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Drilling Dynamics MD

COMPANY ExxonMobil Production
WELL FRU197-33A6
FIELD FREEDOM RANCH UNIT
REGION ROCKY MOUNTAINS
COORDINATES 39.915536
108.285764
ELEVATION GL = 6385'
KB = 6412'
COUNTY, STATE RIO BLANCO, CO
API INDEX 051031153500
SPUD DATE 10/17/2009
CONTRACTOR HELMRICH AND PAYNE
CO. REP. RICKY OWENS
RIG/TYPE 215/FLEX 3
LOGGING UNIT MLU 051
GEOLOGISTS D.CLAAR
B.MARSH
ADD. PERSONS B. JOHANNING
G.BAKER
CO. GEOLOGIST M. BIGGS

LOG INTERVAL

CASING DATA

DEPTHS: 3,852' TO 12,294'
DATES: 03/02/2010 TO 03/16/2010
SCALE: 1" = 100'

10.75" AT 3,862'
7.00" AT 8,465'
AT
AT

MUD TYPES

HOLE SIZE

LSND TO 12,294'
TO
TO
TO

9.875" TO 8,465'
6.125" TO 12,294'
TO
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	

Lithology

<0 Ttl Gas 1K>
units

<0 CO2 25K>
ppm

<0 Flare Ht. 100>
ft

Depth

<150 Avg RPM 0><100 ROP 0><400 MSE 0>

ft/hr

psi

<30K Avg Torque 0><50 Avg WOB 0>

FTLBS klbs

MGS

Remarks

Survey Data, Mud Reports, Other Info.

<0 Ttl Gas 50>
CO2 25K
Flare Ht. 100>

<150 Avg RPM 0><100 ROP 0><400 MSE 0>

<30K Avg Torque 0><50 Avg WOB 0>

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.

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 RUN THROUGH THE GAS BUSTER THE INTERVAL IS MARKED ON THE MGS COLUMN AND THE SIZE OF FLARES 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 = 200PPM METHANE

10.75" CASING SET @ 3,837'

CANRIG STARTED FULL LOGGING SERVICES @ 3,852' ON 03/02/2010.

DRILL TO 3,862' AND PERFORM F.I.T.

SHALE = LIGHT GRAY TO BLuish GRAY WITH ORANGE-BROWN MUD ENCRUSTED; BRITTLE TO PULVERULENT; IRREGULAR TO PLANAR FRACTURE; MASSIVE TO PLATY TO FLAKY CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; THICK STRUCTURE; THICKLY BEDDED WITH SANDSTONE AND SOME SILTSTONE; ABUNDANT AMOUNT OF ORANGE-BROWN MUD IN SAMPLE.

SANDSTONE = WHITE TO TRANSLUCENT TO LIGHT GRAY WITH A TRACE AMOUNT OF DARK LITHICS 0-3%; FINE TO UPPER VERY FINE GRAINED; FAIR TO POOR SORTING; VERY FINE LOOSE GRAINS TO FINE GRAINED SMALL CLUSTERS; SLIGHT TO MODERATE REACTION TO DILUTE HCL; SUB ANGULAR TO SUB ROUNDED; MODERATE TO LOW SPHERICITY; VERY THINLY INTERBEDDED WITH SHALE AND SILTSTONE.

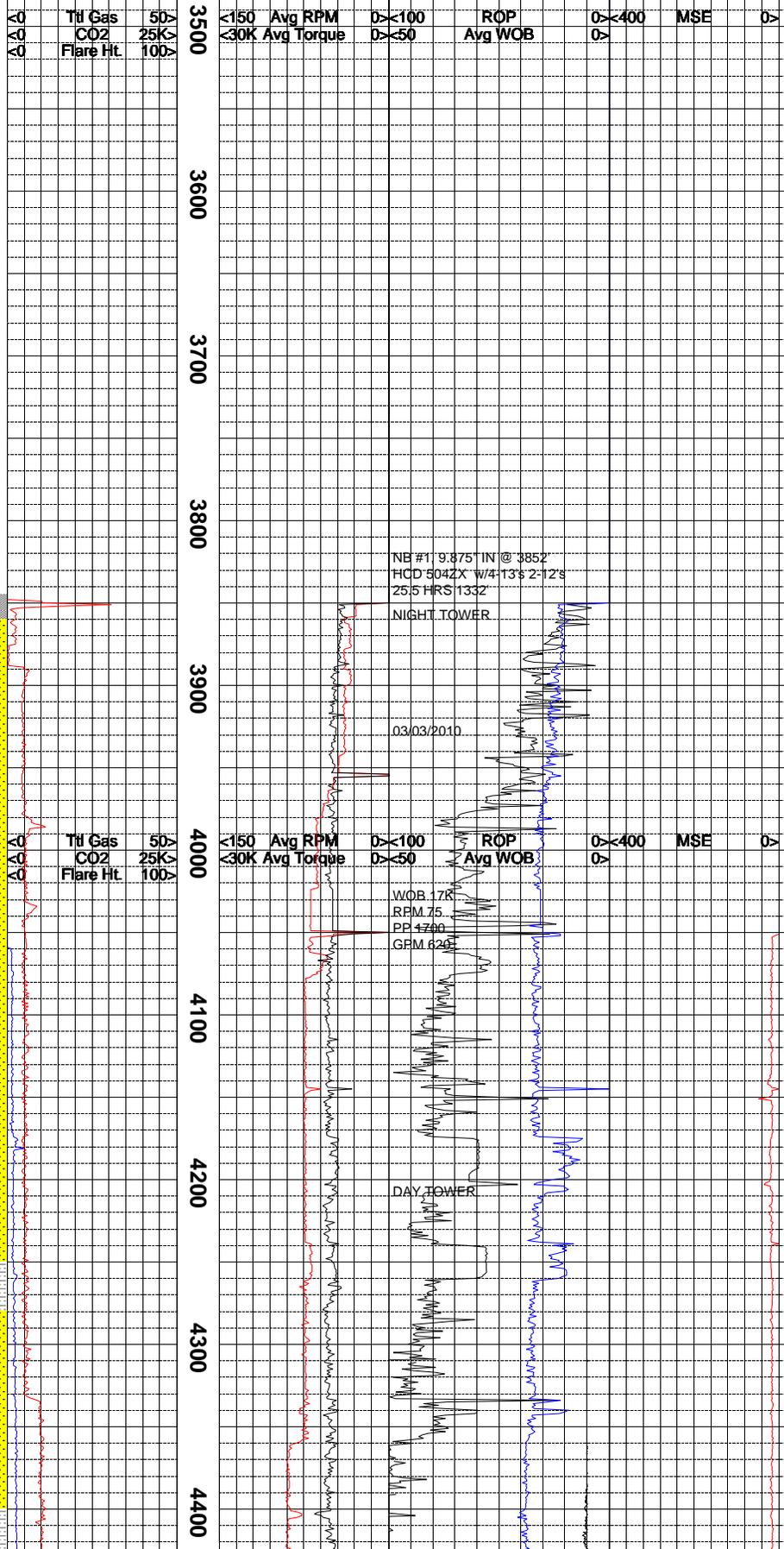
SHALE = BROWNISH GRAY TO GRAY TO LIGHT BLuish GRAY; BRITTLE TO PULVERULENT TENACITY; IRREGULAR TO PLANAR FRACTURE; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; TRACE AMT OF CLAY IN SAMPLE TRAY; THIN STRUCTURE; THICKLY BEDDED WITH THIN LAYERS OF SANDSTONE OR SILTSTONE IN-BETWEEN.

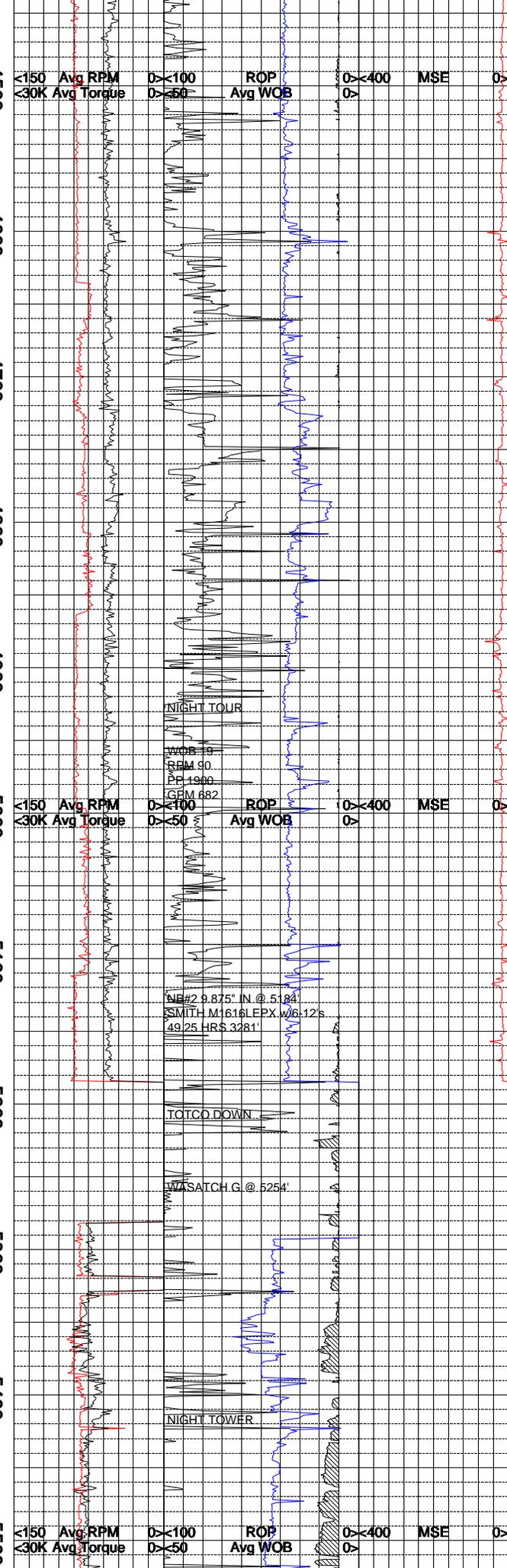
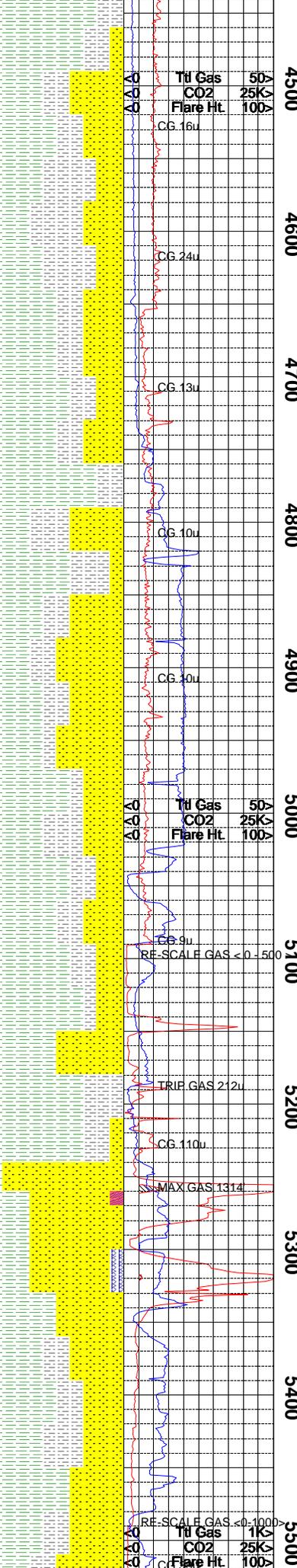
SILTSTONE = YELLOWISH BROWN TO YELLOW GRAY TO LIGHT BLuish GRAY; VARICOLORED; MOTTLED IN PART; MOD HARD TO CRUNCHY; SLI PLATY CUTTINGS; IRREGULAR FRACTURE; SPARKLING LUSTER WHEN DRIED; MOD CALC; RARE CARBONACEOUS MATERIAL; SILTY TO GRITTY TEXTURE; OCC CONTAINS VF QUARTZ GRAINS; SME F TO VF GRAINED SANDSTONE INTERBEDS; OCC LOOSE MEDIUM BROWN LS/ CALCITE GRAINS; NO VISIBLE STRUCTURE.

NAHCOLITE = TRACE AMOUNTS IN SAMPLE; CLEAR; CRYSTALLINE; SOFT; WITH OUTER REDDISH CLAY COATING.

SHALE = VARICOLORED; MOTTLED IN PART; LIGHT GRAY TO YELLOW BROWN; MOTTLED GRAYYELLOW; FIRM TO CRUNCHY TO MOD HARD; IRREGULAR TO BLOCKY FRACTURE; DOM PLATY CUTTINGS; SLI CALCAREOUS; VERY FINE MICA VARIABLE AMOUNTS OF SILT; GRADING TO ARGILLACEOUS SILTSTONE; ROUGH TO SILTY TEXTURE; RARE LIGHT GRAY SANDSTONE INTERBEDS; NO VISIBLE STRUCTURE; TRACE AMOUNTS OF NAHCOLITE IN SAMPLES.

SANDSTONE = LIGHT GRAY; SOME BROWN





TO PURPLE TO DARK GRAY SPECIMENS;
 FINE TO VERY FINE GRAINED; ANGULAR TO
 SUBANGULAR; LOW TO MOD SPHERICITY;
 GRAIN SUPPORTED; DOM CALCAREOUS CMT;
 CLEAN W/ ONLY A TRACE OF CARBONACEOUS
 MATERIAL; SME REDDISH GRAINS; TIGHT POR;
 THINLY INTERBEDDED WITH SHALE AND
 SILTSTONE.

SHALE = VARICOLORED; MOTTLED IN PART;
 BROWN; LIGHT GRAY TO BLUISH GRAY; YELLOW
 FIRM TO MOD HARD; MASSIVE TO PLATY CTGS;
 IRREGULAR FRACTURE; DULL EARTHY LUSTER;
 NON CALCAREOUS IN PURE SHALE EXAMPLES;
 VARIABLE AMOUNTS OF SILT; GRADING TO
 ARGILLACEOUS SILTSTONE; INTERBEDDED
 W/VARICOLORED ARGILLACEOUS SANDSTONE;
 NO VISIBLE STRUCTURE.

SILTSTONE = VARICOLORED; MOTTLED;
 ORANGE BROWN; YELLOW BROWN; TRACE
 PURPLE; MOD HARD; MASSIVE TO SLI PLATY
 CUTTINGS; MOD CALCAREOUS; VF MICA;
 IRREGULAR FRACTURE; DULL EARTHY TO SLI
 SPARKLING LUSTER WHEN DRIED; SILTY TO
 GRITTY TEXTURE; SOME VERY ARGILLACEOUS
 EXAMPLES; NO VISIBLE STRUCTURE.

SANDSTONE = MINOR LOOSE GRAINS; LT
 GRAY; BRN; HARD PRESERVED SPECIMENS;
 FINE GRAINED; ANGULAR TO SUBANGULAR;
 LOW TO MOD SPHERICITY; CALCITE CEMENT;
 DOM GRAIN SUPPORTED W/SME MATRIX
 SUPPORTED ARGILLACEOUS EXAMPLES;
 NO GAS INCREASES.

SHALE = VARICOLORED; MOTTLED IN PART;
 LIGHT GRAY; YELLOW; YELLOW BROWN; TR
 PURPLE AND REDBROWN; FIRM TO MOD HARD;
 PLATY CUTTINGS; IRREGULAR FRACTURE; DULL
 EARTHY LUSTER; VERY FINE MICA; SMOOTH TO
 ROUGH TEXTURE TO SILTY IN SILTY EXAMPLES
 NON CALCAREOUS; MOD CALCAREOUS IN SILTY
 EXAMPLES; NO VISIBLE STRUCTURE; TRACE
 AMOUNTS OF WHITE, CRYSTALLINE NAHCOLITE
 IN SAMPLE TRAYS.

SANDSTONE = VARICOLORED; BROWN; PURPLE
 LT TO DARK GRAY; HARD; UPPER TO LOWER
 FINE GRAINED; LOW SPHERICITY; MOD SORTED
 CALCAREOUS CLAY CEMENT TO CALCITE CMT;
 DOM GRAIN SUPPORTED; SUBANGULAR GRS;
 MINOR AMT OF LOOSE GRAINS; TIGHT; NO
 GAS INCREASES.

SILTSTONE = DARK GRAY WITH HUES OF
 BROWN; VERY TOUGH TO DENSE TENACITY;
 IRREGULAR TO PLANAR FRACTURE; PLATY TO
 TABULAR CUTTINGS HABIT; DULL TO SLIGHTLY
 SPARKLING LUSTER; SILTY TO GRITTY
 TEXTURE; THIN STRUCTURE; THINLY
 INTERBEDDED WITH SHALE.

SHALE = LIGHT GRAY TO GRAY WITH ORANGE-
 BROWN HUES; BRITTLE TO CRUMBLY TENACITY;
 IRREGULAR TO PLANAR FRACTURE; PLATY
 TO FLAKY CUTTINGS HABIT; DULL TO EARTHY
 LUSTER; SMOOTH TO SILTY TEXTURE; THIN
 STRUCTURE; BECOMING MORE THINLY
 BEDDED WITH SANDSTONE AND SILTSTONE.

NOTE = BIT TRIP BEGAN ON 03/03/2010 AT
 21:00 HRS TO CHANGE OUT DIRECTIONAL
 TOOLS. RESUMED DRILLING ON 03/04/2010
 AT 14:00 HRS.

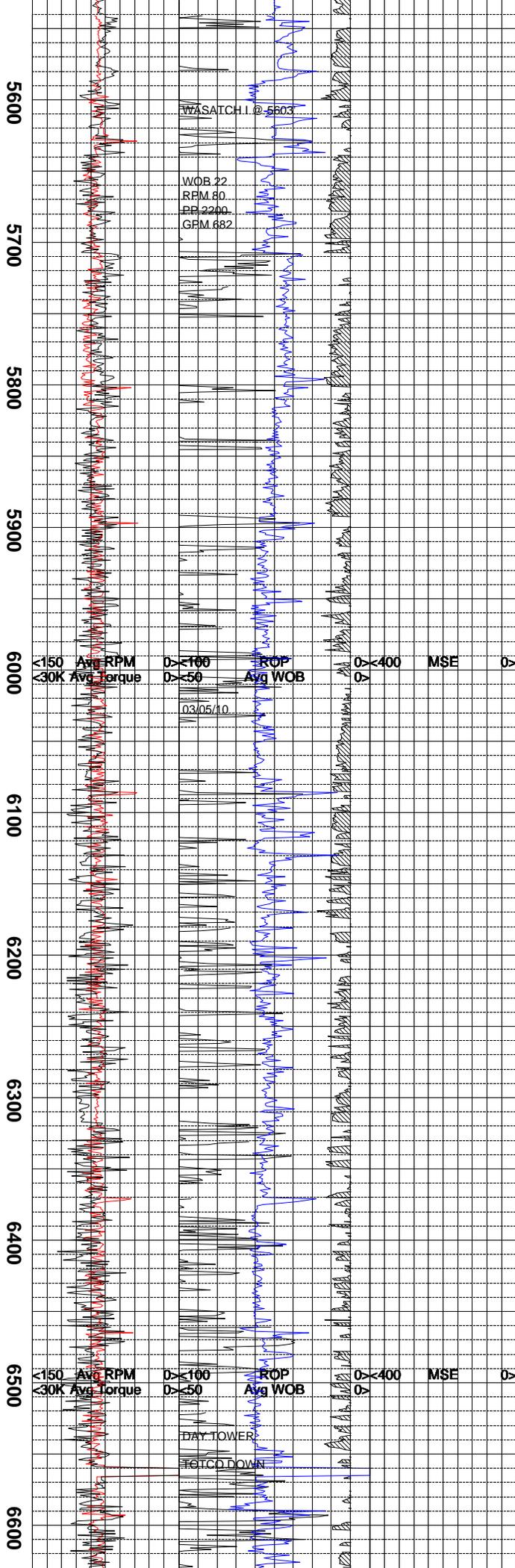
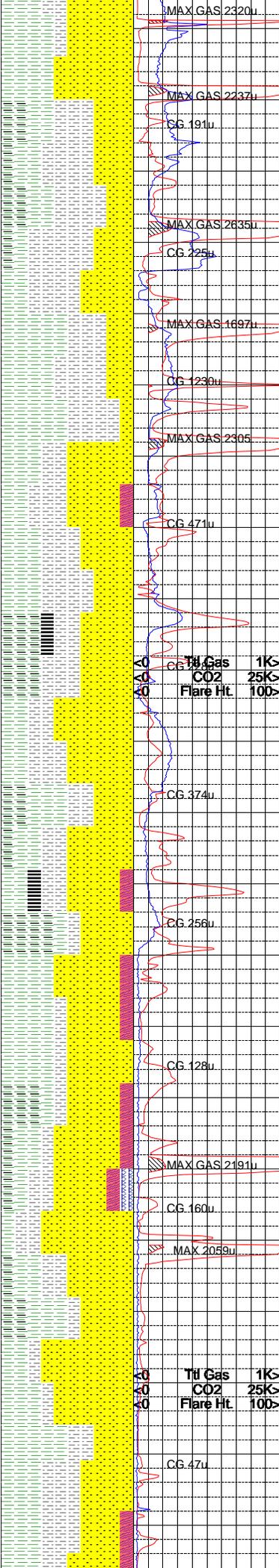
WASATCH G PLACED AT 5254' MD 5154' TVD

START TO LOSE MUD AT 5254'. LOST TOTAL
 RETURNS AT 5325'. REGAINED FULL RETURNS
 AT 5325'

WASATCH G SANDSTONE = ABUNDANT LOOSE
 GRAINS; FINE TO UPPER FINE GRAINED IN
 UPPER SECTION; FRIABLE IN UPPER SECTION;
 BECOMING MEDIUM GRAINED TOWARD BASE;
 DOM SILICEOUS CEMENT WITH MINOR CALCITE;
 ABUNDANT LOOSE GRAINS; GRAIN SUPPORTED;
 LOOSE KAOLIN CLAY OBSERVED IN LOWER
 SAND INTERVAL; COARSE CALCITE- PROBABLE
 FRACTURE FILL OBSERVED IN 5260- 5270'
 SAMPLE; 1300+ UNIT GAS SHOW ON TOP;
 LOWER GAS DATA IN WASATCH G NOT RELIABLE
 BECAUSE OF MUD LOSSES.

SHALE = GRAY TO BLUISH GRAY WITH HUES
 OF BROWN; TOUGH TO DENSE TENACITY;
 IRREGULAR TO BLOCKY TO PLANAR FRACTURE;
 MASSIVE TO PLATY CUTTINGS HABIT; DULL
 TO EARTHY LUSTER; SMOOTH TO SILTY
 TEXTURE; THIN STRUCTURE; THINLY
 INTERBEDDED WITH SANDSTONE AND
 SILTSTONE.

SANDSTONE = WHITE TO VERY LIGHT GRAY
 WITH A TRACE AMOUNT OF DARK LITHICS;
 VERY NON-FRIABLE TIGHT CLUSTERS; UPPER
 VERY FINE GRAINED; WELL SORTED; SUB
 ROUNDED TO ANGULAR; MODERATE
 SPHERICITY; HIGH GAS SHOW WITH THE



SANDSTONE = HIGHLY REACTIVE TO DILUTE HCL; CALCAREOUS CEMENTATION; 1-3% DARK LITHICS THAT GIVE A SLIGHT SALT AND PEPPERED APPEARANCE TO THE SANDSTONE.

SILTSTONE = DARK GRAY TO DARK BROWN WITH HUES OF BLACK-BROWN; VERY TOUGH TO DENSE TENACITY; IRREGULAR TO PLANAR FRACTURE; MASSIVE TO TABULAR CUTTINGS HABIT; DULL TO SPARKLING LUSTER; SILTY TO MILDLY GRITTY TEXTURE; THIN STRUCTURE THINLY INTERBEDDED WITH SANDSTONE AND SHALE.

WASATCH I PLACED AT 5603' MD

SHALE = LIGHT GRAY TO DARK BLUISH GRAY; TOUGH TO BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURE; PLATY TO FLAKY CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; VERY THINLY INTERBEDDED WITH SANDSTONE AND SILTSTONE.

SANDSTONE = WHITE TO TRANSLUCENT WITH LIGHT GRAY TO BLACK SPECS THROUGHOUT; NON-FRIABLE; VERY HARD TIGHT CLUSTER; HIGHLY REACTIVE TO DILUTE HCL; CALC CEMENTATION; FINE TO UPPER VERY FINE GRAINED; FAIR TO WELL SORTED; SUB ANGULAR TO SUB ROUNDED; MODERATE TO LOW SPHERICITY; TRACE AMOUNT OF POLISHED SURFACE FEATURES; ELEVATION IN GAS DURING SANDSTONE INTERVALS; THINLY INTERBEDDED WITH SHALE AND SILTSTONE.

SILTSTONE = DARK BROWNISH BLACK TO DARK GRAY WITH BROWN HUES; TOUGH TO DENSE TENACITY; IRREGULAR TO PLANAR FRACTURE; MASSIVE TO TABULAR CUTTINGS HABIT; SILTY TO GRITTY TEXTURE; THIN STRUCTURE; THINLY INTERBEDDED.

CARBONACEOUS SHALE = DARK GRAY TO GRAY WITH BLACK LAMINATIONS; CLEARLY VISIBLE COAL LAMINATION ACROSS THE CARBONACEOUS SHALE; TOUGH TO DENSE TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY CUTTINGS HABIT; RESINOUS TO DULL LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; THINLY INTERBEDDED WITH SANDSTONE AND SILTSTONE.

SANDSTONE = WHITE TO LIGHT GRAY WITH A TRACE AMT OF DARK LITHICS GIVING A SALT AND PEPPERED APPEARANCE; ABOUT HALF THE SAMPLE IS TIGHT NON-FRIABLE CLUSTER AND HALF IS UPPER VERY FINE LOOSE GRAINS RANGES FROM FINE TO UPPER VERY FINE GRAINED; FAIR TO WELL SORTED; SUB ANGULAR TO SUB ROUNDED; MODERATE SPHERICITY; HIGHLY REACTIVE TO DILUTE HCL; CALCAREOUS CEMENTATION; 1-3% DARK LITICS; THINLY INTERBEDDED.

SHALE = LIGHT GRAY TO BLUISH GRAY; TOUGH TO BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; THINLY INTERBEDDED WITH SILTSTONE AND SANDSTONE; APPEARS TO GRADE TO CARB. SHALE IN PLACES WHERE THERE IS DARK GRAY BANDING ON SOME INDIVIDUAL SPECIMENS.

SILTSTONE = DARK GRAYISH BROWN TO DARK BROWN; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURE; PLATY TO TABULAR CUTTINGS HABIT; DULL TO SPARKLING LUSTER; THIN STRUCTURE; THINLY INTERBEDDED WITH SANDSTONE AND SHALE.

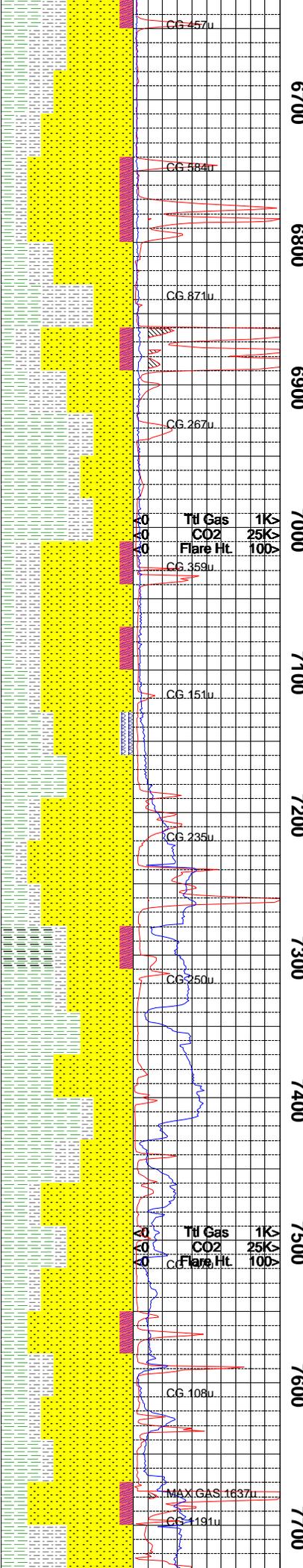
SANDSTONE = WHITE TO TRANSLUCENT TO OPAQUE WITH A TRACE AMT OF DARK LITHICS THROUGHOUT; UPPER FINE TO FINE GRAINED; FAIR TO WELL SORTED; SUB ANGULAR TO SUB ROUNDED; MIXTURE OF TIGHT NON-FRIABLE CLUSTER TO LOOSE GRAINS; HIGHLY REACTIVE TO DILUTE HCL; CALCAREOUS CEMENTATION; MODERATE SPHERICITY; 1-3% DARK LITHICS; THINLY INTERBEDDED WITH SHALE AND SILTSTONE. MODERATE INCREASE IN GAS WITH THE SANDSTONES.

SHALE = LIGHT GRAY TO LIGHT GREENISH GRAY; LT TO MEDIUM BROWN; SOME MOTTLED GRAYBROWN EXAMPLES; FIRM TO MOD HARD; PLATY CUTTINGS; VARIABLE AMTS OF SILT; GRADING TO ARGILLACEOUS SILTSTONE; OCC SOME ISOLATED QUARTZ GRAINS; NON CALC TO MOD CALCAREOUS IN SILTY SPECIMENS; DULL EARTHY LUSTER; SMOOTH TO ROUGH TEXTURE; SILTY TEXTURE IN SILTY EXAMPLES TRACE MICROPYRITE IN SILTY EXAMPLES; NO VISIBLE STRUCTURE.

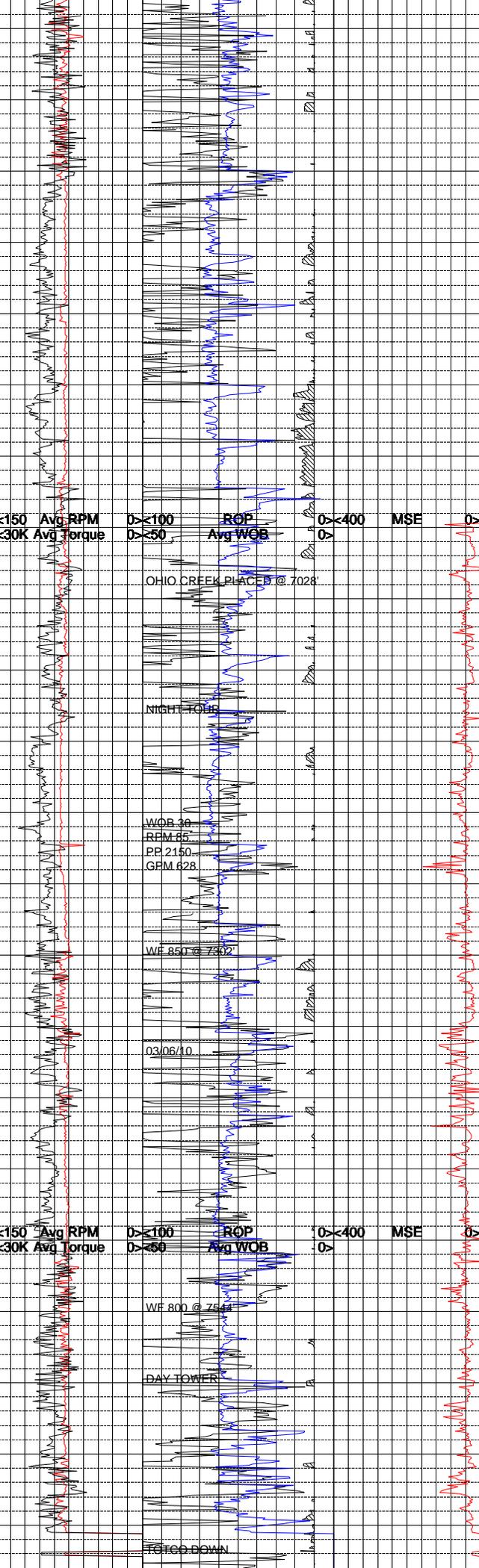
SANDSTONE = ABUNDANT LOOSE GRAINS; TRACE LT GRAY PRESERVED SPECIMENS; LOWER MED TO FINE GRAINED; ANGULAR TO SUBANGULAR;

<150 Avg RPM >100 ROP >400 MSE >30K Avg Torque >50 Avg WOB

<150 Avg RPM >100 ROP >400 MSE >30K Avg Torque >50 Avg WOB



6700
6800
6900
7000
7100
7200
7300
7400
7500
7600
7700



CALCITE CEMENT; 5% ANGULAR BLACK UNIDENT GRAINS; TRACE WHITE KAOLIN CLY IN MATRIX GRAIN SUPPORTED; MOD REACTION TO DILUTE HCL; TRACE LOOSE PYRITE; COARSE CALCITE PROBABLE FRACTURE FILL OBSERVED IN THE 6590' TO 6650' SAMPLES; ASSOCIATED WITH MINOR GAS SHOWS.

SANDSTONE = LIGHT GREENISH GRAY; VERY HARD AND TIGHT; VERY FINE GRAINED; WELL SORTED; ANGULAR TO SUBANGULAR; MOD SPHERICITY; GRADING TO SILTSTONE; HIGH REACTION WITH DILUTE HCL; DOM CALCITE CEMENT; MICA IN MATRIX; SOME BLACK CARB PARTICLES AND LAMINATIONS; COARSE CALC PROBABLE FRACTURE FILL IN THE 6740' TO 6800' SAMPLES; RARE WHITE COARSE CALCITE ADHERING TO SANDSTONE SPECIMENS; ASSOC WITH GAS SHOWS.

SANDSTONE = ABUNDANT LOOSE GRAINS; LIGHT GRAY; LOWER MEDIUM TO UPPER FINE GRAINED; MOD SORTED; ANGULAR TO SUBROUNDED; LOW TO MOD SPHERICITY; DOM CALCITE CEMENT; SOME HARD SILIC SPECIMENS; SCATTERED UNIDENT BLACK GRAINS; COARSE WHITE CALCITE-PROBABLE FRACTURE FILL IN THE 6860'-6890' SAMPLE; ASSOCIATED WITH GAS SHOWS.

SHALE = LT GREENISH GRAY; TR BROWN; MOD HARD; PLATY TO WEDGELIKE CTGS; IRREGULAR FRACTURE; DULL EARTHY TO SLI SPARKLING LUSTER WHEN DRIED; SMOOTH TO SILTY TEXTURE; DULL EARTHY LUSTER; NON CALCAREOUS; SILTY IN PART; INTERBD WITH LT BROWN SANDSTONE.

OHIO CREEK PLACED AT 7028' MD 6928' TVD

SANDSTONE = ABUNDANT LOOSE GRAINS; WHITE TO LIGHT GRAY; SME LT BROWN; LOWER MEDIUM TO FINE GRAINED; MOD SORTED; ANG TO SUBANGULAR; DOM CALCITE CEMENT; SME ANGULAR MEDIUM LITHIC FRAGS AND UNIDEN GRAINS; READILY REACTIVE TO DILUTE HCL; TRACE GREEN GRAINS; COARSE CALCITE CRYSTAL IN THE 7010' TO 7040' SAMPLE AND THE 7070' TO 7100' SAMPLE- FRAC FILL.

SHALE = LIGHT GRAY TO BLUISH GRAY; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; PLATY TO FLAKY CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; THINLY INTERBEDDED WITH SANDSTONE AND SILTSTONE.

SANDSTONE = WHITE TO CLR TO TRANSLUCENT ABUNDANT LOOSE GRAINS; TRACE AMOUNT OF KAOLINIC SANDSTONE; FINE TO UPPER VERY FINE GRAINED; FAIR TO WELL SORTED; SUB ANGULAR TO ANGULAR; MODERATE SPHERICITY; SLIGHT POLISHED SURFACE FEATURES; MOD. REACTION TO DILUTE HCL; CALCAREOUS CEMENTATION; TRACE AMOUNT OF COARSE CALCITE CRYSTALS AS POSSIBLE FRACTURE FILL; 1-3% DARK LITHICS; THINLY INTERBEDDED WITH SHALE AND SILTSTONE.

SHALE = LIGHT GRAY TO LIGHT BLUISH GRAY; TOUGH TO BRITTLE TO CRUMBLY TENACITY; BLOCKY TO PLANAR FRACTURE; PLATY TO FLAKY CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; APPEARS TO GRADE TO SILTSTONE IN PLACES; THIN STRUCTURE; THINLY INTERBEDDED WITH SANDSTONE AND SILTSTONE.

SANDSTONE = WHITE TO LIGHT GRAY; TRACE AMOUNT OF DARK LITHICS; FINE TO UPPER VERY FINE GRAINED; FAIR SORTING; SUB ROUNDED TO ROUND TO SLIGHTLY ANGULAR; MODERATE TO LOW SPHERICITY; HIGHLY REACTIVE TO DILUTE HCL; CALCAREOUS CEMENTATION; THINLY INTERBEDDED; WITH SAMPLE WERE A LOT OF LARGE SHALE CAVINGS

SANDSTONE = ABUNDANT LOOSE GRAINS; LOWER MEDIUM TO FINE GRAINED; ANGULAR TO SUBANGULAR; SME LOOSE SUBROUNDED GRAINS IN TRAYS; MOD SORTED; DOM GRAIN SUPPORTED; SILICEOUS TO CALCAREOUS CMT; SOME LOOSE WHITE KAOLIN CLAY IN TRAYS; TRACE RED AND GREEN GRAINS IN MATRIX; LOW SPHERICITY; SME SCATTERED BLACK TO BROWN CARBONACEOUS MATERIAL; SME BLACK CARBONACEOUS LAMINATIONS; COARSE CALCITE PROBABLE FRACTURE FILL IN THE 7550'-7580' SAMPLE; OCCASIONALLY THIN GAS SPIKES.

SHALE = LIGHT GRAY TO LIGHT GREENISH GRY MOD HARD; DOM PLATY CUTTINGS; BLOCKY TO IRREGULAR FRACTURE; DULL EARTHY LUSTER; SMOOTH TO ROUGH TO SILTY TEXTURE; SILTY IN PART; NON CALCAREOUS IN NON SILTY SPECIMENS; BLACK CARBONACEOUS LAMINATION SME VERY SILTY EXAMPLES.

SANDSTONE = ABUNDANT LOOSE GRAINS; LT

CG 457u
CG 589u
CG 871u
CG 267u
CG 359u
CG 151u
CG 235u
CG 250u
CG 108u
MAX GAS 1637u
CG 1191u

Tilt Gas 1K
CO2 25K
Flare Hit 100

<150 Avg RPM
>30K Avg Torque

>100 ROP
>50 Avg WOB

>400 MSE

OHIO CREEK PLACED @ 7028'

NIGHT TOWER

WOB 96
RPM 85
PI 2150
GFM 628

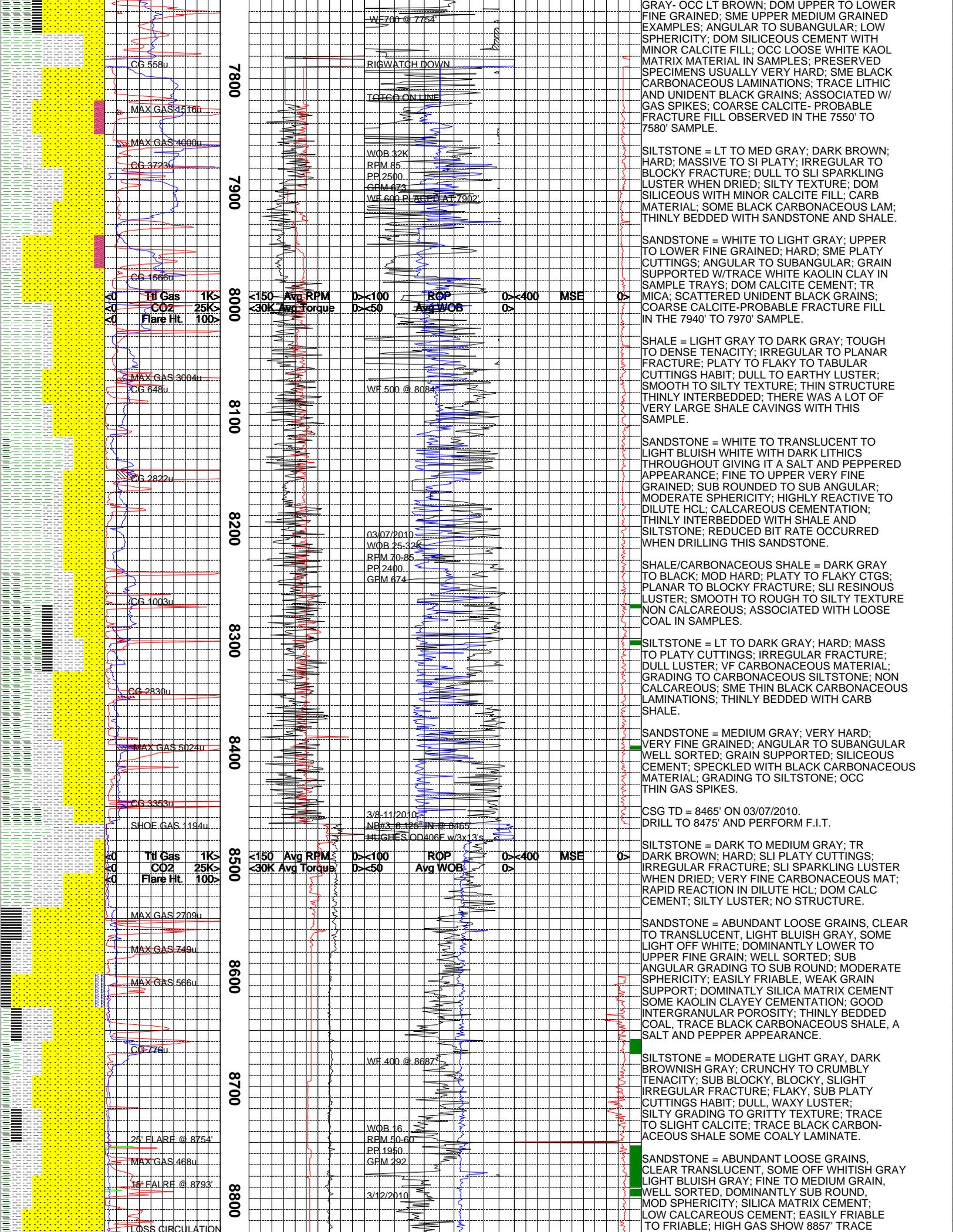
WF 850 @ 7302

03/06/10

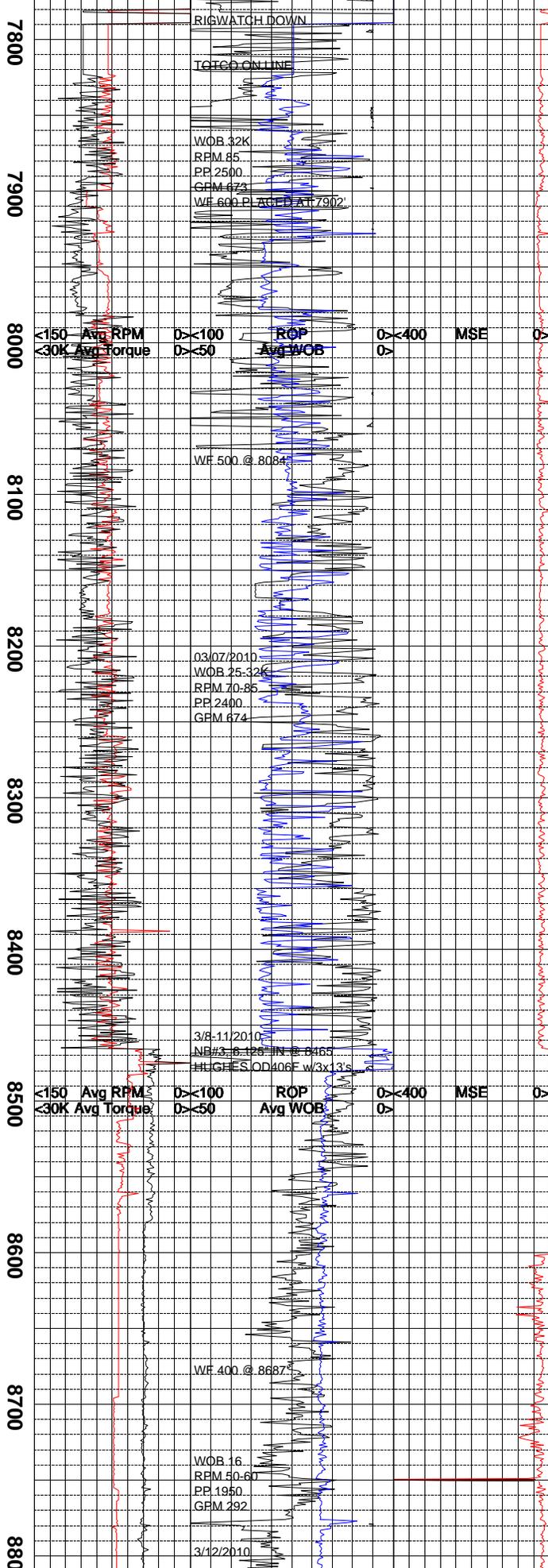
WF 800 @ 7544

DAY TOWER

TOTCO DOWN



CG 558u
 MAX GAS 3516u
 MAX GAS 4000u
 CG 3723u
 CG 1566u
 MAX GAS 3004u
 CG 648u
 CG 2822u
 CG 1003u
 CG 2830u
 MAX GAS 5024u
 CG 3353u
 SHOE GAS 1194u
 MAX GAS 2709u
 MAX GAS 749u
 MAX GAS 566u
 CG 776u
 25' FLARE @ 8754
 MAX GAS 468u
 16' FLARE @ 8793
 LOSS CIRCULATION



GRAY - OCC LT BROWN; DOM UPPER TO LOWER FINE GRAINED; SME UPPER MEDIUM GRAINED EXAMPLES; ANGULAR TO SUBANGULAR; LOW SPHERICITY; DOM SILICEOUS CEMENT WITH MINOR CALCITE FILL; OCC LOOSE WHITE KAOL MATRIX MATERIAL IN SAMPLES; PRESERVED SPECIMENS USUALLY VERY HARD; SME BLACK CARBONACEOUS LAMINATIONS; TRACE LITHIC AND UNIDENT BLACK GRAINS; ASSOCIATED W/ GAS SPIKES; COARSE CALCITE- PROBABLE FRACTURE FILL OBSERVED IN THE 7550' TO 7580' SAMPLE.

SILTSTONE = LT TO MED GRAY; DARK BROWN; HARD; MASSIVE TO SILTY; IRREGULAR TO BLOCKY FRACTURE; DULL TO SILTY SPARKLING LUSTER WHEN DRIED; SILTY TEXTURE; DOM SILICEOUS WITH MINOR CALCITE FILL; CARB MATERIAL; SOME BLACK CARBONACEOUS LAM; THINLY BEDDED WITH SANDSTONE AND SHALE.

SANDSTONE = WHITE TO LIGHT GRAY; UPPER TO LOWER FINE GRAINED; HARD; SME PLATY CUTTINGS; ANGULAR TO SUBANGULAR; GRAIN SUPPORTED W/TRACE WHITE KAOLIN CLAY IN SAMPLE TRAYS; DOM CALCITE CEMENT; TR MICA; SCATTERED UNIDENT BLACK GRAINS; COARSE CALCITE-PROBABLE FRACTURE FILL IN THE 7940' TO 7970' SAMPLE.

SHALE = LIGHT GRAY TO DARK GRAY; TOUGH TO DENSE TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO FLAKY TO TABULAR CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE THINLY INTERBEDDED; THERE WAS A LOT OF VERY LARGE SHALE CAVINGS WITH THIS SAMPLE.

SANDSTONE = WHITE TO TRANSLUCENT TO LIGHT BLUISH WHITE WITH DARK LITHICS THROUGHOUT GIVING IT A SALT AND PEPPERED APPEARANCE; FINE TO UPPER VERY FINE GRAINED; SUB ROUNDED TO SUB ANGULAR; MODERATE SPHERICITY; HIGHLY REACTIVE TO DILUTE HCL; CALCAREOUS CEMENTATION; THINLY INTERBEDDED WITH SHALE AND SILTSTONE; REDUCED BIT RATE OCCURRED WHEN DRILLING THIS SANDSTONE.

SHALE/CARBONACEOUS SHALE = DARK GRAY TO BLACK; MOD HARD; PLATY TO FLAKY CTGS; PLANAR TO BLOCKY FRACTURE; SILTY RESINOUS LUSTER; SMOOTH TO ROUGH TO SILTY TEXTURE NON CALCAREOUS; ASSOCIATED WITH LOOSE COAL IN SAMPLES.

SILTSTONE = LT TO DARK GRAY; HARD; MASS TO PLATY CUTTINGS; IRREGULAR FRACTURE; DULL LUSTER; VF CARBONACEOUS MATERIAL; GRADING TO CARBONACEOUS SILTSTONE; NON CALCAREOUS; SME THIN BLACK CARBONACEOUS LAMINATIONS; THINLY BEDDED WITH CARB SHALE.

SANDSTONE = MEDIUM GRAY; VERY HARD; VERY FINE GRAINED; ANGULAR TO SUBANGULAR WELL SORTED; GRAIN SUPPORTED; SILICEOUS CEMENT; SPECKLED WITH BLACK CARBONACEOUS MATERIAL; GRADING TO SILTSTONE; OCC THIN GAS SPIKES.

CSG TD = 8465' ON 03/07/2010.
 DRILL TO 8475' AND PERFORM F.I.T.

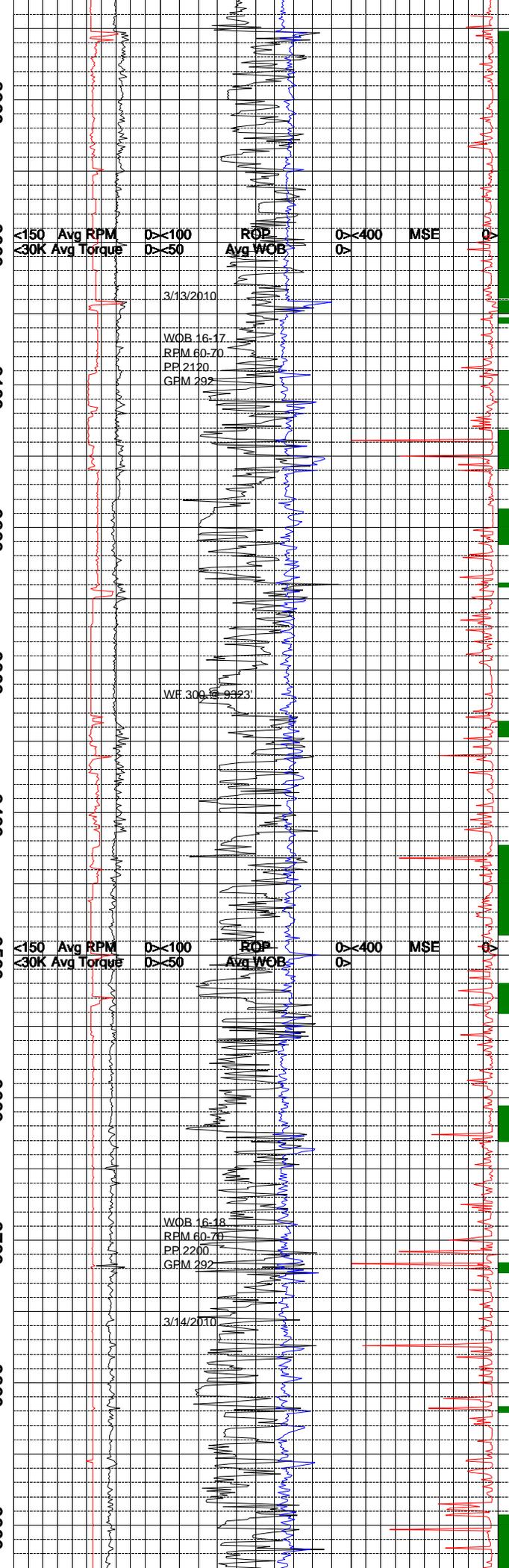
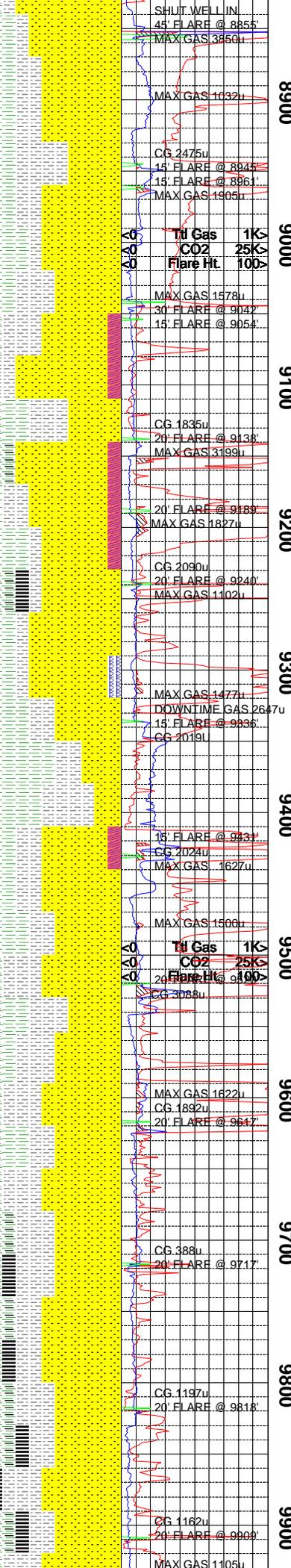
SILTSTONE = DARK TO MEDIUM GRAY; TR DARK BROWN; HARD; SILTY PLATY CUTTINGS; IRREGULAR FRACTURE; SILTY SPARKLING LUSTER WHEN DRIED; VERY FINE CARBONACEOUS MAT; RAPID REACTION IN DILUTE HCL; DOM CALC CEMENT; SILTY LUSTER; NO STRUCTURE.

SANDSTONE = ABUNDANT LOOSE GRAINS, CLEAR TO TRANSLUCENT, LIGHT BLUISH GRAY, SOME LIGHT OFF WHITE; DOMINANTLY LOWER TO UPPER FINE GRAIN; WELL SORTED; SUB ANGULAR GRADING TO SUB ROUND; MODERATE SPHERICITY; EASILY FRIABLE, WEAK GRAIN SUPPORT; DOMINANTLY SILICA MATRIX CEMENT SOME KAOLIN CLAYEY CEMENTATION; GOOD INTERGRANULAR POROSITY; THINLY BEDDED COAL, TRACE BLACK CARBONACEOUS SHALE, A SALT AND PEPPER APPEARANCE.

SILTSTONE = MODERATE LIGHT GRAY, DARK BROWNISH GRAY; CRUNCHY TO CRUMBLY TENACITY; SUB BLOCKY, BLOCKY, SLIGHT IRREGULAR FRACTURE; FLAKY, SUB PLATY CUTTINGS HABIT; DULL, WAXY LUSTER; SILTY GRADING TO GRITTY TEXTURE; TRACE TO SLIGHT CALCITE; TRACE BLACK CARBONACEOUS SHALE SOME COALY LAMINATE.

SANDSTONE = ABUNDANT LOOSE GRAINS, CLEAR TRANSLUCENT, SOME OFF WHITISH GRAY LIGHT BLUISH GRAY; FINE TO MEDIUM GRAIN, WELL SORTED, DOMINANTLY SUB ROUND, MOD SPHERICITY; SILICA MATRIX CEMENT; LOW CALCAREOUS CEMENT; EASILY FRIABLE TO FRIABLE; HIGH GAS SHOW 8857' TRACE

BLACK COALY/CARBONACEOUS SHALE IMBEDDED.



SHUT IN WELL @ 8858' IN HIGH PRESSURE GAS INTERVAL 8852'-8858'. 30' TO 45' FLARES. BRING MUD WT UP TO 9.7PPG.

SANDSTONE = ABUNDANT LOOSE GRAINS; TR PRESERVED LIGHT GRAY PRESERVED SPECIMENS LOWER MEDIUM TO UPPER FINE GRAINED; MOD WELL SORTED; ANGULAR TO SUBROUNDED; CALCITE CEMENT; SME SCATTERED CARB MAT; SANDSTONE INTERVAL AT 8852'-8857' WAS SHUT IN; ASSOCIATED WITH MAJOR GAS SHOWS

SILTSTONE = DARK GRAY; SME LIGHT GRAY; MOD TO VERY HARD; PLATY TO SLI FLAKY CTGS; BLOCKY TO IRREGULAR FRACTURE; DULL TO SLI SPARKLING LUSTER WHEN DRIED; VERY FINE CARBONACEOUS MATERIAL; SME BLACK COAL/CARBONACEOUS LAMINATIONS.

SANDSTONE = LIGHT BROWNISH GRAY, OFF WHITE, BLUISH GRAY; SOME SALT AND PEPPER APPEARANCE; VERY FINE TO FINE GRAIN; SUB ANGULAR TO SUB ROUND; FAIR TO WELL SORTED; MODERATE SPHERICITY; FRIABLE TO FIRM TO SLIGHTLY HARD; CLAYEY TO CALCAREOUS CEMENT; SOME COARSE CALCITE FRACTURE FILL; TRACE BLACK CARBONACEOUS SHALE/COAL IMBEDDED LAMINATIONS.

SANDSTONE = ABUNDANT LOOSE GRAINS; RARE PRESERVED SPECIMENS-PROBABLE GOOD POROSITY; WHITE TO LIGHT GRAY PRESERVED SPECIMENS; LOWER TO UPPER FINE GRAINED; WELL SORTED; GRAIN SUPPORTED; TRACE WH KAOLIN MATRIX MATERIAL IN TRAYS; DOM SILICEOUS CEMENT WITH MINOR CALCITE FILL 5% UNIDENT BLACK GRAINS; ASSOCIATED WITH MAJOR GAS SHOWS; COARSE CALCITE-PROB FRACTURE FILL FROM 9140' TO 9230'.

SANDSTONE = ABUNDANT LOOSE GRAINS; PROB GOOD POROSITY; LOWER MEDIUM TO FINE GRAINED; ANGULAR TO SUBROUNDED; LOW TO MOD SPHERICITY; DOM SILICEOUS CEMENT; LOW REACTION TO DILUTE HCL; OCC SPECKLED SALT AND PEPPER APPEARANCE; ASSOC W/ GAS

SHALE = DARK GRAY; SME DARK BROWN; FIRM; PLATY TO FLAKY CUTTINGS; PLANAR TO BLKY FRACTURE; DULL EARTHLY LUSTER; SMOOTH TO ROUGH TEXTURE; VF MICA; NON TO MOD CALCAREOUS IN SILTY EXAMPLES; MINOR CARB MATERIAL; SOME VERY FINE GRAINED SS LAMINATIONS; THINLY BEDDED.

SANDSTONE = ABUNDANT LOOSE GRAINS; LT GRAY; SOME DARK BROWN CARBONACEOUS EXAMPLES; FINE TO VERY FINE GRAINED; MOD WELL SORTED; ANGULAR TO SUBANGULAR; SILICEOUS CEMENT WITH MINOR CALCITE; 5% BLACK CARB AND LITHIC FRAGMENTS; COARSE CALCITE FRACTURE FILL MATERIAL OBSERVED IN THE 9410' TO 9440' SAMPLE; ASSOCIATED WITH GAS SHOWS.

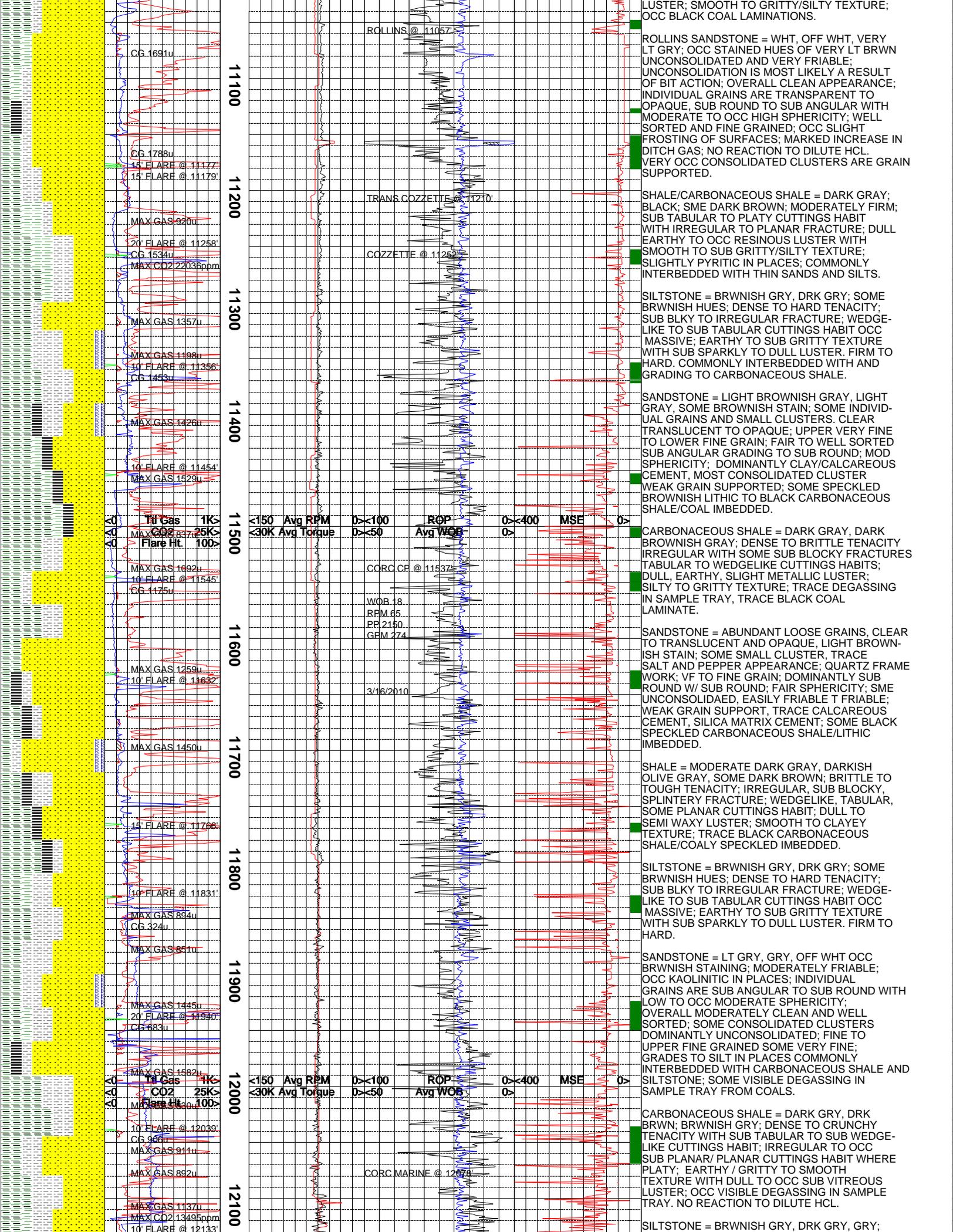
SILTSTONE = BROWNISH GRAY, LIGHT MOD GRAY, PALE YELLOWISH BROWN; UPPER VERY FINE TO LOWER FINE GRAIN; PULVERULENT TO CRUMBLY TENACITY; WEDGELIKE, SUB PLATY CUTTINGS HABIT; SUB BLOCKY, SLIGHT IRREGULAR FRACTURE; DULL, EARTHLY GRADING TO WAXY, TRACE SPARKLING LUSTER; SMOOTH SILTY, TRACE GRITTY TEXTURE; TRACE WEAK HCL REACTION; TRACE BLACK CARBONACEOUS SHALE LAMINATE.

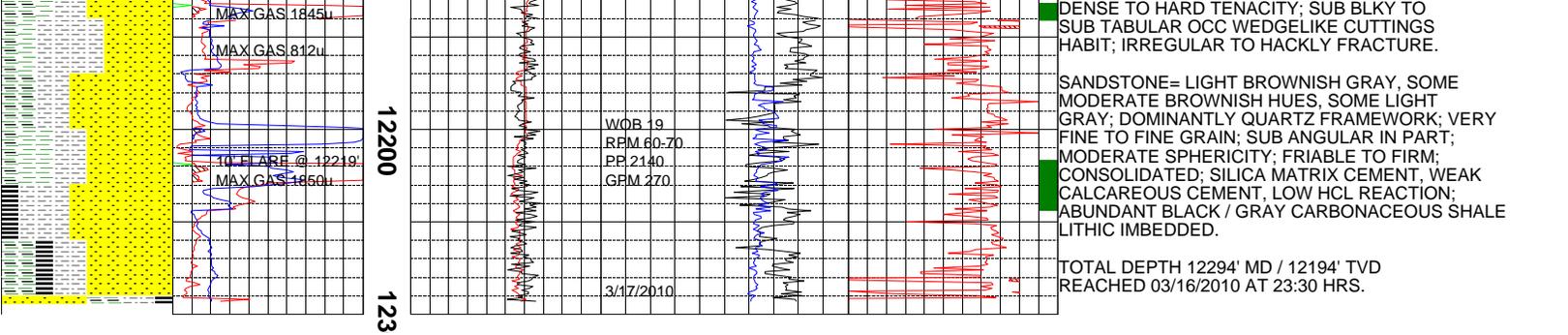
SANDSTONE = ABUNDANT LOOSE GRAINS, LIGHT BLUISH WHITE, CLEAR TO TRANSLUCENT, SOME SALT AND PEPPER APPEARANCE; UPPER VERY FINE TO FINE GRAIN; EASILY FRIABLE SOME SMALL CLUSTERS; DOMINANTLY SUB ANGULAR SOME SUB ROUND; SILICA MATRIX CEMENT, TR CLAYEY CEMENT, VERY WEAK HCL REACTION; FAIR TO WELL SORTED; TRACE BLACK CARBONACEOUS SHALE SPECKLED IMBEDDED.

SHALE = DARK GRAY, MODERATE GRAY; BRITTLE TO CRUMBLY TENACITY; PLANAR, SUB BLOCKY FRACTURE; TABULAR WITH SOME WEDGELIKE CUTTINGS HABIT; DULL SUB WAXY LUSTER; SILTY GRADING TO GRITTY TEXTURE; TRACE BLACK SPECKLE CARBONACEOUS SHALE LAMINATE;

SANDSTONE = MODERATE LIGHT GRAY, LIGHT GRAY HUES, SOME GRAYISH OFF WHITE, SALT AND PEPPER APPEARANCE; SOME LOOSE GRAINS SMALL CLUSTERS; VERY FINE TO FINE GRAIN; DOMINANTLY SUB ANGULAR TRACE SUB ROUND; FAIR SORTED; CLAYEY CEMENT, TRACE CALC CEMENT, WEAK HCL REACTION; TRACE KAOLINIC IN SAMPLE TRAY; TRACE BLACK SPECKLED CARBONACEOUS/COAL IMBEDDED/LAMINATE.

SILTSTONE = LIGHT BROWNISH GRAY, LT GRAY CRUMBLY TO CRUNCHY TENACITY; SUB BLOCKY TO IRREGULAR FRACTURE; TABULAR TO PLATY CUTTINGS HABIT; DULL SPARKLING LUSTER;





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