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

COMBO TVD

COMPANY	ExxonMobil Production
WELL	PCU 296-5A01
FIELD	Piceance Creek Unit
REGION	Rocky Mountain
COORDINATES	39.912053000
	108.198567000
ELEVATION	7295.5'
COUNTY, STATE	Rio Blanco, CO
API INDEX	051031124800
SPUD DATE	10/21/2009
CONTRACTOR	Helmerich and Payne
CO. REP.	C.Curtis/ M. Hudon
RIG/TYPE	321 / Flex 4
LOGGING UNIT	031
GEOLOGISTS	M. Franco
	C. Record/ B.Smelsor
ADD. PERSONS	M.Piper
	R.McCane
CO. GEOLOGIST	Nova Roosmawati

LOG INTERVAL

DEPTHS:	4665'	**TO**	14288'
DATES:	09/06/2010	**TO**	10/05/2010
SCALE:	1" = 100'		

MUD TYPES

WATERBASED	**TO**	14288'
	TO	
	TO	
	TO	

CASING DATA

16.0"	**AT**	150'
10.75"	**AT**	4633'
7.0"	**AT**	10105'
4.5"	**AT**	14265'

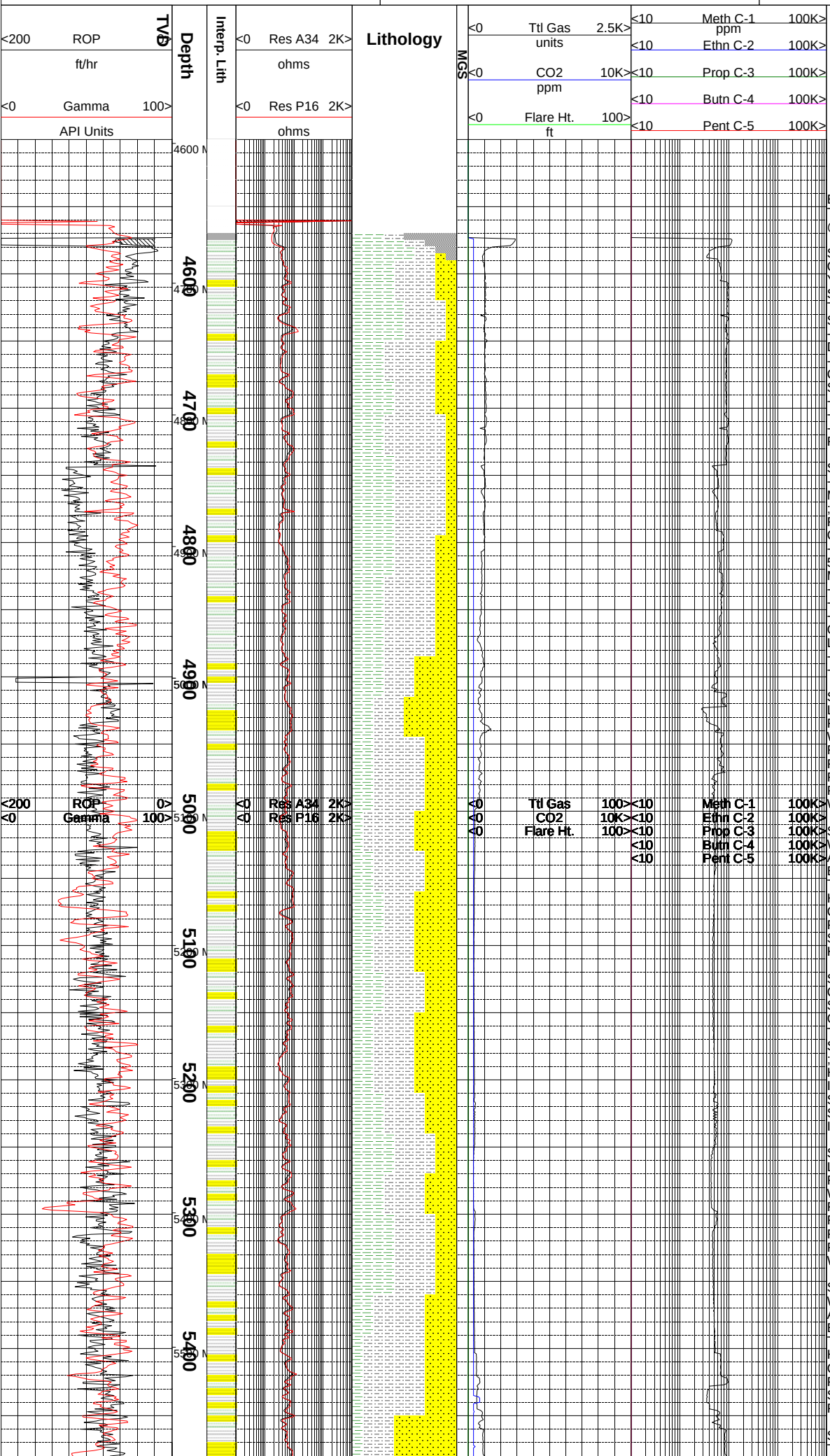
HOLE SIZE

14.75"	**TO**	126'
9.875"	**TO**	10119'
6.125"	**TO**	14288'
	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 THE FRU 296-5A01 WELL ON 9/7/2010 @ 4665' MD.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO OCCASIONAL PALE RED PURPLE AND LIGHT YELLOWISH TAN GRAY; SLIGHTLY DENSE TO SLIGHTLY CRUMBLY TO SLIGHTLY BRITTLE TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONA -L MASSIVE TO WEDGE LIKE CUTTINGS HABIT; DULL TO EARTHY DULL TO SEMI-FROSTED LUST -ER; MODERATELY SMOOTH TO MODERATELY CLAYEY TO SLIGHTLY SILTY TEXTURE; VERY SMALL AMOUNT OF CARBONACEOUS SHALE VISI -LY EFFERVESCING IN SAMPLE, NO OTHER DIS -TINGUISHABLE STRUCTURAL FEATURES PRESE -T; TRACE AMOUNT OF ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT GRAY TO VERY LIGH -T TANISH BROWN GRAY WITH FEW BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE ; MODERATELY GRAIN SUPPORTED WITH VERY FEW LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATELY HIGHT REACT -ON TO DILUTE HCL; MATRIX CONTAINS 3 TO 5% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO MEDIUM-COARSE GRAINED; FAIR TO POOR SORT -ING; SUB-ANGULAR TO ANGULAR TO SUB-ROUN -DED ANGULARITY; LOW TO MODERATE SPHERIC -ITY; VERY POOR GRADE SANDSTONE VISIBLE GRADING WITH POOR GRADE SILTSTONE, NO LAMINAE OR OTHER DISTINGUISHABLE STRUCTU -RAL FEATURES PRESENT; NO ACCESSORY MINE -RALS PRESENT IN SAMPLE.

SILTSTONE = LIGHT BROWN TO TAN TO VERY LIGHT GRAY IN COLOR; GRAIN SIZE IS VERY FINE; VERY WELL SORTED; ANGULARITY IS WELL ROUNDED TO ROUNDED; SURFACE FEATURES NOT VISIBLE; SOFT TO EASILY FRIABLE HARDNESS; GRAIN SUPPORTED WITH FEW LITHIC CLASTS; KAOLINITE CLAY PRESENT IN SAMPLE; SILTSTONE INTERBEDDED WITH VERY SOFT SHALES.

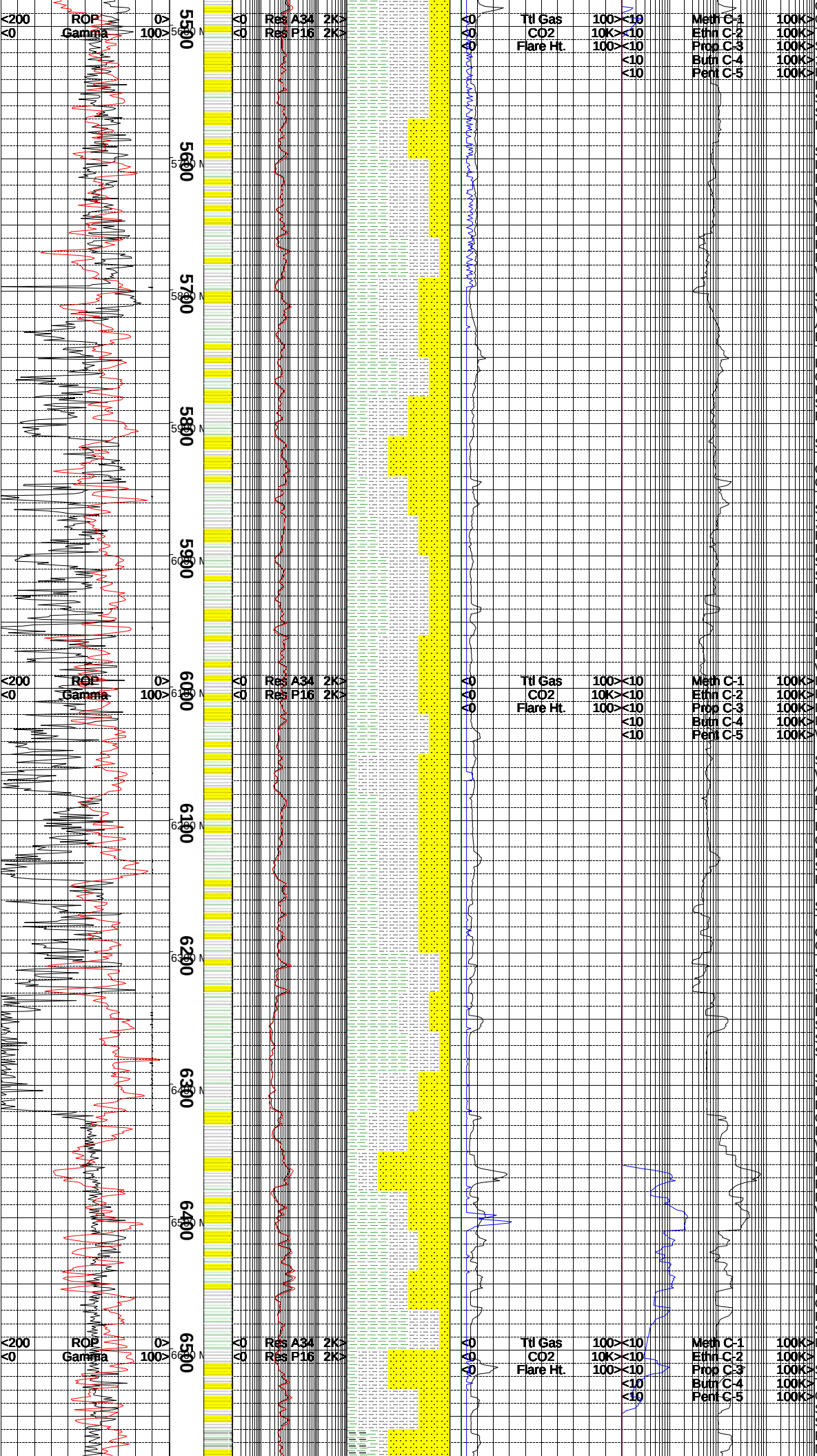
SHALE = VERY LIGHT GRAY TO MEDIUM GRAY WITH SOME SAMPLES BEING A TAN TO BROWN AND SOME HAVING A BLUEISH GREEN HUE; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO VISIBLE STRUCTURES PRESENT; INTERBEDDED WITH SILTSTONE AND SOME SANDSTONE; TRACE AMOUNTS OF KAOLINITIC CLAYS PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT GRAY TO GRAY COLOR WITH SOME BROWNISH RED STAINING; LOWER FINE TO UPPER FINE GRAINED; WELL TO FAIR SORTING; SUBROUND TO SUBANGULAR ANGULARITY; MOFDERATE SPHERICITY; SOME FROSTED/POLISHED GRAINS ; MODERATLEY HARD TO FRIABLE HARDNESS; HIGHLY REACTIVE WITHA 10% HCL SOLUTION INDICATING CALCITE CEMENTATION; GRAIN SUPPORTED; DARK LITHIC CLASTS PRESENT IN SAMPLE; NO ACCESSORY MINERAL PRESENT IN SAMPLE.

SILTSTONE = LIGHT BROWN TO TAN TO VERY LIGHT GRAY IN COLOR; GRAIN SIZE IS VERY FINE; VERY WELL SORTED; ANGULARITY IS WELL ROUNDED TO ROUNDED; SURFACE FEATURES NOT VISIBLE; SOFT TO EASILY FRIABLE HARDNESS; GRAIN SUPPORTED WITH FEW LITHIC CLASTS; KAOLINITE CLAY PRESENT IN SAMPLE; SILTSTONE INTERBEDDED WITH VERY SOFT SHALES.

SHALE = VERY LIGHT GRAY TO MEDIUM GRAY WITH SOME SAMPLES BEING A TAN TO BROWN AND SOME HAVING A BLUEISH GREEN HUE; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO VISIBLE STRUCTURES PRESENT; INTERBEDDED WITH SILTSTONE AND SOME SANDSTONE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT GRAY TO WHITE TO TRANSLUCENT GRAINS WITH SOME REDISH PINK



GRAINS; LOWER FINE TO UPPER FINE GRAINED; WELL TO FAIR SORTING; SUBROUND TO SUBANGULAR ANGULARITY; MOFDERATE SPHERICITY; SOME FROSTED/POLISHED GRAINS ; MODERATLEY HARD TO FRIABLE HARDNESS; HIGHLY REACTIVE WITHA 10% HCL SOLUTION INDICATING CALCITE CEMENTATION; GRAIN SUPPORTED; DARK LITHIC CLASTS PRESENT IN SAMPLE; NO ACCESSORY MINERAL PRESENT IN SAMPLE.

SILTSTONE = LIGHT BROWN TO TAN TO VERY LIGHT GRAY IN COLOR WITH SOME SAMPLES BEING REDISH PINK; GRAIN SIZE IS VERY FINE; VERY WELL SORTED; ANGULARITY IS WELL ROUNDED TO ROUNDED; SURFACE FEATURES NOT VISIBLE; SOFT TO EASILY FRIABLE HARDNESS; GRAIN SUPPORTED WITH FEW LITHIC CLASTS; KAOLINITE CLAY PRESENT IN SAMPLE; SILTSTONE INTERBEDDED WITH VERY SOFT SHALES.

SHALE = VERY LIGHT GRAY TO MEDIUM GRAY WITH SOME SAMPLES BEING A TAN TO BROWN AND SOME HAVING A BLUEISH GREEN HUE; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO VISIBLE STRUCTURES PRESENT; INTERBEDDED WITH SILTSTONE AND SOME SANDSTONE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT GRAY TO WHITE TO TRANSLUCENT TO PINKISH RED TO BROWN GRAINS; LOWER FINE TO UPPER FINE GRAINED; WELL TO FAIR SORTING; SUBROUND TO SUBANGULAR ANGULARITY; MOFDERATE SPHERICITY; SOME FROSTED/POLISHED GRAINS ; MODERATLEY HARD TO FRIABLE HARDNESS; HIGHLY REACTIVE WITHA 10% HCL SOLUTION INDICATING CALCITE CEMENTATION; GRAIN SUPPORTED; DARK LITHIC CLASTS PRESENT IN SAMPLE; NO ACCESSORY MINERAL PRESENT IN SAMPLE.

SILTSTONE = LIGHT BROWN TO TAN TO VERY LIGHT GRAY IN COLOR WITH SOME SAMPLES BEING REDISH PINK; GRAIN SIZE IS VERY FINE; VERY WELL SORTED; ANGULARITY IS WELL ROUNDED TO ROUNDED; SURFACE FEATURES NOT VISIBLE; SOFT TO EASILY FRIABLE HARDNESS; GRAIN SUPPORTED WITH FEW LITHIC CLASTS; KAOLINITE CLAY PRESENT IN SAMPLE; SILTSTONE INTERBEDDED WITH VERY SOFT SHALES.

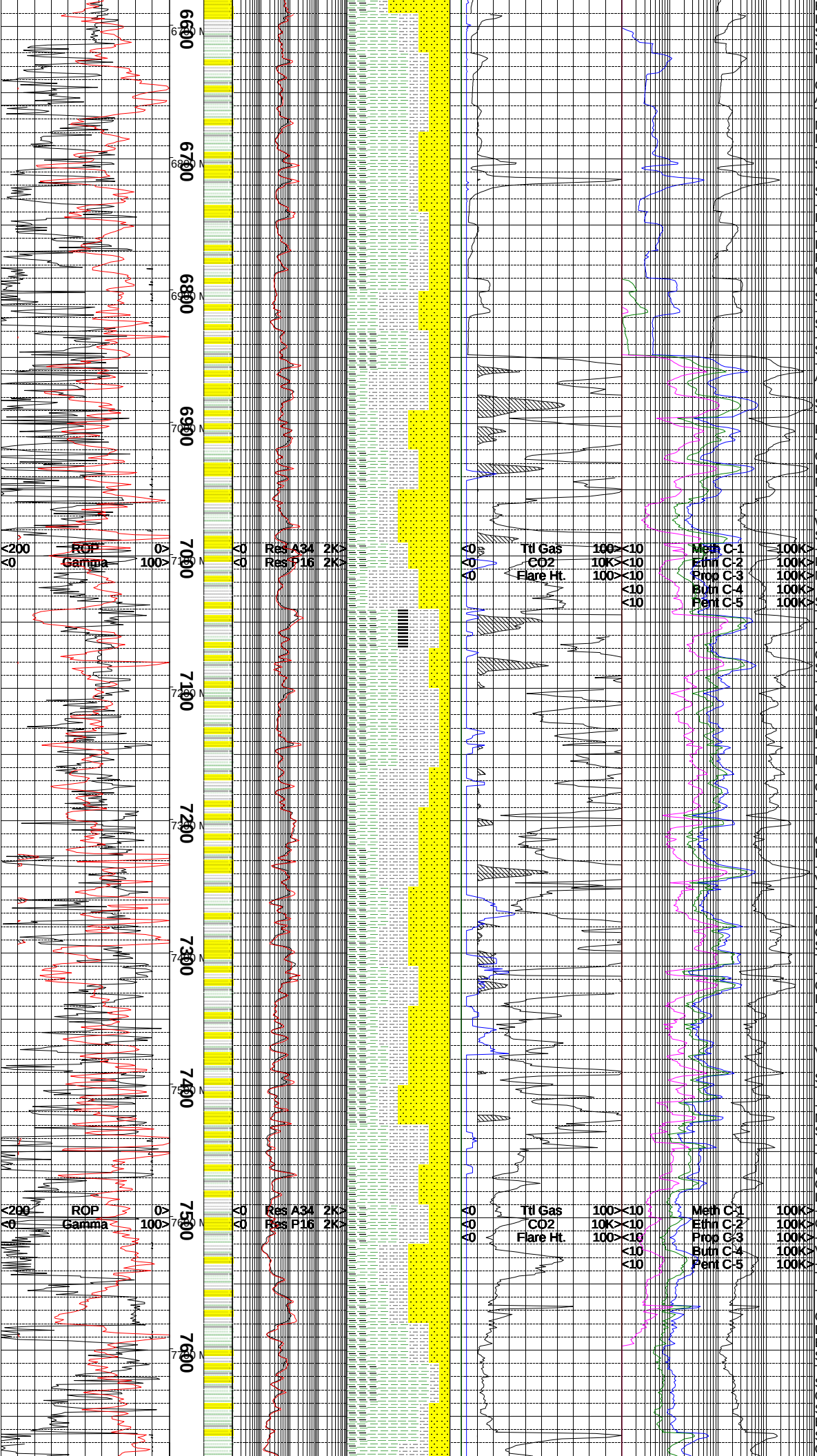
SHALE = VERY LIGHT GRAY TO MEDIUM GRAY WITH SOME SAMPLES BEING A TAN TO BROWN AND SOME HAVING A BLUEISH GREEN HUE; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO VISIBLE STRUCTURES PRESENT; INTERBEDDED WITH SILTSTONE AND SOME SANDSTONE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT GRAY TO WHITE TO TRANSLUCENT TO PINKISH RED TO BROWN GRAINS; LOWER FINE TO UPPER FINE GRAINED; WELL TO FAIR SORTING; SUBROUND TO SUBANGULAR ANGULARITY; MOFDERATE SPHERICITY; SOME FROSTED/POLISHED GRAINS ; MODERATLEY HARD TO FRIABLE HARDNESS; HIGHLY REACTIVE WITHA 10% HCL SOLUTION INDICATING CALCITE CEMENTATION; GRAIN SUPPORTED; DARK LITHIC CLASTS PRESENT IN SAMPLE; KAOLINITE CLAY PRESENT IN SAMPLE.

SILTSTONE = LIGHT BROWN TO TAN TO VERY LIGHT GRAY IN COLOR WITH SOME SAMPLES BEING REDISH PINK TO A DARK BROWN COLOR; GRAIN SZE IS VERY FINE TO FINE TO UPPER FINE; VERY WELL SORTED; ANGULARITY IS WELL ROUNDED TO ROUNDED; SURFACE FEATURES NOT VISIBLE; SOFT TO EASILY FRIABLE HARDNESS; GRAIN SUPPORTED WITH FEW LITHIC CLASTS; KAOLINITE CLAY PRESENT IN SAMPLE; SILTSTONE INTERBEDDED WITH SHALE AND SANDSTONE.

SHALE = VERY LIGHT GRAY TO MEDIUM GRAY WITH SOME SAMPLES HAVING A BLUISH HUE; BRITTLE TO CRUMBLY TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO VISIBLE STRUCTURES PRESENT; INTERBEDDED WITH SILTSTONE AND SOME SANDSTONE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT GRAY TO WHITE TO TRANSLUCENT GRAINS; UPPER FINE TO MEDIUM GRAINED; WELL SORTED; SUBROUNDED TO SUBANGULAR ANGULARITY; MODERATE SPHERICITY; SOME SAMPLES SHOW SURFACE FEATURES OF MECHANICAL ABRASION; MODERATLEY HARD TO FRIABLE HARDNESS;



HIGHLY REACTIVE WITHA 10% HCL SOLUTION INDICATING CALCITE CEMENTATION; GRAIN SUPPORTED; DARK LITHIC CLASTS PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

CARBONACEOUS SHALE = VERY DARK GRAY TO ALMOST BLACK IN COLOR; DENSE TO BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT; LUSTER IS DULL TO EARTHY; SMOOTH TO CLAYEY TEXTURE; NO VISIBLE STRUCTURE IN THE SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRA -Y TO OCCASIONAL MODERATE REDDISH BROWN IN COLOR; SLIGHTLY DENSE TO SLIGHTLY CRU -MBLY TO VERY SLIGHTLY BRITTLE TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULR TO SUB-NODULAR TO OCCASIONAL SEMI-PLATY CUTTINGS HABIT; DU -LL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VER -Y SLIGHLTY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE BEDDING WITH POOR GRAD -E SANDSTONE AND POOR GRADE SHALE IN SAMPLE, NO LAMINAE OR OTHER DISTINGUISHA -BLE STRUCTURAL FEATURES PRESENT; NO ACCESSORY MINERAL PRESENT IN SAMPLE.

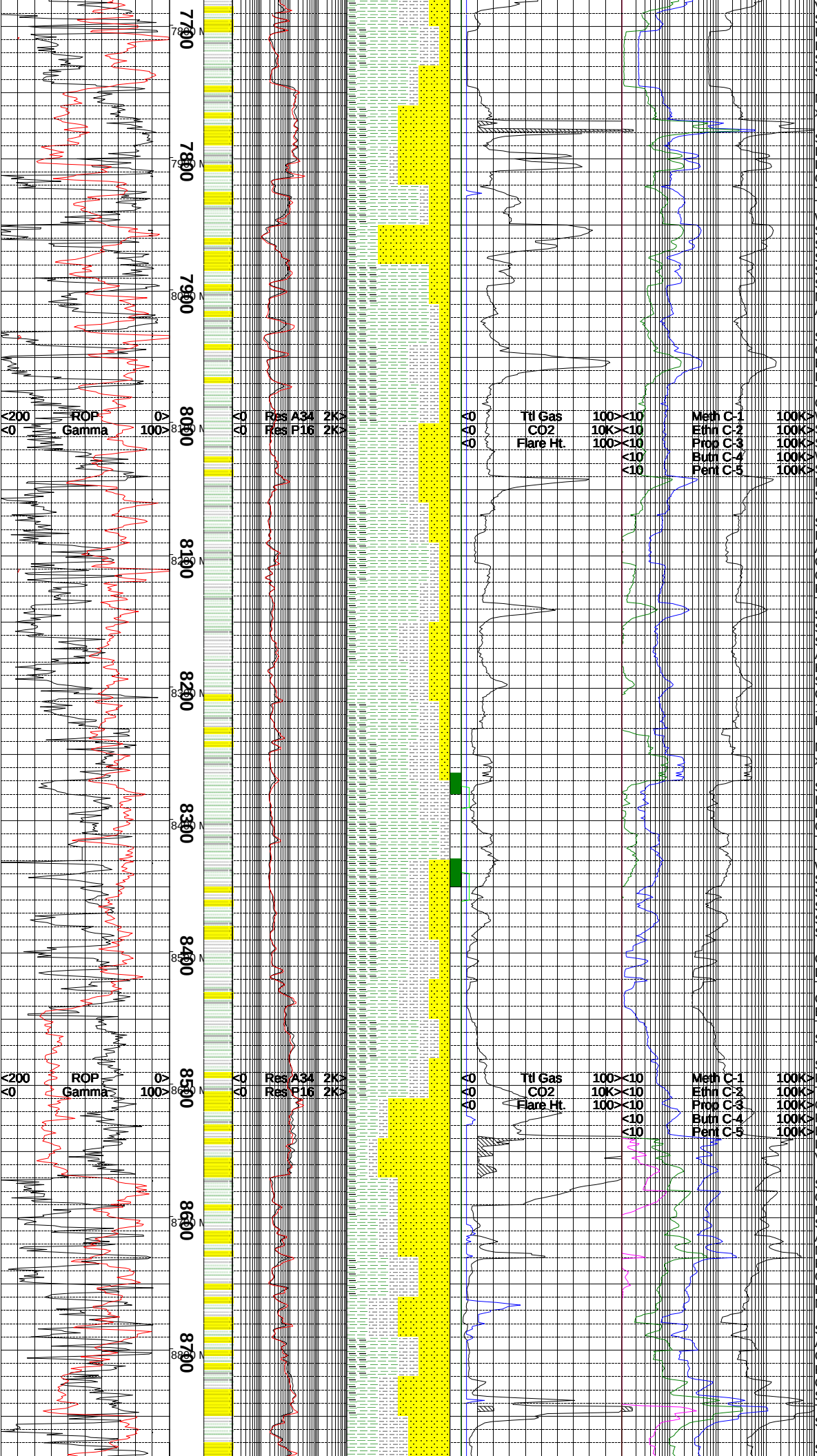
SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL LIGHT GRAY AND GRAYISH RED PURPLE MOTTLING IN COLOR; VERY SLIGHTLY TOUGH TO MODERATELY DENSE TO OCCASIONAL CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO OCCASIONAL ELON -GATED CUTTINGS HABIT; DULL TO EARTHY DU -LL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERATELY SMOOTH TO SLIGH SILTY TEXTURE; NO VISIBLE LAMINAE OR OTH -ER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT; TRACE AMOUNTS OF ACCESSORY MINERAL PYRITE PRESENT IN SAMPLE.

SANDSTONE = OFF WHITE TO VERY LIGHT GRAY TO VERY LIGHT TANISH BROWN-GRAY TO OCCAS -IONAL LIGHT BRILLIANT GREEN WITH FEW BL -ACK AND MODERATE BROWN HUES IN COLOR; QUARTZ DOMINATE; PREDOMINATELY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; CONSIST -S OF CALCITIC CEMENTATION WITH MODERATE -LY HIGH REACTION TO DILUTE HCL; MATRIX CONTAINS 2 TO 4% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO MEDIUM-COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO SUB -ROUNDED TO ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTON -E VISIBLY GRADING AND BEDDING WITH POOR GRADE SANDSTONE, NO OTHER DISTINGUISHABL -E SURFACE FEATURES PRESENT; NO ACCESSOR -Y MINERALS PRESENT IN SAMPLE.

CARBONACEOUS SHALE = BROWNISH GRAY TO DARK BROWNISH GRAY TO OCCASIONAL BROWN -ISH BLACK IN COLOR; MODERATELY DENSE TO VERY SLIGHLTY TOUGH TO SLIGHLTY CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB -PLANAR TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO SUB-TABULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO VERY SLIGHLTY GRITTY TO OCCASINAL SEM -I-SMOOTH TEXTURE; VERY SMALL AMOUNT OF CARBONACEOUS SHALE LIGHTLY EFFERVESCING IN SAMPLE, SMALL AMOUNT OF KAOLINITIC SA -NDSTONE IN SAMPLE, NO OTHER DISTINGUISH -ABLE STRUCTURAL FEATURES PRESENT; TRACE AMOUNTS OF ACCESSORY MINERAL PYRITE VISIBLY PRESENT IN SAMPLE.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO MEDIUM GRAY TO OCCASIONAL MEDIUM BRO -NISH GRAY IN COLOR; MODERATELY TOUGH TO MODERATELY DENSE TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY FRACT -URE; OCCASIONAL MASSIVE TO WEDGE LIKE TO OCCASIONAL ELONGATED TO SUB-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-WAXY TO SEMI-FROSTED LUSTER; MODERATELY SMOOTH TO VERY SLIGHT -LY SILTY TEXTURE; VERY SMALL AMOUNTS OF CARBONACEOUS SHALE AND COAL VISIBLY EFFE -RVESCING IN SAMPLE, THIN COAL LAMINAE VISIBLE IN SHALE CUTTING, NO OTHER DISTI -NGUISHABLE STRUCTURAL FEATURES PRESENT TRACE AMOUNTS OF ACCESSORY MINERAL PYRI -E VISIBLE IN SAMPLE.

CARBONACEOUS SHALE = BROWNISH GRAY TO DARK BROWNISH GRAY TO OCCASIONAL BROWNISH COLOR; MODERATELY DENSE TO SLIGHTLY TOUGH TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGELIKE TO SUB-TABULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO SEMI-SPARKLING LUSTER; SLIGHTLY CLAYEY TO SLIGHTLY GRITTY TO OCCASIONALLY SEMI-SMOOTH TEXTURE;



VERY SMALL AMOUNTS OF CARBONACEOUS SHALE WHICH SLIGHTLY EFFERVESED WHEN IN CONTACT WITH A 10% SOLUTION OF HCL; IN SAMPLE, SMALL AMOUNT OF KAOLINITIC SANDSTONE IN SAMPLE; NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT.

NOTE : CHANGE OF THA ATTENUATION FROM x10 TO x100 AT 7879' MD.

SHALE = LIGHT GRAY TO MEDIUM DARK GRAY IN COLOR WITH SOME SAMPLES BEING A VERY LIGHT BROWNISH GRAY OR A BLUEISH GREEN GRAY; TOUGH TO DENSE TO BRITTLE TENACITY; FRACTURE IS PLANAR TO BLOCKY; THE CUTTINGS HABIT IS MASSIVE TO PLATY WITH SOME SAMPLES SHOWING A FLAKY OR SCALY HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TO SILTY TEXTURE; SOME SAMPLES SHOW LAMINAE TO VERY THIN STRUCTURE WITH THE MAJORITY OF THE SAMPLE HAVING NO STRUCTURE; ACCESSORY MINERALS IN SAMPLE INCLUDE KAOLINITE AND A TRACE AMOUNT OF PYRITE.

SILTSTONE = GRAY TO VERY LIGHT GRAY IN COLOR WITH SOME SAMPLES BEING VERY LIGHT BROWN TO A REDISH BROWN COLOR; TENACITY IS DENSE TO BRITTLE TO CRUNCHY; BLOCKY TO IRREGULAR FRACTURE; MASSIVE TO PLATY CUTTINGS HABIT WITH SOME SAMPLES BEING WEDGELIKE; LUSTER IS DULL TO EARTHY; SILTY TO GRITTY TEXTURE; NO VISIBLE STRUCTURE PRESENT; SAMPLES INTERBEDDED WITH SHALE AND CARBONACEOUS SHALE; SOME SAMPLES ARE NOT VERY WELL CONSOLIDATED; NO ACCESSORY MINERALS PRESENT IN THE SAMPLE.

SANDSTONE = TRANSLUCENT TO WHITE TO GRAY IN COLOR WITH SOME SAMPLES HAVING BEING A RUSTY BROWN AND SOME HAVING A BLUISH GREEN HUE; FRAMEWORK IS DOMINATED BY QUARTZ GRAIN WITH K-SPAR AND LITHIC FRAGMENTS; GRAIN SIZE IS LOWER MEDIUM TO UPPER FINE GRAINED; VERY WELL TO WELL SORTING; ROUNDED TO SUBROUNDED TO SUBANGULAR GRAINS; HIGH TO MODERATE SPHERICITY; SOME INDIVIDUAL GRAINS ARE FROSTED DUE TO MECHANICAL ABRASION; HARDNESS IS HARD TO FRIABLE WITH SOME SAMPLES BEING SOFT AND NOT WELL CONSOLIDATED; VERY LITTLE REACTION WITH 10% HCL SOLUTION; GRAIN SUPPORTED WITH POSSIBLE SILICA CEMENTATION.

NOTE : CHANGE OF THA ATTENUATION FROM x100 TO x10 AT 8339' MD.

SHALE = LIGHT GRAY TO MEDIUM DARK GRAY IN COLOR WITH SOME SAMPLES BEING A VERY LIGHT BROWNISH GRAY OR A BLUEISH GREEN GRAY; TOUGH TO DENSE TO BRITTLE TENACITY; FRACTURE IS PLANAR TO BLOCKY; THE CUTTINGS HABIT IS MASSIVE TO PLATY WITH SOME SAMPLES SHOWING A FLAKY OR SCALY HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TO SILTY TEXTURE; SOME SAMPLES SHOW LAMINAE TO VERY THIN STRUCTURE WITH THE MAJORITY OF THE SAMPLE HAVING NO STRUCTURE.

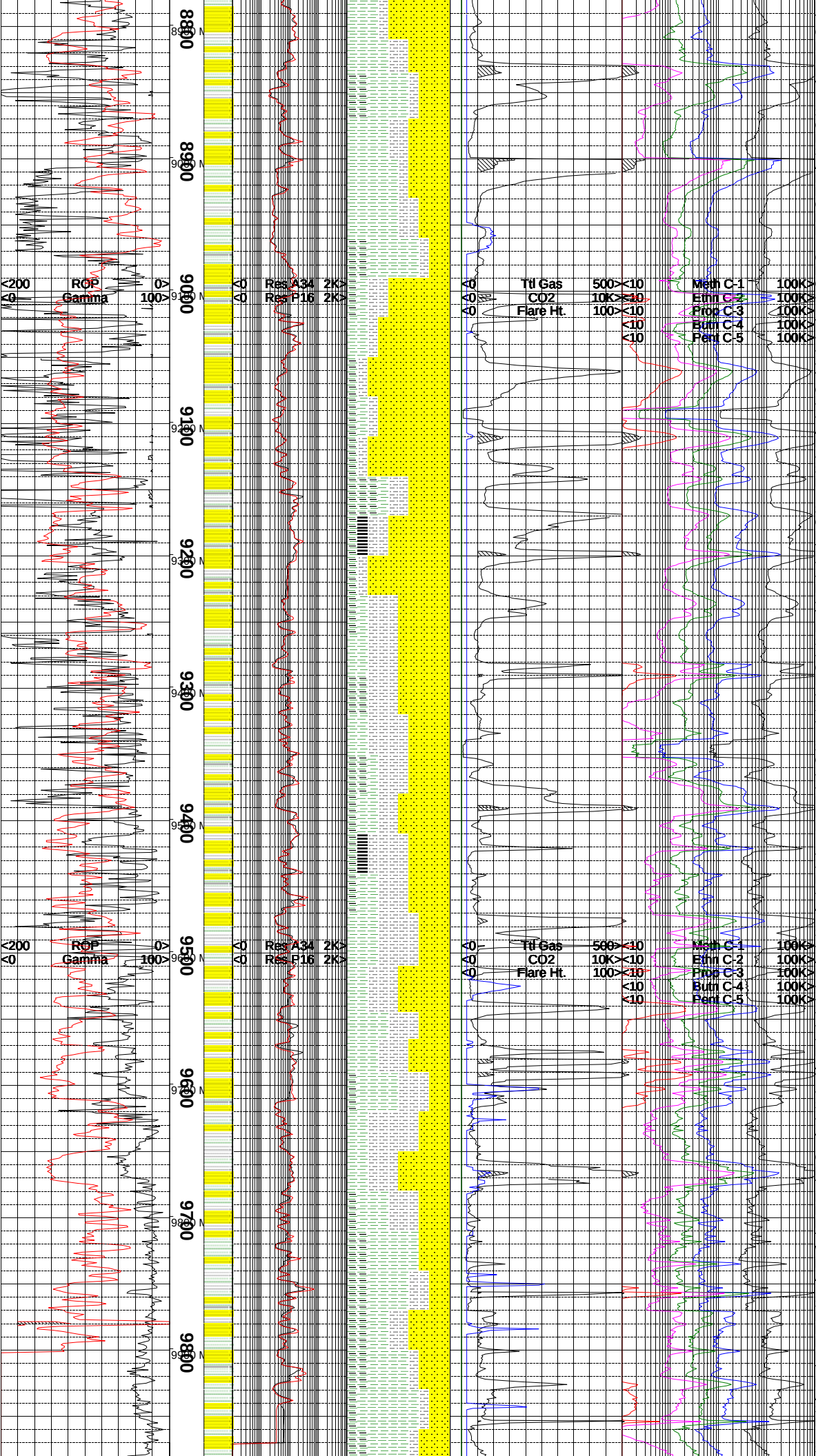
CARBONACEOUS SHALE = BLACK TO A VERY DARK BROWN COLOR; DENSE TO BRITTLE TENACITY; IRREGULAR TO PLANAR FRACTURE; CUTTINGS HABIT IS PLATY TO WEDGELIKE TO BLADED; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TO SILTY TEXTURE; NO VISIBLE STRUCTURE IN THE SAMPLE.

SILTSTONE = LIGHT BROWN TO TAN TO A REDISH BROWN COLOR; CRUMBLY TO CRUNCHY TENACITY; SOME SAMPLE IS NOT VERY WELL CONSOLIDATED; IRREGULAR TO BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT; DULL EARTHY LUSTER WITH SOME HAVING A GREASY LUSTER; SILTY TO GRITTY TEXTURE; NO VISIBLE STRUCTURE OR ACCESSORY MINERALS.

SANDSTONE = TRANSLUCENT TO WHITE GRAINS; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; VERY WELL TO WELL SORTING; ROUND TO SUBROUND TO SUB ANGULAR GRAINS; SPERICITY IS HIGH TO MODERATE; SOME FROSTED GRAINS; FIRMLY FRIABLE TO HARD; CALCITE CEMENTATION; GRAIN SUPPORTED; FEW LITHIC CLASTS; HIGHLY REACTIVE WITH A 10% HCL SOLUTION; NO VISIBLE FLOURECENSE.

SHALE = VERY LIGHT GRAY TO DARK GRAY TO A VERY LIGHT BLUEISH GRAY; BRITTLE TO CRUNCHY TENACITY; PLANAR TO IRREGULAR FRACTURE; PLATY TO WEDGELIKE TO BLADED CUTTINGS HABIT; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; LAMINAE TO THIN STRUCTURE; INTERBEDDED WITH SILTSTONE AND SANDSTONE.

SILTSTONE = LIGHT BROWN TO TAN TO A



REDISH BROWN COLOR; CRUMBLY TO CRUNCHY TENACITY; SOME SAMPLE IS NOT VERY WELL CONSOLIDATED; IRREGULAR TO BLOCKY FRACTURE; MASSIVE CUTTINGS HABIT; DULL EARTHY LUSTER WITH SOME HAVING A GREASY LUSTER; SILTY TO GRITTY TEXTURE; NO VISIBLE STRUCTURE OR ACCESSORY MINERALS.

SANDSTONE = TRANSLUCENT TO WHITE GRAINS; QUARTZ FRAMEWORK; UPPER FINE TO LOWER MEDIUM GRAIN SIZE; VERY WELL TO WELL SORTING; ROUND TO SUBROUND TO SUB ANGULAR GRAINS; SPERICITY IS HIGH TO MODERATE; SOME FROSTED GRAINS; FIRMLY FRIABLE TO HARD; CALCITE CEMENTATION; GRAIN SUPPORTED; FEW LITHIC CLASTS; HIGHLY REACTIVE WITH A 10% HCL SOLUTION; NO VISIBLE FLOURECENSE.

CARBONACEOUS SHALE = BROWNISH GRAY TO DARK BROWNISH GRAY TO BROWNISH BLACK TO OCCASIONAL OLIVE BLACK IN COLOR; MODERAT -ELY DENSE TO SLIGHTLY TOUGH TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY FRACTURE; MOSTLY SMALLER CUTTI -NGS TO WEDGE LIKE TO SUB-TABULAR CUTTIN -GS HABIT; DULL TO EARTHY DULL TO OCCASI -ONAL SEMI-SPARKLING LUSTER; SEMI-SMOOTH TO VERY SLIGHTLY GRITTY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POO -R GRADE SANDSTONE, VERY THIN COAL LAMIN -AE VISIBLE IN SHALE CUTTING, VERY SMALL AMOUNT OF CARBONACEOUS SHALE VISIBLE EFFERVECING IN SAMPLE, NO OTHER DISTINGU -ISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE; NO VISIBLE ACCESSORY MINERALS PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO OCCASIONAL MEDIUM LIGHT GRAY IN COLOR; MODERATELY DENSE TO VERY SLIGHTLY TOUGH TO OCCASIONAL CRUNCHY TENACITY; IRREGULA -R TO SEMI-BLOCKY TO SEMI-PLANAR TO EART -HY FRACTURE; OCCASIONAL MASSIVE TO SUB-PLATY TO WEDGE LIKE TO OCCASIONAL ELONGA -TED CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASINAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERATELY SMOOTH TO SEMI-SILTY TEXTURE; POOR GRADE SANDSTONE VISI -BLY IN CONTACT WITH COAL, SMALL AMOUNT CARBONACEOUS SHALE AND COAL VISIBLY EFFERVESCING IN SAMPLE, NO OTHER DISTING -UISHABLE STRUCTUAL FEATURES PRESENT IN SAMPLE; TRACE AMOUNTS OF ACCESSORY MINE -AL PYRITE PRESENT IN SAMPLE.

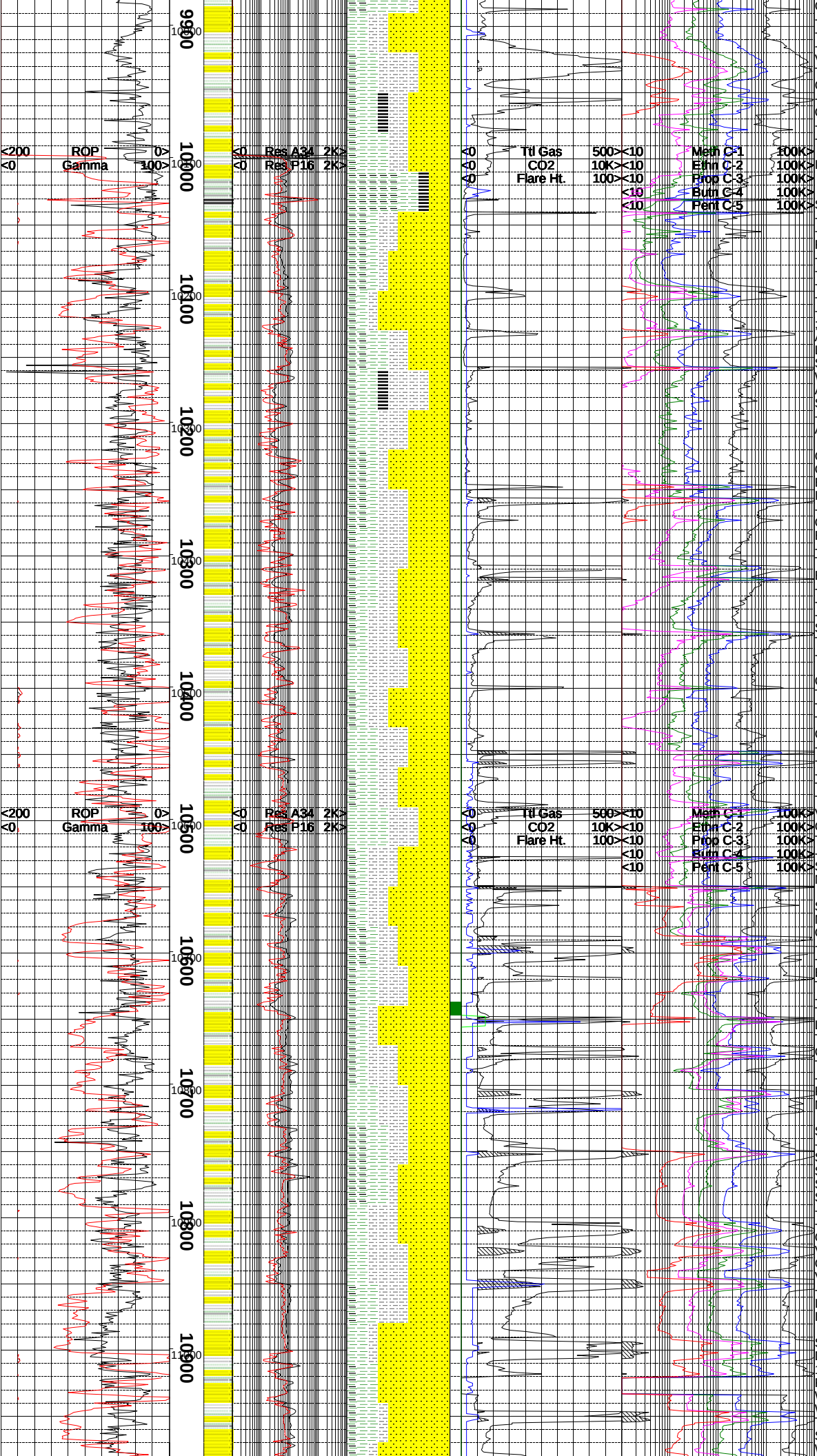
SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT GRAY WITH FEW BLACK HUES IN COLOR; MODER -ATELY DENSE TO OCCASIONAL BRITTLE TENAC -ITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING LUSTER ; SLIGHTLY GRITTY TO VERY SLIGHTLY GRANU -LAR TEXTURE; POOR GRADE SANDSTONE VISIB -LE GRADING WITH POOR GRADE SILTSTONE, NO LAMINAE OR OTHER DISTINGUISHABLE STRU -CTURAL FEATURES PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = OFF WHITE TO VERY LIGHT BROW -NISH GRAY TO YELLOWISH GRAY WITH BLACK AND MODERATE BROWN HUES; QUARTZ DOMINA -FRAME WORK; PREDOMINATELY GRAIN SUPPORT -D WITH FAIR AMOUNT OF LOOSE GRAINS; CON -SISTS OF CALCITIC CEMENTATION WITH MODE -RATELY HIGH REACTION TO DILUTE HCL; MAT -RIX CONTAINS 3 TO 5% DARK LITHIC FRAGME -NTS; MEDIUM TO MEDIUM-COARSE GRAINED; FAIR TO POOR SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTS -TONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, NO BEDDING OR OTHER DISTINGUI -SHABLE SURFACE FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

CARBONACEOUS SHALE = BLACK TO A VERY DARK GRAY TO A DARK BROWNISH GRAY COLOR TENACITY IS TOUGH TO DENSE TO BRITTLE; FRACTURE IS IRREGUALR TO BLOCKY; CUTTING HABIT IS TABULAR TO WEDGELIKE; DULL LUSTER WITH SOME SAMPLES BEING GREASY TO RESINOUS; MOSTLY SMOOTH IN TEXTURE WITH SOME SAMPLES BEING CLAYEY TO SILTY; LAMINAE TO VERY THIN STRUCTURE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SHALE = DARK GRAY TO LIGHT GRAY TO VERY LIGHT BROWNISH GRAY COLOR; TOUGH TO DENSE TO BRITTLE TENACITY; BLOCKY TO PLANAR FRACTURE; TABULAR TO WEDGELIKE TO BLADED; DULL TO EARTHY LUSTER; SMOOTH TO CLAYEY TEXTURE; NO VISIBLE STRUCTURE PRESENT IN SAMPLE; TRACE AMOUNTS OF ACCESSORY MINERAL PYRITE IN SAMPLE; SMALL AMOUNT OF CARBONACEOUS SHALE PRESENT IN SAMPLE.

SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT



GRAY IN COLOR; IRREGULAR TO EARTHY FRACT
-URE; SUB-TABULAR TO SUB-NODULAR TO SEMI
-PLATY CUTTINGS HABIT; DULL TO EARTHY DU
-LL TO OCCASIONAL SEMI-SPARKLING LUSTER;
VERY SLIGHTLY CLAYEY TO SLIGHTLY GRITTY
TO VERY SLIGHLTY GRANULAR TEXTURE; WELL
GRADE SANDSTONE VISIBLE BEDDING WITH WEL
-L GRADE SILTSTONE, NO OTHER LAMINAE OR
OTHER DISTINGUISHABLE STRUCTURAL FEATURE
-S PRESENT; NO ACCESSORY MINERALS PRESEN
-T IN SAMPLE.

INTERMEDIATE TD SET @10120' ON 9/12/2010
BEGIN DRILLING PRODUCTION ON 9/19/2010

SANDSTONE = OFF WHITE TO VERY LIGHT TANI
-SH BROWN GRAY WITH FEW BLACK AND MODER
-TE BROWN HUES IN COLOR; QUARTZ DOMINATE
FRAME WORK; PREDOMINATELY GRAIN SUPPORT
-D WITH FEW LOOSE GRAINED CUTTINGS; CEME
-NTATION CONSISTS OF CALCITE WITH MODERA
-TELY HIGH REACTION TO DILUTE HCL; MATRI
-X CONTAINS 3 TO 5% DARK LITHIC FRAGMENT
-S; MEDIUM-FINE TO MEDIUM-COARSE GRAINED
; FAIR TO POOR SORTING; SUB-ANGULAR TO
ANGULAR TO SUB-ROUNDED ANGULARITY;
LOW TO MODERATE SPHERICITY; POOR GRADE
SANDSTONE VISIBLE BEDDING AND GRADING
WITH POOR GRADE SILTSTONE, VERY SMALL
AMOUNT OF COAL VISIBLY EFFERVESCING IN
SAMPLE, NO OTHER BEDDING OR OTHER DISTIN
-GUISHABLE SURFACE FEATURES PRESENT; NO
ACCESSORY MINERALS PRESENT IN SAMPLE.

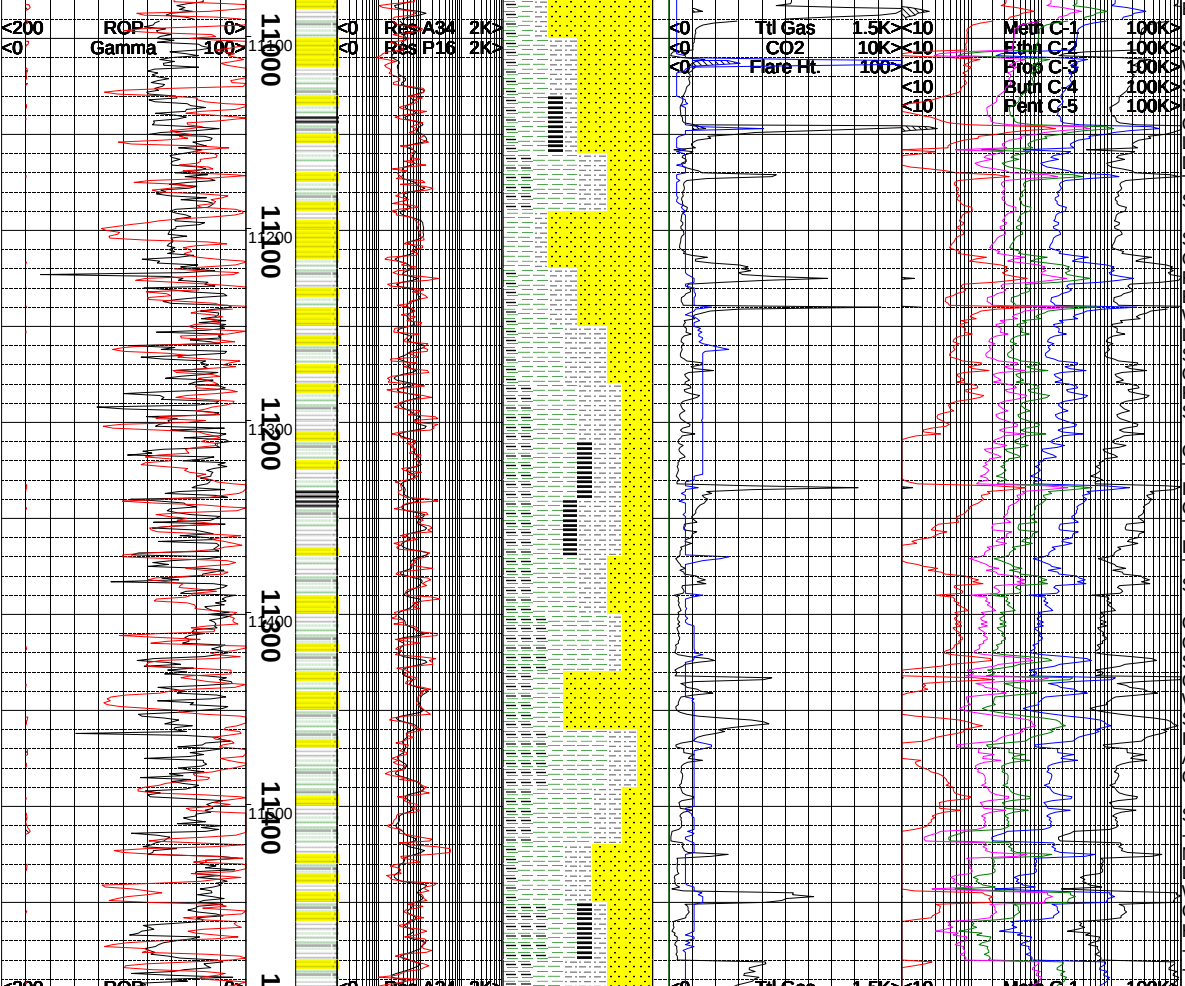
COAL = DARK GRAYISH BLACK TO BLACK IN
COLOR; MODERATELY CRUNCHY TO SLIGHTLY
BRITTLE TO VERY SLIGHTLY DENSE TENACITY;
IRREGULAR TO SUB-BLOCKY TO HACKLY FRACTU
-RE; OCCASIONAL MASSIVE TO WEDGE LIKE TO
OCCASIONAL SEMI-BLADED CUTTINGS HABIT;
EARTHY DULL TO SEMI-METALLIC TO SEMI-VIT
-EOUS TO SEMI-GREASY LUSTER; SEMI-SMOOTH
TO SEMI-CRYSTALIN TEXTURE; COAL VISIBLY
EFFERVESCING IN SAMPLE, VERY THIN COAL L
-AMINAE VISIBLE IN SHALE CUTTING, POOR G
-RADE SILTSTONE VISIBLE BEDDING WITH POO
-R GRADE SHALE, NO OTHER DISTINGUISHABLE
STRUCTURAL FEATURES PRESENT IN SAMPLE;
TRACE AMOUNTS OF ACCESSORY MINERAL PYRI
-E PRESENT IN SAMPLE.

CARBONACEOUS SHALE = DARK BROWNISH BLAC
TO BROWNISH BLACK TO DARK BROWNISH GRAY
TO OLIVE GRAY IN COLOR; MODERATELY DENSE
TO SLIGHTLY CRUNCHY TO VERY SLIGHTLY
CRUMBLY TENACITY; IRREGULAR TO SUB-BLOCK
-Y TO SUB-PLANAR TO EARTHY-HACKLY FRACTU
-RE; SUB-TABULAR TO SUB-NODULAR TO OCCAS
-IONAL SEMI-PLATY CUTTINGS HABIT; DULL
TO EARTHY DULL TO OCCASIONAL SEMI-GREASY
TO SEMI-SPARKLING LUSTER; SEMI-SMOOTH TO
VERY SLIGHTLY GRITTY TEXTURE; VERY THIN
COAL LAMINAE VISIBLE IN SHALE CUTTING,
TRACE AMOUNTS OF COAL VISIBLY EFFERVESCI
-NG IN SAMPLE, NO OTHER DISTINGUISHABLE
STRUCTURAL FEATURES PRESENT IN SAMPLE;
NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SHALE = VERY LIGHT GRAY TO LIGHT GRAY TO
MEDIUM LIGHT GRAY TO OCCASIONAL MEDIUM
GRAY IN COLOR; SLIGHTLY DENSE TO SLIGHTL
-Y CRUMBLY TO VERY SLIGHTLY BRITTLE TENA
-CITY; IRREGULAR TO SUB-PLANAR TO SEMI-
BLOCKY TO EARTHY FRACTURE; WEDGE LIKE
TO OCCASIONAL ELONGATED TO MOSTLY SMALL
-R CUTTINGS HABIT; DULL TO EARTHY DULL
TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY
LUSTER; MODERATELY SMOOTH TO SEMI-SILTY
TEXTURE; POOR GRADE SILTSTONE VISIBLE
GRADING WITH POOR GRADE SANDSTONE, VERY
THIN COAL LAMINAE VISIBLE IN SHALE CUTTI
-NG, NO OTHER DISTINGUISHABLE STRUCTURAL
FEATURES PRESENT IN SAMPLE; NO ACCESSORY
MINERALS PRESENT IN SAMPLE.

SILTSTONE = VERY LIGHT GRAY TO LIGHT GRA
-Y IN COLOR; MODERATELY DENSE TO VERY
SLIGHTLY TOUGH TENACITY; IRREGULAR TO
SUB-PLANAR TO EARTHY-HACKLY FRACTURE;
SUB-TABULAR TO SUB-NODULAR TO OCCASIONA
SEMI-PLATY CUTTINGS HABIT; DULL TO EARTH
-Y DULL TO OCCASIONAL SEMI-SPARKLING LUS
-TER; SLIGHLTY GRITTY TO VERY SLIGHLTY
GRANULAR TEXTURE; POOR GRADE SILTSTONE
VISIBLE GRADING AND BEDDING WITH POOR
GRADE SANDSTONE, VERY THIN COAL LAMINAE
VISIBLE IN SHALE CUTTING, NO OTHER DISTI
-NGUISHABLE STRUCTURAL FEATURES PRESENT
IN SAMPLE; NO ACCESSORY MINERALS PRESENT
IN SAMPLE.

SANDSTONE = WHITE TO LIGHT GRAY;
DOMINATE QUARTZ FRAMEWORK WITH APPROX.
10% BLACK LITHIC CLASTS INTERBEDDED;
FINE TO MEDIUM GRAINED WITH FAIR TO SEMI
WELL SORTING; SUBANGULAR TO SUBROUNDED
WITH MODERATE SPHERICITY; FIRMLY FRIABLE
TO MODERATE HARDNESS; CALCITE CEMENT AS
SUGGESTED BY A MEDIUM TO STRONG REACTIO
WITH HCL; KAOLINITE IN MATRIX; NO VISIBL



BEDDING STRUCTURE.

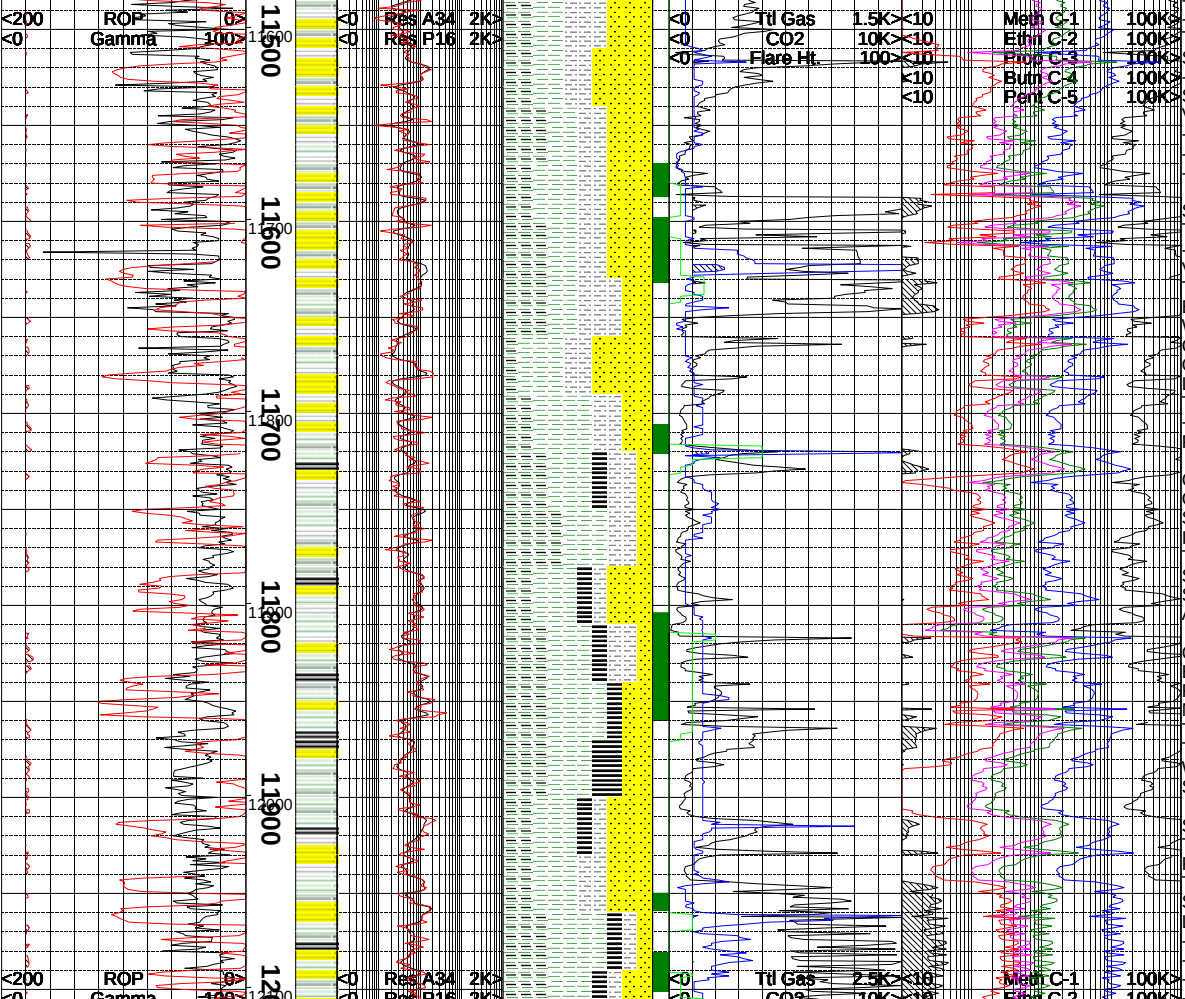
SHALE = MEDIUM GRAY TO MEDIUM DARK GRAY WITH A SLIGHT MEDIUM BLUISH GRAY HUE; SLIGHTLY DENSE TO BRITTLE TENACITY; FRACTURES FROM PLANAR TO IRREGULAR; CUTTINGS ARE PLATY TO SLIGHTLY TABULAR; LUSTER RANGES FROM EARTHY TO WAXY TO DULL; SMOOOTH TO SILTY TEXTURE; LMAINAE TO THIN STRUCTURE; INTERBEDDED WITH SILTSTONE; NO OTHER VISIBLE STRUCTURES.

SILTSTONE = MEDIUM DARK GRAY TO DARK GRAY; DENSE TO SLIGHTLY BRITTLE TENACITY FRACTURES FROM MOSTLY IRREGULAR TO BLOCKY; CUTTINGS ARE TABULAR TO SEMI WEDGELIKE; EARTHY TO SLIGHTLY SPARKLING LUSTER; SILTY TEXTURE; GRADING INTO SHALE; THIN TO SEMI THICK STRUCTURE; OCCASIONAL VERY THIN SEEMS OF COAL RUNNING THROUGH; NO OTHER VISIBLE STRUCTURE.

COAL = BLACK; CRUMBLY TO BRITTLE TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR TO OCCASIONALLY PLANAR; CUTTINGS ARE FLAKY TO NODULAR; RESINOUS TO POLISHED LUSTER; THIN STRUCTURE; INTERBEDDED WITH SANDSTONE AND SHALE; THIN VEINS OBSERVED RUNNING THROUGH SILTSTONE AND SANDSTONE SPECIMENS.

CARBONACEOUS SHALE = BROWNISH BLACK TO GRAYISH BLACK; TENACITY IS BRITTLE TO SLIGHTLY CRUNCHY; PLANAR FRACTURING; CUTTINGS ARE ELONGATED TO OCCASIONALLY WEDGELIKE; DULL EARTHY LUSTER; SMOOTH TO SILTY TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SANDSTONE; TRACE AMOUNTS OF PYRITE PRESENT OCCASIONALLY OBSERVED ON THE CARBONACEOUS SHALE.

SANDSTONE = LIGHT BROWNISH GRAY TO YELLO -WISH GRAY TO VERY LIGHT GRAY WITH FEW MODERATE BROWN AND BLACK HUES; QUARTZ DOMINATE; PREDOMINATELY GRAIN SUPPORTED WITH VERY FEW LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATELY HIGH REACTION TO DILUTE HCL; MATRIX CONT -AINS 3 TO 5% DARK LITHIC FRAGMENTS; FIN -E TO MEDIUM COARSE GRAINED; FAIR TO POO -R SORTING; SUB-ANGULAR TO SUB-ROUNDED TO ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE IN VISI -BLE BEDDING CONTACT WITH POOR GRADE SANDTONE, POOR GRADE CARBONACEOUS SHAL VISIBLE BEDDING WITH SHALE, NO OTHER LAM -INAE OR OTHER DISTINGUISHABLE STRUCTURA -L FEATURES PRESENT IN SAMPLE; NO ACCESS -ORY MINERALS PRESENT IN SAMPLE.



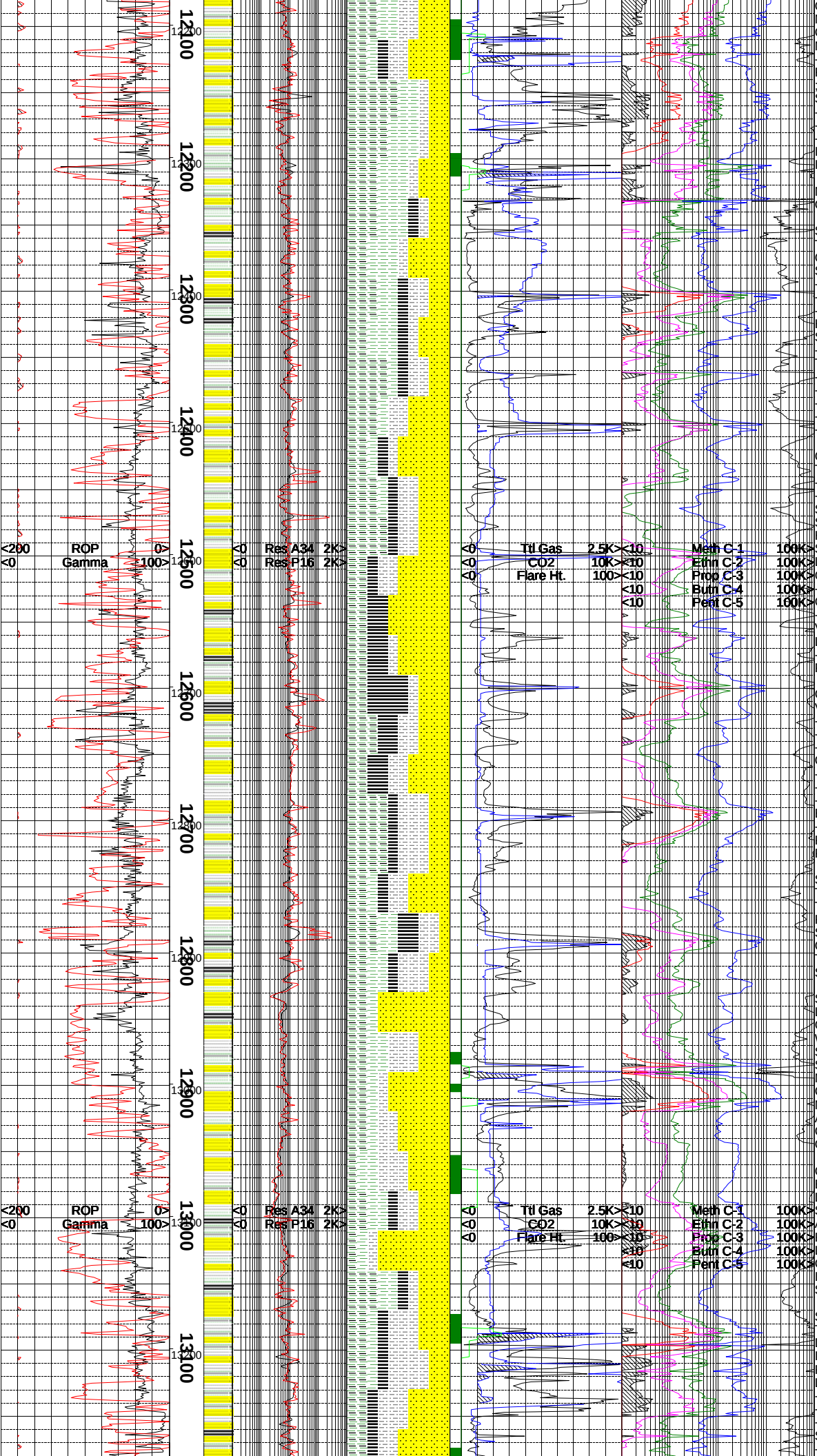
SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO MEDIUM GRAY TO OCCASIONAL MEDIUM BRO -NISH GRAY IN COLOR; MODERATELY DENSE TO VERY SLIGHTLY TOUGH TO SLIGHTLY CRUNCHY TENACITY; IRREGULAR TO SUB-BLOCKY TO EARTHY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO ELONGATED TO SEMI-PLATY CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-WAXY TO SEMI-FROSTED LUSTER; MODERATELY SMOOTH TO SEMI-SILTY TEXTURE; NO VISIBLE LAMINAE OR OTHER DIS -TINGUISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE.

CARBONACEOUS SHALE = GRAYISH BLACK TO GRAY TO BLACK; TENACITY IS BRITTLE TO SLIGHTLY CRUMBLY; FRACTURES FROM IRREGULAR TO SEMI BLOCKY TO PLANAR; TABULAR CUTTINGS; WAXY TO EARTHY TO SLIGHTLY RESINOUS LUSTER; SILTY TO SMOOTH TEXTURE; TRACE AMOUNTS OF PYRITE ASSOCIATED WITH SAMPLE.

COAL = BLACK TO GRAYISH BLACK; VERY BRITTLE TO CRUMBLY TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR; CUTTINGS ARE NODULAR TO OCCASIONALLY FLAKY; RESINOUS TO POLISHED LUSTER; SMOOTH TO CLAYEY TEXTURE; THIN STRUCTURE; INTERBEDDED WITH SHALE AND CARBONACEOUS SHALE AND SANDSTONE.

SILTSTONE = BROWNISH GRAY TO MEDIUM GRAY TENACITY IS DENSE TO BRITTLE; FRACTURS FROM BLOCKY TO IRREGULAR; CUTTINGS ARE TABULAR TO WEDGELIKE; EARTHY TO DULL TO SLIGHTLY WAXY LUSTER; SILTY TEXTURE; LIKELY GRADING FROM SHALE; THIN COAL LAM -INAE VISIBLE IN SHALE CUTTING; SMALL AM -OUNT OF COAL VISIBLY EFFERVESCING IN SA -MPLE, NO OTHER DISTINGUISHABLE STRUCTUR -AL FEATURES PRESENT IN SAMPLE; NO ACCES -SORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = VERY LIGHT BROWNISH GRAY TO LIGHT YELLOWISH GRAY WITH FEW BLACK AND MODERATE BROWN HUES; QUARTZ DOMINATE FRAME WORK; PREDOMINATELY GRAIN SUPPORT -D WITH VERY FEW LOOSE GRAINS; CONSISTS



OF CALCITIC CEMENTATION WITH LIGHT TO MODERATE REATION TO DILUTE HCL; MATRIX CONTAINS 3 TO 5% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO MEDIUM-COARSE GRAINED; FA -IR TO POOR SORTING; SUB-ANGULAR TO SUB-ROUNDED TO OCCASIONAL ROUNDED ANGULARI ; LOW TO MODERATE SPHERICITY; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRAD -E SANDSTONE, SMALL AMOUNT OF COAL VISIB -LY EFFERVESCING IN SAMPLE, NO OTHER DIS -TINGUISHABLE SURFACE FEATURES PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

NOTE = TRIPPED OUT @ 12355' TO CHANGE OUT BIT.

SHALE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO MEDIUM GRAY TO OCCASIONAL MEDIUM DARI GRAY IN COLOR; MODERATELY DENSE TO VERY SLIGHTLY TOUGH TO SLIGHTLY CRUNCHY TENAC -ITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLA -NAR TO HACKLY FRACTURE; OCCASIONAL MASS -IVE TO ELONGATED TO WEDGE LIKE CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-FROSTED TO SEMI-WAXY LUSTER; MODERA -TELY SMOOTH TO SEMI-SILTY TEXTURE; VERY THIN COAL LAMINAE VISIBLE IN SHALE CUTTI -NG, SMALL AMOUNT OF COAL VISIBLY EFFERV -ESCING IN SAMPLE, NO OTHER DISTINGUISHA -BLE STRUCTURAL FEATURES PRESENT IN SAMP -LE; NO ACCESSORY MINERALS VISIBLY PRESE -NT IN SAMPLE.

CARBONACEOUS SHALE = DARK BROWNISH GRA TO BROWNISH BLACK TO OCCASINAL OLIVE BLA -CK IN COLOR; MODERATELY TO SLIGHTLY DEN -SE TENACITY; IRREGULAR TO SUB-BLOCKY TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR CUTTINGS HABIT; DULL TO EARTHY DULL TO OCCASIONAL SEMI-SPARKLING TO OCCASIONAL SEMI-GREASY LUSTER; SLIGHTLY GRITTY TO VERY SLIGHLTY GRANULAR TEXTURE; POOR GRADE CARBONACE -S SHALE VISIBLY BEDDED WITH COAL, POOR GRADE SILTSTONE VISIBLE GRADING WITH POO -R GRADE SANDSTONE, SMALL AMOUNT OF COAL VISIBLY EFFERVESCING IN SAMPLE, NO OTHER LAMINAE OR OTHER DISTINGUISHABLE STRUCTU -RAL FEARTURES PRESENT; TRACE AMOUNTS OF PYRITE VISIBLY PRESENT IN SAMPLE.

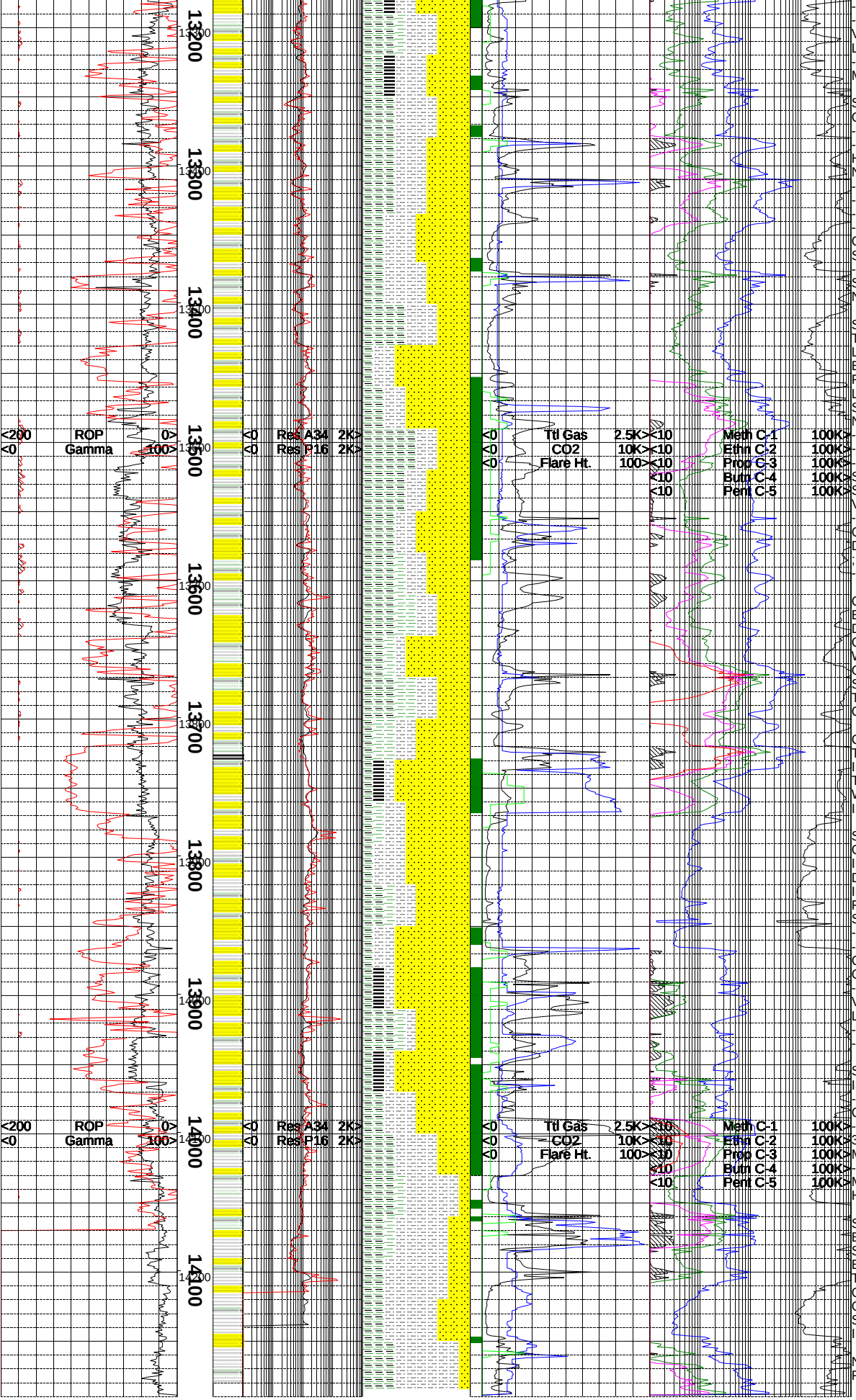
COAL = GRAYISH BLACK TO BLACK IN COLOR; VERY SLIGHTLY DENSE TO MODERATELY CRUNC -Y TO VERY SLIGHTLY CRUMBLY TENACITY; IR -REGULAR TO SUB-BLOCKY TO HACKLY FRACTUR -E; OCCASIONAL MASSIVE TO WEDGE LIKE TO OCCASIONAL ELONGATED CUTTINGS HABIT; DUL -L TO EARTHY DULL TO OCCASIONAL SEMI-MET -ALIC TO SEMI-VITREOUS LUSTER; SEMI-SMOO -TH TEXTURE; FAIR AMOUNT OF COAL VISIBLY EFFERVESCING IN SAMPLE, NO OTHER DISTING -USHABLE STRUCTURAL FEATURES VISIBLY PRESENT IN SAMPLE; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SILTSTONE = BROWNISH GRAY TO DARK GRAY TO BROWNISH BLACK; TENACITY IS BRITTLE TO CRUMBLY; IRREGULAR TO BLOCKY FRACTURING; CUTTINGS ARE WEDGELIKE TO SLIGHTLY TABULAR; EARTHY TO DULL WITH AN OCCASIONAL SLIGHT WAXY LUSTER; SILTY TEXTURE; THIN STRUCTURE; GRADING TOWARDS SHALE.

SANDSTONE = WHITE TO TRANSLUCENT TO LIGHT GRAY; DOMINATE QUARTZ FRAMEWORK; GRAIN SIZE VARIES FROM FINE TO COARSE WITH POOR SORTING; SUBANGULAR TO SUBROUNDED WITH MODERATE TO LOW SPHERICITY; HARD TO MODERATE HARDNESS; MILD REACTION WITH HCL SUGGESTS SOME CALICITE CEMENT; SILICEOUS/CALCAREOUS MATRIX; NO VISIBLE BEDDING; HIGH GAS ASSOCIATED WITH SAMPLE; INTERBEDDED CARBONACEOUS SHALE AND TRACE AMOUNTS OF COAL.

CARBONACEOUS SHALE = GRAYISH BLACK TO BROWNISH BLACK; TENACITY IS SLIGHTLY DENSE TO BRITTLE; IRREGULAR TO BLOCKY TO SLIGHTLY SPLINTERY FRACTURING; CUTTINGS ARE TABULAR TO PLATY; EARTHY TO SLIGHTLY RESINOUS LUSTER; SMOOTH TEXTURE; THIN TO LAMINAE TO OCCASIONALLY THICK STRUCTURE; CONTAINS TRACE AMOUNTS OF PYRITE INTERBEDDED; HIGH GAS ASSOCIATED WITH SAMPLE.

SHALE = MEDIUM LIGHT GRAY TO MEDIUM GRAY TO MEDIUM DARK GRAY IN COLOR; MODERATELY DENSE TO VERY SLIGHLTY CRUNCHY TENACITY; IRREGULAR TO SUB-PLANAR TO SEMI-BLOCKY FRACTURE; OCCASIONAL MASSIVE TO WEDGE LIKE TO ELONGATED CUTTINGS HABIT; DULL T -O EARTHY DULL TO OCCASIONAL SEMI-FROSTE -D TO SEMI-WAXY LUSTER; MODERATELY SMOOT -H TO SLIGHTLY SILTY TEXTURE; POOR GRADE SANDSTONE VISIBLY BEDDING WITH POOR GRAD -E CARCONACEOUS SHALE, POOR GRADE SILTST



-ONE VISIBLE GRADING WITH POOR GRADE SAN -DSTONE IN SAMPLE, SMALL AMOUNT OF COAL VISIBLY EFFERVESCING IN SAMPLE, NO OTHER LAMINAE OR OTHER DISTINGUISHABLE STRUCTU -RAL FEATURES PRESENT; NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SILTSTONE = LIGHT GRAY TO LIGHT BROWNISH GRAY IN COLOR; MODERATELY DENSE TO SLIGH -TLY CRUNCHY TO OCCASIONAL CRUMBLY TENA -TIY; IRREGULAR TO SUB-PLANAR TO EARTHY HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO OCCASIONAL SEMI-PLATY CUTTING -S HABIT; DULL TO EARTHY DULL TO OCCASIO -NAL SEMI-SPARKLING LUSTER; SLIGHTLY GRI -TTY TO OCCASIONAL VERY SLIGHTLY GRANULA -R TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE, VERY SMALL AMOUNT OF COAL VISIBLY EFFERVESCIN -G IN SAMPLE, NO OTHER DISTINGUISHABLE STRUCTURAL FEATURES PRESENT IN SAMPLE, NO ACCESSORY MINERALS PRESENT IN SAMPLE.

SANDSTONE = OFF WHITE TO YELLOWISH GRAY TO VERY LIGHT TANISH BROWN GRAY TO VERY LIGHT GRAY WITH FEW MODERATE BROWN AND BLACK HUES; QUARTZ DOMINATE FRAME WORK; PREDOMINATELY GRAIN SUPPORTED WITH FEW LOOSE GRAINS; CONSISTS DOMINATELY OF SILICIC CEMENTATION WITH VERY LIGHT TO NO REACTION TO DILUTE HCL; MATRIX CONTAI -NS 3 TO 5% DARK LITHIC FRAGMENTS; MEDIU -M TO MEDIUM-COARSE GRAINED; FAIR TO POO -R SORTING; SUB-ANGULAR TO ANGULAR TO SUB-ROUNDED ANGULARITY; LOW TO MODERATE SPHERICITY; VERY SMALL AMOUNT OF COAL VISIBLY EFFERVESCING IN SAMPLE; POOR GRA -DE SILTSTONE VISIBLE GRADING WITH POOR GRADE SANDSTONE IN SAMPLE, NO OTHER DISTINGUISHABLE SURFACE FEATURES PRESENT ; NO ACCESSORY MINERALS PRESENT IN SAMP -LE.

CARBONACEOUS SHALE = BROWNISH BLACK TO BLACK; TENACITY IS BRITTLE TO SLIGHTLY DENSE; IRREGULAR TO BLOCKY TO SLIGHTLY CONCHOIDAL FRACTURING; CUTTINGS ARE WEDGELIKE TO FLAKY; POLISHED TO OCCASIONALLY EARTHY LUSTER; SMOOTH TO SLIGHTLY SILTY TEXTURE; THIN STRUCTURE; TRACE AMOUNTS OF COAL SEEMS OCCASIONALL OBSERVED INTERBEDDED.

COAL = BLACK; BRITTLE TO CRUMBLY TENACITY; FRACTURES FROM BLOCKY TO IRREGULAR TO PLANAR; CUTTINGS ARE FLAKY TO SLIGHTLY PLATY; EARTHY TO SLIGHTLY WAXY TO POLISHED LUSTER; THIN STRUCTURE; INTERBEDDED WITH SANDSTONE.

SILTSTONE = LIGHT GRAY TO MEDIUM LIGHT GRAY TO OCCASIONAL LIGHT BROWNISH GRAY IN COLOR; MODERATELY DENSE TO SLIGHTLY DENSE TO VERY SLIGHTLY BRITTLE TENACITY; IRREGULAR TO SUB-PLANAR TO EARTHY-HACKLY FRACTURE; SUB-TABULAR TO SUB-NODULAR TO SEMI-PLATY CUTTINGS HABIT; DULL TO EARTH -Y DULL TO OCCASIONAL SEMI-SPARKLING LUS -TER; SLIGHTLY GRITTY TO VERY SLIGHLTY GRANULAR TO SEMI-CLAYEY TEXTURE; POOR GRADE SILTSTONE VISIBLE GRADING WITH POO -R GRADE SANDSTONE, SMALL AMOUNT OF COAL VISIBLY EFFERVESCING IN SAMPLE, NO OTHER LAMINAE OR OTHER DISTINGUISHABLE STRUCTU -RAL FEATURES PRESENT; NO ACCESSORY MINE -RALS PRESENT IN SAMPLE.

SANDSTONE = OFF WHITE TO YELLOWISH GRAY- ISH WHITE; QUARTZ DOMINATE; GRAIN SUPPOR -TED WITH FEW LOOSE GRAINS; CONSISTS OF CALCITIC CEMENTATION WITH MODERATE REACT -ION TO DILUTE HCL; MATRIX CONTAINS 1 TO 3% DARK LITHIC FRAGMENTS; MEDIUM-FINE TO MEDIUM GRAINED; FAIR TO WELL SORTING; SU -B-ANGULAR TO SUB-ROUNDED ANGULARITY; MODERATE SPHERICITY; HARD TO MODERATE HARDNESS; NO VISIBLE BEDDING STRUCTURE.

SILTSTONE - MEDIUM DARK GRAY TO GRAYISH BLACK TO BROWNISH BLACK; DENSE TO SLIGHTLY BRITTLE TENACITY; IRREGULAR TO BLOCKY FRACTURING; CUTTINGS ARE MASSIVE TO TABULAR; DULL EARTHY TO WAXY WITH AN OCCASIONAL SPARKLING LUSTER; SILTY TO GRITTY TEXTURE; THICK TO MASSIVE STRUCTURE; CONTAINS CARBONACEOUS SHALE INTERBEDDED.

NOTE = REACHED TOTAL DEPTH OF 14288' FOR PCU 296-5A01 ON 10/1/2010 AT 3:00 PM.