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

Drilling Dynamics MD

COMPANY	ExxonMobil Production
WELL	Freedom Unit 197-33A8
FIELD	Piceance Creek
REGION	Rockies
COORDINATES	39.915617000 108.285739000
ELEVATION	GL:6387 KB: 6414
COUNTY, STATE	Rio Blanco, Colorado
API INDEX	05-103-1140-100
SPUD DATE	January 28, 2010
CONTRACTOR	Helmerich and Payne
CO. REP.	Ricky T. Owens
RIG/TYPE	215/ Flex 3
LOGGING UNIT	MLU051
GEOLOGISTS	George Baker Brenda Marsh
ADD. PERSONS	Devin Claar Bill Johanning
CO. GEOLOGIST	Melanie Biggs

LOG INTERVAL

DEPTHS: 3,900' **TO** 12,457'
DATES: 1/28/2010 **TO** 2/12/2010
SCALE: 1" = 100'

CASING DATA

10.75" **AT** 3,914'
7.00" **AT** 8,646'
4.5" **AT** 12,457'
AT

HOLE SIZE

9.875" **TO** 8,648"
6.125" **TO** 12.457'
TO
TO

MUD TYPES

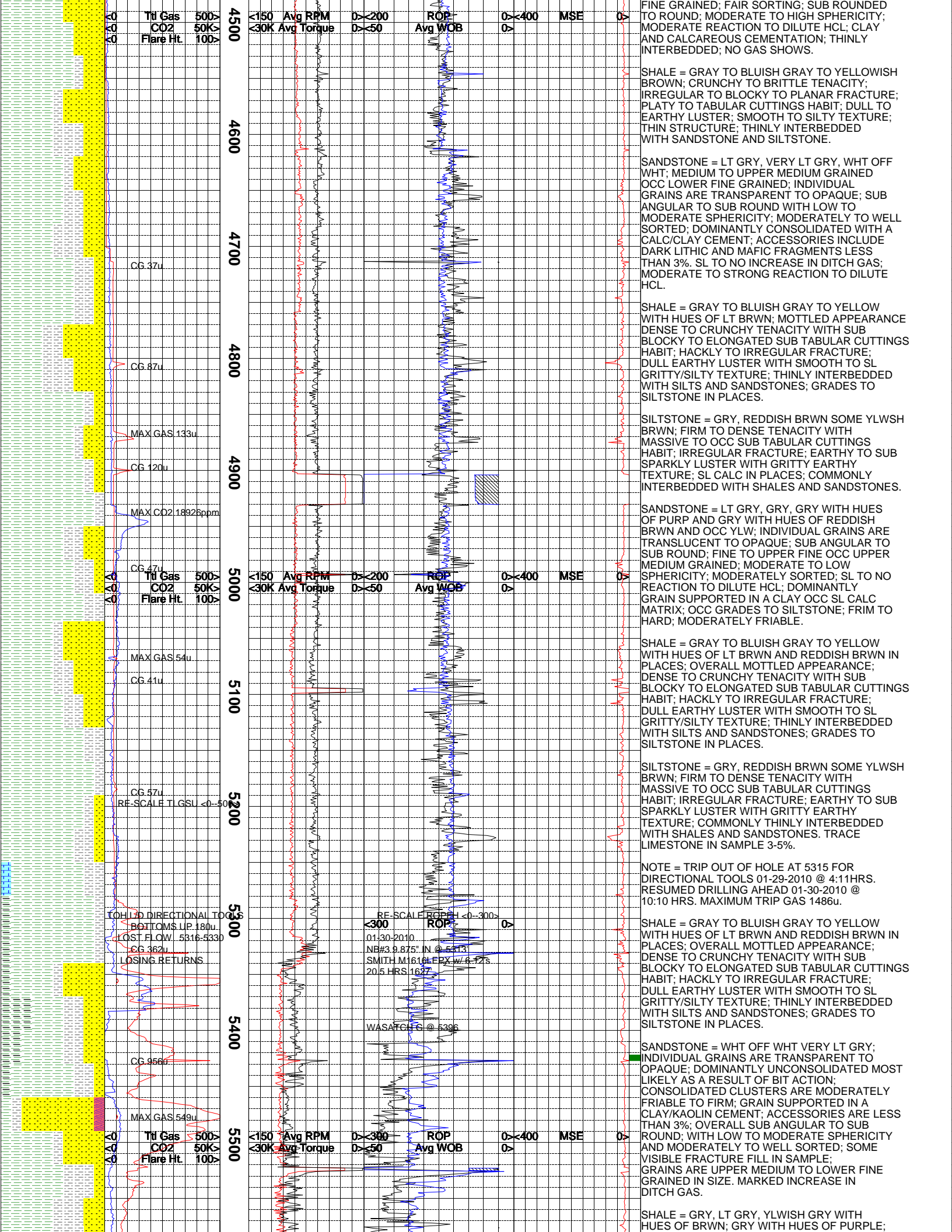
SPUD **TO** 3,900'
LSND **TO** 12,457'
TO
TO

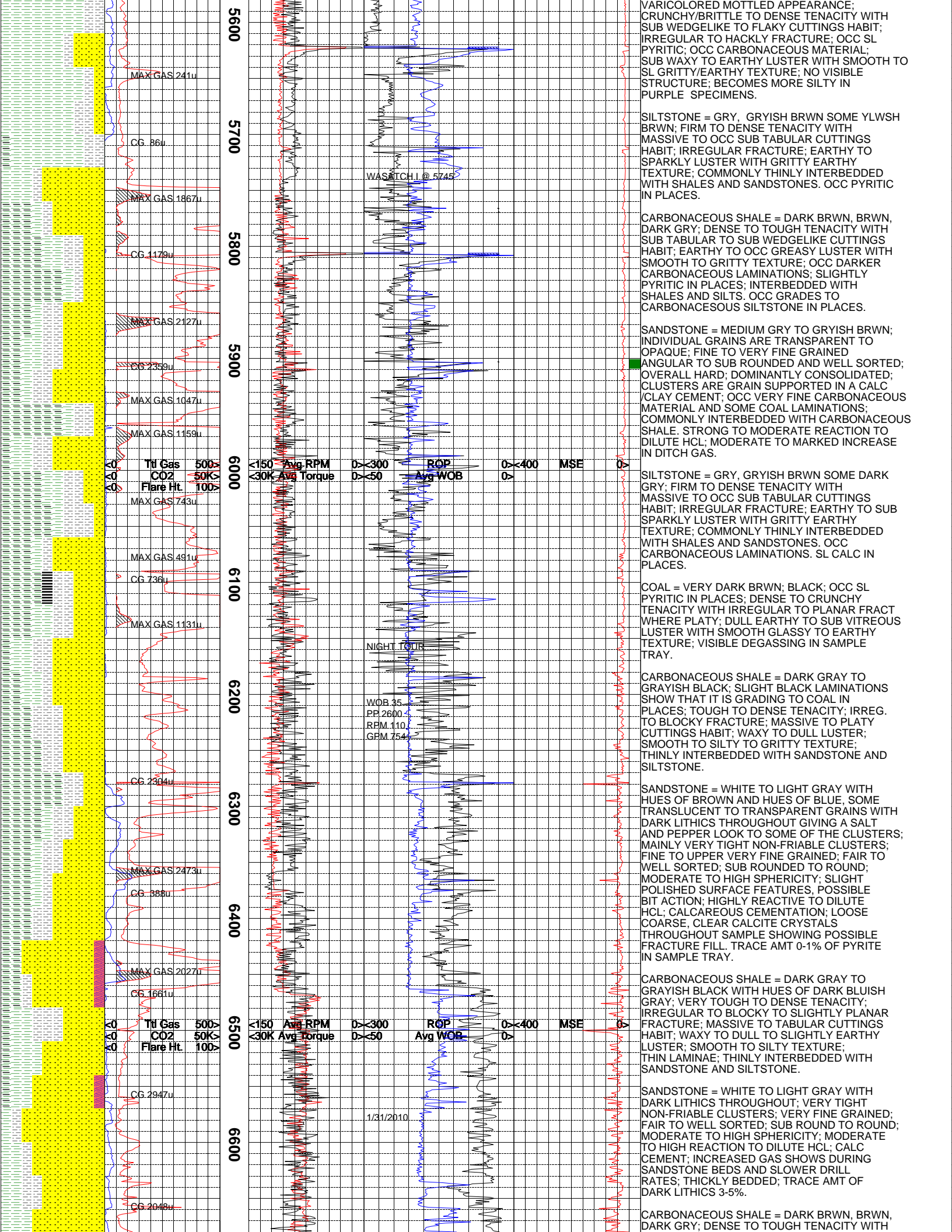
ABBREVIATIONS

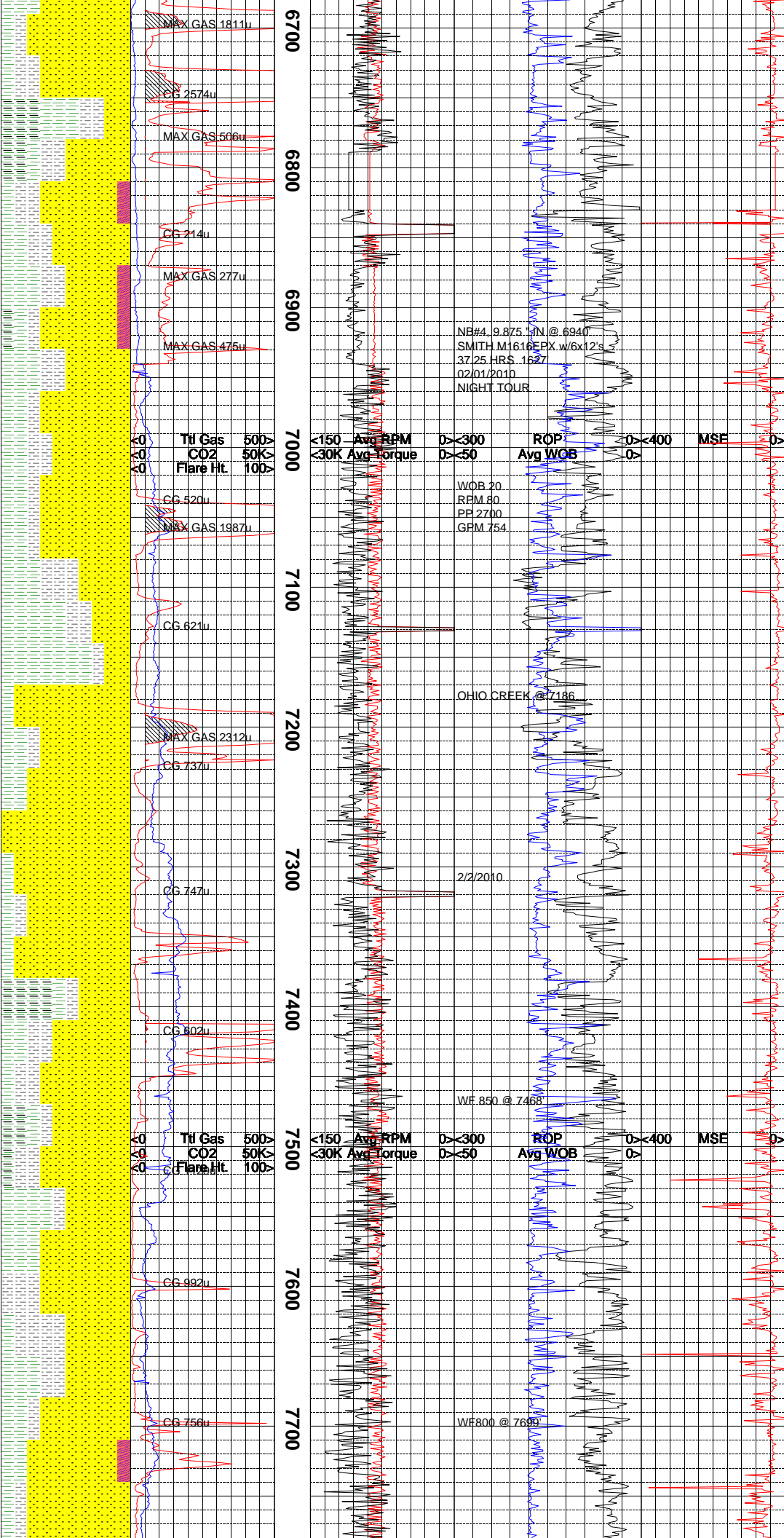
<i>NB</i> NEWBIT	<i>PV</i> PLASTIC VISCOSITY	<i>LC</i> LOST CIRCULATION
<i>RRB</i> RERUN BIT	<i>YP</i> YIELD POINT	<i>CO</i> CIRCULATE OUT
<i>CB</i> CORE BIT	<i>FL</i> FLUID LOSS	<i>NR</i> NO RETURNS
<i>WOB</i> WEIGHT ON BIT	<i>CL</i> PPM CLORIDE ION	<i>TG</i> TRIP GAS
<i>RPM</i> ROTARY REV/MIN	<i>Rm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

Lithology	<0 Ttl Gas 1.5K>			Depth	<150 Avg RPM 0><300 ROP 0><400 MSE 0>			MGS	Remarks	
	units				ft/hr				psi	
	<0 CO2 50K>				Avg WOB 0>				Survey Data, Mud Reports, Other Info.	
	ppm				FTLBS					
	<0 Flare Ht. 100>									
	ft				klbs					
										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.
										CONNECTION GASES AS WELL AS TRIP AND DOWNTIME GASES ARE NOTED ON THE LOG. LARGE CONNECTION GASES WHICH APPEAR ON THE MUD LOG USUALLY REFLECT UPHOLE GAS INTERVALS BLEEDING GAS INTO THE BOREHOLE DURING CONNECTIONS.
										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
										WHEN THE MUD IS RUN THROUGH THE GAS BUSTER THE INTERVAL IS MARKED ON THE MGS COLUMN AND SIZE OF FLARES NOTED.
										EVIDENCE OF FRACTURE FILL IS NOTED ON THE MUD LOG AS METAMORPHICS. KAOLIN PERCENTAGE IN SS INTERVALS IS ALSO NOTED
										1 UNIT OF GAS = 200 PPM METHANE
										SHALE = BLUISH GRAY TO GRAY MOTTLED WITH ORANGE-BROWN HUES; BRITTLE TO PULVERULENT; IRREGULAR TO PLANAR FRACTURE; MASSIVE TO PLATY TO TABULAR CUTTINGS HABIT; DULL TO VERY EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THICK STRUCTURE; THICKLY BEDDED.
										SANDSTONE = GRAY TO CLEAR TO OFF WHITE WITH HUES OF BROWN; FINE TO VERY FINE GRAINED; VERY SMALL TIGHT CLUSTERS; FAIR SORTING; SUB ANGULAR TO SUB ROUNDED MODERATE TO HIGH SPHERICITY; CALCAREOUS CLAY CEMENT AND GRAIN SUPPORTED; MOD. REACTION TO DILUTE HCL; SLIGHTLY CALCAREOUS; VERY THINLY INTERBEDDED.
										SHALE = LIGHT GRAY TO BLUISH GRAY TO LIGHT ORANGE-BROWN; BRITTLE TO PULVERULENT TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO TABULAR CUTTINGS HABIT; DULL TO VERY EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THICK STRUCTURE; THICKLY BEDDED WITH VERY THIN LAYERS OF SANDSTONE OR SILTSTONE ALTERNATING.
										SILTSTONE = DARK BROWNISH GRAY TO BROWN WITH BLACK SPECS; VERY HARD AND DENSE; IRREGULAR TO BLOCKY FRACTURE; TABULAR TO WEDGELIKE CUTTINGS HABIT; EARTHY TO SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; THIN STRUCTURE; VERY THINLY BEDDED.
										SHALE = LIGHT GRAY TO GRAY WITH LIGHT BROWN HUES TO LIGHT BROWN TO ORANGE BROWN; CRUMBLY TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; DULL TO VERY EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; APPEARS TO GRADE TO SILTSTONE IN PLACES; THICKLY BEDDED.
										SANDSTONE = CLEAR TO WHITE TO OPAQUE WITH HUES OF GRAY AND YELLOW; MOSTLY LOOSE GRAINS; FEW TIGHT CLUSTERS; FINE TO UPPER VERY FINE GRAINED; SUB ANGULAR TO SUB ROUNDED; MODERATE SPHERICITY WHEN IN CLUSTERS; SLIGHT REACTION TO DILUTE HCL; GRAIN SUPPORTED; THINLY INTERBEDDED BETWEEN THICKER BEDS OF SHALE.
										SHALE = GRAY TO GRAYISH BLUE WITH LIGHT ORANGE-BROWN SPECIMENS; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO TABULAR CUTTINGS HABIT; DULL TO EARTHY LUSTER; CLAYEY TO SILTY TEXTURE; THIN STRUCTURE.
										SANDSTONE = WHITE TO TRANSLUCENT TO OPAQUE WITH A TRACE AMT OF DARK LITHICS WITHIN THE CLUSTERS; VERY SMALL TIGHT NON-FRIABLE CLUSTERS; FINE TO UPPER VERY







SUB TABULAR TO SUB WEDGE LIKE CUTTINGS HABIT; EARTHY TO OCC GREASY LUSTER WITH SMOOTH TO GRITTY TEXTURE; OCC DARKER CARBONACEOUS LAMINATIONS; SLIGHTLY PYRITIC IN PLACES; INTERBEDDED WITH SHALES AND SILTS.

SHALE = GRY, LT GRY, LT BRWN, BRWN WITH HUES OF GRY, GRYISH GRN IN PLACES; DENSE TO CRUNCHY TENACITY WITH SUB MASSIVE TO SUB WEDGE LIKE OCC FLAKY CUTTINGS HABIT; IRREGULAR TO HACKLY FRACTURE; SMOOTH TO SL EARTHY TEXTURE WITH WAXY TO DULL LUSTER; OCC SL PYRITIC IN PLACES; MODERATE TO NO REACTION TO DILUTE HCL. TRACE LIMESTONE/ OR VERY LIMY SHALE.

NOTE = TOH FOR BIT AT 6940' PRIOR TO DRILLING OHIO CREEK 01-31-2010 @ 10:05 HRS. RESUMED DRILLING 02-01-2010 @ 16:00 HRS.

SANDSTONE = WHITE TO LIGHT GRAY WITH SOME CLEAR AND TRANSLUCENT GRAINS; AS WELL AS SOME DARK LITHICS GIVING A DIRTY SALT AND PEPPERED APPEARANCE; FINE TO UPPER VERY FINE GRAINED; FAIR TO WELL SORTING; MODERATE SPHERICITY; HIGHLY REACTIVE TO DILUTE HCL; CALCAREOUS CEMENTATION; THINLY BEDDED WITH ALTERNATING BEDS OF SHALE AND SILTSTONE.

SHALE = LIGHT GRAY TO GRAY WITH BLUISH HUES; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; PLATY TO TABULAR CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN LAMINAE; VERY THINLY INTERBEDDED WITH SANDSTONE AND SHALE; APPEARS TO GRADE TO SILTSTONE ON SOME SPECIMENS.

SILTSTONE = BROWNISH GRAY TO GRAYISH BLACK; TOUGH TO DENSE TENACITY; IRREGULAR FRACTURE; TABULAR CUTTINGS HABIT; DULL TO SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; THINLY INTERBEDDED WITH SANDSTONE AND SHALE.

OHIO CREEK SANDSTONE = WHITE TO VERY LIGHT GRAY TO CLEAR AND TRANSLUCENT GRAINS; ABUNDANT LOOSE UNCONSOLIDATED GRAINS AND VERY FRIABLE CLUSTERS; SOME DARK LITHICS THROUGHOUT GIVING A SALT AND PEPPERED APPEARANCE; SLIGHT TO MODERATE REACTION TO DILUTE HCL; SLIGHTLY CALCAREOUS CEMENTATION WHEN IN CLUSTERS; MAINLY GRAIN SUPPORTED OR LOOSE GRAINS; FINE GRAINED; SUB ANGULAR TO SUB ROUNDED; MODERATE TO LOW SPHERICITY; SOME POLISHED SURFACE FEATURES FROM POSSIBLE BIT ACTION; THICKLY BEDDED WITH SMALLER BEDS OF SHALE OR SILTSTONE IN BETWEEN.

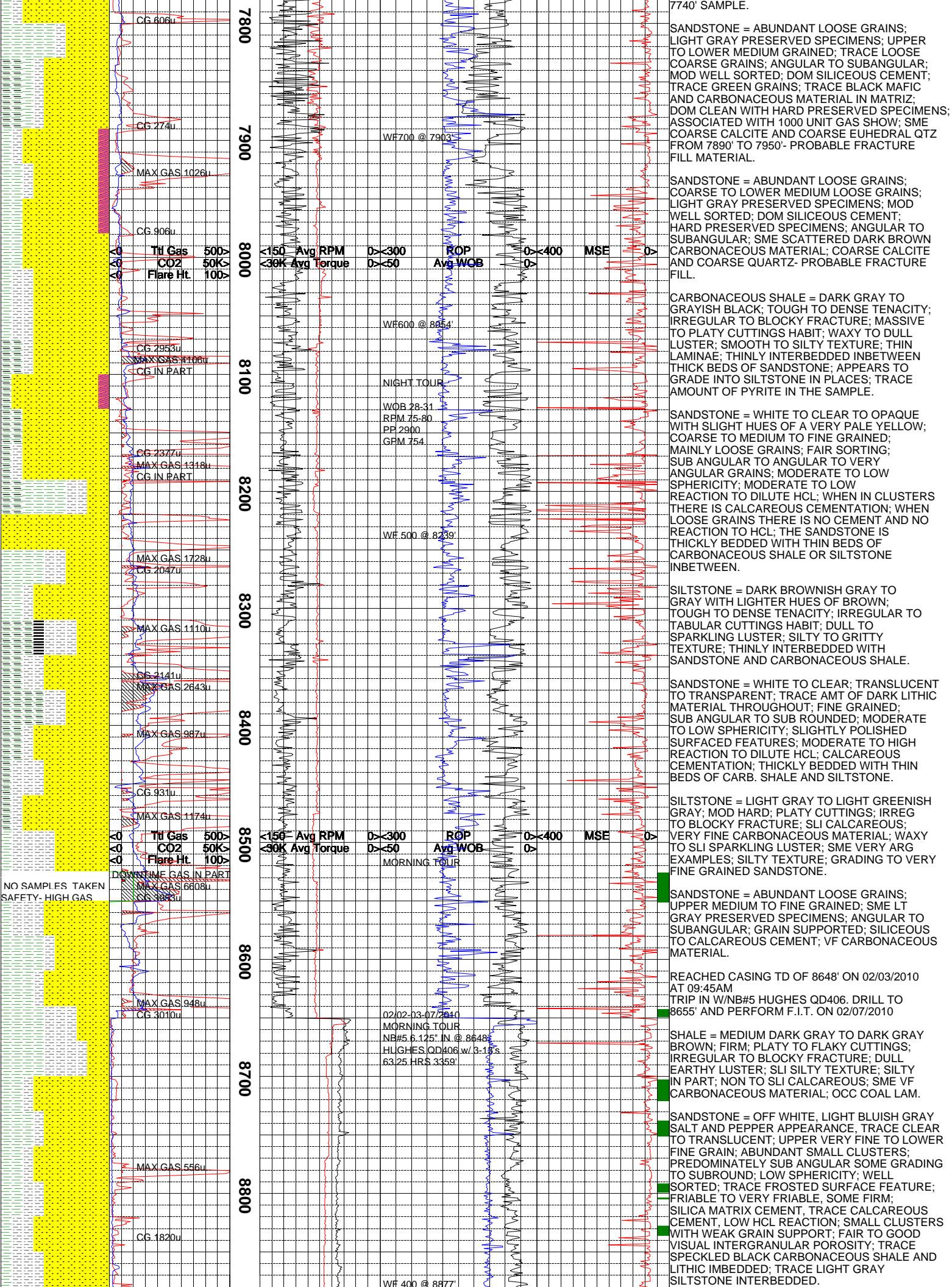
SHALE = LIGHT GRAY TO MEDIUM GRAY TO GRAY WITH HUES OF BLUE AND MOTTLED W/ WHITE SPECS; DENSE TO BRITTLE TENACITY; PLANAR TO MOTTLED FRACTURE; PLATY TO FLAKY CUTTINGS HABIT; DULL TO EARTHY TO VERY SLIGHTLY SPARKLING LUSTER; SMOOTH TO GRITTY TEXTURE; APPEARS TO GRADE TO SILTSTONE IN PLACES; THIN LAMINAE; VERY THINLY BEDDED WITH SANDSTONE.

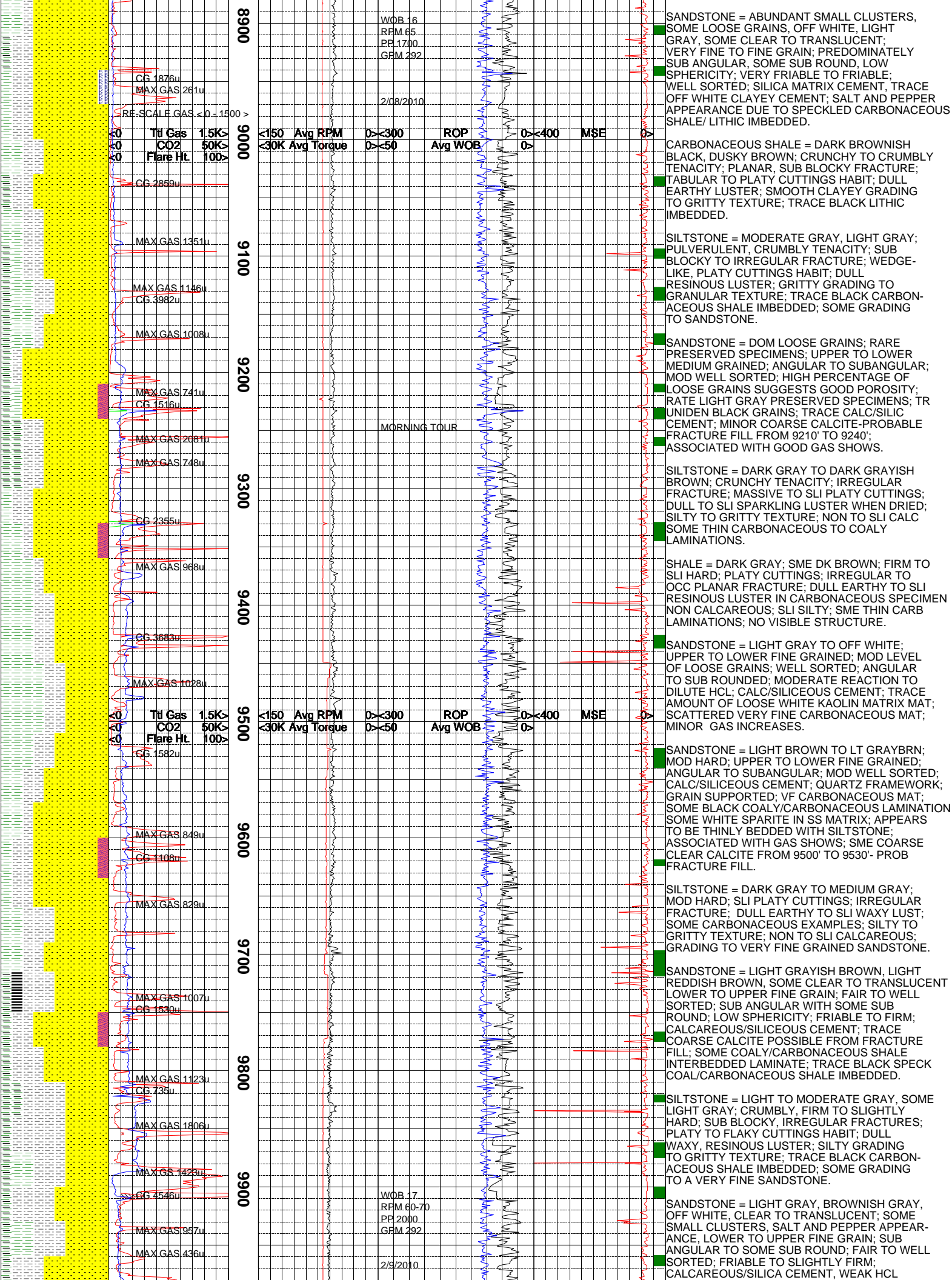
SILTSTONE = DARK GRAY TO BROWNISH GRAY TO BROWNISH BLACK; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURE; TABULAR TO WEDGE LIKE CUTTINGS HABIT; SILTY TO GRITTY TO GRANULAR TEXTURE; THIN STRUCTURE; VERY THINLY INTERBEDDED WITH SANDSTONE.

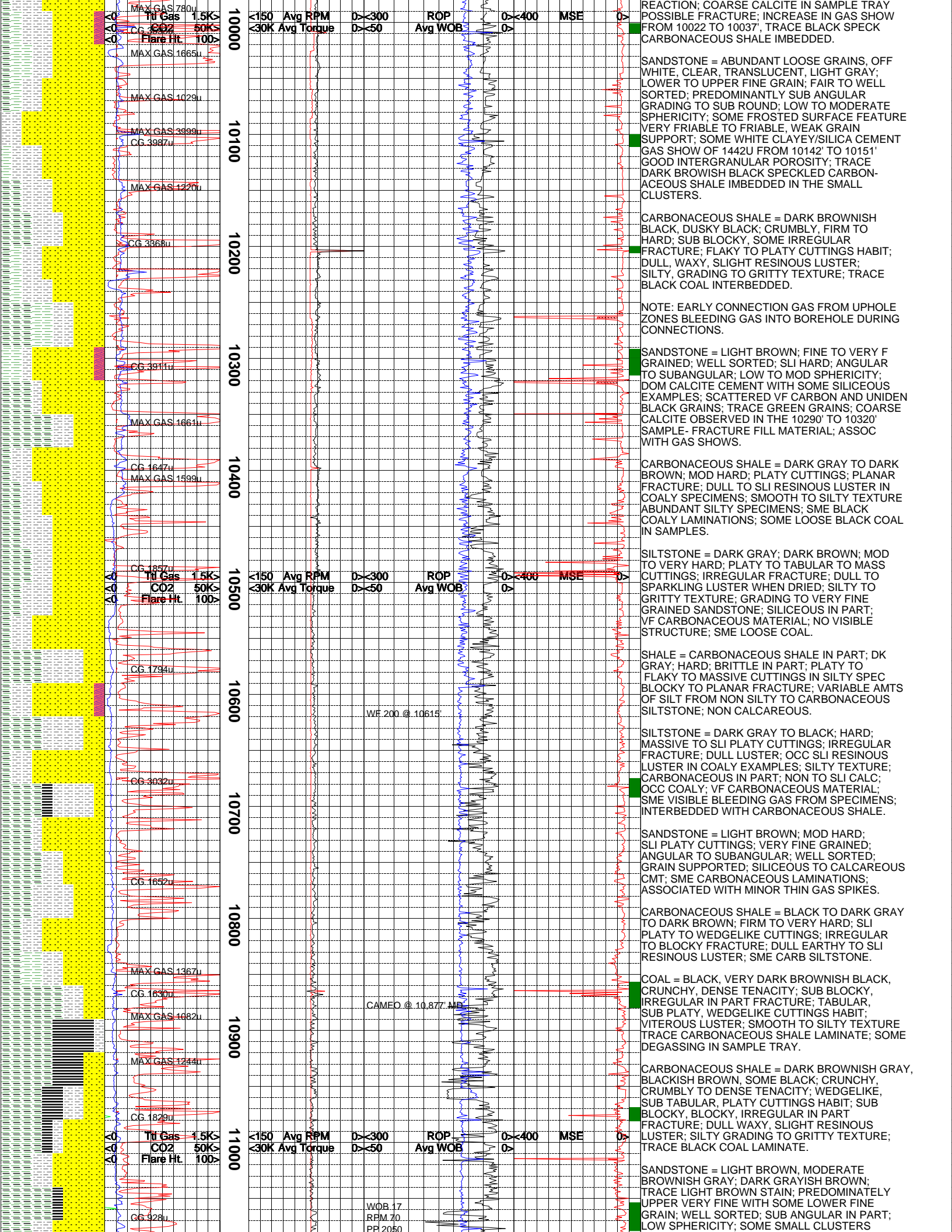
SANDSTONE = LIGHT GRAY TO LIGHT GREENISH GRAY; VERY FINE GRAINED; SUBANGULAR; WELL SORTED; VERY FINE CARBONACEOUS MATERIAL; TRACE MICA; DOM CALCITE CEMENT ARGILLACEOUS IN PART; THINLY BEDDED WITH SHALE; GRADING TO SILTSTONE.

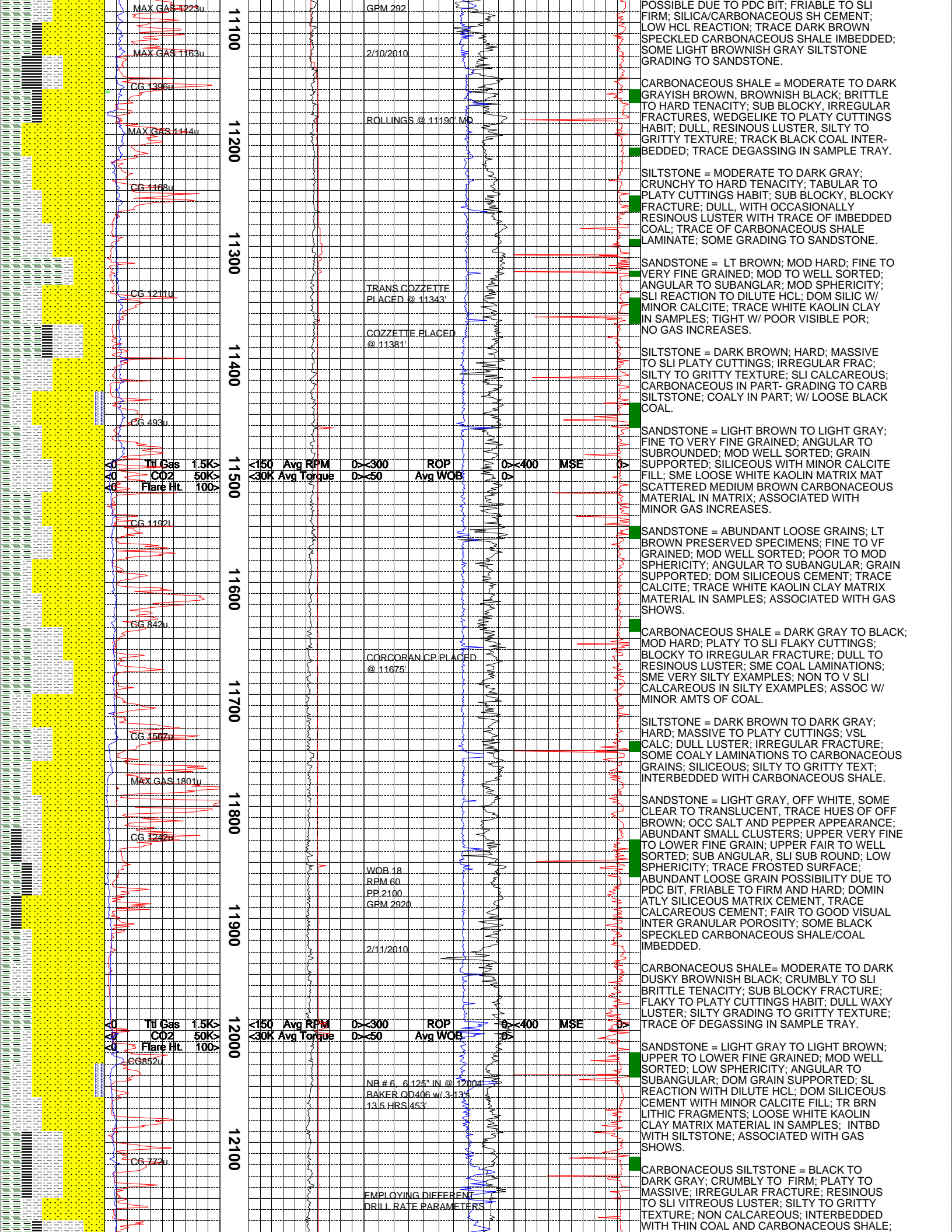
SHALE = LIGHT GREEN TO GREENISH GRAY TO LIGHT GRAY; FIRM; PLATY TO FLAKY CTGS IRREGULAR TO BLOCKY FRACTURE; SLI CALC; DULL EARTHY TO SLI WAXY LUSTER; SMOOTH TO ROUGH TEXTURE; ISOLATED QUARTZ GRAIN; COMMONLY SANDY TO SILTY; THINLY BEDDED.

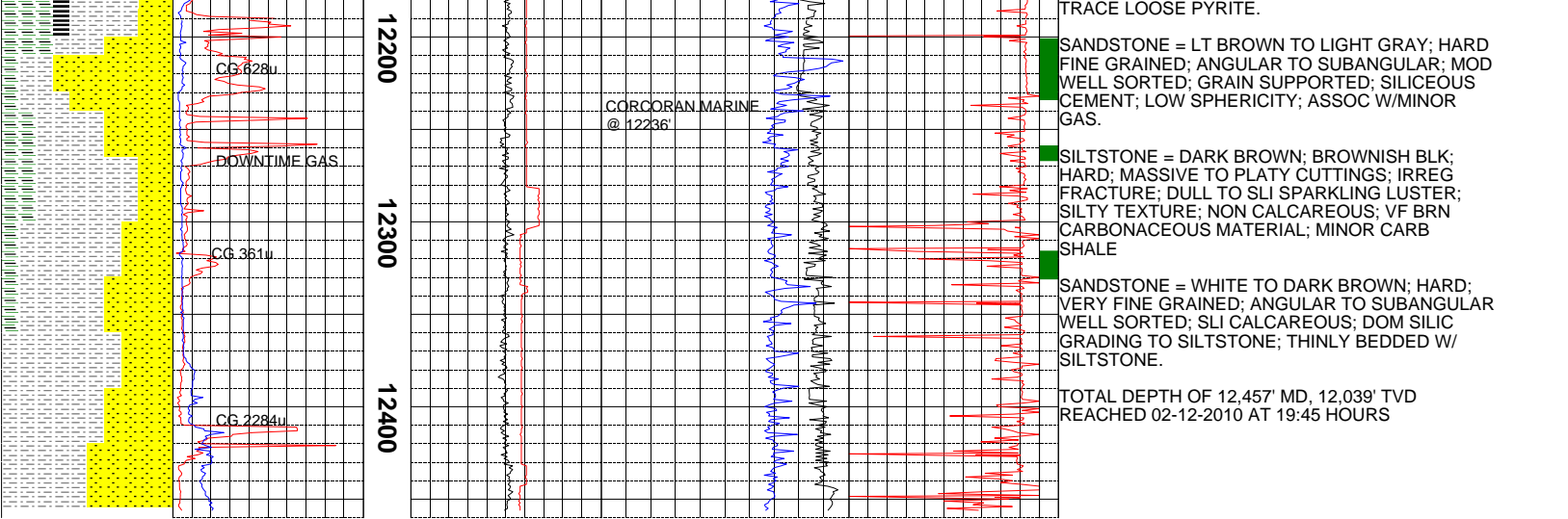
SANDSTONE-WF800- LIGHT TO MEDIUM GRAY IN PRESERVED SPECIMENS; UPPER TO LOWER MEDIUM GRAINED IN PRESERVED SPECIMENS; TRACE AMOUNT OF CONGLOMERATIC SPECIMENS WITH COARSE TO FINE QUARTZ GRAINS; ABNT LOOSE COARSE QUARTZ IN THE 7710' TO 7740 SAMPLE; ANGULAR TO SUBANGULAR GRAINS; DOM SILICEOUS CEMENT WITH MINOR CALCITE FILL; SME BLACK COALY LAMINATIONS; SALT AND PEPPER WITH BLACK MAFIC GRAINS IN SOME SPECIMENS; TRACE GRAY CHERT AND CHLORITIC MICA; MINOR GAS; COARSE CALC PROBABLE FRACTURE FILL IN THE 7710' TO











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