUBANGULAR, SOME FROSTED MOSTLY POLISHED, FRIABLE, CALCITE CEMENTED, BIOTITE, GRADING TO SILTSTONE, LOW GAS

SANDSTONE = WHITE TO SALT AND PEPPER, FINE TO VERY FINE GRAINED, MODERATELY WELL SORTED, SUBROUNDED TO SUBANGULAR, SOME POLISHED, FRIABLE, CALCITE CEMENTED, BIOTITE, SOME GRADING TO SILTSTONE, LOW GAS RECORDED

SANDSTONE = WHITE TO LIGHT GRAY; QUARTZ WITH UP TO 30% LITHIC FRAGMENTS, OFTEN ANGULAR AND BLACK GIVING A SALT AND PEPPER APPEARANCE; FINE TO MEDIUM GRAINED; WELL SORTED; SUBANGULAR TO SUBROUNDED; MODERATE TO LOW SPHERICITY; POLISH GRAINS; EASILY FRIABLE TO FRIABLE CALCITE CEMENT; GRAIN SUPPORT; INTER-BEDDED GRAY SHALE; LOW TO MODERATE BACKGROUND GAS, SOME HIGH GAS SEEN IN SAND BEDS.

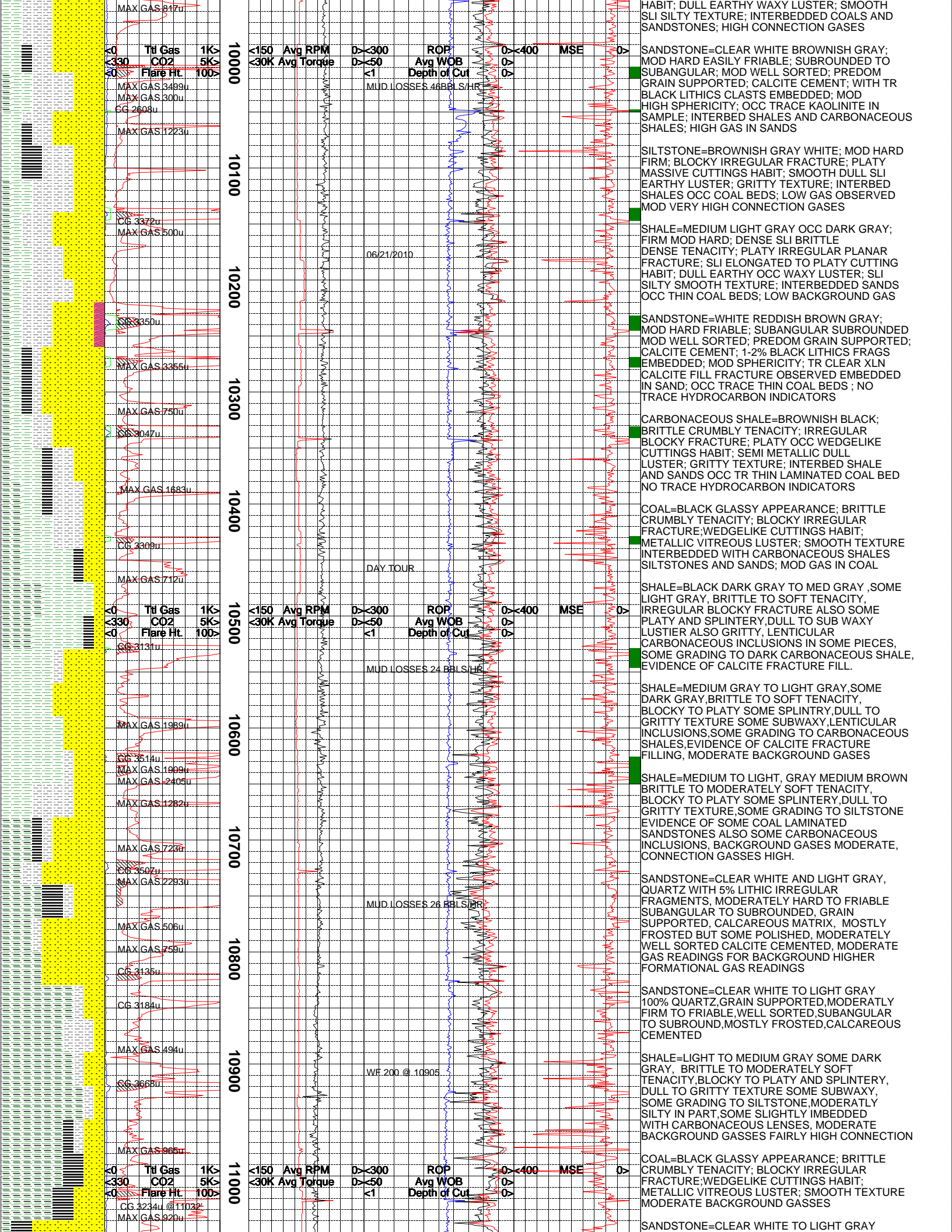
SANDSTONE = WHITE TO LIGHT GRAY, QUARTZ WITH UP TO 10% LITHIC FRAGMENTS, OFTEN ANGULAR AND BLACK GIVING SALT AND PEPPER APPEARANCE, FINE TO MEDIUM GRAINED; SUBANGULAR TO SUBROUND, LOW SPHERICITY, POLISHED GRAINS SOME FROSTY, FRIABLE CALCITE CEMENTED, GRAIN SUPPORT LOW BACKGROUND GAS MODERATE GAS FROM FORMATION HIGH

SHALE = MEDIUM TO LIGHT GRAY, MEDIUM BROWN, BRITTLE TO SOFT, BLOCKY TO PLANAR. MASSIVE HABITAT, DULL LUSTER, GRADING TO LIGHT GRAY TO MEDIUM BROWN SILTSTONE, SOME CALCITE FRACTURE FILLING ASSOCIATED WITH THE SILTSTONE, ALSO LENTICULAR CARBONACEOUS LENSES.

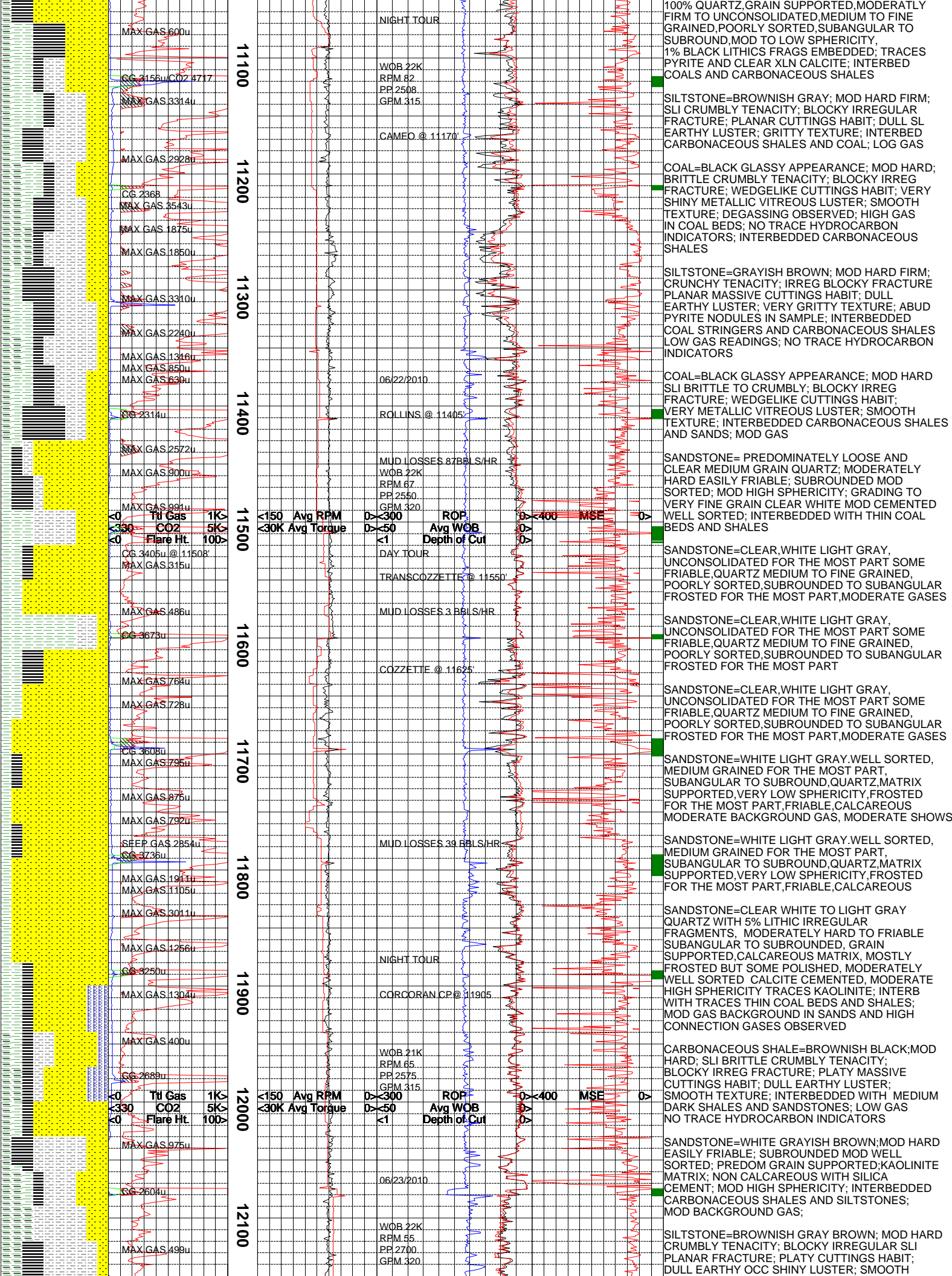
SANDSTONE = WHITE TO LIGHT GRAY, QUARTZ WITH UP TO 20% LITHIC FRAGMENTS, OFTEN ANGULAR, FINE TO MEDIUM GRAINED, WELL SORT SUBANGULAR TO SUBROUND, INTERBEDDED GRAY AND BROWN SHALES, SOME HIGHLY CARBONACEOUS.

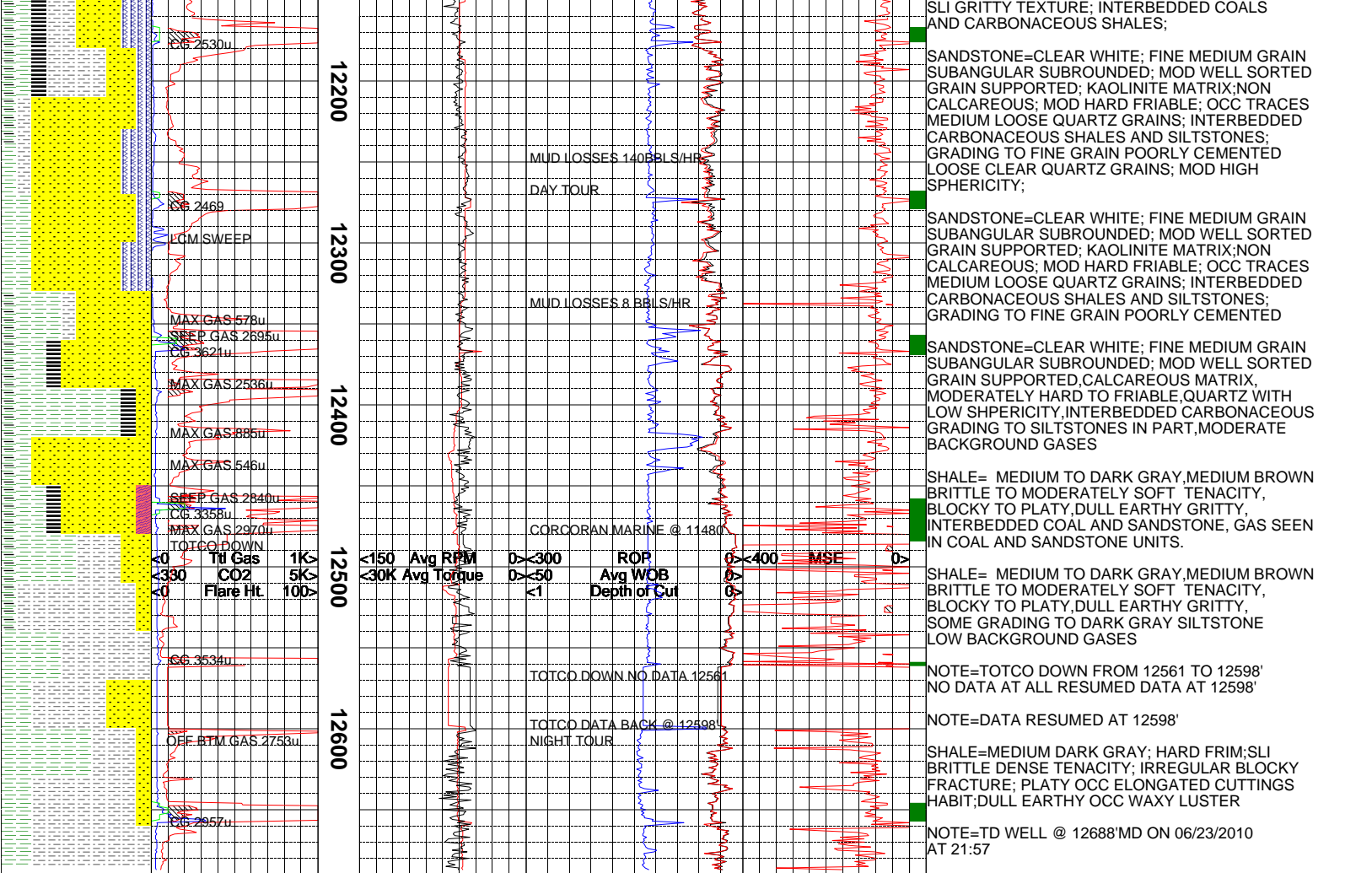
CARBONACEOUS SHALE = BROWNISH BLACK; MOD HARD FIRM; SLI BRITTLE TO CRUMBLY TENACITY; IRREGULAR BLOCKY OCC EARTHY FRACTURE; MASSIVE PLATY CUTTINGS HABIT; SEMI METALLIC LUSTER; SMOOTH TEXTURE; OCC TRACE INTERBEDDED THIN LAMINATED COAL BEDS AND SANDSTONE; LOW BACKGROUND GAS WITH MOD HIGH CONNECTION GASES NO TRACE HYDROCARBON INDICATORS

SHALE = MEDIUM LIGHT GRAY; MOD HARD FIRM; SLI CRUMBLY TENACITY; BLOCKY IRREGULAR FRACTURE; PLATY OCC ELONGATED CUTTINGS









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