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MUDLOG MD

COMPANY	ExxonMobil Production
WELL	PCU 197-34A4
FIELD	PICEANCE CREEK UNIT
REGION	ROCKY MOUNTAIN
COORDINATES	LAT: 39.918076000 LONG: -108.276956000
ELEVATION	G.L.: 6492' R.K.B.: 30.2'
COUNTY, STATE	RIO BLANCO, CO
API INDEX	051031154100
SPUD DATE	03/04/2010
CONTRACTOR	HELMERICH AND PAYNE
CO. REP.	JOEY THOMAS
RIG/TYPE	HP 325/FLEX 4S
LOGGING UNIT	MLU 48
GEOLOGISTS	M. GROSS J.SELL
ADD. PERSONS	D. NEW
CO. GEOLOGIST	MELISSA SAURBORN

LOG INTERVAL

DEPTHS: 3735' **TO** 12641'

DATES: 06/08/2010 **TO** 08/13/2010

SCALE: 1" = 100'

CASING DATA

10.75" **AT** 3713'

7.00" **AT** 8560'

AT

AT

MUD TYPES

SPUD MUD **TO** 3735'

LSND **TO** 12641'

TO

TO

HOLE SIZE

14.75" **TO** 3735'

9.875" **TO** 8605'

TO

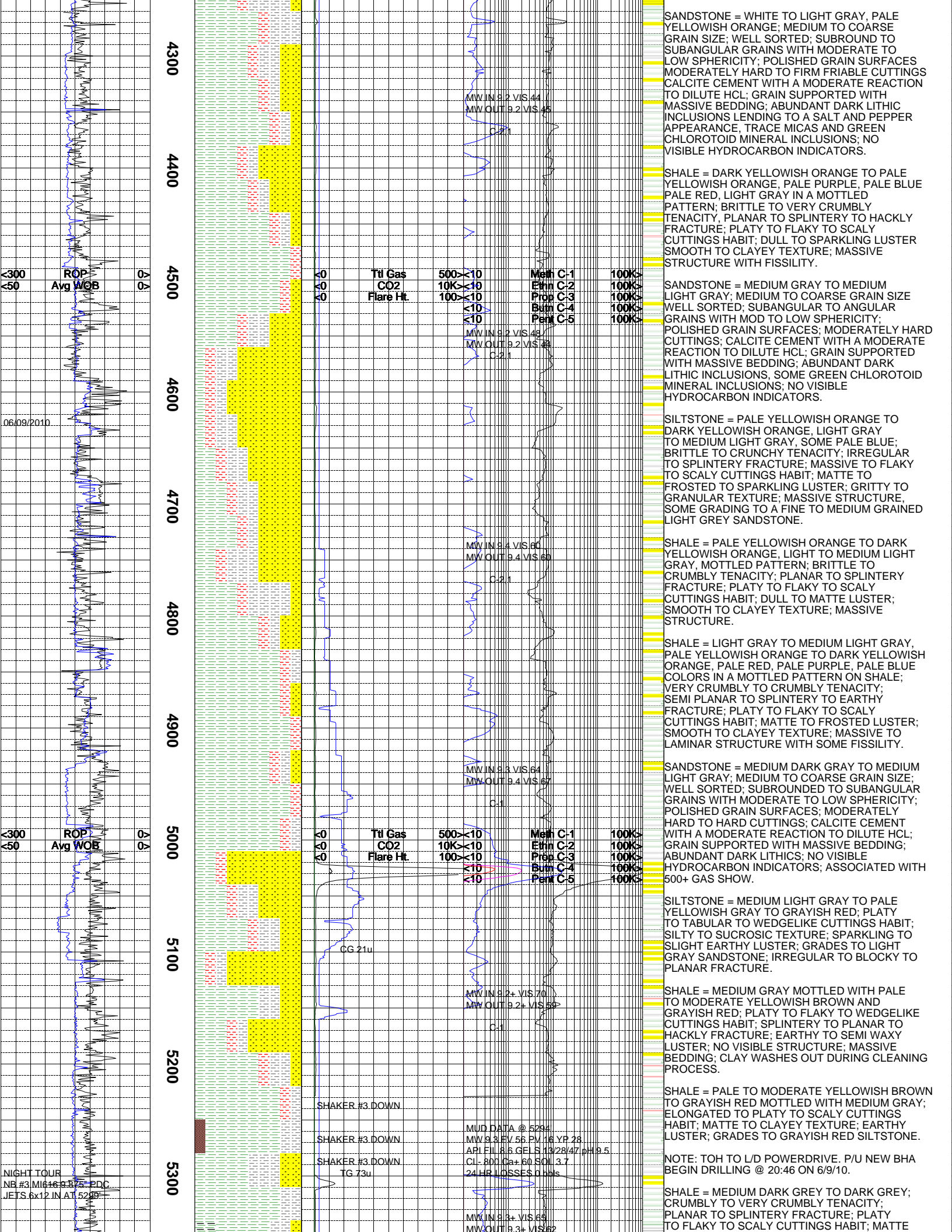
TO

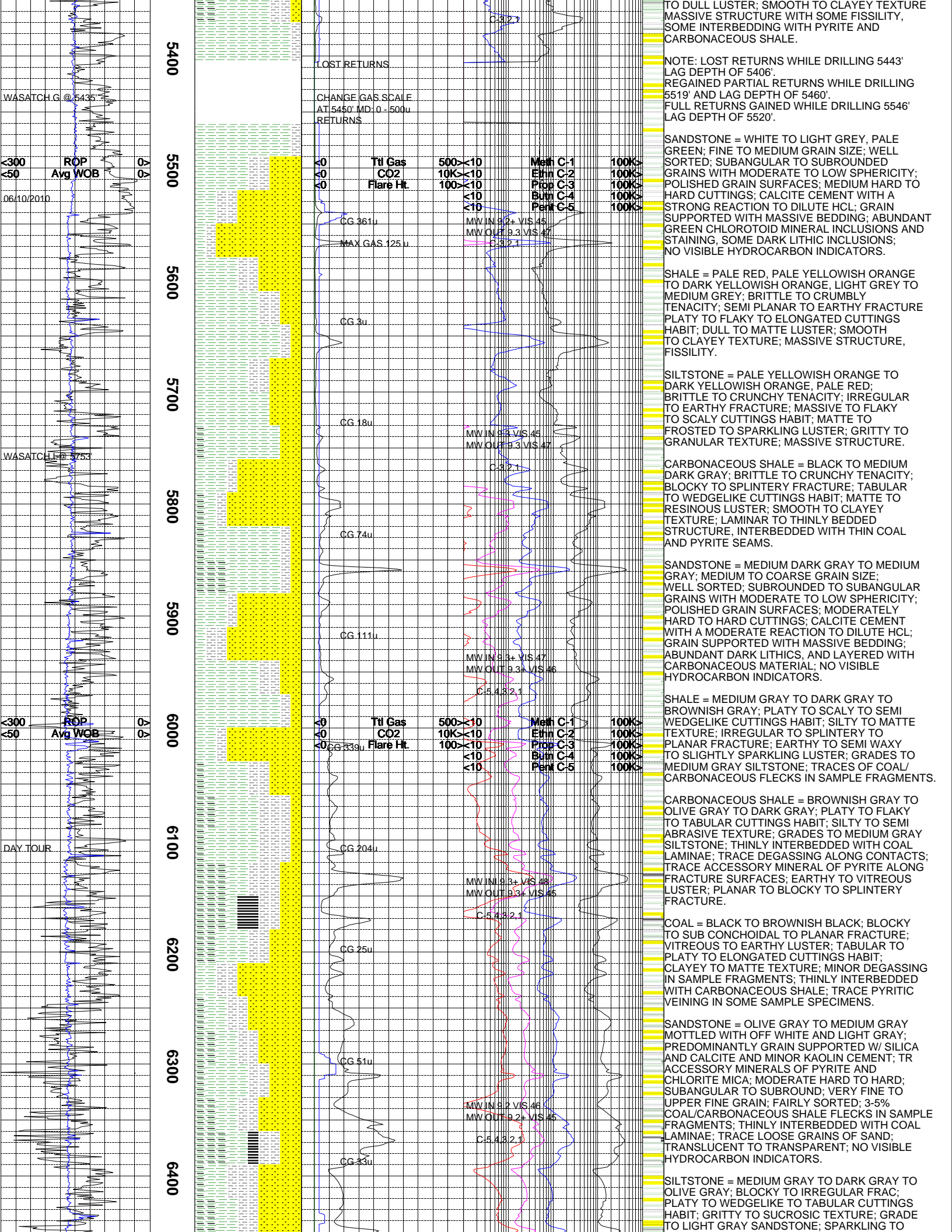
ABBREVIATIONS

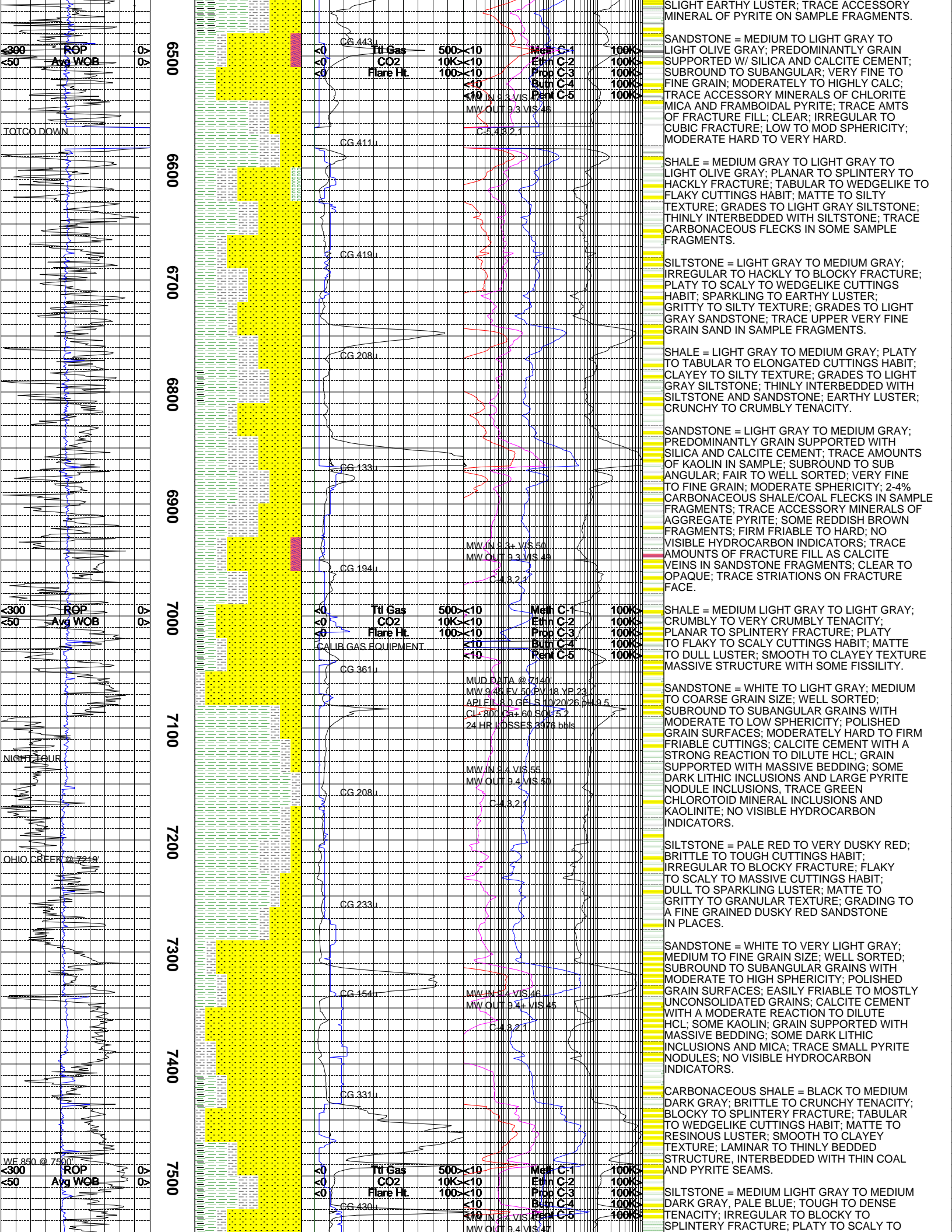
<i>NB</i> NEWBIT	<i>PV</i> PLASTIC VISCOSITY	<i>LC</i> LOST CIRCULATION
<i>RRB</i> RERUN BIT	<i>YP</i> YIELD POINT	<i>CO</i> CIRCULATE OUT
<i>CB</i> CORE BIT	<i>FL</i> FLUID LOSS	<i>NR</i> NO RETURNS
<i>WOB</i> WEIGHT ON BIT	<i>CL</i> PPM CLORIDE ION	<i>TG</i> TRIP GAS
<i>RPM</i> ROTARY REV/MIN	<i>Rm</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	

ROP			Depth	Lithology	MGS			Interp. Lith			Remarks	
ft/hr					Ttl Gas units			Meth C-1 ppm				
Avg WOB			CO2 ppm			Ethn C-2			Prop C-3			
klbs			Flare Ht. ft			Butn C-4			Pent C-5			
3300												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.
3400												
3500												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
3600												WHEN THE MUD IS RUN THROUGH THE MGS (MUD GAS SEPARATOR) THE INTERVAL IS MARKED ON THE LOG IN THE SLIDE COLUMN AND NOTED ON THE LOG.
3700												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.
3800												10.75" SURFACE CASING WAS SET AT 3713'. DRILLED 10' OF NEW FORMATION AND PERFORM F.I.T. - GOOD. DRILL AHEAD.
3900												SURVEY @ 3670' MD: INC 18.65 AZI 79.73 TVD 3530.28'
4000												EPOCH WELL SERVICES COMMENCED FULL LOGGING ON 06/08/2010 AT 3735'
4100												SHALE = MODERATE YELLOWISH BROWN TO MEDIUM GRAY MOTTLED WITH GRAYISH RED; PLATY TO WEDGE LIKE TO SCALY CUTTINGS HABIT; CLAYEY TO SMOOTH TEXTURE; DULL EARTHY LUSTER; NO VISIBLE STRUCTURE IN SAMPLE.
4200												SANDSTONE = MODERATE YELLOWISH BROWN TO GRAYISH RED TO MINOR OFF WHITE; FRIABLE TO MODERATE HARD; LOW TO MOD SPHERICITY; FAIRLY SORTED; ANGULAR TO SUB ROUND; 1-3% DARK LITHIC FRAGMENTS; VERY FINE TO UPPER FINE GRAIN; MODERATE TO HIGHLY CALCAREOUS; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT; TRACE AMOUNTS OF NAHCOLITE IN SAMPLE.
												SHALE = PALE TO MODERATE YELLOWISH GRAY TO MINOR REDDISH GRAY; PLATY TO FLAKY TO WEDGE LIKE CUTTINGS HABIT; SPLINTERY TO HACKLY TO IRREGULAR FRACTURE; CLAYEY TO MATTE TEXTURE; SOME CLAY WASHED AWAY DURING CLEANING PROCESS.
												SANDSTONE = PALE YELLOWISH GRAY TO MED GRAY; FRIABLE TO MODERATE HARD; VERY FINE TO UPPER FINE GRAIN; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT; 1-3% LITHIC FRAGMENTS; LOW TO MODERATE SPHERICITY; SUBROUND TO SUB ANGULAR; POOR TO WELL SORTED; TRACE AMOUNTS OF NAHCOLITE AND LIMESTONE FRAGMENTS.
												SILTSTONE = PALE YELLOWISH ORANGE TO DARK YELLOWISH ORANGE, LIGHT GRAY; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO EARTHY FRACTURE; MASSIVE TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO FROSTED TO SPARKLING LUSTER; GRITTY TO GRANULAR TEXTURE; MASSIVE STRUCTURE.
												SHALE = PALE YELLOWISH ORANGE TO DARK YELLOWISH ORANGE, LIGHT TO MEDIUM LIGHT GRAY, MOTTLED PATTERN; BRITTLE TO CRUMBLY TENACITY; PLANAR TO SPLINTERY FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; DULL TO MATTE LUSTER; SMOOTH TO CLAYEY TEXTURE; MASSIVE STRUCTURE.







SANDSTONE = MEDIUM TO LIGHT GRAY TO LIGHT OLIVE GRAY; PREDOMINANTLY GRAIN SUPPORTED W/ SILICA AND CALCITE CEMENT; SUBROUND TO SUBANGULAR; VERY FINE TO FINE GRAIN; MODERATELY TO HIGHLY CALC; TRACE ACCESSORY MINERALS OF CHLORITE MICA AND FRAMBOIDAL PYRITE; TRACE AMTS OF FRACTURE FILL; CLEAR; IRREGULAR TO CUBIC FRACTURE; LOW TO MOD SPHERICITY; MODERATE HARD TO VERY HARD.

SHALE = MEDIUM GRAY TO LIGHT GRAY TO LIGHT OLIVE GRAY; PLANAR TO SPLINTERY TO HACKLY FRACTURE; TABULAR TO WEDGE LIKE TO FLAKY CUTTINGS HABIT; MATTE TO SILTY TEXTURE; GRADES TO LIGHT GRAY SILTSTONE; THINLY INTERBEDDED WITH SILTSTONE; TRACE CARBONACEOUS FLECKS IN SOME SAMPLE FRAGMENTS.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY; IRREGULAR TO HACKLY TO BLOCKY FRACTURE; PLATY TO SCALY TO WEDGE LIKE CUTTINGS HABIT; SPARKLING TO EARTHY LUSTER; GRITTY TO SILTY TEXTURE; GRADES TO LIGHT GRAY SANDSTONE; TRACE UPPER VERY FINE GRAIN SAND IN SAMPLE FRAGMENTS.

SHALE = LIGHT GRAY TO MEDIUM GRAY; PLATY TO TABULAR TO ELONGATED CUTTINGS HABIT; CLAYEY TO SILTY TEXTURE; GRADES TO LIGHT GRAY SILTSTONE; THINLY INTERBEDDED WITH SILTSTONE AND SANDSTONE; EARTHY LUSTER; CRUNCHY TO CRUMBLY TENACITY.

SANDSTONE = LIGHT GRAY TO MEDIUM GRAY; PREDOMINANTLY GRAIN SUPPORTED WITH SILICA AND CALCITE CEMENT; TRACE AMOUNTS OF KAOLIN IN SAMPLE; SUBROUND TO SUB ANGULAR; FAIR TO WELL SORTED; VERY FINE TO FINE GRAIN; MODERATE SPHERICITY; 2-4% CARBONACEOUS SHALE/COAL FLECKS IN SAMPLE FRAGMENTS; TRACE ACCESSORY MINERALS OF AGGREGATE PYRITE; SOME REDDISH BROWN FRAGMENTS; FIRM FRIABLE TO HARD; NO VISIBLE HYDROCARBON INDICATORS; TRACE AMOUNTS OF FRACTURE FILL AS CALCITE VEINS IN SANDSTONE FRAGMENTS; CLEAR TO OPAQUE; TRACE STRIATIONS ON FRACTURE FACE.

SHALE = MEDIUM LIGHT GRAY TO LIGHT GRAY; CRUMBLY TO VERY CRUMBLY TENACITY; PLANAR TO SPLINTERY FRACTURE; PLATY TO FLAKY TO SCALY CUTTINGS HABIT; MATTE TO DULL LUSTER; SMOOTH TO CLAYEY TEXTURE MASSIVE STRUCTURE WITH SOME FISSILITY.

SANDSTONE = WHITE TO LIGHT GRAY; MEDIUM TO COARSE GRAIN SIZE; WELL SORTED; SUBROUND TO SUBANGULAR GRAINS WITH MODERATE TO LOW SPHERICITY; POLISHED GRAIN SURFACES; MODERATELY HARD TO FIRM FRIABLE CUTTINGS; CALCITE CEMENT WITH A STRONG REACTION TO DILUTE HCL; GRAIN SUPPORTED WITH MASSIVE BEDDING; SOME DARK LITHIC INCLUSIONS AND LARGE PYRITE NODULE INCLUSIONS, TRACE GREEN CHLOROTOID MINERAL INCLUSIONS AND KAOLINITE; NO VISIBLE HYDROCARBON INDICATORS.

SILTSTONE = PALE RED TO VERY DUSKY RED; BRITTLE TO TOUGH CUTTINGS HABIT; IRREGULAR TO BLOCKY FRACTURE; FLAKY TO SCALY TO MASSIVE CUTTINGS HABIT; DULL TO SPARKLING LUSTER; MATTE TO GRITTY TO GRANULAR TEXTURE; GRADING TO A FINE GRAINED DUSKY RED SANDSTONE IN PLACES.

SANDSTONE = WHITE TO VERY LIGHT GRAY; MEDIUM TO FINE GRAIN SIZE; WELL SORTED; SUBROUND TO SUBANGULAR GRAINS WITH MODERATE TO HIGH SPHERICITY; POLISHED GRAIN SURFACES; EASILY FRIABLE TO MOSTLY UNCONSOLIDATED GRAINS; CALCITE CEMENT WITH A MODERATE REACTION TO DILUTE HCL; SOME KAOLIN; GRAIN SUPPORTED WITH MASSIVE BEDDING; SOME DARK LITHIC INCLUSIONS AND MICA; TRACE SMALL PYRITE NODULES; NO VISIBLE HYDROCARBON INDICATORS.

CARBONACEOUS SHALE = BLACK TO MEDIUM DARK GRAY; BRITTLE TO CRUNCHY TENACITY; BLOCKY TO SPLINTERY FRACTURE; TABULAR TO WEDGE LIKE CUTTINGS HABIT; MATTE TO RESINOUS LUSTER; SMOOTH TO CLAYEY TEXTURE; LAMINAR TO THINLY BEDDED STRUCTURE; INTERBEDDED WITH THIN COAL AND PYRITE SEAMS.

SILTSTONE = MEDIUM LIGHT GRAY TO MEDIUM DARK GRAY, PALE BLUE; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY TO SPLINTERY FRACTURE; PLATY TO SCALY TO

