



Copyright © 2003 by Epoch Well Services, Inc.

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 PCU296-5A05
FIELD PICEANCE CREEK
REGION ROCKYS
COORDINATES 39.911890000 Deg N
108.198602000 Deg W
ELEVATION 7295.9'

COUNTY, STATE RIO BLANCO, CO
API INDEX 051031124400
SPUD DATE 11/14/2009
CONTRACTOR HE
CO. REP. CANDICE CURTIS

RIG/TYPE 321, FLEX 4
LOGGING UNIT 31
GEOLOGISTS C. RECORD / B. SMELSER
M. FRANCO
ADD. PERSONS M. PIPER
R. McCANE
CO. GEOLOGIST CHRIS ALBA

LOG INTERVAL

DEPTHS: 4400' **TO** 13721'
DATES: 11/11/2010 **TO** 11/28/2010
SCALE: 1"=100'

CASING DATA

16.00" **AT** 150'
10.75" **AT** 4662'
7.00" **AT** 9954'
4.5" **AT** 13700'

MUD TYPES

WATER BASED **TO** 13721'
TO
TO
TO

HOLE SIZE

14.75" **TO** 4677'
9.875" **TO** 9967'
6.125" **TO** 13721'
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		

ROP			Depth	Lithology	Ttl Gas			Meth C-1			Interp. Lith	Remarks
<200	ft/hr	>0			<0	units	2K>	<100	ppm	1000K>		
Avg WOB			4500		CO2			Ethn C-2				
<50	klbs	>0			<0	ppm	20K>	<10	100K>			
			4600		Flare Ht.			Butn C-4				
<200		>0			<0	ft	100>	<10	100K>			
			4700					Pent C-5				
<200		>0			<0		<10	100K>				
			4800									
<200		>0			<0		<10	100K>				
			4900									
<200		>0			<0		<10	100K>				
			5000									
<200		>0			<0		<10	100K>				
			5100									
<200		>0			<0		<10	100K>				
			5200									
<200		>0			<0		<10	100K>				
			5300									
<200		>0			<0		<10	100K>				

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 = 10,000 PPM
ETHANE = 1,000 PPM
PROPANE = 1,000 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 296-5A05 WELL ON 11/11/2010 @ 4677' MD.

SILTSTONE = MODERATE BROWN TO MODERATE YELLOWISH BROWN TO MODERATE REDDISH BROWN; SLIGHTLY DENSE TO BRITTLE TO SLIGHTLY CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURING; MASSIVE TO TABULAR CUTTINGS; EARTHY TO DULL LUSTER; SILTY TO GRITTY TEXTURE; THICK TO MASSIVE STRUCTURE.

SHALE = MEDIUM GRAY TO MEDIUM BLUISH GRAY TO LIGHT OLIVE GRAY WITH OCCASIONAL GRAYISH BLUE HUE; BRITTLE TENACITY; PLANAR TO SUB BLOCKY FRACTURING; CUTTINGS ARE PLATY TO TABULAR; EARTHY TO DULL LUSTER; SMOOTH TO SLIGHTLY SILTY TEXTURE; GRADING FROM SILTSTONE; THIN STRUCTURE; INTERBEDDED WITH SILTSTONE AND SANDSTONE.

SANDSTONE = BROWNISH GRAY TO MODERATE BROWN TO TRANSLUCENT TO OLIVE GRAY TO LIGHT GRAY TO WHITE; DOMINATE QUARTZ FRAMEWORK WITH APPROXIMATELY 5% BROWNISH GRAY LITHIC CLASTS; FINE TO MEDIUM FINE GRAINED WITH FAIR SORTING; SOME SPECIMEN APPEARS TO BE GRADING TOWARDS SILTSTONE; QUARTZ FRAMEWORK WITH APPROXIMATELY 5% FRIABLE; MATRIX SUPPORT WITH CALCITE CEMENT; MILD REACTION WITH DILUTE HCL; NO VISIBLE BEDDING STRUCTURE.

SILTSTONE = MODERATE BROWN TO MODERATE YELLOWISH BROWN TO LIGHT GRAY; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURING; MASSIVE TO TABULAR CUTTINGS; EARTHY WITH AN OCCASIONAL SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; INTERBEDDED WITH SHALE AND SANDSTONE; THICK TO MASSIVE STRUCURE.

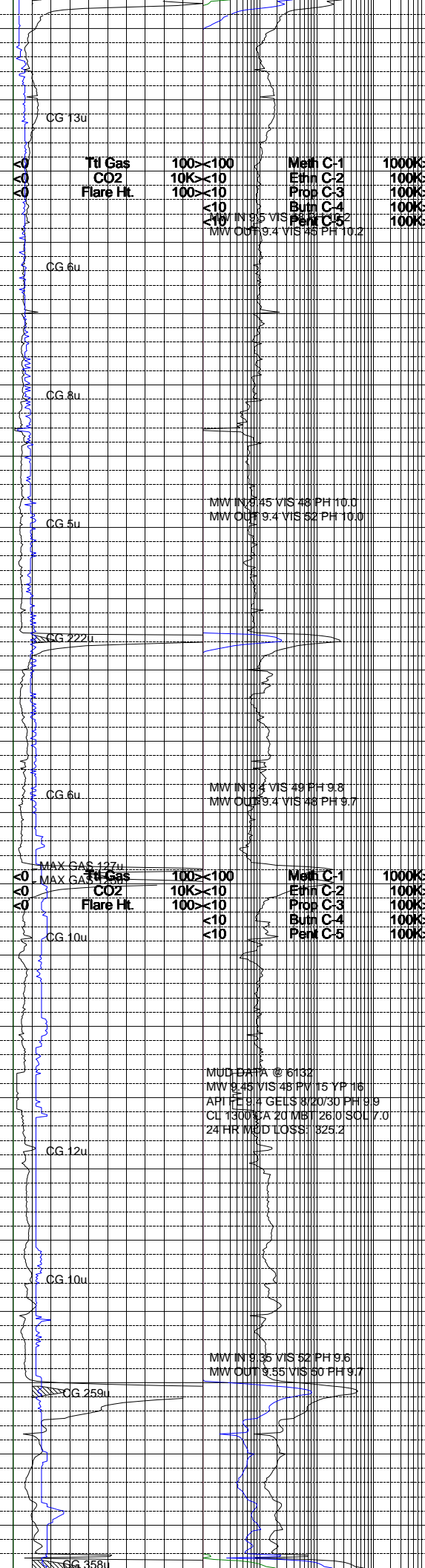
SANDSTONE = TRANSLUCENT TO LIGHT GRAY TO MODERATE BROWN; DOMINATE QUARTZ FRAMEWORK; FINE TO MEDIUM GRAINED WITH FAIR SORTING; ANGULAR TO SUB ANGULAR WITH LOW SPHERICITY; FIRMLY FRIABLE TO FRIABLE WITH ABUNDENT LOOSE GRAINS IN SAMPLE; MODERATE TO STRONG REACTION WITH DILUTE HCL; CALCITE CEMENT WITH MATRIX SUPPORT WITH OCCASIONAL SPECIMENS DISPLAYING GRAIN SUPPORT; INTERBEDDED WITH SILTSTONE AND SHALE; NO OTHER VISIBLE BEDDING STRUCTURE.

SHALE = MEDIUM LIGHT GRAY TO MEDIUM BLUISH GRAY TO LIGHT OLIVE GRAY WITH OCCASIONAL MODERATE OLIVE BROWN HUES; BRITTLE TENACITY; PLANAR TO SPLINTERY FRACTURING; CUTTINGS ARE PLATY TO FLAKY TO SLIGHTLY TABULAR; DULL TO WAXY LUSTER SMOOTH TO SILTY TEXTURE; SOME GRADING FROM SILTSTONE; THIN STRUCTURE.

SILTSTONE = BROWNISH GRAY TO MODERATE BROWN TO MODERATE OLIVE BROWN TO MODERATE YELLOWISH BROWN; SLIGHTLY DENSE TO BRITTLE TENACITY; BLOCKY TO IRREGULAR FRACTURING; CUTTINGS ARE MASSIVE TO TABULAR; DULL TO EARTHY TO WAXY TO A SLIGHT SPARKLING LUSTER; GRITTY TO SILTY TEXTURE; MASSIVE TO THICK STRUCTURE; NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERALS

WASATCH G@ 8305

5400	5500	5600	5700	5800	5900	6000	6100	6200	6300	6400
------	------	------	------	------	------	------	------	------	------	------



PRESENT IN SAMPLE

SANDSTONE = VERY LIGHT GRAY TO OFF WHITE
TO VERY LIGHT BROWNISH GRAY WITH FEW
BLACK AND MODERATE BROWN HUES; QUARTZ
DOMINATE FRAME WORK; PREDOMINATELY
GRAIN SUPPORTED WITH FEW LOOSE GRAINS;
CONSISTS OF CALCITIC CEMENTATION WITH
LIGHT TO MODERATE REACTION TO DILUTE HCL
; MATRIX CONTAINS 3 TO 5% DARK LITHIC
FRAGMENTS; FINE TO MEDIUM-COARSE GRAINED
; FAIR TO POOR SORTING; SUB-ANGULAR TO
SUB-ROUNDED TO ROUNDED ANGULARITY; LOW
TO MODERATE SPHERICITY; POOR GRADE SILTS
-TONE VISIBLE GRADING WITH POOR GRADE
SANDSTONE, AND BEDDING WITH POOR GRADE
SHALE, NO OTHER DISTINGUISHABLE SURFACE
FEATURES PRESENT IN SAMPLE; NO ACCESSORY
MINERALS PRESENT IN SAMPLE.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM GRAY IN COLOR; VERY SLIGHTLY DENSE TO SLIGHTLY CRUMBLY TO SLIGHTLY BRITTLE TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONALLY MASSIVE TO WEDGE LIKE TO SUB-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERATELY SMOOTH TO SLIGHTLY CLAYEY TO VERY SLIGHTLY SILTY TEXTURE; POOR GRADE SILTSTONE VISIBLE BEDDING WITH POOR GRADE SALE, POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES VISIBLY PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

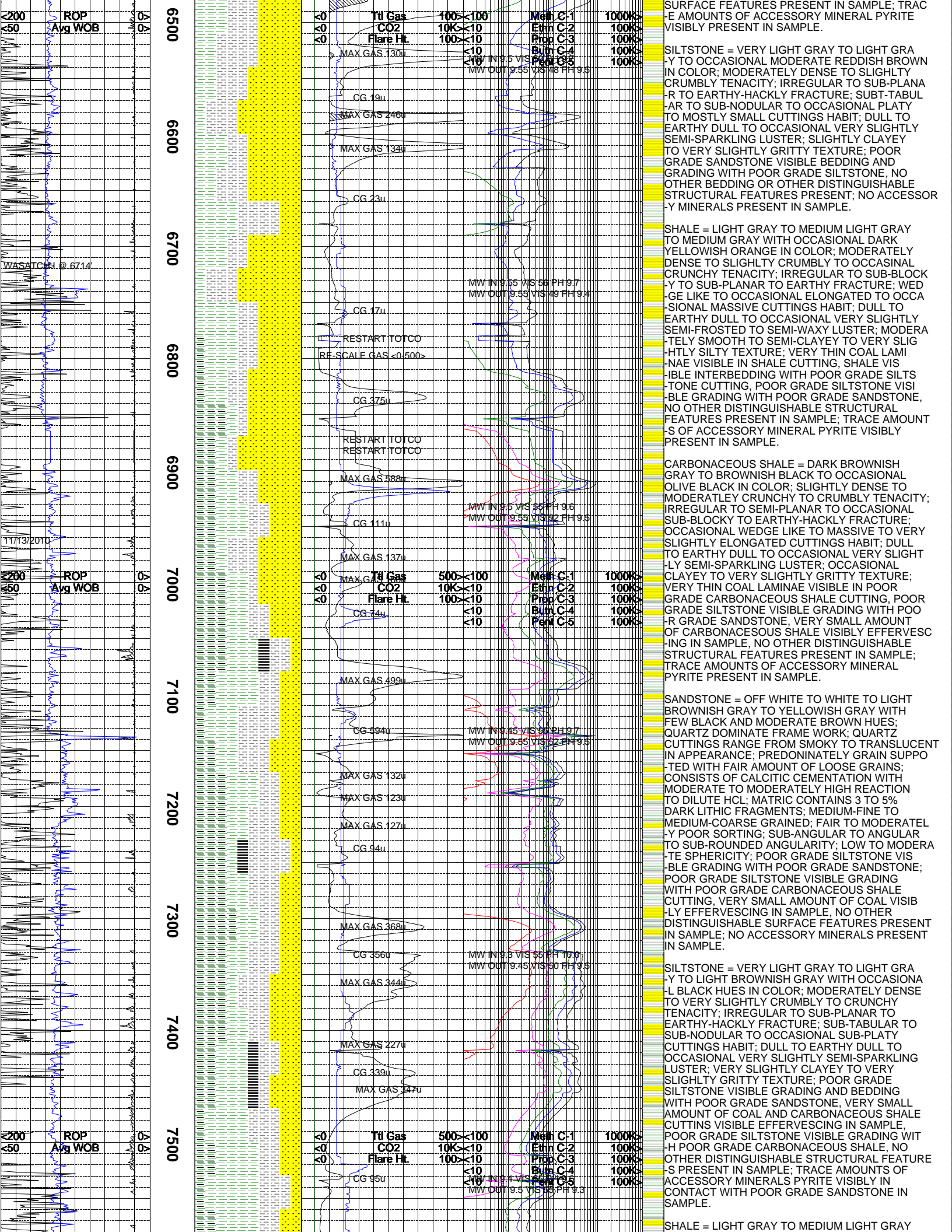
SILTSTONE = VERY LIGHT GRAY TO VERY LIGHT BROWNISH GRAY TO OCCASIONAL PALE YELLOWISH ORANGE TO LIGHT BROWN IN COLOR; MODERATELY CRUMBLY TO VERY SLIGHTLY BRITTLE TO OCCASIONAL VERY SLIGHTLY DENSE TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO MOSTLY SMALL CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL VERY SLIGHTLY SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, NO LAMINAE OR OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

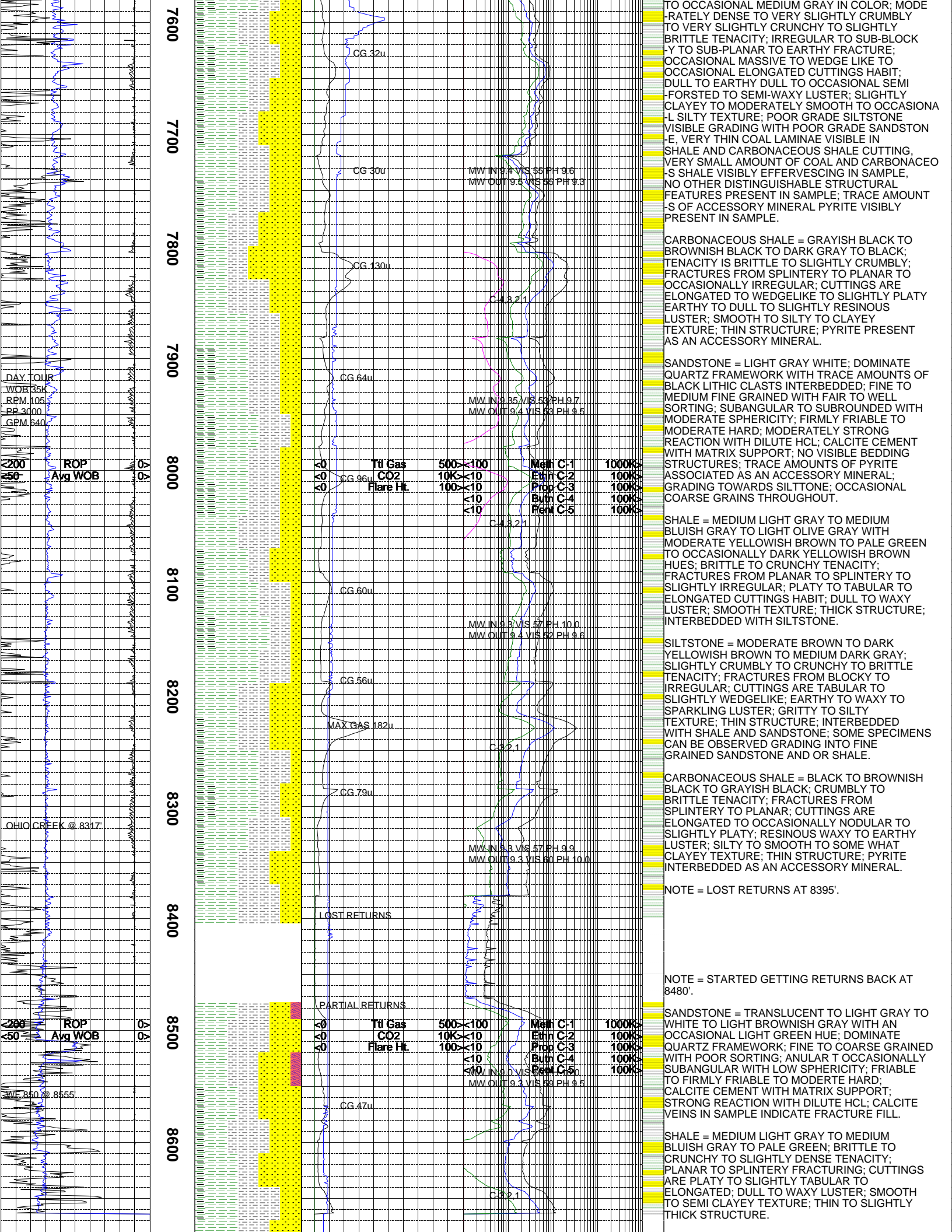
SANDSTONE, LIGHT BROWNISH GRAY TO LIGHT PALE REDDISH BROWN TO OCCASIONAL VERY LIGHT GRAY WITH FEW BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAMEWORK; PREDOMINATELY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATE TO HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 3 TO 5% DARK LITHIC FRAGMENTS; FINE TO MEDIUM-COARSE GRAINED; FAIR TO MODERATELY POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, POOR GRADE SILTSTONE VISIBLE BEDDING WITH POOR GRADE SHALE, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

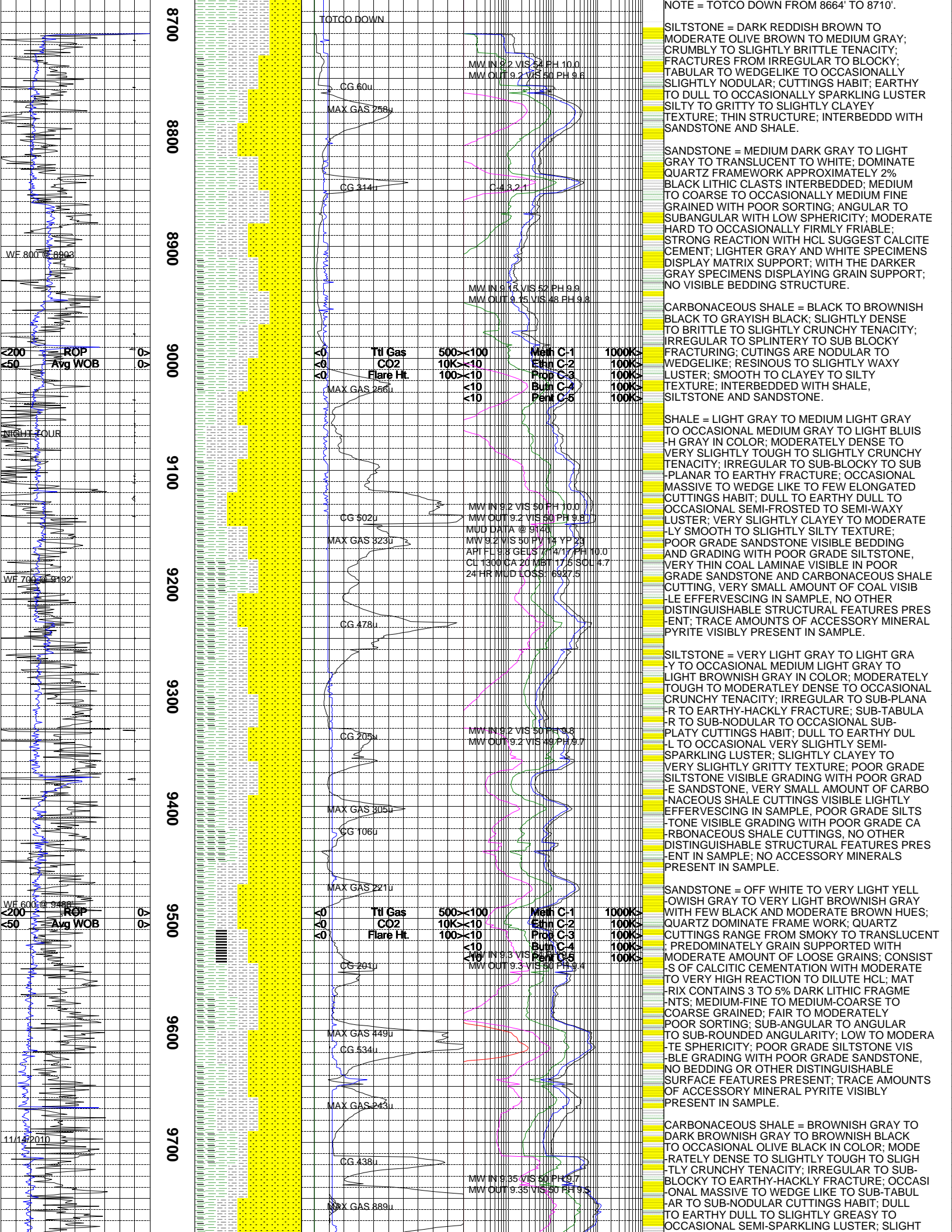
NOTE: DRILLED TO 6132', POOH TO REMOVE
DIRECTIONAL TOOLS ON 11/12/2010.

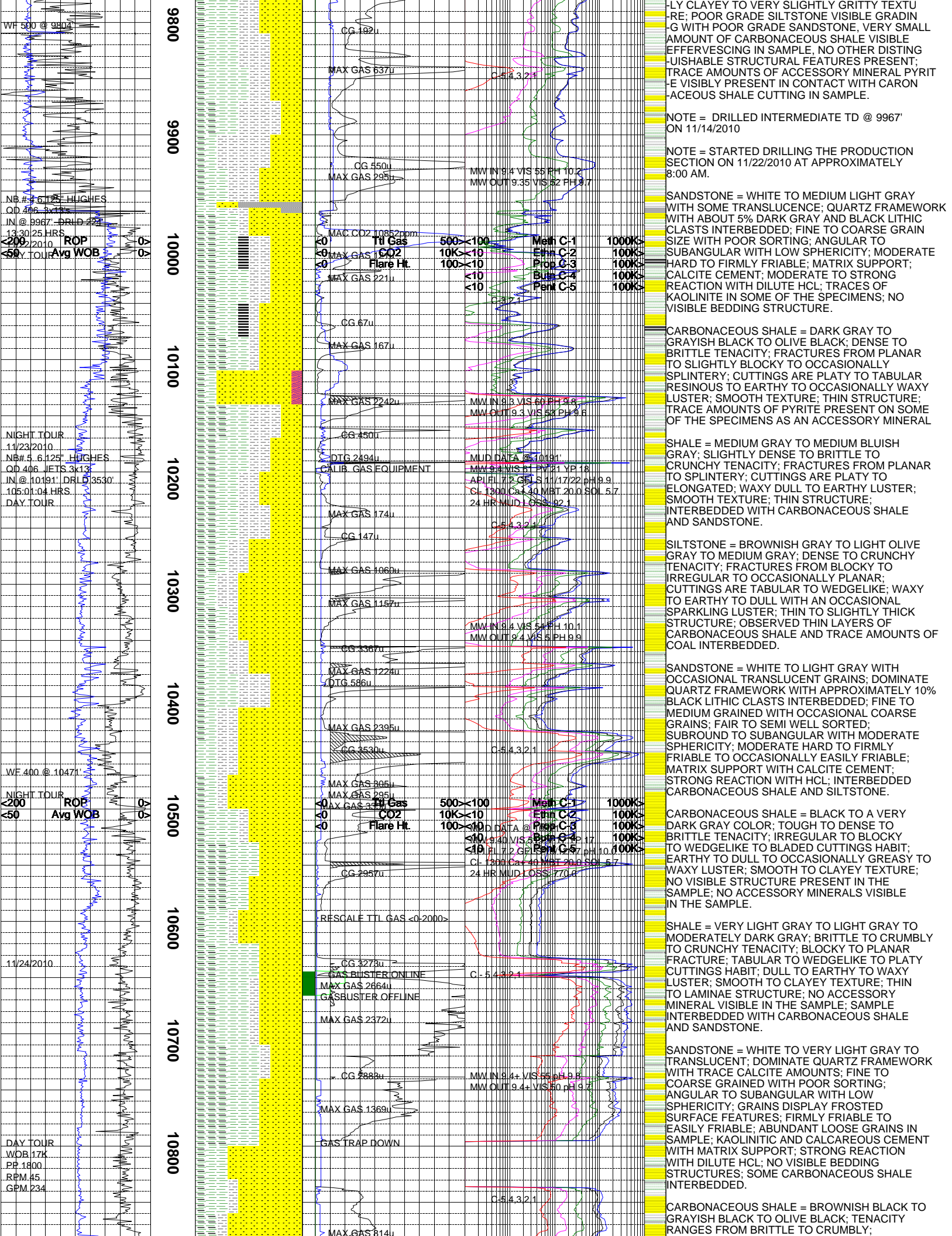
SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM GRAY IN COLOR; MODERATELY DENSE TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO OCCASIONAL ELONGATED CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-WAXY TO SEMI-FROSTED LUSTER; MODERATELY SMOOTH TO VERY SLIGHTLY CLAYEY TO VERY SLIGHTLY SILTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, NO LAMINAE OR OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

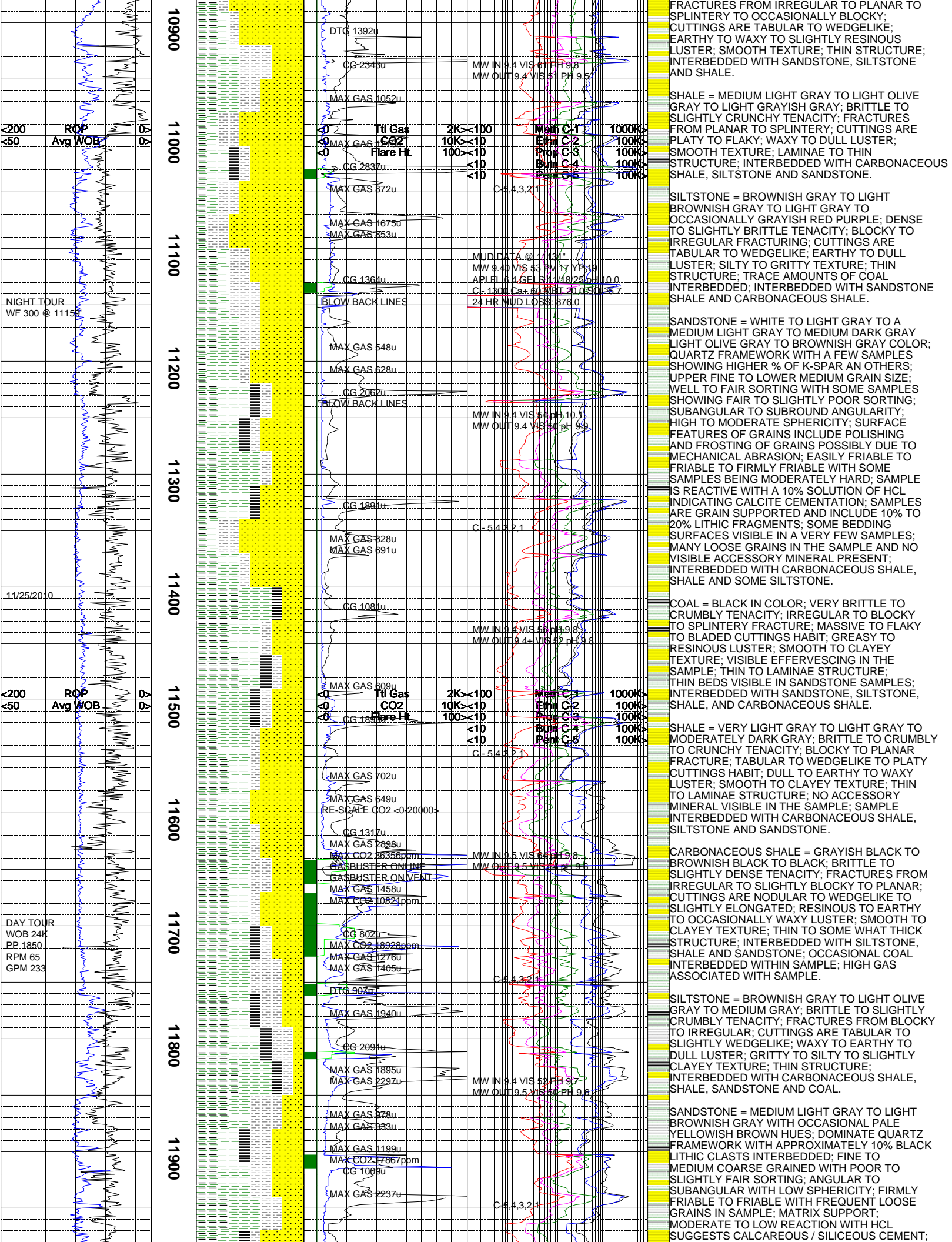
WASATCH G SANDSTONE = OFF WHITE TO WHITE TO VERY LIGHT GRAY WITH OCCASIONAL BLACK MODERATE BROWN, AND OCCASIONAL BRILLIANT GREEN HUES; QUARTZ DOMINATE FRAME WORK; QUARTZ CUTTINGS RANGE FROM SMOKY TO TRANSLUCENT; PREDOMINATELY GRAIN SUPPORTED WITH FAIR AMOUNT OF LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATE TO MODERATELY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 1 TO 3% DARK LITHIC FRAGMENTS; FINE TO MEDIUM-FINE TO MEDIUM-COARSE GRAINED; MODERATELY FAIR TO POOR SORTING; SUB-ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, VERY SMALL AMOUNT OF COAL VISIBLY EFFERVESCENT IN SAMPLE, NO OTHER DISTINGUISHABLE

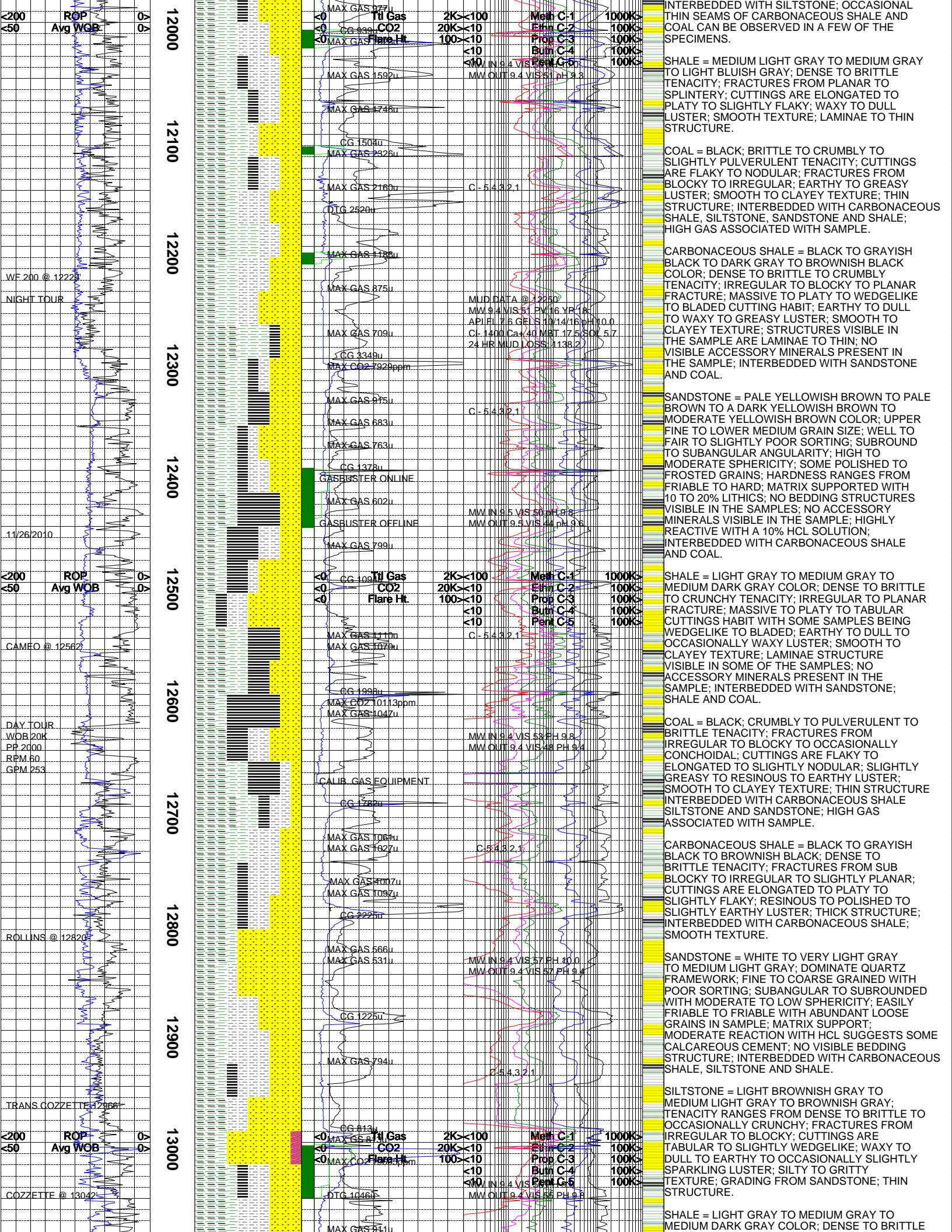


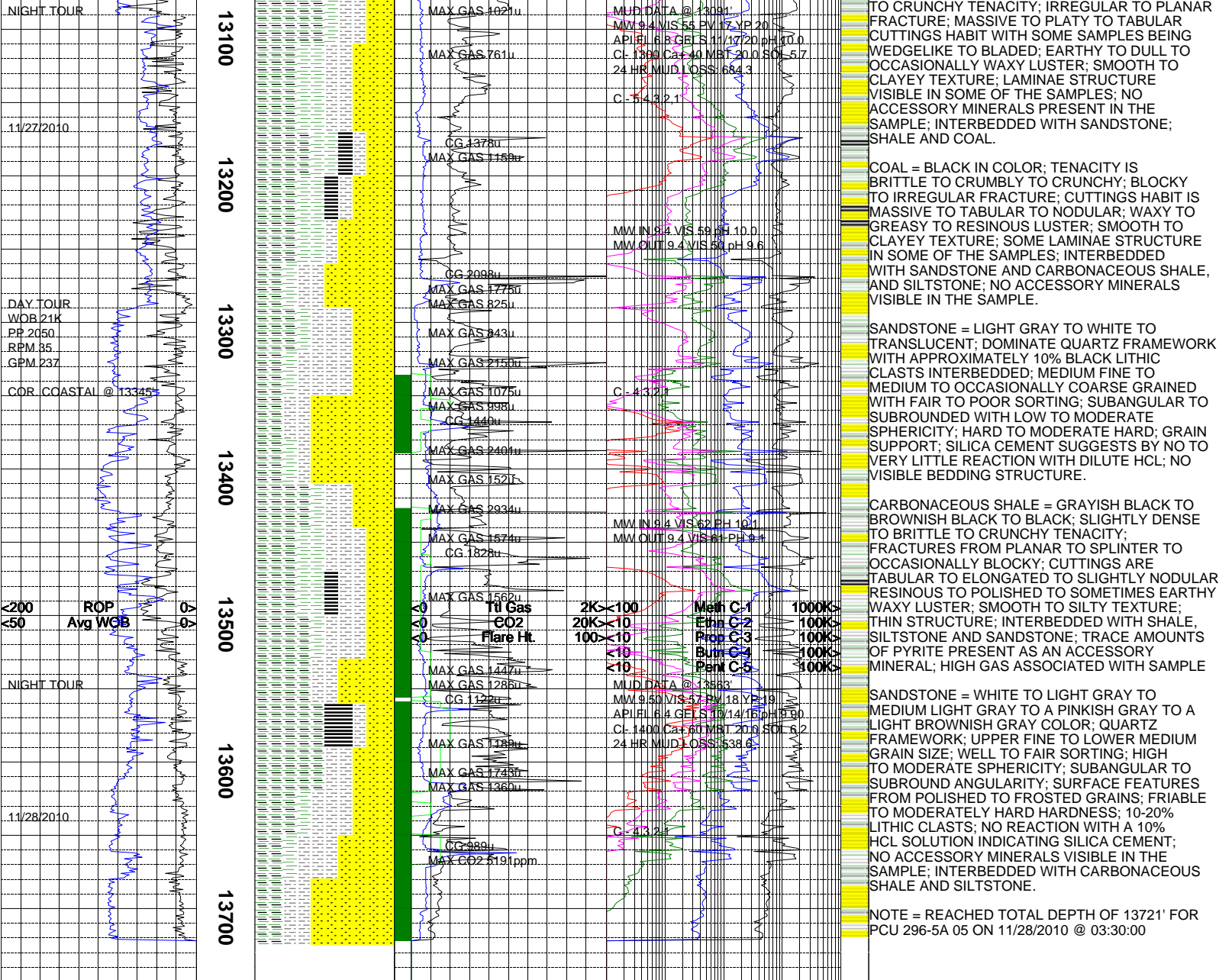












The log data, interpretations and recommendation provided by Epoch are inferences and assumptions based on measurements of drilling fluids. Such inferences and assumptions are not infallible and reasonable professionals may differ. Epoch does not represent or warrant the accuracy, correctness or completeness of any log data, interpretations, recommendations or information provided by Epoch, its officers, agents or employees. Epoch does not and cannot guarantee the accuracy of any such interpretation of the log data, interpretations or recommendations and Company is fully responsible for all decisions and actions it takes based on such log data, interpretations and recommendations.

