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(281) 784-5500
Bakersfield, CA
(661) 328-1595
New Iberia, LA
(337) 364-2322
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Mudlog MD

COMPANY	EXXONMOBIL
WELL	PCU 296-6A1
FIELD	PICEANCE CREEK
REGION	ROCKIES
COORDINATES	39.900065 108.212247
ELEVATION	7363.5'
COUNTY, STATE	RIO BLANCO, CO
API INDEX	05-103-11475-00
SPUD DATE	10/22/2010
CONTRACTOR	HELMERICH _PAYNE
CO. REP.	KEVIN GARDNER
RIG/TYPE	FLEX 4
LOGGING UNIT	033
GEOLOGISTS	KEVIN MCMULLEN JASON REISENBICHLER
ADD. PERSONS	DONALD EVANS JASON YEAGER
CO. GEOLOGIST	MELISSA SAURBORN

LOG INTERVAL

DEPTHS: 145' **TO** 13822'
DATES: 10/22/2010 **TO** 11/15/2010
SCALE: 1" : 100'

CASING DATA

16" **AT** 140'
10.75" **AT** 4440'
7" **AT** 9667'

AT

HOLE SIZE

14.75" **TO** 4444'
9.875" **TO** 9667'
6.125" **TO** 13822'
TO

MUD TYPES

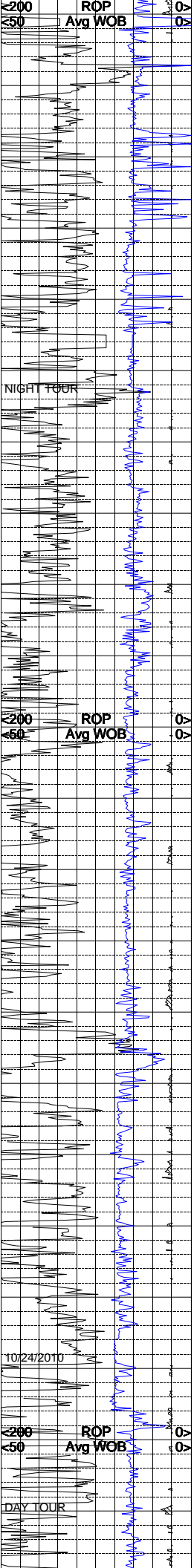
SPUD MUD **TO** 4444'
LSND **TO** 13822'
TO
TO

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	

Survey Data, Mud Reports, Other Info.					
Remarks					
<p>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.</p> <p>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 BORE HOLE DURING CONNECTIONS.</p> <p>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</p> <p>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.</p> <p>ALL SANDSTONE INTERVALS ARE EXAMINED FOR SAMPLE FLUORESCENCE IN THE UV SCOPE FOR HYDROCARBON FLUORESCENCE AND MINOR FLUORESCENCE FROM POSSIBLE FRACTURE FILL. ALL FLUORESCENCE IS NOTED ON THE MUDLOG.</p> <p>16" SURFACE CONDUIT WAS SET AT 145'.</p> <p>CANRIG DRILLING TECHNOLOGY LTD. COMMENCED LOGGING SERVICES ON 10/22/2010 @ 145' MD.</p> <p>CANRIG DRILLING TECHNOLOGY LTD.</p>					



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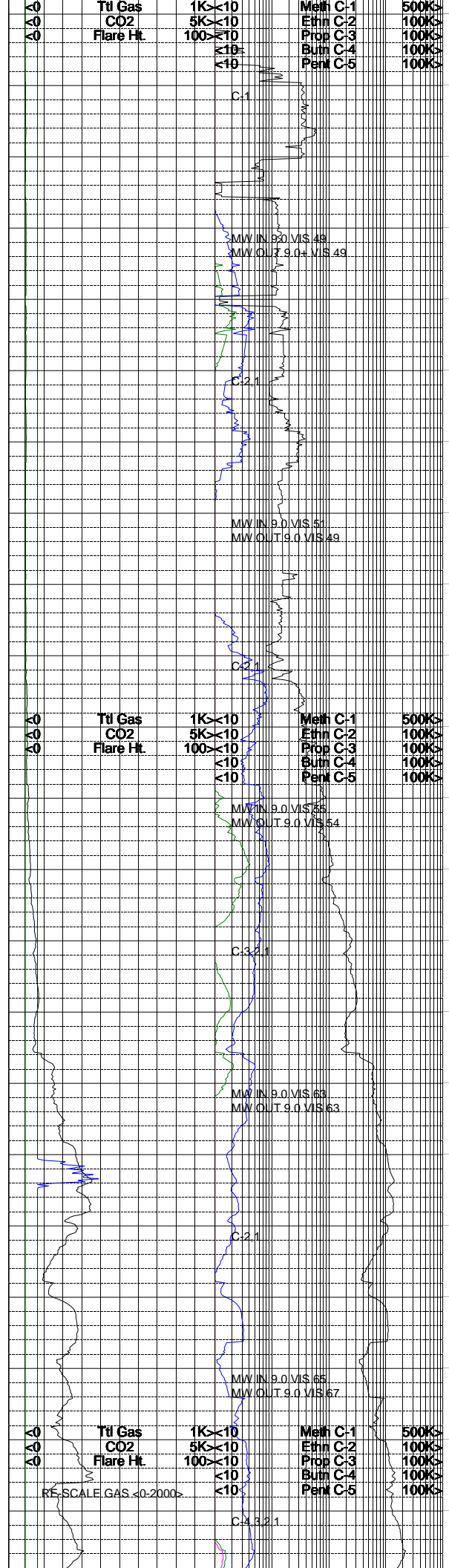
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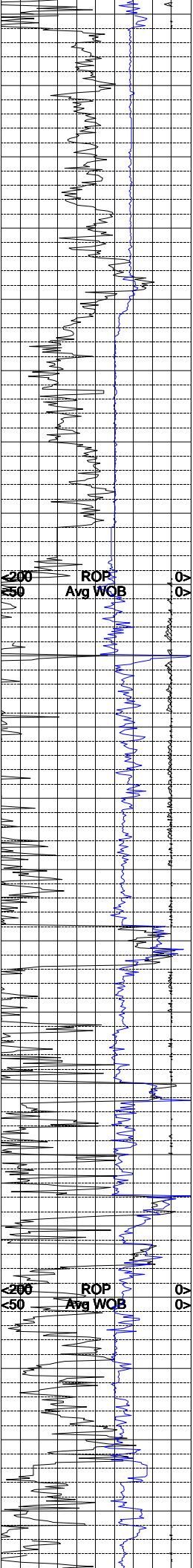
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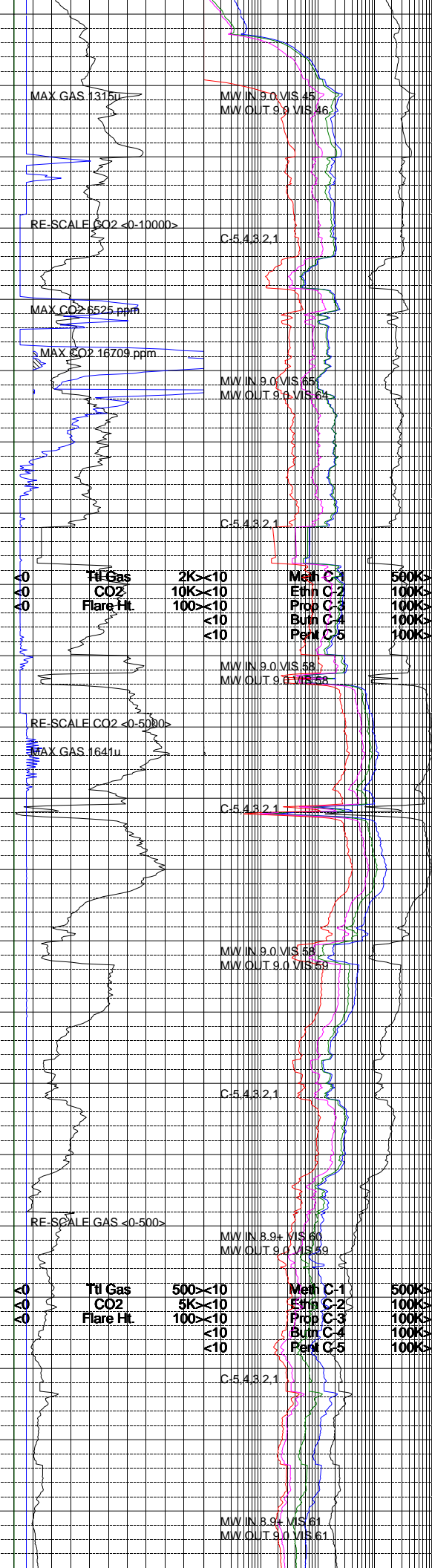
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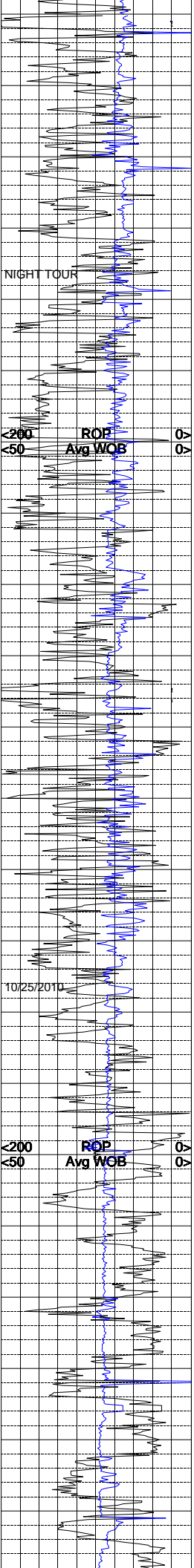
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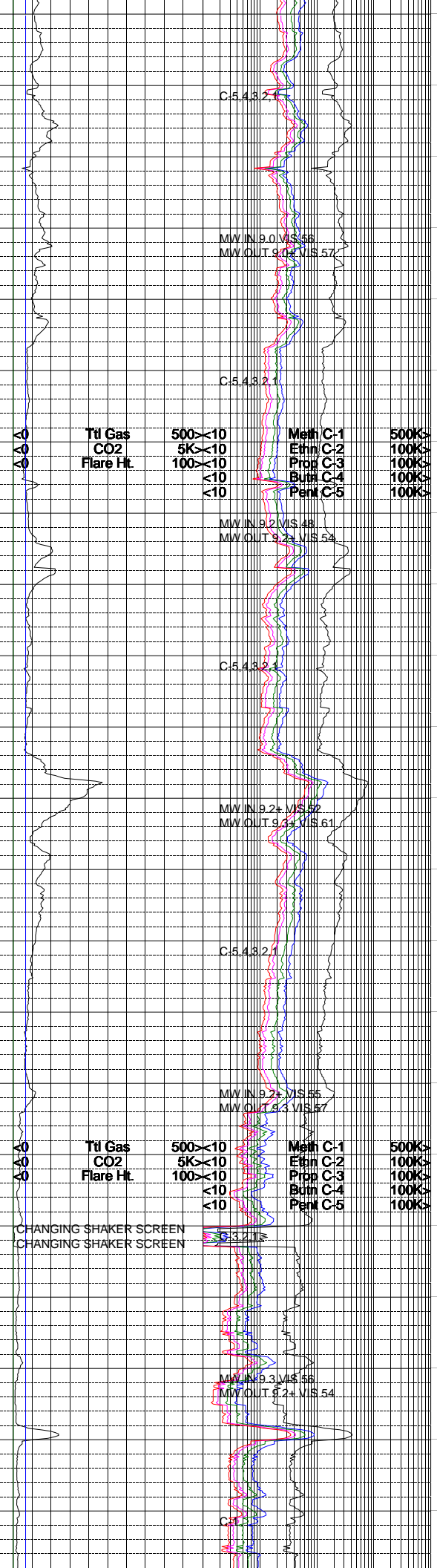
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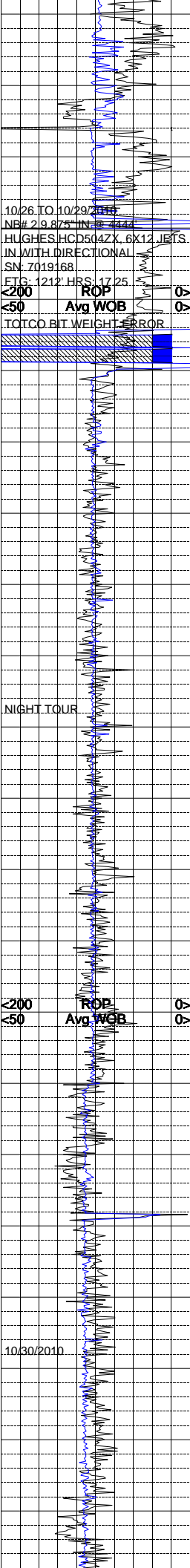
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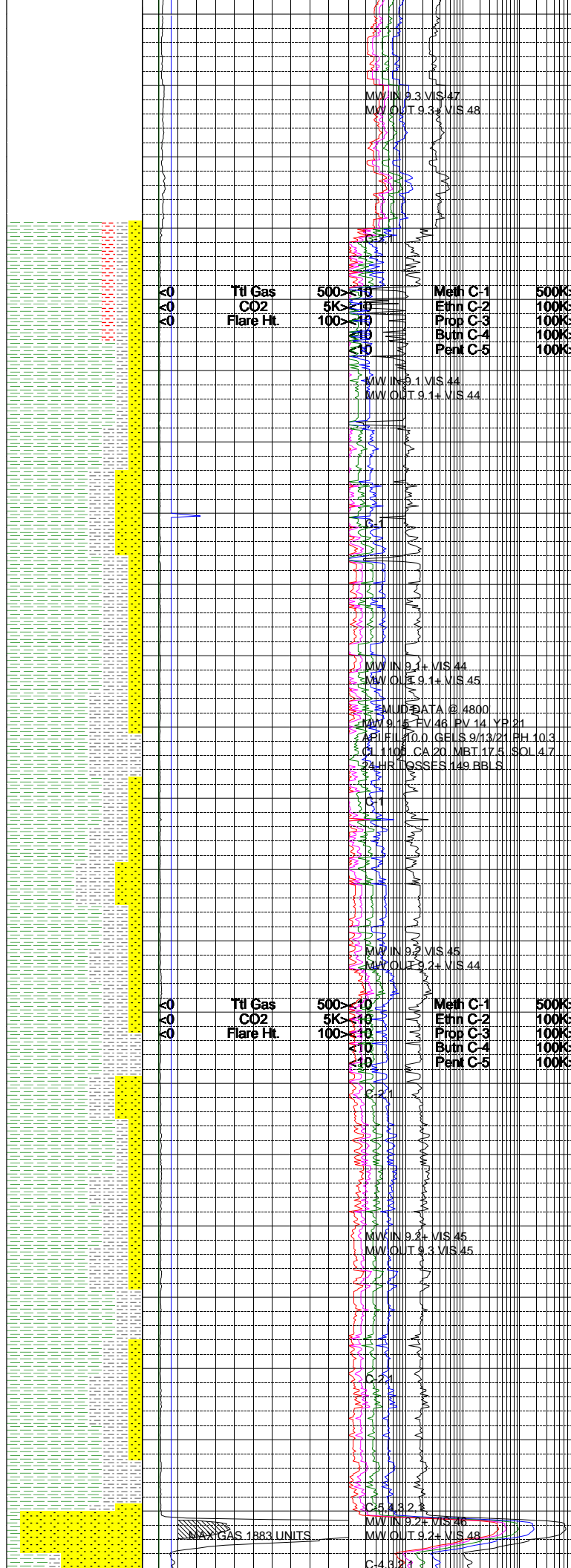
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NOTE = TD SURFACE HOLE AT 4444' MD ON 10/25/2010 AT 1400 HRS.

SHALE = LIGHT GRAY TO YELLOWISH BROWN TO PALE BLUE WITH GREENISH ORANGE AND LIGHT RED HUES; BRITTLE TO CRUMBLY TENACITY; BLOCKY TO IRREGULAR FRACTURE; TABULAR TO WEDGELIKE CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TO TRACE SILTY TEXTURE; OVERALL THIN TO THICK STRUCTURE WITH TRACES OF CLAYSTONE PRESENT WITHIN SAMPLE <10%; NON CALCAREOUS WITH NO HYDROCARBON INDICATORS PRESENT.

SANDSTONE = WHITE TO OPAQUE TO VERY LIGHT GRAY WITH TRANSPARENT GRAINS AND A SALT AND PEPPER APPEARANCE; MEDIUM TO COARSE GRAINED; FAIRLY TO POORLY SORTED; ROUND TO SUBROUNDED; MODERATE TO HIGH SPHERICITY; OVERALL QUARTZ FRAMEWORK WITH TRACES OF MAFIC LITHIC FRAGMENTS; NON TO VERY SLIGHTLY CALCAREOUS; NO APPARENT OIL INDICATORS PRESENT.

SHALE = LIGHT GRAY, YELLOWISH BROWN, AND REDDISH BROWN IN COLOR; FIRM TO MODERATELY HARD; CRUNCHY TO BRITTLE; TABULAR TO NODULAR CUTTINGS HABIT; DULL, EARTHY LUSTER; OVERALL SILTY TEXTURE; GRADATIONAL TO A SILTSTONE; DOMINANTLY NON CALCAREOUS; NO APPARENT OIL INDICATORS.

SILTSTONE = YELLOW BROWN TO BROWN TO REDDISH BROWN IN COLOR; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO SLIGHTLY WEDGELIKE CUTTINGS HABIT; DULL TO EARTHY LUSTER; SILTY TO GRITTY TEXTURE; OVERALL STRUCTURE IS THICK.

SHALE = LIGHT GRAY TO BLUE GRAY TO YELLOW TO LIGHT BROWN IN COLOR; TENACITY IS DENSE TO BRITTLE; SAMPLE HAS FLAKY TO PLATY TO WEDGELIKE TO SLIGHTLY MASSIVE CUTTINGS HABIT; FRACTURE IS IRREGULAR TO PLANAR; DULL EARTHY TO WAXY LUSTER; OVERALL TEXTURE IS SMOOTH; STRUCTURE IS GENERALLY THIN TO SLIGHTLY THICK; SAMPLE IS NON REACTIVE IN 10% HCL SOLUTION; NO OIL INDICATORS.

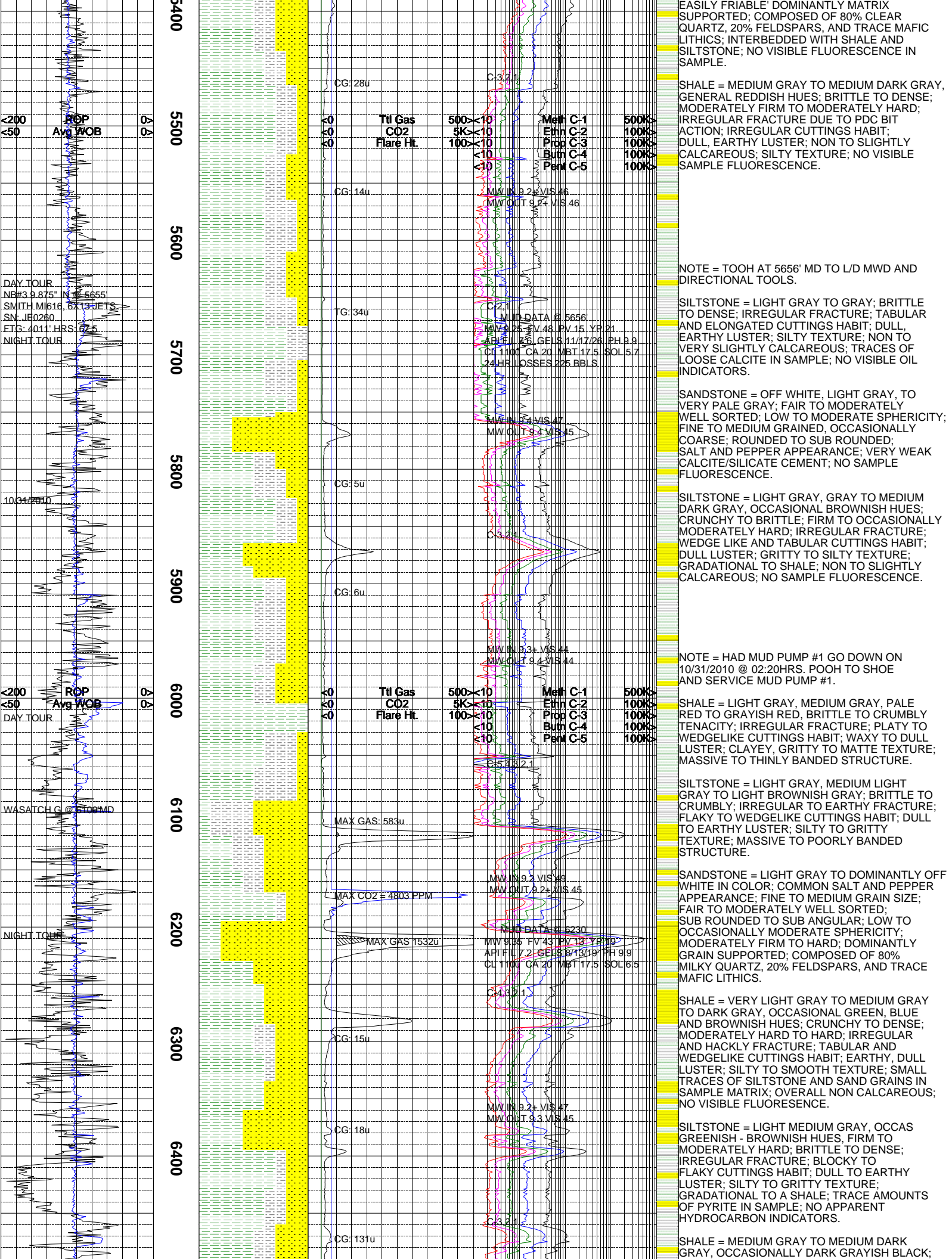
SHALE = GRAY, MEDIUM GRAY, TO MEDIUM DARK GRAY, OCCASIONAL GREENISH AND REDDISH HUES; CRUNCHY TO DENSE; FIRM TO MODERATELY HARD; IRREGULAR AND HACKLY FRACTURE; TABULAR AND PLATY CUTTINGS HABIT; DULL, EARTHY LUSTER; SILTY TO CLAYEY TEXTURE; VERY SLIGHTLY CALCAREOUS; NO APPARENT OIL INDICATORS.

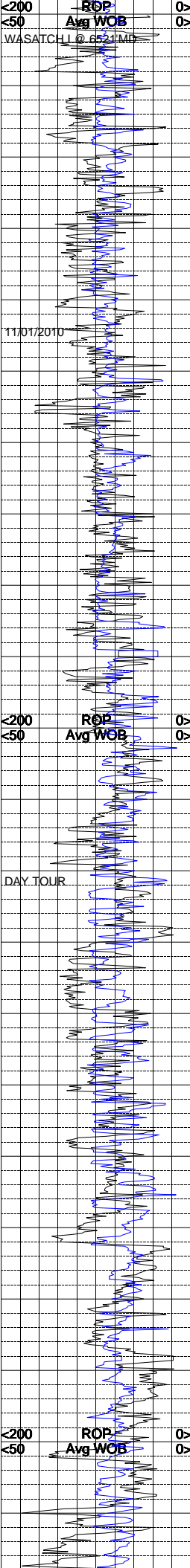
SHALE = GRAY, MEDIUM DARK GRAY, YELWSH BROWN, AND REDDISH BROWN IN COLOR; MODERATELY FIRM TO MODERATELY HARD; BRITTLE TO DENSE TENACITY; IRREGULAR AND HACKLY FRACTURE; TABULAR AND WEDGE LIKE CUTTINGS HABIT; EARTHY LUSTER; DULL LUSTER; INTERBEDDED WITH SILTSTONE AND SANDSTONE; SMOOTH TEXTURE; THICK STRUCTURE; GENERALLY NON CALCAREOUS; NO APPARENT HYDROCARBON INDICATORS.

SILTSTONE = REDDISH BROWN TO YELLOWISH BROWN, OCCASIONAL GREENISH HUES; CRUNCHY TO DENSE; MODERATELY FIRM TO MODERATELY HARD; IRREGULAR FRACTURE; TABULAR AND PLATY CUTTINGS HABIT; EARTHY LUSTER; SILTY TO GRITTY TEXTURE; DOMINANTLY A MUD STONE; GENERALLY NON CALCAREOUS; NO APPARENT HYDROCARBON INDICATORS.

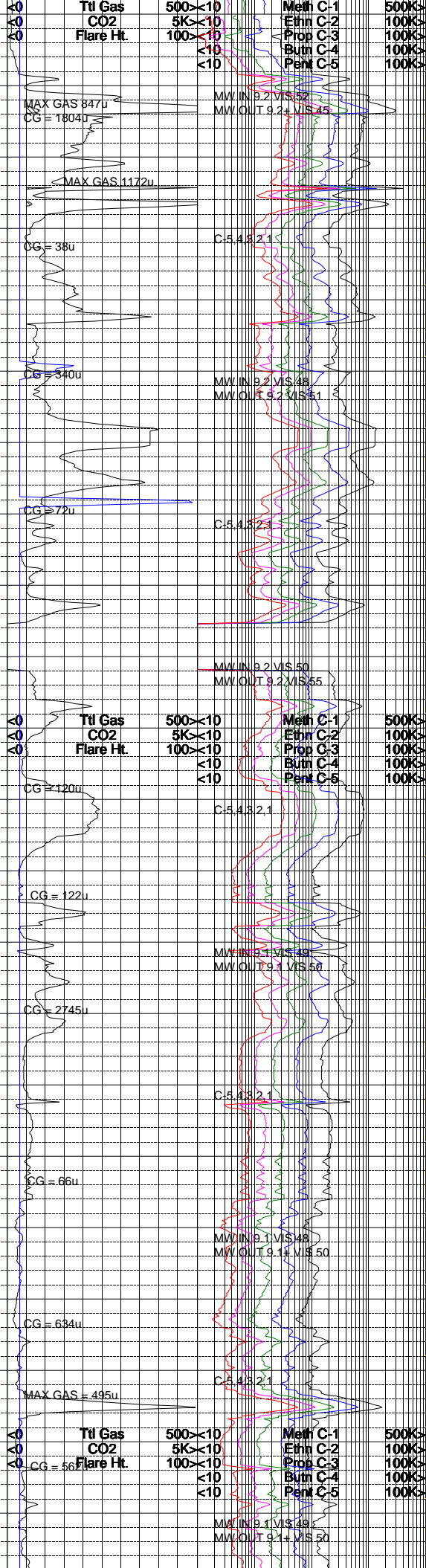
SILTSTONE = VERY LIGHT GRAY TO GRAY; CRUNCHY TO DENSE; FIRM TO MODERATELY HARD; IRREGULAR FRACTURE; IRREGULAR AND TABULAR CUTTINGS HABIT; EARTHY LUSTER; GRITTY TO SILTY TEXTURE; NON TO VERY SLIGHTLY CALCAREOUS; GRADATIONAL TO A SHALE; NO APPARENT HYDROCARBON INDICATORS.

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY; FINE TO MEDIUM GRAIN SIZE; FAIR TO OVERALL MODERATELY WELL SORTED; SUB ANGULAR TO SUB ROUNDED; LOW TO MODERATE SPHERICITY; UNCONSOLIDATED TO DOMINANTLY





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MODERATELY HARD TO HARD; BRITTLE TO DENSE; IRREGULAR FRACTURE; PLATY TO SCALY CUTTINGS HABIT; EARTHY TO DULL LUSTER; OVERALL SMOOTH TEXTURE; GENERALLY CALCAREOUS; NO APPARENT HYDROCARBON INDICATORS.

SILTSTONE = LIGHT GRAY TO MEDIUM GRAY; TOUGH TO DENSE; MODERATELY FIRM TO HARD; IRREGULAR AND HACKLY FRACTURE; TABULAR TO WEDGE LIKE TO MASSIVE CUTTINGS HABIT; EARTHY TO DULL LUSTER; OVERALL SILTY TEXTURE; GRADATIONAL TO SANDSTONE; OVERALL NON CALCAREOUS; NO APPARENT OIL INDICATORS PRESENT.

SANDSTONE = MEDIUM LIGHT GRAY TO LIGHT GRAY COLOR; PREDOMINANTLY QUARTZ GRAINS; VERY FINE GRAIN SIZE; VERY WELL SORTED; SUBROUNDED GRAINS WITH MODERATE TO HIGH SPHERICITY; FIRM, GRAIN SUPPORTED; TRACE OF CHEMICAL DISSOLUTION ON SURFACES OF GRAINS; TRACE OF GROUND SURFACES DUE TO PDC BIT; SLIGHT REACTION WITH HCL; NO FLUORESCENCE UNDER UV LIGHT.

CARBONACEOUS SHALE = OVERALL DARK GRAY TO BLACK IN COLOR; CRUNCHY TO DENSE; MODERATELY FIRM TO MODERATELY HARD; IRREGULAR AND HACKLY FRACTURE; BLOCKY TO MASSIVE CUTTINGS HABIT; WAXY TO DOMINANTLY GREASY LUSTER; OVERALL SMOOTH TEXTURE; IMBEDDED STRINGERS OF SANDSTONE, SHALE, AND COAL LESS THAN 1%; NONCALCAREOUS; SLIGHT DEGASSING ON SURFACE; GRADATIONAL TO SHALE; NO VISIBLE OIL INDICATORS.

NOTE = LOST FULL RETURNS @ 6972'MD. REGAINED PARTIAL RETURNS @ 6981'MD. LOST FULL RETURNS @ 7003'MD. NO SAMPLE WAS TAKEN FROM 6930'MD - 6960'MD. REGAINED PARTIAL RETURNS @ 7017'MD.

SILTSTONE = GRAYISH BROWN TO BROWNISH GRAY TO MEDIUM GRAY COLOR; DENSE TO CRUNCHY TENACITY; IRREGULAR TO EARTHY FRACTURE; WEDGE LIKE TO NODULAR CUTTINGS HABIT; SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; MASSIVE STRUCTURE; NO REACTION WITH HCL.

COAL = BLACK; TOUGH TO BRITTLE TENACITY; BLOCKY, CONCHOIDAL FRACTURE; TABULAR AND BLOCKY CUTTINGS HABIT; POLISHED TO VITREOUS LUSTER; SMOOTH TEXTURE; GRADATIONAL TO CARBONACEOUS SHALE; TRACE PYRITE IMBEDDED IN SAMPLE.

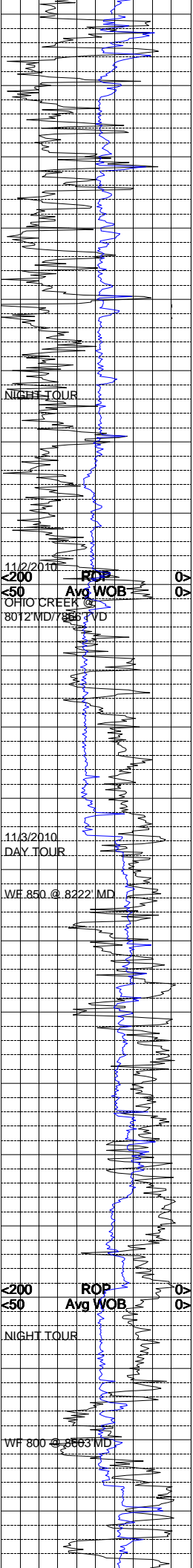
SANDSTONE = LIGHT GRAY, MEDIUM GRAY TO BROWNISH GRAY; QUARTZ FRAMEWORK; VERY FINE GRAINED; FAIRLY WELL TO WELL SORTED; SUBANGULAR TO SUBROUNDED; FRIABLE TO MODERATELY HARD; GRAIN SUPPORTED; INTERSTICES OCCLUDED; MINOR CALCITE AND SILICA CEMENT; FAINTLY BEDDED AS INDICATED BY GRAIN SIZE AND COLOR OF TRACE MINERALS; DOES NOT FLUORESC

SHALE = LIGHT GRAY, MEDIUM LIGHT GRAY, MEDIUM GRAY TO LIGHT BROWNISH GRAY; TOUGH. BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY TO WEDGE LIKE CUTTINGS HABIT; GREASY, WAXY TO EARTHY LUSTER; CLAYEY TO SILTY TEXTURE; MASSIVE STRUCTURE; GRADATIONAL TO CARBONACEOUS SHALE WITH CHANGE IN COLOR TO GRAYISH RED TO DUSKY BROWN; TRACE DISSEMINATED CARBONACEOUS MATERIAL

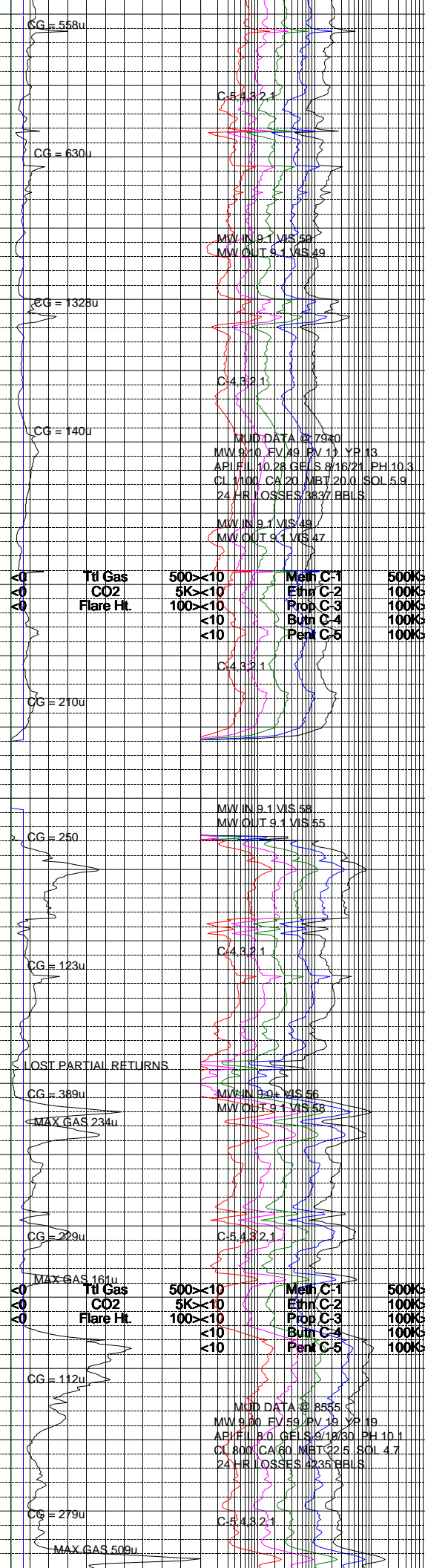
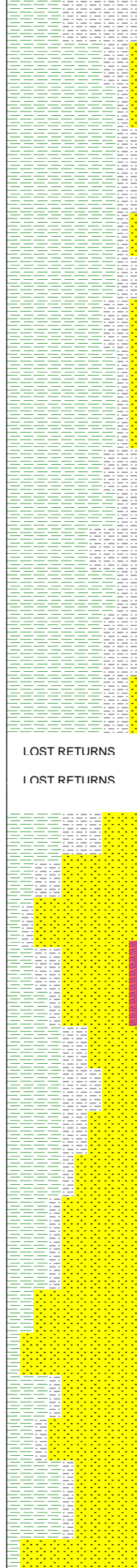
CARBONACEOUS SHALE = GRAYISH RED, GRAYISH BROWN, DUSKY BROWN TO VERY DUSKY RED; DENSE, TOUGH, BRITTLE TO CRUNCHY TENACITY; BLOCKY TO IRREGULAR FRACTURE; PLATY TO WEDGE LIKE CUTTINGS HABIT; DULL TO EARTHY LUSTER; CLAYEY, SILTY TO GRITTY TEXTURE; MASSIVE TO LENTICULAR STRUCTURE; NARROW LENSES OF CARBONACEOUS MATERIAL OCCUR; IRREGULAR LENSES AND ACCUMULATIONS OF PYRITE RANDOMLY DISTRIBUTED.

SILTSTONE = MEDIUM LIGHT GRAY, MEDIUM GRAY, BROWNISH GRAY, PALE REDDISH BROWN TO GRAYISH RED; TOUGH, BRITTLE TO CRUNCHY; IRREGULAR TO PLANAR FRACTURE; PLATY, TABULAR TO WEDGE LIKE CUTTINGS HABIT; WAXY, DULL TO EARTHY LUSTER; CLAYEY TO SILTY TEXTURE; MASSIVE STRUCTURE; BEDDING AND LAMINATIONS ARE INDISTINCT.

SHALE = LIGHT GRAY, MEDIUM LIGHT GRAY, BROWNISH GRAY, PALE REDDISH BROWN, MODERATE REDDISH BROWN TO GRAYISH RED; DENSE, BRITTLE TO CRUMBLY; IRREGULAR TO PLANAR FRACTURE; MASSIVE, PLATY TO WEDGE LIKE CUTTINGS HABIT; WAXY,



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DULL TO EARTHY LUSTER; CLAYEY TO SILTY TEXTURE; MASSIVE STRUCTURE, BEDDING OR LAMINAE INDISTINCT; TRACE DISSEMINATED CARBONACEOUS MATERIAL AND PYRITE.

SANDSTONE = LIGHT GRAY, MEDIUM GRAY TO BROWNISH GRAY; QUARTZ FRAMEWORK; VERY FINE GRAINED; FAIRLY WELL TO WELL SORTED; SUBANGULAR TO SUBROUNDED; FRIABLE TO MODERATELY HARD; GRAIN SUPPORTED; INTERSTICES OCCLUDED; MINOR CALCITE AND SILICA CEMENT; FAINTLY BEDDED AS INDICATED BY GRAIN SIZE AND COLOR OF TRACE MINERALS; NO FLUORESCENCE IN SAMPLE.

SHALE = VERY LIGHT GRAY TO MEDIUM GRAY TO DARK GRAY, OCCASIONAL GREEN, BLUE AND BROWNISH HUES; CRUNCHY TO DENSE; MODERATELY HARD TO HARD; IRREGULAR AND HACKLY FRACTURE; TABULAR AND WEDGELIKE CUTTINGS HABIT; EARTHY, DULL LUSTER; SILTY TO SMOOTH TEXTURE; SMALL TRACES OF SILTSTONE AND SAND GRAINS IN SAMPLE MATRIX; OVERALL NON CALCAREOUS; NO VISIBLE FLUORESCENCE.

SILTSTONE = LIGHT BROWNISH GRAY TO LIGHT MEDIUM GRAY COLOR; CRUNCHY TO DENSE TENACITY; IRREGULAR FRACTURE; NODULAR TO TABULAR TO WEDGELIKE CUTTINGS HABIT; WAXY, VITREOUS LUSTER; SILTY TO GRITTY TEXTURE, GRADING INTO SANDSTONE; MASSIVE STRUCTURE; NO REACTION WITH HCL.

NOTE = POOH FOR WIPER TRIP @ 7990'MD.

SHALE = LIGHT GRAY TO DARK GRAY TO REDDISH BRN; CRUNCHY TO BRITTLE TO SLIGHTLY DENSE TENACITY; FRACTURE TENDS TO BE PLANAR; GENERALLY PLATY TO WEDGE LIKE TO BLADED CUTTINGS; LUSTER IS EARTHY TO DULL TO WAXY; OVERALL SMOOTH TO SLIGHTLY CLAYEY TEXTURE; THIN STRUCTURE.

NOTE = LOST FULL RETURNS @ 8152'MD
NO SAMPLE WAS TAKEN FROM 8100'MD - 8160'MD.

SANDSTONE = LIGHT GRAY, MEDIUM GRAY; QUARTZ FRAMEWORK; FINE TO VERY FINE GRAINED; FAIR TO VERY WELL SORTED; SUBANGULAR TO SUBROUND; FRIABLE TO MODERATELY HARD; MODERATE CALCITE CEMENT; GRAIN SUPPORTED; INTERSTICES OCCLUDED; NO VISIBLE BEDDING FEATURES; MINOR COLOR VARIATION; 3-5 PERCENT DARK MAFIC AND OPAQUE ACCESSORY MINERALS; NO FLUORESCENCE; LARGE AGGREGATE TO RHOMBIC CALCITE FROM FRACTURE FILLING. CALCITE RHOMBS ARE TRANSLUCENT AND SHOW FLUID INCLUSIONS ALONG GROWTH SURFACES AND CLEAVAGE PLANES.

SHALE = LIGHT GRAY, MEDIUM LIGHT GRAY, LIGHT BROWNISH GRAY TO LIGHT BROWN; TOUGH, DENSE, BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO PLANAR FRACTURE; PLATY, FLAKY TO WEDGELIKE CUTTINGS HABIT WAXY, DULL TO EARTHY LUSTER; CLAYEY TO SILTY TEXTURE; MASSIVE, POORLY DEVELOPED STURCTURE OR BEDDING.

SILTSTONE = LIGHT GRAY, MEDIUM LIGHT GRAY TO GREENISH GRAY; TOUGH, BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO PLANAR FRACTURE; MASSIVE, PLATY TO WEDGELIKE CUTTINGS HABIT; DULL TO EARTHY LUSTER; CLAYEY, GRITTY TO SILTY TEXTURE; MASSIVE TO FAINTLY DEVELOPED STRUCTURE.

SANDSTONE = VERY LIGHT GRAY, LIGHT GRAY, MEDIUM LIGHT GRAY, PINKISH GRAY TO VERY PALE ORANGE; QUARTZ FRAMEWORK; FINE GRAINED TO VERY FINE GRAINED; WELL TO VERY WELL SORTED; SUBROUNDED TO ROUNDED CLEAR TO TRANSLUCENT QUARTZ; SOFT TO FIRMLY FRIABLE; MOSTLY GRAIN SUPPORTED; INTERSTICES OCCLUDED; NO SAMPLE FLUORESCENCE.

SILTSTONE = MEDIUM TO LIGHT GRAY WITH REDDISH BROWN HUES; OVERALL TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURE; WEDGELIKE CUTTINGS HABIT; DULL TO MEDIUM GRAIN SIZE; VERY SILTY TO GRITTY TEXTURE; MASSIVE STRUCTURE; VERY SLIGHT REACTION WITH HCL.

NOTE = LOOSE CALCITE IN SAMPLE; MAY BE FRACTURE FILL FROM UP HOLE LOSSES.

SANDSTONE = WHITE TO CLEAR TO OPAQUE AND LIGHT BROWNISH GRAY WITH LESS THAN 5% DARK LITHIC FRAGMENTS IN GRAINS; FINE TO MEDIUM GRAIN SIZE WITH TRACES OF COARSE GRAINS WITHIN MATRIX; WELL TO FAIRLY SORTED; SUBANGULAR TO ANGULAR AND SUBROUNDED GRAINS; MODERATE TO HIGH

