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MUDLOG TVD

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

DEPTHS:	3,852'	TO	12,294'
DATES:	03/02/2010	TO	03/16/2010
SCALE:	5" = 100'		

CASING DATA

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

MUD TYPES

LSND	TO	12,294'
	TO	
	TO	
	TO	

HOLE SIZE

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
	ANDESITE
	ANHYDRITE
	BASALT
	BENTONITE
	BIOTITIZATION
	BRECCIA
	CALCARENITE
	CALCAREOUS TUFF
	CALCILUTITE
	CARBONATES
	CARBONACEOUS MAT
	CARBONACEOUS SH
	CEMENT CONTAM.
	CHALK
	CRYSTALLINE TUFF
	CHERT - ARGILL

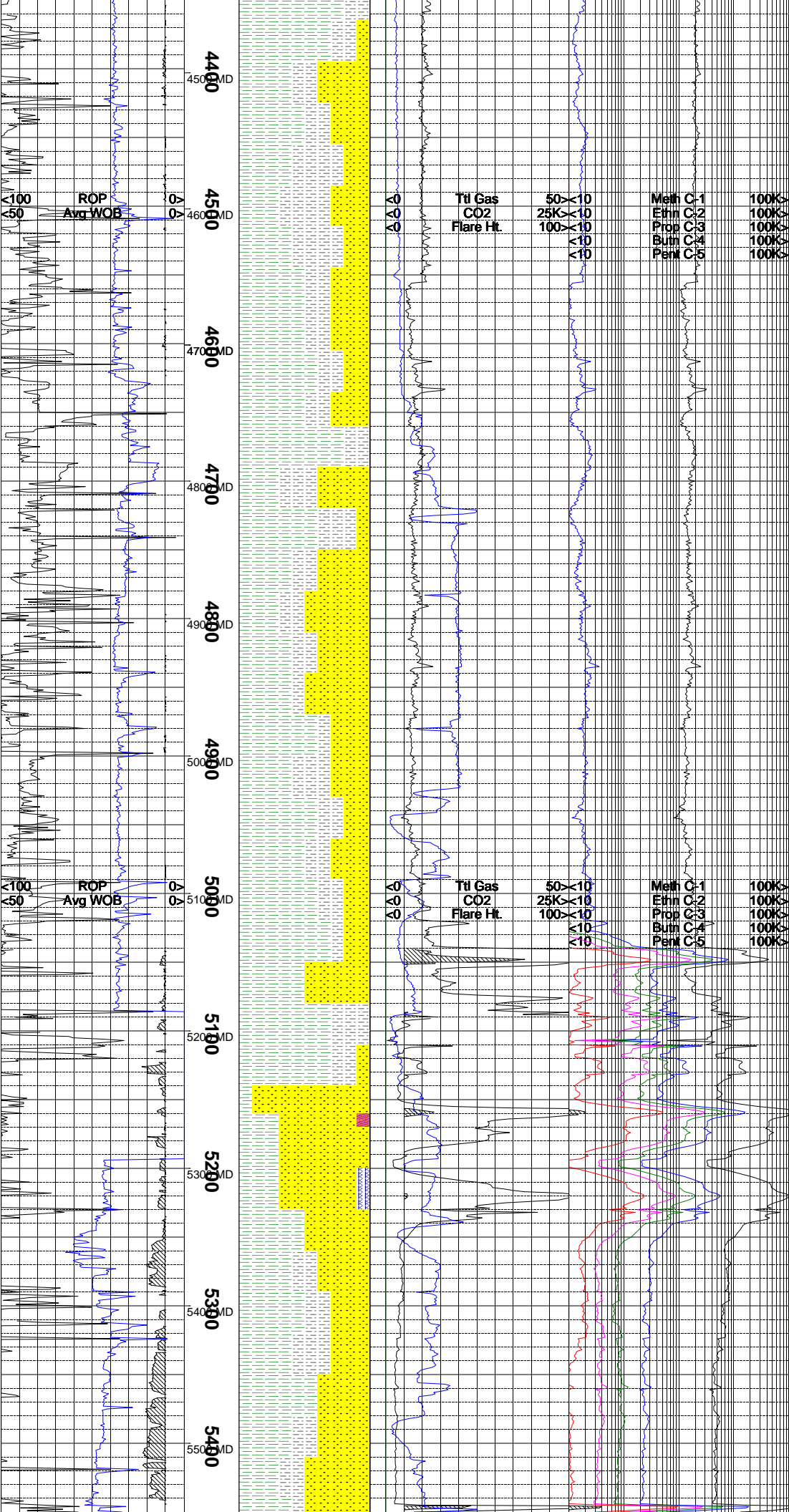
	CHERT - GLASSY
	CHERT - PORCEL
	CHERT - TIGER STRIPE
	CHERT - UNDIFF
	CLAY
	CLAY-MUDSTONE
	CLYST-TUFFACEOUS
	CHLORITIZATION
	COAL
	CONGLOMERATE
	CONGL. SAND
	CONGL. SANDSTONE
	COQUINA
	DACITE
	DIATOMITE
	DIORITE
	DOLOSTONE

	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
	SALT
	SAND

	SANDSTONE
	SANDSTONE-TUFFACEOUS
	SERICITIZATION
	SERPENTINE
	SHALE
	SHALE TUFFACEOUS
	SHELL FRAGMENTS
	SIDERITE
	SILICIFICATION
	SILTSTONE
	SILTST-TUFFACEOUS
	TUFF
	VOLCANICLASTICS SEDS
	VOLCANICS

Survey Data, Mud Reports, Other Info.					
Remarks					
<p>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.</p> <p>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.</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 GAS BUSTER THE INTERVAL IS MARKED ON THE MGS COLUMN AND THE SIZE OF FLARES NOTED.</p> <p>EVIDENCE OF FRACTURE FILL IS NOTED ON THE MUD LOG. KAOLIN PERCENTAGE IN SS INTERVALS IS ALSO NOTED ON THE MUD LOG.</p> <p>1 UNIT OF GAS = 200PPM METHANE</p> <p>10.75" CASING SET @ 3,837'</p> <p>CANRIG STARTED FULL LOGGING SERVICES @ 3,852' ON 03/02/2010.</p> <p>DRILL TO 3,862' AND PERFORM F.I.T.</p> <p>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 EARTHLY LUSTER; SMOOTH TO CLAYEY TEXTURE; THICK STRUCTURE; THICKLY BEDDED WITH SANDSTONE AND SOME SILTSTONE; ABUNDANT AMOUNT OF ORANGE-BROWN MUD IN SAMPLE.</p> <p>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.</p> <p>SHALE = BROWNISH GRAY TO GRAY TO LIGHT BLUISH GRAY; BRITTLE TO PULVERULENT TENACITY; IRREGULAR TO PLANAR FRACTURE; DULL TO EARTHLY 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.</p> <p>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.</p> <p>NAHCOLITE = TRACE AMOUNTS IN SAMPLE; CLEAR; CRYSTALLINE; SOFT; WITH OUTER REDDISH CLAY COATING.</p> <p>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.</p>					



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.

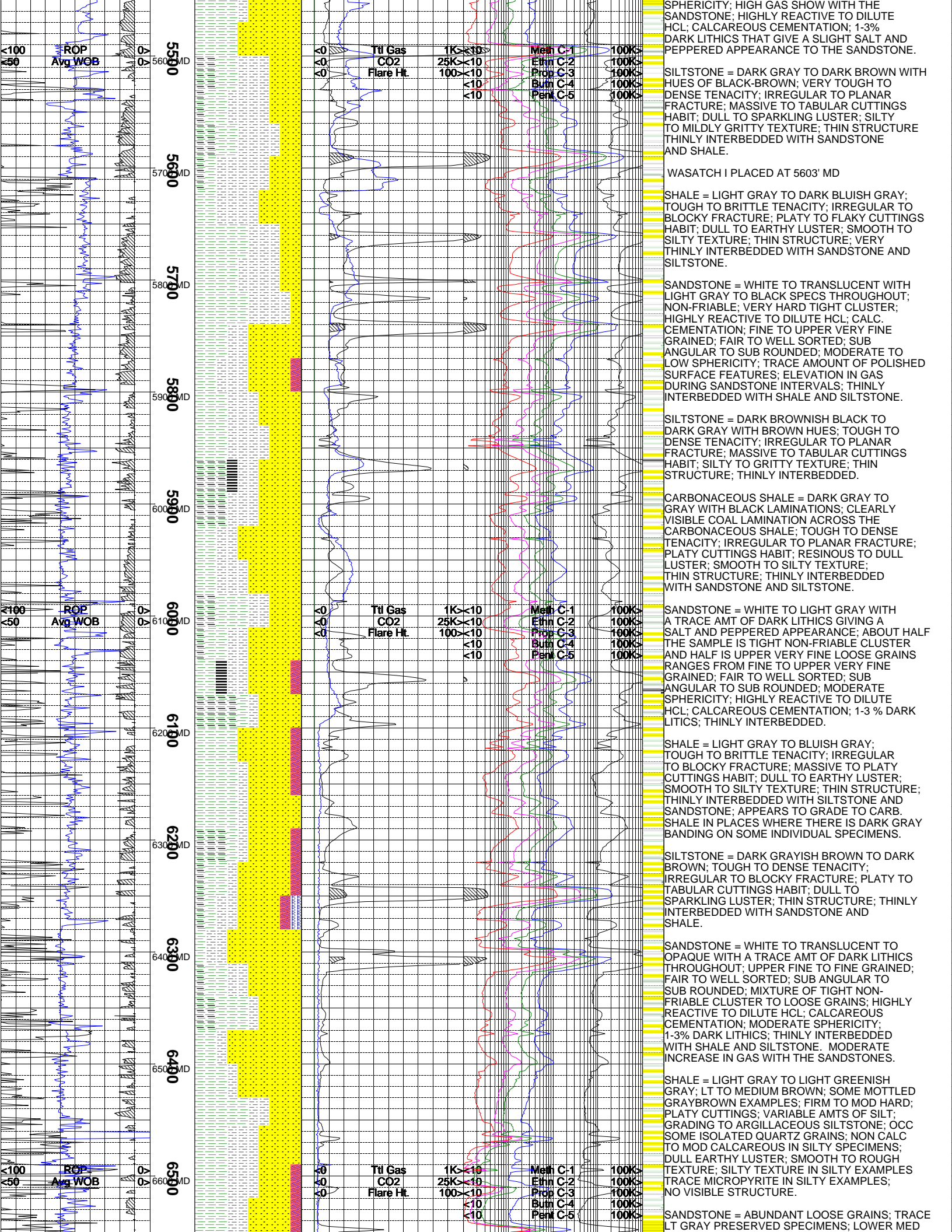
WASATCH G PLACED AT 5254' MD 5154' TVD

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 LITHICS; THINLY INTERBEDDED.

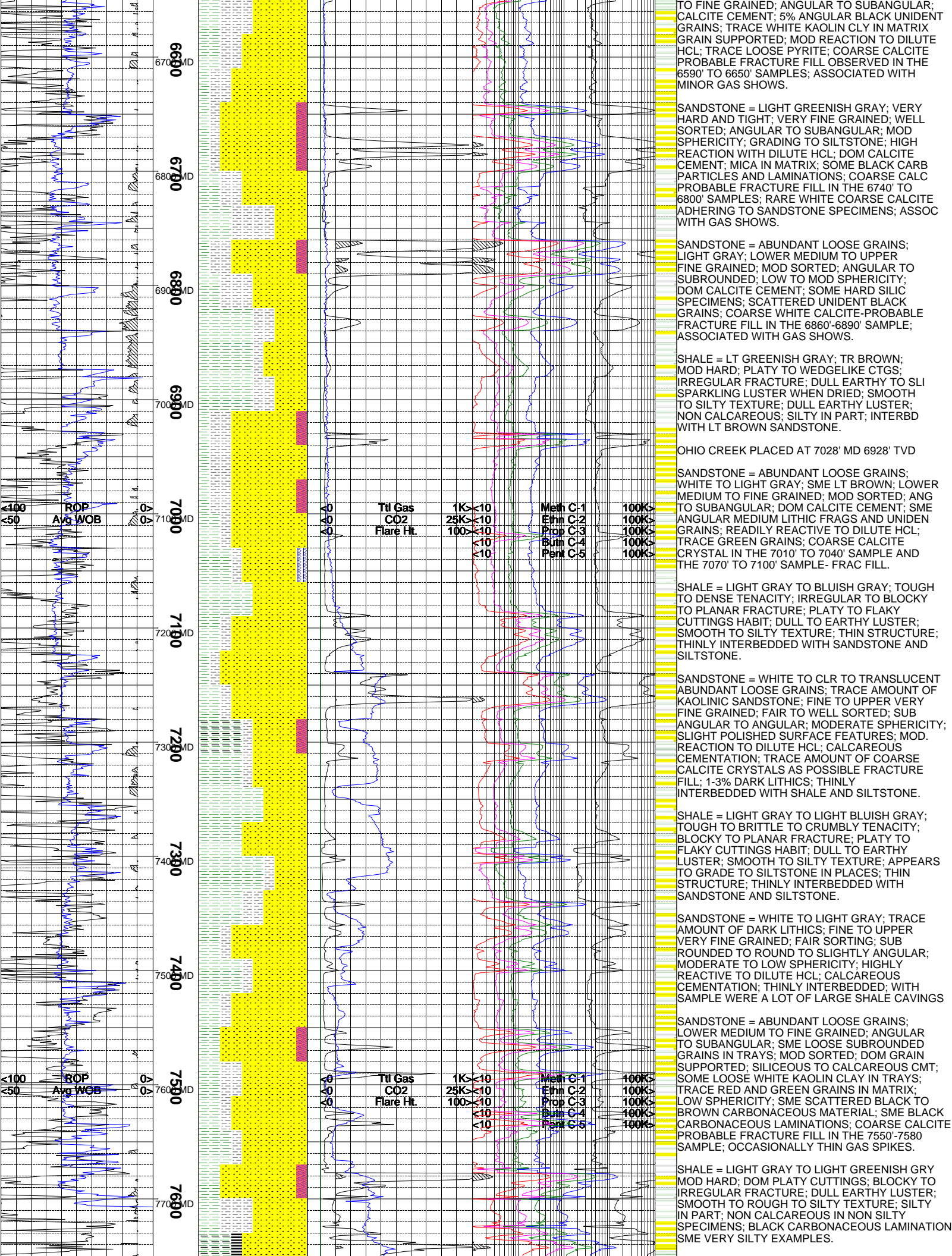
SHALE = LIGHT GRAY TO BLuish GRAY; TOUGH TO BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; THINLY INTERBEDDED WITH SILTSTONE AND SANDSTONE; APPEARS TO GRADE TO CARB. SHALE IN PLACES WHERE THERE IS DARK GRAY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

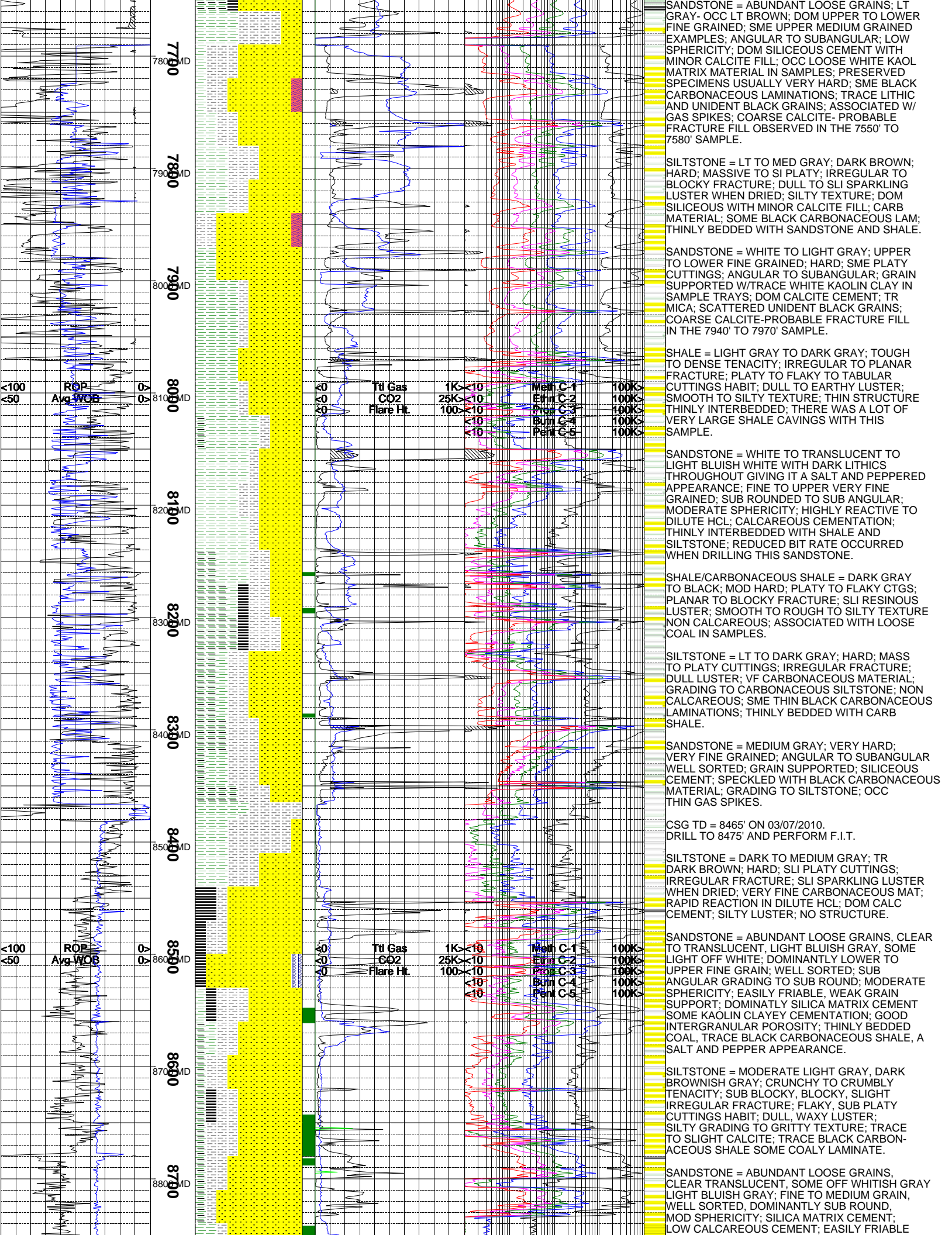
SILTSTONE = DARK GRAYISH BROWN TO DARK BROWN; TOUGH TO DENSE TENACITY; IRREGULAR TO BLOCKY FRACTURE; PLATY TO TABULAR CUTTINGS HABIT; DULL TO SPARKLING LUSTER; THIN STRUCTURE; THINLY INTERBEDDED WITH SANDSTONE AND SHALE.

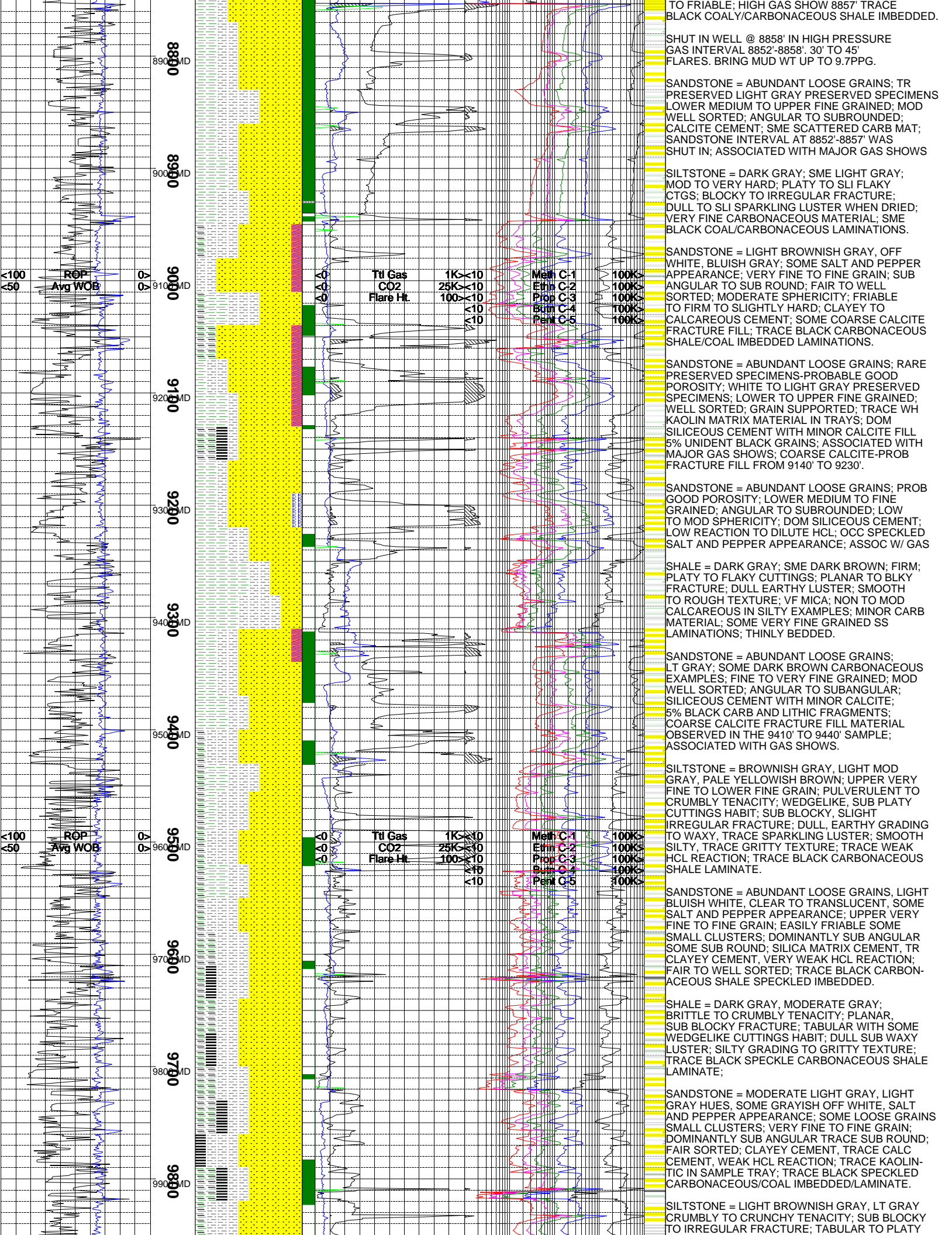
SANDSTONE = WHITE TO TRANSLUCENT TO OPAQUE WITH A TRACE AMT OF DARK LITHICS THROUGHOUT; UPPER FINE TO FINE GRAINED; FAIR TO WELL SORTED; SUB ANGULAR TO SUB ROUNDED; MIXTURE OF TIGHT NON-FRIABLE CLUSTER TO LOOSE GRAINS; HIGHLY REACTIVE TO DILUTE HCL; CALCAREOUS CEMENTATION; MODERATE SPHERICITY; 1-3% DARK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

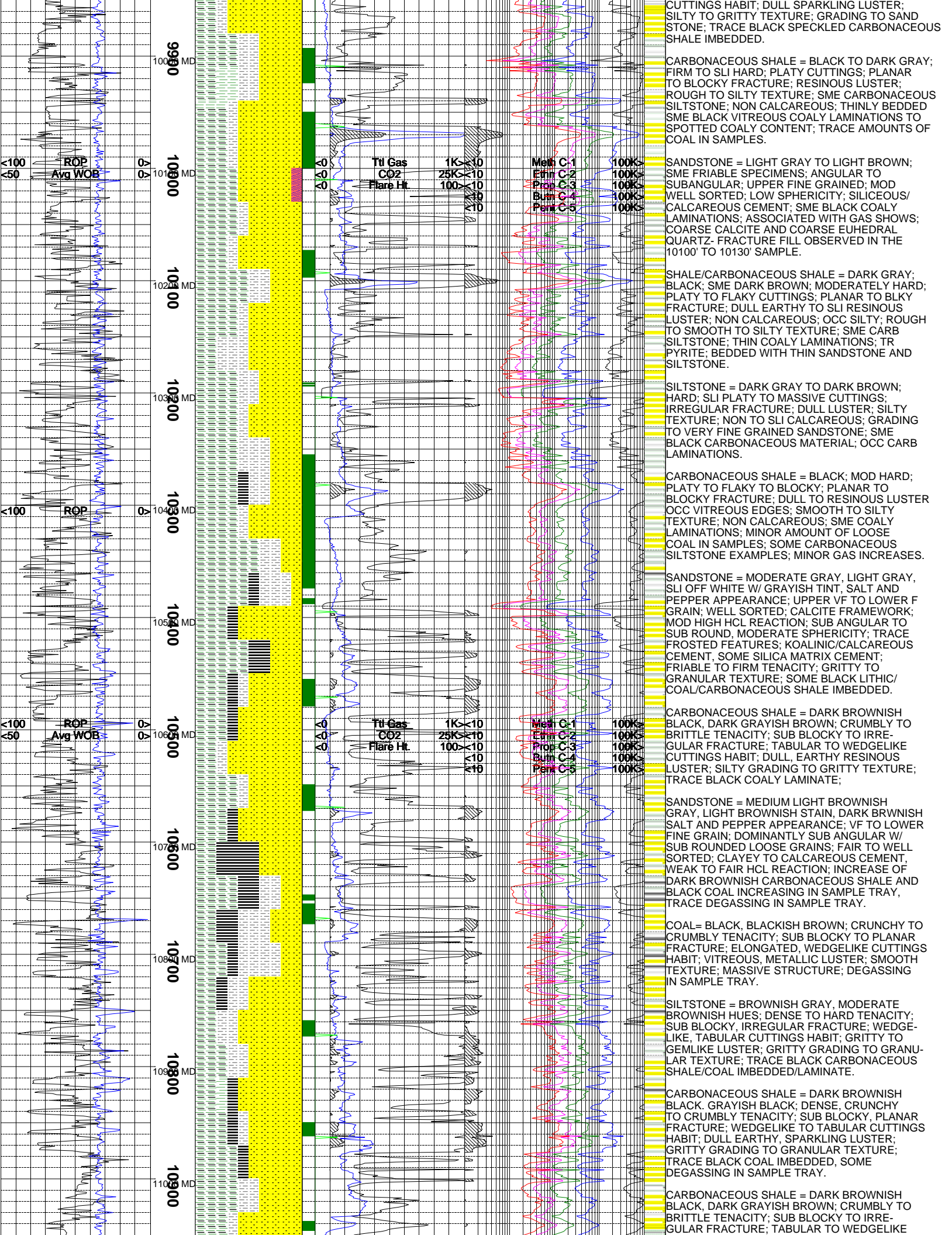
SHALE = LIGHT GRAY TO LIGHT GREENISH GRAY; LT TO MEDIUM BROWN; SOME MOTTLED GRAYBROWN EXAMPLES; FIRM TO MOD HARD; PLATY CUTTINGS; VARIABLE AMTS OF SILT; GRADING TO ARGILLACEOUS SILTSTONE; OCC SOME ISOLATED QUARTZ GRAINS; NON CALC TO MOD CALCAREOUS IN SILTY SPECIMENS; DULL EARTHY LUSTER; SMOOTH TO ROUGH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

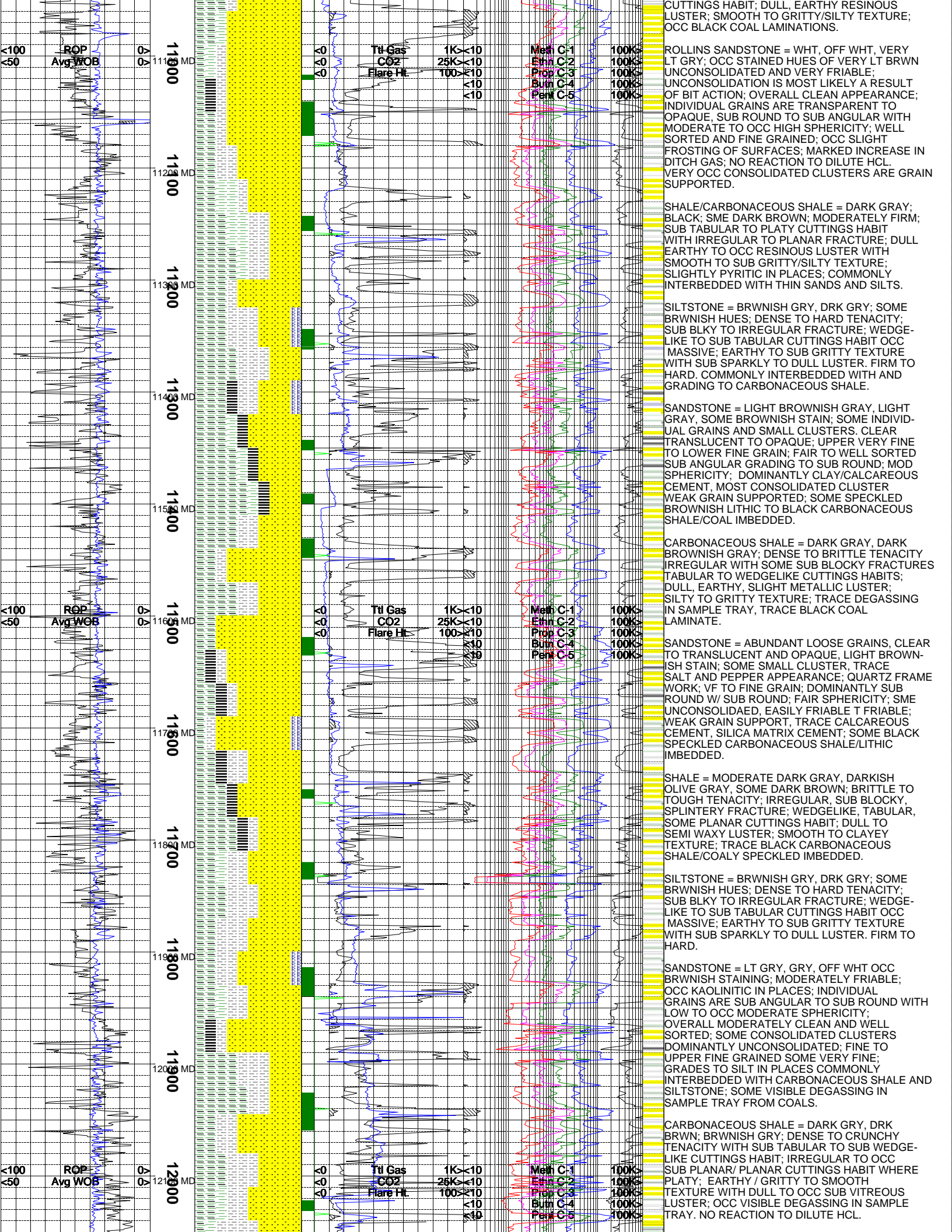
SANDSTONE = ABUNDANT LOOSE GRAINS; TRACE LT GRAY PRESERVED SPECIMENS; LOWER MED

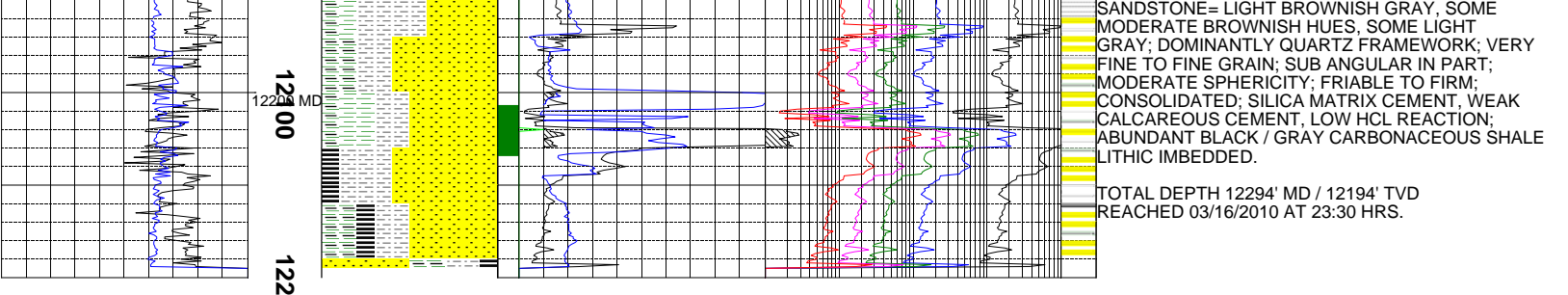












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