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Anchorage, AK
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Drilling Dynamics MD

COMPANY ExxonMobil Production
WELL PCU 297-11C7
FIELD Piceance Creek
REGION Rocky Mountain
COORDINATES 39.896041 N
108.254563 W
ELEVATION GL: 6966.2'
RKB: 6996.4'
COUNTY, STATE Rio Blanco, CO
API INDEX 051031146900
SPUD DATE 02/19/2010
CONTRACTOR HP Drilling
CO. REP. M. Sadler / J. Wood
RIG/TYPE #326/ Flex-Rig 4
LOGGING UNIT MLU # 036
GEOLOGISTS J. Kokes/ D. Thibodeaux
C. Record
ADD. PERSONS H. Strickland/ J. Yeagar
P. Strickland/ D. Lockhart
CO. GEOLOGIST C. Alba

LOG INTERVAL

CASING DATA

DEPTHS: 3882' TO 12785'
DATES: 03/25/2010 TO 07/01/2010
SCALE: 1" = 100'

16" AT 150'
10 3/4" AT 3866'
7" AT 8707'
AT

MUD TYPES

HOLE SIZE

Water Based Spud Mud TO 3882'
LSND TO 12785'
TO
TO

14 3/4" TO 3882'
9 7/8" TO 8722'
6 1/8" TO 12785'
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 | |

<300 ROP 0>
ft/hr

<50 Avg WOB 0>
klbs

<1 Depth of Cut 0>
in/rev

Depth

Lithology

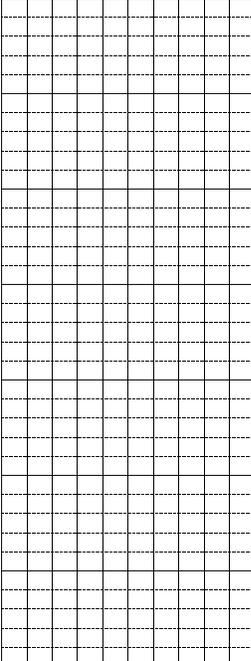
MGS

| | |
|-------------------|--------------------|
| <0 Ttl Gas 1.5K> | <10 Meth C-1 100K> |
| <330 CO2 5K> | <10 Ethn C-2 100K> |
| <0 Flare Ht. 100> | <10 Prop C-3 100K> |
| | <10 Butn C-4 100K> |
| | <10 Pent C-5 100K> |

Interp. Lith

Remarks

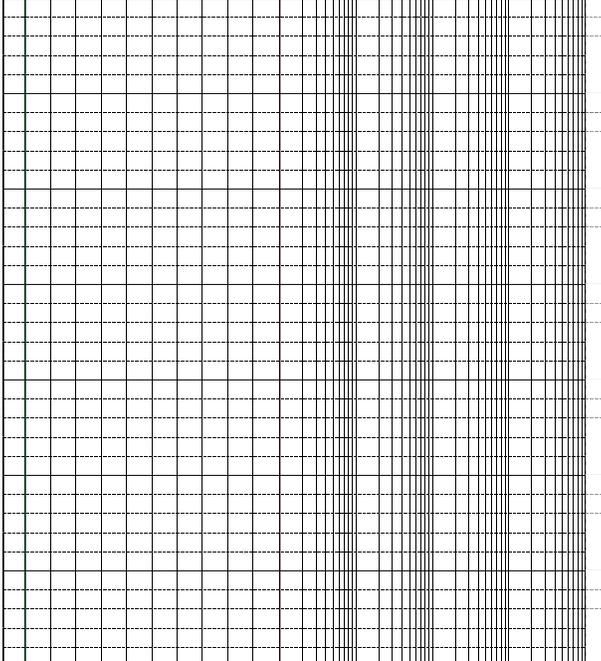
Survey Data, Mud Reports, Other Info.



3600

3700

3800



ALL SAMPLE 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

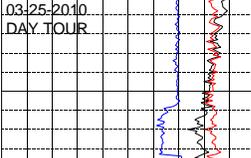
WHEN THE MUD IS CIRCULATED THROUGH THE GAS BUSTER, THE INTERVAL IS MARKED IN THE MGS COLUMN; THE SIZE OF THE FLARES ARE NOTED AS WELL.

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

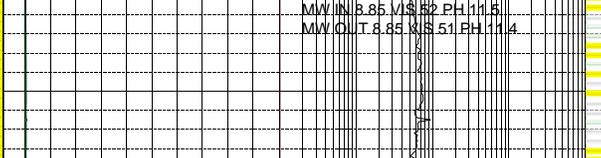
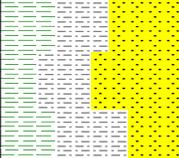
SET 10.75" SURFACE CASING AT 3866'.

NB#2, 9.7/8" IN @ 3866
TYPE: HUGHES HCD5047X
S/N: 7019025 JETS: 4X13.2X12
ETG: 1163' HRS: 21



3900

4000



COMMENCED LOGGING ON PCU 297-11C7 ON 03-25-2010 AT 13:58:15 HRS.

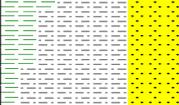
SANDSTONE = YELLOWISH GRAY TO MEDIUM GRAY WITH OCC SLIGHT GREENISH GRAY HUE; QUARTZ FRAMEWORK WITH APPROXIMATELY 10% BLACK LITHIC CLASTS; FINE TO MEDIUM SIZE WITH FAIR SORTING; SUBANGULAR TO SUBROUNDED; MODERATE SPHERICITY; FRIABLE TO FIRMLY FRIABLE; CALCITE CEMENT; WHITE CLAY MATRIX.

<300 ROP 0>
ft/hr

<50 Avg WOB 0>
klbs

<1 Depth of Cut 0>
in/rev

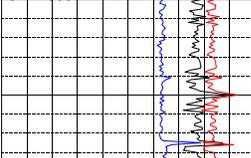
4000



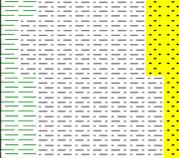
SILTSTONE = DUSKY YELLOW TO LIGHT OLIVE BROWN TO MEDIUM LIGHT GRAY; CRUMBLY TENACITY; IRREGULAR TO SLIGHTLY BLOCKY FRACTURING; MASSIVE TO TABULAR CUTTINGS; EARTHY LUSTER; SILTY TO GRITTY TEXTURE; THICK STRUCTURE; GRADING FROM SANDSTONE. INTERBED WITH LIGHT GRAY MOD HARD SOFT SLI SILTY SHALE; LOW GAS NO TRACE HYDROCARBONS

NIGHT TOUR

WOB 18-20K
RPM 85
PB 2225
GPM 693

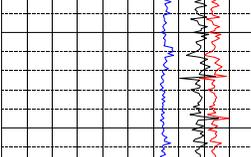


4100

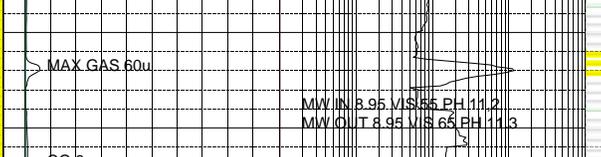
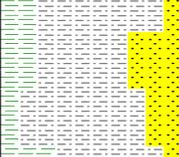


MUD REPORT @ 4080
MW IN 8.90 VIS 52 RV 17 YP 28
AP FIL 7.6 GE S 14/34/41 PH 11.2
CL 1300 CA 68 MBT 20.0 SOL 4.2
24 HR MUD LOSSES 0.8 BBL/S

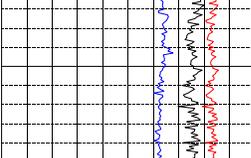
SHALE=LIGHT MEDIUM GRAY YELLOWISH BROWN WITH PURPLE HUES; CRUMBLY DENSE TENACITY BLOCKY IRREGULAR FRACTURE; PLANAR TO OCC WEDGELIKE TO NODULAR CUTTINGS HABIT; DULL EARTHY LUSTER; SILTY SMOOTH TEXTURE; MASSIVE STRUCTURE; GRADING INTO BROWNISH RED MOD SANDY BLOCKY SILTSTONES OCC TRACES OF SAND STRINGERS; VERY LOW GAS READINGS, NO TRACE HYDROCARBONS



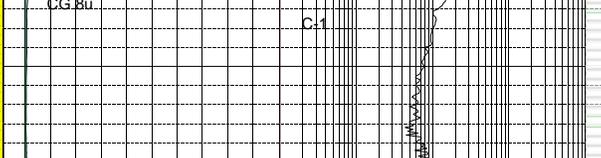
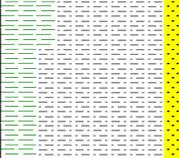
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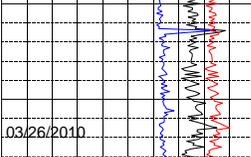
SANDSTONE=WHITE YELLOW GRAY; FINE TO MEDIUM GRAIN; SUBANGULAR OCC ANGULAR; MOD SORTED; MOD HARD FRIABLE; PREDOM QUARTZ GRAIN SUPPORTED; CALCITE CEMENT; 1% ANGULAR BLACK LITHICS CLASTS EMBEDDED MOD HIGH SPHERICITY; NO VISIBLE TRACE HYDROCARBONS PRESENT;



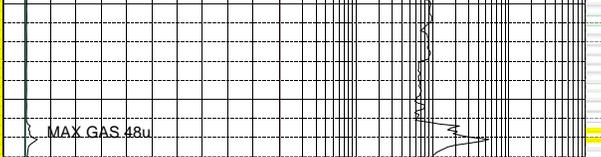
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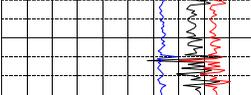
SILTSTONE=BROWNISH RED TO BROWN OCC LIGHT GRAY; CRUMBLY TENACITY; BLOCKY IRREGULAR FRACTURE; MASSIVE PLATY CUTTINGS HABIT; DULL EARTHY OCC SPARKLING LUSTER; SANDY GRITTY TEXTURE; INTERBED WITH LIGHT GRAY BROWNISH YELLOW CLAYEY SHALES; LOW GAS NO TRACE HYDROCARBONS



4400



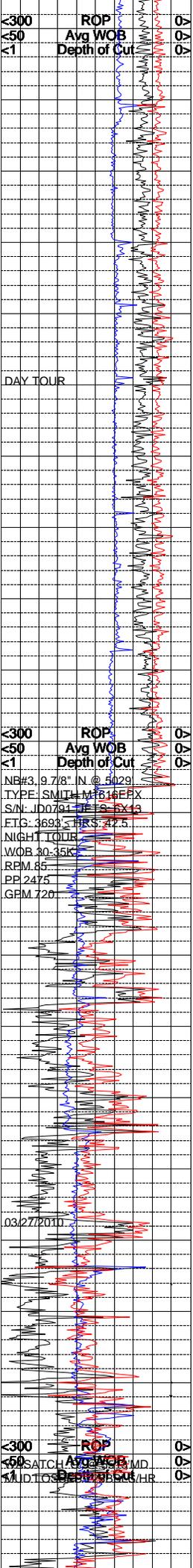
SANDSTONE=WHITE REDDISH BROWN GRAY BLACK; FINE MEDIUM GRAIN; SUBROUNDED TO SUBANGULAR; MOD WELL SORTED; PREDOM QUARTZ GRAIN SUPPORTED; CALCITE CEMENT; MOD REACTION TO HCL; TR BLACK ANGULAR LITHICS CLASTS EMBEDDED; MOD SPHERICITY; INTERBEDDED WITH LIGHT GRAY REDDISH BROW SHALES AND SILTSTONES; MOD LOW GAS; NO TRACE HYDROCARBONS



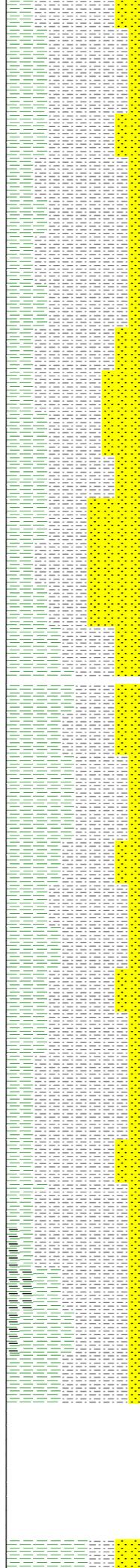
4500



SILTSTONE=BROWNISH RED LIGHT GRAY; CRUMBLY DENSE TENACITY; BLOCKY IRREG FRACTURE; PLATY NODULAR WEDGELIKE



4500
4600
4700
4800
4900
5000
5100
5200
5300
5400
5500



| Depth (ft) | Til Gas | CO2 | Flare Ht | Meth C-1 | Ethin C-2 | Prop C-3 | Butn C-4 | Pern C-5 |
|------------|---------|------|----------|----------|-----------|----------|----------|----------|
| 4500 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 4600 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 4700 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 4800 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 4900 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 5000 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 5100 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 5200 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 5300 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 5400 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 5500 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |

SHALE=LIGHT MEDIUM GRAY; MOD HARD FIRM PLATY IRREGULAR FRACTURE; MASSIVE WEDGELIKE CUTTINGS HABIT; SMOOTH CLAYEY SILTY TEXTURE; DULL EARTHY OCC WAXY LUSTER; GRADING TO BROWNISH BLOCKY SILTSTONE WITH OCC SANDSTONES INTERBEDDED VERY LOW GAS; NO TRACE HYDROCARBONS

SILTSTONE=BROWNISH RED;MOD HARD FIRM; CRUMBLY DENSE TENACITY; IRREGULAR BLOCKY PLANAR CUTTINGS HABIT; DULL EARTHY OCC SPARKLING LUSTER; SMOOTH GRITTY TEXTURE; NON CALCAREOUS; MASSIVE STRUCTURE; WITH LIGHT GRAY OCC BROWN SHALES INTERBEDDED AND OCC WHITE FINE GRAIN HARD FRIABLE SANDSTONES; LOW GAS; NO TRACE HYDROCARBONS

SANDSTONE = MODERATE YELLOWISH BROWN TO MEDIUM LIGHT GRAY; QUARTZ FRAMEWORK WITH 15% LITHICS; FINE TO VERY FINE GRAINED; GRADES INTO SILTSTONE; SUBROUNDED; MODERATE SPHERICITY; FRIABLE TO FIRMLY FRIABLE; CALCITE CEMENT; SLIGHT LIGHT BROWN TO WHITE CLAY MATRIX.

SHALE = MEDIUM LIGHT GRAY TO OCC GRAYISH PURPLE AND PALE GREEN; BRITTLE TENACITY; IRREGULAR TO PLANAR FRACTURING; TABULAR CUTTINGS; WAXY TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SILTSTONE AND SANDSTONE GRADES FROM SILTSTONE.

SILTSTONE = LIGHT OLIVE BROWN TO DARK YELLOWISH ORANGE; BRITTLE TO CRUMBLY TENACITY; IRREGULAR FRACTURING; MASSIVE TO TABULAR CUTTINGS; EARTHY TO WAXY LUSTER; GRITTY TO SILTY TO OCC CLAYEY TEXTURE; THICK STRUCTURE; INTERBEDDED WITH SANDSTONE AND SHALE.

SHALE = MEDIUM LIGHT GRAY TO MODERATE GREENISH YELLOW AND OCC GRAYISH PURPLE HUE; BRITTLE TENACITY; IRREGULAR TO PLANAR TO OCC SPLINTER FRACTURING; TABULAR TO PLATY CUTTINGS; DULL TO WAXY; SILTY TO SMOOTH TEXTURE.

DRILLED TO 5039' POOH PICKED UP PACKED HOLE DRILLING ASSEMBLY AND NEW BIT LAID OUT DIRECTIONAL TOOLS

SHALE=LIGHT MEDIUM GRAY YELLOW BROWN; MOD HARD FIRM; CRUMBLY DENSE TENACITY; IRREGULAR BLOCKY FRACTURE; PLATY OCC TABULAR MASSIVE CUTTINGS HABIT; SMOOTH SILTY CLAYEY TEXTURE; MASSIVE STRUCTURE INTERBEDDED WITH REDDISH BROWN SILTSTONE LOW GAS READINGS

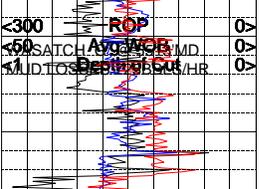
SILTSTONE=REDDISH BROWN; MOD FIRM; BLOCK IRREGULAR FRACTURE;MASSIVE WEDGELIKE CUTTINGS HABIT; DULL EARTHY LUSTER; SMOOTH GRITTY TEXTURE; INTERBEDDED WITH MULTICOLOR SHALES TR WHITE SANDSTONES VERY LOW GAS READINGS; NO TRACE VISIBLE HYDROCARBONS

SHALE=REDDISH BROWN OCC LIGHT MEDIUM GRAY; MOD HARD FIRM; CRUMBLY DENSE TENACITY; IRREGULAR BLOCKY FRACTURE; MASSIVE PLATY OCC WEDGELIKE CUTTINGS HABIT; DULL EARTHY OCC WAXY LUSTER; SMOOTH SLI SILTY TO CLAYEY TEXTURE; OCC SANDY TO GRITTY; NON CALCAREOUS; MASSIVE STRUCTURE; GRADES INTO SANDY BROWNISH RED SILTSTONE; INTERBEDDED SANDS ; LOW GAS READINGS; NO TRACE HYDROCARBONS PRESENT

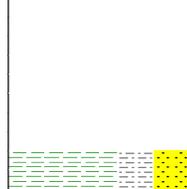
CARBONACEOUS SHALE=BROWNISH BLACK; BRITTLE DENSE TENACITY; PLANAR FRACTURE SCALY MASSIVE PLATY CUTTINGS HABIT; DULL EARTHY OCC VITREOUS LUSTER; SMOOTH TEXTURE; INTERBEDDED WITH GRAY BROWNISH RED SHALES AND SILTSTONES TRACES PYRITE AND CHALCOPYRITE EMBEDDED IN SHALES

NOTE: DRILLED TO 5513 TOP WASATCH G AT 5513'MD/5399TVD LOST FULL RETURNS PUMPED 2 30BBLs LCM PILLS NO RETURNS FROM 5464 TO 5560 CONTINUE TO STACK 30BBLs LCM PILLS DOWN HOLE REDUCED PUMPS GAINED BACK PARTIAL RETURNS AT SAMPLE 5560 WAS OUT OF HOLE NO SAMPLES OR GAS READINGS FROM 5464 TO 5560'

SHALE=LIGHT MEDIUM GRAY; MOD HARD FIRM CRUMBLY DENSE TENACITY; IRREGULAR BLOCKY FRACTURE; MASSIVE PLATY OCC SLI WEDGELIKE CUTTINGS HABIT; DULL EARTHY OCC WAXY LUSTER; SMOOTH SLI SILTY TEXTURE

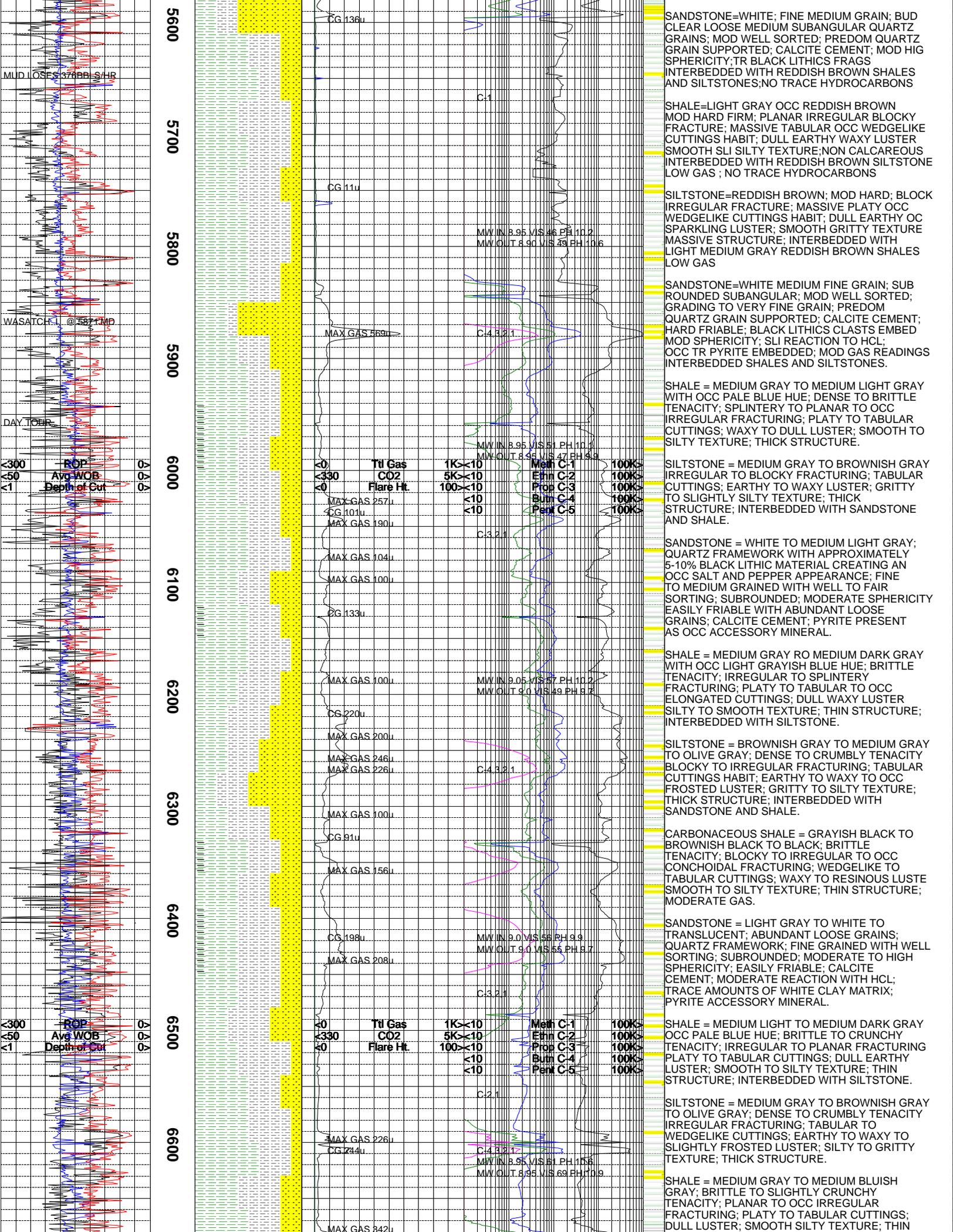


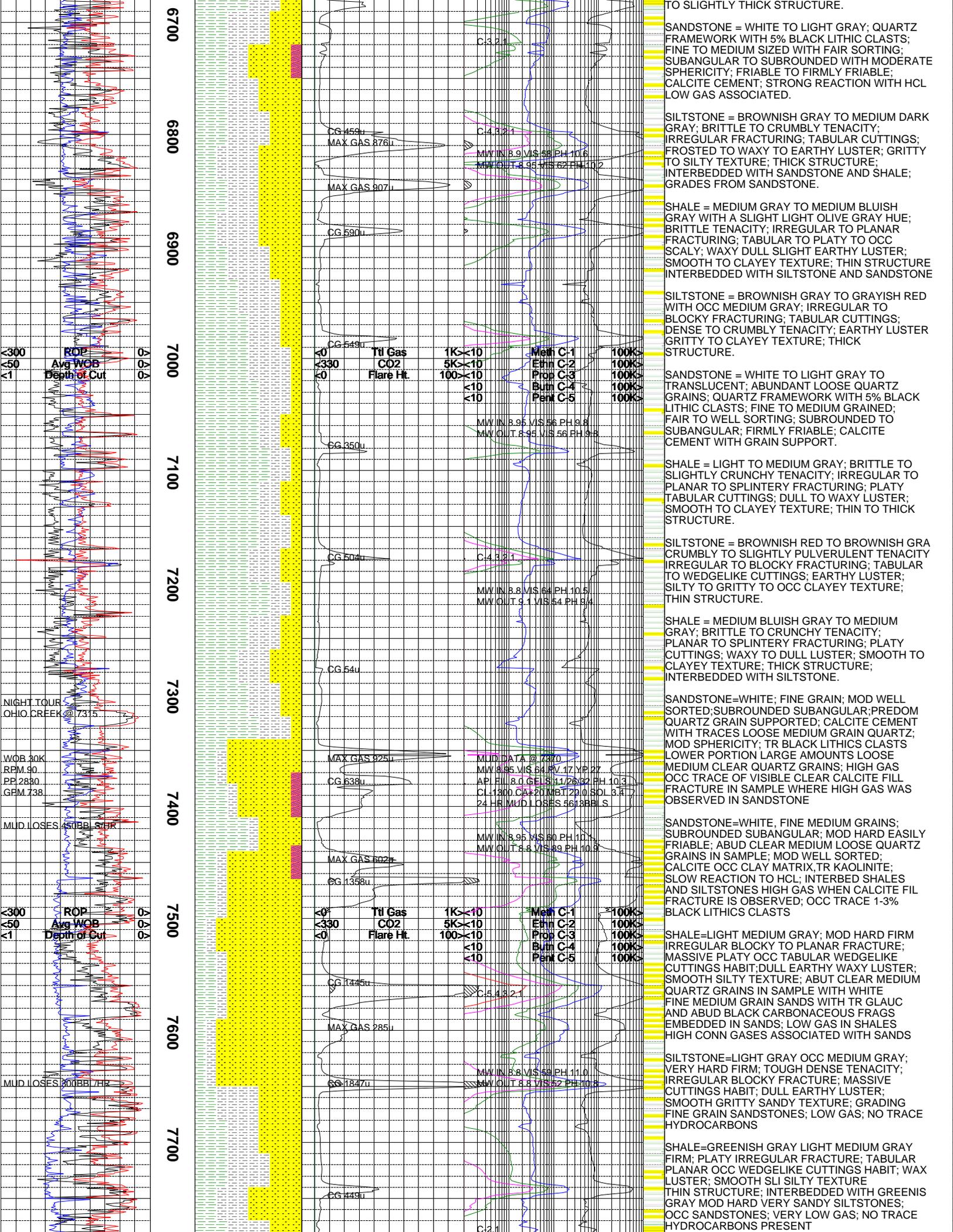
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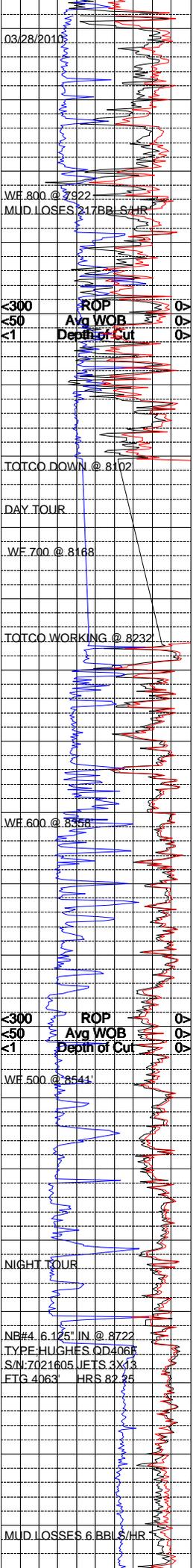


| Depth (ft) | Til Gas | CO2 | Flare Ht | Meth C-1 | Ethin C-2 | Prop C-3 | Butn C-4 | Pern C-5 |
|------------|---------|------|----------|----------|-----------|----------|----------|----------|
| 5500 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |
| 5550 | <0 | <330 | <10 | 1K<10 | 5K<10 | 100<10 | <10 | <10 |

SHALE=LIGHT MEDIUM GRAY; MOD HARD FIRM CRUMBLY DENSE TENACITY; IRREGULAR BLOCKY FRACTURE; MASSIVE PLATY OCC SLI WEDGELIKE CUTTINGS HABIT; DULL EARTHY OCC WAXY LUSTER; SMOOTH SLI SILTY TEXTURE







7800

7900

8000

8100

8200

8300

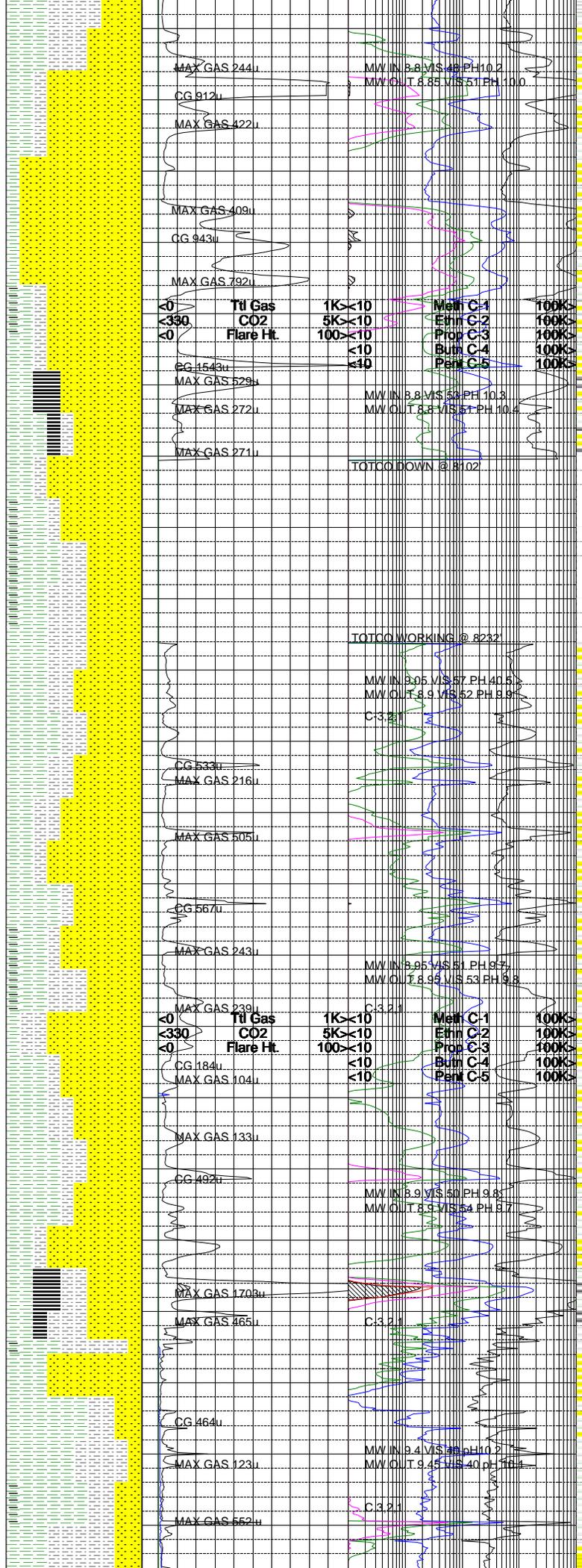
8400

8500

8600

8700

8800



SANDSTONE=WHITE GREENISH GRAY; FINE TO MEDIUM GRAIN; SUBANGULAR SUBROUNDED; MOD WELL SORTED; PREDOM QUARTZ GRAIN SUPPORTED; CLAY MATRIX OCC CALCITE; VERY POORLY CEMENTED; SLI REACTION TO HCL; 1-3% BLACK CARBONACEOUS MATERIAL EMBEDDED; OCC TRACE CHALCOPYRITE; MOD SPHERICITY INTERBEDDED WITH GRAY SHALES AND OCC SANDY SILTSTONES; MOD GAS IN SANDS

SANDSTONE=OFF WHIT WHITE; MED FINE GRAIN MOD HARD FRIABLE; PREDOM QUARTZ GRAINS SUPPORTED; SUBANGULAR SUBROUNDED; SALT PEPPER APPEARANCE 3=5% CARBONACEOUS MATERIAL EMBEDDED; CLAY SLI CALCITE CEMENT; MOD WELL SORTED; ABUD LOOSE ANG QUARTZ GRAINS; HIGH SPHERICITY; INTERBED WITH SHALES; HIGH GAS IN SANDS WITH HIGH CONNECTION GASES

SHALE=MEDIUM LIGHT GRAY; MOD HARD FIRM; DENSE TENACITY; BLOCKY IRREGULAR FRACTURE; PLATY TO MASSIVE OCC WEDGELIKE CUTTINGS HABIT; DULL EARTHY WAXY LUSTER SMOOTH SILTY TEXTURE; THIN STRUCTURE; INTERBEDDED SMALL THIN BLACK BLOCKY GLASSY COAL BEDS; MOD GAS IN COAL BEDS

NOTE = TOTCO DOWN FROM 8102' TO 8231'; NO DRILLING DATA BUT ABLE TO GET SAMPLES FROM STROKES AND DEPTH FROM DRILLER.

SANDSTONE = WHITE TO TRANSLUCENT TO LIGHT GRAY; QUARTZ FRAMEWORK; FIRMLY FRIABLE TO MODERATE HARD; FINE TO MEDIUM GRAINED WITH FAIR TO WELL SORTING; SUBROUNDED TO SUBANGULAR; MODERATE SPHERICITY; CALCITE CEMENT; MODERATE REACTION WITH HCL.

NOTE = TOTCO RECORDING DRILLING DATA @ 8232.

SILTSTONE = OLIVE GRAY TO MEDIUM GRAY; DENSE TO SLIGHTLY CRUMBLY TENACITY; BLOCKY TO IRREGULAR FRACTURING; MASSIVE TO TABULAR CUTTINGS; EARTHY TO WAXY LUSTER; GRITTY TO CLAYEY TEXTURE; THIN STRUCTURE.

SANDSTONE = WHITE TO MEDIUM GRAY; QUARTZ FRAMEWORK WITH 10% BLACK LITHIC CLASTS; FINE TO MEDIUM SIZED WITH FAIR TO WELL SORTING; SUBROUNDED TO SUBANGULAR WITH MODERATE TO LOW SPHERICITY; MODERATE HARDNESS TO FIRMLY FRIABLE; GRAIN SUPPORTED; CALCITE CEMENT; SLOW REACTION WITH HCL.

SHALE = LIGHT TO MEDIUM GRAY; BRITTLE TO CRUNCHY TENACITY; PLANAR TO IRREGULAR FRACTURING; PLATY TO TABULAR CUTTINGS; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SILTSTONE AND SANDSTONE.

SANDSTONE = TRANSLUCENT TO WHITE TO LIGHT GRAY; ABUNDANT LOOSE GRAINS; QUARTZ FRAMEWORK; FINE TO OCC MEDIUM GRAIN SIZE WITH WELL SORTING; SUBROUNDED TO SUBANGULAR WITH MODERATE SPHERICITY; FRIABLE; SLOW REACTION WITH HCL; CALCITE CEMENT.

SHALE = MEDIUM GRAY; DENSE TO BRITTLE TENACITY; PLANAR TO SLIGHTLY SPLINTERY FRACTURING; PLATY TO TABULAR CUTTINGS; DULL TO EARTHY LUSTER; SMOOTH TEXTURE; THIN STRUCTURE.

SANDSTONE=WHITE OFF WHITE, MOD HARD FRIABLE; SUBROUNDED SUBANGULAR; MOD WELL SORTED; PREDOM QUARTZ GRAIN SUPPORT CLAY SLI CEMENT MATRIX; SLOW REACTION TO HCL; 1=3% BLACK CARBONACEOUS MATERIAL EMBEDDED; MOD HIGH SPHERICITY; ABUD LOOSE CLEAR MEDIUM QUARTZ GRAINS IN SAMPLE; MOD GAS IN SANDS; INTERBEDDED SHALES AND THIN BLACK BLOCKY COAL BEDS HIGH GAS IN COAL BEDS

DRILLED TO 8722' MD/8607' TVD. SET CASING AT 8707'.

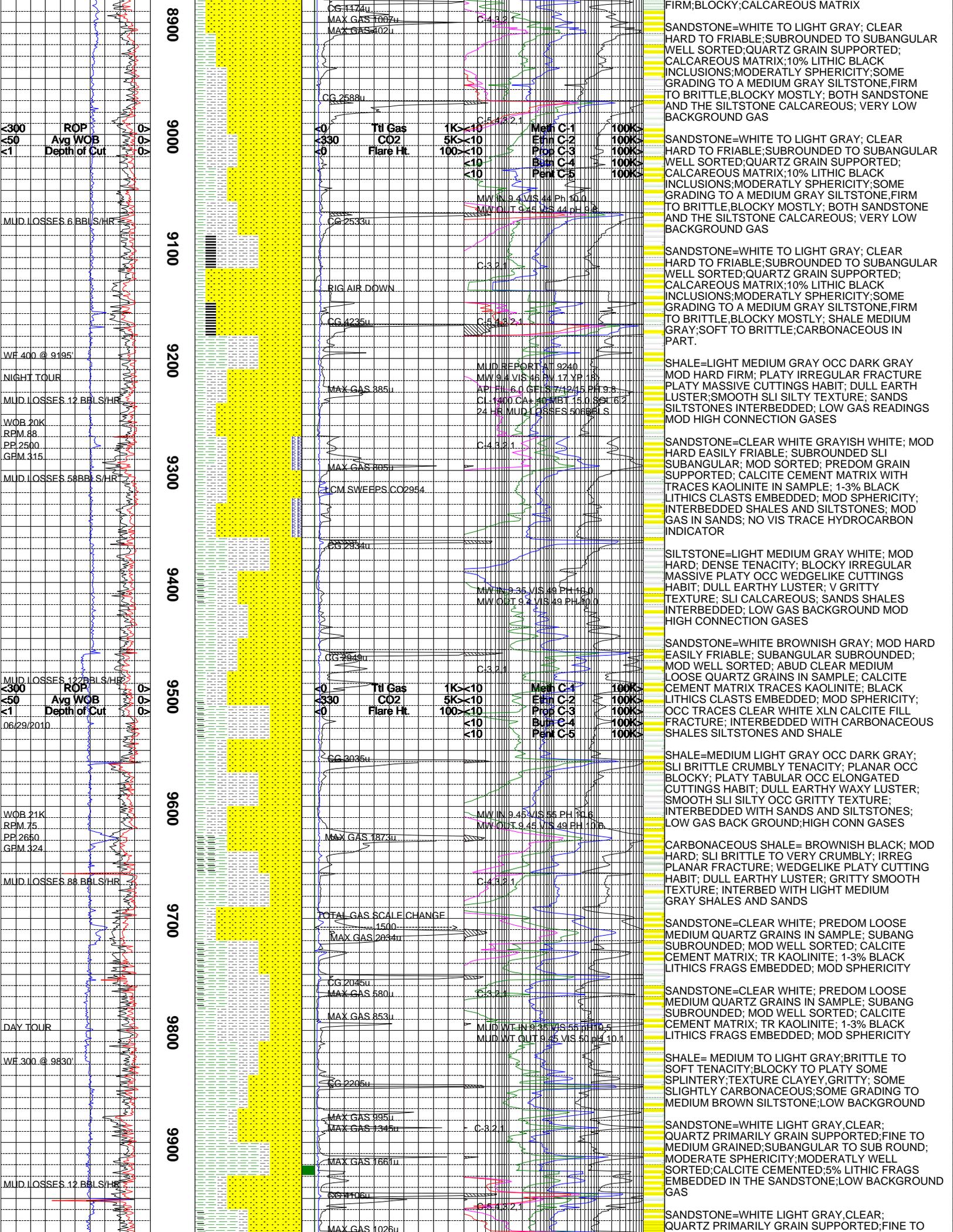
SANDSTONE=WHITE OFF WHITE, MOD HARD FRIABLE; SUBROUNDED SUBANGULAR; MOD WELL SORTED; PREDOM QUARTZ GRAIN SUPPORT CLAY SLI CEMENT MATRIX; BLACK INCLUSIONS APPROX 10%; MODERATLY HIGH SPHERICITY; VERY LOW BACKGROUND GAS

SHALE = MEDIUM GRAY; DENSE TO BRITTLE TENACITY; PLANAR TO SLIGHTLY SPLINTERY FRACTURING; PLATY TO TABULAR CUTTINGS; THIN STRUCTURE; SOME GRADING TO CARBON ACEOUS SHALES AND LENTICULAR CARBON PARTICLES

SILTSTONE= WHITE, LIGHT GRAY; BRITTLE TO

| | | | | |
|------|-----------|--------|-----------|-------|
| <0 | Ttl Gas | 1K<10 | Meth C-1 | 100K> |
| <330 | CO2 | 5K<10 | Ethin C-2 | 100K> |
| <0 | Flare Hit | 100<10 | Prop C-3 | 100K> |
| | | <10 | Butn C-4 | 100K> |
| | | <10 | Perm C-5 | 100K> |

| | | | | |
|------|-----------|--------|-----------|-------|
| <0 | Ttl Gas | 1K<10 | Meth C-1 | 100K> |
| <330 | CO2 | 5K<10 | Ethin C-2 | 100K> |
| <0 | Flare Hit | 100<10 | Prop C-3 | 100K> |
| | | <10 | Butn C-4 | 100K> |
| | | <10 | Perm C-5 | 100K> |



8900
9000
9100
9200
9300
9400
9500
9600
9700
9800
9900

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

MUD LOSSES 6 BBL/S/HR

WF 400 @ 9195'

NIGHT TOUR

MUD LOSSES 12 BBL/S/HR

WOB 20K
RPM 88
PP 2500
GFM 315

MUD LOSSES 58 BBL/S/HR

MUD LOSSES 12 BBL/S/HR
<300 ROP
<50 Avg WOB
<1 Depth of Cut
06/29/2010

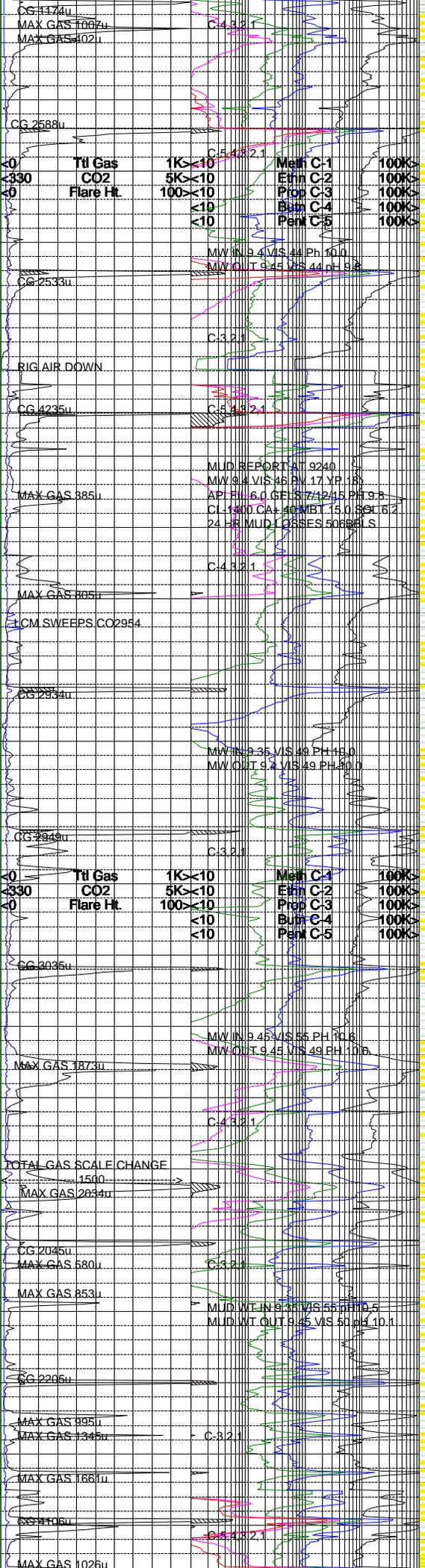
WOB 21K
RPM 75
PP 2650
GFM 324

MUD LOSSES 88 BBL/S/HR

DAY TOUR

WF 300 @ 9830'

MUD LOSSES 12 BBL/S/HR



FIRM;BLOCKY;CALCAREOUS MATRIX

SANDSTONE=WHITE TO LIGHT GRAY; CLEAR HARD TO FRIABLE;SUBROUNDED TO SUBANGULAR WELL SORTED;QUARTZ GRAIN SUPPORTED; CALCAREOUS MATRIX;10% LITHIC BLACK INCLUSIONS;MODERATLY SPHERICITY;SOME GRADING TO A MEDIUM GRAY SILTSTONE.FIRM TO BRITTLE.BLOCKY MOSTLY; BOTH SANDSTONE AND THE SILTSTONE CALCAREOUS; VERY LOW BACKGROUND GAS

SANDSTONE=WHITE TO LIGHT GRAY; CLEAR HARD TO FRIABLE;SUBROUNDED TO SUBANGULAR WELL SORTED;QUARTZ GRAIN SUPPORTED; CALCAREOUS MATRIX;10% LITHIC BLACK INCLUSIONS;MODERATLY SPHERICITY;SOME GRADING TO A MEDIUM GRAY SILTSTONE.FIRM TO BRITTLE.BLOCKY MOSTLY; BOTH SANDSTONE AND THE SILTSTONE CALCAREOUS; VERY LOW BACKGROUND GAS

SANDSTONE=WHITE TO LIGHT GRAY; CLEAR HARD TO FRIABLE;SUBROUNDED TO SUBANGULAR WELL SORTED;QUARTZ GRAIN SUPPORTED; CALCAREOUS MATRIX;10% LITHIC BLACK INCLUSIONS;MODERATLY SPHERICITY;SOME GRADING TO A MEDIUM GRAY SILTSTONE.FIRM TO BRITTLE.BLOCKY MOSTLY; SHALE MEDIUM GRAY;SOFT TO BRITTLE;CARBONACEOUS IN PART.

SHALE=LIGHT MEDIUM GRAY OCC DARK GRAY MOD HARD FIRM; PLATY IRREGULAR FRACTURE PLATY MASSIVE CUTTINGS HABIT; DULL EARTH LUSTER;SMOOTH SLI SILTY TEXTURE; SANDS SILTSTONES INTERBEDDED; LOW GAS READINGS MOD HIGH CONNECTION GASES

SANDSTONE=CLEAR WHITE GRAYISH WHITE; MOD HARD EASILY FRIABLE; SUBROUNDED SLI SUBANGULAR; MOD SORTED; PREDOM GRAIN SUPPORTED; CALCITE CEMENT MATRIX WITH TRACES KAOLINITE IN SAMPLE; 1-3% BLACK LITHICS CLASTS EMBEDDED; MOD SPHERICITY; INTERBEDDED SHALES AND SILTSTONES; MOD GAS IN SANDS; NO VIS TRACE HYDROCARBON INDICATOR

SILTSTONE=LIGHT MEDIUM GRAY WHITE; MOD HARD; DENSE TENACITY; BLOCKY IRREGULAR MASSIVE PLATY OCC WEDGELIKE CUTTINGS HABIT; DULL EARTHY LUSTER; V GRITTY TEXTURE; SLI CALCAREOUS; SANDS SHALES INTERBEDDED; LOW GAS BACKGROUND MOD HIGH CONNECTION GASES

SANDSTONE=WHITE BROWNISH GRAY; MOD HARD EASILY FRIABLE; SUBANGULAR SUBROUNDED; MOD WELL SORTED; ABUD CLEAR MEDIUM LOOSE QUARTZ GRAINS IN SAMPLE; CALCITE CEMENT MATRIX TRACES KAOLINITE; BLACK LITHICS CLASTS EMBEDDED; MOD SPHERICITY; OCC TRACES CLEAR WHITE XLN CALCITE FILL FRACTURE; INTERBEDDED WITH CARBONACEOUS SHALES SILTSTONES AND SHALE

SHALE=MEDIUM LIGHT GRAY OCC DARK GRAY; SLI BRITTLE CRUMBLY TENACITY; PLANAR OCC BLOCKY; PLATY TABULAR OCC ELONGATED CUTTINGS HABIT; DULL EARTHY WAXY LUSTER; SMOOTH SLI SILTY OCC GRITTY TEXTURE; INTERBEDDED WITH SANDS AND SILTSTONES; LOW GAS BACK GROUND;HIGH CONN GASES

CARBONACEOUS SHALE= BROWNISH BLACK; MOD HARD; SLI BRITTLE TO VERY CRUMBLY; IRREG PLANAR FRACTURE; WEDGELIKE PLATY CUTTING HABIT; DULL EARTHY LUSTER; GRITTY SMOOTH TEXTURE; INTERBED WITH LIGHT MEDIUM GRAY SHALES AND SANDS

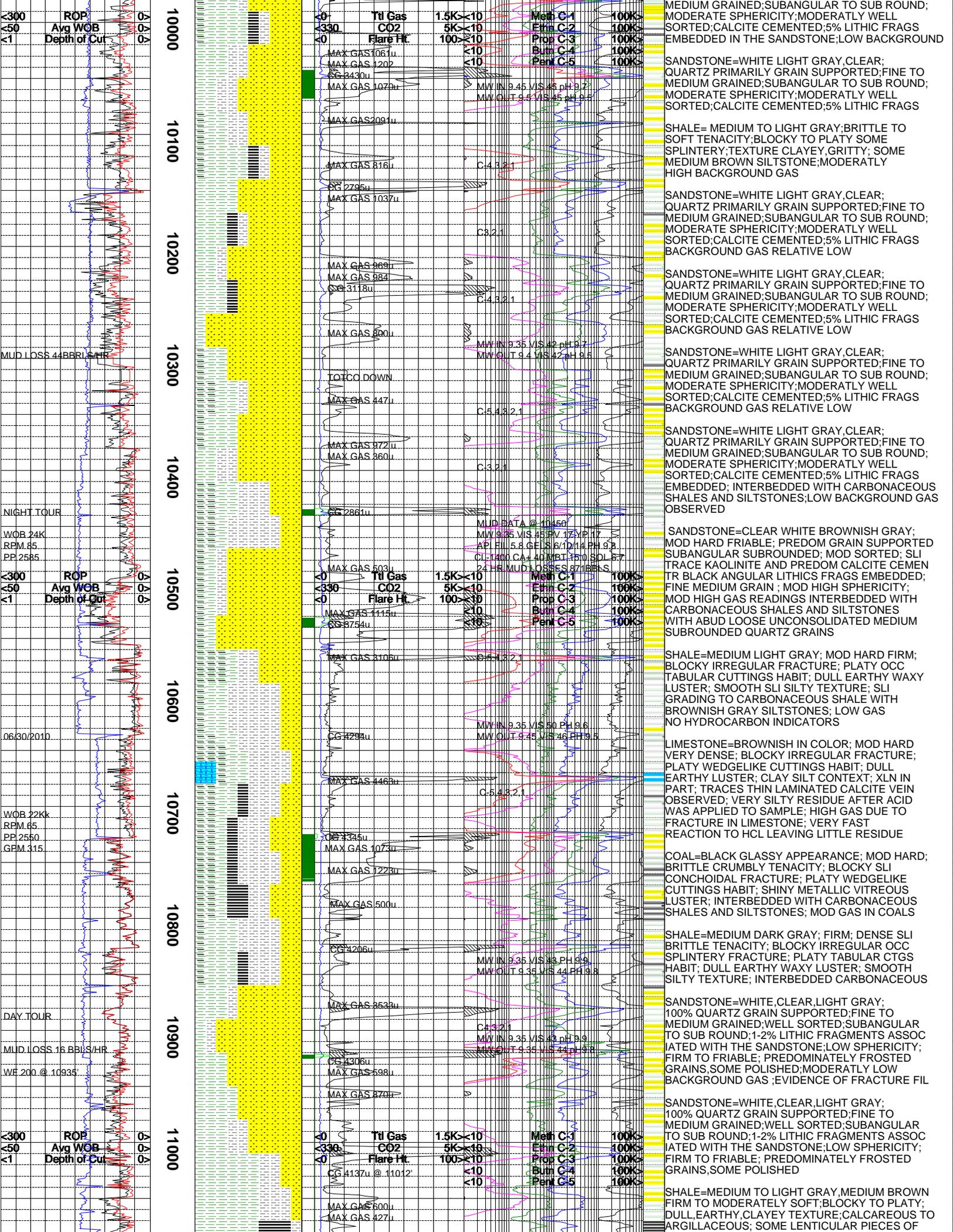
SANDSTONE=CLEAR WHITE; PREDOM LOOSE MEDIUM QUARTZ GRAINS IN SAMPLE; SUBANG SUBROUNDED; MOD WELL SORTED; CALCITE CEMENT MATRIX; TR KAOLINITE; 1-3% BLACK LITHICS FRAGS EMBEDDED; MOD SPHERICITY

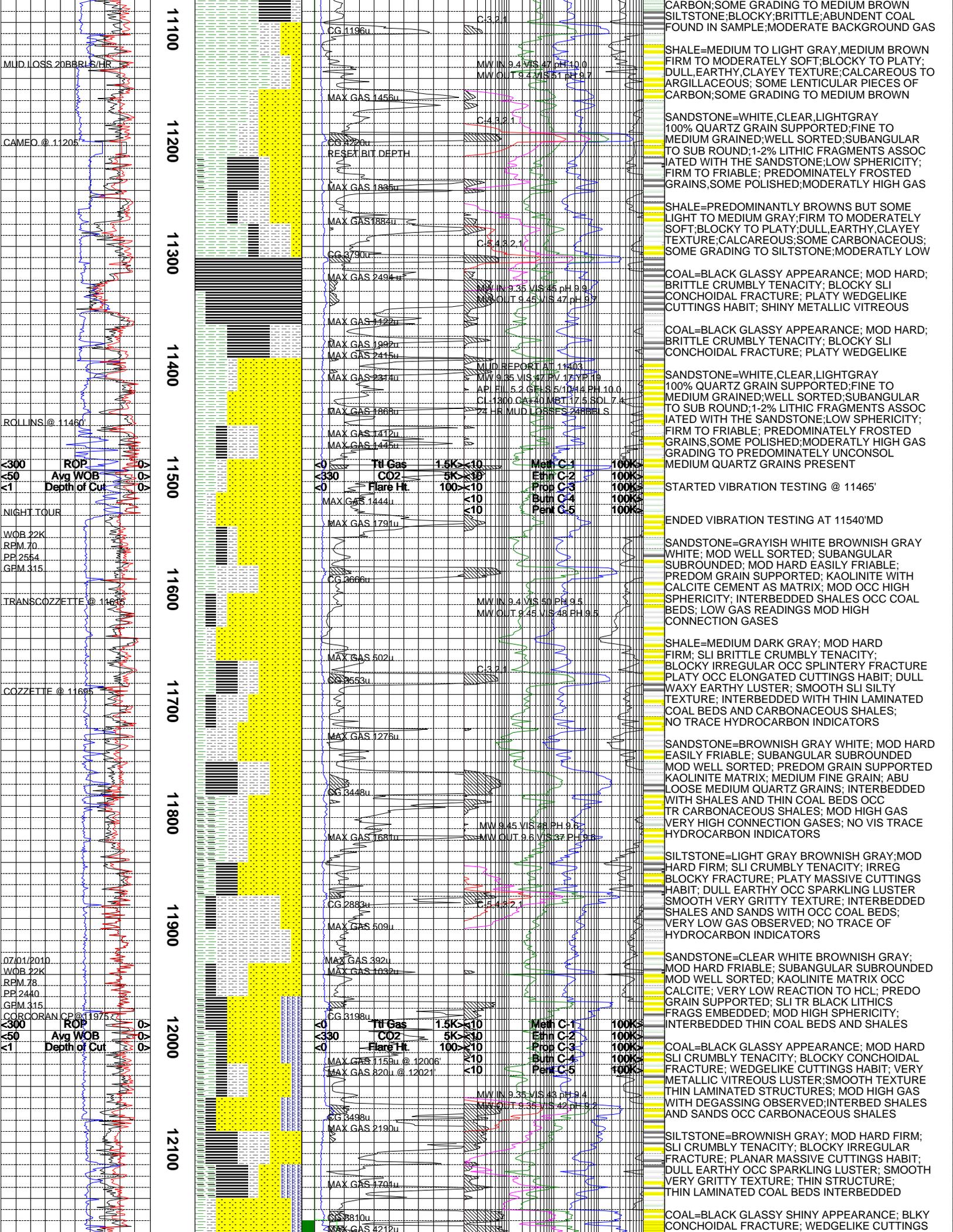
SANDSTONE=CLEAR WHITE; PREDOM LOOSE MEDIUM QUARTZ GRAINS IN SAMPLE; SUBANG SUBROUNDED; MOD WELL SORTED; CALCITE CEMENT MATRIX; TR KAOLINITE; 1-3% BLACK LITHICS FRAGS EMBEDDED; MOD SPHERICITY

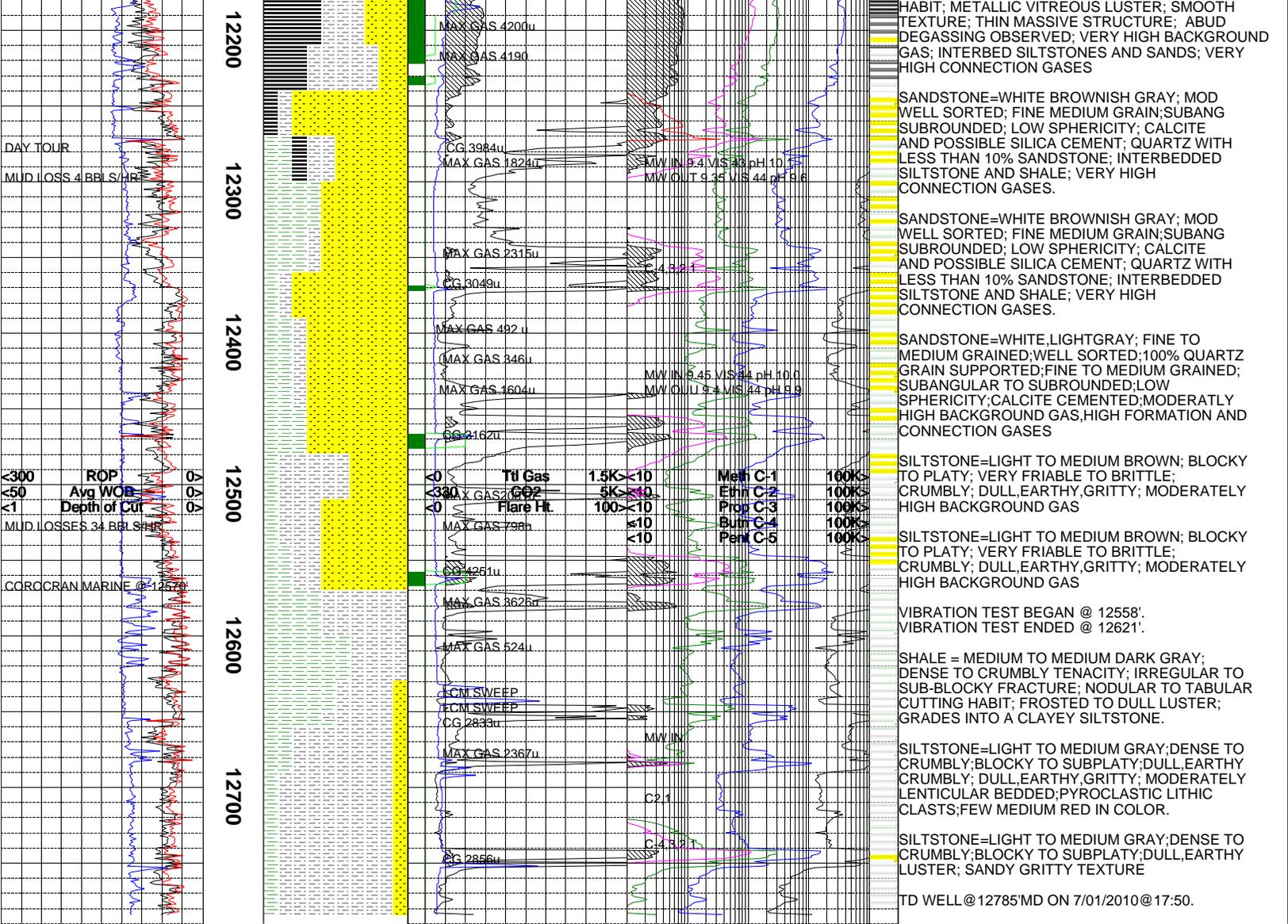
SHALE= MEDIUM TO LIGHT GRAY;BRITTLE TO SOFT TENACITY;BLOCKY TO PLATY SOME SPLINTERY;TEXTURE CLAYEY,GRITTY; SOME SLIGHTLY CARBONACEOUS;SOME GRADING TO MEDIUM BROWN SILTSTONE;LOW BACKGROUND

SANDSTONE=WHITE LIGHT GRAY,CLEAR; QUARTZ PRIMARILY GRAIN SUPPORTED;FINE TO MEDIUM GRAINED;SUBANGULAR TO SUB ROUND; MODERATE SPHERICITY;MODERATLY WELL SORTED;CALCITE CEMENTED;5% LITHIC FRAGS EMBEDDED IN THE SANDSTONE;LOW BACKGROUND GAS

SANDSTONE=WHITE LIGHT GRAY,CLEAR; QUARTZ PRIMARILY GRAIN SUPPORTED;FINE TO







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.