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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 TVD

COMPANY	EXXONMOBIL
WELL	FRU197-33A2
FIELD	FREEDOM RANCH UNIT
REGION	ROCKIES
COORDINATES	39.915658 108.285631
ELEVATION	6390'
COUNTY, STATE	RIO BLANCO, CO
API INDEX	05-103-11098-00
SPUD DATE	2/1/2009
CONTRACTOR	HELMRICH AND PAYNE
CO. REP.	KEVIN GARDNER
RIG/TYPE	239 / Flex 3
LOGGING UNIT	MLU 033
GEOLOGISTS	LAYNE GOOD NICK BAUER
ADD. PERSONS	JASON REISENBICHLER
CO. GEOLOGIST	MELISSA SAURBORN

LOG INTERVAL

DEPTHS: 4000' **TO** 12297'
DATES: 6/26/2009 **TO** 7/10/2009
SCALE: 1" = 100'

CASING DATA

16" **AT** 130'
10.75" **AT** 3956'
7" **AT** 8536'

AT

HOLE SIZE

14.75" **TO** 3983'
9.875" **TO** 8555'
6.125" **TO** 12297'
TO

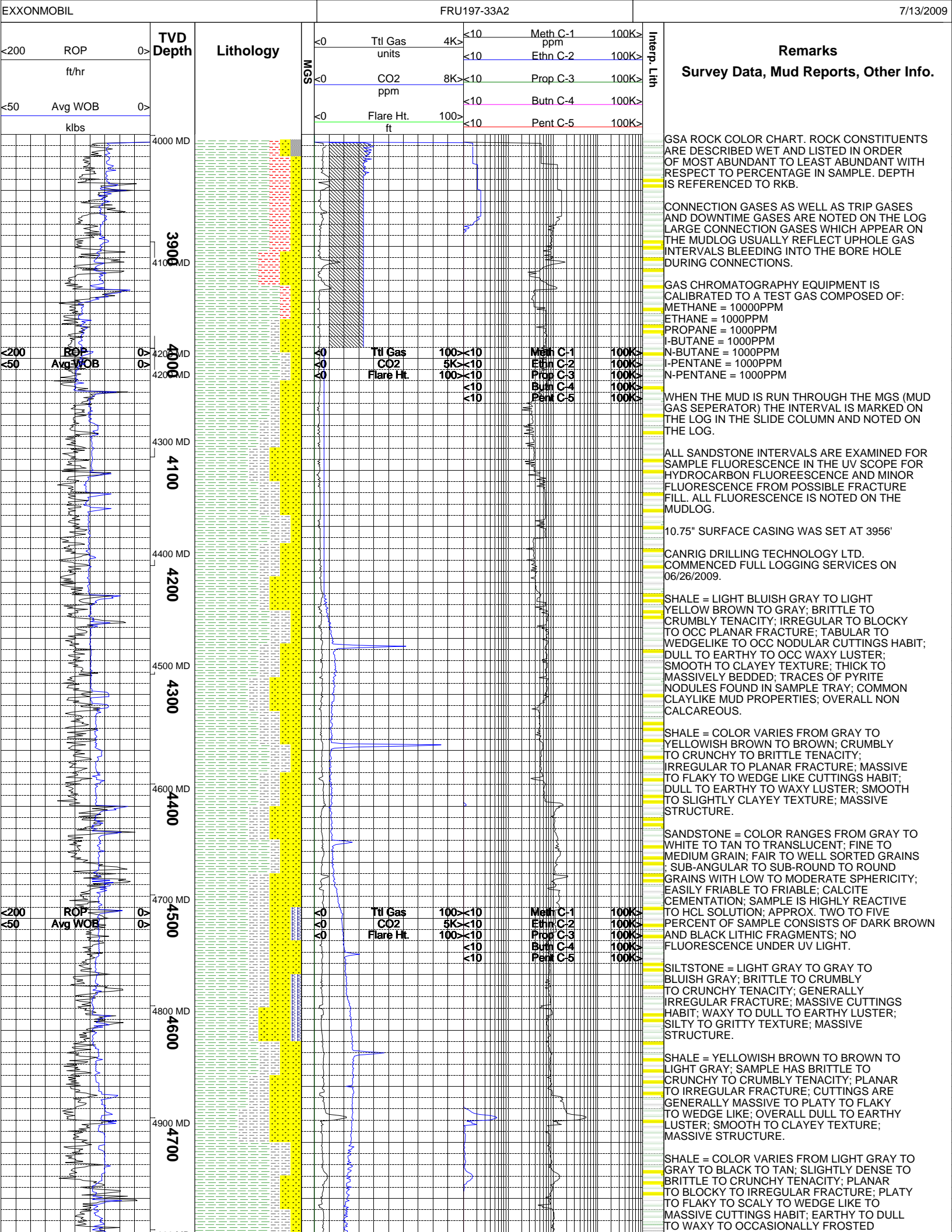
MUD TYPES

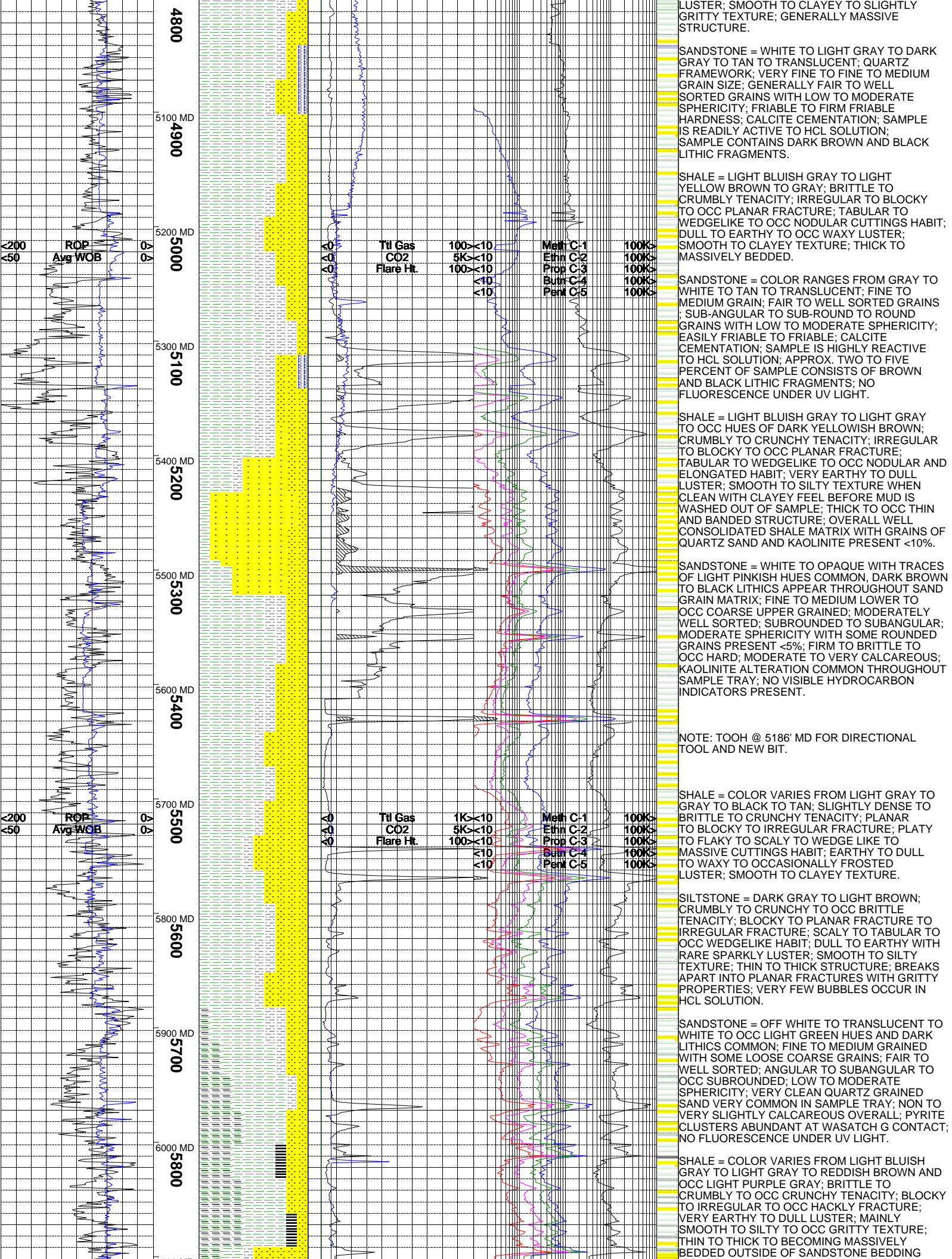
SPUD MUD **TO** 3983'
LSND **TO** 12297'
TO
TO

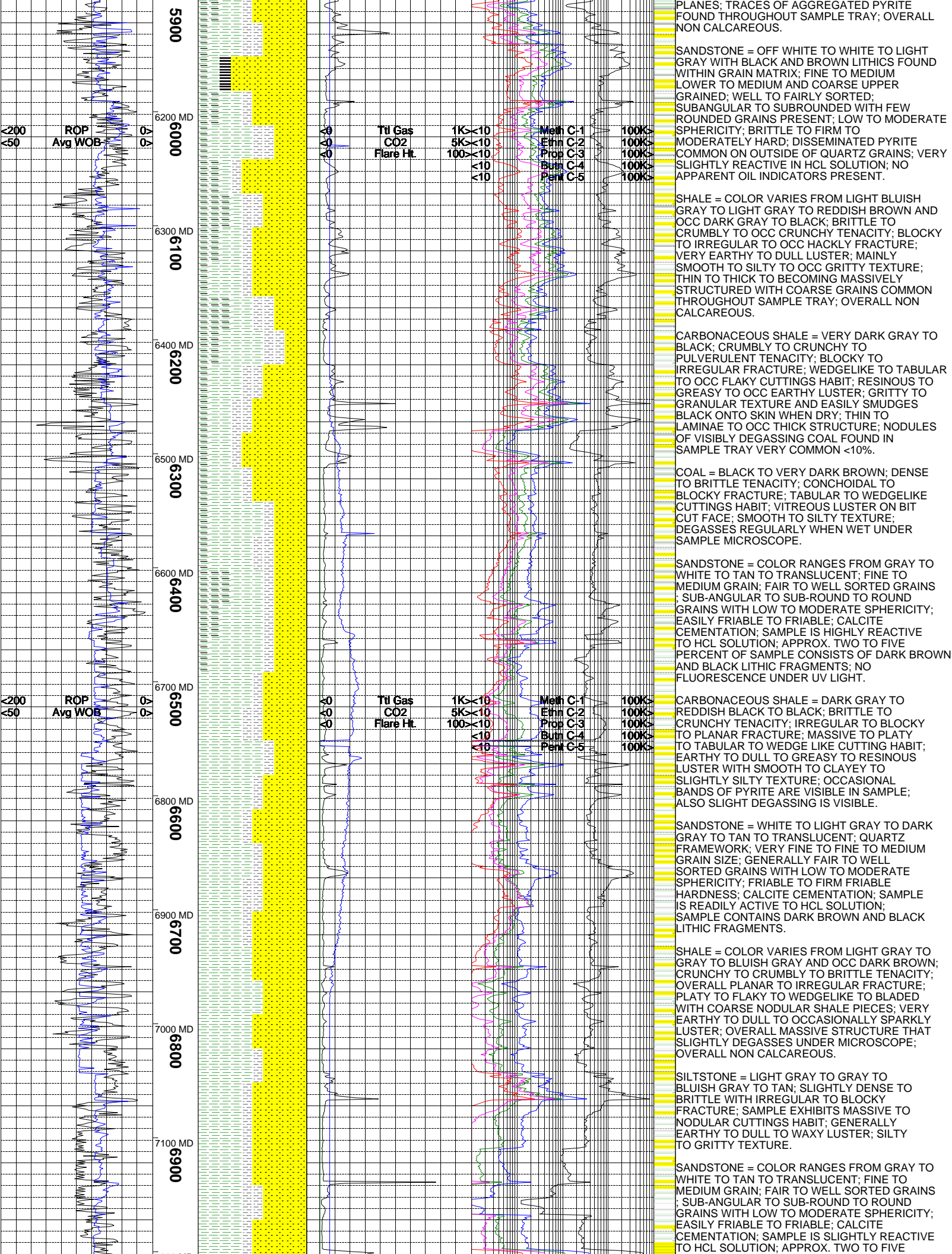
ABBREVIATIONS

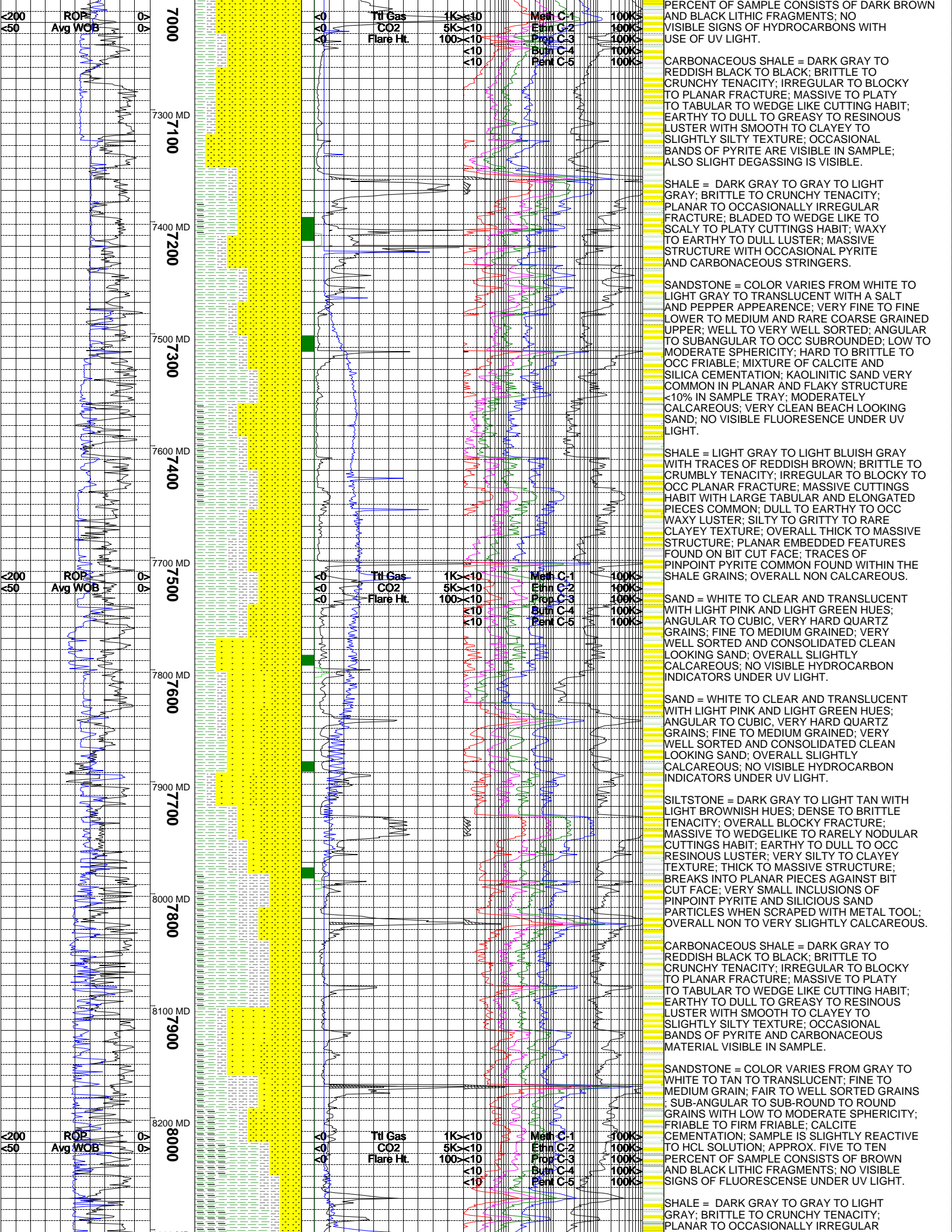
<i>NB</i> NEWBIT	<i>PV</i> PLASTIC VISCOSITY	<i>LC</i> LOST CIRCULATION
<i>RRB</i> RERUN BIT	<i>YP</i> YIELD POINT	<i>CO</i> CIRCULATE OUT
<i>CB</i> CORE BIT	<i>FL</i> FLUID LOSS	<i>NR</i> NO RETURNS
<i>WOB</i> WEIGHT ON BIT	<i>CL</i> PPM CLORIDE ION	<i>TG</i> TRIP GAS
<i>RPM</i> ROTARY REV/MIN	<i>Rm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

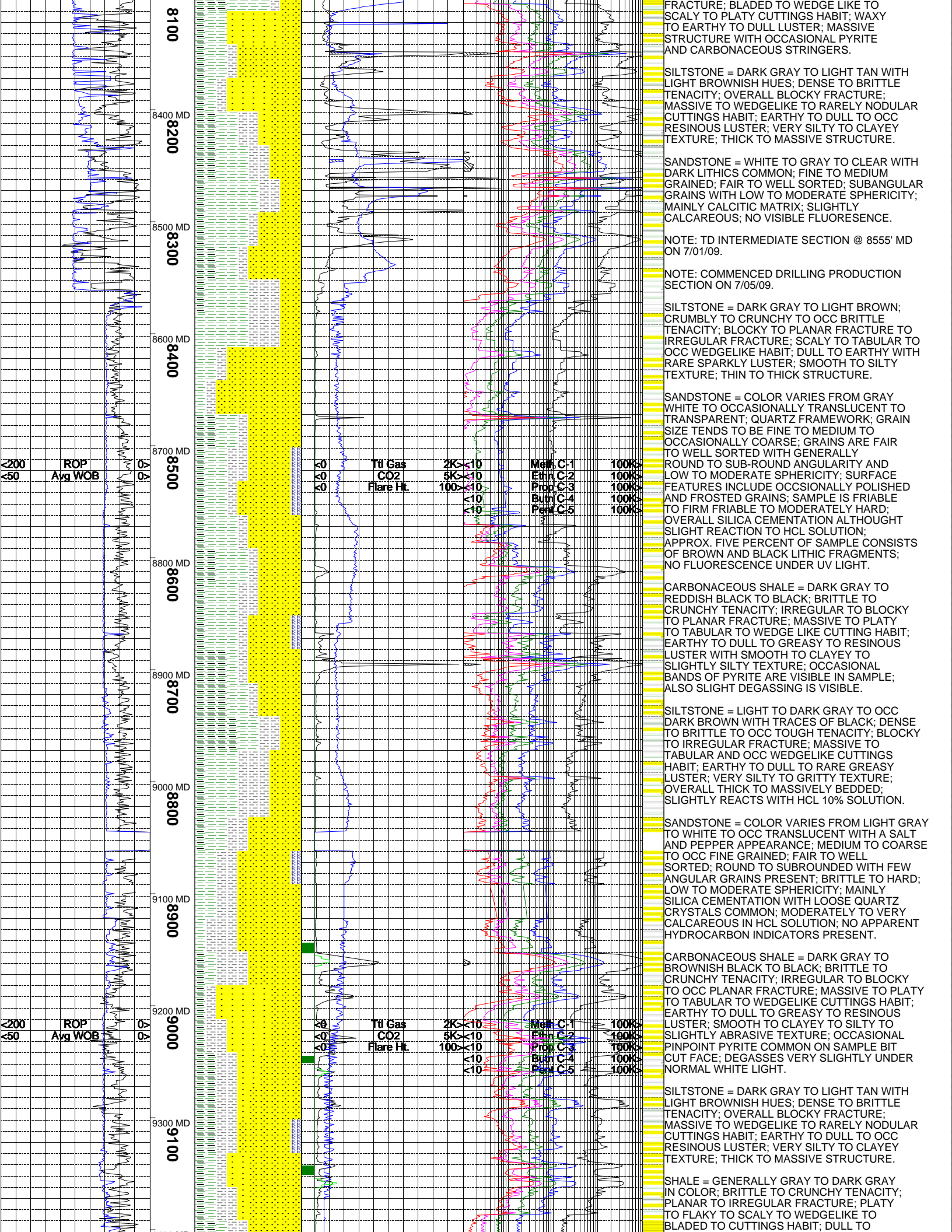
ALTERED ZONE	CHERT - GLASSY	FELSIC SILIC DIKE	MARL - CALC	SANDSTONE
ANDESITE	CHERT - PORCEL	FOSSIL	METAMORPHICS	SANDSTONE-TUFFACEOUS
ANHYDRITE	CHERT - TIGER STRIPE	GABBRO	MUDSTONE	SERICITIZATION
BASALT	CHERT - UNDIFF	GLASSY TUFF	OBSIDIAN	SERPENTINE
BENTONITE	CLAY	GRANITE	PALEOSOL	SHALE
BIOTITIZATION	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	

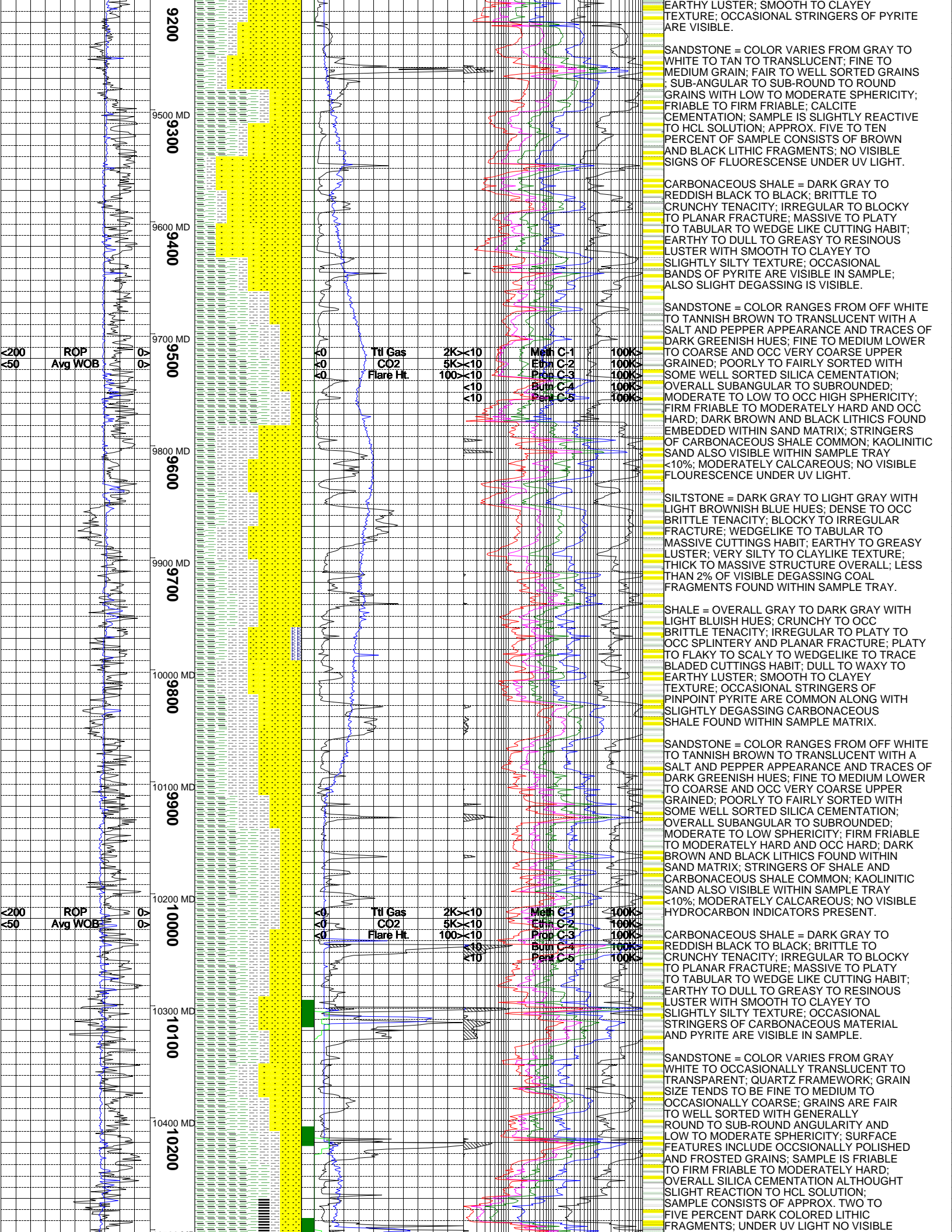












EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; OCCASIONAL STRINGERS OF PYRITE ARE VISIBLE.

SANDSTONE = COLOR VARIES FROM GRAY TO WHITE TO TAN TO TRANSLUCENT; FINE TO MEDIUM GRAIN; FAIR TO WELL SORTED GRAINS ; SUB-ANGULAR TO SUB-ROUND TO ROUND GRAINS WITH LOW TO MODERATE SPHERICITY; FRIABLE TO FIRM FRIABLE; CALCITE CEMENTATION; SAMPLE IS SLIGHTLY REACTIVE TO HCL SOLUTION; APPROX. FIVE TO TEN PERCENT OF SAMPLE CONSISTS OF BROWN AND BLACK LITHIC FRAGMENTS; NO VISIBLE SIGNS OF FLUORESCENCE UNDER UV LIGHT.

CARBONACEOUS SHALE = DARK GRAY TO REDDISH BLACK TO BLACK; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY TO TABULAR TO WEDGE LIKE CUTTING HABIT; EARTHY TO DULL TO GREASY TO RESINOUS LUSTER WITH SMOOTH TO CLAYEY TO SLIGHTLY SILTY TEXTURE; OCCASIONAL BANDS OF PYRITE ARE VISIBLE IN SAMPLE; ALSO SLIGHT DEGASSING IS VISIBLE.

SANDSTONE = COLOR RANGES FROM OFF WHITE TO TANNISH BROWN TO TRANSLUCENT WITH A SALT AND PEPPER APPEARANCE AND TRACES OF DARK GREENISH HUES; FINE TO MEDIUM LOWER TO COARSE AND OCC VERY COARSE UPPER GRAINED; POORLY TO FAIRLY SORTED WITH SOME WELL SORTED SILICA CEMENTATION; OVERALL SUBANGULAR TO SUBROUNDED; MODERATE TO LOW TO OCC HIGH SPHERICITY; FIRM FRIABLE TO MODERATELY HARD AND OCC HARD; DARK BROWN AND BLACK LITHICS FOUND EMBEDDED WITHIN SAND MATRIX; STRINGERS OF CARBONACEOUS SHALE COMMON; KAOLINITIC SAND ALSO VISIBLE WITHIN SAMPLE TRAY <10%; MODERATELY CALCAREOUS; NO VISIBLE FLOURESCENCE UNDER UV LIGHT.

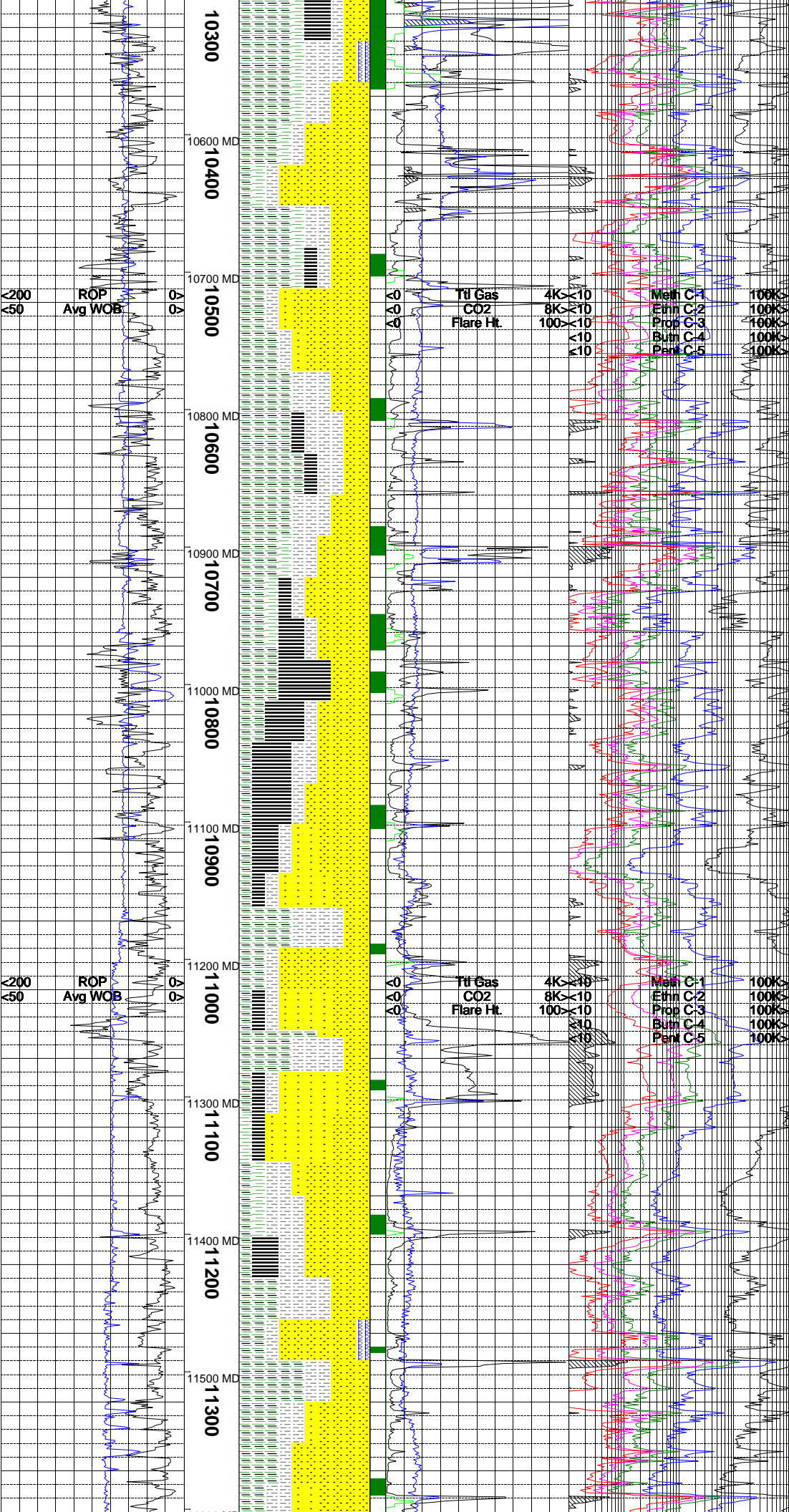
SILTSTONE = DARK GRAY TO LIGHT GRAY WITH LIGHT BROWNISH BLUE HUES; DENSE TO OCC BRITTLE TENACITY; BLOCKY TO IRREGULAR FRACTURE; WEDGELIKE TO TABULAR TO MASSIVE CUTTINGS HABIT; EARTHY TO GREASY LUSTER; VERY SILTY TO CLAYLIKE TEXTURE; THICK TO MASSIVE STRUCTURE OVERALL; LESS THAN 2% OF VISIBLE DEGASSING COAL FRAGMENTS FOUND WITHIN SAMPLE TRAY.

SHALE = OVERALL GRAY TO DARK GRAY WITH LIGHT BLUISH HUES; CRUNCHY TO OCC BRITTLE TENACITY; IRREGULAR TO PLATY TO OCC SPLINTERY AND PLANAR FRACTURE; PLATY TO FLAKY TO SCALY TO WEDGELIKE TO TRACE BLADED CUTTINGS HABIT; DULL TO WAXY TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; OCCASIONAL STRINGERS OF PINPOINT PYRITE ARE COMMON ALONG WITH SLIGHTLY DEGASSING CARBONACEOUS SHALE FOUND WITHIN SAMPLE MATRIX.

SANDSTONE = COLOR RANGES FROM OFF WHITE TO TANNISH BROWN TO TRANSLUCENT WITH A SALT AND PEPPER APPEARANCE AND TRACES OF DARK GREENISH HUES; FINE TO MEDIUM LOWER TO COARSE AND OCC VERY COARSE UPPER GRAINED; POORLY TO FAIRLY SORTED WITH SOME WELL SORTED SILICA CEMENTATION; OVERALL SUBANGULAR TO SUBROUNDED; MODERATE TO LOW SPHERICITY; FIRM FRIABLE TO MODERATELY HARD AND OCC HARD; DARK BROWN AND BLACK LITHICS FOUND WITHIN SAND MATRIX; STRINGERS OF SHALE AND CARBONACEOUS SHALE COMMON; KAOLINITIC SAND ALSO VISIBLE WITHIN SAMPLE TRAY <10%; MODERATELY CALCAREOUS; NO VISIBLE HYDROCARBON INDICATORS PRESENT.

CARBONACEOUS SHALE = DARK GRAY TO REDDISH BLACK TO BLACK; BRITTLE TO CRUNCHY TENACITY; IRREGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY TO TABULAR TO WEDGE LIKE CUTTING HABIT; EARTHY TO DULL TO GREASY TO RESINOUS LUSTER WITH SMOOTH TO CLAYEY TO SLIGHTLY SILTY TEXTURE; OCCASIONAL STRINGERS OF CARBONACEOUS MATERIAL AND PYRITE ARE VISIBLE IN SAMPLE.

SANDSTONE = COLOR VARIES FROM GRAY WHITE TO OCCASIONALLY TRANSLUCENT TO TRANSPARENT; QUARTZ FRAMEWORK; GRAIN SIZE TENDS TO BE FINE TO MEDIUM TO OCCASIONALLY COARSE; GRAINS ARE FAIR TO WELL SORTED WITH GENERALLY ROUND TO SUB-ROUND ANGULARITY AND LOW TO MODERATE SPHERICITY; SURFACE FEATURES INCLUDE OCCSIONALLY POLISHED AND FROSTED GRAINS; SAMPLE IS FRIABLE TO FIRM FRIABLE TO MODERATELY HARD; OVERALL SILICA CEMENTATION ALTHOUGH SLIGHT REACTION TO HCL SOLUTION; SAMPLE CONSISTS OF APPROX. TWO TO FIVE PERCENT DARK COLORED LITHIC FRAGMENTS; UNDER UV LIGHT NO VISIBLE



SIGNS OF HYDROCARBONS.

SHALE - COLOR VARIES FROM GRAY TO DARK GRAY TO OCCASIONALLY BLACK; CRUNCHY TO BRITTLE TO SLIGHTLY DENSE TENACITY; IRRGULAR TO PLANAR TO HACKLY FRACTURE; PLATY TO FLAKY TO WEDGE-LIKE TO BLADED CUTTINGS HABIT; SLIGHTLY WAXY TO DULL TO EARTHY LUSTER; TEXTURE IS GENERALLY SMOOTH TO SLIGHTLY CLAYEY; THIN LAMINAE TO MASSIVE STRUCTURE; OCCASIONAL CARBONACEOUS MATERIAL PRESENT IN SAMPLE.

CARBONACEOUS SHALE = DARK GRAY TO GRAY TO REDDISH BLACK TO BLACK; BRITTLE TO CRUNCHY TENACITY; IRRGULAR TO BLOCKY TO PLANAR FRACTURE; MASSIVE TO PLATY TO TABULAR TO WEDGELIKE CUTTINGS HABIT; EARTHY TO DULL TO GREASY TO RESINOUS TO SLIGHTLY SPARKLY LUSTER; OVERALL HAS A SMOOTH TO CLAYEY TO ASHY AND SLIGHTLY SILTY TEXTURE; VERY COMMON OCCURENCE OF CARBONACEOUS MATERIAL AND PYRITE CLUSTERS ARE VISIBLE IN SAMPLE; NON CALCAREOUS OVERALL.

SHALE = GENERALLY GRAY TO DARK GRAY IN COLOR; BRITTLE TO CRUNCHY TENACITY; PLANAR TO IRRGULAR TO BLOCKY FRACTURE; MASSIVE TO TABULAR WITH OCCASIONALLY FLAKY TO SCALY TO WEDGELIKE TO BLADED CUTTINGS HABIT; DULL TO SOMEWHAT WAXY AND EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; OCCASIONAL STRINGERS OF PYRITE AND LARGE CARBONACEOUS SHALE NODULES ARE VERY COMMON.

COAL = BLACK TO VERY DARK GRAY; CRUNCHY TO BRITTLE TO OCC DENSE TENACITY; BLOCKY TO CONCHOIDALLY FRACTURED; OVERALL MASSIVE TO TABULAR CUTTINGS HABIT; METALLIC TO VITREOUS LUSTER ON BIT CUT FACE; VERY SMOOTH TEXTURE; WELL LAMINATED TO THICK STRUCTURE; DISTINCT PLANAR FEATURES EMBEDDED WITHIN GRAIN MATRIX WITH VISIBLE DEGASSING COMMON.

SANDSTONE = COLOR RANGES FROM OFF WHITE TO TANNISH BROWN TO TRANSLUCENT WITH A SALT AND PEPPER APPEARANCE AND TRACES OF DARK GREENISH HUES; FINE TO MEDIUM LOWER TO COARSE AND OCC VERY COARSE UPPER GRAINED; POORLY TO FAIRLY SORTED WITH SOME WELL SORTED SILICA CEMENTATION; OVERALL SUBANGULAR TO SUBROUNDED; MODERATE TO LOW SPHERICITY; FIRM FRIABLE TO MODERATELY HARD AND OCC HARD; DARK OVERALL SILICA CEMENTATION THOUGHTOUT; VERY REACTIVE IN HCL SOLUTION; SAMPLE TRAY CONSISTS OF APPROXIMATELY FIVE TO TEN PERCENT DARK COLORED LITHIC FRAGMENTS; UNDER UV LIGHT NO VISIBLE SIGNS OF HYDROCARBONS.

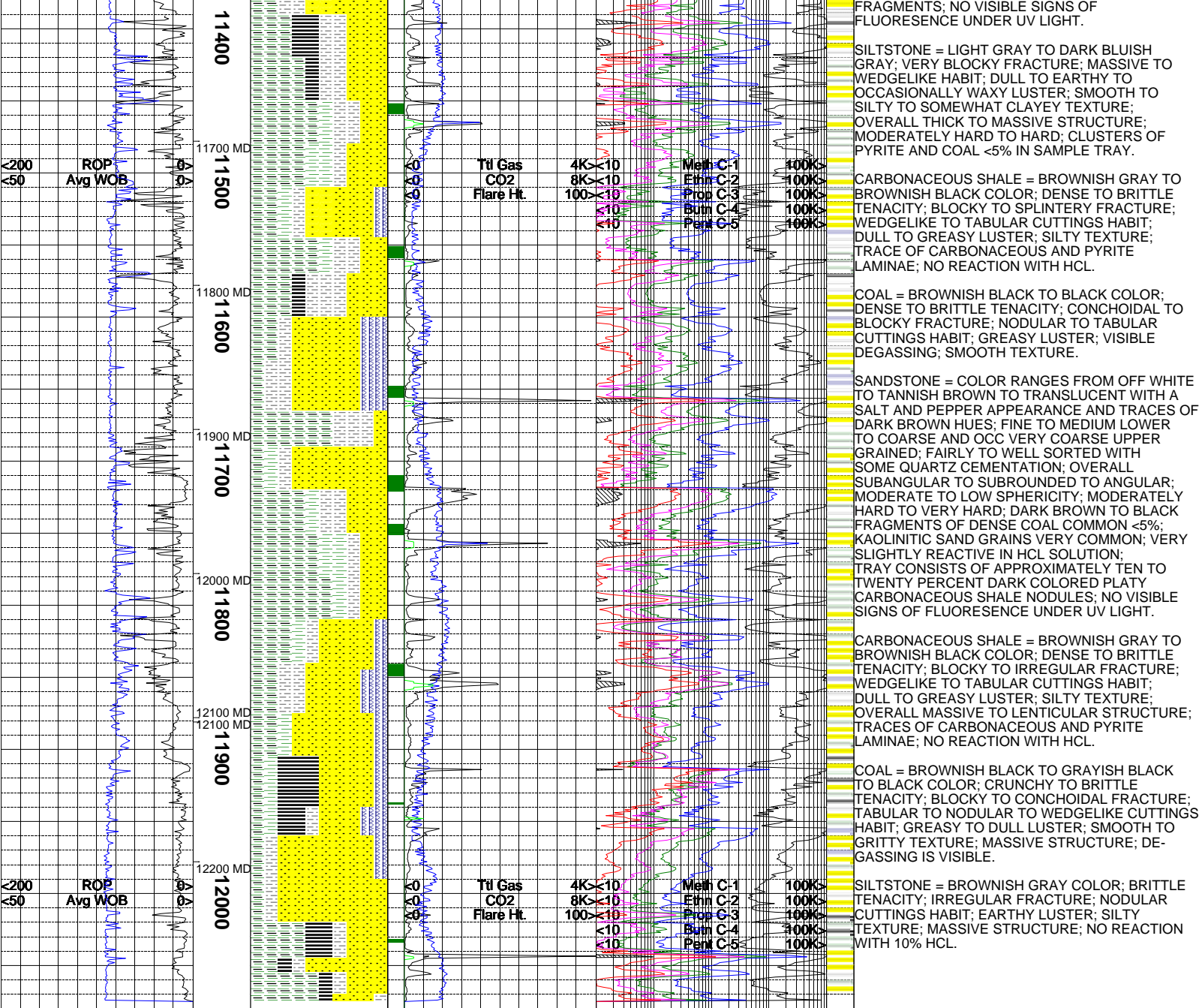
CARBONACEOUS SHALE = GRAYISH BROWN TO BROWNISH BLACK COLOR; TOUGH TO DENSE TENACITY; BLOCKY FRACTURE; WEDGELIKE TO NODULAR CUTTINGS HABIT; EARTHY TO GREASY LUSTER; SILTY TEXTURE; TRACE OF CARBONACEOUS LAMINAE; NO REACTION WITH 10% HCL.

SILTSTONE = DARK YELLOWISH BROWN TO BROWNISH GRAY COLOR; DENSE TENACITY; BLOCKY FRACTURE; NODULAR CUTTINGS HABIT; EARTHY LUSTER; MASSIVE STRUCTURE; NO REACTION WITH HCL.

SANDSTONE = LIGHT GRAY TO VERY LIGHT GRAY COLOR; QUARTZ GRAINS; FINE TO VERY FINE GRAIN SIZE; FAIR SORTING; SUB-ANGULAR GRAINS WITH MODERATE SPHERICITY; GRAIN SUPPORTED, PREDOMINANTLY UN-CONSOLIDATED IN TRAY DUE TO PDC BIT; NO REACTION WITH HCL; TRACE OF FRACTURE FILL; NO FLUORESCENCE UNDER UV LIGHT.

SHALE = MEDIUM BLuish TO LIGHT BROWNISH COLOR; DENSE TENACITY; IRRGULAR TO HACKLY FRACTURE; PLATY TO WEDGELIKE CUTTINGS HABIT; DULL TO WAXY LUSTER; CLAYEY TO SILTY TEXTURE; MASSIVE STRUCTURE; NO REACTION WITH HCL.

SANDSTONE = COLOR RANGES FROM OFF WHITE TO TANNISH BROWN TO TRANSLUCENT WITH A SALT AND PEPPER APPEARANCE AND TRACES OF DARK BLuish HUES; FINE TO MEDIUM LOWER TO COARSE AND OCC VERY COARSE UPPER GRAINED; POORLY TO FAIRLY SORTED WITH SOME WELL SORTED QUARTZ CEMENTATION; OVERALL SUBANGULAR TO SUBROUNDED; MODERATE TO LOW SPHERICITY; FIRM FRIABLE TO MODERATELY HARD TO VERY HARD; DARK FRAGMENTS OF DENSE COAL COMMON <10%; KAOLINITIC SAND GRAINS OCCUR <5%; VERY SLIGHTLY REACTIVE IN HCL SOLUTION; TRAY CONSISTS OF APPROXIMATELY FIVE TO TEN PERCENT DARK COLORED PLATY SHALE



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