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

MUDLOG MD

COMPANY ExxonMobil Production

WELL PCU 197-34A5

FIELD PICEANCE CREEK

REGION ROCKY MOUNTAIN

COORDINATES LAT: 39.918116

LONG: -108.27697

ELEVATION G.L.:6492.9'

RKB: 30.2'

COUNTY, STATE RIO BLANCO, CO

API INDEX 051031154000

SPUD DATE 5/27/2010

CONTRACTOR HELMRICH_PAYNE

CO. REP. JOSEPH THOMAS

RIG/TYPE 325/FLEX 4S

LOGGING UNIT MLU 048

GEOLOGISTS MARK GROSS

DONNA NEW

ADD. PERSONS JENN SELL

CO. GEOLOGIST MELISSA J. SAURBORN

LOG INTERVAL

CASING DATA

DEPTHS: 3644' TO 12633'
DATES: 05/27/2010 TO 08/24/2010
SCALE: 1" = 100'

10.75" AT 3624'
7" AT 8600'
AT
AT

MUD TYPES

HOLE SIZE

SPUD MUD TO 3644'
LSND TO 12633'
TO
TO

14.75" TO 3644'
9.875" TO 8655'
6.125" TO 12633'
TO

ABBREVIATIONS

- NB NEWBIT, RRB RERUN BIT, CB CORE BIT, WOB WEIGHT ON BIT, RPM ROTARY REV/MIN, PP PUMP PRESSURE, SPM STROKES/MIN, MW MUD WEIGHT, VIS FUNNEL VISCOSITY
PV PLASTIC VISCOSITY, YP YIELD POINT, FL FLUID LOSS, CL PPM CLORIDE ION, Rm MUD RESISTIVITY, Rmf FILTRATE RESISTIVITY, PR POOR RETURNS, LAT LOGGED AFTER TRIP, LAS LOGGED AFTER SURVEY
LC LOST CIRCULATION, CO CIRCULATE OUT, NR NO RETURNS, TG TRIP GAS, SG SURVEY GAS, WG WIPER GAS, CG CONNECTION GAS

- 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

<150 ROP 0>
ft/hr
<50 Avg WOB 0>
klbs

Depth

Lithology

MGS
Ttl Gas 2K<
units
CO2 90K<
ppm
Flare Ht. 100<
ft
<10 Meth C-1 100K>
ppm
<10 Ethn C-2 100K>
<10 Prop C-3 100K>
<10 Butn C-4 100K>
<10 Pent C-5 100K>

Interp. Lith

Remarks
Survey Data, Mud Reports, Other Info.

3200

3300

3400

3500

3600

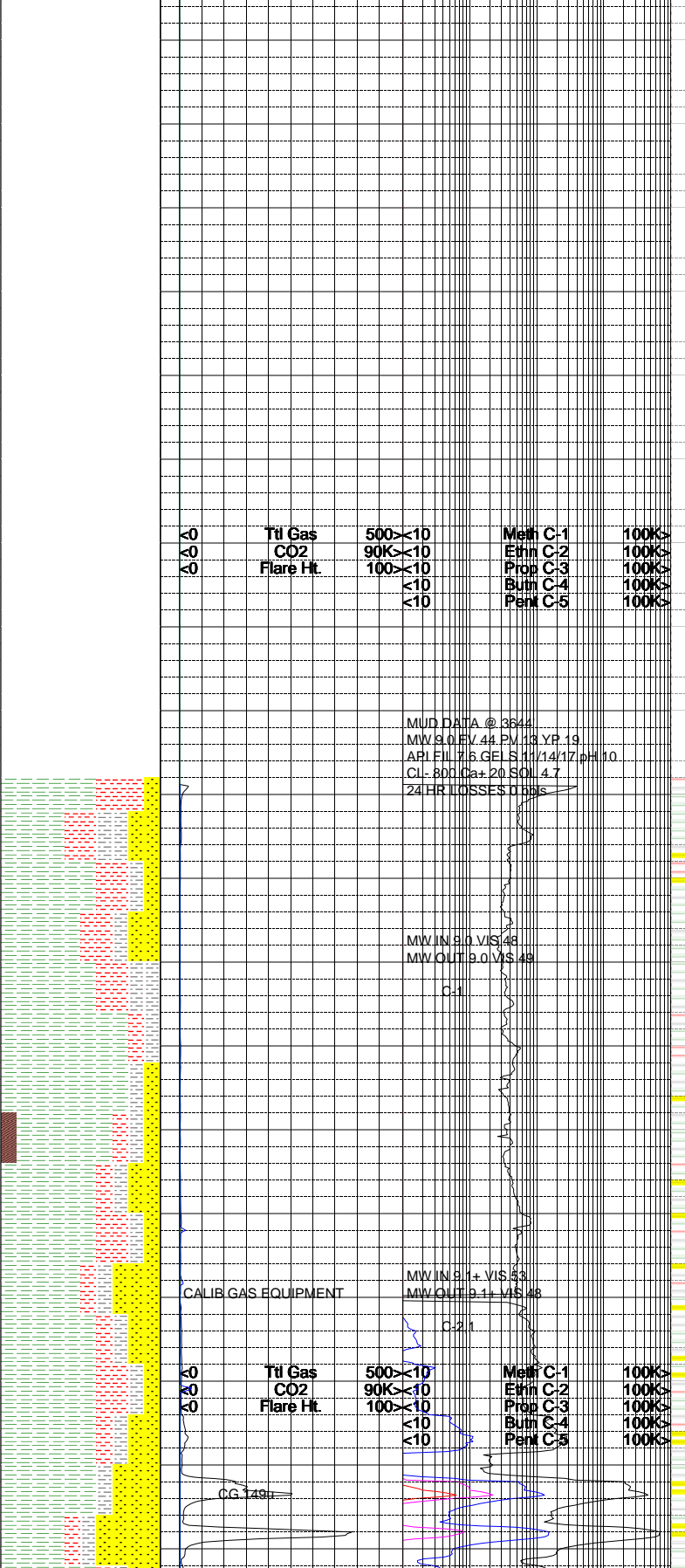
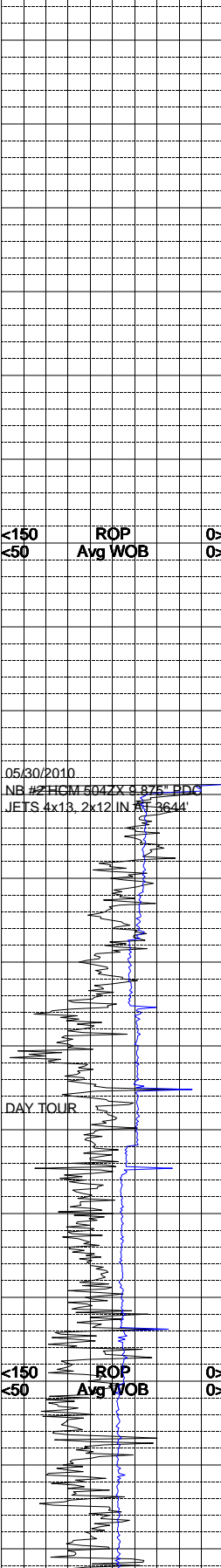
3700

3800

3900

4000

4100



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 WITH RESPECT TO PERCENTAGE IN SAMPLE. DEPTH IS REFERENCED TO RKB.

CONNECTION GASES AS WELL AS TRIP GASES AND DOWNTIME GASES ARE NOTED ON THE LOG. LARGE CONNECTION GASES WHICH APPEAR ON THE MUDLOG USUALLY REFLECT UPHOLE GAS INTERVALS BLEEDING 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 RUN THROUGH THE MGS (MUD GAS SEPERATOR) THE INTERVAL IS MARKED ON THE LOG IN THE SLIDE COLUMN AND NOTED ON THE LOG.

ALL SANDSTONE INTERVALS ARE EXAMINED FOR SAMPLE FLUORESCENCE IN THE UV SCOPE AND FOR HYDROCARBON FLUORESCENCE AND MINOR FLUORESCENCE FROM POSSIBLE FRACTURE FILL. ALL FLUORESCENCE IS NOTED ON THE MUDLOG.

10.75" SURFACE CASING WAS SET AT 3624'. DRILLED 10' OF NEW FORMATION AND PERFORM F.I.T. - GOOD. DRILL AHEAD.

SURVEY @ 3644' MD: INC 17.33 AZI 37.18
TVD 3507.83'

EPOCH WELL SERVICES COMMENCED FULL LOGGING ON 05/30/2010 AT 3645'

SHALE = PALE RED, LIGHT GRAY TO MEDIUM LIGHT GRAY, DARK YELLOWISH ORANGE TO PALE YELLOWISH ORANGE, ALL IN A MOTTLED PATTERN; CRUMBLY TO BRITTLE TENACITY; IRREGULAR TO SEMI PLANAR FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE.

SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT GRAY, PALE YELLOWISH ORANGE TO DARK YELLOWISH ORANGE; BRITTLE TO CRUMBLY TENACITY; BLOCKY TO IRREGULAR FRACUTRE; MASSIVE CUTTINGS HABIT; DULL TO SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; MASSIVE STRUCTURE.

SHALE = LIGHT GRAY TO MOD YELLOWISH BROWN MOTTLED WITH BROWNISH GRAY; PLATY TO SCALY TO FLAKY CUTTINGS HABIT; CLAYEY TO SMOOTH TEXTURE; DULL EARTHY LUSTER; THINLY INTERBEDDED WITH PALE YELLOWISH GRAY SILTSTONE; PLANAR TO HACKLY FRACTURE.

SANDSTONE = VERY LIGHT GRAY TO PALE YELLOWISH BROWN OT OFF WHITE; FRAIBLE TO MODERATE HARD; VERY FINE TO FINE GRAIN; FAIRLY SORTED; SUBANGULAR TO SUBROUND; LOW TO MODERATE SPHERICITY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND SOME KAOLIN CEMENT; THINLY INTERBEDDED WITH SILTSTONE; TRACE ACC MINERALS OF NAHCOLITE AND CHLORITE; TR CARBONACEOUS MATERIAL IN SAMPLE FRAGS.

SHALE = LIGHT GRAY MOTTLED WITH MODERATE YELLOWISH BROWN AND TRACE GRAYISH RED; PLATY TO SCALY TO WEDGELIKE CUTTINGS HABIT; CLAYEY TO SLIGHTLY SILTY TEXTURE; EARTHY LUSTER; THINLY INTERBEDDED WITH LIGHT GRAY SILTSTONE; ANGULAR TO PLANAR TO HACKLY FRACTURE.

SILTSTONE = LIGHT GRAY TO MODERATE YELLOWISH GRAY; IRREGULAR TO BLOCKY TO SPLINTERY FRACTURE; PLATY TO TABULAR CUTTINGS HABIT; SILTY TO CLAYEY TEXTURE; GRADES TO LIGHT GRAY SANDSTONE; TRACE LOOSE FINE GRAIN SAND; SPARKLING TO EARTHY LUSTER; THINLY INTERBEDDED WITH

05/30/2010
NB #2 FCM 9047X 9.875" PDC
JETS 4x13, 2x12 IN RT 3644'

DAY TOUR

CALIB GAS EQUIPMENT

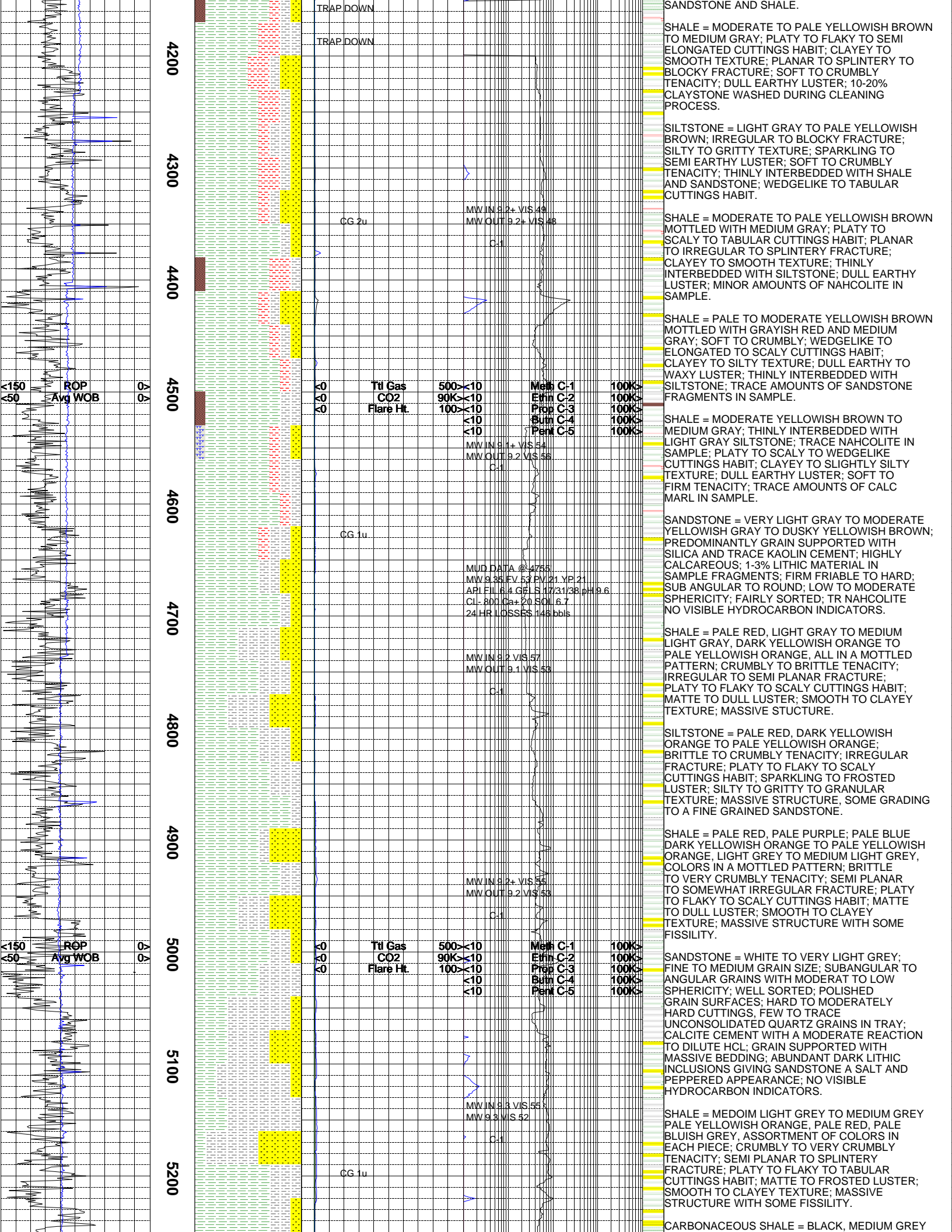
CG TAG

MUD DATA @ 3644
MW IN 9.0 VIS 48
MW OUT 9.1 VIS 48
API FIL 7.5 GELS 11/14/17 pH 10
CL- 800 Ca+ 20 SOL 4.7
24HR LOSSES 0.58

MW IN 9.0 VIS 48
MW OUT 9.0 VIS 48

MW IN 9.1+ VIS 53
MW OUT 9.1+ VIS 48

MW IN 9.1+ VIS 51
MW OUT 9.1+ VIS 48



4200
4300
4400
4500
4600
4700
4800
4900
5000
5100
5200

TRAP DOWN
TRAP DOWN
CG 2u
CG 1u
CG 1u

Ttl Gas	500	<10	Meth	C-1	100%
CO2	90K	<10	Eff	C-2	100%
Flare Ht	100	<10	Prop	C-3	100%
		<10	Burn	C-4	100%
		<10	Pent	C-5	100%

MW IN 9.2+ VIS 49	
MW OUT 9.2+ VIS 48	
MW IN 9.1+ VIS 54	
MW OUT 9.2 VIS 56	
MW IN 9.2 VIS 57	
MW OUT 9.1 VIS 53	
MW IN 9.2+ VIS 55	
MW OUT 9.2 VIS 53	
MW IN 9.3 VIS 56	
MW OUT 9.3 VIS 52	

MUD DATA @ 4755
MW 9.36 EV 53 PV 21 YP 21
API FIL 6.4 GELS 17/31/38 pH 9.6
CL- 800 Ca+ 20 SOL 6.7
24 HR LOSS 5 143 bbls

SANDSTONE AND SHALE.

SHALE = MODERATE TO PALE YELLOWISH BROWN TO MEDIUM GRAY; PLATY TO FLAKY TO SEMI ELONGATED CUTTINGS HABIT; CLAYEY TO SMOOTH TEXTURE; PLANAR TO SPLINTERY TO BLOCKY FRACTURE; SOFT TO CRUMBLY TENACITY; DULL EARTHY LUSTER; 10-20% CLAYSTONE WASHED DURING CLEANING PROCESS.

SILTSTONE = LIGHT GRAY TO PALE YELLOWISH BROWN; IRREGULAR TO BLOCKY FRACTURE; SILTY TO GRITTY TEXTURE; SPARKLING TO SEMI EARTHY LUSTER; SOFT TO CRUMBLY TENACITY; THINLY INTERBEDDED WITH SHALE AND SANDSTONE; WEDGE LIKE TO TABULAR CUTTINGS HABIT.

SHALE = MODERATE TO PALE YELLOWISH BROWN MOTTLED WITH MEDIUM GRAY; PLATY TO SCALY TO TABULAR CUTTINGS HABIT; PLANAR TO IRREGULAR TO SPLINTERY FRACTURE; CLAYEY TO SMOOTH TEXTURE; THINLY INTERBEDDED WITH SILTSTONE; DULL EARTHY LUSTER; MINOR AMOUNTS OF NAHCOLITE IN SAMPLE.

SHALE = PALE TO MODERATE YELLOWISH BROWN MOTTLED WITH GRAYISH RED AND MEDIUM GRAY; SOFT TO CRUMBLY; WEDGE LIKE TO ELONGATED TO SCALY CUTTINGS HABIT; CLAYEY TO SILTY TEXTURE; DULL EARTHY TO WAXY LUSTER; THINLY INTERBEDDED WITH SILTSTONE; TRACE AMOUNTS OF SANDSTONE FRAGMENTS IN SAMPLE.

SHALE = MODERATE YELLOWISH BROWN TO MEDIUM GRAY; THINLY INTERBEDDED WITH LIGHT GRAY SILTSTONE; TRACE NAHCOLITE IN SAMPLE; PLATY TO SCALY TO WEDGE LIKE CUTTINGS HABIT; CLAYEY TO SLIGHTLY SILTY TEXTURE; DULL EARTHY LUSTER; SOFT TO FIRM TENACITY; TRACE AMOUNTS OF CALC MARL IN SAMPLE.

SANDSTONE = VERY LIGHT GRAY TO MODERATE YELLOWISH GRAY TO DUSKY YELLOWISH BROWN; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND TRACE KAOLIN CEMENT; HIGHLY CALCAREOUS; 1-3% LITHIC MATERIAL IN SAMPLE FRAGMENTS; FIRM FRIABLE TO HARD; SUB ANGULAR TO ROUND; LOW TO MODERATE SPHERICITY; FAIRLY SORTED; TR NAHCOLITE NO VISIBLE HYDROCARBON INDICATORS.

SHALE = PALE RED, LIGHT GRAY TO MEDIUM LIGHT GRAY, DARK YELLOWISH ORANGE TO PALE YELLOWISH ORANGE, ALL IN A MOTTLED PATTERN; CRUMBLY TO BRITTLE TENACITY; IRREGULAR TO SEMI PLANAR FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE.

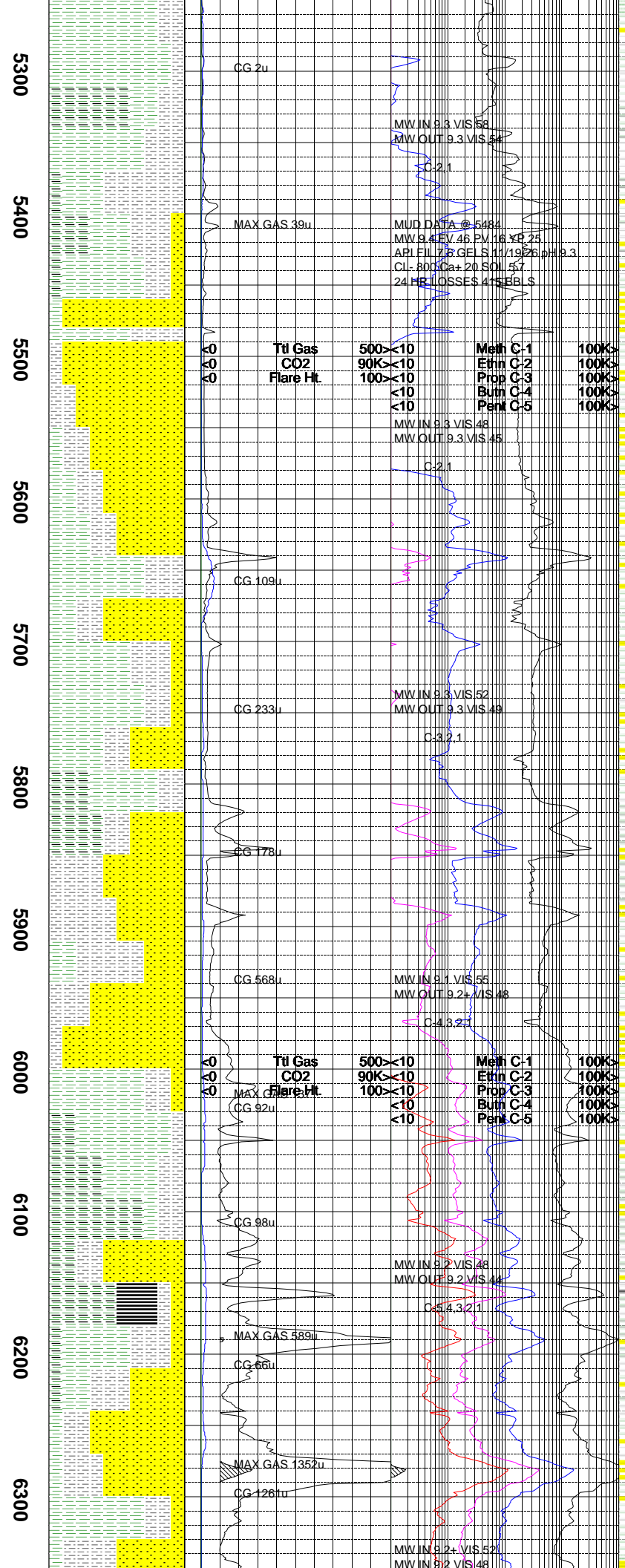
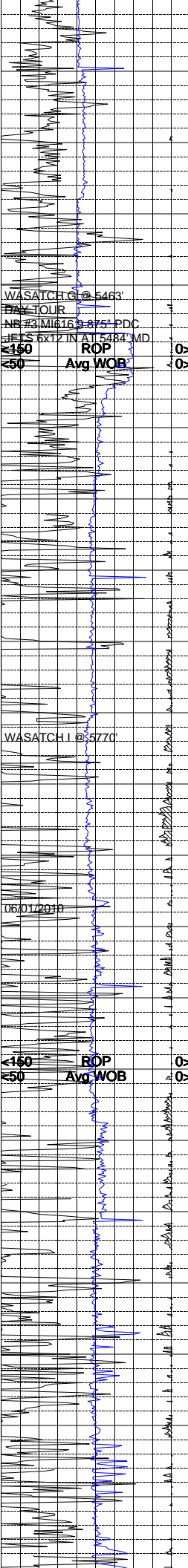
SILTSTONE = PALE RED, DARK YELLOWISH ORANGE TO PALE YELLOWISH ORANGE; BRITTLE TO CRUMBLY TENACITY; IRREGULAR FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; SPARKLING TO FROSTED LUSTER; SILTY TO GRITTY TO GRANULAR TEXTURE; MASSIVE STRUCTURE, SOME GRADING TO A FINE GRAINED SANDSTONE.

SHALE = PALE RED, PALE PURPLE; PALE BLUE DARK YELLOWISH ORANGE TO PALE YELLOWISH ORANGE, LIGHT GREY TO MEDIUM LIGHT GREY, COLORS IN A MOTTLED PATTERN; BRITTLE TO VERY CRUMBLY TENACITY; SEMI PLANAR TO SOMEWHAT IRREGULAR FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE WITH SOME FISSILITY.

SANDSTONE = WHITE TO VERY LIGHT GREY; FINE TO MEDIUM GRAIN SIZE; SUBANGULAR TO ANGULAR GRAINS WITH MODERAT TO LOW SPHERICITY; WELL SORTED; POLISHED GRAIN SURFACES; HARD TO MODERATELY HARD CUTTINGS, FEW TO TRACE UNCONSOLIDATED QUARTZ GRAINS IN TRAY; CALCITE CEMENT WITH A MODERATE REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; ABUNDANT DARK LITHIC INCLUSIONS GIVING SANDSTONE A SALT AND PEPPERED APPEARANCE; NO VISIBLE HYDROCARBON INDICATORS.

SHALE = MEDOIM LIGHT GREY TO MEDIUM GREY PALE YELLOWISH ORANGE, PALE RED, PALE BLUISH GREY, ASSORTMENT OF COLORS IN EACH PIECE; CRUMBLY TO VERY CRUMBLY TENACITY; SEMI PLANAR TO SPLINTERY FRACTURE; PLATY TO FLAKY TO TABULAR CUTTINGS HABIT; MATTE TO FROSTED LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE WITH SOME FISSILITY.

CARBONACEOUS SHALE = BLACK, MEDIUM GREY



TO MEDIUM DARK GREY; BRITTLE TO CRUNCHY TENACITY; BLOCKY TO SPLINTERY FRACTURE; FLAKY TO TABULAR TO WEDGELIKE CUTTINGS HABIT; MATTE TO WAXY TO RESINOUS LUSTER; SMOOTH TO CLAYEY TEXTURE; BANDED TO LAMINAR STRUCTURE; INTERBEDDED WITH PYRITE AND COAL, COAL VISIBLY DEGASSING IN SAMPLE TRAY, ASSOCIATED WITH MINOR GAS SPIKE.

SILTSTONE = MEDIUM GRAY TO LIGHT GRAY; EARTHY TO SPARKLING LUSTER; PLATY TO SCALY CUTTINGS HABIT; SPLINTERY TO HACKLY TO PLANAR FRACTURE; SILTY TO CLAYEY TEXTURE; THINLY INTERBEDDED WITH SHALE; TRACE FLECKS OF CARBONACEOUS SHALE IN SAMPLE FRAGMENTS.

NOTE: TRIP OUT OF HOLE AT 5484' TO LAY DOWN MWD AND POWERDRIVE TOOLS. PICK UP NEW BHA WITH BIT #3. TRIP IN HOLE AND DRILL AHEAD.

START DRILLING WITH BIT #3 AT 20:17 ON 05/31/2010.

SANDSTONE = WHITE TO VERY LIGHT GREY; FINE TO MEDIUM GRAIN SIZE; SUBANGULAR TO ANGULAR GRAINS WITH MODERATE TO LOW SPHERICITY; WELL SORTED; POLISHED GRAIN SURFACES; MODERATELY HARD TO FIRM FIRABLE; ABUNDANT UNCONSOLIDATED AND LOOSE QUARTZ GRAINS IN TRAY; CALCITE CEMENT WITH A MODERATE REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; ABUNDANT DARK LITHIC INCLUSIONS GIVING SANDSTONE A SALT AND PEPPERED APPEARANCE; TRACE MICAS AND GREEN CHLOROTOID MINERAL INCLUSIONS; NO VISIBLE HYDROCARBON INDICATORS.

CARBONACEOUS SHALE = BLACK, MEDIUM GREY TO MEDIUM DARK GREY; BRITTLE TO CRUNCHY TENACITY; BLOCKY TO SPLINTERY FRACTURE; FLAKY TO TABULAR TO WEDGELIKE CUTTINGS HABIT; MATTE TO WAXY TO RESINOUS LUSTER; SMOOTH TO CLAYEY TEXTURE; BANDED TO LAMINAR STRUCTURE; INTERBEDDED WITH PYRITE AND COAL, COAL VISIBLY DEGASSING IN SAMPLE TRAY.

SILTSTONE = MEDIUM GREY TO MEDIUM LIGHT GREY; TOUGH TO VERY TOUCH TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO SCALY CUTTINGS HABIT; FROSTED TO SPARKLING LUSTER; GRITTY TO GRANULAR TEXTURE; MASSIVE STRUCTURE, SOME GRADING TO A FINE TO MEDIUM GRAINED SANDSTONE.

SANDSTONE = LIGHT GREY TO MEDIUM DARK GREY; MEDIUM TO COARSE GRAIN SIZE; WELL SORTED; SUBROUND TO SUBANGULAR GRAINS WITH MODERATE TO LOW SPHERICITY; POLISHED GRAIN SURFACES; HARD TO MODERATELY HARD CUTTINGS WITH KAOLINITIC CEMENT; GRIN SUPPORTED WITH MASSIVE TO GRADED BEDDING; ABUNDANT CARBONACEOUS FLECKS THROUGHOUT; NO VISIBLE HYDROCARBON INDICATORS.

SHALE = DARK GREY TO MEDIUM DARK GREY; BRITTLE TO CRUMBLY TENACITY; SEMI PLANAR TO SOMEWHAT IRREGULAR FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE WITH SOME FISSILITY.

CARBONACEOUS SHALE = DARK GREY TO MEDIUM DARK GREY, SOME BLACK; SEMI PLANAR TO BLOCKY TO SPLINTERY FRACTURE; PLATY TO FLAKY TO WEDGELIKE CUTTINGS HABIT; MATTE TO RESINOUS LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE; ABUNDANT CARBONACEOUS AND PYRITE FLECKS.

COAL = BLACK TO BROWNISH BLACK; BRITTLE TO CRUNCHY TENACITY; BLOCKY TO PLANAR TO CHONCOIDAL FRACTURE; FLAKY TO PLATY TO TABULAR CUTTINGS HABIT; WAXY TO MATTE TO METALLIC LUSTER; SMOOTH TO CLAYEY TEXTURE; LAMINAR TO THICK STRUCTURE; ABUNDANT PYRITE BANDS AND INCLUSIONS; VISIBLE DEGASSING IN SAMPLE TRAY.

SILTSTONE = LIGHT GREY TO MEDIUM DARK GREY; TOUGH TO VERY TOUCH TENACITY; IRREGULAR TO SPLINTERY FRACTURE; MASSIVE TO FLAKY CUTTINGS HABIT; FROSTED TO SPARKLING LUSTER; SILTY TO GRITTY TO GRANULAR TEXTURE; MASSIVE TO GRADED STRUCTURE, GRADING TO A FINE GRAINED SANDSTONE IN PLACES.

SANDSTONE = WHITE TO MEDIUM LIGHT GREY; COARSE TO MEDIUM GRAIN SIZE; WELL SORTED SUBANGULAR TO ANGULAR GRAINS WITH MODERATE TO LOW SPHERICITY; POLISHED GRAIN SURFACES; MODERATELY HARD TO FIRM FIRABLE CUTTINGS; CALCITE CEMENT

WASATCH I @ 5463'
 MAX TOUR
 NB #3 M16169-875' PDC
 HELIX 6X12 IN AT 5484' MD

WASATCH I @ 5770'

06/01/2010

ROP
 Avg WOB

Ttl Gas	500	<10	Meth C-1	100K
CO2	90K	<10	Ethn C-2	100K
Flare Ht	100	<10	Prop C-3	100K
		<10	Burn C-4	100K
		<10	Penk C-5	100K

Ttl Gas	500	<10	Meth C-1	100K
CO2	90K	<10	Ethn C-2	100K
Flare Ht	100	<10	Prop C-3	100K
		<10	Burn C-4	100K
		<10	Penk C-5	100K

MW IN 9.3 V/S 58
 MW OUT 9.3 V/S 54

MUD DATA @ 5484'
 MW 9.4 REV 46 PV 1.8 YG 25
 API FIL 7.6 GEL S 11/19/26 pH 9.3
 CL- 800 Ca+ 20 SOL 5.7
 24 HE LOSSES 4.5 EB S

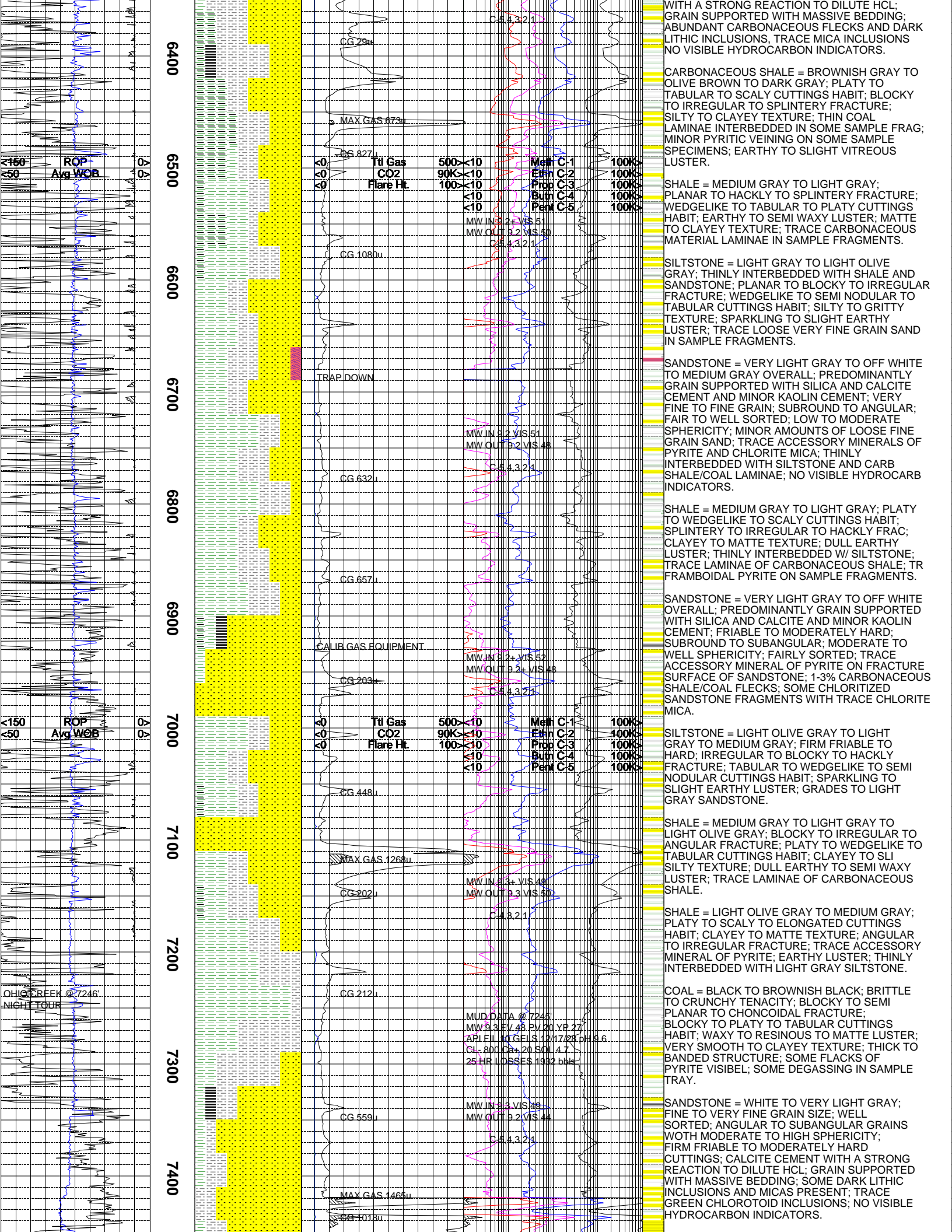
MW IN 9.3 V/S 46
 MW OUT 9.3 V/S 45

MW IN 9.3 V/S 52
 MW OUT 9.3 V/S 49

MW IN 9.1 V/S 55
 MW OUT 9.2 V/S 48

MW IN 9.2 V/S 48
 MW OUT 9.2 V/S 44

MW IN 9.2+ V/S 52
 MW IN 9.2 V/S 46



WITH A STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; ABUNDANT CARBONACEOUS FLECKS AND DARK LITHIC INCLUSIONS, TRACE MICA INCLUSIONS NO VISIBLE HYDROCARBON INDICATORS.

CARBONACEOUS SHALE = BROWNISH GRAY TO OLIVE BROWN TO DARK GRAY; PLATY TO TABULAR TO SCALY CUTTINGS HABIT; BLOCKY TO IRREGULAR TO SPLINTERY FRACTURE; SILTY TO CLAYEY TEXTURE; THIN COAL LAMINAE INTERBEDDED IN SOME SAMPLE FRAG; MINOR PYRITIC VEINING ON SOME SAMPLE SPECIMENS; EARTHY TO SLIGHT VITREOUS LUSTER.

SHALE = MEDIUM GRAY TO LIGHT GRAY; PLANAR TO HACKLY TO SPLINTERY FRACTURE; WEDGELIKE TO TABULAR TO PLATY CUTTINGS HABIT; EARTHY TO SEMI WAXY LUSTER; MATTE TO CLAYEY TEXTURE; TRACE CARBONACEOUS MATERIAL LAMINAE IN SAMPLE FRAGMENTS.

SILTSTONE = LIGHT GRAY TO LIGHT OLIVE GRAY; THINLY INTERBEDDED WITH SHALE AND SANDSTONE; PLANAR TO BLOCKY TO IRREGULAR FRACTURE; WEDGELIKE TO SEMI NODULAR TO TABULAR CUTTINGS HABIT; SILTY TO GRITTY TEXTURE; SPARKLING TO SLIGHT EARTHY LUSTER; TRACE LOOSE VERY FINE GRAIN SAND IN SAMPLE FRAGMENTS.

SANDSTONE = VERY LIGHT GRAY TO OFF WHITE TO MEDIUM GRAY OVERALL; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT AND MINOR KAOLIN CEMENT; VERY FINE TO FINE GRAIN; SUBROUND TO ANGULAR; FAIR TO WELL SORTED; LOW TO MODERATE SPHERICITY; MINOR AMOUNTS OF LOOSE FINE GRAIN SAND; TRACE ACCESSORY MINERALS OF PYRITE AND CHLORITE MICA; THINLY INTERBEDDED WITH SILTSTONE AND CARB SHALE/COAL LAMINAE; NO VISIBLE HYDROCARB INDICATORS.

SHALE = MEDIUM GRAY TO LIGHT GRAY; PLATY TO WEDGELIKE TO SCALY CUTTINGS HABIT; SPLINTERY TO IRREGULAR TO HACKLY FRAC; CLAYEY TO MATTE TEXTURE; DULL EARTHY LUSTER; THINLY INTERBEDDED W/ SILTSTONE; TRACE LAMINAE OF CARBONACEOUS SHALE; TR FRAMBOIDAL PYRITE ON SAMPLE FRAGMENTS.

SANDSTONE = VERY LIGHT GRAY TO OFF WHITE OVERALL; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE AND MINOR KAOLIN CEMENT; FRIABLE TO MODERATELY HARD; SUBROUND TO SUBANGULAR; MODERATE TO WELL SPHERICITY; FAIRLY SORTED; TRACE ACCESSORY MINERAL OF PYRITE ON FRACTURE SURFACE OF SANDSTONE; 1-3% CARBONACEOUS SHALE/COAL FLECKS; SOME CHLORITIZED SANDSTONE FRAGMENTS WITH TRACE CHLORITE MICA.

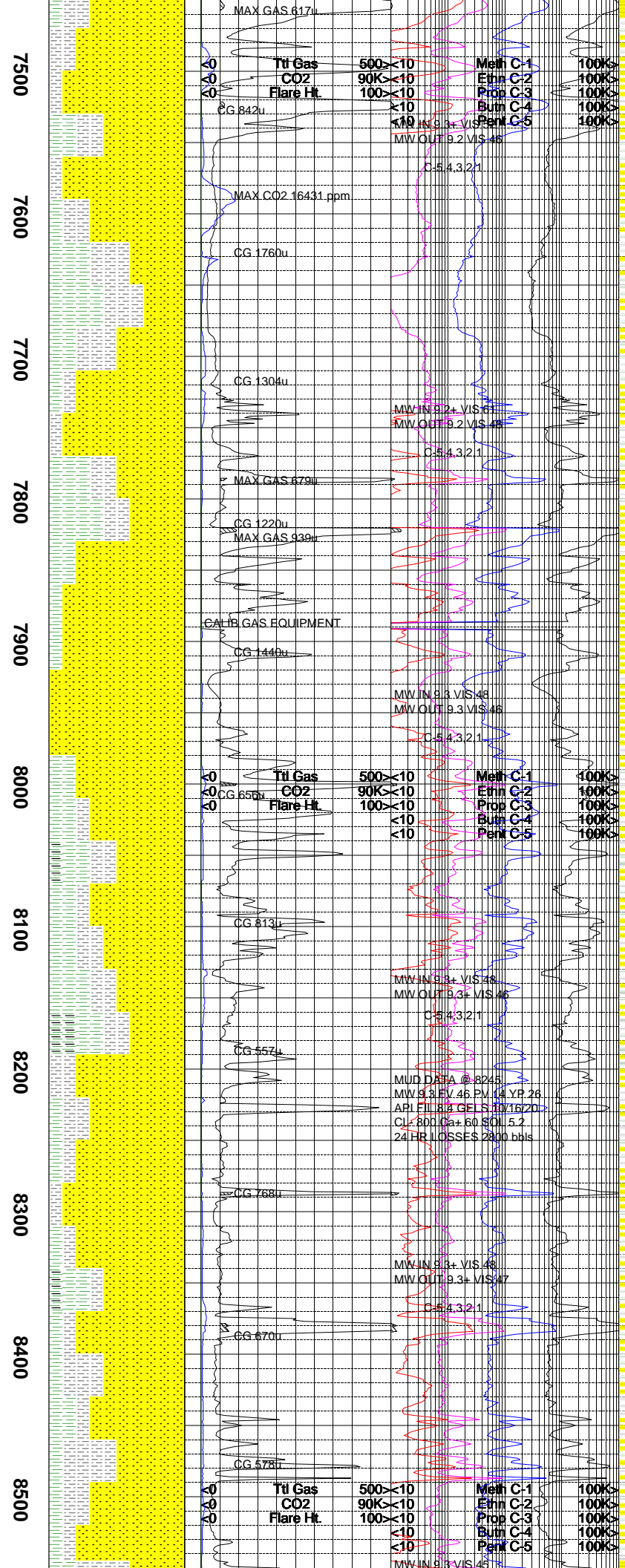
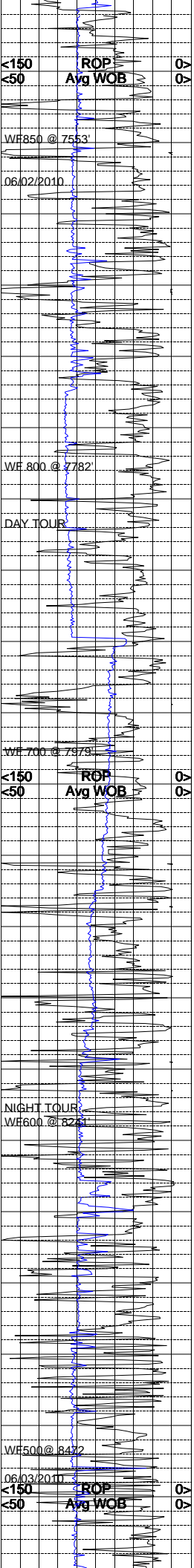
SILTSTONE = LIGHT OLIVE GRAY TO LIGHT GRAY TO MEDIUM GRAY; FIRM FRIABLE TO HARD; IRREGULAR TO BLOCKY TO HACKLY FRACTURE; TABULAR TO WEDGELIKE TO SEMI NODULAR CUTTINGS HABIT; SPARKLING TO SLIGHT EARTHY LUSTER; GRADES TO LIGHT GRAY SANDSTONE.

SHALE = MEDIUM GRAY TO LIGHT GRAY TO LIGHT OLIVE GRAY; BLOCKY TO IRREGULAR TO ANGULAR FRACTURE; PLATY TO WEDGELIKE TO TABULAR CUTTINGS HABIT; CLAYEY TO SILTY TEXTURE; DULL EARTHY TO SEMI WAXY LUSTER; TRACE LAMINAE OF CARBONACEOUS SHALE.

SHALE = LIGHT OLIVE GRAY TO MEDIUM GRAY; PLATY TO SCALY TO ELONGATED CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; ANGULAR TO IRREGULAR FRACTURE; TRACE ACCESSORY MINERAL OF PYRITE; EARTHY LUSTER; THINLY INTERBEDDED WITH LIGHT GRAY SILTSTONE.

COAL = BLACK TO BROWNISH BLACK; BRITTLE TO CRUNCHY TENACITY; BLOCKY TO SEMI PLANAR TO CHONCOIDAL FRACTURE; BLOCKY TO PLATY TO TABULAR CUTTINGS HABIT; WAXY TO RESINOUS TO MATTE LUSTER; VERY SMOOTH TO CLAYEY TEXTURE; THICK TO BANDED STRUCTURE; SOME FLACKS OF PYRITE VISIBEL; SOME DEGASSING IN SAMPLE TRAY.

SANDSTONE = WHITE TO VERY LIGHT GRAY; FINE TO VERY FINE GRAIN SIZE; WELL SORTED; ANGULAR TO SUBANGULAR GRAINS WOTH MODERATE TO HIGH SPHERICITY; FIRM FRIABLE TO MODERATELY HARD CUTTINGS; CALCITE CEMENT WITH A STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; SOME DARK LITHIC INCLUSIONS AND MICAS PRESENT; TRACE GREEN CHLOROTOID INCLUSIONS; NO VISIBLE HYDROCARBON INDICATORS.



SILTSTONE = LIGHT GRAY TO MEDIUM DARK GRAY; TOUGH TO VERY TOUGH TENACITY; IRREGULAR TO SPLINTERY FRACTURE; MASSIVE TO FLAKY CUTTINGS HABIT; FROSTED TO SPARKLING LUSTER; SILTY TO GRITTY TO GRANULAR TEXTURE; MASSIVE TO GRADED STRUCTURE, GRADING TO A FINE GRAINED SANDSTONE IN PLACES.

SHALE = MODERATE TO PALE YELLOWISH BROWN TO MEDIUM GRAY; PLATY TO FLAKY TO SEMI ELONGATED CUTTINGS HABIT; CLAYEY TO SMOOTH TEXTURE; PLANAR TO SPLINTERY TO BLOCKY FRACTURE; SOFT TO CRUMBLY TENACITY; DULL MATTE LUSTER; MASSIVE STRUCTURE.

SILTSTONE = MEDIUM GRAY TO MEDIUM LIGHT GRAY; TOUGH TO VERY TOUCH TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO SCALY CUTTINGS HABIT; FROSTED TO SPARKLING LUSTER; GRITTY TO GRANULAR TEXTURE; MASSIVE STRUCTURE, SOME GRADING TO A FINE TO MEDIUM GRAINED SANDSTONE.

SANDSTONE = VERY LIGHT GRAY TO OFF WHITE OVERALL; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT AND TRACE KAOLIN; 1-3% CARBONACEOUS SHALE/COAL FLECKS INTERSPERSED IN SAMPLE FRAGMENTS; ROUND TO SUBANGULAR; VERY FINE TO UPPER FINE GRAIN; WELL SORTED; MODERATE TO WEL SPHERICITY; TRACE ACCESSORY MINERALS OF PYRITE AGGREGATE AND CHLORITE MICAS; SOME LOOSE GRAINS; TRANSLUCENT TO CLEAR; FRIABLE TO MODERATE HARD; TRACE LITHICS IN SAMPLE SPECIMENS.

SANDSTONE = OFF WHITE TO TRANSPARENT TO VERY LIGHT GRAY; PREDOMINANTLY LOOSE GRAIN; TRACE ACCESSORY MINERALS OF MICRO PYRITE AND CHLORITE MICA; SUBANGULAR TO ROUND; WELL SORTED; MODERATE TO HIGH SPHERICITY; CLEAR TO OPAQUE; MINOR ABRASIONS TO GRAINS POSSIBLE DUE TO PDC BIT ACTION; SOME PRESERVED SANDSTONE SPECIMENS; 1-2% CARBONACEOUS MATERIAL IN SAMPLE FRAGMENTS; THINLY INTERBEDDED WITH SILTSTONE LAMINAE; SOFT TO FIRM FRIABLE; SILICA AND CALCITE CEMENT; NO VISIBLE HYDROCARBON INDICATORS.

NOTE: UPHOLE FORMATION GASES BLEEDING INTO WELLBORE DURING CONNECTIONS. EARLY GASES SHOWING ON MUDLOG AT CONNECTION DEPTHS.

SHALE = MEDIUM GRAY TO LIGHT GRAY; HACKLY TO BLOCKY TO PLANAR FRACTURE; PLATY TO ELONGATED TO WEDGELIKE CUTTINGS HABIT; CLAYEY TO MATTE TEXTURE; DULL EARTHY TO SEMI WAXY LUSTER; GRADES TO LIGHT GRAY SILTSTONE; MINOR AMOUNTS OF LOOSE SAND IN SAMPLE FRAGMENTS.

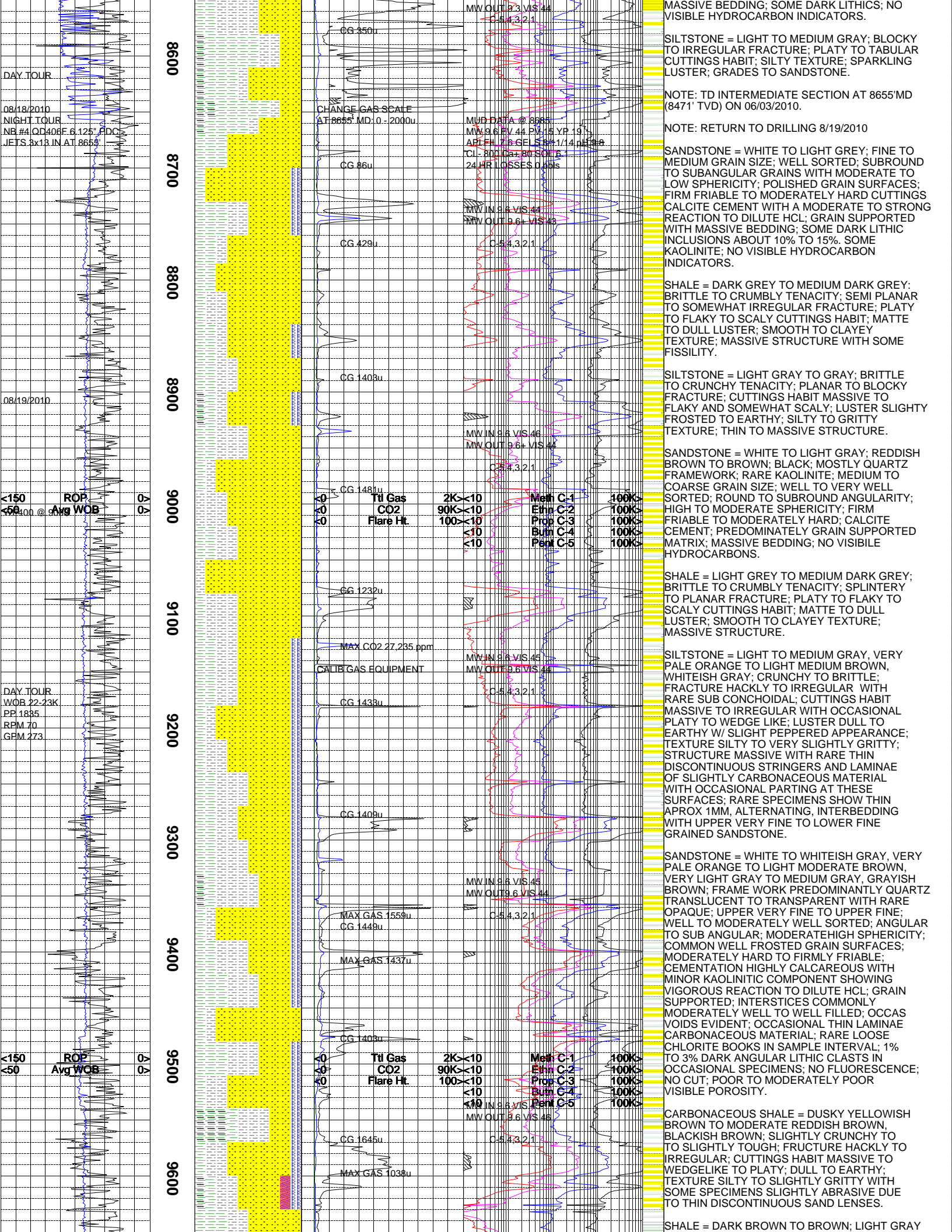
SILTSTONE = LIGHT GRAY TO LIGHT OLIVE GRAY; IRREGULAR TO HACKLY TO BLOCKY FRACTURE; FLAKY TO WEDGELIKE TO TABULAR CUTTINGS HABIT; SPARKLING TO SLI EARTHY LUSTER; SILTY TO GRITTY TEXTURE; THINLY INTERBEDDED WITH SHALE AND SANDSTONE.

SANDSTONE = WHITE TO MEDIUM LIGHT GREY; COARSE TO MEDIUM GRAIN SIZE; WELL SORTED SUBANGULAR TO ANGULAR GRAINS WITH MODERATE TO LOW SPHERICITY; POLISHED GRAIN SURFACES; MAINLY UNCONSOLIDATED QUARTZ GRAINS WITH FEW EASILY FRIABLE CUTTINGS; GRAIN SUPPORTED AND MASSIVELY BEDDED WHERE CONSOLIDATED; ABUNDANT DARK LITHIC INCLUSIONS IN SANDSTONE; INTERBEDDED WITH A LIGHT GREY SILTSTONE; NO VISIBLE HYDROCARBON INDICATORS.

SILTSTONE = LIGHT GREY TO MEDIUM LIGHT GREY; TOUGH TO VERY TOUGH TENACITY; IRREGULAR TO SPLINTERY FRACTURE; MASSIVE TO FLAKY CUTTINGS HABIT; FROSTED TO SPARKLING LUSTER; SILTY TO GRITTY TO GRANULAR TEXTURE; MASSIVE TO GRADED STRUCTURE, GRADING TO A FINE GRAINED WHITE TO LIGHT GREY SANDSTONE.

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

SANDSTONE = WHITE TO VERY LIGHT GREY; FINE TO MEDIUM GRAIN SIZE; SUBANGULAR TO ANGULAR GRAINS WITH MODERAT TO LOW SPHERICITY; WELL SORTED; POLISHED GRAIN SURFACES; MODERATELY HARD TO FIRM FIRABLE; ABUNDANT UNCONSOLIDATED AND LOOSE QUARTZ GRAINS IN TRAY; CALCITE CEMENT WITH A STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH



DAY TOUR
08/18/2010
NIGHT TOUR
NB #4 QD406F.6.125_FDC
JETS 3x13.IN AT 8655'

08/19/2010

<150 ROP
<50 Avg WOB

DAY TOUR
WOB 22-23K
PP 1835
RPM 70
GFM 273

>150 ROP
>50 Avg WOB

CHANGE GAS SCALE
AT 8655'.MD:0.2000u

MUD DATA @ 8655'
MW 9.6 EV 44 PV 15 YP 19.5
API FH 7.6 GEL ST 11/14 0.53
CL 800 Ca+ 80 SOL 6
24 HR LOSS 0.65

Ttl Gas	2K < 10	Meth C-1	100K >
CO2	90K < 10	Ethn C-2	100K >
Flare Ht	100 < 10	Prop C-3	100K >
	< 10	Burn C-4	100K >
	< 10	Perm C-5	100K >

MAX CO2 27,235 ppmt
CALIB GAS EQUIPMENT

MAX GAS 1559u
CG 1448u

MAX GAS 1437u

MAX GAS 1038u

WISSLE BEDDING; SOME DARK LITHICS; NO VISIBLE HYDROCARBON INDICATORS.

SILTSTONE = LIGHT TO MEDIUM GRAY; BLOCKY TO IRREGULAR FRACTURE; PLATY TO TABULAR CUTTINGS HABIT; SILTY TEXTURE; SPARKLING LUSTER; GRADES TO SANDSTONE.

NOTE: TD INTERMEDIATE SECTION AT 8655'.MD (8471' TVD) ON 06/03/2010.

NOTE: RETURN TO DRILLING 8/19/2010

SANDSTONE = WHITE TO LIGHT GRAY; FINE TO MEDIUM GRAIN SIZE; WELL SORTED; SUBROUND TO SUBANGULAR GRAINS WITH MODERATE TO LOW SPHERICITY; POLISHED GRAIN SURFACES; FIRM FRIABLE TO MODERATELY HARD CUTTINGS CALCITE CEMENT WITH A MODERATE TO STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; SOME DARK LITHIC INCLUSIONS ABOUT 10% TO 15%. SOME KAOLINITE; NO VISIBLE HYDROCARBON INDICATORS.

SHALE = DARK GREY TO MEDIUM DARK GREY; BRITTLE TO CRUMBLY TENACITY; SEMI PLANAR TO SOMEWHAT IRREGULAR FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE WITH SOME FISSILITY.

SILTSTONE = LIGHT GRAY TO GRAY; BRITTLE TO CRUNCHY TENACITY; PLANAR TO BLOCKY FRACTURE; CUTTINGS HABIT MASSIVE TO FLAKY AND SOMEWHAT SCALY; LUSTER SLIGHTLY FROSTED TO EARTHY; SILTY TO GRITTY TEXTURE; THIN TO MASSIVE STRUCTURE.

SANDSTONE = WHITE TO LIGHT GRAY; REDDISH BROWN TO BROWN; BLACK; MOSTLY QUARTZ FRAMEWORK; RARE KAOLINITE; MEDIUM TO COARSE GRAIN SIZE; WELL TO VERY WELL SORTED; ROUND TO SUBROUND ANGULARITY; HIGH TO MODERATE SPHERICITY; FIRM FRIABLE TO MODERATELY HARD; CALCITE CEMENT; PREDOMINATELY GRAIN SUPPORTED MATRIX; MASSIVE BEDDING; NO VISIBLE HYDROCARBONS.

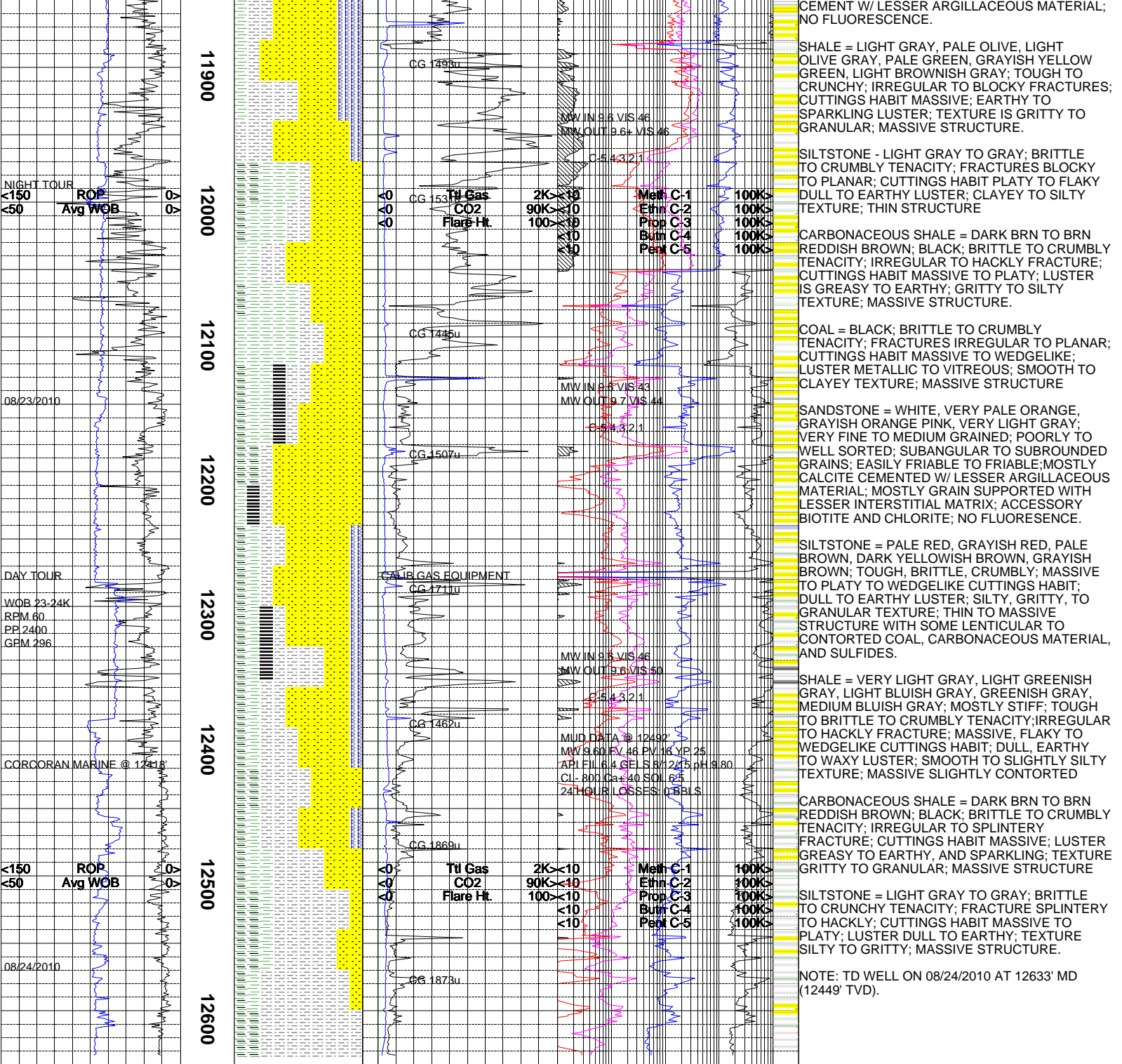
SHALE = LIGHT GREY TO MEDIUM DARK GREY; BRITTLE TO CRUMBLY TENACITY; SPLINTERY TO PLANAR FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE.

SILTSTONE = LIGHT TO MEDIUM GRAY, VERY PALE ORANGE TO LIGHT MEDIUM BROWN, WHITEISH GRAY; CRUNCHY TO BRITTLE; FRACTURE HACKLY TO IRREGULAR WITH RARE SUB CONCHOIDAL; CUTTINGS HABIT MASSIVE TO IRREGULAR WITH OCCASIONAL PLATY TO WEDGE LIKE; LUSTER DULL TO EARTHY W/ SLIGHT PEPPERED APPEARANCE; TEXTURE SILTY TO VERY SLIGHTLY GRITTY; STRUCTURE MASSIVE WITH RARE THIN DISCONTINUOUS STRINGERS AND LAMINAE OF SLIGHTLY CARBONACEOUS MATERIAL WITH OCCASIONAL PARTING AT THESE SURFACES; RARE SPECIMENS SHOW THIN APPROX 1MM, ALTERNATING, INTERBEDDING WITH UPPER VERY FINE TO LOWER FINE GRAINED SANDSTONE.

SANDSTONE = WHITE TO WHITEISH GRAY, VERY PALE ORANGE TO LIGHT MODERATE BROWN, VERY LIGHT GRAY TO MEDIUM GRAY, GRAYISH BROWN; FRAME WORK PREDOMINANTLY QUARTZ TRANSLUCENT TO TRANSPARENT WITH RARE OPAQUE; UPPER VERY FINE TO UPPER FINE; WELL TO MODERATELY WELL SORTED; ANGULAR TO SUB ANGULAR; MODERATE-HIGH SPHERICITY; COMMON WELL FROSTED GRAIN SURFACES; MODERATELY HARD TO FIRMLY FRIABLE; CEMENTATION HIGHLY CALCAREOUS WITH MINOR KAOLINITIC COMPONENT SHOWING VIGOROUS REACTION TO DILUTE HCL; GRAIN SUPPORTED; INTERSTICES COMMONLY MODERATELY WELL TO WELL FILLED; OCCAS VOIDS EVIDENT; OCCASIONAL THIN LAMINAE CARBONACEOUS MATERIAL; RARE LOOSE CHLORITE BOOKS IN SAMPLE INTERVAL; 1% TO 3% DARK ANGULAR LITHIC CLASTS IN OCCASIONAL SPECIMENS; NO FLUORESCENCE; NO CUT; POOR TO MODERATELY POOR VISIBLE POROSITY.

CARBONACEOUS SHALE = DUSKY YELLOWISH BROWN TO MODERATE REDDISH BROWN, BLACKISH BROWN; SLIGHTLY CRUNCHY TO TO SLIGHTLY TOUGH; FRACTURE HACKLY TO IRREGULAR; CUTTINGS HABIT MASSIVE TO WEDGELIKE TO PLATY; DULL TO EARTHY; TEXTURE SILTY TO SLIGHTLY GRITTY WITH SOME SPECIMENS SLIGHTLY ABRASIVE DUE TO THIN DISCONTINUOUS SAND LENSES.

SHALE = DARK BROWN TO BROWN; LIGHT GRAY



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