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

MUDLOG MD

COMPANY	EXXON MOBIL
WELL	PCU 197-34B8
FIELD	PICEANCE CREEK
REGION	ROCKY MOUNTAINS
COORDINATES	39.915659000
	108.261198000
ELEVATION	6,649.1'
COUNTY, STATE	RIO BLANCO, CO
API INDEX	05-103-11082-00
SPUD DATE	12/13/2008
CONTRACTOR	H _P
CO. REP.	S.GUYOTE/W.GARNER
RIG/TYPE	# 320/FLEX 4S+
LOGGING UNIT	MLU # 032
GEOLOGISTS	J.KEEVAN
	C.RECORD/C.PIERCE
ADD. PERSONS	M.PIPER/B. HICKS
	T.WALKER
CO. GEOLOGIST	CHRIS ALBA

LOG INTERVAL

DEPTHS:	4,000'	**TO**	12,645'
DATES:	9/30/2009	**TO**	12/28/2009
SCALE:		1"=100'	

MUD TYPES

LSND	**TO**	12,645'
	TO	
	TO	
	TO	

CASING DATA

15"	**AT**	150'
10.75"	**AT**	3,976'
7"	**AT**	8,794'
	AT	

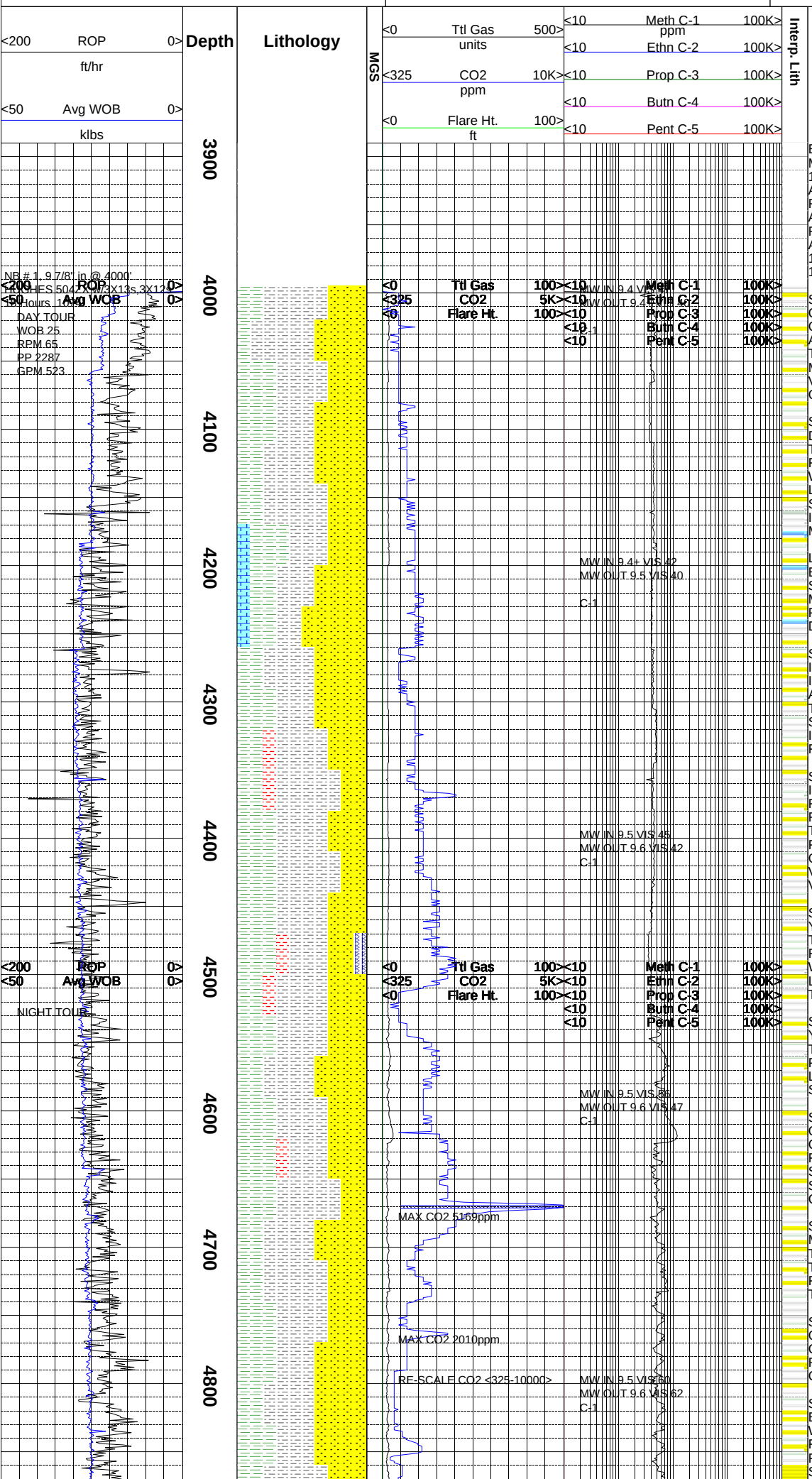
HOLE SIZE

14.75"	**TO**	4,000'
9.875"	**TO**	8,806'
6.125"	**TO**	12,645'
	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.

EPOCH WELL SERVICES COMMENCED MUDLOGGING ON THE EXXONMOBIL PCU 197-34B8 WELL ON 09/30/2009 AT 4000' MD.
ALL COLORS ARE REFERENCED TO THE GSA ROCK COLOR CHART.
ALL TRIP AND CONNECTION GASES ARE REFERENCED ABOVE BACKGROUND; ALL OTHERS ARE ABSOLUTE.
1% METH. EQUIV. = 50 UNIT = 10000 PPM.
10 3/4" CASING @ 3957' PIT 12.0 PPG (E)

SANDSTONE = YELLOWISH GRAY TO WHITE IN COLOR; QUARTZ FRAMEWORK; MEDIUM TO FINE GRAIN SIZE; FAIR TO WELL SORTING; GRAINS ARE ROUNDED TO SUBANGULAR WITH MODERATE TO HIGH SPHERICITY; SAMPLE IS FRIABLE TO MODERATELY HARD; CALCITE CEMENT; NO VISIBLE BEDDING; NO VISIBLE VOIDS; NO GAS SHOWS FROM THIS SANDSTONE.

SILTSTONE = DARK YELLOWISH ORANGE TO DARK YELLOWISH BROWN IN COLOR; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; CUTTINGS RANGE FROM PLATY TO WEDGELIKE IN APPEARANCE; DULL TO EARTHY LUSTER EXHIBITED; TEXTURE RANGES FROM SILTY TO GRANULAR WITH SOME GRADATION INTO SANDSTONE NOTICEABLE; THICK TO MASSIVE STRUCTURE APPARENT.

LIMESTONE = LIGHT BLUISH GRAY TO MEDIUM BLUISH GRAY WITH POSSIBLE LIMONITE STAINING; MATRIX DOMINATED - MUDSTONE; MATRIX APPEARS TO BE CLASTIC IN ORIGIN; POINT CONTACTS FABRIC WITH NO DISCERNIBLE POROSITY.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY IN COLOR; CRUMBLY TO PULVERANT TENACITY; IRREGULAR TO BLOCKY FRACTURE; CUTTINGS ARE PLATY TO TABULAR IN APPEARANCE; DULL TO EARTHY LUSTER EXHIBITED; CLAYEY TO SILTY TEXTURE; THIN TO LAMINAE STRUCTURE INTERBEDDED WITH SILTSTONES APPARENT FROM DRILL BREAKS.

SANDSTONE = LIGHT GREENISH GRAY TO WHITE IN COLOR; QUARTZ FRAMEWORK; COARSE TO FINE GRAIN SIZE; POOR TO FAIR SORTING; ROUNDED TO SUBANGULAR GRAINS WITH LOW TO MODERATE SPHERICITY; FRIABLE TO FIRMLY FRIABLE HARDNESS; CALCITE CEMENT; GRAIN SUPPORTED WITH CEMENT FABRIC; NO VISIBLE POROSITY; CHLORITE GRAINS VISIBLE IN MATRIX; NO GAS SHOWS.

SILTSTONE = GRAYISH ORANGE TO DUSKY YELLOW IN COLOR; DENSE TO CRUMBLY IN TENACITY; IRREGULAR TO CONCHOIDAL FRACTURE; CUTTINGS ARE NODULAR TO WEDGELIKE IN COLOR; DULL TO EARTHY LUSTER EXHIBITED; SILTY TO GRITTY TEXTURE; THIN TO THICK STRUCTURE.

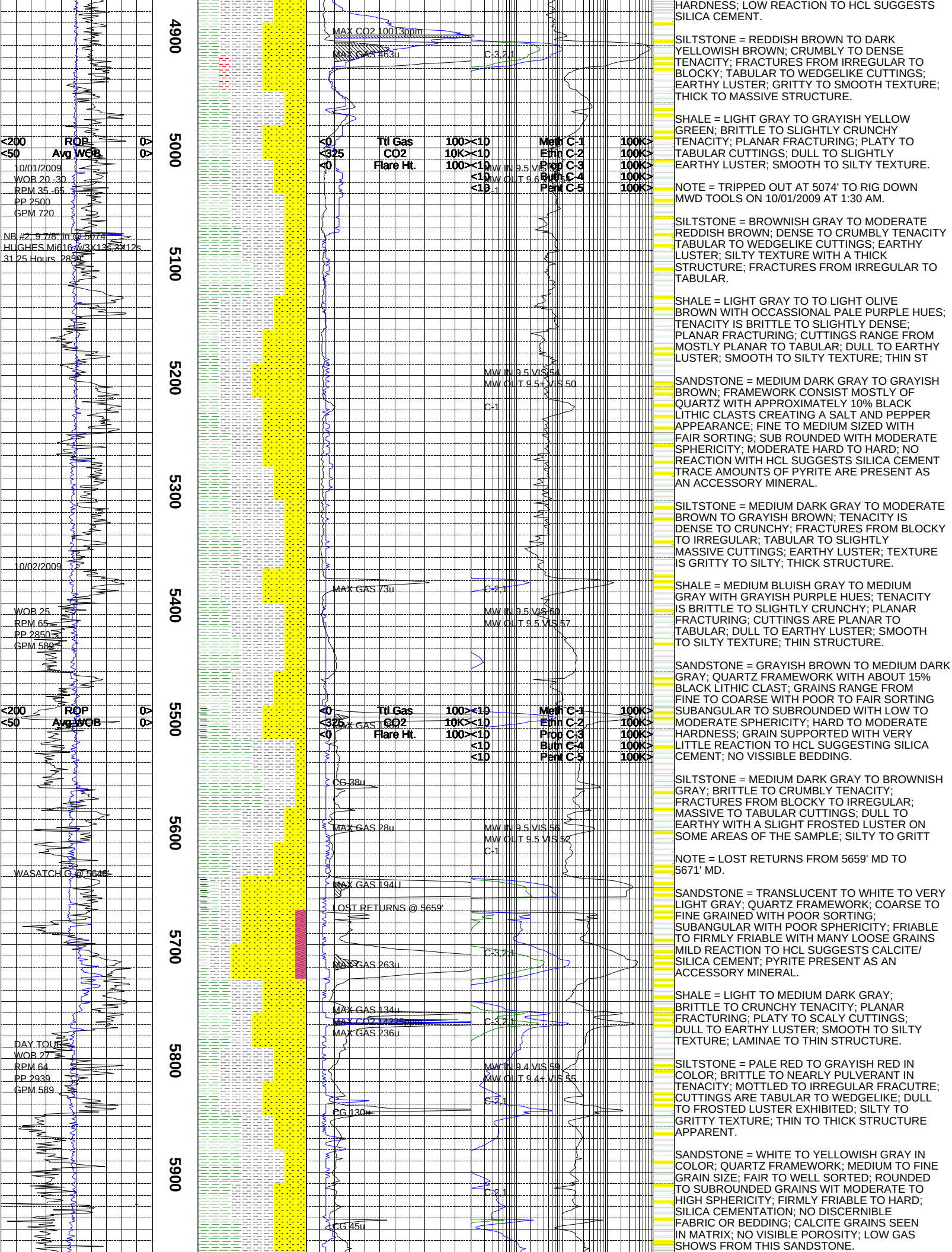
SHALE = LIGHT GRAY TO MODERATE GREENISH YELLOW WITH GRAYISH PURPLE HUES; BRITTLE TENACITY; PLANAR TO IRREGULAR FRACTURING PLATY TO SCALY CUTTINGS; DULL TO WAXY LUSTER; SMOOTH TEXTURE; THIN TO LAMINAE STRUCTURE.

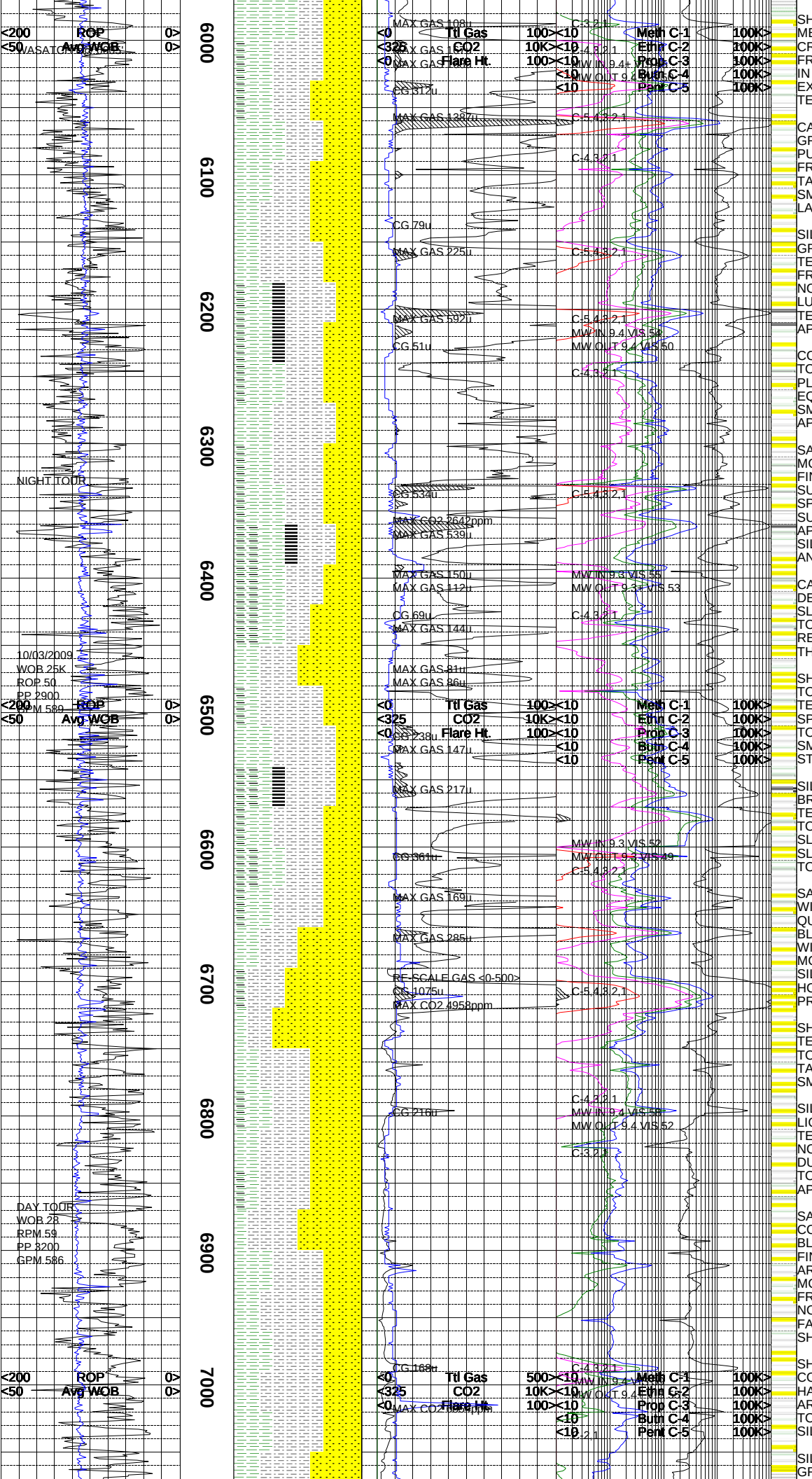
SANDSTONE = LIGHT GREENISH GRAY TO LIGHT OLIVE GRAY TO LIGHT GRAY; FRAMEWORK CONSISTS OF MOSTLY QUARTZ; MEDIUM TO FINE SIZED GRAINS WITH POOR SORTING; SUBROUNDED TO SUBANGULAR WITH MODERATE SPHERICITY; FIRMLY FRIABLE WITH CALCITE CEMENT; MODERATE REACTION WITH HCL.

SILTSTONE = PALE REDDISH BROWN TO MODERATE BROWN; DENSE TO CRUMBLY TENACITY; BLOCKY TO IRREGULAR FRACTURING TABULAR CUTTINGS; EARTHY WITH A SLIGHT FROSTED LUSTER; GRITTY TO SILTY TEXTURE; THICK TO MASSIVE STRUCTURE.

SHALE = MEDIUM BLUISH GRAY TO GREENISH GRAY TO LIGHT GRAY; BRITTLE TO SLIGHTLY CRUNCHY TENACITY; PLANAR FRACTURING; PLATY TO TABULAR TO SLIGHTLY SCALY CUTTINGS; DULL LUSTER; THIN STRUCTURE.

SANDSTONE = BROWNISH GRAY TO MODERATE BROWN TO GRAY COLOR; QUARTZ FRAMEWORK WITH APPROXIMATELY 5% DARK LITHIC CLASTS FINE TO MEDIUM SIZED GRAINS WITH FAIR TO POOR SORTING; SUBANGULAR WITH LOW SPHERICITY; FIRMLY FRIABLE TO MODERATE


4900
5000
5100
5200
5300
5400
5500
5600
5700
5800
5900
<200 ROP 0>
<50 Avg WOB 0>
10/01/2009
WOB 20 -30
RPM 35 -65
PP 2500
GPM 720
NB #2 9 7/8" in @ 5074'
HUGHES Mi616 w/3X13s, 3x12s
31.25 Hours 2850'
10/02/2009
WOB 25
RPM 65
PP 2850
GPM 589
WASATCH G @ 5640'
DAY TOUR
WOB 27
RPM 64
PP 2939
GPM 589
MAX CO2 10013ppm
MAX GAS 263u
C-3 2-1
<0 Ttl Gas 100><10 Meth C-1 100K>
<325 CO2 10K><10 Ethn C-2 100K>
<0 Flare Ht. 100><10 Prop C-3 100K>
<10 Butn C-4 100K>
<10 Pent C-5 100K>
MW IN 9.5 VIS 54
MW OUT 9.5+ VIS 50
C-1
MAX GAS 73u
C-2 1
MW IN 9.5 VIS 60
MW OUT 9.5 VIS 57
MAX GAS 160u
CG 38u
MAX GAS 28u
MW IN 9.5 VIS 56
MW OUT 9.5 VIS 52
C-1
MAX GAS 194U
LOST RETURNS @ 5659'
C-3 2-1
MAX GAS 263u
MAX GAS 134u
MAX CO2 14225ppm
MAX GAS 236u
C-3 2-1
MW IN 9.4 VIS 59
MW OUT 9.4+ VIS 55
C-2 1
CG 130u
C-2 1
CG 45u
HARDNESS; LOW REACTION TO HCL SUGGESTS SILICA CEMENT.
SILTSTONE = REDDISH BROWN TO DARK YELLOWISH BROWN; CRUMBLY TO DENSE TENACITY; FRACTURES FROM IRREGULAR TO BLOCKY; TABULAR TO WEDGELIKE CUTTINGS; EARTHY LUSTER; GRITTY TO SMOOTH TEXTURE; THICK TO MASSIVE STRUCTURE.
SHALE = LIGHT GRAY TO GRAYISH YELLOW GREEN; BRITTLE TO SLIGHTLY CRUNCHY TENACITY; PLANAR FRACTURING; PLATY TO TABULAR CUTTINGS; DULL TO SLIGHTLY EARTHY LUSTER; SMOOTH TO SILTY TEXTURE.
NOTE = TRIPPED OUT AT 5074' TO RIG DOWN MWD TOOLS ON 10/01/2009 AT 1:30 AM.
SILTSTONE = BROWNISH GRAY TO MODERATE REDDISH BROWN; DENSE TO CRUMBLY TENACITY TABULAR TO WEDGELIKE CUTTINGS; EARTHY LUSTER; SILTY TEXTURE WITH A THICK STRUCTURE; FRACTURES FROM IRREGULAR TO TABULAR.
SHALE = LIGHT GRAY TO TO LIGHT OLIVE BROWN WITH OCCASSIONAL PALE PURPLE HUES; TENACITY IS BRITTLE TO SLIGHTLY DENSE; PLANAR FRACTURING; CUTTINGS RANGE FROM MOSTLY PLANAR TO TABULAR; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN ST
SANDSTONE = MEDIUM DARK GRAY TO GRAYISH BROWN; FRAMEWORK CONSIST MOSTLY OF QUARTZ WITH APPROXIMATELY 10% BLACK LITHIC CLASTS CREATING A SALT AND PEPPER APPEARANCE; FINE TO MEDIUM SIZED WITH FAIR SORTING; SUB ROUNDED WITH MODERATE SPHERICITY; MODERATE HARD TO HARD; NO REACTION WITH HCL SUGGESTS SILICA CEMENT TRACE AMOUNTS OF PYRITE ARE PRESENT AS AN ACCESSORY MINERAL.
SILTSTONE = MEDIUM DARK GRAY TO MODERATE BROWN TO GRAYISH BROWN; TENACITY IS DENSE TO CRUNCHY; FRACTURES FROM BLOCKY TO IRREGULAR; TABULAR TO SLIGHTLY MASSIVE CUTTINGS; EARTHY LUSTER; TEXTURE IS GRITTY TO SILTY; THICK STRUCTURE.
SHALE = MEDIUM BLUISH GRAY TO MEDIUM GRAY WITH GRAYISH PURPLE HUES; TENACITY IS BRITTLE TO SLIGHTLY CRUNCHY; PLANAR FRACTURING; CUTTINGS ARE PLANAR TO TABULAR; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE.
SANDSTONE = GRAYISH BROWN TO MEDIUM DARK GRAY; QUARTZ FRAMEWORK WITH ABOUT 15% BLACK LITHIC CLAST; GRAINS RANGE FROM FINE TO COARSE WITH POOR TO FAIR SORTING SUBANGULAR TO SUBROUNDED WITH LOW TO MODERATE SPHERICITY; HARD TO MODERATE HARDNESS; GRAIN SUPPORTED WITH VERY LITTLE REACTION TO HCL SUGGESTING SILICA CEMENT; NO VISSIBLE BEDDING.
SILTSTONE = MEDIUM DARK GRAY TO BROWNISH GRAY; BRITTLE TO CRUMBLY TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR; MASSIVE TO TABULAR CUTTINGS; DULL TO EARTHY WITH A SLIGHT FROSTED LUSTER ON SOME AREAS OF THE SAMPLE; SILTY TO GRITT
NOTE = LOST RETURNS FROM 5659' MD TO 5671' MD.
SANDSTONE = TRANSLUCENT TO WHITE TO VERY LIGHT GRAY; QUARTZ FRAMEWORK; COARSE TO FINE GRAINED WITH POOR SORTING; SUBANGULAR WITH POOR SPHERICITY; FRIABLE TO FIRMLY FRIABLE WITH MANY LOOSE GRAINS MILD REACTION TO HCL SUGGESTS CALCITE/ SILICA CEMENT; PYRITE PRESENT AS AN ACCESSORY MINERAL.
SHALE = LIGHT TO MEDIUM DARK GRAY; BRITTLE TO CRUNCHY TENACITY; PLANAR FRACTURING; PLATY TO SCALY CUTTINGS; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; LAMINAE TO THIN STRUCTURE.
SILTSTONE = PALE RED TO GRAYISH RED IN COLOR; BRITTLE TO NEARLY PULVERANT IN TENACITY; MOTTLED TO IRREGULAR FRACUTRE; CUTTINGS ARE TABULAR TO WEDGELIKE; DULL TO FROSTED LUSTER EXHIBITED; SILTY TO GRITTY TEXTURE; THIN TO THICK STRUCTURE APPARENT.
SANDSTONE = WHITE TO YELLOWISH GRAY IN COLOR; QUARTZ FRAMEWORK; MEDIUM TO FINE GRAIN SIZE; FAIR TO WELL SORTED; ROUNDED TO SUBROUNDED GRAINS WIT MODERATE TO HIGH SPHERICITY; FIRMLY FRIABLE TO HARD; SILICA CEMENTATION; NO DISCERNIBLE FABRIC OR BEDDING; CALCITE GRAINS SEEN IN MATRIX; NO VISIBLE POROSITY; LOW GAS SHOWS FROM THIS SANDSTONE.



SHALE = LIGHT BLUISH GRAY TO MEDIUM TO MEDIUM LIGHT GRAY IN COLOR; DENSE TO CRUMBLY IN TENACITY; SPLINTERY TO PLANAR FRACTURE; CUTTINGS ARE PLATY TO TABULAR IN APPEARANCE; WAXY TO DULL LUSTER EXHIBITED; CLAYEY TO SLIGHTLY SILTY TEXTURE; THIN STRUCTURE APPARENT.

CARBONACEOUS SHALE = GREENISH BLACK TO GRAYISH BLACK IN COLOR; BRITTLE TO PULVERANT IN TENACITY; PLANAR TO MOTTLED FRACTURE; CUTTINGS ARE WEDGELIKE TO TABULAR IN HABIT; GREASY TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN TO LAMINAE STRUCTURE APPARENT.

SILTSTONE = PALE OLIVE TO VERY LIGHT GRAY IN COLOR; DENSE TO BRITTLE IN TENACITY; IRREGULAR TO CONCHOIDAL FRACTURE; CUTTINGS ARE WEDGELIKE TO NODULAR IN APPEARANCE; DULL TO EARTHY LUSTER EXHIBITED; SILTY TO GRITTY TEXTURE; THIN TO THICK STRUCTURE APPARENT.

COAL = GRAYISH BLACK IN COLOR; BRITTLE TO PULVERANT IN TENACITY; HACKLY TO PLANAR FRACTURE; CUTTINGS ARE TABULAR TO EQUANT IN APPEARANCE; METALLIC LUSTER; SMOOTH TEXTURE; THICK TO THIN STRUCTURE APPARENT.

SANDSTONE = WHITE TO LIGHT GRAY WITH MODERATE YELLOWISH BROWN HUES; MEDIUM TO FINE SIZED GRAINS WITH FAIR SORTING; SUBROUNDED WITH MODERATE TO HIGH SPHERICITY; HARD TO MODERATE HARD; GRAIN SUPPORTED; QUARTZ FRAMEWORK WITH APPROXIMATELY 5%-10% BLACK LITHIC CLASTS SILICA CEMENT; TRACE AMOUNTS OF PYRITE AND CALCITE AS ACCESSORY MINERALS.

CARBONACEOUS SHALE = DARK GRAY TO BLACK; DENSE TO BRITTLE TENACITY; BLOCKY TO SLIGHTLY CONCHOIDAL FRACTURING; NODULAR TO WEDGELIKE CUTTINGS; EARTHY TO RESINOUS LUSTER; SILTY TO SMOOTH TEXTURE THIN TO THICK STRUCTURE.

SHALE = PALE OLIVE TO MEDIUM LIGHT GRAY TO LIGHT BLUISH GRAY; DENSE TO BRITTLE TENACITY; FRACTURES FROM PLANAR TO SPLINTERY; PLATY TO SCALY CUTTINGS; DULL TO SLIGHTLY WAXY LUSTER; TEXTURE IS SMOOTH TO SILTY; THIN TO LAMINAE STRUCTURE.

SILTSTONE = DARK YELLOWISH BROWN TO BROWNISH BLACK; DENSE TO CRUMBLY TENACITY; FRACTURES FROM MOSTLY BLOCKY TO OCCASSIONALLY IRREGULAR; TABULAR TO SLIGHTLY MASSIVE CUTTINGS; EARTHY WITH A SLIGHT FROSTED LUSTER; TEXTURE IS SILTY TO GRITTY; THICK STRUCTURE.

SANDSTONE = WHITE TO MEDIUM DARK GRAY WITH SOME MODERATE GREENISH YELLOW HUES; QUARTZ FRAME WORK WITH APPROXIMATELY 10% BLACK LITHIC CLASTS; FINE GRAIN SIZE WITH WELL SORTING; SUBROUNDED; HARD TO MODERATE HARD; GRAINS SUPPORTED WITH SILICA CEMENT; VERY SLIGHT REACTION TO HCL SUGGESTS SOME CALCITE GRAINS MAY BE PRESENT.

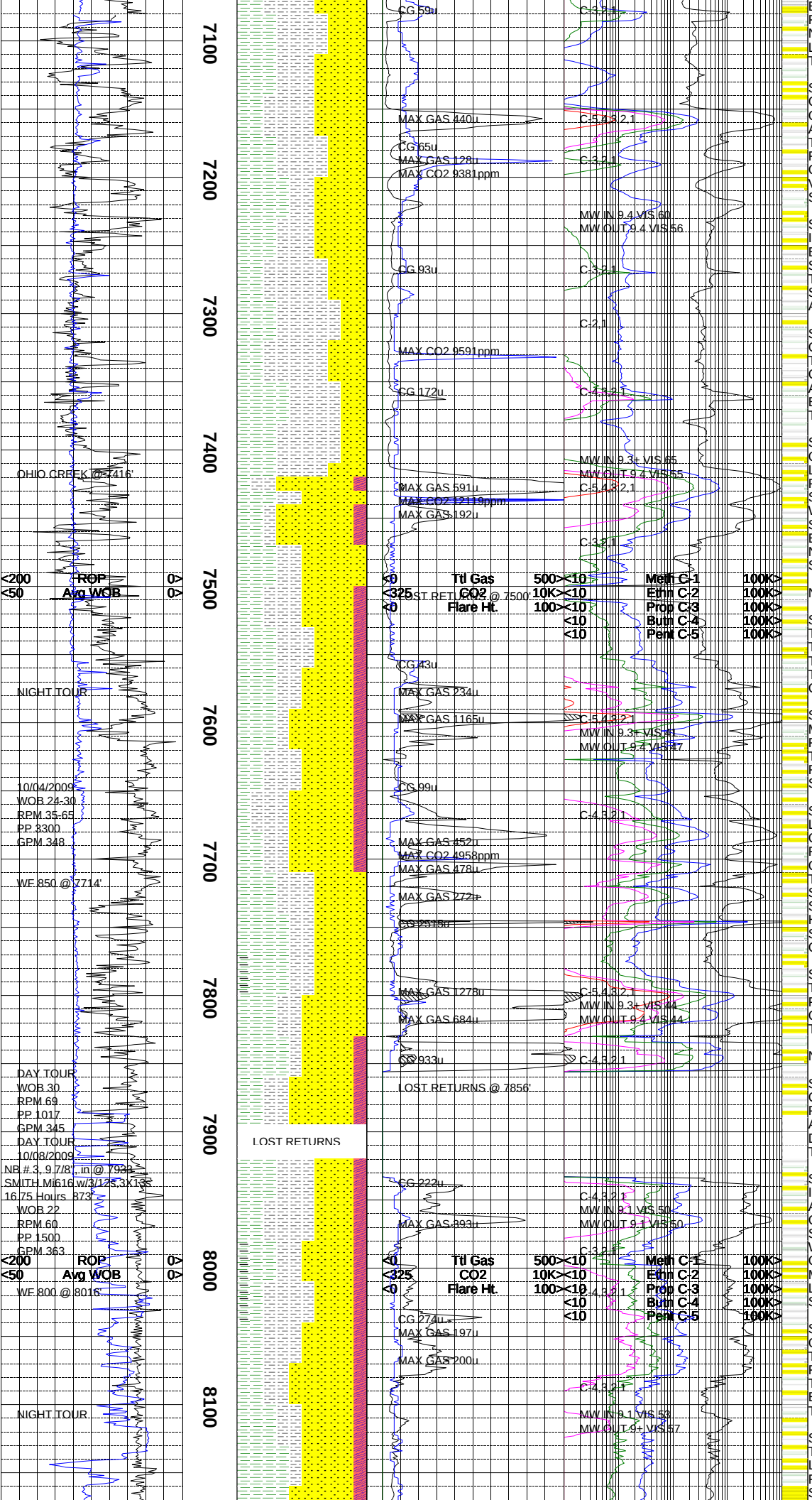
SHALE = LIGHT GRAY TO GREENISH GRAY; TENACITY IS BRITTLE TO CRUNCHY; PLANAR TO SPLINTERY FRACTURING; SCALY TO TABULAR CUTTINGS; LUSTER IS DULL TO WAXY SMOOTH TO SILTY TEXTURE; THIN STRUCTURE.

SILTSTONE = LIGHT OLIVE GRAY TO VERY LIGHT GRAY IN COLOR; DENSE TO BRITTLE IN TENACITY; CONCHOIDAL TO PLANAR FRACTURE; NODULAR TO WEDGELIKE CUTTINGS HABIT; DULL TO EARTHY LUSTER EXHIBITED; SILTY TO GRITTY TEXTURE; THIN STRUCTURE APPARENT.

SANDSTONE = WHITE TO YELLOWISH GRAY IN COLOR; QUARTZ FRAMEWORK WITH ABOUT 3% BLACK LITHIC FRAGMENTS; MEDIUM TO VERY FINE GRAIN SIZE; FAIR SORTING; GRAINS ARE ANGULAR TO SUBROUNDED WITH LOW TO MODERATE SPHERICITY; FRIABLE TO FIRMLY FRIABLE; CALCITE CEMENT; TIGHT SAND WITH NO VISIBLE POROSITY; POINT CONTACT FABRIC WITH NO VISIBLE BEDDING; LOW GAS SHOWS.

SHALE = GREENISH GRAY TO MEDIUM GRAY IN COLOR; DENSE TO CRUCNHY IN TENACITY; HACKLY TO IRREGULAR FRACTURING; CUTTINGS ARE WEDGELIKE TO NODULAR IN HABIT; WAXY TO DULL LUSTER EXHIBITED; CLAYEY TO SILTY TEXTURE, SOME ABRUPT CONTACTS WITH

SILTSTONE = MODERATE REDDISH BROWN TO GRAYISH ORANGE IN COLOR; DENSE TO



BRITTLE IN TENACITY; BLOCKY TO PLANAR FRACTURE; CUTTINGS ARE WEDGELIKE TO NODULAR, SOME MASSIVE; EARTHY TO FROSTED LUSTER EXHIBITED; SILTY TO GRITTY LUSTER THIN STRUCTURE APPARENT.

SANDSTONE = WHITE TO VERY LIGHT GRAY IN COLOR; QUARTZ FRAMEWORK. MEDIUM TO FINE GRAIN SIZE; FAIR TO WELL SORTED; GRAINS ARE ROUNDED TO SUBANGULAR WITH MODERATE TO HIGH SPERICITY; HARDNESS RANGES FROM FRIABLE TO MODERATELY HARD; CALCITE CEMENT; NO DISCERNIBLE BEDDING; NO VISIBLE POROSITY; LOW TO MODERATE GAS SHOWS.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY IN COLOR; BRITTLE TO CRUMBLY IN TENACITY BLOCKY TO PLANAR FRACTURE; CUTTINGS ARE SCALY TO ELONGATED IN APPEARANCE; WAXY TO DULL LUSTER EXHIBITED; CLAYEY TO SLIGHTLY SILTY TEXTURE; THIN STRUCTURE APPARENT.

SILTSTONE = LIGHT BROWNISH GRAY TO LIGHT GRAY IN COLOR; DENSE TO CRUMBLY IN TENACITY; IRREGULAR TO BLOCKY FRACTURE; CUTTINGS ARE NODULAR TO WEDGELIKE IN APPEARANCE; EARTHY TO FROSTED LUSTER EXHIBITED; SILTY TO GRITTY IN TEXTURE; THICK STRUCTURE APPARENT.

SANDSTONE = LIGHT GRAY TO WHITE IN COLOR QUARTZ FRAMEWORK WITH 3 - 5% BLACK LITHIC FRAGMENTS GIVING A SALT AND PEPPER APPEARANCE; MEDIUM TO FINE GRAIN SIZE WITH SOME COARSE GRAINS; FAIR TO WELL SORTED; GRAINS ARE SUBANGULAR TO SUBROUNDED WITH MODERATE SPHERICITY; EASILY TO FIRMLY FRIABLE; CALCITE CEMENT NO VISIBLE POROSITY; MODERATE TO LOW GAS SHOWS.

NOTE = LOST RETURNS @ 7500'.

SHALE = PALE BLUE TO MEDIUM GRAY; TENACITY IS BRITTLE TO CRUMBLY; PLANAR TO SLIGHTLY BLOCKY FRACTURING; SCALY TO TABULAR CUTTINGS; DULL WO WAXY LUSTER; TEXTURE IS SMOOTH TO SILTY TO SLIGHTLY CLAYEY; THIN STRUCTURE.

SILTSTONE = LIGHT BROWNISH GRAY TO MEDIUM GRAY; DENSE TO BRITTLE TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR; TABULAR TO WEDGELIKE CUTTINGS; LUSTER RANGES FROM EARTHY TO DULL; TEXTURE IS SILTY TO GRITTY; THIN STRUCTURE.

SANDSTONE = TRANSLUCENT TO WHITE TO LIGHT GRAY; QUARTZ FRAMEWORK WITH SOME CRYSTAL CLEAR SILICA WICH INDICATES FRACTURING AND ABOUT 10% BLACK LITHIC CLASTS; FINE TO MEDIUM SIZED WITH FAIR TO WELL SORTING; SUBROUNDED TO SUBANGULAR WITH MODERATE TO LOW SPHERICITY; FIRMLY FRIABLE TO MODERATE HARDNESS WITH SOME LOOSE GRAINS; STRONG REACTION WITH HCL SUGGESTS CALCITE CEMENT; PYRITE AS ACCESSORY.

SHALE = LIGHT GRAY TO PALE BLUE; BRITTLE TO CRUNCHY TENACITY; FRACTURES FROM PLANAR TO IREGULAR; SCALY TO TABULAR CUTTINGS; DULL LUSTER; SMOOTH TEXTURE; THIN STRUCTURE.

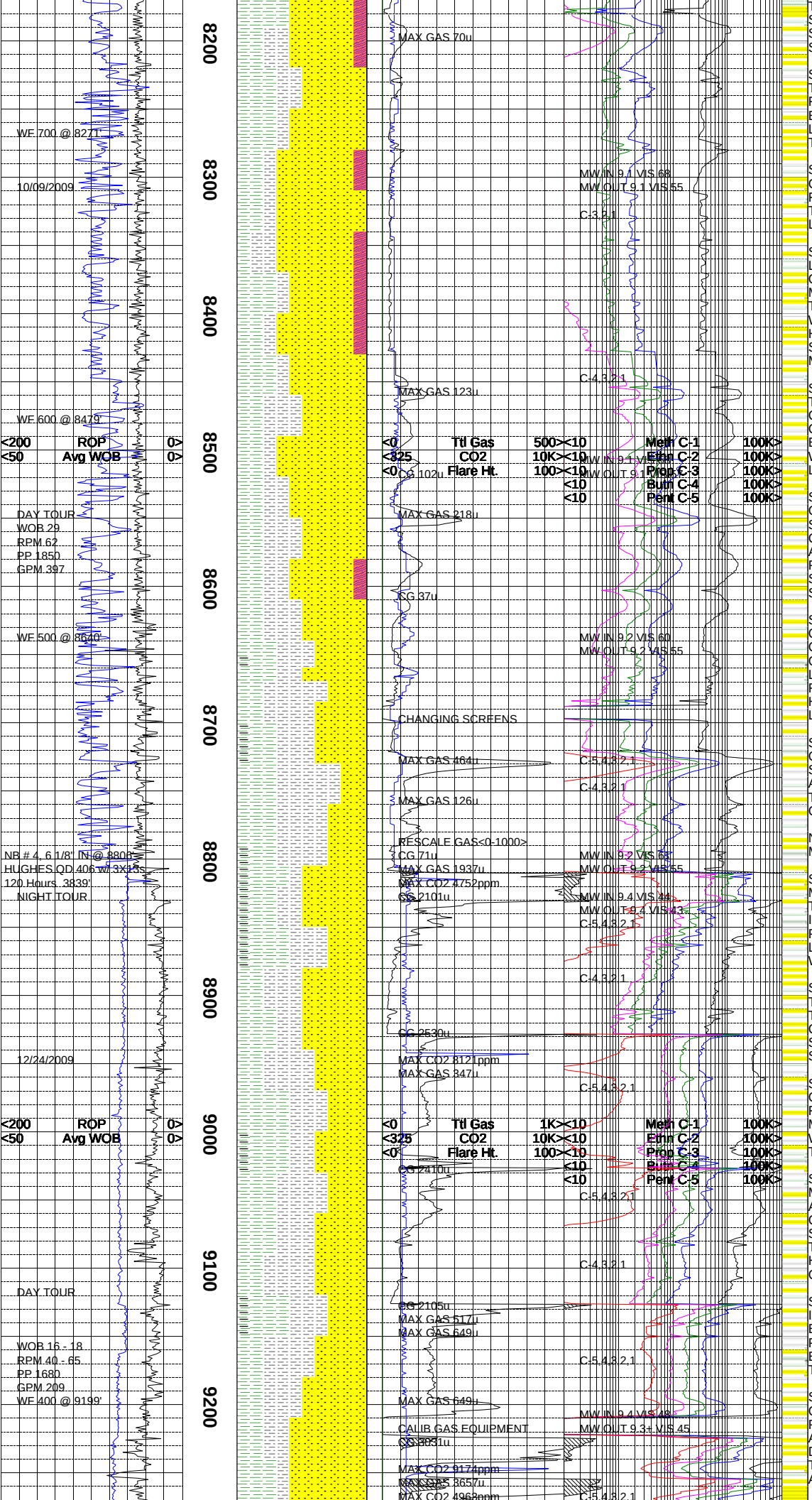
NOTE = LOST COMPLETE RETURNS @ 7856'.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY IN COLOR; TOUGH TO DENSE IN TENACITY; PLANAR TO IRREGULAR FRACTURE; CUTTINGS ARE NODULAR TO WEDGELIKE IN APPEARANCE; DULL TO EARTHY LUSTER EXHIBITED; SILTY TO CLAYEY TEXTURE; THIN STRUCTURE.

SANDSTONE = WHITE TO NEARLY COLORLESS IN COLOR; QUARTZ FRAMEWORK WITH CALCITE AND BLACK LITHIC FRAGMENTS PRESENT; COARSE TO VERY FINE GRAIN SIZE; POOR SORTING;GRAINS ARE ANGULAR TO SUBROUNDED WITH LOW TO MODERATE SPHERICITY; SILICA CEMENT; HARDNESS RENGES FROM FRIABLE TO MODERATELY HARD; NO VISIBLE POROSITY; LOW TO MODERATE GAS SHOWS FROM THIS SANDSTONE.

SHALE = GREENISH GRAY TO MEDIUM DARK GRAY IN COLOR; DENSE TO BRITTLE IN TENACITY; IRREGULAR TO CONCHOIDAL FRACTURE; CUTTINGS AREWEDGELIKE TO TABULAR IN HABIT; WAXY TO DULL LUSTER EXHIBITED; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE APPARENT; NONCALCAREOUS.

SANDSTONE = LIGHT GRAY TO WHITE TO TRANSLUCENT; QUARTZ FRAMEWORK WITH MANY LOOSE GRAINS; MEDIUM TO FINE SIZED WITH FAIR TO WELL SORTING; SUBANGULAR TO SUBROUNDED; MODERATE SPHERICITY; FRIABLE



TO MODERATE HARDNESS DEPENDING ON THE SPECIMEN; GRAIN SUPPORTED WITH CALCITE/ SILICEOUS CEMENT AS SUGGESTED BY A STRONG REACTION WITH HCL.

SHALE = MEDIUM DARK GRAY TO LIGHT GRAY; TENACITY IS DENSE TO CRUNCHY; FRACTURES FROM PLANAR TO SPLINTERY; TABULAR TO ELONGATED CUTTINGS; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; LAMINAE TO THIN STRUCTURE.

SILTSTONE = LIGHT GRAY TO MEDIUM DARK GRAY; TENACITY IS DENSE TO CRUMBLY; FRACTURES FROM IRREGULAR TO BLOCKY; TABULAR TO WEDGELIKE CUTTINGS; EARTHY LUSTER; THIN STRUCTURE.

SANDSTONE = WHITE TO TRANSLUCENT TO LIGHT GRAY; FRAMEWORK CONSISTS OF MOSTLY QUARTZ GRAINS WITH SOME CALCITE IN THE MATRIX; MEDIUM TO FINE SIZED WITH FAIR TO WELL SORTING; ANGULAR TO SUBROUNDED WITH MODERATE SOHERICITY; MODERATE HARDNESS WITH MANY LOOSE GRAINS; GRAIN SUPPORTED WITH SOME CALCITE MATRIX; MODERATE TO STRONG REACTION WITH HCL.

SHALE = LIGHT GRAY TO DARK GRAY COLORING TENACITY IS DENSE TO BRITTLE TO SLIGHTY CRUNCHY; PLANAR TO SPLINTERY TO SLIGHTLY CONSHOIDAL FRACTURING; PLATY TO ELONGATED CUTTINGS; DULL TO SLIGHTLY WAXY LUSTER; SILTY TO SMOOTH TEXTURE; LAMINAE TO THIN STRUCTURE.

SILTSTONE = MEDIUM DARK GRAY TO DARK GRAY IN COLOR; DENSE TO BRITTLE TENACITY SAMPLE SHOWS BLOCKY TO PLANAR FRACTURE; CUTTINGS ARE NODULAR TO WEDGELIKE IN APPEARANCE; DULL TO EARTHY LUSTER; SOME PYRITE VISIBLE IN MATRIX; SILTY TO SLIGHTLY GRITTY TEXTURE; THIN TO THICK STRUCTURE APPARENT.

SANDSTONE = WHITE TO NEARLY COLORLESS; QUARTZ FRAMEWORK; GRAINS RANGE FROM COARSE TO FINE; POOR TO FAIR SORTING; GRAINS ARE ANGULAR TO SUBROUNDED WITH LOW TO MODERATE SPHERICITY; HARDNESS RANGES FROM FIRMLY FRIABLE TO MODERATELY HARD; CALCITE CEMENT;NO VISIBLE POROSITY LOW GAS SHOWS FROM THIS SAND.

SHALE = GREENISH GRAY TO MEDIUM LIGHT GRAY IN COLOR; DENSE TO BRITTLE TENACITY SPLINTERY TO PLANAR FRACTURE; CUTTINGS ARE NODULAR TO ELONGATED IN HABIT; WAXY TO DULL LUSTER EXHIBITED; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE APPARENT.

NOTE = INTERMEDIATE TD REACHED AT 8806' MD ON 10/9/2009 AT 11:55 AM.

SANDSTONE = WHITE TO TRANSLUCENT TO MEDIUM LIGHT GRAY; QUARTZ FRAMEWORK WITH TRACE AMOUNTS OF CARBONACEOUS SHALE IMBEDDED; FINE TO COARSE GRAINED WITH POOR SORTING; ANGULAR TO SUBANGULAR WITH LOW SPHERICITY; FIRMLY FRAIBLE; CALCITE WITH GRAIN SUPPORT.

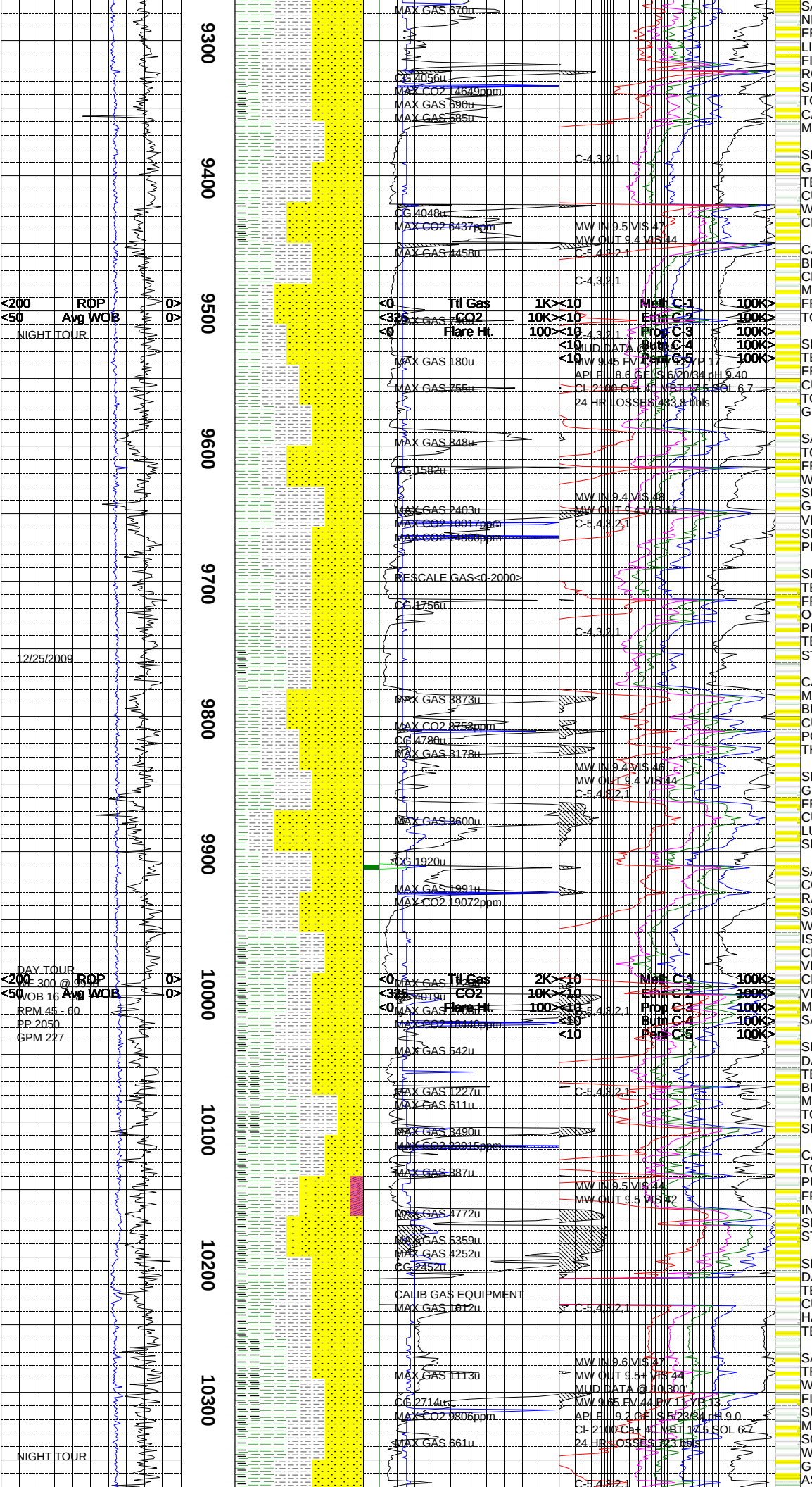
SHALE = MEDIUM DARK GRAY TO LIGHT GRAY; TENACITY IS BRITTLE TO CRUNCHY; PLANAR TO SPLINTERY FRACTURING; PLATY TO SCALY CUTTINGS; LUSTER IS DULL TO EARTHY; SMOOTH TEXTURE; LAMINAE TO THIN STRUCTURE.

SILTSTONE = BROWNISH GRAY TO MEDIUM DARK GRAY; TOUGH TO DENSE TENACITY; FRACTURES FROM IRREGULAR TO BLOCKY; CUTTINGS ARE MASSIVE TO TABULAR; LUSTER IS EARTHY TO WAXY LUSTER; GRITTY TO SILTY TEXTURE; THICK STRUCTURE.

SANDSTONE = WHITE TO TRANSLUCENT TO MEDIUM LIGHT GRAY; QUARTZ FRAMEWORK WITH APPROXIMATELY 10% BLACK LITHIC CLASTS; COARSE TO MEDIUM SIZED WITH POOR SORTING SUBANGULAR WITH LOW SPHERICITY; FRIABLE TO FIRMLY FRIABLE; STRONG REACTION WITH HCL SUGGESTS CALCITE CEMENT; MODERATE GAS ASSOCIATED WITH SAMPLE DEPTH.

SHALE = PALE OLIVE TO MEDIUM LIGHT GRAY IN COLOR; BRITTLE TO CRUMBLY IN TENACITY BLOCKY TO PLANAR FRACTURE; CUTTINGS ARE PLATY TO TABULAR IN APPEARANCE; WAXY TO EARTHY LUSTER EXHIBITED; CLAYEY TO SILTY TEXTURE; THIN STRUCTURE APPARENT.

SILTSTONE = DARK GREENISH GRAY TO MEDIUM GRAY IN COLOR; DENSE TO BRITTLE TENACITY PLANAR TO IRREGULAR FRACTURE; CUTTINGS ARE FLAKY TO WEDGELIKE IN APPEARANCE; DULL TO EARTHY LUSTER EXHIBITED; SILTY TO GRITTY TEXTURE; THIN STRUCTURE APPARENT; NO DISCERNIBLE ACCESSORIES.



SANDSTONE = BLUISH WHITE TO WHITE TO NEARLY TRANSLUCENT IN COLOR; QUARTZ FRAMEWORK WITH APPROXIMATELY 5% BLACK LITHIC FRAGMENTS; GRAINS ARE COARSE TO FINE IN SIZE; FAIR SORTING; GRAINS ARE ROUNDED TO SUBANGULAR WITH MODERATE SPHERICITY; HARDNESS RANGES FROM FRIABLE TO MODRATELY HARD; SILICA CEMENT; SOME CALCITE GRAINS VISIBLE IN THE SAMPLE; MODERATE TO HIGH GAS SHOWS IN THIS SAND.

SHALE = MEDIUM LIGHT GRAY TO MEDIUM DARK GRAY IN COLOR; BRITTLE TO CRUMBLY IN TENACITY; IRREGULAR TO PLANAR FRACTURE; CUTTINGS ARE FLAKY TO TABULAR IN HABIT; WAXY TO DULL LUSTER EXHIBITED; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE APPARENT.

CARBONACEOUS SHALE = BROWNISH GRAY TO BROWNISH BLACK IN COLOR; DENSE TO CRUMBLY IN TENACITY; CUTTINGS RANGE FROM MASSIVE TO WEDGELIKE IN HABIT; PLANAR FRACTURE; SILTY TO GRITTY TEXTURE; THIN TO LAMINAE STRUCTURE APPARENT.

SILTSTONE = MEDIUM GRAY TO BROWNISH GRAY TENACITY IS DENSE TO BRITTLE; FRACTURES FROM MOSTLY BLOCKY TO IRREGULAR; CUTTINGS ARE TABULAR; LUSTER IS EARTHY TO OCCASSIONALY SPRKLING; SILTY TO GRITTY TEXTURE; THICK STRUCTURE.

SANDSTONE = WHITE TO MEDIUM LIGHT GRAY TO OCCASSIONALY TRANSLUNCENT; QUARTZ FRAMEWORK; FINE TO MEDIUM SIZED GRAINS WITH FAIR SORTING; SUBANGULAR TO SUBROUNDED WITH MODERATE SPHERICITY; GRAIN SUPPORTED; MODERATE HARDNESS; VERY SLIGHT REACTION WITH HCL SUGGESTS SILICA CEMENT; TRACE AMOUNTS OF PYRITE PRESENT AS AN ACCESSORY MINERAL.

SHALE = LIGHT GRAY WITH PALE BLUE HUES; TENACITY IS BRITTLE TO SLIGHTLY CRUNCHY; FRACTURES FROM MOSTLY PLANAR TO OCCASSIONALY SPLINTERY; CUTTINGS ARE PLATY TO SCALY; LUSTER IS DULL TO WAXY; TEXTURE IS SMOOTH; LAMINAE TO THIN STRUCTURE.

CARBONACEOUS SHALE = BROWNISH BLACK TO MEDIUM DARK GRAY; TENACITY IS CRUMBLY TO BRITTLE; FRACTURES FROM BLOCKY TO PLANAR CUTTINGS ARE TABULAR; EARTHY TO SLIGHTLY POLISHED LUSTER; SMOOTH TO SILTY TEXTURE THIN STRUCTURE.

SILTSTONE = BROWNISH GRAY TO MEDIUM DARK GRAY TO BROWNISH BLACK; DENSE TENACITY; FRACTURES FROM PLANAR TO IRREGULAR; CUTTINGS ARE TABULAR TO WEDGELIKE; LUSTER IS EARTHY TO SLIGHTLY SPARKLING; SILTY TO GRITTY TEXTURE; THICK STRUCTURE

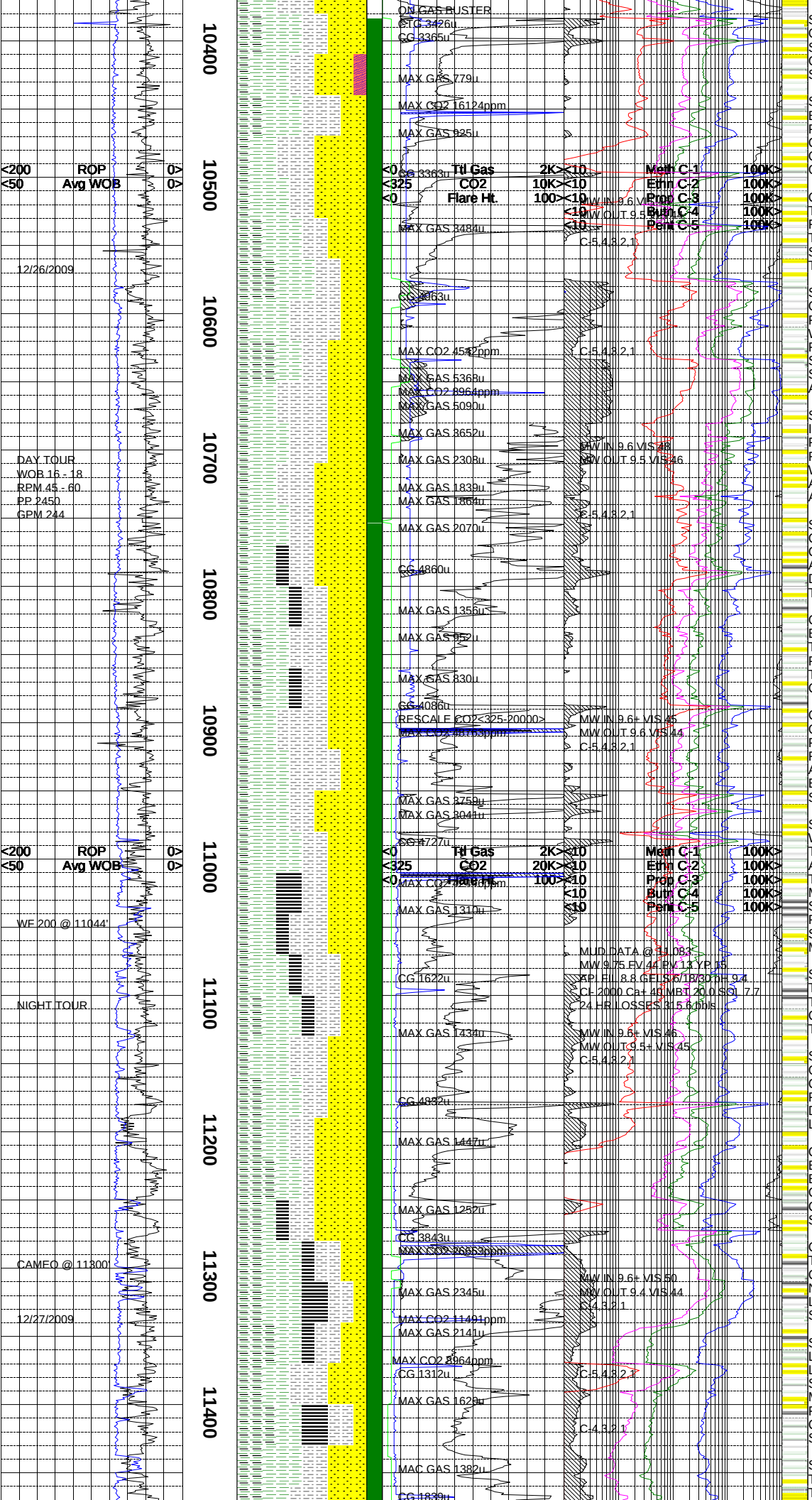
SANDSTONE = YELLOWISH GRAY TO WHITE IN COLOR; QUARTZ FRAMEWORK; GRAIN SIZE RANGES FROM MEDIUM TO FINE; FAIR TO WELL SORTED; GRAINS ARE ANGULAR TO SUBROUNDED WITH LOW TO MODERATE SPHERICITY; SAMPLE IS EASILY TO FIRMLY FRIABLE; CALCITE CEMENT; POINT CONTACT FABRIC WITH NO VISIBLE POROSITY; SOME LIMONITE AND CHLORITE GRAINS SEEN IN SAMPLE; NO VISIBLE BEDDING; MODERATELY LOW TO MODERATELY HIGH GAS SHOWS FROM THIS SANDSTONE.

SHALE = DARK GREENISH GRAY TO MEDIUM DARK GRAY IN COLOR; DENSE TO CRUMBLY IN TENACITY; SAMPLE SHOWS IRREGULAR TO BLOCKY FRACTURE; CUTTINGS RANGE FROM MASSIVE TO ELONGATED IN APPEARANCE; WAXY TO DULL LUSTER EXHIBITED; CLAYEY TO SILTY TEXTURE; THIN TO LAMINAE STRUCTURE

CARBONACEOUS SHALE = MEDIUM BLUISH GRAY TO GRAYISH BLACK IN COLOR; BRITTLE TO PULVERANT TENACITY; MOTTLED TO IRREGULAR FRACTURE; CUTTINGS ARE NODULAR TO PLATY IN APPEARANCE; WAXY TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN TO LAMINAE STRUCTURE APPARENT.

SILTSTONE = BROWNISH BLACK TO MEDIUM DARK GRAY IN COLOR; DENSE TO CRUMBLY TENACITY; PLANAR TO BLOCKY FRACTURE; CUTTINGS ARE NODULAR TO WEDGELIKE IN HABIT; SILTY TO GRITTY, NEARLY GRANULAR TEXTURE; THIN STRUCTURE APPARENT.

SANDSTONE = MEDIUM LIGHT GRAY TO TRANSLUCENT TO WHITE; QUARTZ FRAMEWORK WITH LESS THAN 5% BLACK LITHIC CLASTS; FINE GRAINED WITH WELL SORTING; SUBROUNDED WITH MODERATE SPHERICITY; MODERATE HARD TO FIRMLY FRIABLE WITH SOME LOOSE GRAINS; CERY SLIGHT REACTION WITH HCL INDICATES A SILICA CEMENT; GRAIN SUPPORTED; MODERATE TO HIGH GAS ASSOCIATED WITH SPECIMEN.



SHALE = BROWNISH GRAY TO MEDIUM LIGHT GRAY; BRITTLE TENACITY; PLANAR TO SLIGHTLY SPLINTERY FRACTURING; PLATY CUTTINGS; LUSTER IS DULL TO EARTHY; SMOOTH TEXTURE; THIN TO THICK STRUCTURE.

SILTSTONE = MEDIUM DARK GRAY TO BROWNISH BLACK; TENACITY IS DENSE TO BRITTLE; PLANAR TO BLOCKY FRACTURING; TABULAR CUTTINGS; LUSTER IS EARTHY WITH OCCASSIONAL SPARKLING AREAS; TEXTURE IS GRITTY; THICK STRUCTURE.

CARBONACEOUS SHALE = BLACK TO DARK GRAY; TENACITY IS CRUMBLY TO DENSE; FRACTURES FROM BLOCKY TO PLANAR; CUTTINGS ARE TABULAR TO WEDGELIKE; LUSTER IS WAXY TO SLIGHTLY POLISHED; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE.

SANDSTONE = TRANSLUCENT TO LIGHT GRAY; QUARTZ FRAMEWORK WITH MANY LOOSE GRAINS; FINE SIZED WITH WELL SORTING; SUBANGULAR WITH LOW TO MODERATE SPHERICITY; FRIABLE TO MODERATE HARDNESS; GRAIN SUPPORTED; VERY SLIGHT REACTION WITH HCL SUGGESTS SILICA CEMENT; HIGH GAS ASSOCIATED WITH SAMPLE.

SHALE = LIGHT BLUISH GRAY TO DARK GRAY IN COLOR; DENSE TO BRITTLE TENACITY; PLANAR TO CONCHOIDAL FRACTURE; CUTTINGS RANGE FROM PLATY TO TABULAR IN HABIT; WAXY TO EARHTY LUSTER; CLAYEY TO SILTY, ALMOST GRITTY TEXTURE; THIN STRUCTURE APPARENT; NON-CALCAREOUS.

SILTSTONE = OLIVE GRAY TO DARK GRAY IN COLOR; TOUGH TO BRITTLE IN TENACITY; CONCHOIDAL TO BLOCKY FRACTURE; CUTTINGS ARE NODULAR TO WEDGELIKE IN APPEARANCE; DULL TO EARTHY LUSTER EXHIBITED; SILTY TO GRITTY TEXTURE; THIN STRUCTURE.

COAL = GRAYISH BLACK TO BLACK IN COLOR; BRITTLE TO CRUNCHY IN TENACITY; HACKLY TO IRREGULAR FRACTURE; CUTTINGS ARE PLATY TO FLAKY IN APPEARANCE; METALLIC TO GREASY LUSTER EXHIBITED; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE APPARENT.

CARBONACEOUS SHALE = BROWNISH BLACK TO GRAYISH BLACK IN COLOR; BRITTLE TO PULVERANT IN TENACITY; PLANAR TO BLOCKY FRACTURE; CUTTINGS ARE PLATY TO SCALY IN APPEARANCE; WAXY TO EARTHY LUSTER EXHIBITED; CLAYEY TO SILTY TEXTURE; THIN STRUCTURE APPARENT.

SANDSTONE = PALE YELLOWISH BROWN TO WHITE IN COLOR; QAURTZ FRAMEWORK; MEDIUM TO FINE GRAIN SIZE; FAIR SORTING; GRAINS ARE ROUNDED TO SUBANGULAR WITH MODERATE TO HIGH SPHERICITY; FIRMLY FRIABLE TO MODERATELY HARD; PRIMARILY SILICA CEMENT SOME CALCITE; GRAIN SUPPORTED;NO VISIBLE POROSITY; GRADATIONAL BEDDING SEEN IN SAMPLE, WITH GRADATION DOWN TO SILTSTONE MODERATELY HIGH GAS SHOWS.

SILTSTONE = BROWNISH GRAY TO DARK GRAY; TENACITY IS BRITTLE TO CRUMBLY; PLANAR TO IRREGULAR FRACTURING; TABULAR CUTTINGS; EARTHY LUSTER; GRITY TO SILTY TEXTURE; THIN STRUCTURE.

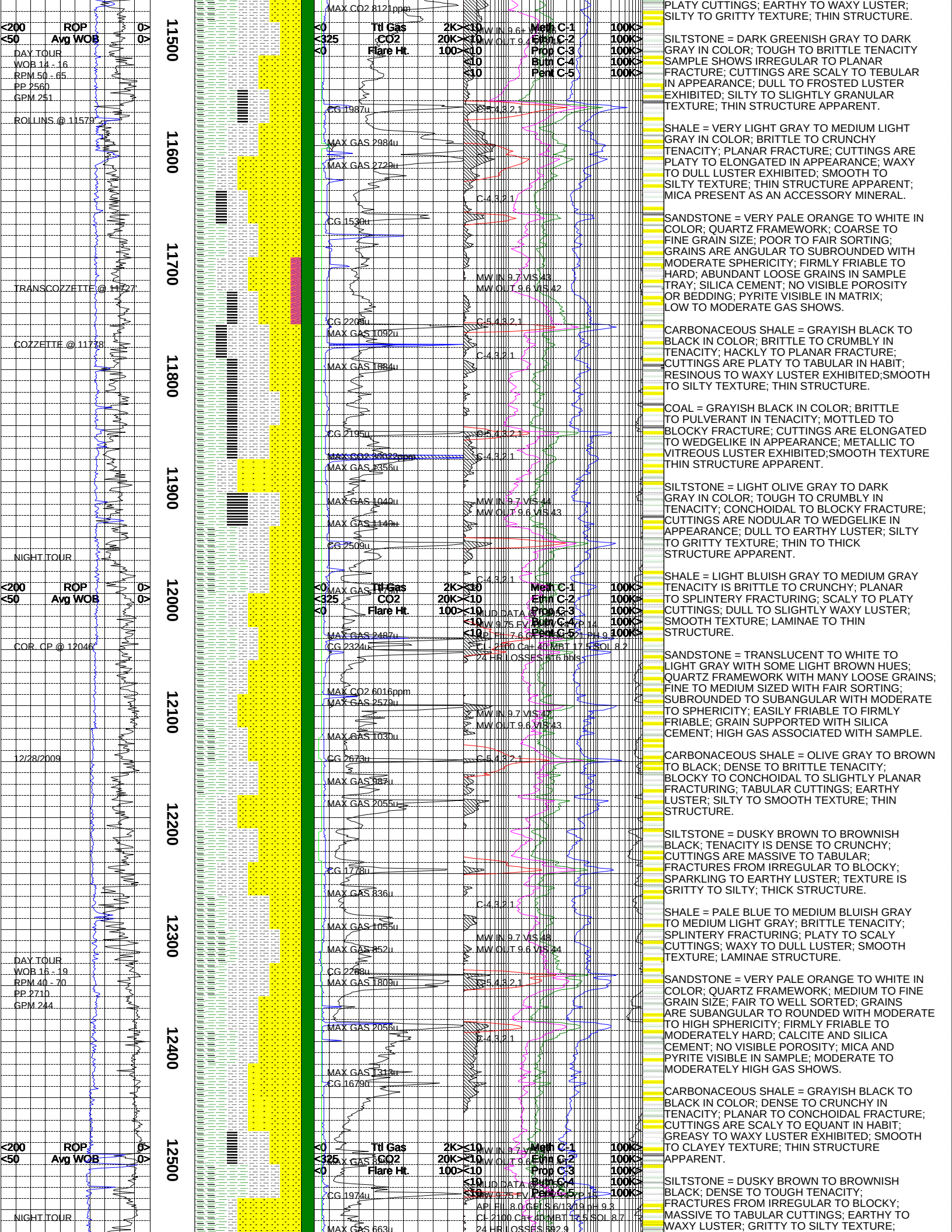
SHALE = MEDIUM BLUISH GRAY TO MEDIUM GRAY; TENACITY IS BRITTLE TO SLICHTLY CRUNCHY; FRACTURES FROM SPLINETERY TO PLANAR; CUTTINGS ATE PLATY TO ELONGATED; DULL LUSTER; SMOOTH TEXTURE; THIN TO LAMINAE STRUCTURE.

CARBONACEOUS SHALE = BLACK TO OLIVE BLACK; BRITTLE TENACITY; SPLINTERY TO BLOCKY FRACTURING; TABULAR TO WEDGELIKE CUTTINGS; POILISHED TO EARTHY LUSTER; CLAYEY TO SMOOTH TEXTURE; THICK STRUCTURE.

COAL = BLACK; CRUMBLY TO PULVERULENT TENACITY; FRACTURES FROM BLOCKY TO CONCHOIDAL TO SPLINTERY; WEDGELIKE TO NODULAR CUTTINGS; RESINOUS TO POLISHED LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE.

SANDSTONE = WHITE TO TRANSLUCENT TO LIGHT GRAY; QUARTZ FRAMEWORK WITH MANY LOOSE GRAINS; FINE SIZED WITH WELL SORTING; SUBROUNDED TO SUBANGULAR WITH MODERATE SPHERICITY; FRIABLE TO EASILY FRIABLE; MILD REACTION WITH HCL SUGGESTS CALCAREOUS/SILICA CEMENT; GRAIN SUPPORTED.

SILTSTONE = BROWNISH GRAY TO OLIVE GRAY TO MEDIUM GRAY; BRITTLE TO CRUNCHY TENACITY; PLANAR FRACTURING; TABULAR TO



PLATY CUTTINGS; EARTHY TO WAXY LUSTER; SILTY TO GRITTY TEXTURE; THIN STRUCTURE.

SILTSTONE = DARK GREENISH GRAY TO DARK GRAY IN COLOR; TOUGH TO BRITTLE TENACITY SAMPLE SHOWS IRREGULAR TO PLANAR FRACTURE; CUTTINGS ARE SCALY TO TEBULAR IN APPEARANCE; DULL TO FROSTED LUSTER EXHIBITED; SILTY TO SLIGHTLY GRANULAR TEXTURE; THIN STRUCTURE APPARENT.

SHALE = VERY LIGHT GRAY TO MEDIUM LIGHT GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; PLANAR FRACTURE; CUTTINGS ARE PLATY TO ELONGATED IN APPEARANCE; WAXY TO DULL LUSTER EXHIBITED; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE APPARENT; MICA PRESENT AS AN ACCESSORY MINERAL.

SANDSTONE = VERY PALE ORANGE TO WHITE IN COLOR; QUARTZ FRAMEWORK; COARSE TO FINE GRAIN SIZE; POOR TO FAIR SORTING; GRAINS ARE ANGULAR TO SUBROUNDED WITH MODERATE SPHERICITY; FIRMLY FRIABLE TO HARD; ABUNDANT LOOSE GRAINS IN SAMPLE TRAY; SILICA CEMENT; NO VISIBLE POROSITY OR BEDDING; PYRITE VISIBLE IN MATRIX; LOW TO MODERATE GAS SHOWS.

CARBONACEOUS SHALE = GRAYISH BLACK TO BLACK IN COLOR; BRITTLE TO CRUMBLY IN TENACITY; HACKLY TO PLANAR FRACTURE; CUTTINGS ARE PLATY TO TABULAR IN HABIT; RESINOUS TO WAXY LUSTER EXHIBITED;SMOOTH TO SILTY TEXTURE; THIN STRUCTURE.

COAL = GRAYISH BLACK IN COLOR; BRITTLE TO PULVERANT IN TENACITY; MOTTLED TO BLOCKY FRACTURE; CUTTINGS ARE ELONGATED TO WEDGELIKE IN APPEARANCE; METALLIC TO VITREOUS LUSTER EXHIBITED;SMOOTH TEXTURE THIN STRUCTURE APPARENT.

SILTSTONE = LIGHT OLIVE GRAY TO DARK GRAY IN COLOR; TOUGH TO CRUMBLY IN TENACITY; CONCHOIDAL TO BLOCKY FRACTURE; CUTTINGS ARE NODULAR TO WEDGELIKE IN APPEARANCE; DULL TO EARTHY LUSTER; SILTY TO GRITTY TEXTURE; THIN TO THICK STRUCTURE APPARENT.

SHALE = LIGHT BLUISH GRAY TO MEDIUM GRAY TENACITY IS BRITTLE TO CRUNCHY; PLANAR TO SPLINTERY FRACTURING; SCALY TO PLATY CUTTINGS; DULL TO SLIGHTLY WAXY LUSTER; SMOOTH TEXTURE; LAMINAE TO THIN STRUCTURE.

SANDSTONE = TRANSLUCENT TO WHITE TO LIGHT GRAY WITH SOME LIGHT BROWN HUES; QUARTZ FRAMEWORK WITH MANY LOOSE GRAINS; FINE TO MEDIUM SIZED WITH FAIR SORTING; SUBROUNDED TO SUBANGULAR WITH MODERATE TO SPHERICITY; EASILY FRIABLE TO FIRMLY FRIABLE; GRAIN SUPPORTED WITH SILICA CEMENT; HIGH GAS ASSOCIATED WITH SAMPLE.

CARBONACEOUS SHALE = OLIVE GRAY TO BROWN TO BLACK; DENSE TO BRITTLE TENACITY; BLOCKY TO CONCHOIDAL TO SLIGHTLY PLANAR FRACTURING; TABULAR CUTTINGS; EARTHY LUSTER; SILTY TO SMOOTH TEXTURE; THIN STRUCTURE.

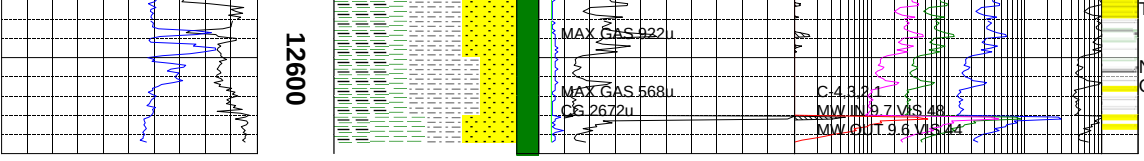
SILTSTONE = DUSKY BROWN TO BROWNISH BLACK; TENACITY IS DENSE TO CRUNCHY; CUTTINGS ARE MASSIVE TO TABULAR; FRACTURES FROM IRREGULAR TO BLOCKY; SPARKLING TO EARTHY LUSTER; TEXTURE IS GRITTY TO SILTY; THICK STRUCTURE.

SHALE = PALE BLUE TO MEDIUM BLUISH GRAY TO MEDIUM LIGHT GRAY; BRITTLE TENACITY; SPLINTERY FRACTURING; PLATY TO SCALY CUTTINGS; WAXY TO DULL LUSTER; SMOOTH TEXTURE; LAMINAE STRUCTURE.

SANDSTONE = VERY PALE ORANGE TO WHITE IN COLOR; QUARTZ FRAMEWORK; MEDIUM TO FINE GRAIN SIZE; FAIR TO WELL SORTED; GRAINS ARE SUBANGULAR TO ROUNDED WITH MODERATE TO HIGH SPHERICITY; FIRMLY FRIABLE TO MODERATELY HARD; CALCITE AND SILICA CEMENT; NO VISIBLE POROSITY; MICA AND PYRITE VISIBLE IN SAMPLE; MODERATE TO MODERATELY HIGH GAS SHOWS.

CARBONACEOUS SHALE = GRAYISH BLACK TO BLACK IN COLOR; DENSE TO CRUNCHY IN TENACITY; PLANAR TO CONCHOIDAL FRACTURE; CUTTINGS ARE SCALY TO EQUANT IN HABIT; GREASY TO WAXY LUSTER EXHIBITED; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE APPARENT.

SILTSTONE = DUSKY BROWN TO BROWNISH BLACK; DENSE TO TOUGH TENACITY; FRACTURES FROM IRREGULAR TO BLOCKY; MASSIVE TO TABULAR CUTTINGS; EARTHY TO WAXY LUSTER; GRITTY TO SILTY TEXTURE;



THICK STRUCTURE.

NOTE = REACHED TOTAL DEPTH OF 12645' MD ON 12/28/2009 AT 11:30 PM.