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# MUDLOG MD

**COMPANY** ExxonMobil Oil Corporation  
**WELL** PCU 297-12A1-ST1  
**FIELD** Piceance Creek  
**REGION** Rocky Mountains  
**COORDINATES** Lat: 39.8890710  
Long: 108.2372410  
**ELEVATION** GL: 7183.6'  
RKB: 7213'  
**COUNTY, STATE** Rio Blanco, Colorado  
**API INDEX** 051031115701  
**SPUD DATE** 09/22/2009  
**CONTRACTOR** HE DRILLING  
**CO. REP.** M. SADLER / J. WOODS  
**RIG/TYPE** 326 FLEX FOUR  
**LOGGING UNIT** CANRIG UNIT ML036  
**GEOLOGISTS** Don Thibodeaux  
Brandon Laiche  
**ADD. PERSONS** Huel Patti Strickland  
Linda Davison/Darryl Ebbert  
**CO. GEOLOGIST** CHRIS ALBA

## LOG INTERVAL

## CASING DATA

**DEPTHS:** 4111' TO 13338'  
**DATES:** 6/16/2009 TO 9/24/2009  
**SCALE:** 1" = 100'

16.000" AT 150'  
10.750" AT 4111'  
7.00" AT 9131'  
4.50" AT 13338'

## MUD TYPES

## HOLE SIZE

WATER BASE TO 5730'  
DSF TO 6200'  
LSND TO 13338'  
TO

14.250" TO 4111'  
9.875" TO 9131'  
6.125" TO 13338'  
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	KAOLINIC	RECRYSTALLIZED CALCITE	VOLCANICS
CHALK	DIATOMITE	LIMESTONE	RHYOLITE	
CRYSTALLINE TUFF	DIORITE	LITHIC TUFF	SALT	
CHERT - ARGILL	DOLOSTONE	MARL - DOLO	SAND	

<200 ROP 0>  
ft/hr  
<50 Avg WOB 0>  
klbs

Depth

Lithology

MGS  
<0 Ttl Gas 1K> <10 Meth C-1 100K>  
units ppm  
<10 Ethn C-2 100K>  
<0 CO2 25K> <10 Prop C-3 100K>  
ppm <10 Butn C-4 100K>  
<0 Flare Ht. 100> <10 Pent C-5 100K>  
ft

Interp. Lith

Remarks  
Survey Data, Mud Reports, Other Info.

3800

3900

4000

4100

4200

4300

4400

4500

4600

47

<200 ROP 0>  
<50 Avg WOB 0>

<0 Ttl Gas 100> <10 Meth C-1 100K>  
CO2 5K <10 Ethn C-2 100K>  
Flare Ht. 100 <10 Prop C-3 100K>  
<10 Butn C-4 100K>  
<10 Pent C-5 100K>

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. ALL ROCK COLORS ARE REFERENCED TO THE 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 CIRCULATED THROUGH THE GAS BUSTER, THE INTERVAL IS MARKED IN THE MGS COLUMN AND SIZE OF FLARES ARE NOTED.

EVIDENCE OF FRACTURE FILL IS NOTED ON THE MUD LOG. KAOLIN PERCENTAGE IN SS INTERVALS IS ALSO NOTED ON THE MUD LOG.

1 UNIT OF GAS = 200 PPM METHANE EPOCH COMMENCED LOGGING ON 6/16/2009 AT 4111' MD.

NOTE: DRILLING WITH POWER DRIVE AND MWD

SHALE = DARK YELLOWISH BROWN, MEDIUM TO DARK OLIVE GRAY; FIRM TO MODERATELY HARD; CRUMBLY TO MODERATELY TOUGH; IRREGULAR, PLANER AND WEDGELIKE CUTTINGS HABIT; MATTE TO OCCASIONALLY SLIGHTLY RESINOUS LUSTER DOMINANTLY SMOOTH TEXTURE; SLIGHTLY TO VERY CALCAREOUS; LOCALLY SILTY, GRADING IN PART AND INTER BEDDED WITH SILTSTONE; POOR TO MODERATE FISSILITY.

SILTSTONE = DARK YELLOWISH BROWN TO MEDIUM GRAY; FIRM TO MODERATELY HARD; CRUMBLY TO OCCASIONALLY TOUGH; IRREG AND SUBBLOCKY OR WEDGELIKE CUTTINGS HABIT; MATTE LUSTER WITH SCATTERED SPARKLES; MODERATELY CALCAREOUS

SANDSTONE = PALE YELLOWISH LIGHT BROWN, LIGHT OFF WHITE, LIGHT PALE GRAYISH BROWN; SOME CLEAR TO SLIGHT TRANSLUCENT; QUARTZ FRAMEWORK; UPPER TO LOWER FINE GRAIN SIZE; POOR TO FAIR SORTING; CONSOLIDATED IN PART; PREDOMINATELY SUBANGULAR ANGULARITY; SEMI FROSTED SURFACE FEATURES; EASILY FRIABLE TO FIRM FRIABLE; CLAY MATRIX CEMENT; WEAK GRAIN SUPPORTED; TRACES CALCITE CEMENT; WEAK HCL REACTION; VERY POOR VISUAL INTER GRANULAR POROSITY; TRACES DARK BROWNISH SILTSTONE INTERBEDDED.

NOTE: START KICK-OFF AT 4436'. SIDETRACK DATA BEGINS AT 4450'.

SHALE = DARK YELLOWISH TO BROWNISH ORANGE, TRACES LIGHT YELLOWISH BROWN; PULVERULENT, CRUMBLY TO SOME FIRM TENACITY, SUB BLOCKY, IRREGULAR IN PART FRACTURE; WEDGELIKE, ELONGATED CUTTINGS HABIT; DULL, EARTHY, SEMI WAXY LUSTER; CLAYEY TO SMOOTH TEXTURE; MASSIVE TO THICK STRUCTURE.

SILTSTONE - LIGHT ORANGISH GRAY, LIGHT YELLOWISH BROWN; CRUMBLY TO SLIGHT BRITTLE TENACITY; BLOCKY TO SUB BLOCKY FRACTURES; WEDGELIKE, SUB BLOCKY CUTTINGS HABIT; DULL EARTHY LUSTER; SILTY TO SLIGHTLY GRITTY TEXTURE; SEMI THICK STRUCTURE.

KICK-OFF FAILED, TRIP FOR BHA @ 4648'.

SANDSTONE = LIGHT GRAY TO VERY LIGHT GRAY, OCCASIONALLY BLuish GRAY; EASILY FRIABLE TO FIRM; VERY FINE LOWER TO FINE LOWER; SUBANGULAR TO ANGULAR; MOD SORTED; DOMINANTLY QUARTZ WITH MINOR LITHICS; SCATTERED FROSTED GRAINS;

06/16/09  
NB #2 9.7/8" IN AT 4111'  
HTC  
JETS  
SN

WOB 15  
RPM 60  
PP 2315  
SPM 160

MW IN 8.9 VIS 43  
MW OUT 8.9 VIS 48

MW IN 9.0 VIS 46  
MW OUT 8.9 VIS 49

MW IN 8.6+ VIS 59  
MW OUT 8.6+ VIS 40

MUD DATA @ 4473'  
MW 8.6 FV 51 PV 11 VP 17  
AP FILL 12.4 GELS 9.30/40 Rh 11.7  
CL 2500 GA+ 10 MBT 20.0 SOL 1.7  
24 HR LOSSES 1098.4 BBL S

NB #3 9.7/8" AT 4437'  
HC 504 W/ MOTOR MWD  
JETS: 4X13, 2X12  
SN: 7011849  
ETG: 212 HRS: 21

<200 ROP 0>  
<50 Avg WOB 0>

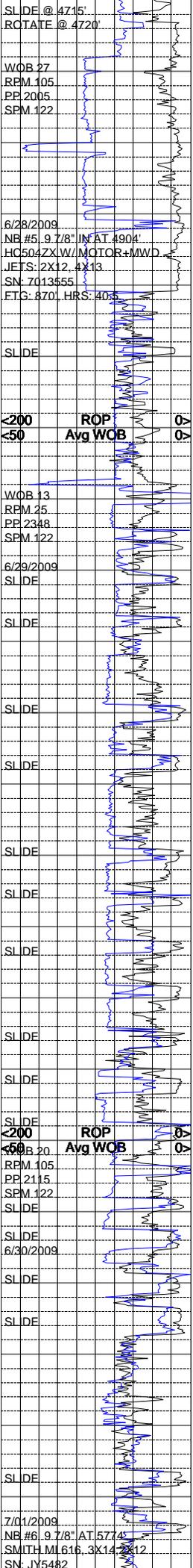
<0 Ttl Gas 100> <10 Meth C-1 100K>  
CO2 5K <10 Ethn C-2 100K>  
Flare Ht. 100 <10 Prop C-3 100K>  
<10 Butn C-4 100K>  
<10 Pent C-5 100K>

6/26/2009

WOB 6.8  
RPM  
PP 1979  
SPM 122  
NB #4 9.7/8" IN AT 4648'  
SMITH W/MOTOR MWD  
JETS: 4X16  
SN: PL1453  
ETG: 256 HRS: 21

MW IN 8.6+ VIS 55  
MW OUT 8.6+ VIS 55

ROTATE @ 4680'



4800  
4900  
5000  
5100  
5200  
5300  
5400  
5500  
5600  
5700  
5800

NO CG  
TG 11u  
MAX GAS 548  
Ttl Gas  
CO2  
Flare Ht  
BG Bu  
MAX GAS 59u  
CO2 14440 ppm

C.1  
MW IN 8.7 VIS 54  
MW OUT 8.7+ VIS 61  
MUD DATA @ 4748'  
MW 8.75 FV 53 PV 17 YF 21  
AP FILL 9.0 GELS 8/26/38 Ph 11.3  
CL 2600 CA+ 10 MBT 20.0 SOL 2.4  
24 HR LOSSES 0.00 BBL S  
C.1  
C.3.2.1  
Meth C-1  
Ethn C-2  
Prop C-3  
Burn C-4  
Penk C-5  
MUD DATA @ 4804'  
MW 8.65 FV 63 PV 18 YF 21  
AP FILL 0.0 GELS 9/30/43 Ph 10.9  
CL 2600 CA+ 10 MBT 20.0 SOL 3.2  
24 HR LOSSES 16.0 BBL S  
C.2.1  
MW IN 9.0 VIS 56  
MW OUT 9.0 VIS 56  
C.1  
MW IN 9.1 VIS 54  
MW OUT 9.2 VIS 56  
MUD DATA @ 5435'  
MW 9.15 FV 54 PV 16 YF 21  
AP FILL 10.8 GELS 8/37/- Ph 9.8  
CL 2500 CA+ 10 MBT 20.0 SOL 4.4  
24 HR LOSSES 00.0 BBL S  
MW IN 9.0+ VIS 55  
MW OUT 9.1+ VIS 54  
C.2.1  
MW IN 9.0 VIS 52  
MW OUT 9.0 VIS 53  
MUD DATA @ 5740'  
MW 9.10 FV 53 PV 14 YF 25  
AP FILL 10.0 GELS 9/35/46 Ph 10.3  
CL 2500 CA+ 10 MBT 22.5 SOL 4.2  
24 HR LOSSES 00.0 BBL S  
MUD DATA @ 5774'  
MW 9.10 FV 55 PV 15 YF 23

CLAY MATRIX; VARIABLE MATRIX/GRAIN SUPPORTED; LIGHT CALCITE CEMENT; INTERBEDDED WITH SILTSTONE AND SHALE.

SHALE = PALE YELLOWISH BROWN, VERY LIGHT BLUISH GRAY, LIGHT YELLOWISH GRAY; CRUMBLY, SLIGHT PULVERULENT TENACITY; SUB BLOCKY, BLOCKY SEMIL IRREGULAR FRACTURE; WEDGELIKE, OCCASIONALLY TABULAR CUTTINGS HABIT; PREDOMINATELY DULL, EARTHY, SOME WAXY LUSTER; CLAYEY, SLIGHT SILTY TEXTURE; THICK MASSIVE STRUCTURE.

SILTSTONE = LIGHT TO MEDIUM GRAY, PURPLISH BROWN; FIRM TO MODERATELY HARD; CRUMBLY TO OCCASIONALLY TOUGH; SUB-BLOCKY, IRREGULAR AND WEDGELIKE CUTTINGS; DULL LUSTER WITH SCATTERED SPARKLES; SLIGHTLY TO MODERATELY CALCAREOUS; SCATTERED TO COMMON VERY FINE SAND DISSEMINATED THROUGHOUT.

SANDSTONE = VERY LIGHT GRAY TO OFF WHITE OCCASIONALLY LIGHT BROWNISH GRAY; LOWER TO UPPER VERY FINE GRAIN, SOME TRACES FINE GRAIN; POOR TO FAIR SORTING; SUB ANGULAR TO SUBROUND ANGULARITY; FRIABLE IN PART; PREDOMINATELY CLAY MATRIX, TRACES WEAK CALCAREOUS CEMENT; SCATTERED SPECKLED DARK GRAY TO BLACK LITHICS; TRACES INTERBEDDED WITH SILTSTONE.

SHALE = DARK YELLOWISH BROWN, MODERATE GRAYISH YELLOW; BRITTLE TO MODERATE DENSE TENACITY, SUBBLOCKY, BLOCKY TO SLIGHT IRREGULAR FRACTURE; WEDGELIKE ELONGATED, SUB PLATY CUTTINGS HABIT; DULL, EARTHY, SEMI WAXY LUSTER; CLAYEY SLIGHTLY SILTY TEXTURE; THICK MASSIVE STRUCTURE.

SILTSTONE = LIGHT TO MODERATE YELLOWISH BROWN, TRACES GRAYISH BROWN; CRUMBLY, BRITTLE IN PART; SUB BLOCKY, BLOCKY WITH OCCASIONAL IRREGULAR FRACTURE; WEDGELIKE CUTTINGS HABIT; DULL RESINOUS LUSTER; SILTY TO GRITTY TEXTURE; THICK STRUCTURE

SANDSTONE = LIGHT TO MEDIUM GRAY WITH SLIGHT BROWNISH ORANGE HUES; FIRM; VERY FINE LOWER TO FINE LOWER; ANGULAR TO SUBROUND; MODERATELY SORTED; DOMINANTLY QUARTZ WITH MINOR LITHICS; CLAY MATRIX; VARIABLE MATRIX/GRAIN SUPPORTED; MODERATE CALCITE CEMENT; INTERBEDDED WITH SILTSTONE AND SHALE.

SHALE = MODERATE YELLOWISH BROWN, LIGHT YELLOWISH GRAY; FIRM TO MODERATELY HARD; CRUMBLY TO MODERATELY TOUGH; PLANER, IRREGULAR AND WEDGELIKE CUTTINGS; DULL TO SLIGHTLY RESINOUS LUSTER; DOMINANTLY SMOOTH TEXTURE; SLIGHTLY TO OCCASIONALLY VERY CALCAREOUS; INTERBEDDED WITH SILTSTONE AND SANDSTONE.

SILTSTONE = MODERATE TO PALE YELLOWISH BROWN, GRAYISH ORANGE; FIRM TO MODERATELY HARD; CRUMBLY TO TOUGH; IRREGULAR AND SUBBLOCKY CUTTINGS; DULL LUSTER WITH SCATTERED MICRO SPARKLES; GRITTY TEXTURE; CALCAREOUS; SCATTERED BLACK PINPOINT SPECKS; INTERBEDDED WITH SANDSTONE AND SHALE.

SANDSTONE = GRAYISH ORANGE, OFF WHITE IN PART, SOME LIGHT PALE YELLOWISH BROWN PREDOMINATELY FINE GRAIN, TRACES VERY FINE GRAIN; FAIR TO WELL SORTED; SUB ANGULAR TO SUBROUND ANGULARITY; LOW SPHERICITY; TRACE FROSTED SURFACE FEATURE; EASILY FRIABLE TO FRIABLE; CLAY MATRIX CEMENT, TRACES SILICA CEMENT, VERY WEAK CALCAREOUS CEMENT REACTION TO HCL, FAIR GRAIN SUPPORT; TRACES BLACK SPECKLED LITHIC IMBEDDED.

SHALE = LIGHT YELLOWISH GRAY, MODERATE YELLOWISH BROWN; FIRM TO MOD HARD; CRUMBLY TO MODERATELY TOUGH; IRREGULAR, PLANER, WEDGELIKE CUTTINGS; DULL TO SLIGHTLY RESINOUS LUSTER; DOMINANTLY SMOOTH TEXTURE; SLIGHTLY TO OCCASIONALLY VERY CALCAREOUS; OCCASIONALLY SILTY, GRADING TO AND INTERBEDDED WITH SILTSTONE; POOR TO MODERATE FISSILITY.

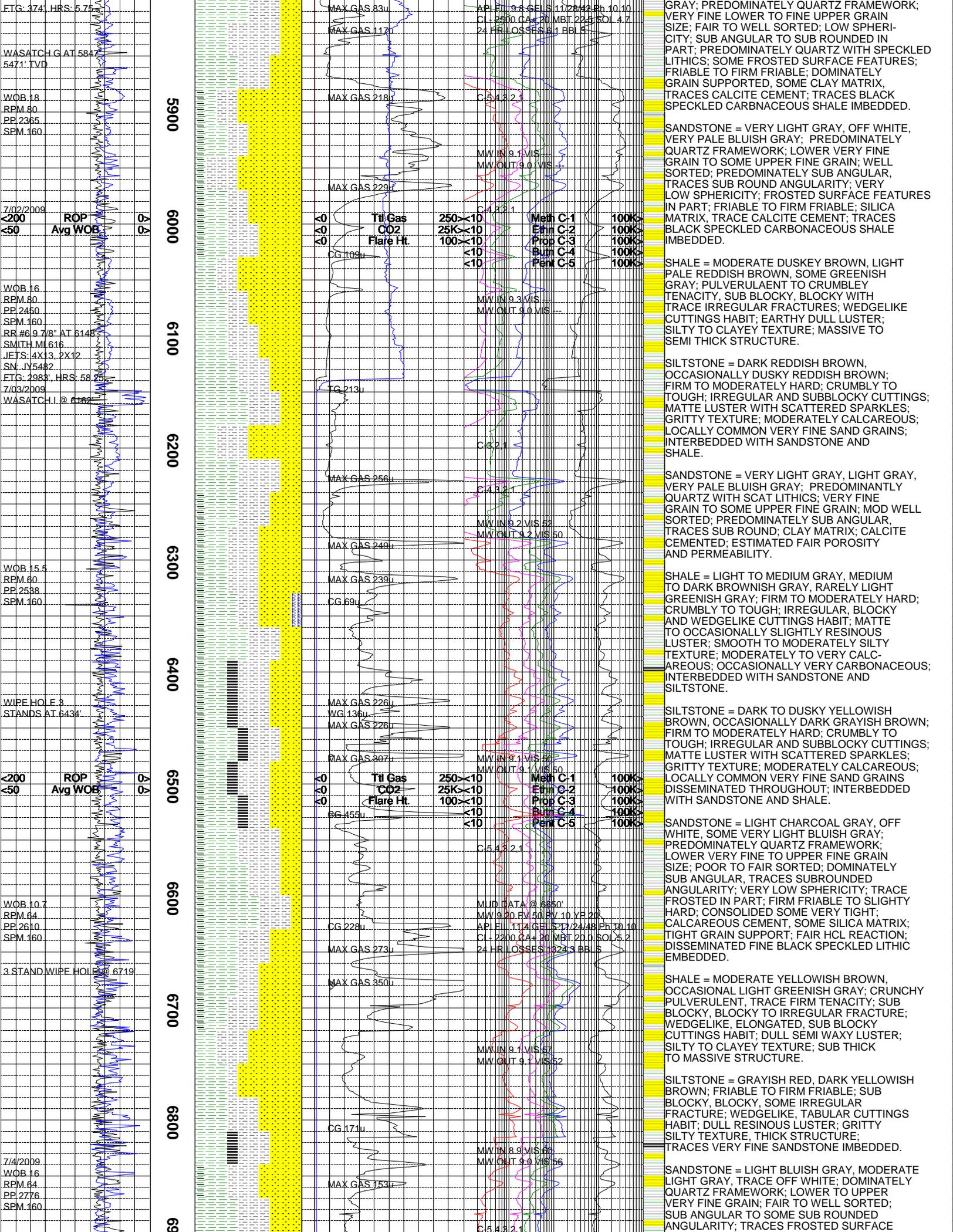
SHALE = PALE LIGHT BROWNISH GRAY, LIGHT YELLOWISH GRAY; PULVERULENT, SEMI BRITTLE TENACITY; SUB BLOCKY, BLOCKY, SLIGHT IRREGULAR FRACTURE; NODULAR, WEDGELIKE, SUB BLOCKY CUTTINGS HABIT; DULL EARTHY, WAXY IN PART LUSTER; CLAYEY, SEMI SMOOTH TEXTURE; THICK MASSIVE STRUCTURE.

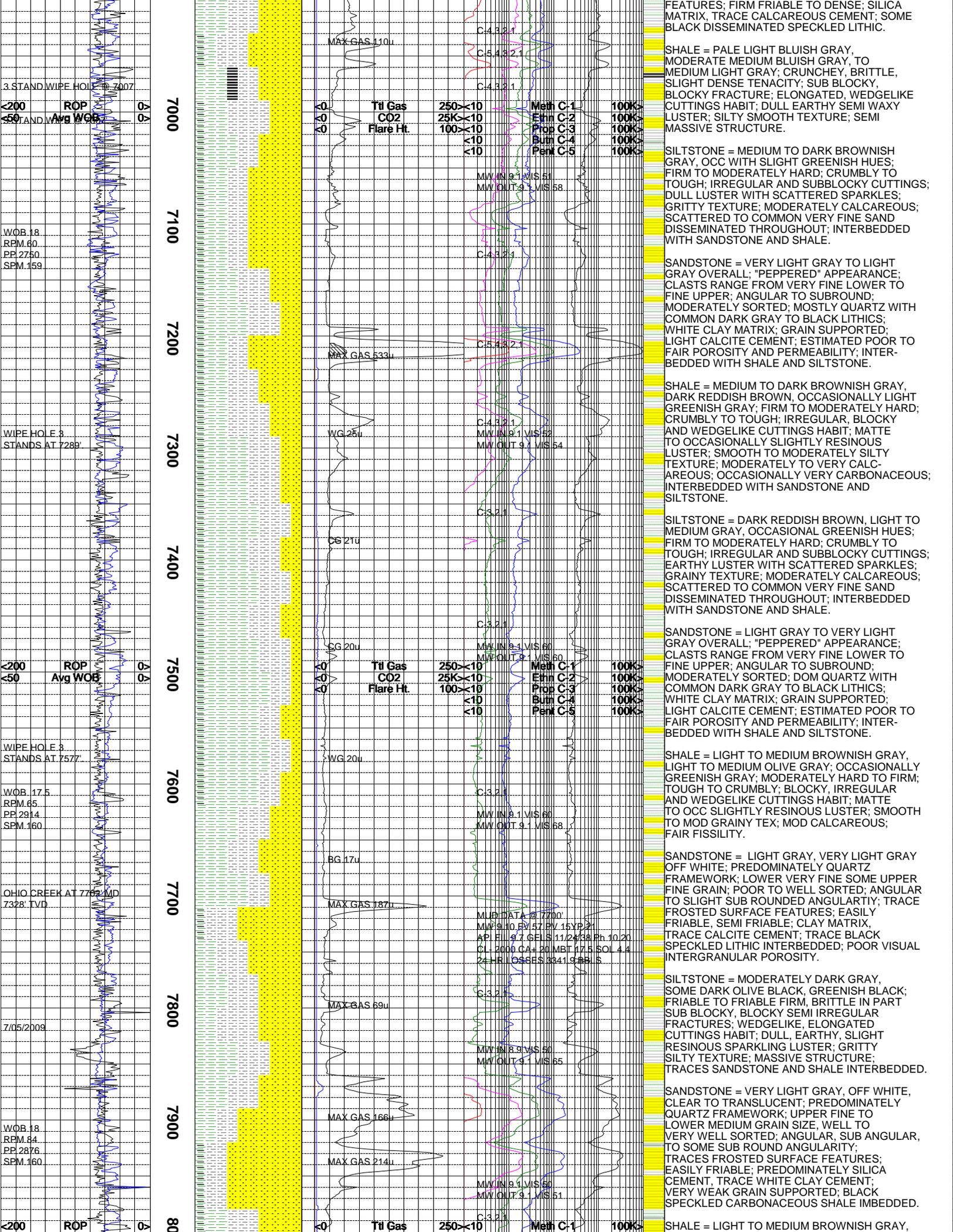
SANDSTONE = LIGHT GRAY, VERY LIGHT BLUISH GRAY, TRACES LIGHT GREENISH

Ttl Gas	100X<10	Meth C-1	100K>
CO2	5KX<10	Ethn C-2	100K>
Flare Ht	100X<10	Prop C-3	100K>
	<10	Burn C-4	100K>
	<10	Penk C-5	100K>

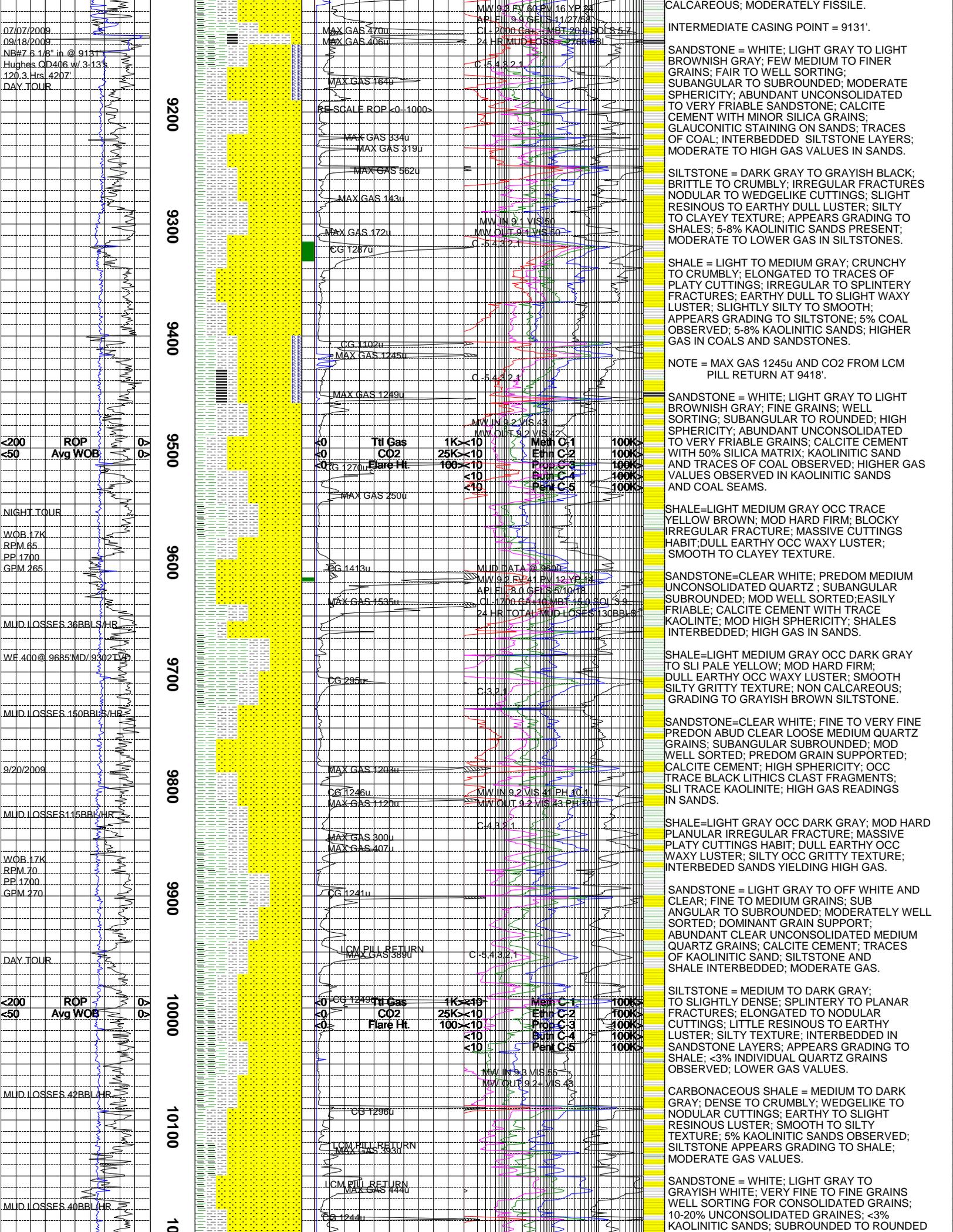
Ttl Gas	100X<10	Meth C-1	100K>
CO2	25KX<10	Ethn C-2	100K>
Flare Ht	100X<10	Prop C-3	100K>
	<10	Burn C-4	100K>
	<10	Penk C-5	100K>

NOTE: GAS SCALE CHANGE  
0-250u









07/07/2009  
09/18/2009  
NB#7 6 1/8" in @ 9131'  
Hughes QD406 w/ 3-13'S  
120.3 Hrs. 4207'  
DAY TOUR

200 ROP  
50 Avg WOB

NIGHT TOUR  
WOB 17K  
RPM 65  
PP 1700  
GFM 265

MUD LOSSES 36BBL/HR

WF 400 @ 9685' MD/9302' LBS

MUD LOSSES 150BBL/HR

9/20/2009

MUD LOSSES 115BBL/HR

WOB 17K  
RPM 70  
PP 1700  
GFM 270

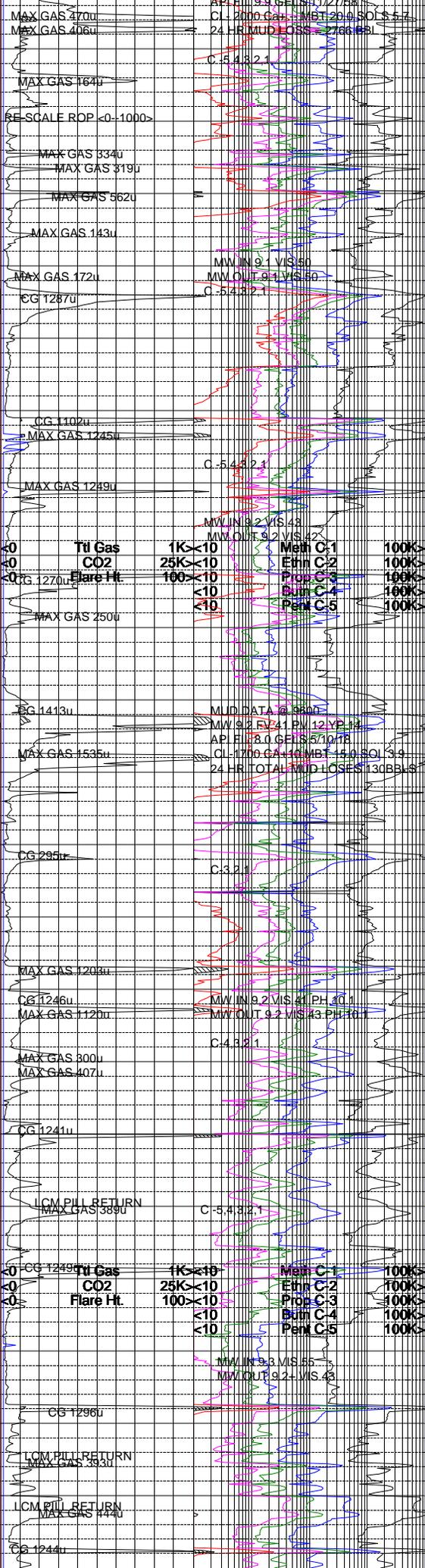
DAY TOUR

200 ROP  
50 Avg WOB

MUD LOSSES 42BBL/HR

MUD LOSSES 40BBL/HR

9200  
9300  
9400  
9500  
9600  
9700  
9800  
9900  
10000  
10100  
10



INTERMEDIATE CASING POINT = 9131'

SANDSTONE = WHITE; LIGHT GRAY TO LIGHT BROWNISH GRAY; FEW MEDIUM TO FINER GRAINS; FAIR TO WELL SORTING; SUBANGULAR TO SUBROUNDED; MODERATE SPHERICITY; ABUNDANT UNCONSOLIDATED TO VERY FRIABLE SANDSTONE; CALCITE CEMENT WITH MINOR SILICA GRAINS; GLAUCONITIC STAINING ON SANDS; TRACES OF COAL; INTERBEDDED SILTSTONE LAYERS; MODERATE TO HIGH GAS VALUES IN SANDS.

SILTSTONE = DARK GRAY TO GRAYISH BLACK; BRITTLE TO CRUMBLY; IRREGULAR FRACTURES NODULAR TO WEDGELIKE CUTTINGS; SLIGHT RESINOUS TO EARTHY DULL LUSTER; SILTY TO CLAYEY TEXTURE; APPEARS GRADING TO SHALES; 5-8% KAOLINITIC SANDS PRESENT; MODERATE TO LOWER GAS IN SILTSTONES.

SHALE = LIGHT TO MEDIUM GRAY; CRUNCHY TO CRUMBLY; ELONGATED TO TRACES OF PLATY CUTTINGS; IRREGULAR TO SPLINTERY FRACTURES; EARTHY DULL TO SLIGHT WAXY LUSTER; SLIGHTLY SILTY TO SMOOTH; APPEARS GRADING TO SILTSTONE; 5% COAL OBSERVED; 5-8% KAOLINITIC SANDS; HIGHER GAS IN COALS AND SANDSTONES.

NOTE = MAX GAS 1245u AND CO2 FROM LCM PILL RETURN AT 9418'

SANDSTONE = WHITE; LIGHT GRAY TO LIGHT BROWNISH GRAY; FINE GRAINS; WELL SORTING; SUBANGULAR TO ROUNDED; HIGH SPHERICITY; ABUNDANT UNCONSOLIDATED TO VERY FRIABLE GRAINS; CALCITE CEMENT WITH 50% SILICA MATRIX; KAOLINITIC SAND AND TRACES OF COAL OBSERVED; HIGHER GAS VALUES OBSERVED IN KAOLINITIC SANDS AND COAL SEAMS.

SHALE = LIGHT MEDIUM GRAY OCC TRACE YELLOW BROWN; MOD HARD FIRM; BLOCKY IRREGULAR FRACTURE; MASSIVE CUTTINGS HABIT; DULL EARTHY OCC WAXY LUSTER; SMOOTH TO CLAYEY TEXTURE.

SANDSTONE = CLEAR WHITE; PREDOM MEDIUM UNCONSOLIDATED QUARTZ; SUBANGULAR SUBROUNDED; MOD WELL SORTED; EASILY FRIABLE; CALCITE CEMENT WITH TRACE KAOLINITE; MOD HIGH SPHERICITY; SHALES INTERBEDDED; HIGH GAS IN SANDS.

SHALE = LIGHT MEDIUM GRAY OCC DARK GRAY TO SLI PALE YELLOW; MOD HARD FIRM; DULL EARTHY OCC WAXY LUSTER; SMOOTH SILTY GRITTY TEXTURE; NON CALCAREOUS; GRADING TO GRAYISH BROWN SILTSTONE.

SANDSTONE = CLEAR WHITE; FINE TO VERY FINE PREDOM ABUND CLEAR LOOSE MEDIUM QUARTZ GRAINS; SUBANGULAR SUBROUNDED; MOD WELL SORTED; PREDOM GRAIN SUPPORTED; CALCITE CEMENT; HIGH SPHERICITY; OCC TRACE BLACK LITHICS CLAST FRAGMENTS; SLI TRACE KAOLINITE; HIGH GAS READINGS IN SANDS.

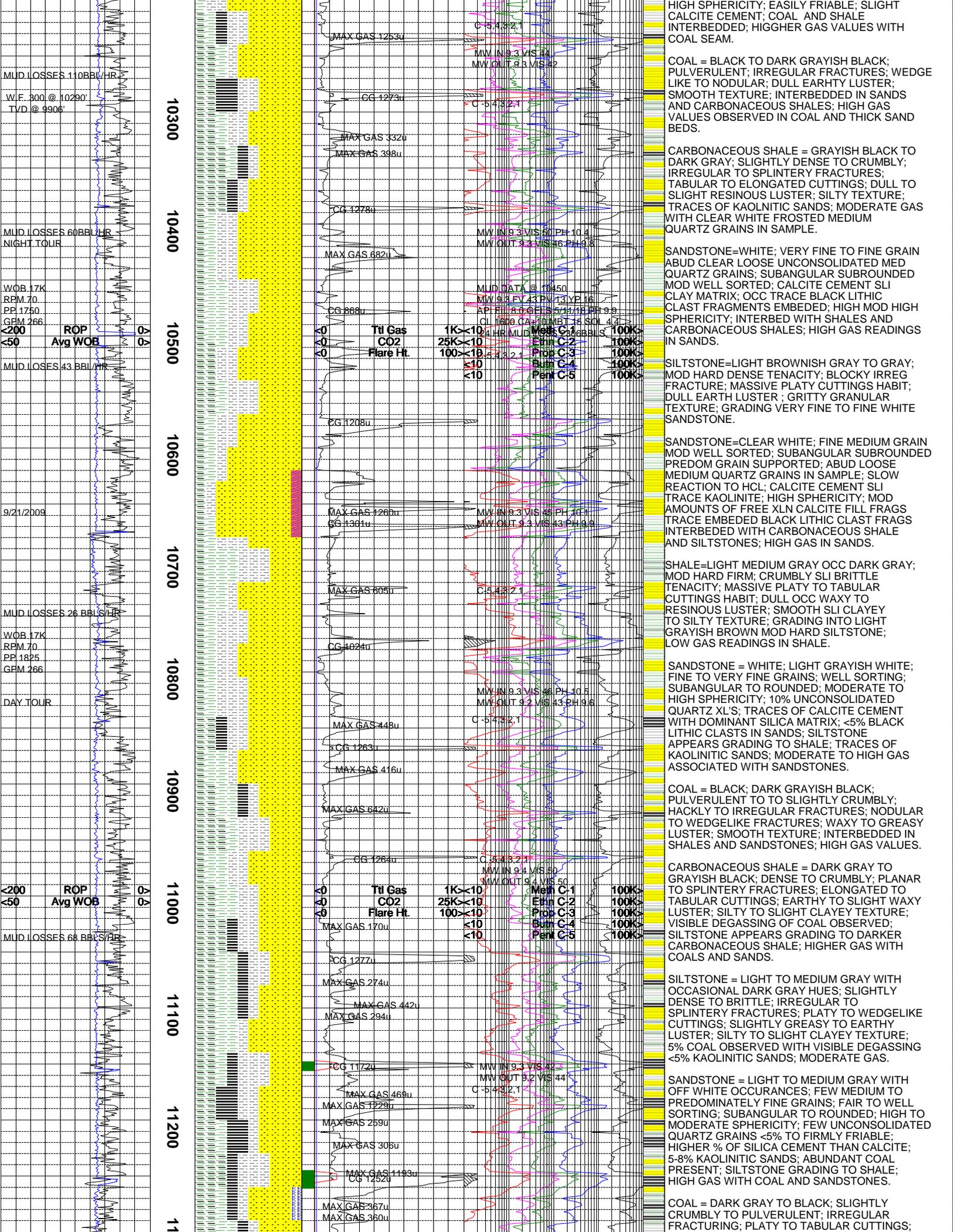
SHALE = LIGHT GRAY OCC DARK GRAY; MOD HARD PLANULAR IRREGULAR FRACTURE; MASSIVE PLATY CUTTINGS HABIT; DULL EARTHY OCC WAXY LUSTER; SILTY OCC GRITTY TEXTURE; INTERBEDDED SANDS YIELDING HIGH GAS.

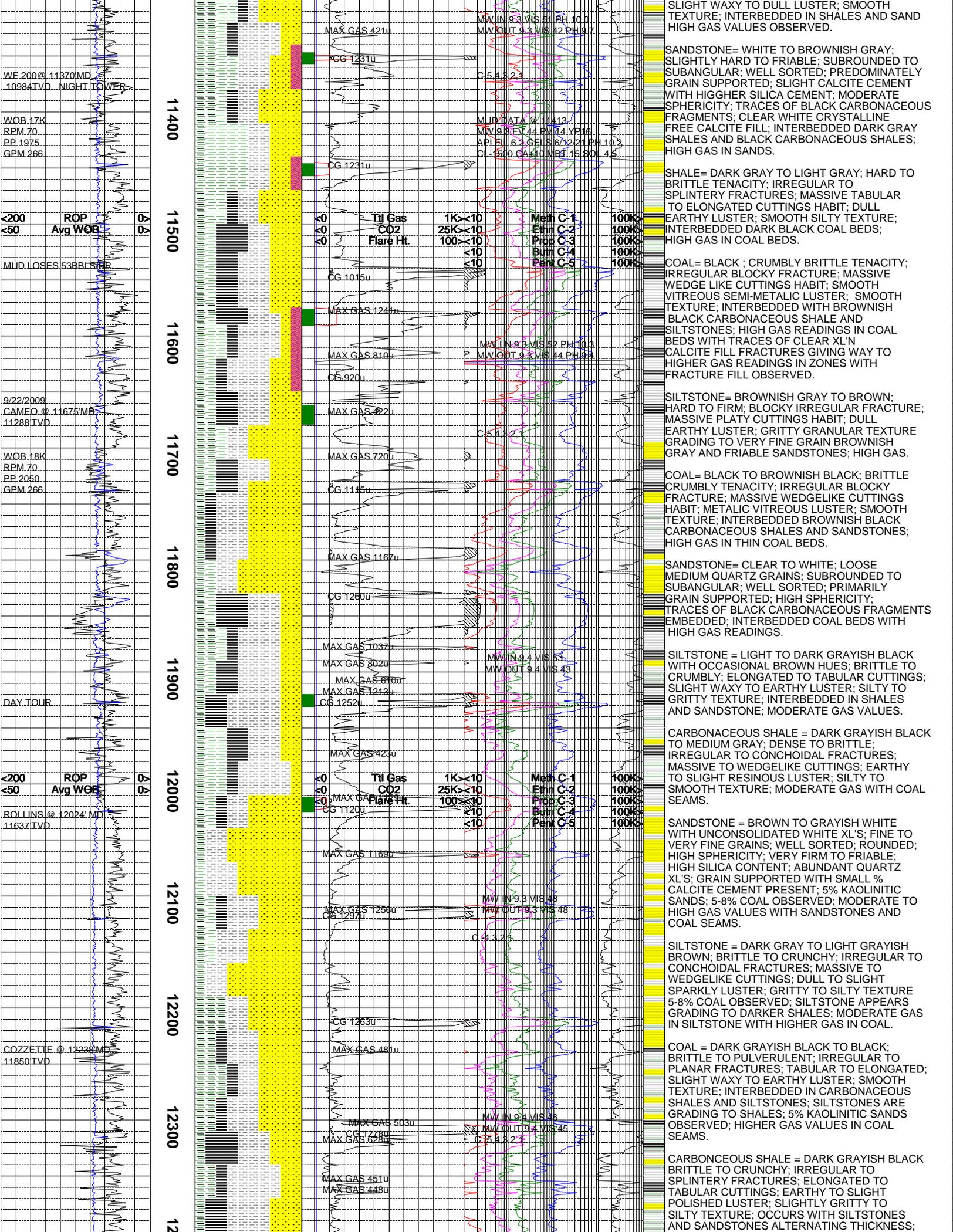
SANDSTONE = LIGHT GRAY TO OFF WHITE AND CLEAR; FINE TO MEDIUM GRAINS; SUB ANGULAR TO SUBROUNDED; MODERATELY WELL SORTED; DOMINANT GRAIN SUPPORT; ABUNDANT CLEAR UNCONSOLIDATED MEDIUM QUARTZ GRAINS; CALCITE CEMENT; TRACES OF KAOLINITIC SAND; SILTSTONE AND SHALE INTERBEDDED; MODERATE GAS.

SILTSTONE = MEDIUM TO DARK GRAY; TO SLIGHTLY DENSE; SPLINTERY TO PLANAR FRACTURES; ELONGATED TO NODULAR CUTTINGS; LITTLE RESINOUS TO EARTHY LUSTER; SILTY TEXTURE; INTERBEDDED IN SANDSTONE LAYERS; APPEARS GRADING TO SHALE; <3% INDIVIDUAL QUARTZ GRAINS OBSERVED; LOWER GAS VALUES.

CARBONACEOUS SHALE = MEDIUM TO DARK GRAY; DENSE TO CRUMBLY; WEDGELIKE TO NODULAR CUTTINGS; EARTHY TO SLIGHT RESINOUS LUSTER; SMOOTH TO SILTY TEXTURE; 5% KAOLINITIC SANDS OBSERVED; SILTSTONE APPEARS GRADING TO SHALE; MODERATE GAS VALUES.

SANDSTONE = WHITE; LIGHT GRAY TO GRAYISH WHITE; VERY FINE TO FINE GRAINS WELL SORTING FOR CONSOLIDATED GRAINS; 10-20% UNCONSOLIDATED GRAINES; <3% KAOLINITIC SANDS; SUBROUNDED TO ROUNDED





WF 200 @ 11370 MD  
10984 TVD. NIGHT TO WF

WOB 17K  
RPM 70  
PP 1975  
GPM 266

<200 ROP  
<50 Avg WOB

MUD LOSSES 538 BLS

9/22/2009  
CAMEO @ 11675 MD  
11288 TVD

WOB 18K  
RPM 70  
PP 2050  
GPM 266

DAY TOUR

<200 ROP  
<50 Avg WOB

ROLLINS @ 12024' MD  
11637 TVD

COZZETTIE @ 12228 MD  
11850 TVD

MAX GAS 503u  
MAX GAS 628u

MAX GAS 451u  
MAX GAS 480u

MAX GAS 421u  
MW IN 9.3 VLS 51 PH 10.0  
MW OUT 9.3 VLS 42 PH 9.7

CG 1231u  
C 5482u

MUD DATA @ 11413  
MW IN 9.3 VLS 44 PH 14 YF 16  
API FL 6.2 GELS 6/12/21 PH 10  
CL 1500 CA 4.0 MBT 15 SOL 45

CG 1231u

Ttl Gas 1K <math>\times 10</math>  
CO2 25K <math>\times 10</math>  
Flare Ht 100 <math>\times 10</math>  
Meth C-1 100K  
Ethn C-2 100K  
Prop C-3 100K  
Burn C-4 100K  
Penk C-5 100K

CG 1015u  
MAX GAS 724u

MAX GAS 810u  
MW IN 9.3 VLS 52 PH 10.3  
MW OUT 9.3 VLS 44 PH 9.4

CG 920u  
MAX GAS 922u

CG 1115u

MAX GAS 1167u  
CG 1260u

MAX GAS 1037u  
MAX GAS 802u  
MAX GAS 610u  
MAX GAS 1213u  
CG 1252u

MW IN 9.4 VLS 53  
MW OUT 9.4 VLS 45

MAX GAS 423u

Ttl Gas 1K <math>\times 10</math>  
CO2 25K <math>\times 10</math>  
Flare Ht 100 <math>\times 10</math>  
Meth C-1 100K  
Ethn C-2 100K  
Prop C-3 100K  
Burn C-4 100K  
Penk C-5 100K

MAX GAS 1169u

MAX GAS 1256u  
CG 1297u  
MW IN 9.3 VLS 48  
MW OUT 9.3 VLS 48

C 4325u

CG 1263u  
MAX GAS 481u

MAX GAS 503u  
MAX GAS 628u  
MW IN 9.4 VLS 46  
MW OUT 9.4 VLS 45

CG 451u  
CG 480u

SILT WAXY TO DULL LUSTER; SMOOTH TEXTURE; INTERBEDDED IN SHALES AND SAND HIGH GAS VALUES OBSERVED.

SANDSTONE= WHITE TO BROWNISH GRAY; SLIGHTLY HARD TO FRIABLE; SUBROUNDED TO SUBANGULAR; WELL SORTED; PREDOMINATELY GRAIN SUPPORTED; SLIGHT CALCITE CEMENT WITH HIGHER SILICA CEMENT; MODERATE SPHERICITY; TRACES OF BLACK CARBONACEOUS FRAGMENTS; CLEAR WHITE CRYSTALLINE FREE CALCITE FILL; INTERBEDDED DARK GRAY SHALES AND BLACK CARBONACEOUS SHALES; HIGH GAS IN SANDS.

SHALE= DARK GRAY TO LIGHT GRAY; HARD TO BRITTLE TENACITY; IRREGULAR TO SPLINTERY FRACTURES; MASSIVE TABULAR TO ELONGATED CUTTINGS HABIT; DULL EARTHY LUSTER; SMOOTH SILTY TEXTURE; INTERBEDDED DARK BLACK COAL BEDS; HIGH GAS IN COAL BEDS.

COAL= BLACK ; CRUMBLY BRITTLE TENACITY; IRREGULAR BLOCKY FRACTURE; MASSIVE WEDGE LIKE CUTTINGS HABIT; SMOOTH VITREOUS SEMI-METALIC LUSTER; SMOOTH TEXTURE; INTERBEDDED WITH BROWNISH BLACK CARBONACEOUS SHALE AND SILTSTONES; HIGH GAS READINGS IN COAL BEDS WITH TRACES OF CLEAR XL'N CALCITE FILL FRACTURES GIVING WAY TO HIGHER GAS READINGS IN ZONES WITH FRACTURE FILL OBSERVED.

SILTSTONE= BROWNISH GRAY TO BROWN; HARD TO FIRM; BLOCKY IRREGULAR FRACTURE; MASSIVE PLATY CUTTINGS HABIT; DULL EARTHY LUSTER; GRITTY GRANULAR TEXTURE GRADING TO VERY FINE GRAIN BROWNISH GRAY AND FRIABLE SANDSTONES; HIGH GAS.

COAL= BLACK TO BROWNISH BLACK; BRITTLE CRUMBLY TENACITY; IRREGULAR BLOCKY FRACTURE; MASSIVE WEDGELIKE CUTTINGS HABIT; METALIC VITREOUS LUSTER; SMOOTH TEXTURE; INTERBEDDED BROWNISH BLACK CARBONACEOUS SHALES AND SANDSTONES; HIGH GAS IN THIN COAL BEDS.

SANDSTONE= CLEAR TO WHITE; LOOSE MEDIUM QUARTZ GRAINS; SUBROUNDED TO SUBANGULAR; WELL SORTED; PRIMARILY GRAIN SUPPORTED; HIGH SPHERICITY; TRACES OF BLACK CARBONACEOUS FRAGMENTS EMBEDDED; INTERBEDDED COAL BEDS WITH HIGH GAS READINGS.

SILTSTONE = LIGHT TO DARK GRAYISH BLACK WITH OCCASIONAL BROWN HUES; BRITTLE TO CRUMBLY; ELONGATED TO TABULAR CUTTINGS; SLIGHT WAXY TO EARTHY LUSTER; SILTY TO GRITTY TEXTURE; INTERBEDDED IN SHALES AND SANDSTONE; MODERATE GAS VALUES.

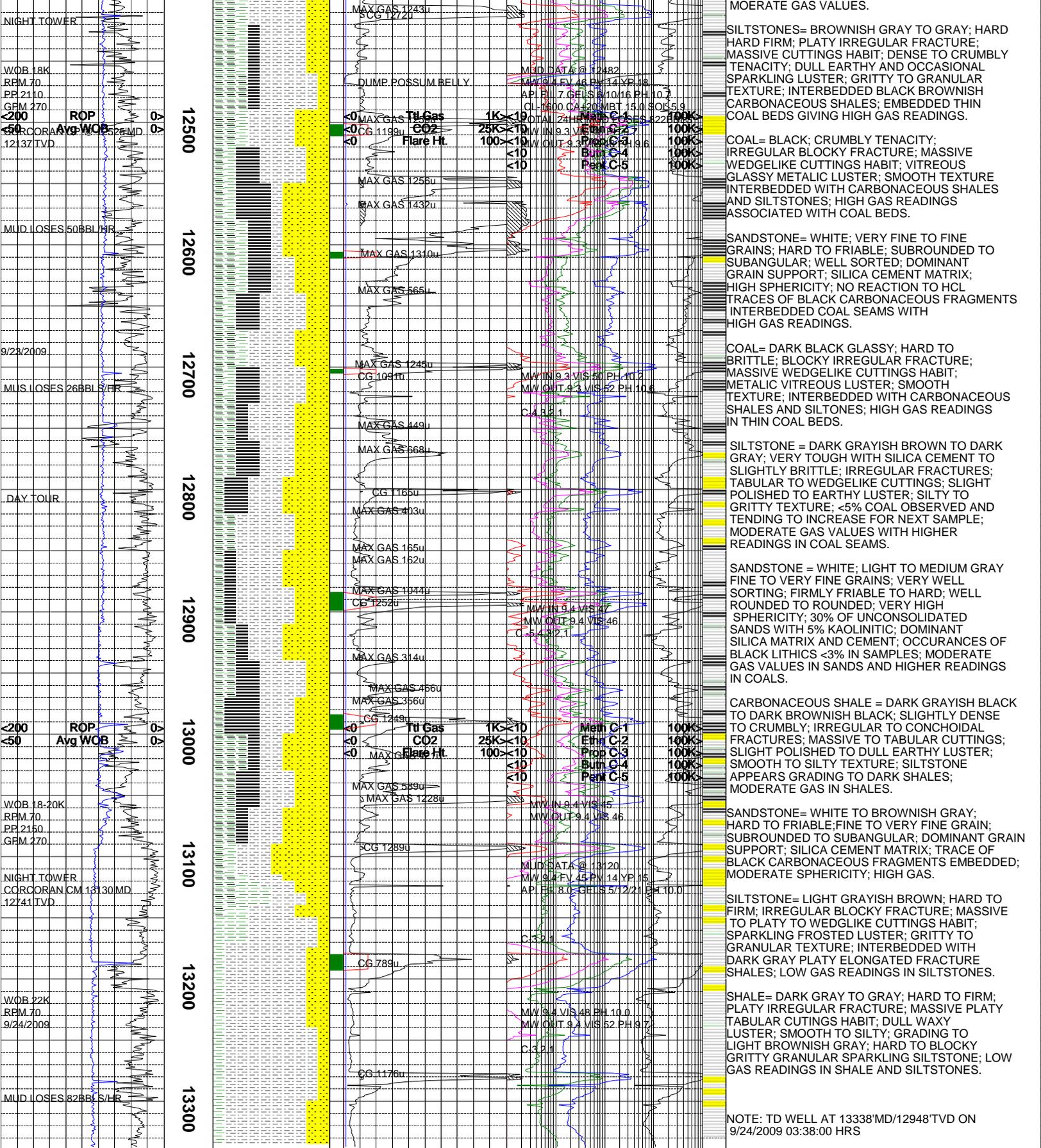
CARBONACEOUS SHALE = DARK GRAYISH BLACK TO MEDIUM GRAY; DENSE TO BRITTLE; IRREGULAR TO CONCHOIDAL FRACTURES; MASSIVE TO WEDGELIKE CUTTINGS; EARTHY TO SLIGHT RESINOUS LUSTER; SILTY TO SMOOTH TEXTURE; MODERATE GAS WITH COAL SEAMS.

SANDSTONE = BROWN TO GRAYISH WHITE WITH UNCONSOLIDATED WHITE XL'S; FINE TO VERY FINE GRAINS; WELL SORTED; ROUNDED; HIGH SPHERICITY; VERY FIRM TO FRIABLE; HIGH SILICA CONTENT; ABUNDANT QUARTZ XL'S; GRAIN SUPPORTED WITH SMALL % CALCITE CEMENT PRESENT; 5% KAOLINIC SANDS; 5-8% COAL OBSERVED; MODERATE TO HIGH GAS VALUES WITH SANDSTONES AND COAL SEAMS.

SILTSTONE = DARK GRAY TO LIGHT GRAYISH BROWN; BRITTLE TO CRUNCHY; IRREGULAR TO CONCHOIDAL FRACTURES; MASSIVE TO WEDGELIKE CUTTINGS; DULL TO SLIGHT SPARKLY LUSTER; GRITTY TO SILTY TEXTURE 5-8% COAL OBSERVED; SILTSTONE APPEARS GRADING TO DARKER SHALES; MODERATE GAS IN SILTSTONE WITH HIGHER GAS IN COAL.

COAL = DARK GRAYISH BLACK TO BLACK; BRITTLE TO PULVERULENT; IRREGULAR TO PLANAR FRACTURES; TABULAR TO ELONGATED; SLIGHT WAXY TO EARTHY LUSTER; SMOOTH TEXTURE; INTERBEDDED IN CARBONACEOUS SHALES AND SILTSTONES; SILTSTONES ARE GRADING TO SHALES; 5% KAOLINIC SANDS OBSERVED; HIGHER GAS VALUES IN COAL SEAMS.

CARBONACEOUS SHALE = DARK GRAYISH BLACK BRITTLE TO CRUNCHY; IRREGULAR TO SPLINTERY FRACTURES; ELONGATED TO TABULAR CUTTINGS; EARTHY TO SLIGHT POLISHED LUSTER; SLIGHTLY GRITTY TO SILTY TEXTURE; OCCURS WITH SILTSTONES AND SANDSTONES ALTERNATING THICKNESS;



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