Houston, TX
(281) 784-5500
Bakersfield, CA
(661) 328-1595
New Iberia, LA
(337) 364-2322
Anchorage, AK
(907) 561-2465

MUDLOG TVD

COMPANY	Exxon Mobil
WELL	FRU197-33B9
FIELD	Piceance Creek
REGION	Rockies
COORDINATES	39.921322000
	-108.282561000
ELEVATION	GL: 6459.3'
	RKB: 30.2'
COUNTY, STATE	RIO BLANCO, CO
API INDEX	051031142200
SPUD DATE	04/08/2010
CONTRACTOR	HP
CO. REP.	C. CURTIS
RIG/TYPE	HP321
LOGGING UNIT	MLU#31
GEOLOGISTS	B.DELANEY; C.RECORD
	M.FRANCO
ADD. PERSONS	M.PIPER; K.WALLANDER
CO. GEOLOGIST	C.ALBA / N. ROOSMAWATI

LOG INTERVAL

DEPTHS:	3950'	**TO**	12300'
DATES:	07/21/2010	**TO**	08/02/2010
SCALE:	1"=100'		

MUD TYPES

WATER-BASED	**TO**	3950'
LSND	**TO**	12300'
	TO	
	TO	

CASING DATA

16.00"	**AT**	150'
10.75"	**AT**	3940'
4.5"	**AT**	12285'
	AT	

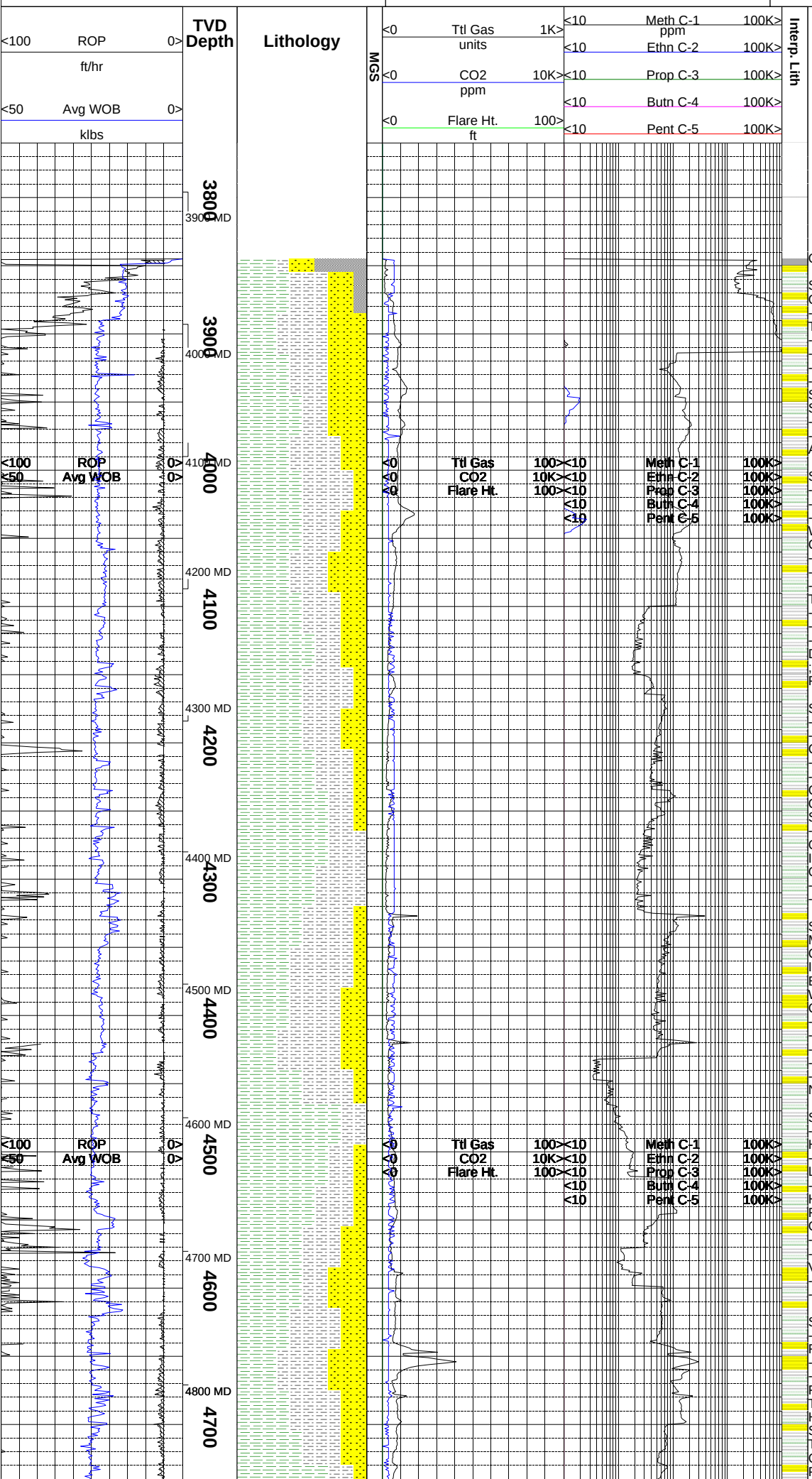
HOLE SIZE

14.75"	**TO**	3950'
8.75"	**TO**	12300'
	TO	
	TO	

ABBREVIATIONS

NB	NEWBIT	*PV*	PLASTIC VISCOSITY	*LC*	LOST CIRCULATION
RRB	RERUN BIT	*YP*	YIELD POINT	*CO*	CIRCULATE OUT
CB	CORE BIT	*FL*	FLUID LOSS	*NR*	NO RETURNS
WOB	WEIGHT ON BIT	*CL*	PPM CLORIDE ION	*TG*	TRIP GAS
RPM	ROTARY REV/MIN	*Rm*	MUD RESISTIVITY	*SG*	SURVEY GAS
PP	PUMP PRESSURE	*Rmf*	FILTRATE RESISTIVITY	*WG*	WIPER GAS
SPM	STROKES/MIN	*PR*	POOR RETURNS	*CG*	CONNECTION GAS
MW	MUD WEIGHT	*LAT*	LOGGED AFTER TRIP		
VIS	FUNNEL VISCOSITY	*LAS*	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



Remarks

Survey Data, Mud Reports, Other Info.

EPOCH WELL SERVICES COMMENCED LOGGING ON 7/21/2010 @ 3950'.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO OCCASIONAL MEDIUM LIGHT GRAY; VERY SLIGH -TLY DENSE TO MOSTLY BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB -PLANAR TO EARTHY HACKLY FRACTURE; OCCAS -IONAL MASSIVE TO WEGE LIKE TO OCCASIONA -L ELONGATED CUTTINGS HABIT; DULL TO EAR -THY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERATELY SMOOTH TO SLIGHTLY CLAYEY TO SLIGHTLY SILTY TEXTUR -E; NO VISIBLE LAMINAE OR OTHER DISTINGU -ISHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

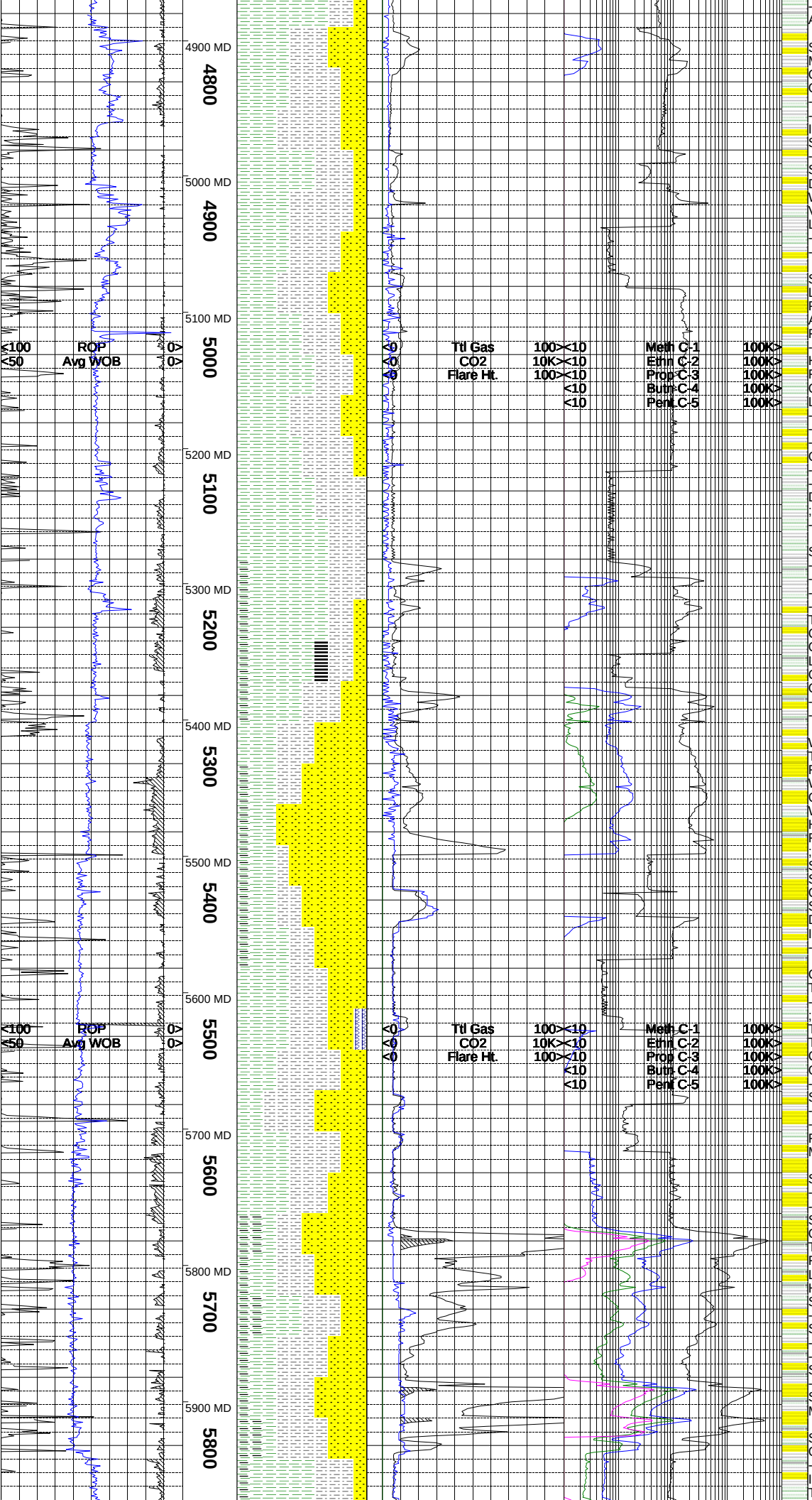
SANDSTONE = OFF WHITE TO VERY LIGHT BROW -NISH GRAY TO YELLOWISH GRAY WITH MODERA -TE BROWN AND BLACK HUES; QUARTZ DOMINAT -E FRAME WORK; MOSTLY GRAIN SUPPORTED WITH VERY FEW LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATELY HIG -H REACTION TO DILUTE HCL; MATRIX CONTAI -NS 3 TO 5% DARK LITIHC FRAGMENTS; MEDIU -M FINE TO MEDIUM-COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO SUB-ROUN -DED ANGULARITY; LOW TO MODERATE SPHERIC -ITY; POOR GRADE SILTSTONE VISIBLE GRADI -NG WITH POOR GRADE SANDSTONE, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT ; NO ACCESSORY MINERALS PRESENT IN SAM-PLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRA -Y TO LIGHT BROWNISH GRAY; SLIGHTLY DENS -E TO MODERATELY BRITTLE TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANA -R TO EARTHY HACKLY FRACTURE; SUB-TABULA -R TO SUB-NODULAR TO OCCASIONAL PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; VERY SLIGHTLY GRITTY TO VERY SLIGHLTY GRANULA -R TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE; CUTT-INGS IN SAMPLE ARE SLIGHTLY CLAYEY; NO OTHER DISTINGUISHABLE STRUCTURAL FEATURE -S PRESENT IN SAMPLE; NO ACCESSORY MINER -ALS PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM LIGHT GRAY; MOSTLY BRITTLE TO CRUMBLY TO VERY SLIGHTLY DENSE TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO ELONGATED TO OCCASIONAL CURVED CUTTINGS HABIT; DULL TO EARTHY DU -LL TO OCCASIONAL SEMI-FROSTED TO SEMI-W -AXY LUSTER; MODERATELY SMOOTH TO SLIGHT -LY CLAYEY TO VERY SLIGHTLY SILTY TEXTUR -E; NO VISIBLE LAMINAE OR OTHER DISTINGU -ISHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = OFF WHITE TO VERY LIGHT BROW -NISH GRAY WITH BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; PREDOM -INATELY GRAIN SUPPORTED WITH VERY FEW LOOSE GRAINS; CONSISTS OF CALCITIC CEMEN -TATION WITH MODERATE REACTION TO DILUTE HCL; MARTIX CONTAINS 2 TO 5% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO MEDIUM-COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGUL -AR TO SUB-ROUNDED ANGULARITY; LOW TO MO -DERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTON -E, NO OTHER DISTINGUISHABLE SURFACE FEA -TURES PRESENT IN SAMPLE.

SILTSTONE = LIGHT GRAY TO VERY LIGHT BRO -WNISH GRAY TO OCCASIONAL MODERATE DUSKY RED; VERY SLIGHTLY DENSE TO SLIGHTY CRUN -CHY TO MODERATELY BRITTLE TENACITY; IRR -EGUALR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO OCCASIONAL SEMI-WEDGE LIKE CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY GRITTY TO VERY SLIGHTLY GRANULAR TEXTURE; POOR GRADE SILTSTONE VISIBLE BEDDING WITH POOR GRADE SANDSTONE, NO OTHER DISTINGUI



-SHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM LIGHT GRAY TO MEDIUM GRAY TO OCCASIONAL DARK YELLOWISH ORANGE WITH OCCASIONAL MOTTLING OF GRAYISH RED PURPL -E; MODERATELY DENSE TO OCCASIONAL CRUM -BLY TO VERY SLIGHLTY BRITTLE TENACITY; IRREGUALR TO SUB-PLANAR TO OCCASIONAL SUB-BLOCKY TO EARTHY FRACTURE; OCCASIONA -L MASSIVE TO WEGE LIKE TO ELONGATED TO SUB-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASINAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERATELY SMOOTH TO VERY SLIGHLTY CLAYEY TEXTURE; NO VISIBLE LAMINAE OR OTHER DISINTGUISHALE STRUCTUR -AL FEATURES PRESENT; NO ACCESSORY MINER -ALS PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT BROWNISH GRAY TO LIGHT TANISH-BROWN GRAY TO OCCASIONAL PALE REDDISH BROWN GRAY WITH FEW BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; CONSISTS OF CALCITIC CEMENTA -TION WITH MODERATE REACTION TO DILUTE HCL; MATRIX CONTAINS 1 TO 3% DARK LITHIC FRAGMENTS; PREDOMINATELY COMPOSED OF GRAIN SUPPORTED CUTTINS WITH VERY FEW LOOSE GRAINS; MEDIUM-FINE TO MEDIUM-COAR -SE GRAINED; FAIR TO MODERATELY POOR SOR -TING; SUB-ANGULAR TO SUB-ROUNDED ANGULA -RITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POO -R GRADE SANDSTONE, SAMPLE CONTAINS LARG -E AMOUNT OF CLAYEY MATERIAL, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT ; NO ACCESSORY MINERALS PRESENT IN SAM -PLE.

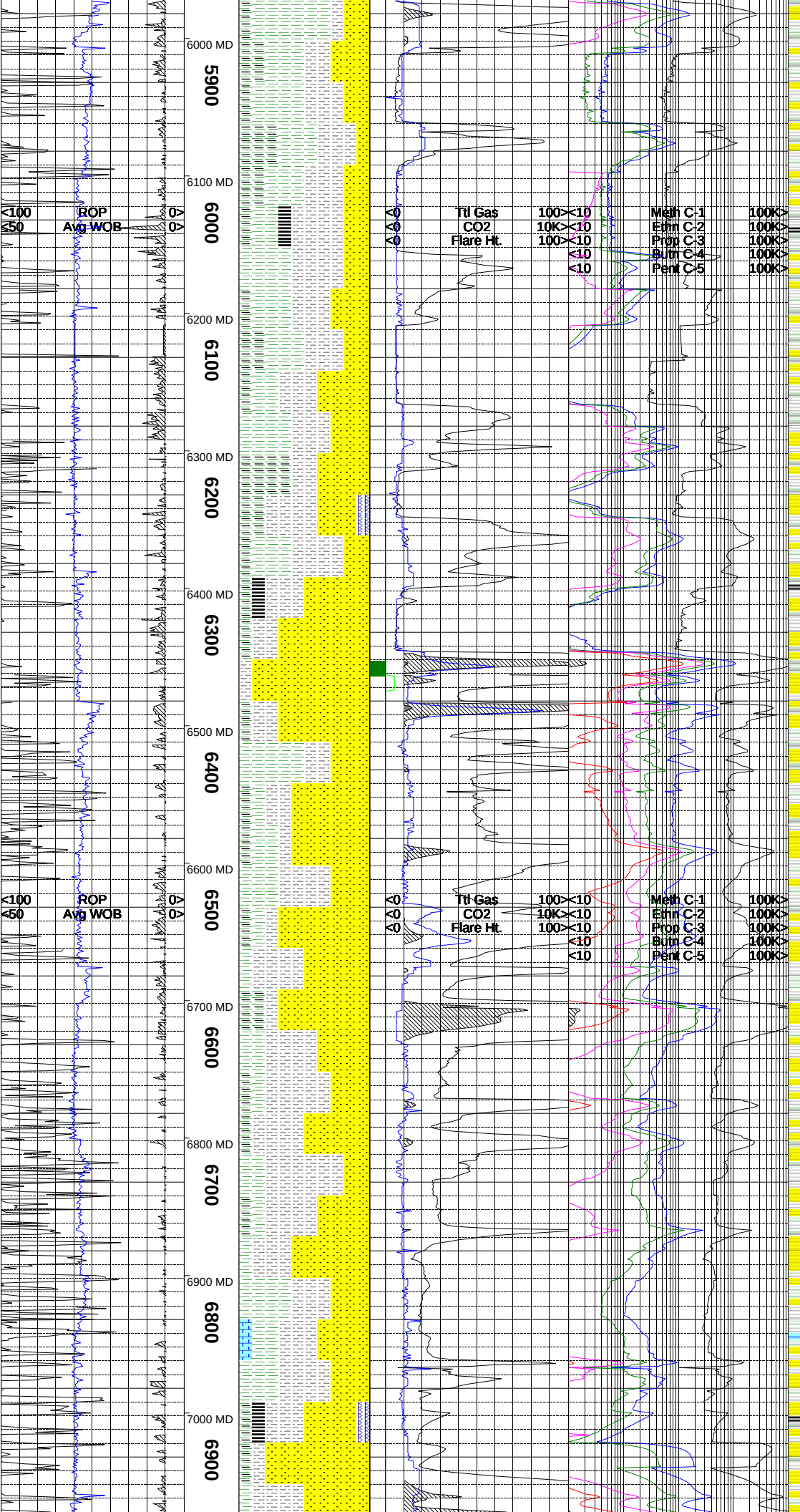
SILTSTONE = VERY LIGHT GRAY TO LIGHT GRA -Y TO LIGHT BROWNISH GRAY; SLIGHTLY DENS -E TO VERY SLIGHLTY CRUNCHY TO OCCASIONA -L BRITTLE TENACITY; IRREGULAR TO SUB-PL -ANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO MOSTLY SMALLER CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL VERY SLIGHTLY SEMI-SPARKLING LUSTER; VERY SLIGHTY GRITTY TO SLIGHTLY CLAYEY TEXTURE; NO VISIBLE LAMINAE OR OTHER DISTINGUISHABLE STRUCTURAL FEATURE -S PRESENT; NO ACCESSORY MINERALS PRESEN -T IN SAMPLE.

WASACH G SANDSTONE = OFF WHITE TO WHITE TO VERY LIGHT TANISH-BROWNISH GRAY WITH FEW BLACK HUES; QUARTZ DOMINATE FRAME WORK; GRAIN SUPPORTED WITH MOSTLY LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATELY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 1 TO 3% DARK LITHIC FRAGMENTS; FINE TO MEDIUM-COARSE GRAINED ; FAIR TO POOR SORTING; SUB-ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANSTONE, VERY SMALL AMOUNT OF COAL IN SAMPLE, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT IN SAMPLE; ACCESSORY MINERAL PYRITE PRES -ENT IN SAMPLE.

CARBONACEOUS SHALE = DARK BROWNISH GRAY TO BROWNISH BLACK TO OLIVE BLACK; MODERA -TELY DENSE TO SLIGHLTY CRUNCHY TENACITY ; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO OCCASIONAL WEDGE LIKE CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHT -LY SMOOTH TO SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE SILT -STONE VISIBLE BEDDING WITH SHALE CUTTIN -G, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

SHALE = LIGHT GRAY TO VERY YELLOWISH GRA -Y TO MEDIUM LIGHT GRAY TO OCCASIONAL MO -DERATE BROWN AND GRAYISH RED PURPLE; SLIGHTLY TOUGH TO MODERATELY DENSE TO OCCASIONAL CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY FRACTURE; MODERATELY MASSIVE TO WEDGE LIKE TO ELONGATED TO SUB-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERA -TELY SMOOTH TO VERY SLIGHLTY CLAYEY TO SLIGHTLY SILTY TEXTURE; VERY SMALL AMOUN -T OF CARBONACEOUS SHALE AND COAL VISIBL -Y EFFERVECSING IN SAMPLE, POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRAD -E SANDSTONE, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM GRAY; MODERATE -LY TOUGH TO MODERTELY DENSE TENACITY; IRREGULAR TO SUB-PLANAR TO SUB-BLOCKY TO EARTHY-HACKLY FRACTURE; SUB-TABULAR



TO SUB-NODULAR TO OCCASIONAL ELONGATED TO SUB-PLATY CUTTINGS HABIT; DULL TO EAR -THY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY GRITTY TO VERY SLIGHTLY GRANULAR TEXTURE; POOR GRADE SHALE VIS -IBLE BEDDING AND INTERBEDDING WITH POOR GRADE SILTSTONE, VERY THIN COAL LAMINAE VISIBLE IN SMALL CARBONACEOUS SHALE CUTT -ING, NO OTHER DISTINGUISHABLE STRUCTURA -L FEATURES PRESENT; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT BROWNISH GRAY TO LIGHT TANISH-BROWN GRAY TO VERY LIGHT GRAY WITH MODERATE BROWN AND BLACK HUES; QUARTZ DOMINATE FRAME WORK; PREDOMINATEL -Y GRAIN SUPPORTED WITH VERY FEW LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATELY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 5 TO 11% DARK LITHI -C FRAGMENTS; MEDIUM-FINE TO MEDIUM-COARSE GRAINED; FAIR TO VERY POOR SORTIN -G; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDE -D ANGULARITY; LOW TO MODERATE SPHERICIT -Y; BEDDING CONTACT VISIBLE BETWEEN POOR GRADE SANDSTONE AND CARBONACEOUS SHALE, POOR GRADE SILTSTONE VISIBLE GRADING WIT -H POOR GRADE SANDSTONE, NO OTHER DISTIN -GUISHABLE SURFACE FEATURES PRESENT; ACC -ESSORY MINERAL PYRITE PRESENT IN SAM -PLE.

CARBONACEOUS SHALE = LIGHT OLIVE GRAY TO MEDIUM GRAY TO BROWNISH GRAY; CRUNCHY TO CRUMBLY TO SLIGHTLY BRITTLE TENACITY; IRREGULAR TO SLIGHT HACKLY FRACTURING; CUTTINGS TEND TO BE PLATY TO SLIGHT ELONGATED WEDGE-LIKE TO SEMI TABULAR IN HABIT; DULL EARTHY TO SEMI SPARKLING TO SLIGHT GREASY LUSTER; GRITTY TO SILTY TEXTURE; THINLY BEDDED CARBONACEOUS MATERIAL.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM GRAY; CRUNCHY TO STIFF TO SEMI CRUMBLY TENACITY; PREDOMINATELY PLANAR TO SLIGHT HACKLY TO OCCASIONAL BLOCKY FRACTURING; CUTTINGS TEND TO BE TABULAR TO SEMI WEDGE LIKE IN HABIT; SEMI FROSTED TO SLIGHT GREASY TO WAXY LUSTER; GRITTY TO SILTY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

SANDSTONE = LIGHT GREENISH GRAY TO WHITE TO VERY LIGHT GRAY TO TRANSLUCENT; MOSTLY QUARTZ FRAMEWORK WITH 3-5 % DARK LITHICS VISIBLE IN SAMPLE; VISIBLE CHLOR -ITE CRYSTALS IN SAMPLE; VERY COARSE TO COARSE TO MEDIUM GRAIN SIZE; FAIR TO WELL SORTED; SUBROUND TO ROUND GRAINS; LOW TO MODERATE SPHERICITY; VISIBLE PITS IN SURFACE OF GRAINS; FIRM FRIABLE TO FRIABLE TO MODERATE HARD; CALCITE CEM-ENTATION DUE TO HIGH REACTION IN DILUTE HCl; GRAIN SUPPORTED; NO VISIBLE HYDRO-CARBONS IN SAMPLE; 2-3% VISIBLE CALCITE FRACTURE-FILL.

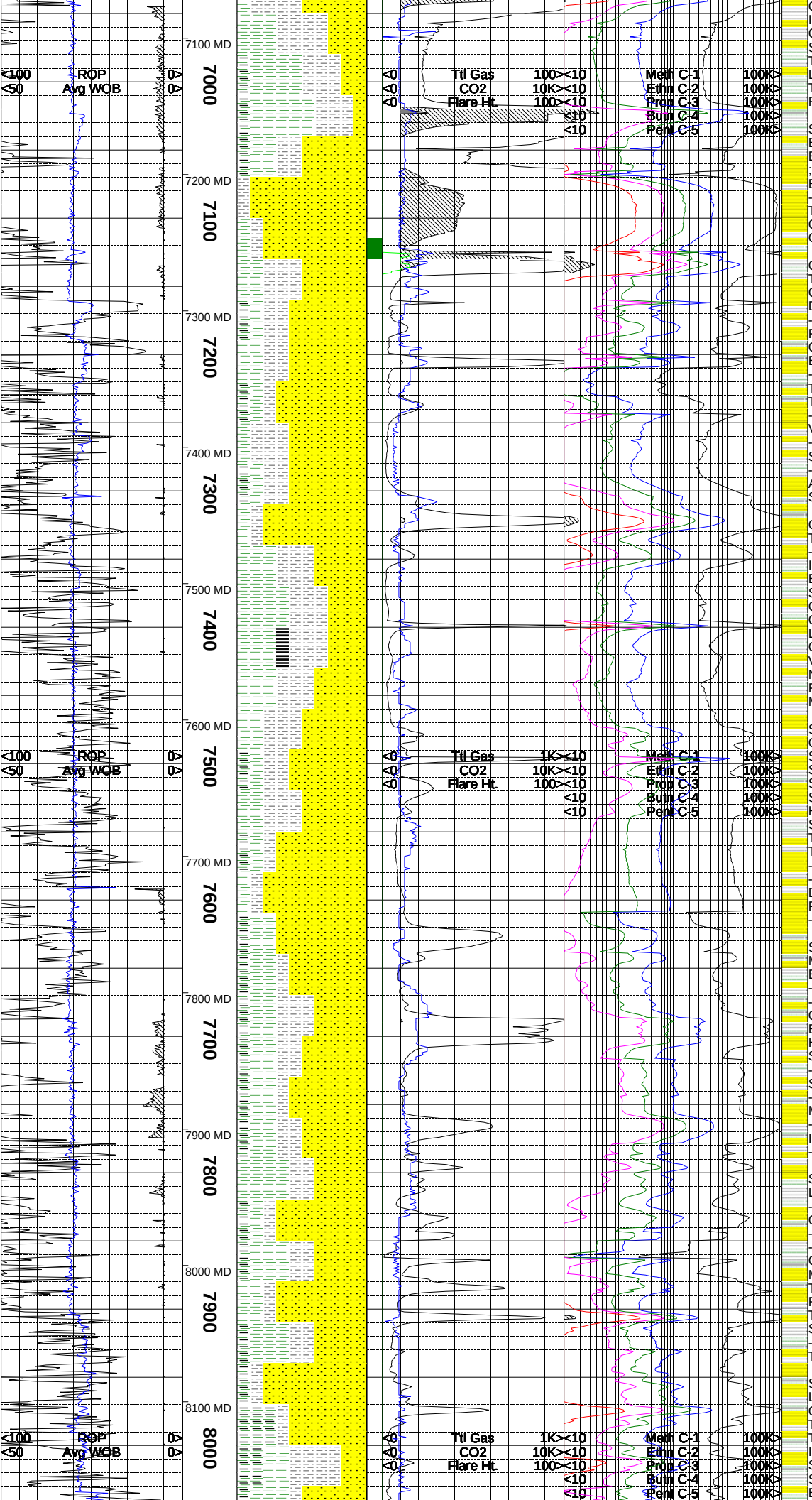
SHALE = VERY LIGHT GRAY TO LIGHT BROWNIS -H GRAY TO PREDOMINATELY YELLOWISH GRAY; BRITTLE TO CRUMBLY TENACITY; MOSTLY PLANAR TO SLIGHT HACKLY FRACTURING; CUT-TINGS TEND TO BE PLATY TO ELONGATED TAB-ULAR TO SEMI BLADED IN HABIT; DULL EARTH -Y TO SEMI GREASY TO SLIGHT WAXY LUSTER; SMOOTH TO SEMI CLAYEY TO MATTE TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

SILTSTONE = VERY LIGHT GRAY TO MEDIUM GRAY; CRUNCHY TO STIFF TO SEMI CRUMBLY TENACITY; PREDOMINATELY HACKLY TO PLANAR TO OCCASIONALLY BLOCKY FRACTURING; CUTTINGS TEND TO BE WEDGE LIKE TO SEMI TABULAR IN HABIT; DULL EARTHY TO SEMI GREASY LUSTER; GRITTY TO SILTY TEXTURE; GRADES INTO MEDIUM GRAIN SANDSTONE.

SANDSTONE = TRANSLUCENT TO VERY LIGHT GRAY TO LIGHT BROWNISH GRAY; PREDOMINATE -LY QUARTZ FRAMEWORK WIT 2-3% DARK LITH-ICS VISIBLE IN SAMPLE; FINE TO MEDIUM TO COARSE GRAIN SIZE; GRAIN SUPPORTED; LOW TO MODERATE SPHERICITY; GRAINS HAVE A SLIGHT POLISH APPERANCE; SUB-ANGULAR TO SUB-ROUND; WELL TO VERY WELL SORTED; CALCITE CEMENTATION DUE TO MODERATE REACTION IN DILUTE HCl; NO VISBLE HYDRO-CARBONS IN SAMPLE.

LIMESTONE = REACTS STRONGLY TO DILUTE HCl; STIFF TO TOUGH TENACITY; PLANAR TO SEMI HACKLY TO BLOCKY FRACTURING; CUTTIN -GS TEND TO BE WEDGE-LIKE TO TABULAR TO SLIGHT NODULAR IN HABIT; WAXY TO DULL EARTHY TO SEMI GREASY LUSTER; CRYSTALL'N TO MATTE TO SMOOTH TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GREENISH GRAY TO LIGHT BLUISH GRAY;



CRUNCHY TO STIFF TO TOUGH TENACITY; IRREGULAR TO SEMI PLANAR FRACTURING; CUTTINGS TEND TO BE PLATY TO TABULAR TO SEMI WEDGE LIKE IN HABIT; SLIGHT GREASY TO SPARKLING TO OCCASIONALLY DULL EARTHY LUSTER; SILTY TO GRITTY TO SEMI GRANULAR TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

SHALE = LIGHT GREENISH GRAY TO LIGHT BLUISH GRAY TO LIGHT GRAY; CRUMBLY TO BRITTLE TO OCCASIONALLY CRUNCHY TENACITY ; PREDOMINATELY PLANAR TO SLIGHTLY BLOCKY TO SEMI HACKLY FRACTURING; CUTTIN -GS TEND TO BE WEDGE-LIKE TO SEMI PLATY TO FLAKY IN HABIT; DULL EARTHY TO SEMI GREASY LUSTER; SMOOTH TO MATTE TEXTURE GRADES INTO A THIN CARBONACEOUS SHALE.

OHIO CREEK SANDSTONE = VERY LIGHT GRAY TO TRANSLUCENT TO WHITE; COARSE TO VERY COARSE GRAIN; MOSTLY QUARTZ WITH 1-3% DARK LITHICS VISIBLE IN SAMPLE; UNCONSOL -IDATED; PREDOMINATELY LOOSE GRAINS TO FEW GRAIN SUPPORTED CUTTINGS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATE EFFERVECSING REACTION TO DILUTE HCL; MED -IUM-FINE TO MEDIUM-COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODER -ATE SPHERCITY; VERY THIN COAL LAMINAE VISIBLE IN SHALE CUTTING, NO OTHER DISTI -NGUISHABLE SURFACE FEATURES PRESENT IN SAMPLE; ACCESSORY MINERAL PYRITE VISI -BLE IN CONTACT WITH SANDSTONE AND LARGE AMOUNT OF CALCITE CUTTINGS PRESENT IN SAMPLE.

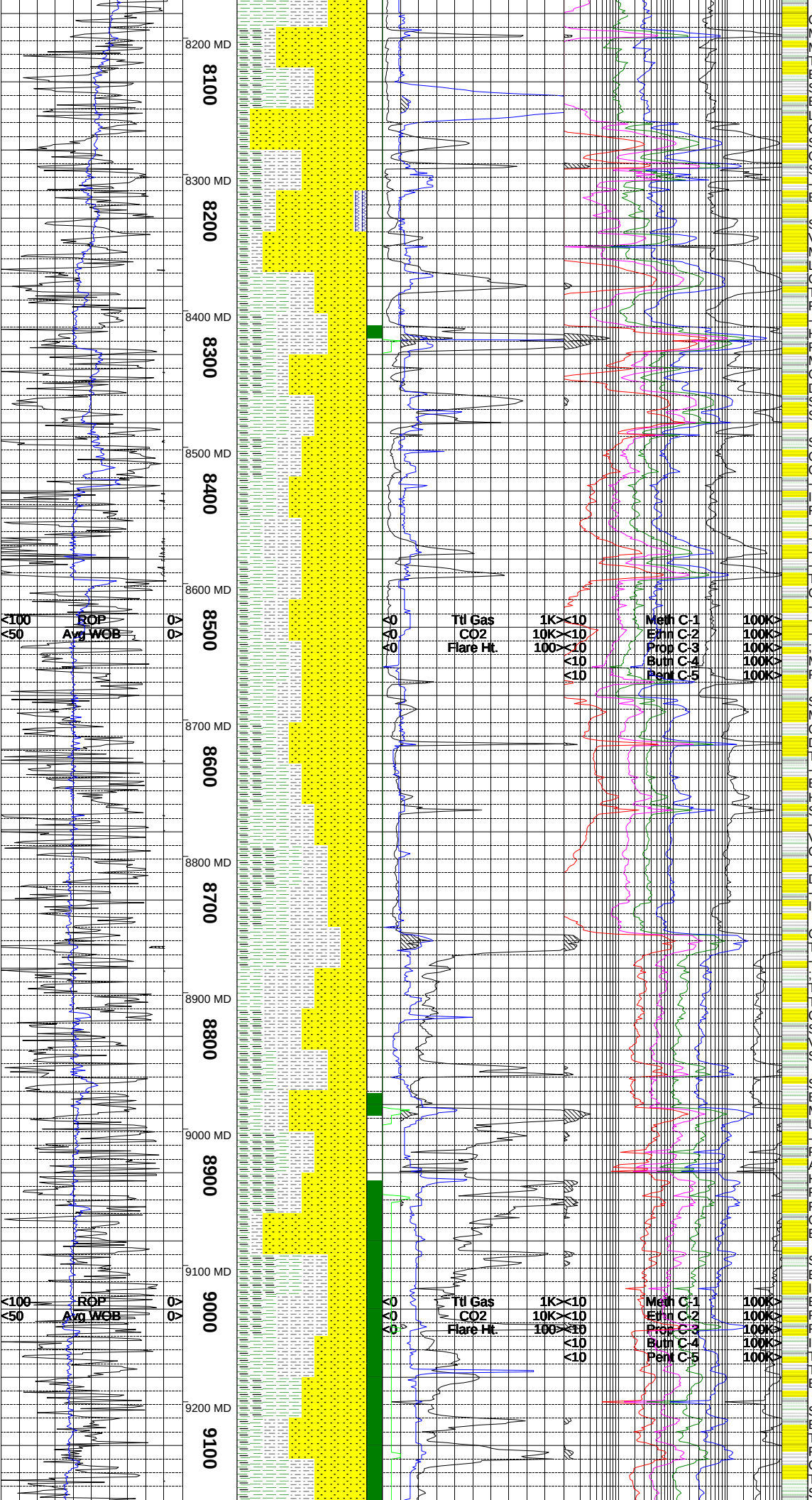
CARBONACEOUS SHALE = DARK BROWNISH GRAY TO BROWNISH BLACK TO OLIVE BLACK; SLIGHT -LY DENSE TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO OCCASIONAL ELONGATED CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL VERY SLIGHTLY SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHLTY GRITTY TEXTURE; VERY THIN COAL LAMINAE VISIBLE IN CARBONACEOUS SHALE CUTTING, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL LIGHT BROWNISH GRAY; SLIGHLTY TOUGH TO MODERATELY DENSE TO SLIGHLTY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; VERY THIN COAL LAMINAE VISIBLE IN SHALE CUTTI -NG, POOR GRADE SILTSTONE VISIBLE GRADIN -G WITH POOR GRADE SANDSTONE, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; ACCESSORY MINERAL PYRITE PRESEN -T IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL LIGHT BLUISH GRAY; SLIGHTLY TOUGH TO MODERATEL -Y DENSE TENACITY; IRREGULAR TO SUB-BLOC -KY TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO ELONGATED TO OCCASIONAL PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERA -TELY SMOOTH TO SLIGHTLY CLAYEY TO VERY SLIGHLTY SILTY TEXTURE; VERY THIN LAMINA -E VISIBLE IN SHALE CUTTING, OCCASIONAL MOTTLING OF SHALE VISIBLE, NO OTHER DIST -INGUISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE; ACCESSORY MINERAL PYRITE PRES -ENT IN SAMPLE.

SANDSTONE = OFF WHITE TO WHITE TO VERY LIGHT GRAY TO TRANSLUCENT; QUARTZ DOMINA -TE FRAME WORK; PREDOMINATELY LOOSE GRAINED WITH FEW GRAIN SUPPORTED CUTTING -S; CONSISTS OF CALCITIC CEMENTATION WIT -H LIGHT REACTION TO DILUTE HCL; MATRIX CONTAINS 1 TO 3% DARK LITHIC FRAGMENTS; MEDIUM TO MEDIUM-COARSE GRAINED; FAIR TO VERY POOR SORTING; SUB-ANGULAR TO ROUNDED TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; GRAINS HAVE A SLIGHT POLISH APPEARANCE; FRIABLE TO FIR -M FRIABLE; NO VISIBLE HYDROCARBONS IN THE SAMPLE.

SHALE = VERY LIGHT GREENISH GRAY TO VERY LIGHT GRAY; CRUNCHY TO BRITTLE TO SEMI CRUMBLY TENACITY; PREDOMINATELY PLANAR TO SLIGHT HACKLY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO SEMI BLADED IN HABIT; DULL EARTHY TO SEMI GREASY TO SLIGHT WAXY LUSTER; SMOOTH TO CLAYEY TO SLIGHT MATTE TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.



CARBONACEOUS SHALE = GRAYISH BLACK TO MEDIUM DARK GRAY TO LIGHT OLIVE GRAY TO MEDIUM BLUISH GRAY; CRUNCHY TO CRUMBLY TO BRITTLE TENACITY; HACKLY TO SEMI BLOCKY TO PREDOMINATELY PLANAR TO SPLINTERY FRACTURING; CUTTINGS TEND TO BE PLATY TO THINLY TABULAR TO SEMI WEDGE LIKE IN HABIT; DULL EARTHY TO SEMI GREASY TO OCCASIONALLY SPARKLING TO SLIGHT FROSTED LUSTER; PREDOMINATELY GRANULAR TO GRITTY TO OCCASIONALLY SMOOTH TO CLAYEY TEXTURE; VISIBLE DEGASS -ING ALONG CARBONACEOUS LAMINAE; VISIBLE BANDS OF CARBONACEOUS MATERIAL.

SANDSTONE = WHITE TO TRANSLUCENT TO VERY LIGHT GRAY TO LIGHT BROWNISH GRAY; MOSTLY QUARTZ FRAMEWORK WITH 3-4% DARK LITHICS VISIBLE IN SAMPLE; UNCONSOLIDATE GRAINS DUE TO BIT ACTION; FIRM FRIABLE TO MODERATE HARD TO PREDOMINATELY FRIABLE; SUB-ROUND TO WELL ROUNDED GRAIN -S; LOW TO MODERATE SPHERICITY; GRAINS HAVE A SLIGHT POLISH APPEARANCE; FAIR TO POORLY SORTED; VERY COARSE TO COARSE TO MEDIUM TO GRANULAR GRAIN SIZE; CALCITE CEMENTATION DUE TO MODERATE REACTION IN DILUTE HCl; NO VISIBLE HYDROCARBONS IN SAMPLE; GRAIN SUPPORTED; GRADES INTO A SILTY CARBONACEOUS SHALE.

SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO MEDIUM GRAY TO LIGHT BROWNISH GRAY TO OCCASIONAL BROWNISH GRAY; SLIGHT -LY TOUGH TO MODERATELY DENSE TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; OCCASIONAL MASSIVE TO ELONGATE -D TO SUB-TABULAR TO SUB-NODULAR CUTTING -S HABIT; DULL TO EARTHY DULL TO OCCASIO -NAL SLIGHTLY SEMI-SPARKLING LUSTER; SLI -GHTLY CLAYEY TO VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING AND BEDDING WITH POOR GRADE SAND -STONE, VERY SMALL AMOUNT OF COAL VISIBL -E EFFERVECSING IN SAMPLE, NO OTHER DIST -INGUISHABLE STRUCTURAL FEATURES PRESENT ; ACCESSORY MINERAL PYRITE AND SEVERAL MEDIUM SIZED RHOMBIC CALCITE CRYSTALS PRESENT IN SAMPLE.

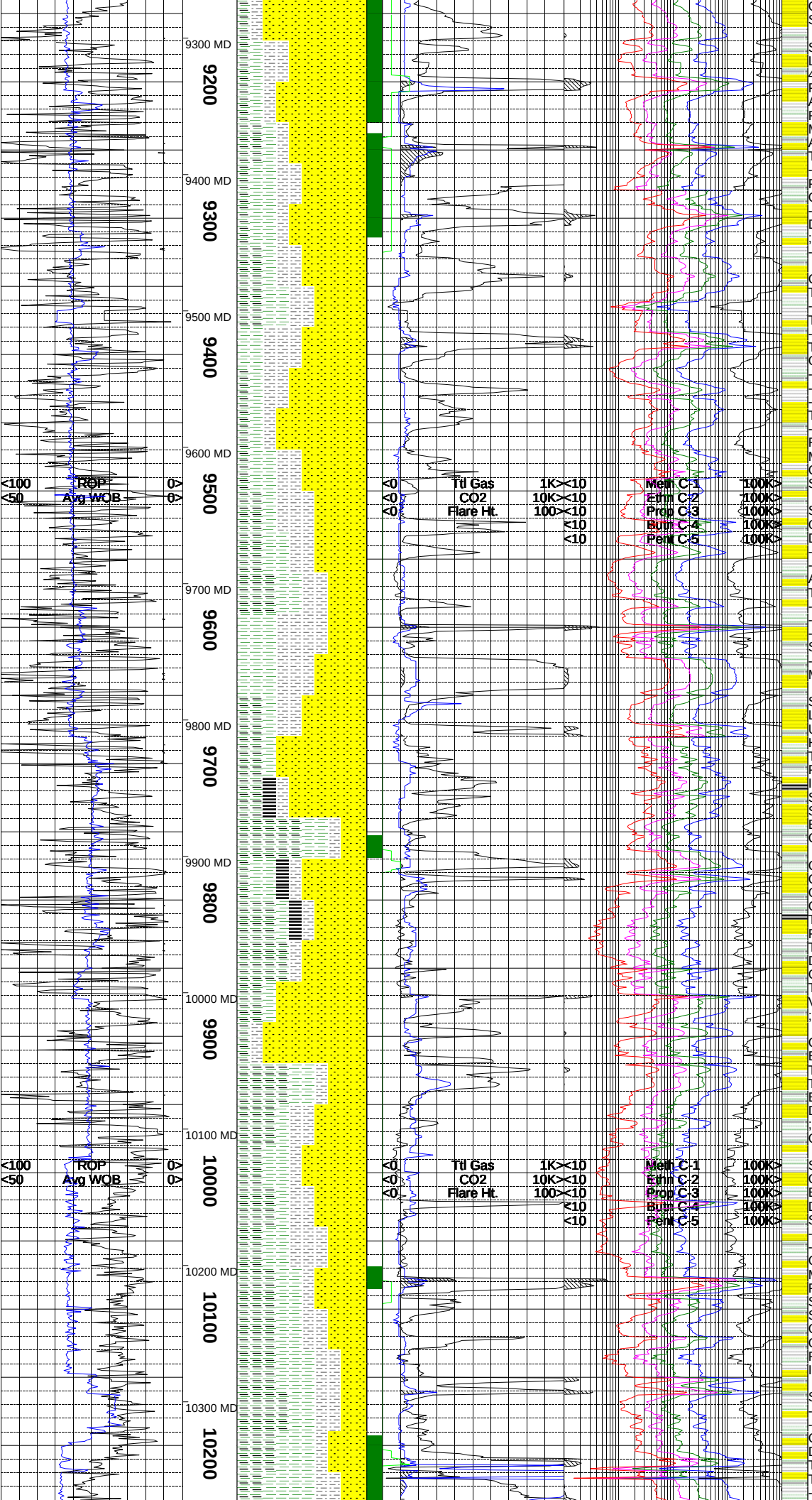
SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM GRAY AND LIGHT BLUISH GRAY; MODERATELY DENSE TO SLIGHTLY CRUMBLY TO CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO EAR -THY FRACTURE; MASSIVE TO WEDGE LIKE TO ELONGATED TO OCCASIONAL PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERA -TELY SMOOTH TO SLIGHTLY SILTY TEXTURE; VERY THIN COAL LAMINAE VISIBLE IN SHALE CUTTING, VERY SMALL AMOUNT OF CARBONACEO -S SHALE VISIBLY EFFERVECSING, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRES -ENT; ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

CARBONACEOUS SHALE = DARK BROWNISH GRAY TO BROWNISH BLACK TO OLIVE BLACK; MODERA -TELY DENSE TO SLIGHTLY CRUNCHY TENACITY ; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUBT-TABULAR TO SUB-NODULAR TO OCCASIONAL SEMI-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO SEMI-SPARKLING TO SEMI-GREASY LUSTER; VISIBLE CARBONACEOUS BANDS THROUGH OUT SAMPLE.

SANDSTONE = VERY LIGHT GRAY TO LIGHT BROWNISH GRAY TO VERY LIGHT OLIVE GRAY; MOSTLY QUARTZ FRAMEWORK WITH 4-5% DARK LITHICS VISIBLE IN SAMPLE; COARSE TO MED -IUM TO OCCASIONALLY FINE GRAIN SIZE; POOR TO FAIR SORTED; SUBROUND TO SUB-ANGULAR TO ANGULAR GRAINS; MODERATE TO HIGH SPHERICITY; GRAINS HAVE A SLIGHT FROSTED TO SEMI PITTED APPEARANCE; FIRM FRIABLE TO MODERATE HARD; UNCONSOLIDATED GRAINS DUE TO BIT ACTION; GRAIN SUPPORT- ED; NO VISIBLE HYDROCARBONS IN SAMPLE;

SILTSTONE = LIGHT GREENISH GRAY TO LIGHT BLUISH GRAY TO OCCASIONALLY LIGHT BROWN- ISH GRAY; STIFF TO CRUNCHY TENACITY; BLOCKY TO PREDOMINATELY HACKLY TO SEMI PLANAR FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO SEMI ELONGATED TABULAR IN HABIT; DULL EARTHY TO SLIGHT GREASY TO SEMI FROSTED LUSTER; GRITTY TO SILTY TO SEMI CLAYEY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

SHALE = VERY LIGHT GRAY TO VERY LIGHT BROWNISH GRAY TO BLUISH GRAY; CRUMBLY TO BRITTLE TENACITY; PREDOMINATELY PLANAR TO HACKLY TO SLIGHTLY IRREGULAR CUTTINGS HABIT; DULL EARTHY TO SEMI WAXY TO SLIGHT GREASY LUSTER; MATTE TO SLIGHT SILTY TO SMOOTH TO CLAYEY TEXTURE; NO



OTHER VISIBLE ACCESSORY MINERALS IN SAMPLE.

SANDSTONE = WHITE TO TRANSLUCENT TO VERY LIGHT GRAY; MOSTLY QUARTZ FRAMEWORK WITH 4-5% DARK LITHICS VISIBLE IN SAMPLE; PREDOMINATELY GRAIN SUPPORTED WITH FAIR AMOUNT OF LOOSE GRAINS PRESENT; MEDIUM-FINE TO MEDIUM-COARSE GRAINED; FAIR TO MODERATELY WELL SORTING; SUB-ANBULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTS -TONE VISIBLE GRADING AND BEDDING WITH POOR GRADE SANDSTONE, VERY SMALL AMOUNT OF CARBONACEOUS SHALE VISIBLE EFFERVESCI -NG IN SAMPLE, NO OTHER BEDDING OR OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT ; NO ACCESSORY MINERALS PRESENT IN SAMPL -E.

CARBONACEOUS SHALE = DARK BROWNISH GRAY TO BROWNISH BLACK TO OCCASIONAL OLIVE BL -ACK; SLIGHTLY TOUGH TO MODERATELY DENSE TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB -PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO OCCASIONAL SUB-NODULAR TO OCCASIONAL ELONGATED CUTTINGS HABIT; DUL -L TO EARTHY DULL TO SEMI-GREASY TO OCCA -SIONAL SEMI-SPARKLING LUSTER; SUB-CLAYE -Y TO VERY SLIGHTLY GRITTY TEXTURE; VERY THIN COAL LAMINAE VISIBLE IN SHALE CUTTI -NG, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE; ACCESSORY MINERAL PYRITE PRESENT IN CONTACT WITH CARBONACEOUS SHALE CUTTING, PRESENT IN SAMPLE.

SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM GRAY; SLIGHTLY DENSE TO SLIGHTLY TOUGH TENACITY; IRREGU -LAR TO SUB-PLANAR TO EARTHY HACKLY FRAC -TURE; SUB-TABULAR TO SUB-NODULAR TO OCC ASIONAL SUB-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKL -ING LUSTER; SLIGHTLY GRITTY TO VERY SLI -GHLTY GRANULAR TEXTURE; POOR GRADE SILT -STONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, NO OTHER DISTINGUISHABLE STRU -CTURAL FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

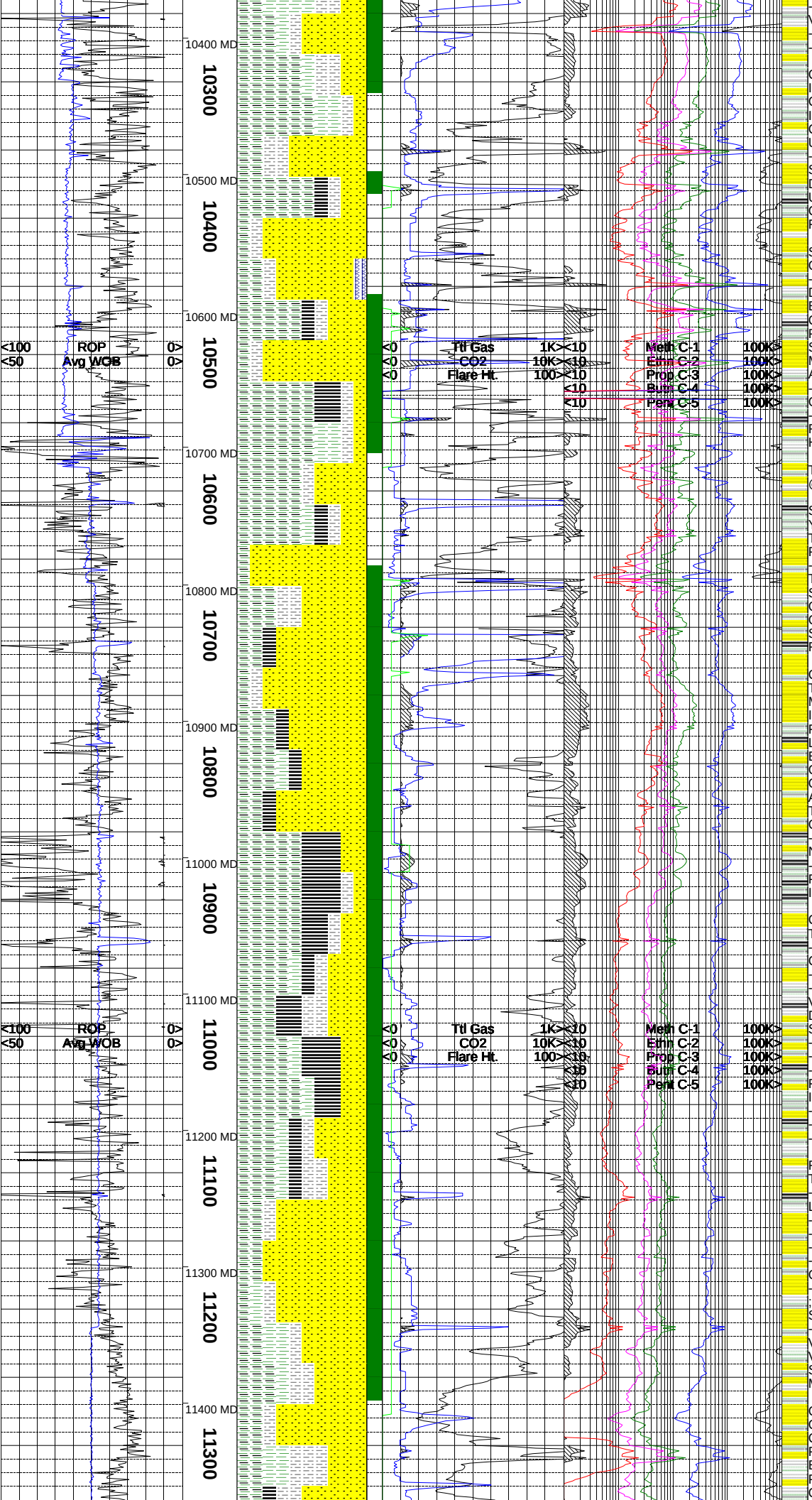
SHALE = VERY LIGHT GREENISH GRAY TO VERY LIGHT BLUISH GRAY TO OLIVE GRAY; IRREG-ULAR TO PREDOMINATELY PLANAR TO SEMI HACKLY FRACTURING; CRUMBLY TO CRUNCHY TO BRITTLE TENACITY; CUTTINGS TEND TO BE PLATY TO FLAKY TO SEMI ELONGATED TABULAR IN HABIT; DULL EARTHY TO SEMI GREASY TO SLIGHT WAXY LUSTER; SMOOTH TO CLAYEY TO SEMI MATTE TEXTURE; NO OTHER VISIBLE BEDDING FEATURES; A FEW NACHOLITE CRYSTALS VISIBLE DUE TO CAVINGS.

COAL = BLACK TO MEDIUM GRAYISH BLACK TO OLIVE BLACK TO PREDOMINATELY BROWNISH GRAY TO BROWNISH BLACK; CRUNCHY TO CRUMBLY TO BRITTLE TENACITY; IRREGULAR TO BLOCKY TO PREDOMINATELY CONCHOIDAL FRACTURING; CUTTINGS TEND TO BE NODULAR TO WEDGE LIKE TO SEMI BLADED IN HABIT; DULL TO FROSTED TO SPARKLING TO SEMI GREASY TO WAXY LUSTER; SMOOTH TO MATTE TO SLIGHT GRITTY TO CLAYEY TEXTURE; VISIBLE DEGASSING THROUGH OUT THE SAMPLE ; VISIBLE PYRITE BANDS.

CARBONACEOUS SHALE = OLIVE GRAY TO LIGHT BROWNISH GRAY TO BROWNISH GRAY; BRITTLE TO CRUMBLY TO CRUNCHY TENACITY; HACKLY TO PLANAR FRACTURING; CUTTINGS TEND TO BE WEDGE LIKE TO SEMI TABULAR IN HABIT; DULL TO FROSTED TO SEMI SPARKLING LUSTER ; GRITTY TO SILTY TEXTURE; VISIBLE BEDS OF CARBONACEOUS MATERIAL IN SAMPLE.

SANDSTONE = LIGHT GRAY TO LIGHT BROWNISH GRAY TO OCCASIONAL BROWNISH GRAY WITH BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; PREDOMINATELY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; CONSIST -S OF CALCITIC CEMENTATION WITH MODERATE -LY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 8 TO 11% DARK LITHIC FRAGMENTS; MEDIUM-COARSE TO COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRA -Y TO OCCASIONAL MEDIUM LIGHT GRAY TO YE -LLOWISH GRAY TO VERY LIGHT BROWNISH GRAY; MODERATELY TOUGH TO MODERATELY DENSE TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO OCCASIONAL MASSIVE CUT -TINGS HABIT; DULL TO EARTHY DULL TO SEM



-I-SPARKLING LUSTER; SLIGHTLY GRITTY TO VERY SLIGHTLY GRANULAR TEXTURE; POOR GRA -DE SILTSTONE VISIBLE BEDDING AND GRADIN -G WITH POOR GRADE SANDSTONE, NO OTHER

CARBONACEOUS SHALE = OLIVE GRAY TO GRAY-ISH BLACK TO MEDIUM GRAY; BRITTLE TO CRUMBLY TO CRUNCHY TENACITY; HACKLY TO IRREGULAR TO SLIGHT BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO SLIGHT NOD-ULAR TO SEMI WEDGE LIKE TO SLIGHT TABULA -R IN HABIT; PREDOMINATELY FROSTED TO SPARKLING TO SEMI GREASY TO OCCASIONALLY DULL EARTHY LUSTER; GRITTY TO SEMI GRAN-ULAR TO SILTY TEXTURE; THIN LAMINAE OF CARBONACEOUS MATERIAL; VISIBLE DEGASSING FROM MOST OF SAMPLE.

SANDSTONE = LIGHT BROWNISH GRAY TO LIGHT GRAY TO WHITE TO OCCASIONALLY TRANSLUCEN -T; MOSTLY QUARTZ FRAMEWORK WITH 7-8% DARK LITHICS VISIBLE IN SAMPLE; VISIBLE BANDS OF CARBONACEOUS MATERIAL; VERY COARSE TO COARSE TO MEDIUM GRAIN SIZE; POOR TO FAIR TO OCCASIONALLY VERY POORLY SORTED; ANGULAR TO SUB-ANGULAR GRAINS; MODERATE TO HIGH SPHERICITY; GRAINS HAVE A SLIGHT FROSTED APPEARANCE; FIRM FRIABL -E TO MODERATE HARD; UNCONSOLIDATED GRAINS DUE TO BIT ACTION; GRAIN SUPPORTE -D; CALCITE CEMENTATION DUE TO HIGH REACTION IN DILUTE HCl; NO VISIBLE HYDR HYDROCARBONS IN SAMPLE.

TRIP OUT OF THE HOLE FOR A NEW BIT @10,713' ON 07/28/2010.

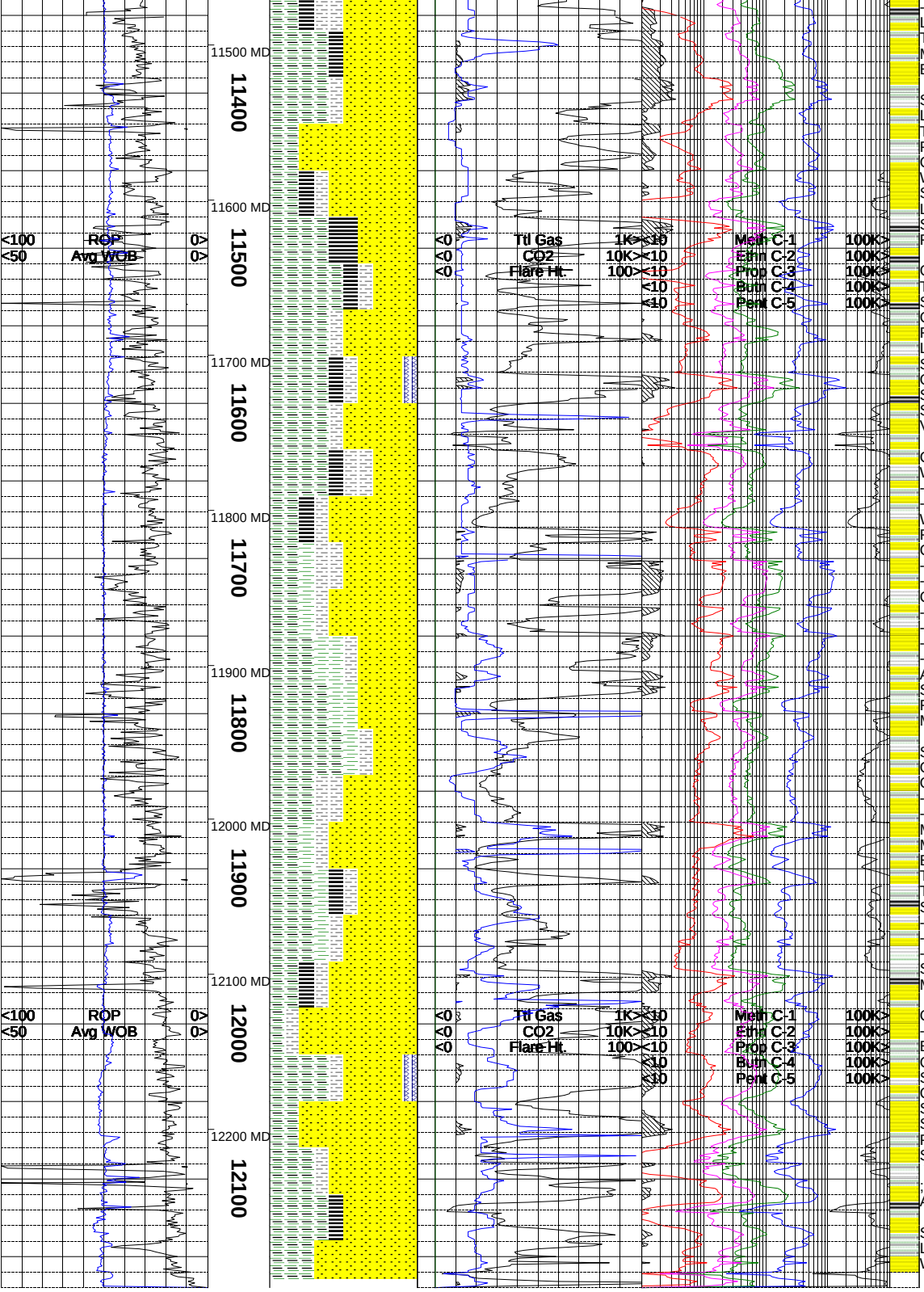
SILTSTONE = MOTTLED GRAYISH TO LIGHT YELLOWISH TO LIGHT BLUISH GRAY; CRUNCHY TO STIFF TO TOUGH TENACITY; BLOCKY TO PREDOMINATELY PLANAR TO HACKLY FRACTURIN -G; CUTTINGS TEND TO BE PLATY TO FLAKY TO SLIGHT ELONGATED TABULAR IN HABIT; SEMI SPARKLING TO SLIGHT FROSTED TO SEMI GREASY LUSTER; SILTY TO SEMI GRANULAR TO GRITTY TEXTURE; GRADES INTO A FINE GRAIN SANDSTONE; NO OTHER VISIBLE BEDDING FEATURES.

COAL = GRAYISH BLACK TO BROWNISH BLACK TO OLIVE BLACK TO BLACK; STIFF TO SLIGHT MALLEABLE TO SEMI CRUNCHY TENACITY; IRREGULAR TO BLOCKY TO SEMI CONCHOIDAL FRACTURING; CUTTINGS TEND TO BE WEDGE-LIKE TO ELONGATED TABULAR TO SLIGHT BLADED IN HABIT; DULL WAXY TO SEMI GREASY TO SLIGHT SPARKLING LUSTER; OCCASIONAL SMOOTH TO SEMI-SILTY TO SEMI-ABRASIVE TEXTURE; COAL CUTTINGS OBSERVED TO BE EFFERVECSING MODERATELY HIGH; POOR GRADE SILTSTONE VISIBLE BEDDING WITH POO -R GRADE CARBONACEOUS SHALE CUTTINGS, NO OTHER DISTINGUISHABLE LAMINAE OR OTHE -R DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERAL PRESENT IN SAMPLE.

CARBONACEOUS SHALE = DARK BROWNISH GRAY TO BROWNISH BLACK TO OLIVE BLACK; SLIGHT -LY TOUGH TO MODERATELY DENSE TO SEMI-CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCK -Y TO SUB-PLANAR TO EARTHY FRACTURE; SUB -TABULAR TO SUB-NODULAR TO OCCASIONAL VERY SLIGHLTY SEMI-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING TO SEMI-GREASY LUSTER; SLIGHTL -Y CLAYEY TO VERY SLIGHTLY GRITTY TEXTUR -E; POOR GRADE CARBONACEOUS SHALE VISIBL -E BEDDING WITH POOR GRADE SANDSTONE, FAIR AMOUNT OF COAL VISIBLY EFFERVESCING IN SAMPLE, NO OTHER LAMINAE OR OTHER DIS -TINGUISHABLE STRUCTURAL FEATURES PRESEN -T; NO ACCESSORY MINERALS PRESENT IN SAM -PLE.

ROLLINS SANDSTONE = WHITE TO OFF WHITE TO TRANSLUCENT WITH FEW BLACK HUES; QUAR -TZ DOMINATE FRAME WORK; PREDOMINATELY LOOSE GRAINS WITH VERY FEW GRAIN SUPPORT -ED CUTTINGS; CONSISTS OF SILICA CEMENTA -TION WITH LITTLE TO NO REACTION TO DILU -TE HCL; MATRIX CONTAINS 1 TO 3% DARK LI -THIC FRAGMENTS; MEDIUM TO MEDIUM-COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGUL -AR TO ANGULAR TO SUB-ROUNDED ANGULARITY ; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE BEDDING WITH POOR GRAD -E SANDSTONE, VERY SMALL AMOUNT OF COAL VISIBLE EFFERVECSING IN SAMPLE, NO OTHER VISIBLE BEDDING OR OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

CARBONACEOUS SHALE = GRAYISH BLACK TO OLIVE GRAY TO BROWNISH GRAY; CRUNCHY TO CRUMBLY TO OCCASIONALLY STIFF TENACITY; PREDOMINATELY HACKLY TO PLANAR TO SEMI BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO SEMI WEDGE LIKE TO OCCASIONALLY BLADED IN HABIT; DULL EARTH



-Y TO SEMI SPARKLING TO SLIGHT GREASY LUSTER; GRITTY TO SEMI GRANULAR TO SILTY TEXTURE; VISIBLE BANDS OF CARBONACEOUS MATERIAL; VISIBLE DEGASSING ALONG THE BANDS.

SILTSTONE = VERY LIGHT BROWNISH GRAY TO LIGHT YELLOWISH GRAY; CRUNCHY TO STIFF TO TOUGH TENACITY; IRREGULAR TO SLIGHT PLANAR TO SEMI HACKLY FRACTURING; CUTTINGS TEND TO BE ELONGATED TABULAR TO WEDGE LIKE TO SEMI BLADED IN HABIT; SEMI SPARKLING TO SLIGHT FROSTED TO GREASY LUSTER; GRITTY TO SLIGHTLY GRANULAR TO SILTY TEXTURE; NO OTHER VISIBLE BEDDING FEATURES.

COAL = GRAYISH BLACK TO BROWNISH BLACK TO BLACK; STIFF TO SLIGHTLY MALLEABLE TO SEMI CRUNCHY TENACITY; PREDOMINATELY CONCHOIDAL TO BLOCKY TO SLIGHT SPLINTERY FRACTURING; CUTTINGS TEND TO BE WEDGE-LIKE TO TABULAR TO SEMI BLADED IN HABIT; SPARKLING TO WAXY TO SLIGHTLY DULL TO OCCASIONALLY SLIGHTLY METALLIC LUSTER; SMOOTH TO SLIGHT CLAYEY TO OCCASIONALLY SILTY TEXTURE; VISIBLE PYRITE IN SAMPLE; VISIBLE DEGASSING ALONG MOST OF SAMPLE.

CORCORAN COASTAL PLAIN SANDSTONE = OFF WHITE TO WHITE TO VERY LIGHT GRAY TO LIG -HT BROWNISH GRAY WITH BLACK AND MODERAT -E BROWN HUES; QUARTZ DOMINATE FRAME WORK; PREDOMINATELY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATELY HIGH REACTIO -N TO DILUTE HCL; MATRIX CONTAINS 2 TO 4 -% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO COARSE GRAINED; FAIR TO VERY POORLY SORT -ED; SUB-ANGULAR TO ANGULAR TO SUB-ROUND -ED ANGULARITY; LOW TO MODERATE SPHERICI -TY; POOR GRADE SILTSTONE VISIBLE GRADIN -G WITH POOR GRADE SANDSTONE, VERY SMALL AMOUNT OF COAL VISIBLY EFFERVESCING IN SAMPLE, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO OCCASIONAL VERY LIGHT PALE YELLOWISH ORANGE; SLIGHLTY DENSE TO SLIGHTLY BRITT -LE TO SLIGHTLY CRUMBLY TENACITY; IRREGU -AR TO SUB-PLANAR TO EARTHY FRACTURE; MODERATELY WEDGE LIKE TO SUB-PLATY TO MOSTLY SMALLER CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERATELY SMOOTH TO MODERATELY CLAYEY TO VERY SLIGHTLY SILTY TEXTURE; POOR GRADE SILTSTONE VISI -BLE BEDDING WITH POOR GRADE CARBONACEOU -S SHALE, VERY SMALL AMOUNT OF COAL VISI -BLE EFFERVESCING IN SAMPLE, NO OTHER SURFACE FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

CARBONACEOUS SHALE = OLIVE GRAY TO MEDIU -M DARK GRAY TO BROWNISH GRAY; VISIBLE BANDS OF CARBONACEOUS MATERIAL; CRUNCHY TO CRUMBLY TENACITY; PLANAR TO SLIGHT HACKLY TO BLOCKY FRACTURING; CUTTINGS TEND TO BE PLATY TO FLAKY TO SEMI TABULAR IN HABIT; DULL EARTHY TO SEMI SPARKLING TO SLIGHT GREASY LUSTER; PREDOMINATELY GRITTY TO SEMI GRANULAR TO SILTY TO OCCASIONALLY SMOOTH TEXTURE; VISIBLE DEGASSING IN SOME OF THE SAMPLE ; VISIBLE HYDROCARBONS UNDER FLUORESCES AT 12180' -12210'.

SANDSTONE = WHITE TO TRANSLUCENT TO VERY LIGHT BROWNISH GRAY; MOSTLY QUARTZ FRAME WORK WITH 4-5% DARK LITHICS VISIBLE IN