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Houston, TX (281) 784-5500
Bakersfield, CA (661) 328-1595
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MUDLOG MD

COMPANY ExxonMobil Production
WELL PCU 297-11C3
FIELD Piceance Creek
REGION Rocky Mountain
COORDINATES 39.896025 N
108.254523 W
ELEVATION GL: 6882.8'
RKB: 6913.0'
COUNTY, STATE Rio Blanco, Colorado
API INDEX 05-103-11473-00
SPUD DATE 01/26/2010
CONTRACTOR HP Drilling
CO. REP. M. Sadler/ M. Wood
RIG/TYPE #326/ HP Flex-4
LOGGING UNIT MLU #36
GEOLOGISTS J. Kokes/J. Keevan
J. Sell/D. Thibodeaux
ADD. PERSONS P. Strickland/D. Bedard
H. Strickland
CO. GEOLOGIST Chris Alba

LOG INTERVAL

CASING DATA

DEPTHS: 3900' TO 12830'
DATES: 04/10/2010 TO 05/25/2010
SCALE: 1" = 100'

16" AT 150'
10 3/4" AT 3887'
7" AT 8712'
4 1/2" AT

MUD TYPES

HOLE SIZE

Water Based Spud Mud TO 3900'
LSND TO 12830'
TO
TO

14 1/4" TO 3900'
9 7/8" TO 8733'
6 1/8" TO 12830'
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

Legend of geological symbols and patterns including: 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, SAND, SANDSTONE, SANDSTONE-TUFFACEOUS, SERICITIZATION, SERPENTINE, SHALE, SHALE TUFFACEOUS, SHELL FRAGMENTS, SIDERITE, SILICIFICATION, SILTSTONE, SILTST-TUFFACEOUS, TUFF, VOLCANICLASTICS SEDS, VOLCANICS.

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	klbs	
<1	Depth of Cut	0>
	in/rev	

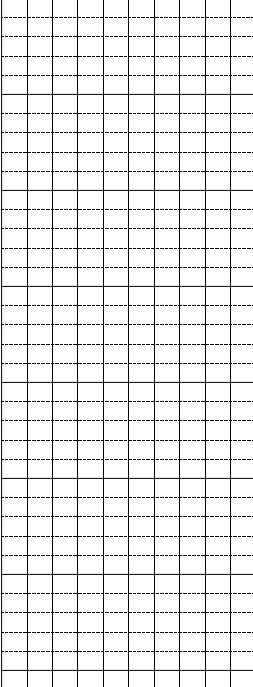
Depth

Lithology

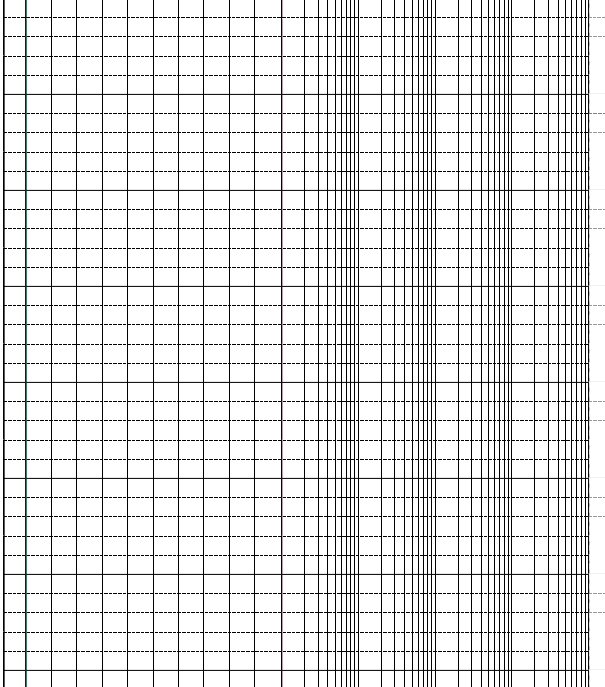
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<330	CO2	10K>	<10	Prop C-3	100K>
	ppm				
<0	Flare Ht.	100>	<10	Butn C-4	100K>
	ft				
			<10	Pent C-5	100K>

Interp. Lith

Remarks  
Survey Data, Mud Reports, Other Info.



3600  
3700  
3800



ALL DEPTHS ARE REFERENCED TO RKB.

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 CONNECTION GASES, TRIP GASES, AND DOWNTIME GASES ARE NOTED ON THE LOG. LARGE CONNECTION GASES WHICH APPEAR ON THE MUD LOG USUALLY REFLECT UP HOLE GAS INTERVALS BLEEDING GAS INTO THE BOREHOLE DURING CONNECTIONS.

GAS CHROMATOGRAPHY EQUIPMENT IS CALIBRATED TO A TEST GAS COMPOSED OF:  
METHANE = 10040 PPM  
ETHANE = 990 PPM  
PROPANE = 1000 PPM  
ISOBUTANE = 1010 PPM  
BUTANE = 1000 PPM  
ISOPENTANE = 1000 PPM  
PENTANE = 1000 PPM

WHEN THE MUD IS CIRCULATED THROUGH THE GAS BUSTER, THE INTERVAL IS MARKED IN THE MGS COLUMN; THE SIZE OF FLARES ARE ALSO NOTED ON THE LOG.

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

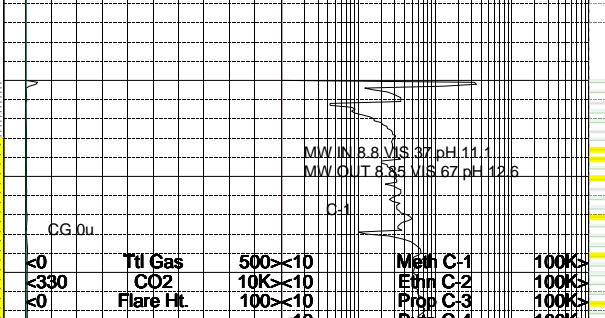
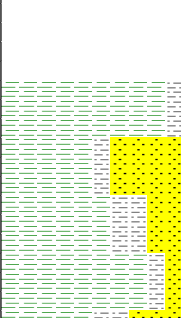
1 UNIT OF GAS = 200 PPM OF METHANE

SET 10.75" SURFACE CASING AT 3881'.

CANRING COMMENCED LOGGING ON PCU297-11C3 ON 04-09-2010 AT 16:23 HRS.

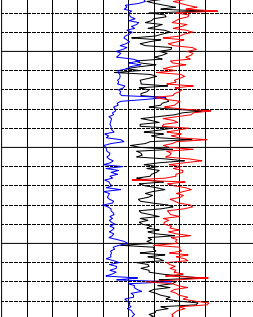
NB #2 9.875" IN @ 3900'  
HUGHES 504ZX / POWERDRIVE  
S/N: 7019010 JETS: 2X12.4x13  
HRS: XX.X FTG: 1504

3900  
4000

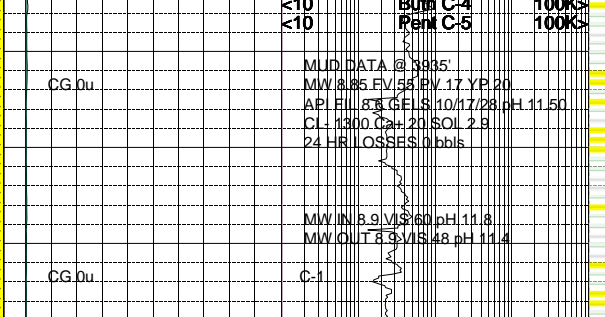
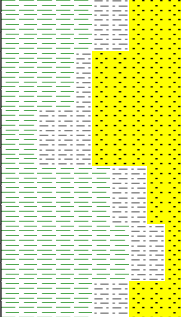


SHALE = PALE YELLOWISH ORANGE, MODERATE RED, MEDIUM BLuish GREY, PALE PURPLE IN A MOTTLED PATTERN; BRITTLE TO CRUMBLY TENACITY; PLANAR TO SPLINTERY FRACTURE; PLATY TO FLAKY CUTTINGS HABIT; SMOOTH TO CLAYEY TEXTURE; DULL TO EARTHY TO MATTE LUSTER; FISSILE TO MASSIVE STRUCTURE.

SANDSTONE - WHITE TO LIGHT GREY, CLEAR WITH SOME BLACK SPECKLES CREATING A SALT AND PEPPERED APPEARANCE; MEDIUM TO FINE GRAIN SIZE; WELL SORTED; MODERATE TO LOW SPHERICITY WITH SUBANGULAR TO ANGULAR GRAINS; POLISHED GRAIN SURFACES; FRIABLE TO FIRM FRIABLE CUTTINGS; CALCITE CEMENT WITH A MODERATE REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; ABUNDANT DARK LITHIC INCLUSIONS; NO VISIBLE HYDROCARBON INDICATORS.

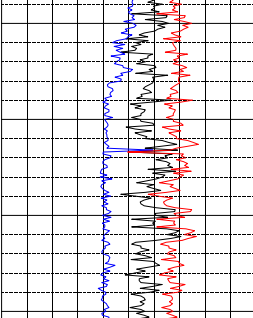


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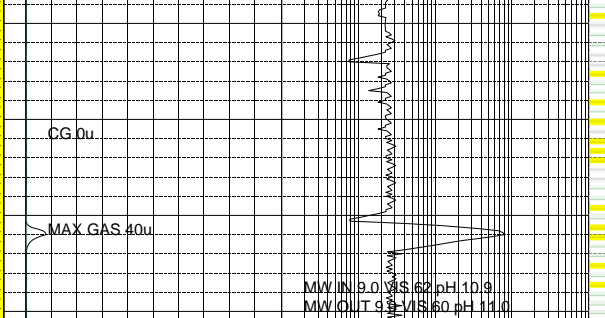
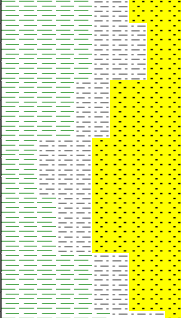


SILTSTONE = PALE YELLOWISH BROWN TO DARK YELLOWISH ORANGE, BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SPLINTERY FRACTURE; FLAKY TO SCALY CUTTINGS HABIT; DULL TO SPARKLING LUSTER; SMOOTH TO GRITTY TEXTURE; MASSIVE STRUCTURE.

SANDSTONE = CLEAR, WHITE TO VERY LIGHT GREY, SOME VERY PALE ORANGE; MEDIUM TO COARSE GRAIN SIZE; WELL SORTED; SUBANGULAR TO ANGULAR GRAINS WITH MODERATE TO LOW SPHERICITY; POLISHED GRAIN SURFACES; FRIABLE TO EASILY FRIABLE, ABUNDANT UNCONSOLIDATED QUARTZ GRAINS; CALCITE CEMENT WITH A STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; SOME DARK LITHIC INCLUSIONS; NO VISIBLE HYDROCARBON INDICATORS.

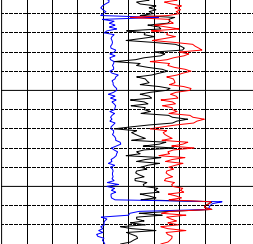


4200  
4300

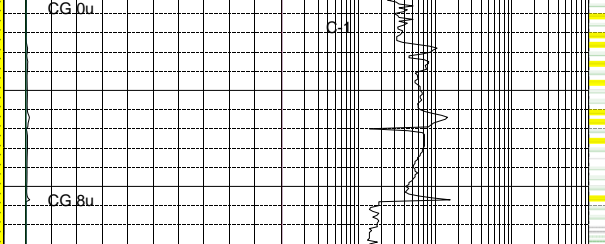
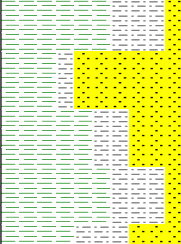


SHALE = DARK YELLOWISH ORANGE TO GRAYISH ORANGE, MEDIUM TO LIGHT GREY; CRUMBLY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLTY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE WITH SOME FISSILITY.

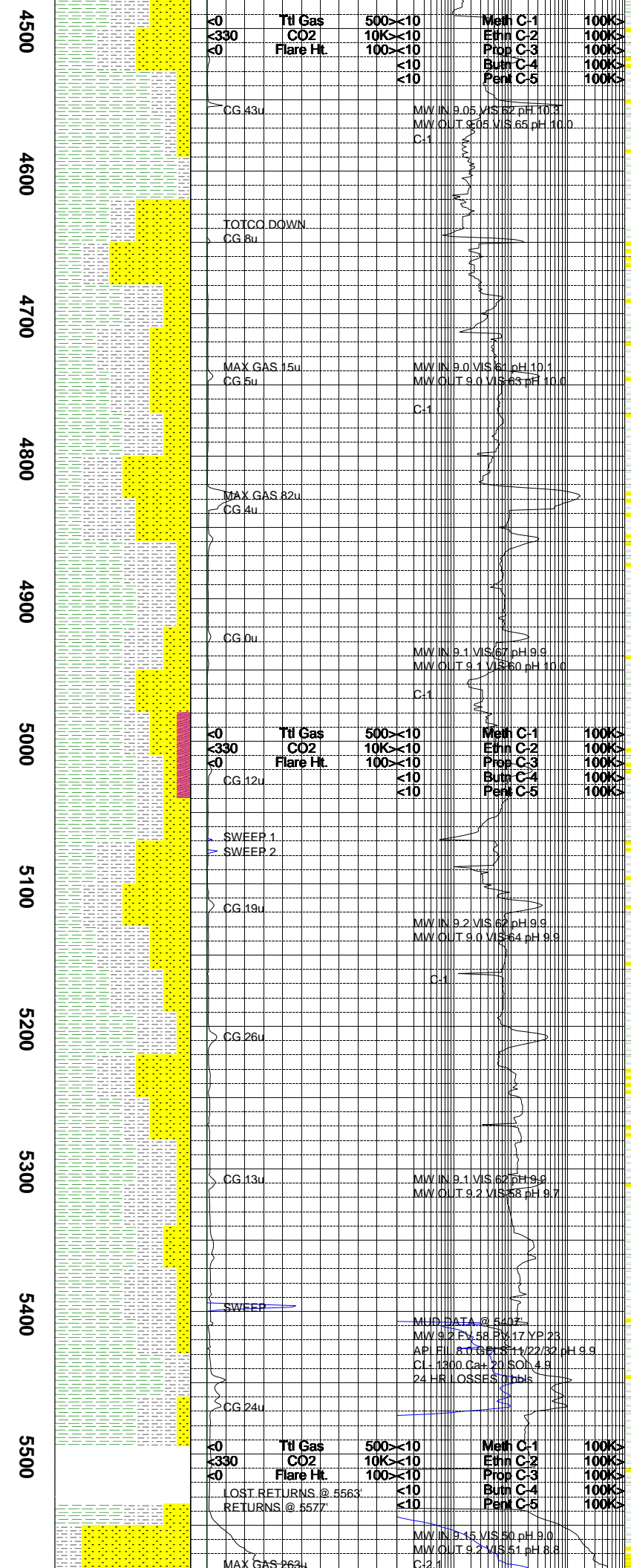
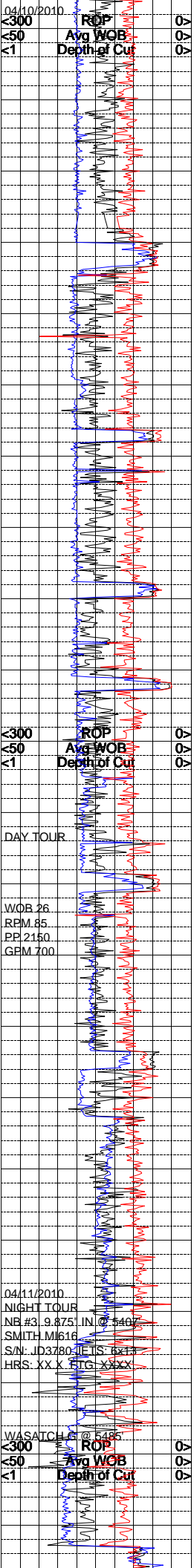
SILTSTONE = PALE YELLOWISH BROWN TO MEDIUM LIGHT GREY; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SPLINTERY FRACTURE; FLAKY TO SCALY CUTTINGS HABIT; DULL TO SPARKLING LUSTER; SMOOTH TO GRITTY TEXTURE; MASSIVE STRUCTURE.



4400



SANDSTONE = CLEAR, WHITE TO MEDIUM



GREY, SALT AND PEPPER APPEARANCE; MEDIUM GRAIN SIZE; WELL SORTED; SUBANGULAR TO SUBROUND GRAINS WITH MODERATE TO LOW SPHERICITY; POLISHED GRAIN SURFACES; FRIABLE TO EASILY FRIABLE, ABUNDANT UNCONSOLIDATED QUARTZ GRAINS; CALCITE CEMENT WITH A SLIGHT REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; SOME DARK LITHIC INCLUSIONS; NO VISIBLE HYDROCARBON INDICATORS.

SHALE = PALE RED, GRAYISH ORANGE TO DARK YELLOWISH ORANGE; BRITTLE TO CRUMBLY TENACITY; SEMI PLANAR TO SPLINTERY FRACTURE; FLAKY TO SCALY CUTTINGS HABIT; MATTE TO FROSTED LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE TO FISSILE STRUCTURE.

SANDSTONE = LIGHT GREY TO MEDIUM GREY, GRAYISH ORANGE TO MODERATE YELLOWISH BROWN; FINE TO MEDIUM GRAIN SIZE; WELL TO VERY WELL SORTED; SUBROUND TO SUBANGULAR GRAINS WITH MODERATE TO LOW SPHERICITY; FIRM FRIABLE TO MODERATE HARD; CALCITE CEMENT WITH MODERATE REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; TRACE DARK LITHIC INCLUSIONS AND MICAS; NO VISIBLE HYDROCARBON INDICATORS.

SILTSTONE = DARK YELLOWISH ORANGE TO GRAYISH ORANGE, BRITTLE TO CRUNCHY TO CRUMBLY TENACITY; IRREGULAR TO SPLINTERY FRACTURE; FLAKY TO SCALY CUTTINGS HABIT; DULL TO SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; MASSIVE STRUCTURE.

SHALE = MODERATE YELLOWISH BROWN TO DARK YELLOWISH ORANGE, PALE RED; BRITTLE TO CRUMBLY TENACITY; SPLINTERY TO SEMI PLANAR FRACTURE; FLAKY TO PLATY CUTTINGS HABIT; MATTE TO SPARKLING LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE WITH FISSILITY.

FRACTURE FILL = CLEAR TO SEMI OPAQUE CALCITE GRAINS AND RHOMBS; MEDIUM IN SIZE; EASILY CLEAVED; STRONG REACTION TO DILUTE HCL IN SAMPLE TRAY.

SILTSTONE = YELLOWISH GRAY TO MODERATE YELLOW, PALE RED TO GRAYISH RED PURPLE; BRITTLE TO CRUMBLY TENACITY; SUB-PLANAR TO IRREGULAR FRACTURE; FLAKY TO WEDGE-LIKE CUTTING HABIT; DULL TO EARTHY LUSTER, MINOR SPARKLING DUE TO VITREOUS CLASTS; GRITTY TO GRANULAR TEXTURE; INTERBEDDED PURPLISH SANDSTONE AND YELLOWISH SHALE; LOW BACKGROUND GAS.

SILTSTONE = YELLOWISH GRAY MOTTLED WITH LIGHT GRAY, MINOR PURPLISH GRAY TO REDDISH BROWN BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SUB-PLANAR FRACTURE; FLAKY TO WEDGE-LIKE CUTTINGS HABIT; EARTHY TO DULL LUSTER; GRITTY TO SILTY TEXTURE; GRADES INTO SHALE OF SIMILAR COLORATION; MASSIVE TO THICK STRUCTURE; LOW GAS.

SHALE = YELLOWISH GRAY TO GRAYISH ORANGE MOTTLED WITH LIGHT GRAY; CRUMBLY TO BRITTLE TENACITY; WEDGE-LIKE TO SUB-TABULAR CUTTING HABIT; DULL LUSTER; MASSIVE TO THICK STRUCTURE; INTERBEDDED WITH AND GRADES INTO SIMILARLY COLORED SILTSTONE AND INTERBEDDED WITH SANDSTONE WEAKLY CALCAREOUS; LOW BACKGROUND GAS.

SHALE = YELLOWISH GRAY TO GRAYISH ORANGE WITH MINOR PURPLISH GRAY OR LIGHT GRAY HUES; CRUMBLY TO BRITTLE TENACITY; IRREGULAR FRACTURE; WEDGE-LIKE TO FLAKY CUTTINGS HABIT; DULL TO EARTHY LUSTER; SILTY TO CLAYEY WITH MINOR GRITTY TEXTURE; GRADES INTO AND INTERBEDDED WITH SILTSTONE AS WELL AS INTERBEDDED SANDSTONE; LOW BACKGROUND GAS.

NOTE: POOH TO L/D DIRECTIONAL TOOL.

SHALE = LIGHT GREY TO MEDIUM GREY, LIGHT BLUISH GREY; BRITTLE TO CRUMBLY TENACITY PLANAR TO SPLINTERY FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE BEDDING WITH FISSILITY.

NOTE: LOST RETURNS WHILE DRILLING FROM 5563' TO 5577' MD.

SANDSTONE = CLEAR, WHITE TO VERY LIGHT GRAY; MEDIUM TO COARSE GRAIN SIZE; WELL SORTED; SUBROUND TO SUBANGULAR GRAINS WITH MODERATE SPHERICITY; FROSTED GRAIN SURFACES; MAINLY UNCONSOLIDATED CLEAR QUARTZ GRAINS WITH SOME EASILY FRIABLE CUTTINGS; SILICA CEMENT WITH NO REACTION

MUD LOSSES 230 BBL/HR

MUD LOSSES 336 BBL/HR

WASATCH I © 5812

DAY TOUR

MUD LOSSES 372 BBL/HR

WOB 29  
RPM 40  
PP 2800  
GPM 764

MUD LOSSES 317 BBL/HR

MUD LOSSES 354 BBL/HR

MUD LOSSES 111 BBL/HR

5600

5700

5800

5900

6000

6100

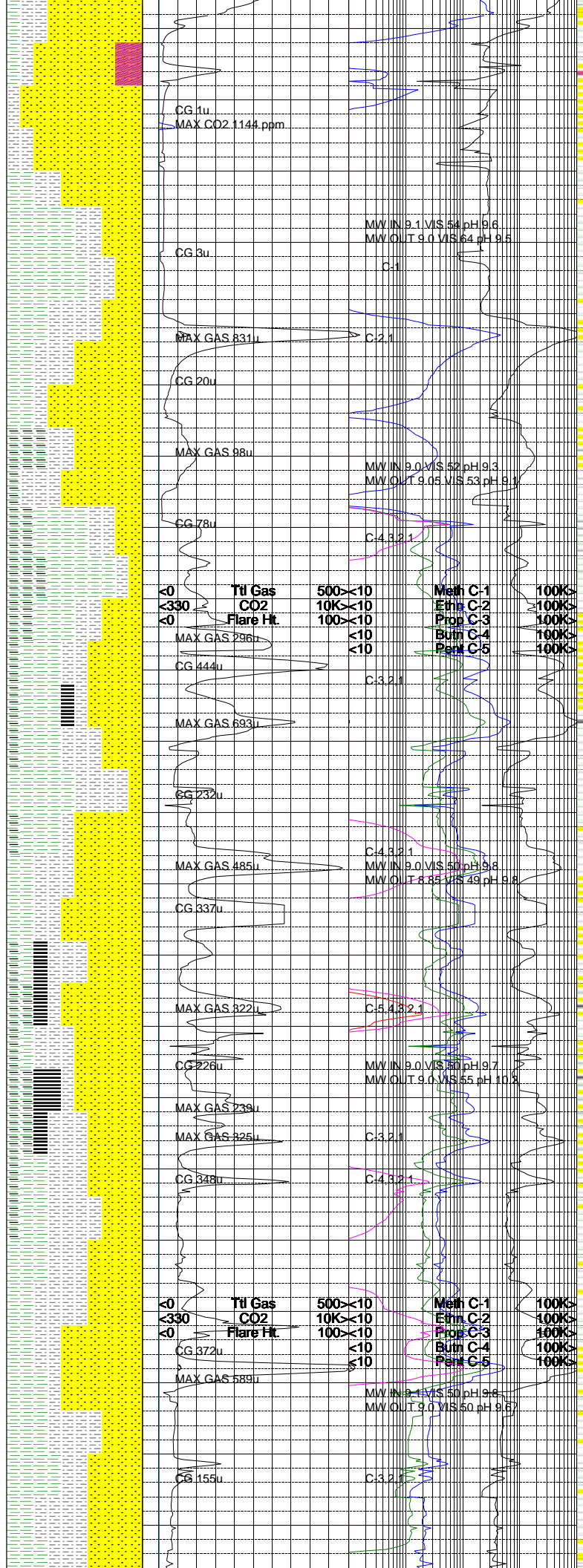
6200

6300

6400

6500

6600



<0	Til Gas	500	<10	Meth C-1	100%
<330	CO2	10K	<10	Ethn C-2	100%
<0	Flare Hit	100	<10	Prop C-3	100%
				Butn C-4	100%
				Parw C-5	100%

TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; TRACE PYRITE INCLUSIONS AND GREEN CHLOROTOID MATERIAL; NO VISIBLE HYDROCARBON INDICATORS.

SILTSTONE = PALE RED, MEDIUM GREY TO PALE GRAYISH BLUE; SEMI TOUGH TO BRITTLE TENACITY; IRREGULAR FRACTURE; MASSIVE TO SCALY CUTTINGS HABIT; MATTE TO FROSTED TO SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; MASSIVE STRUCTURE.

SHALE = MODERATE RED, PALE BLUE, MEDIUM GREY TO LIGHT GREY, SOME MODERATE YELLOW CRUMBLY TENACITY; IRREGULAR TO PLANAR FRACTURE; PTLTY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE WITH SOME FISSILITY.

SANDSTONE = CLEAR, WHITE TO MEDIUM GREY, SALT AND PEPPER APPEARANCE; FINE TO MEDIUM GRAIN SIZE; WELL SORTED; SUBANGULAR TO SUBROUND GRAINS WITH MODERATE TO LOW SPHERICITY; FROSTED GRAIN SURFACES; FRIABLE TO FIRM FRIABLE CUTTINGS; CALCITE CEMENT WITH A MODERATE REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; SOME DARK LITHIC INCLUSIONS; NO VISIBLE HYDROCARBON INDICATORS.

SHALE = MEDIUM TO MEDIUM DARK GRAY, MINOR LIGHT GRAY; DENSE TO BRITTLE TENACITY; HACKLY TO SUB-BLOCKY OR IRREGULAR FRACTURE; MASSIVE TO SUB-TABULAR CUTTING; EARTHY LUSTER; CLAYEY TO SILTY TEXTURE; THICK TO MASSIVE STRUCTURE; INTERBEDDED SILTSTONES AND SANDSTONES, FREQUENTLY GRADES INTO CARBONACEOUS SHALE; INCREASED BACKGROUND GAS.

SANDSTONE = LIGHT TO MEDIUM GRAY; 90% QUARTZ CLASTS WITH THE REMAINDER LITHIC ESPECIALLY BLACK; SUBROUNDED TO SUB-ANGULAR; FINE TO UPPER VERY FINE; CALCITE CEMENT; GRAIN SUPPORTED; INTER-BEDDED SHALE AND CARBONACEOUS SHALE, MINOR COAL SEEN DEGASSING IN SAMPLE; INCREASE IN BACKGROUND GAS.

SHALE = MEDIUM DARK GRAY TO MEDIUM GRAY; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SUB-BLOCKY FRACTURE; WEDGE-LIKE TO FLAKY CUTTINGS HABIT; DULL TO EARTHY LUSTER; SILTY TO CLAYEY, SOME GRITTY TEXTURE; GRADES INTO AND INTERBEDDED WITH SILTSTONE OF THE SAME COLORATION AND INTERBEDDED WITH LITHIC SANDSTONE; LOW BACKGROUND GAS.

SANDSTONE = LIGHT TO MEDIUM GRAY, MINOR BROWNISH GRAY TO BROWNISH BLACK; QUARTZ PREDOMINATELY WITH MINOR LITHIC FRAGMENT INCLUDING BLACK LITHIC FRAGMENTS GIVE A SALT AND PEPPER APPEARANCE; FINE GRAINED FAIR SORTING; FRIABLE TO FIRM FRIABLE; CALCITE CEMENT; FREQUENTLY INTERBEDDED WITH SHALE, CARBONACEOUS SHALE, AND OCCASIONALLY COAL; GAS SEEN IN THE SANDS

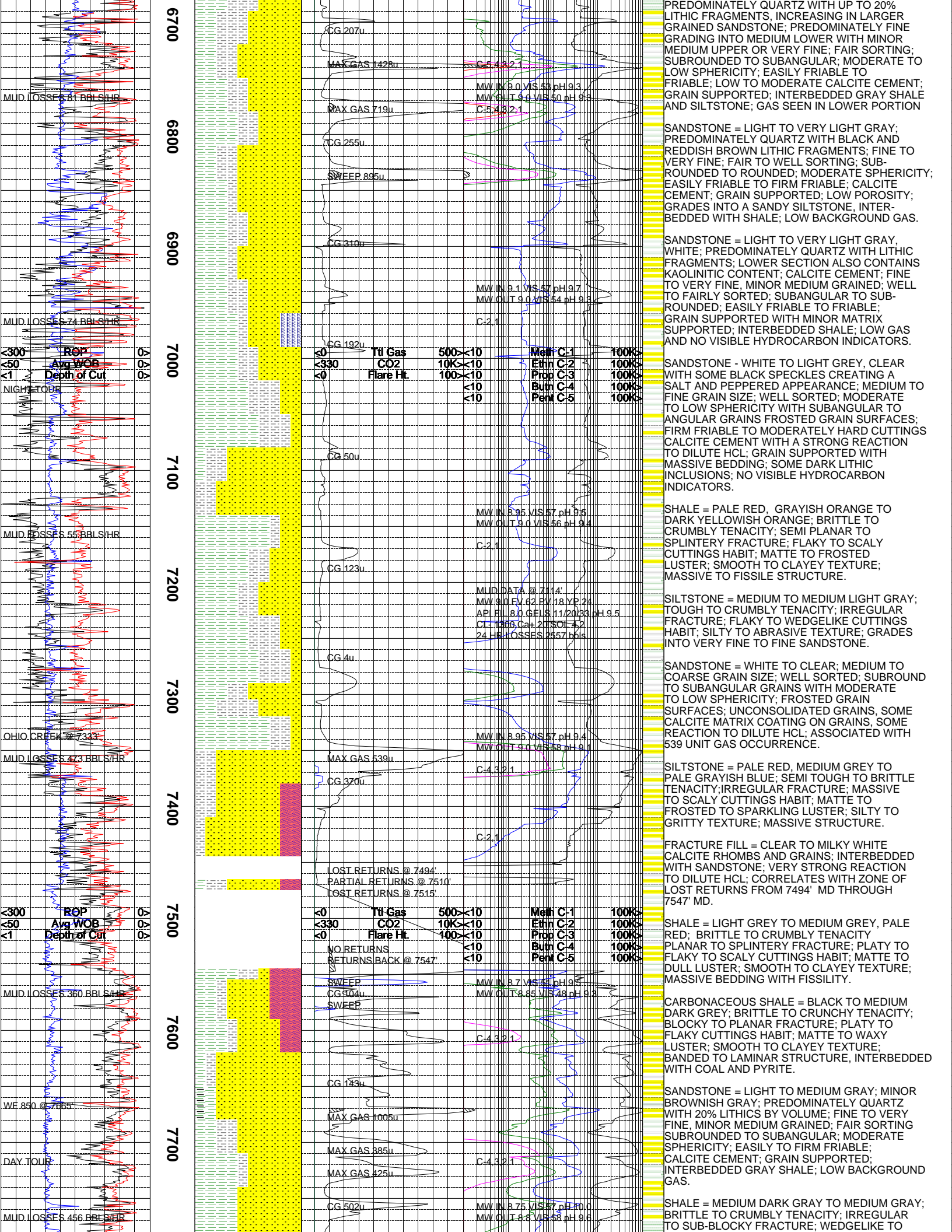
SANDSTONE = LIGHT TO MEDIUM GRAY; MINOR BROWNISH GRAY; PREDOMINATELY QUARTZ WITH 20% LITHICS BY VOLUME; FINE TO VERY FINE, MINOR MEDIUM GRAINED; FAIR SORTING SUBROUNDED TO SUBANGULAR; MODERATE SPHERICITY; EASILY TO FIRM FRIABLE; CALCITE CEMENT; GRAIN SUPPORTED; BEDS OF CARBONACEOUS SHALE AND COAL, GRADES INTO A SILTSTONE; GAS SEEN IN SAND LAYERS.

SILTSTONE = MEDIUM TO MEDIUM DARK GRAY; DENSE TO CRUMBLY TENACITY; IRREGULAR FRACTURE; NODULAR TO WEDGE-LIKE CUTTINGS HABIT; SILTY TO ABRASIVE TEXTURE; GRADES INTO VERY FINE SANDSTONE AND INTERBEDDED SHALE; LOW BACKGROUND GAS.

SANDSTONE = LIGHT TO LIGHT MEDIUM GRAY; FRIABLE TO EASILY FRIABLE; PREDOMINATELY QUARTZ WITH MINOR LITHIC FRAGMENTS; SUBROUNDED TO SUBANGULAR; MODERATE SPHERICITY; FROSTED GRAINS; GRAIN SUPPORTED; MODERATE AMOUNT OF CALCITE CEMENT; INTERBEDDED AND GRADES INTO SILTSTONE, INTERBEDDED GRAY SHALE; GAS SEEN IN SAND BEDS.

SILTSTONE = LIGHT TO MEDIUM LIGHT GRAY; CRUMBLY TO CRUNCHY TENACITY; IRREGULAR FRACTURE; DULL LUSTER; FLAKY TO WEDGE-LIKE CUTTING WITH MINOR TABULAR; GRANULAR TO GRITTY; GRADES INTO A VERY FINE GRAINED SANDSTONE AND INTERBEDDED WITH GRAY SHALE; SLIGHTLY CALCAREOUS; LOW BACKGROUND GAS.

SANDSTONE = VERY LIGHT TO MEDIUM GRAY;



6700  
6800  
6900  
7000  
7100  
7200  
7300  
7400  
7500  
7600  
7700

MUD LOSSES 81 BBL/S/HR  
MUD LOSSES 74 BBL/S/HR  
MUD LOSSES 55 BBL/S/HR  
MUD LOSSES 43 BBL/S/HR  
MUD LOSSES 360 BBL/S/HR  
MUD LOSSES 456 BBL/S/HR

<300 ROP  
<50 Avg WOB  
>1 Depth of Cut

NIGHT TOUR  
OHIO CREEK @ 7313  
DAY TOUR

CG 207u  
MAX GAS 1428u  
MAX GAS 719u  
CG 255u  
SWEEP 895u  
CG 310u  
CG 192u  
CG 50u  
CG 123u  
CG 4u  
CG 370u  
CG 143u  
CG 143u  
CG 502u

MW IN 9.0 VIS 53 pH 9.3  
MW OUT 6.0 VIS 50 pH 9.3  
C5 4.8 2.1  
C5 4.8 2.1

MW IN 9.1 VIS 57 pH 9.7  
MW OUT 9.0 VIS 54 pH 9.3  
C2.1

MW IN 8.95 VIS 57 pH 9.6  
MW OUT 9.0 VIS 56 pH 9.4  
C2.1

MUD DATA @ 7114'  
MW 9.0 EV 62 PV 18 NP 24  
AP FIL 8.0 GELS 11/20/33 pH 9.5  
CF 1366 C4+ 215 COI 4.2  
24 HR LOSSES 2657 bbls

MW IN 8.95 VIS 57 pH 9.4  
MW OUT 9.0 VIS 58 pH 9.1  
C4.3 2.1  
C2.1

LOST RETURNS @ 7494'  
PARTIAL RETURNS @ 7510'  
LOST RETURNS @ 7515'  
NO RETURNS  
RETURNS BACK @ 7547'

MW IN 8.7 VIS 52 pH 9.5  
MW OUT 8.85 VIS 48 pH 9.3  
C4.3 2.1

MW IN 8.75 VIS 57 pH 10.0  
MW OUT 8.8 VIS 58 pH 9.8  
C4.3 2.1

PREDOMINATELY QUARTZ WITH UP TO 20% LITHIC FRAGMENTS; INCREASING IN LARGER GRAINED SANDSTONE; PREDOMINATELY FINE GRADING INTO MEDIUM LOWER WITH MINOR MEDIUM UPPER OR VERY FINE; FAIR SORTING; SUBROUNDED TO SUBANGULAR; MODERATE TO LOW SPHERICITY; EASILY FRIABLE TO FRIABLE; LOW TO MODERATE CALCITE CEMENT; GRAIN SUPPORTED; INTERBEDDED GRAY SHALE AND SILTSTONE; GAS SEEN IN LOWER PORTION

SANDSTONE = LIGHT TO VERY LIGHT GRAY; PREDOMINATELY QUARTZ WITH BLACK AND REDDISH BROWN LITHIC FRAGMENTS; FINE TO VERY FINE; FAIR TO WELL SORTING; SUBROUNDED TO ROUNDED; MODERATE SPHERICITY; EASILY FRIABLE TO FIRM FRIABLE; CALCITE CEMENT; GRAIN SUPPORTED; LOW POROSITY; GRADES INTO A SANDY SILTSTONE, INTERBEDDED WITH SHALE; LOW BACKGROUND GAS.

SANDSTONE = LIGHT TO VERY LIGHT GRAY, WHITE; PREDOMINATELY QUARTZ WITH LITHIC FRAGMENTS; LOWER SECTION ALSO CONTAINS KAOLINITIC CONTENT; CALCITE CEMENT; FINE TO VERY FINE, MINOR MEDIUM GRAINED; WELL TO FAIRLY SORTED; SUBANGULAR TO SUBROUNDED; EASILY FRIABLE TO FRIABLE; GRAIN SUPPORTED WITH MINOR MATRIX SUPPORTED; INTERBEDDED SHALE; LOW GAS AND NO VISIBLE HYDROCARBON INDICATORS.

SANDSTONE - WHITE TO LIGHT GREY, CLEAR WITH SOME BLACK SPECKLES CREATING A SALT AND PEPPERED APPEARANCE; MEDIUM TO FINE GRAIN SIZE; WELL SORTED; MODERATE TO LOW SPHERICITY WITH SUBANGULAR TO ANGULAR GRAINS FROSTED GRAIN SURFACES; FIRM FRIABLE TO MODERATELY HARD CUTTINGS CALCITE CEMENT WITH A STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; SOME DARK LITHIC INCLUSIONS; NO VISIBLE HYDROCARBON INDICATORS.

SHALE = PALE RED, GRAYISH ORANGE TO DARK YELLOWISH ORANGE; BRITTLE TO CRUMBLY TENACITY; SEMI PLANAR TO SPLINTERY FRACTURE; FLAKY TO SCALY CUTTINGS HABIT; MATTE TO FROSTED LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE TO FISSILE STRUCTURE.

SILTSTONE = MEDIUM TO MEDIUM LIGHT GRAY; TOUGH TO CRUMBLY TENACITY; IRREGULAR FRACTURE; FLAKY TO WEDGELIKE CUTTINGS HABIT; SILTY TO ABRASIVE TEXTURE; GRADES INTO VERY FINE TO FINE SANDSTONE.

SANDSTONE = WHITE TO CLEAR; MEDIUM TO COARSE GRAIN SIZE; WELL SORTED; SUBROUND TO SUBANGULAR GRAINS WITH MODERATE TO LOW SPHERICITY; FROSTED GRAIN SURFACES; UNCONSOLIDATED GRAINS, SOME CALCITE MATRIX COATING ON GRAINS, SOME REACTION TO DILUTE HCL; ASSOCIATED WITH 539 UNIT GAS OCCURRENCE.

SILTSTONE = PALE RED, MEDIUM GREY TO PALE GRAYISH BLUE; SEMI TOUGH TO BRITTLE TENACITY; IRREGULAR FRACTURE; MASSIVE TO SCALY CUTTINGS HABIT; MATTE TO FROSTED TO SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; MASSIVE STRUCTURE.

FRACTURE FILL = CLEAR TO MILKY WHITE CALCITE RHOMBS AND GRAINS; INTERBEDDED WITH SANDSTONE; VERY STRONG REACTION TO DILUTE HCL; CORRELATES WITH ZONE OF LOST RETURNS FROM 7494' MD THROUGH 7547' MD.

SHALE = LIGHT GREY TO MEDIUM GREY, PALE RED; BRITTLE TO CRUMBLY TENACITY PLANAR TO SPLINTERY FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE BEDDING WITH FISSILITY.

CARBONACEOUS SHALE = BLACK TO MEDIUM DARK GREY; BRITTLE TO CRUNCHY TENACITY; BLOCKY TO PLANAR FRACTURE; PLATY TO FLAKY CUTTINGS HABIT; MATTE TO WAXY LUSTER; SMOOTH TO CLAYEY TEXTURE; BANDED TO LAMINAR STRUCTURE, INTERBEDDED WITH COAL AND PYRITE.

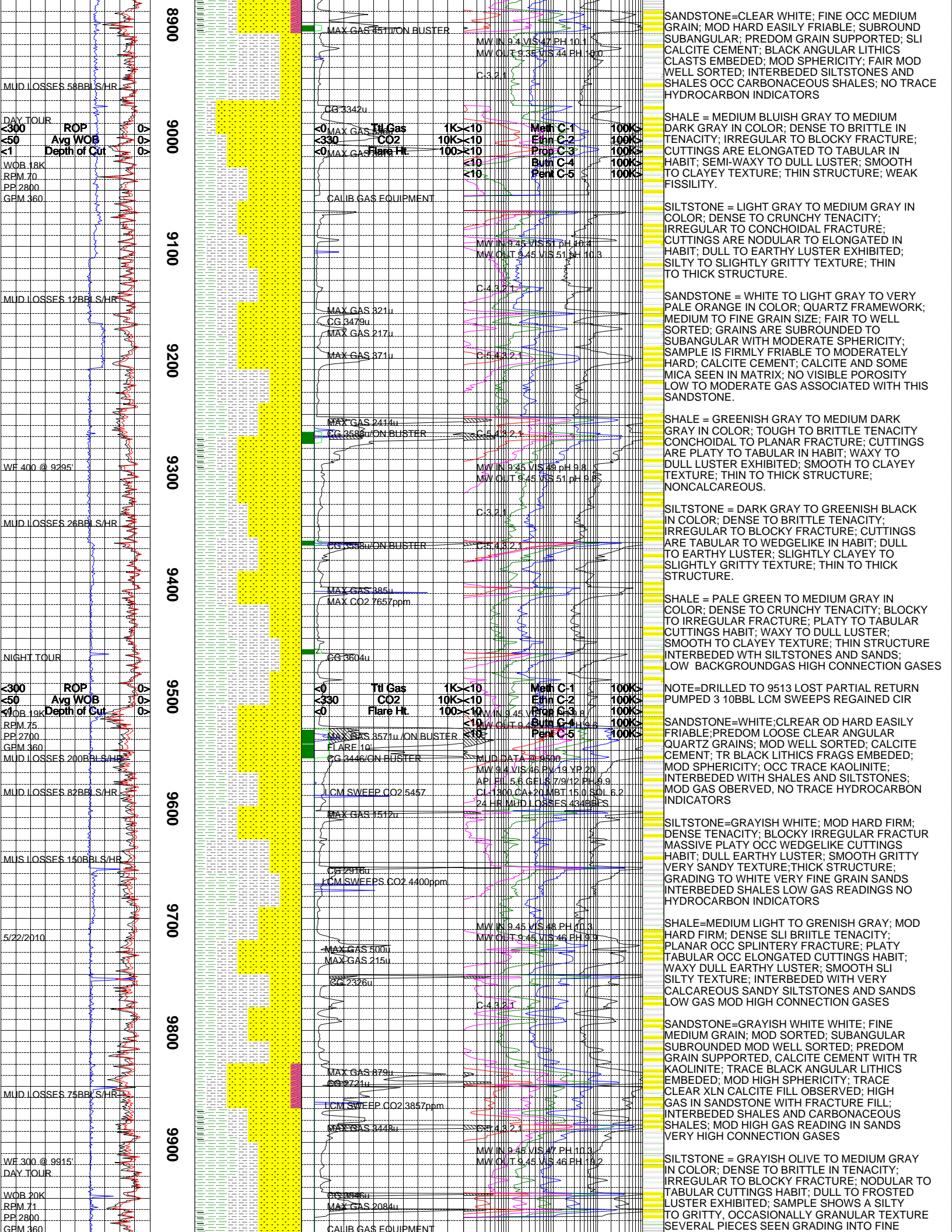
SANDSTONE = LIGHT TO MEDIUM GRAY; MINOR BROWNISH GRAY; PREDOMINATELY QUARTZ WITH 20% LITHICS BY VOLUME; FINE TO VERY FINE, MINOR MEDIUM GRAINED; FAIR SORTING SUBROUNDED TO SUBANGULAR; MODERATE SPHERICITY; EASILY TO FIRM FRIABLE; CALCITE CEMENT; GRAIN SUPPORTED; INTERBEDDED GRAY SHALE; LOW BACKGROUND GAS.

SHALE = MEDIUM DARK GRAY TO MEDIUM GRAY; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SUB-BLOCKY FRACTURE; WEDGELIKE TO

<0	Ttl Gas	500<10	Meth C-1	100K<
<330	CO2	10K<10	Ethin C-2	100K<
<0	Flare Ht	100<10	Prop C-3	100K<
<0		<10	Butn C-4	100K<
<0		<10	Perw C-5	100K<

<0	Ttl Gas	500<10	Meth C-1	100K<
<330	CO2	10K<10	Ethin C-2	100K<
<0	Flare Ht	100<10	Prop C-3	100K<
<0		<10	Butn C-4	100K<
<0		<10	Perw C-5	100K<





8900  
9000  
9100  
9200  
9300  
9400  
9500  
9600  
9700  
9800  
9900

MUD LOSSES 58BBL S/HR  
DAY TOUR  
ROP  
Avg WOB  
Depth of Cut  
WOB 18K  
RPM 70  
PP 2800  
GPM 360  
MUD LOSSES 12BBL S/HR  
WF 400 @ 9295'  
MUD LOSSES 26BBL S/HR  
NIGHT TOUR  
ROP  
Avg WOB  
Depth of Cut  
WOB 19K  
RPM 75  
PP 2700  
GPM 360  
MUD LOSSES 200BBL S/HR  
MUD LOSSES 82BBL S/HR  
5/22/2010  
MUD LOSSES 75BBL S/HR  
WF 300 @ 9915'  
DAY TOUR  
WOB 20K  
RPM 71  
PP 2800  
GPM 360

MAX GAS 3511u/ON BUSTER  
CG 3342u  
MAX GAS 321u  
CG 3479u  
MAX GAS 217u  
MAX GAS 371u  
CG 3585u/ON BUSTER  
MAX GAS 2414u  
CG 3585u/ON BUSTER  
CG 3585u/ON BUSTER  
MAX GAS 385u  
MAX CO2 7657ppm  
CG 3604u  
MAX GAS 3571u/ON BUSTER  
FLARE 10  
CG 3446/ON BUSTER  
MUD DATA @ 9500  
MW IN 9.45 VIS 46 PH 10.3  
MW OUT 9.45 VIS 46 PH 9.9  
CL 1300 CA 20 MBT 15.0 SFL 6.2  
24 HR MUD LOSSES 434BBS  
MAX GAS 1512u  
CG 2916u  
LCM SWEEPS CO2 4400ppm  
MW IN 9.45 VIS 48 PH 10.3  
MW OUT 9.45 VIS 46 PH 9.9  
MAX GAS 5001  
MAX GAS 215u  
CG 2326u  
MAX GAS 879u  
CG 2721u  
LCM SWEEP CO2 3857ppm  
MAX GAS 3478u  
CG 3327u  
MW IN 9.45 VIS 47 PH 10.3  
MW OUT 9.45 VIS 46 PH 9.9  
CG 3604u  
MAX GAS 2084u  
CALIB GAS EQUIPMENT

SANDSTONE= CLEAR WHITE; FINE OCC MEDIUM GRAIN; MOD HARD EASILY FRIABLE; SUBROUND SUBANGULAR; PREDOM GRAIN SUPPORTED; SLI CALCITE CEMENT; BLACK ANGULAR LITHICS CLASTS EMBEDDED; MOD SPHERICITY; FAIR MOD WELL SORTED; INTERBEDDED SILTSTONES AND SHALES OCC CARBONACEOUS SHALES; NO TRACE HYDROCARBON INDICATORS

SHALE = MEDIUM BLuish GRAY TO MEDIUM DARK GRAY IN COLOR; DENSE TO BRITTLE IN TENACITY; IRREGULAR TO BLOCKY FRACTURE; CUTTINGS ARE ELONGATED TO TABULAR IN HABIT; SEMI-WAXY TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE; WEAK FISSILITY.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY IN COLOR; DENSE TO CRUNCHY TENACITY; IRREGULAR TO CONCHOIDAL FRACTURE; CUTTINGS ARE NODULAR TO ELONGATED IN HABIT; DULL TO EARTHY GRITTY TEXTURE; THIN TO THICK STRUCTURE.

SANDSTONE = WHITE TO LIGHT GRAY TO VERY PALE ORANGE IN COLOR; QUARTZ FRAMEWORK; MEDIUM TO FINE GRAIN SIZE; FAIR TO WELL SORTED; GRAINS ARE SUBROUNDED TO SUBANGULAR WITH MODERATE SPHERICITY; SAMPLE IS FIRMLY FRIABLE TO MODERATELY HARD; CALCITE CEMENT; CALCITE AND SOME MICA SEEN IN MATRIX; NO VISIBLE POROSITY LOW TO MODERATE GAS ASSOCIATED WITH THIS SANDSTONE.

SHALE = GREENISH GRAY TO MEDIUM DARK GRAY IN COLOR; TOUGH TO BRITTLE TENACITY CONCHOIDAL TO PLANAR FRACTURE; CUTTINGS ARE PLATY TO TABULAR IN HABIT; WAXY TO DULL LUSTER EXHIBITED; SMOOTH TO CLAYEY TEXTURE; THIN TO THICK STRUCTURE; NONCALCAREOUS.

SILTSTONE = DARK GRAY TO GREENISH BLACK IN COLOR; DENSE TO BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURE; CUTTINGS ARE TABULAR TO WEDGELIKE IN HABIT; DULL TO EARTHY LUSTER; SLIGHTLY CLAYEY TO SLIGHTLY GRITTY TEXTURE; THIN TO THICK STRUCTURE.

SHALE = PALE GREEN TO MEDIUM GRAY IN COLOR; DENSE TO CRUNCHY TENACITY; BLOCKY TO IRREGULAR FRACTURE; PLATY TO TABULAR CUTTINGS HABIT; WAXY TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE INTERBEDDED WITH SILTSTONES AND SANDS; LOW BACKGROUND GAS HIGH CONNECTION GASES

NOTE=DRILLED TO 9513 LOST PARTIAL RETURN PUMPED 3 10BBL LCM SWEEPS REGAINED CIR

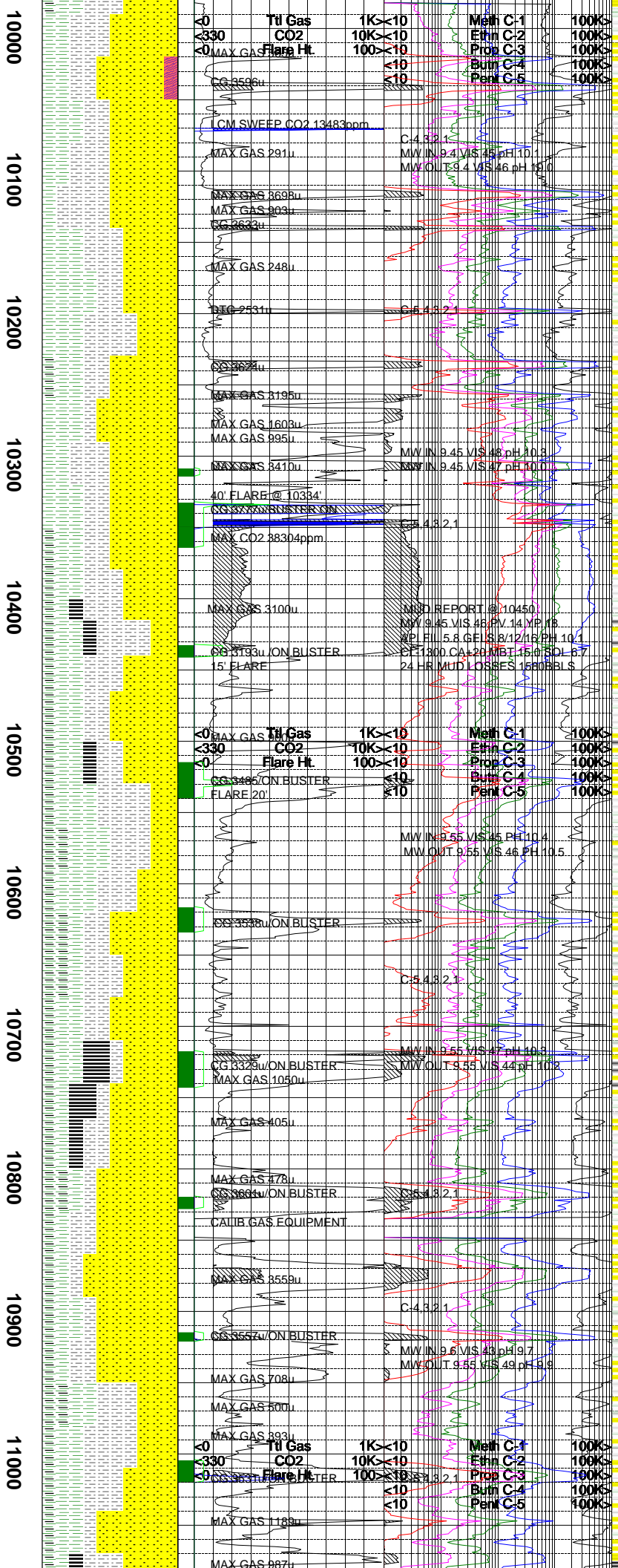
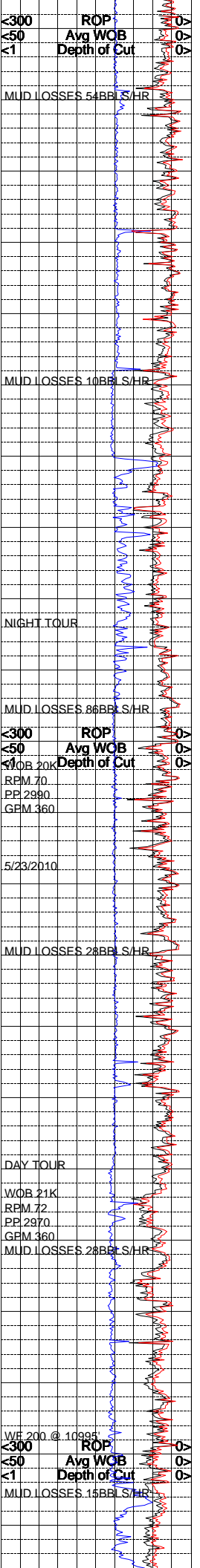
SANDSTONE=WHITE; CLEAR OD HARD EASILY FRIABLE; PREDOM LOOSE CLEAR ANGULAR QUARTZ GRAINS; MOD WELL SORTED; CALCITE CEMENT; TR BLACK LITHICS FRAGS EMBEDDED; MOD SPHERICITY; OCC TRACE KAOLINITE; INTERBEDDED WITH SHALES AND SILTSTONES; MOD GAS OBSERVED, NO TRACE HYDROCARBON INDICATORS

SILTSTONE=GRAYISH WHITE; MOD HARD FIRM; DENSE TENACITY; BLOCKY IRREGULAR FRACTURE MASSIVE PLATY OCC WEDGELIKE CUTTINGS HABIT; DULL EARTHY LUSTER; SMOOTH GRITTY VERY SANDY TEXTURE; THICK STRUCTURE; GRADING TO WHITE VERY FINE GRAIN SANDS INTERBEDDED SHALES LOW GAS READINGS NO HYDROCARBON INDICATORS

SHALE=MEDIUM LIGHT TO GREENISH GRAY; MOD HARD FIRM; DENSE SLI BRITTLE TENACITY; PLANAR OCC SPLINTERY FRACTURE; PLATY TABULAR OCC ELONGATED CUTTINGS HABIT; WAXY DULL EARTHY LUSTER; SMOOTH SLI SILTY TEXTURE; INTERBEDDED WITH VERY CALCAREOUS SANDY SILTSTONES AND SANDS LOW GAS MOD HIGH CONNECTION GASES

SANDSTONE=GRAYISH WHITE WHITE; FINE MEDIUM GRAIN; MOD SORTED; SUBANGULAR SUBROUNDED MOD WELL SORTED; PREDOM GRAIN SUPPORTED, CALCITE CEMENT WITH TR KAOLINITE; TRACE BLACK ANGULAR LITHICS EMBEDDED; MOD HIGH SPHERICITY; TRACE CLEAR XLN CALCITE FILL OBSERVED; HIGH GAS IN SANDSTONE WITH FRACTURE FILL; INTERBEDDED SHALES AND CARBONACEOUS SHALES; MOD HIGH GAS READING IN SANDS VERY HIGH CONNECTION GASES

SILTSTONE = GRAYISH OLIVE TO MEDIUM GRAY IN COLOR; DENSE TO BRITTLE IN TENACITY; IRREGULAR TO BLOCKY FRACTURE; NODULAR TO TABULAR CUTTINGS HABIT; DULL TO FROSTED LUSTER EXHIBITED; SAMPLE SHOWS A SILTY TO GRITTY, OCCASIONALLY GRANULAR TEXTURE SEVERAL PIECES SEEN GRADING INTO FINE



SANDSTONE; THIN STRUCTURE, APPEARS TO BE GRADING TO AND FROM A SANDSTONE.

FRACTURE FILL = CLEAR TO MILKY WHITE CALCITE RHOMBS AND GRAINS; INTERBEDDED WITH SANDSTONE; VERY STRONG REACTION TO DILUTE HCL; CORRELATES WITH LOSS ZONE FROM 10020' TO 10050'.

SHALE = LIGHT BLUISH GRAY TO MEDIUM GRAY IN COLOR; SAMPLE SHOWS A BRITTLE TO TOUGH TENACITY; PLANAR TO IRREGULAR FRACTURE; CUTTINGS ARE PLATY TO TABULAR, SOME ELONGATED; WAXY TO DULL LUSTER; SMOOTH TO CLAYEY, OCCASIONALLY SILTY TEXTURE; THIN STRUCTURE.

SANDSTONE = WHITE TO LIGHT GRAY TO NEARLY TRANSLUCENT; QUARTZ FRAMEWORK WITH SOME BLACK LITHIC FRAGMENTS; COARSE TO FINE GRAIN SIZE; GRAINS ARE ANGULAR TO SUBROUNDED WITH LOW TO MODERATE SPHERICITY; EASILY TO FIRMLY FRIABLE; WEAK CALCITE CEMENT, SLOW TO MODERATE DISSOLUTION IN HCL; NO VISIBLE POROSITY OR BEDDING FEATURES; CALCITE GRAINS VISIBLE IN MATRIX; ASSOCIATED WITH LOW BACKGROUND AND HIGH CONNECTION GAS.

SILTSTONE = DUSKY YELLOWISH BROWN TO DARK GRAY IN COLOR; BRITTLE TO CRUMBLY TENACITY; BLOCKY TO IRREGULAR FRACTURE; NODULAR TO TABULAR CUTTINGS HABIT; DULL TO EARTHY LUSTER; SAMPLE HAS A SILTY TO GRITTY, SOMETIMES GRANULAR TEXTURE; THIN STRUCTURE, INTERBEDDED WITH SANDS AND OCCASIONALLY SHALE.

CARBONACEOUS SHALE = BROWNISH GRAY; MOD HARD FIRM; BRITTLE TENACITY; BLOCKY OCC PLANAR FRACTURE; FLAKY PLATY CUTTING HABIT; DULL EARTHY LUSTER; SLI GRITTY TEXTURE; INTERBEDDED WITH SHALES AND SAND

NOTE; RAISED MW TO 9.6PPG AT 10433; DRILL AHEAD HIGH BACKGROUND GAS HIGH

SANDSTONE GRAYISH BROWN WHITE; MEDIUM FINE GRAIN; SUBROUNDED SUANGULAR; MOD WELL SORTED; PREDOM GRAIN SUPPORTED WITH CALCITE CEMENT AND TRACE KAOLINITE; TRACE BLACK LITHICS CLASTS EMBEDDED; MOD SPHERICITY; INTERBEDDED CARBONACEOUS SHALES OCC THIN COAL BEDS; MOD HIGH GAS IN COAL BEDS; NO HYDROCARBON INDICATORS

SHALE = LIGHT GRAY OCC DARK TO MEDIUM GRAY; MOD HARD FIRM; DENSE SLI CRUMBLY TENACITY; BLOCKY PLANAR OCC TABULAR CUTTINGS HABIT; DULL EARTHY WAXY LUSTER; SMOOTH SLI SILTY TEXTURE; INTERBEDDED CARBONACEOUS SHALES AND SILTSTONES; LOW GAS READINGS NO TRACE HYDROCARBON INDICATORS

SANDSTONE = GRAYISH BROWN; WHITE; MOD HARD FINE MEDIUM GRAIN; MOD SORTED SUBANGULAR SUBROUNDED; PREDOM GRAIN SUPPORTED; TR CALCITE CEMENT; ANGULAR BLACK LITHICS CLASTS EMBEDDED; MOD SPHERICITY; SHALE AND CARBONACEOUS SHALES INTERBEDDED; MOD GAS IN SANDS; NO TRACE HYDROCARBON INDICATORS

COAL = BLACK GLASSY APPEARANCE; MOD HARD; BRITTLE CRUMBLY TENACITY; BLOCKY SLI CONCHOIDAL FRACTURE; WEDGELIKE CUTTINGS HABIT; METALLIC VITREOUS LUSTER; SMOOTH TEXTURE; LAMINAE TO THIN STRUCTURE; SEEN DEGASSING IN SAMPLE TRAY; ASSOCIATED WITH A 1050 UNIT GAS PEAK.

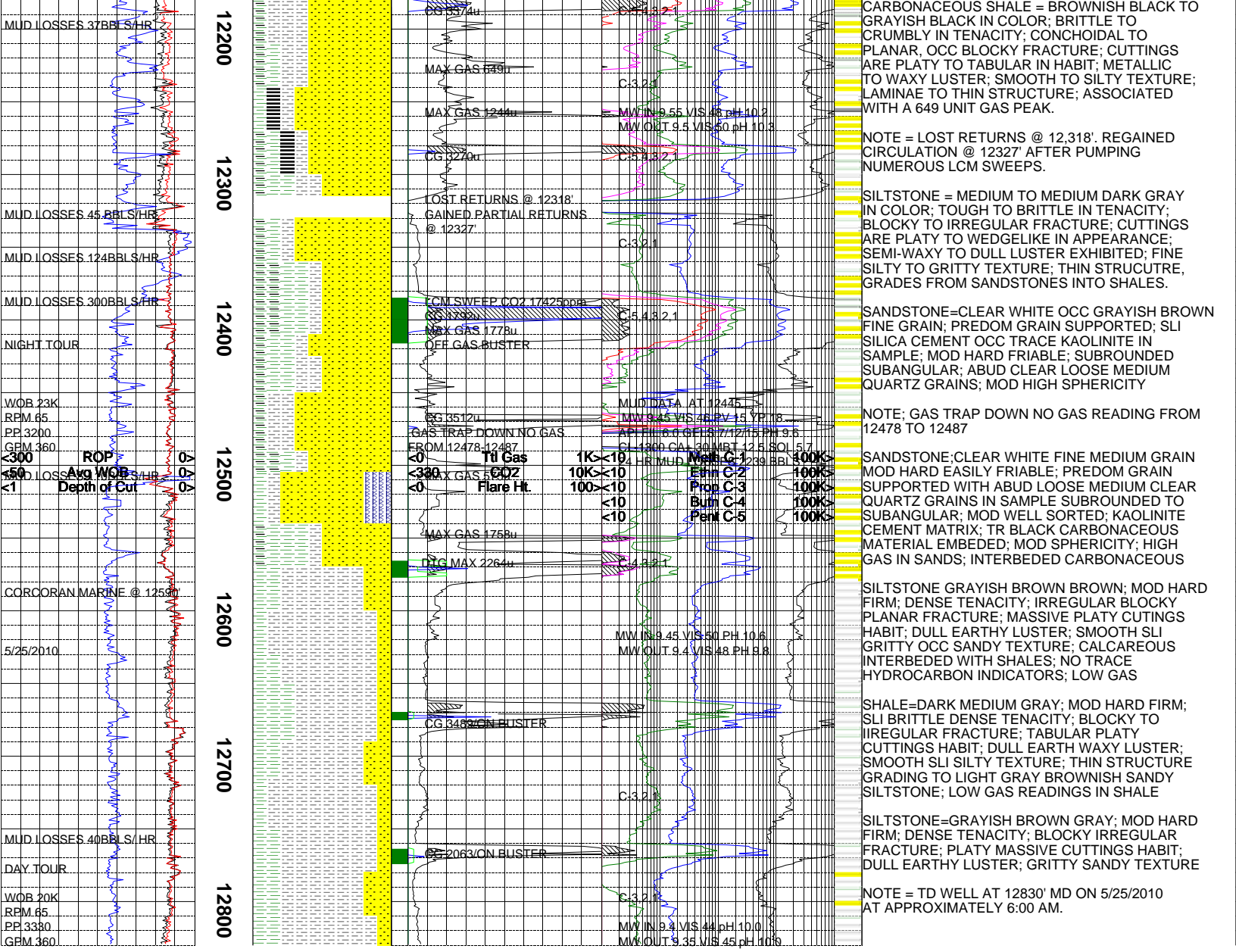
CARBONACEOUS SHALE = GRAYISH BLACK TO OLIVE BLACK IN COLOR; DENSE TO CRUMBLY IN TENACITY; BLOCKY TO IRREGULAR FRACTURE; CUTTINGS ARE NODULAR TO TABULAR IN APPEARANCE; GREASY TO DULL LUSTER; SMOOTH TO OCCASIONALLY SILTY TEXTURE; THIN TO LAMINAE STRUCTURE.

SILTSTONE = BROWNISH BLACK TO MEDIUM DARK GRAY IN COLOR; BRITTLE TO CRUMBLY TENACITY; BLOCKY TO CONCHOIDAL FRACTURE; CUTTINGS ARE MOSTLY NODULAR, SOME PLATY IN HABIT; DULL TO EARTHY LUSTER; SILTY TO GRITTY, OCC GRANULAR TEXTURE; THIN STRUCTURE, GRADES IN AND OUT WITH SANDSTONE.

SHALE = LIGHT BLUISH GRAY TO MEDIUM LIGHT GRAY; DENSE TO BRITTLE TENACITY; BLOCKY TO PLANAR FRACTURE; CUTTINGS ARE PLATY TO WEDGELIKE IN APPEARANCE; WAXY TO DULL LUSTER EXHIBITED; THIN STRUCTURE APPARENT.

SANDSTONE = PALE ORANGE TO WHITE IN COLOR; QUARTZ FRAMEWORK; COARSE TO FINE GRAIN SIZE; POOR TO FAIR SORTING; GRAINS ARE ANGULAR TO SUBROUNDED WITH MODERATE





CARBONACEOUS SHALE = BROWNISH BLACK TO GRAYISH BLACK IN COLOR; BRITTLE TO CRUMBLY IN TENACITY; CONCHOIDAL TO PLANAR, OCC BLOCKY FRACTURE; CUTTINGS ARE PLATY TO TABULAR IN HABIT; METALLIC TO WAXY LUSTER; SMOOTH TO SILTY TEXTURE; LAMINAE TO THIN STRUCTURE; ASSOCIATED WITH A 649 UNIT GAS PEAK.

NOTE = LOST RETURNS @ 12318'. REGAINED CIRCULATION @ 12327' AFTER PUMPING NUMEROUS LCM SWEEPS.

SILTSTONE = MEDIUM TO MEDIUM DARK GRAY IN COLOR; TOUGH TO BRITTLE IN TENACITY; BLOCKY TO IRREGULAR FRACTURE; CUTTINGS ARE PLATY TO WEDGELIKE IN APPEARANCE; SEMI-WAXY TO DULL LUSTER EXHIBITED; FINE SILTY TO GRITTY TEXTURE; THIN STRUCTURE, GRADES FROM SANDSTONES INTO SHALES.

SANDSTONE= CLEAR WHITE OCC GRAYISH BROWN FINE GRAIN; PREDOM GRAIN SUPPORTED; SLI SILICA CEMENT OCC TRACE KAOLINITE IN SAMPLE; MOD HARD FRACTURE; SUBROUNDED SUBANGULAR; ABUD CLEAR LOOSE MEDIUM QUARTZ GRAINS; MOD HIGH SPHERICITY

NOTE = GAS TRAP DOWN NO GAS READING FROM 12478 TO 12487

SANDSTONE: CLEAR WHITE FINE MEDIUM GRAIN MOD HARD EASILY FRIABLE; PREDOM GRAIN SUPPORTED WITH ABUD LOOSE MEDIUM CLEAR QUARTZ GRAINS IN SAMPLE SUBROUNDED TO SUBANGULAR; MOD WELL SORTED; KAOLINITE CEMENT MATRIX; TR BLACK CARBONACEOUS MATERIAL EMBEDDED; MOD SPHERICITY; HIGH GAS IN SANDS; INTERBEDDED CARBONACEOUS

SILTSTONE GRAYISH BROWN BROWN; MOD HARD FIRM; DENSE TENACITY; IRREGULAR BLOCKY PLANAR FRACTURE; MASSIVE PLATY CUTINGS HABIT; DULL EARTHY LUSTER; SMOOTH SLI GRITTY OCC SANDY TEXTURE; CALCAREOUS INTERBEDDED WITH SHALES; NO TRACE HYDROCARBON INDICATORS; LOW GAS

SHALE=DARK MEDIUM GRAY; MOD HARD FIRM; SLI BRITTLE DENSE TENACITY; BLOCKY TO IRREGULAR FRACTURE; TABULAR PLATY CUTTINGS HABIT; DULL EARTH WAXY LUSTER; SMOOTH SLI SILTY TEXTURE; THIN STRUCTURE GRADING TO LIGHT GRAY BROWNISH SANDY SILTSTONE; LOW GAS READINGS IN SHALE

SILTSTONE=GRAYISH BROWN GRAY; MOD HARD FIRM; DENSE TENACITY; BLOCKY IRREGULAR FRACTURE; PLATY MASSIVE CUTTINGS HABIT; DULL EARTHY LUSTER; GRITTY SANDY TEXTURE

NOTE = TD WELL AT 12830' MD ON 5/25/2010 AT APPROXIMATELY 6:00 AM.

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