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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 MD

COMPANY ExxonMobil Production
WELL PCU 297-12A7
FIELD Piceance Creek Unit
REGION Rocky Mountain
COORDINATES Lat. 39.889005 N
Lon. 108.23726 W
ELEVATION GL: 7183.9'
KB: 7214'
COUNTY, STATE RIO BLANCO, CO
API INDEX 05-103-11161-00
SPUD DATE 10/12/2008
CONTRACTOR HP Drilling
CO. REP. J. Woods, M. Sadler
RIG/TYPE 326 / Flex Four
LOGGING UNIT Canrig Unit 36
GEOLOGISTS J.Kokes
B.Laiche
ADD. PERSONS H.Strickland
P.Strickland
CO. GEOLOGIST Chris Alba

LOG INTERVAL

CASING DATA

DEPTHS: 3995' TO 12866'
DATES: 5/22/2009 TO 11/22/2009
SCALE: 5" = 100'

10 3/4" AT 3980'
7" AT 8881'
4.5" AT 12866'
AT

MUD TYPES

HOLE SIZE

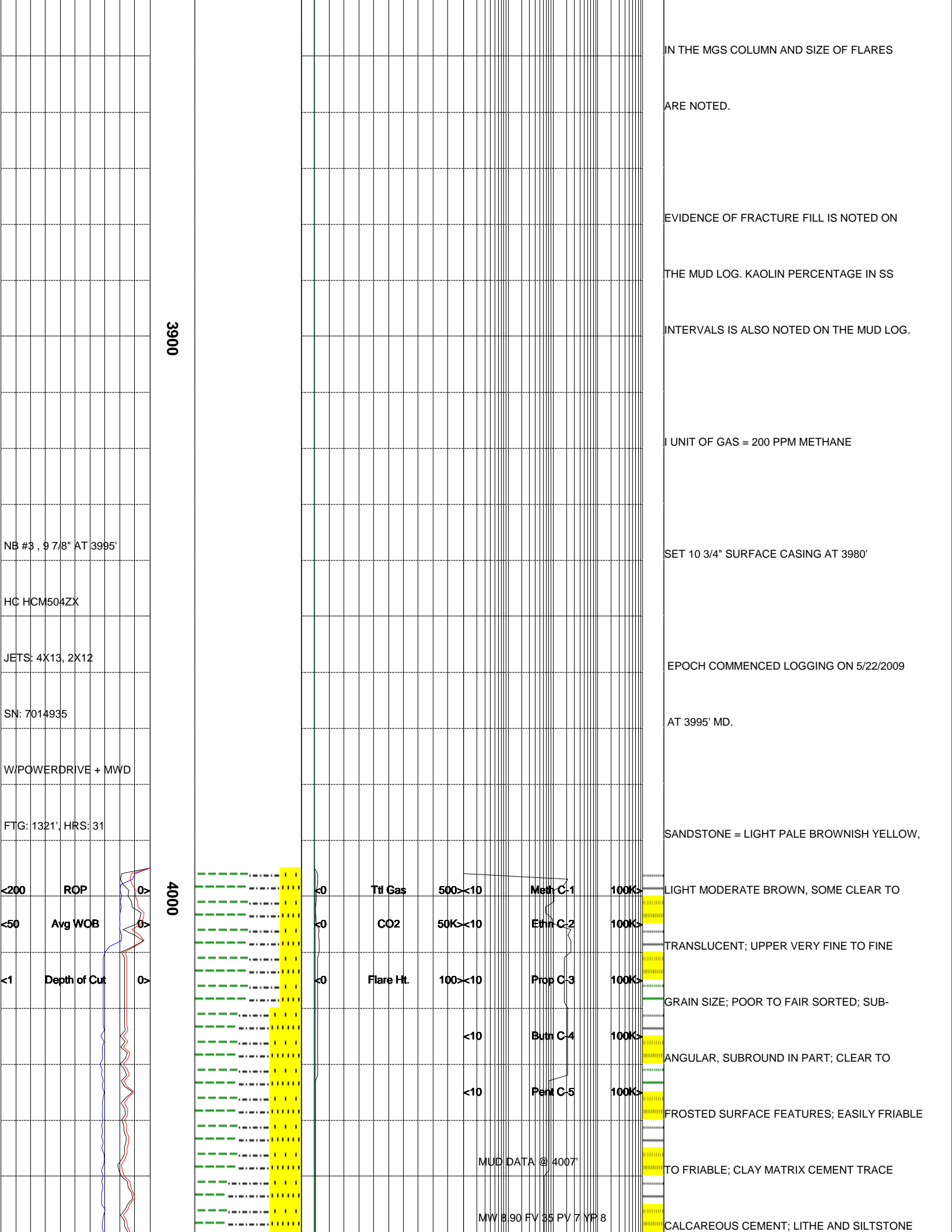
WATER BASED TO 3995'
LSND TO 5500'
DSF TO 5882'
LSND TO 12866'

14 1/4" TO 3995'
9 7/8" TO 8896'
6.125" TO 12866'
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

Legend of geological symbols and patterns including: 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, KAOLINIC, 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.



3900

4000

NB #3 , 9 7/8" AT 3995'

HC HCM504ZX

JETS: 4X13, 2X12

SN: 7014935

W/POWERDRIVE + MWD

FTG: 1321', HRS: 31

<200 ROP

<50 Avg WOB

<1 Depth of Cut

<0 Ttl Gas 500<10 Meth C-1 100K>

<0 CO2 50K<10 Ethn C-2 100K>

<0 Flare Ht. 100<10 Prop C-3 100K>

<10 Butn C-4 100K>

<10 Pent C-5 100K>

MUD DATA @ 4007'

MW 8.90 FV 35 PV 7 YF 8

IN THE MGS COLUMN AND SIZE OF FLARES

ARE NOTED.

EVIDENCE OF FRACTURE FILL IS NOTED ON

THE MUD LOG. KAOLIN PERCENTAGE IN SS

INTERVALS IS ALSO NOTED ON THE MUD LOG.

1 UNIT OF GAS = 200 PPM METHANE

SET 10 3/4" SURFACE CASING AT 3980'

EPOCH COMMENCED LOGGING ON 5/22/2009

AT 3995' MD.

SANDSTONE = LIGHT PALE BROWNISH YELLOW,

LIGHT MODERATE BROWN, SOME CLEAR TO

TRANSLUCENT; UPPER VERY FINE TO FINE

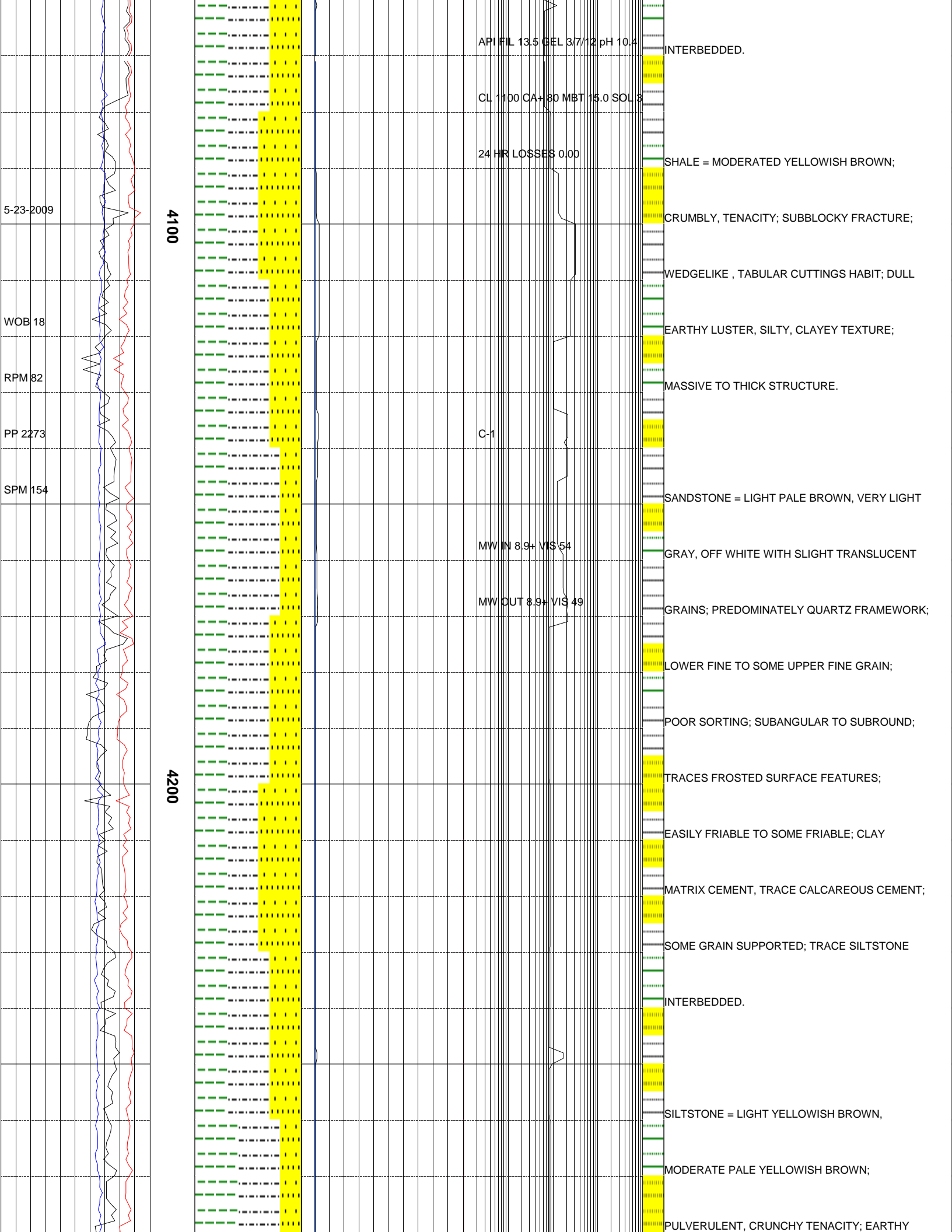
GRAIN SIZE; POOR TO FAIR SORTED; SUB-

ANGULAR, SUBROUND IN PART; CLEAR TO

FROSTED SURFACE FEATURES; EASILY FRIABLE

TO FRIABLE; CLAY MATRIX CEMENT TRACE

CALCAREOUS CEMENT; LITHE AND SILTSTONE



4100

4200

API FIL 13.5 GEL 3.7/1.2 pH 10.4

CL 1100 CA+ 80 MBT 15.0 SOL 3

24 HR LOSSES 0.00

C-1

MW IN 8.9+ VIS 54

MW OUT 8.9+ VIS 49

INTERBEDDED.

SHALE = MODERATED YELLOWISH BROWN;

CRUMBLY, TENACITY; SUBBLOCKY FRACTURE;

WEDGELIKE , TABULAR CUTTINGS HABIT; DULL

EARTHY LUSTER, SILTY, CLAYEY TEXTURE;

MASSIVE TO THICK STRUCTURE.

SANDSTONE = LIGHT PALE BROWN, VERY LIGHT

GRAY, OFF WHITE WITH SLIGHT TRANSLUCENT

GRAINS; PREDOMINATELY QUARTZ FRAMEWORK;

LOWER FINE TO SOME UPPER FINE GRAIN;

POOR SORTING; SUBANGULAR TO SUBROUND;

TRACES FROSTED SURFACE FEATURES;

EASILY FRIABLE TO SOME FRIABLE; CLAY

MATRIX CEMENT, TRACE CALCAREOUS CEMENT;

SOME GRAIN SUPPORTED; TRACE SILTSTONE

INTERBEDDED.

SILTSTONE = LIGHT YELLOWISH BROWN,

MODERATE PALE YELLOWISH BROWN;

PULVERULENT, CRUNCHY TENACITY; EARTHY

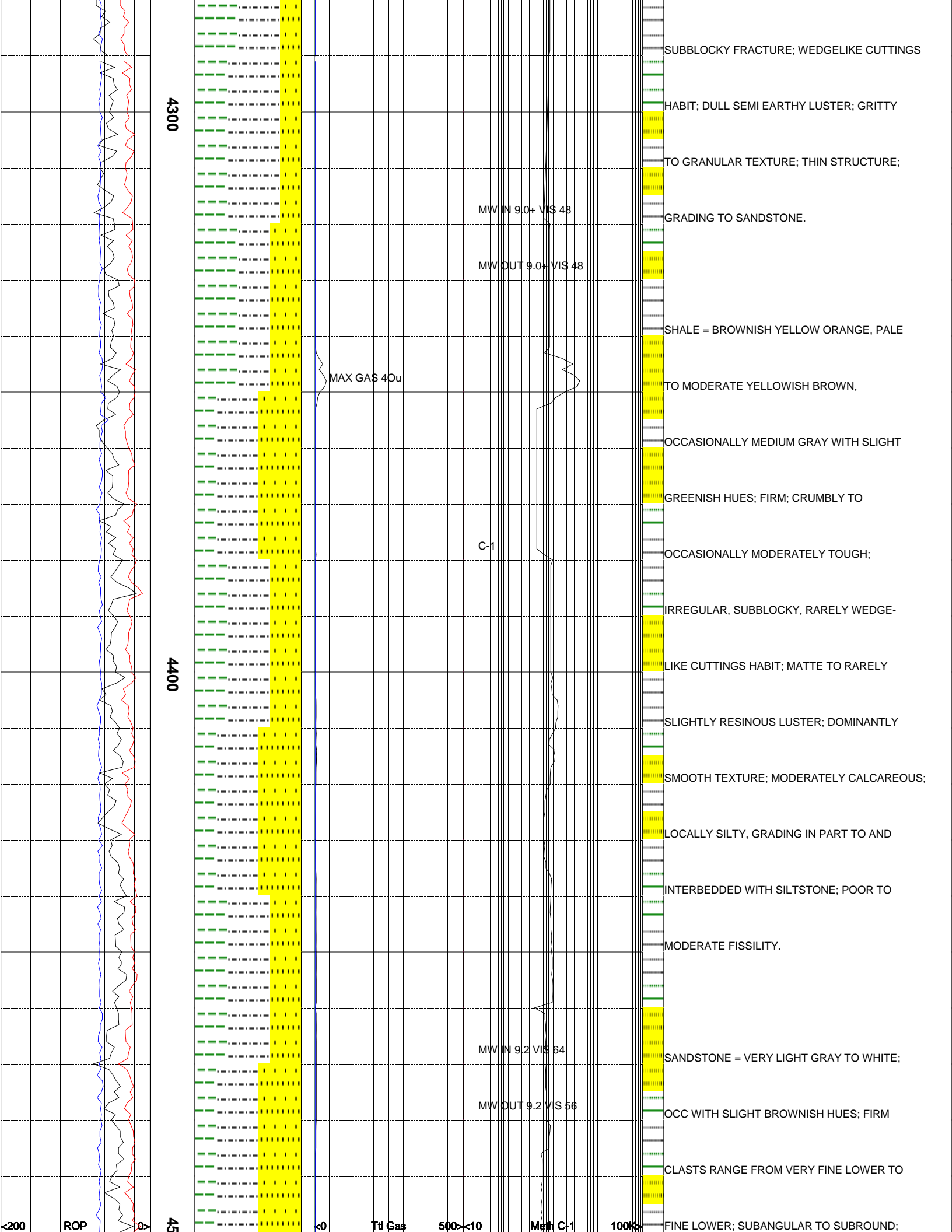
5-23-2009

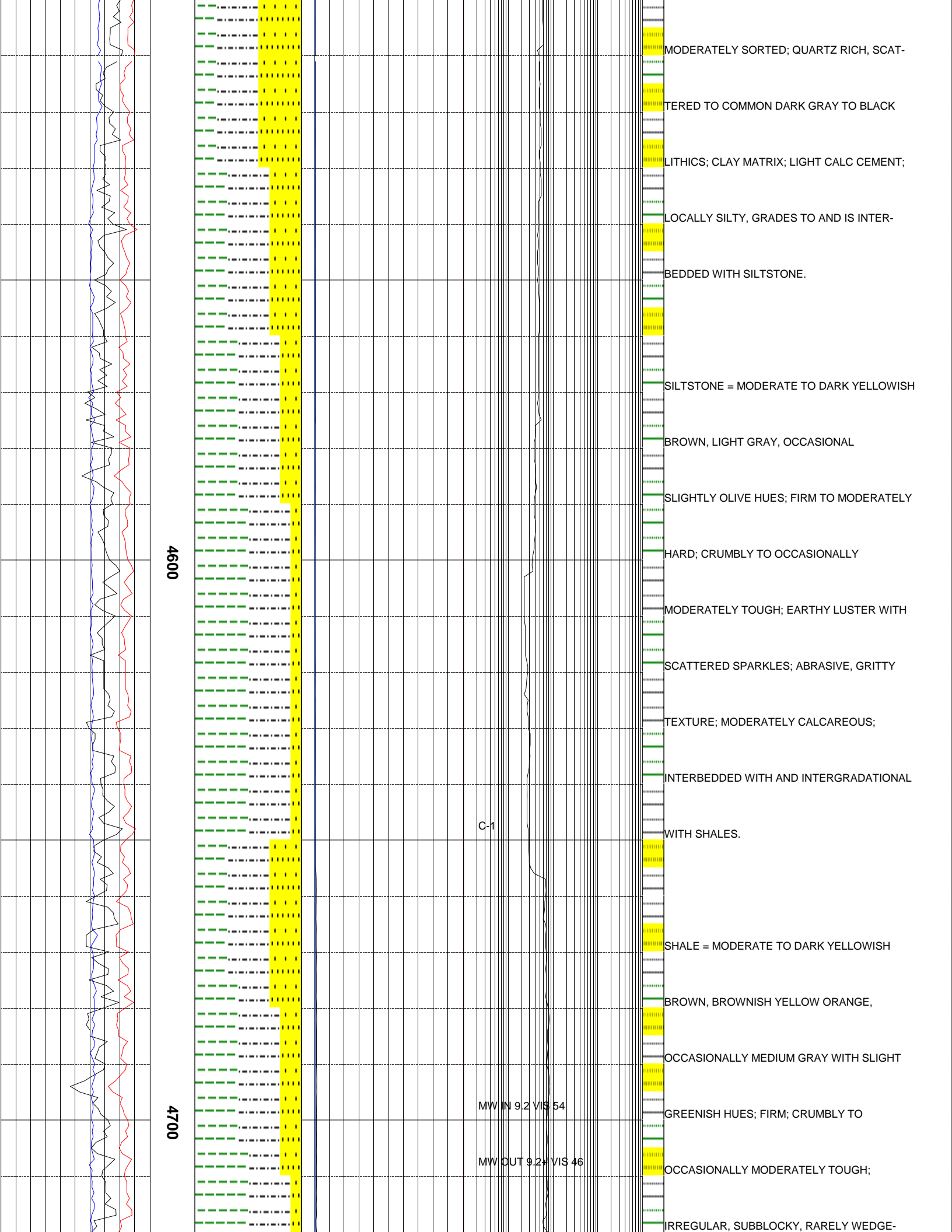
WOB 18

RPM 82

PP 2273

SPM 154





4600

4700

MODERATELY SORTED; QUARTZ RICH, SCATTERED TO COMMON DARK GRAY TO BLACK LITHICS; CLAY MATRIX; LIGHT CALC CEMENT; LOCALLY SILTY, GRADES TO AND IS INTERBEDDED WITH SILTSTONE.

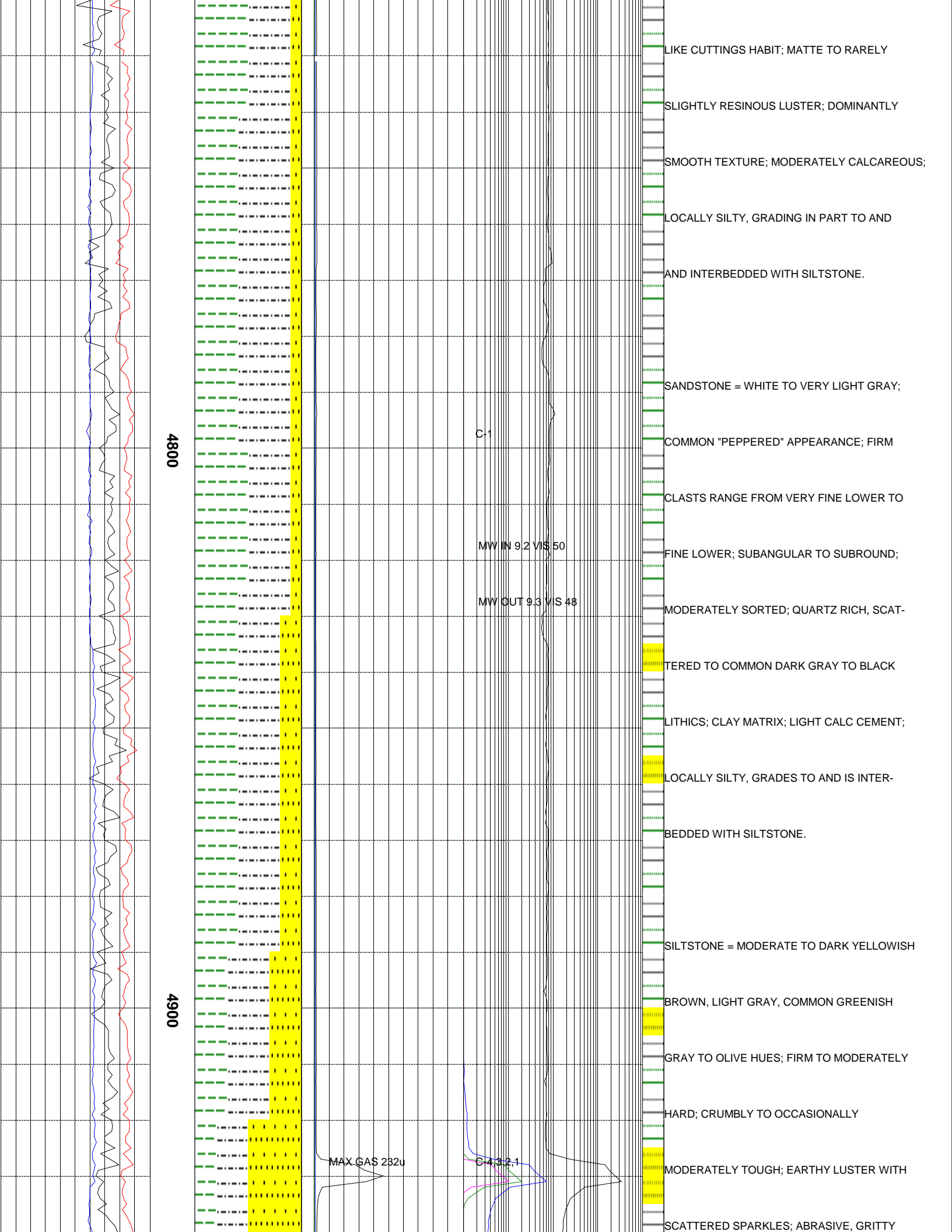
SILTSTONE = MODERATE TO DARK YELLOWISH BROWN, LIGHT GRAY, OCCASIONAL SLIGHTLY OLIVE HUES; FIRM TO MODERATELY HARD; CRUMBLY TO OCCASIONALLY MODERATELY TOUGH; EARTHY LUSTER WITH SCATTERED SPARKLES; ABRASIVE, GRITTY TEXTURE; MODERATELY CALCAREOUS; INTERBEDDED WITH AND INTERGRADATIONAL WITH SHALES.

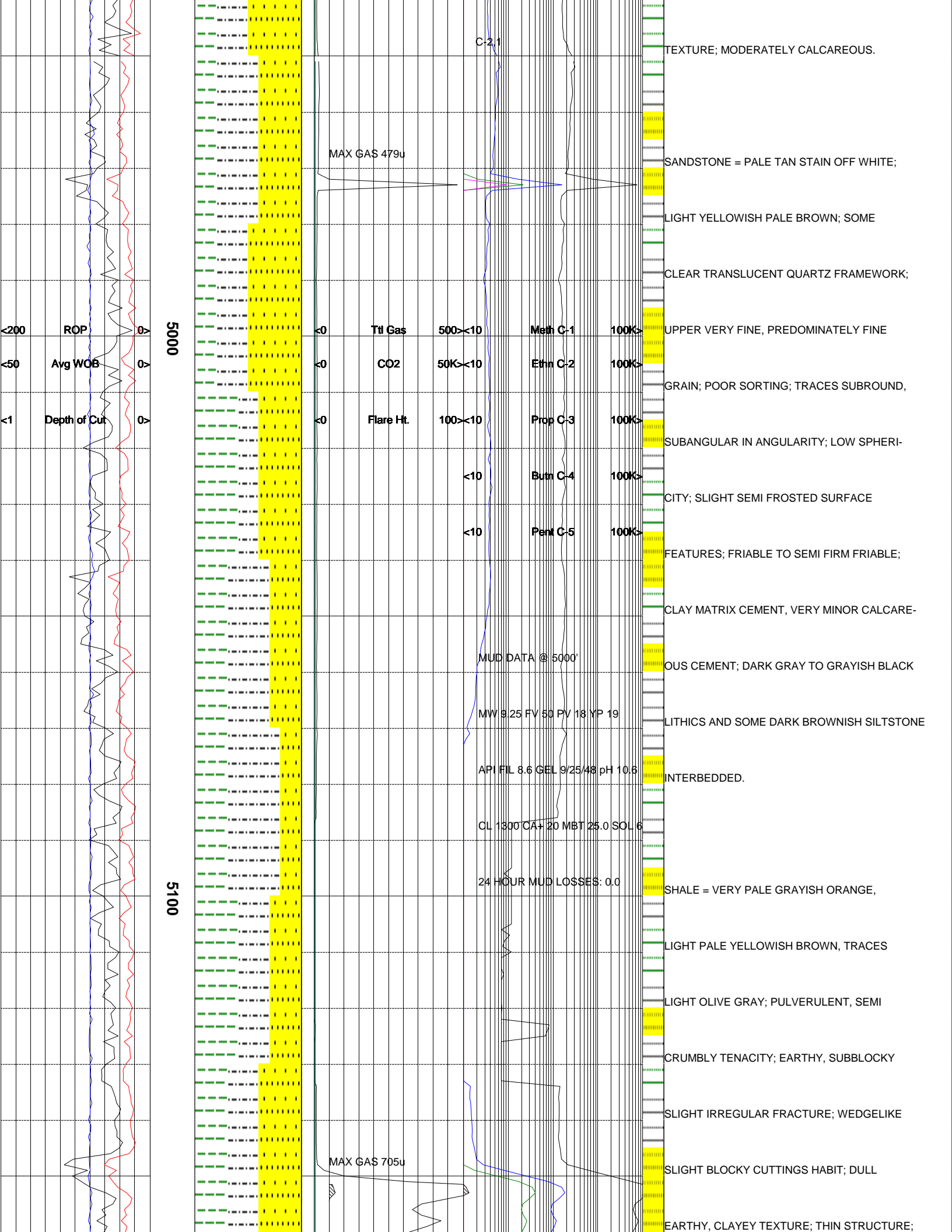
SHALE = MODERATE TO DARK YELLOWISH BROWN, BROWNISH YELLOW ORANGE, OCCASIONALLY MEDIUM GRAY WITH SLIGHT GREENISH HUES; FIRM; CRUMBLY TO OCCASIONALLY MODERATELY TOUGH; IRREGULAR, SUBBLOCKY, RARELY WEDGE-

C-1

MW IN 92 VIS 54

MW OUT 92 VIS 46





5000

5100

<200 ROP
 <50 Avg WOB
 <1 Depth of Cut

MAX GAS 479u

Ttl Gas	500	<10	Meth C-1	100K
CO2	50K	<10	Ethn C-2	100K
Flare Ht.	100	<10	Prop C-3	100K
		<10	Butn C-4	100K
		<10	Pent C-5	100K

MUD DATA @ 5000'

MW 9.25 FV 50 PV 18 YP 19

API FIL 8.6 GEL 9/25/48 pH 10.6

CL 1300 CA+ 20 MBT 25.0 SOL 6

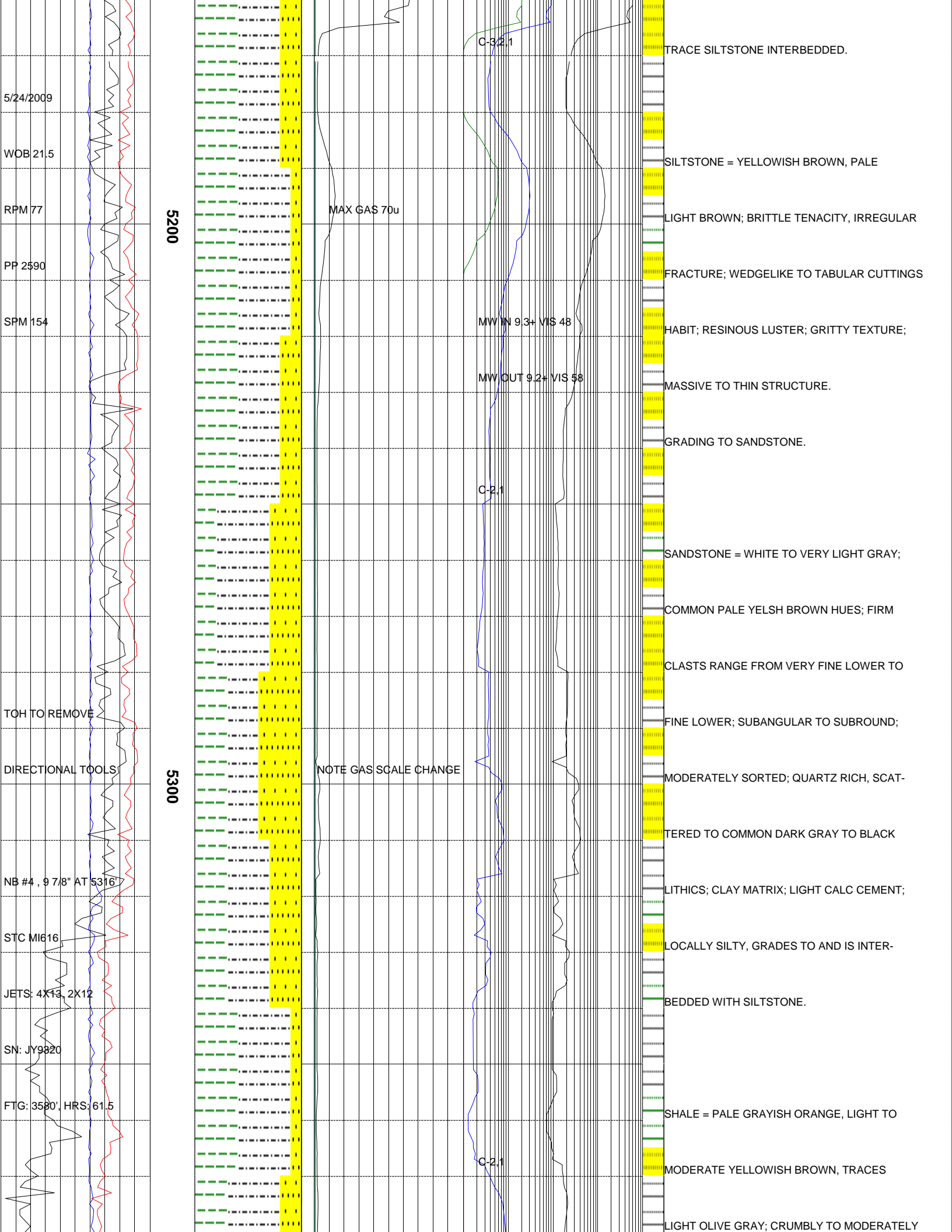
24 HOUR MUD LOSSES: 0.0

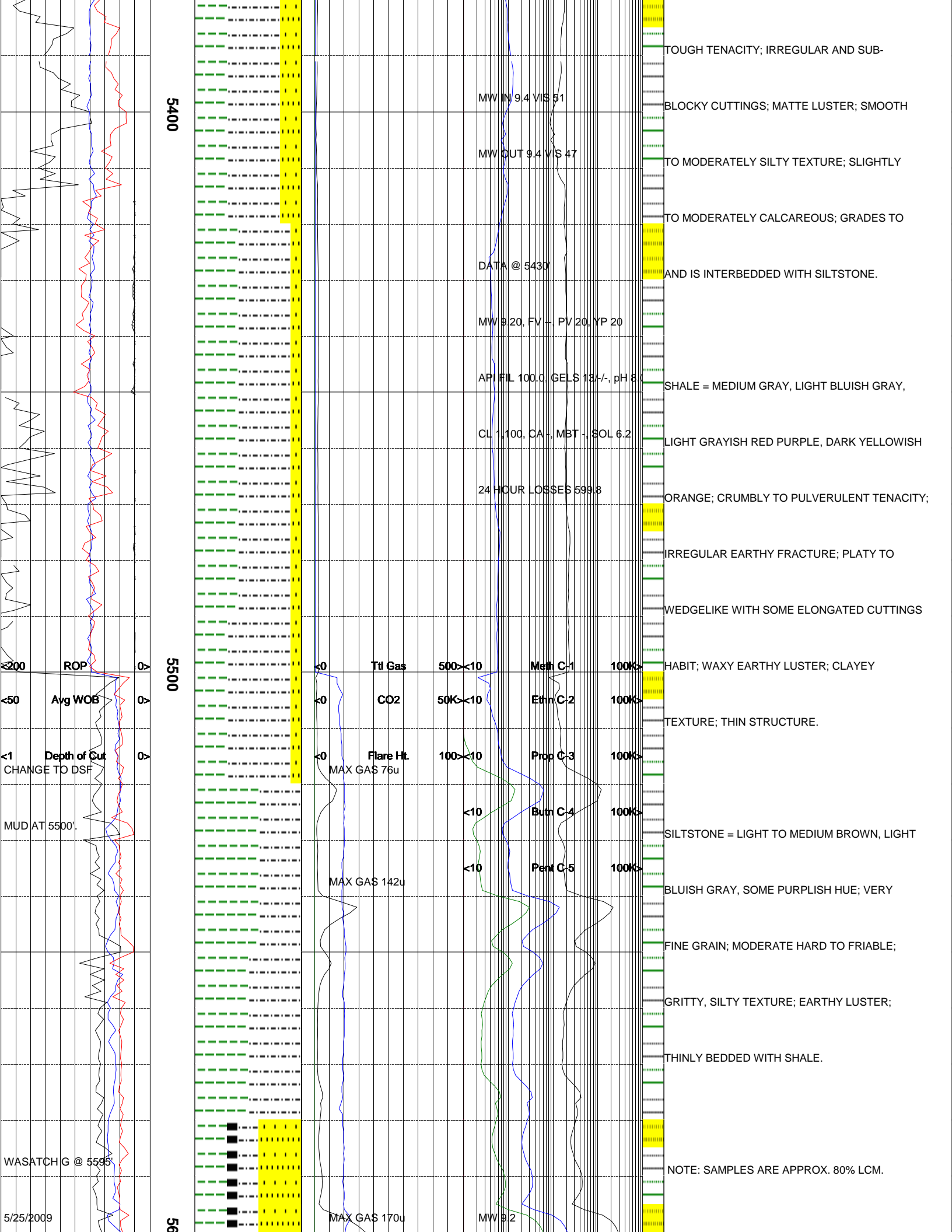
MAX GAS 705u

TEXTURE; MODERATELY CALCAREOUS.

SANDSTONE = PALE TAN STAIN OFF WHITE;
 LIGHT YELLOWISH PALE BROWN; SOME
 CLEAR TRANSLUCENT QUARTZ FRAMEWORK;
 UPPER VERY FINE, PREDOMINATELY FINE
 GRAIN; POOR SORTING; TRACES SUBROUND,
 SUBANGULAR IN ANGULARITY; LOW SPHERI-
 CITY; SLIGHT SEMI FROSTED SURFACE
 FEATURES; FRIABLE TO SEMI FIRM FRIABLE;
 CLAY MATRIX CEMENT, VERY MINOR CALCARE-
 OUS CEMENT; DARK GRAY TO GRAYISH BLACK
 LITHICS AND SOME DARK BROWNISH SILTSTONE
 INTERBEDDED.

SHALE = VERY PALE GRAYISH ORANGE,
 LIGHT PALE YELLOWISH BROWN, TRACES
 LIGHT OLIVE GRAY; PULVERULENT, SEMI
 CRUMBLY TENACITY; EARTHY, SUBBLOCKY
 SLIGHT IRREGULAR FRACTURE; WEDGELIKE
 SLIGHT BLOCKY CUTTINGS HABIT; DULL
 EARTHY, CLAYEY TEXTURE; THIN STRUCTURE;





5400

5500

56

MW IN 9.4 VIS 51

MW OUT 9.4 VIS 47

DATA @ 5430'

MW 9.20, FV -- PV 20, YP 20

API FIL 100.0, GELS 13 +/-, pH 8.0

CL 1.100, CA -- MBT -- SOL 6.2

24 HOUR LOSSES 599.8

Ttl Gas 500 < 10 Meth C-1 100K <

CO2 50K < 10 Ethn C-2 100K <

Flare Ht. 100 < 10 Prop C-3 100K <

MAX GAS 76u < 10 Butn C-4 100K <

MAX GAS 142u < 10 Pent C-5 100K <

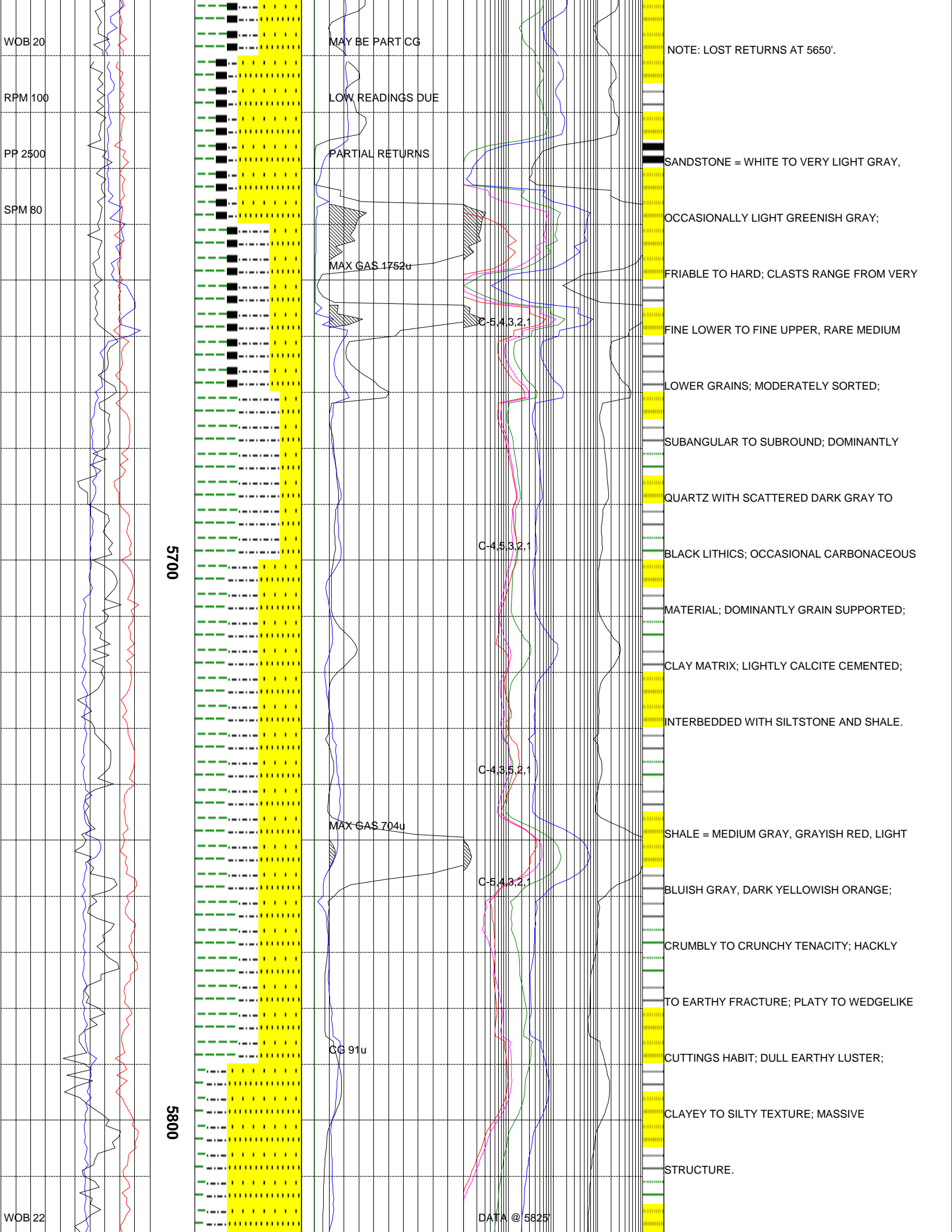
MAX GAS 170u MW 9.2

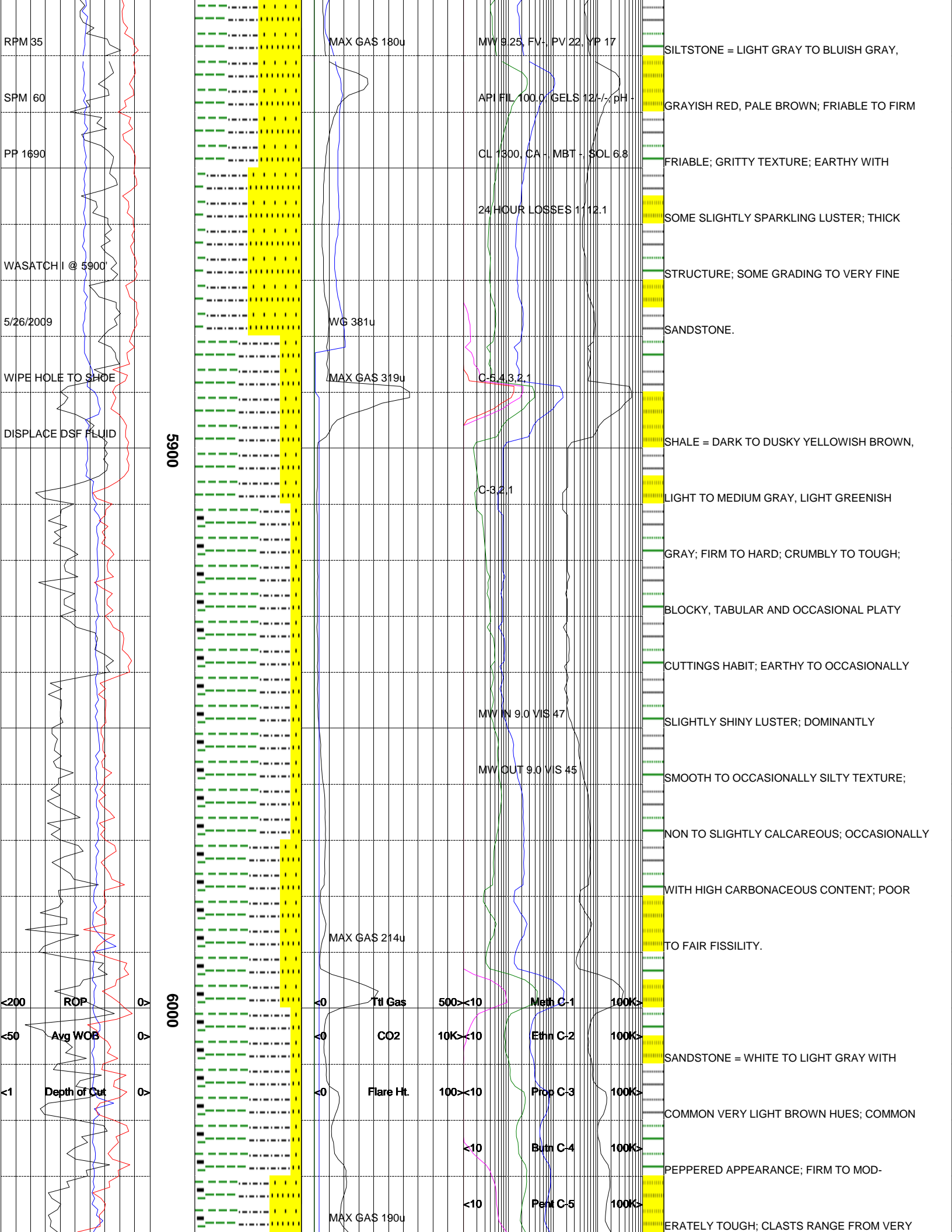
TOUGH TENACITY; IRREGULAR AND SUB-
 BLOCKY CUTTINGS; MATTE LUSTER; SMOOTH
 TO MODERATELY SILTY TEXTURE; SLIGHTLY
 TO MODERATELY CALCAREOUS; GRADES TO
 AND IS INTERBEDDED WITH SILTSTONE.
 SHALE = MEDIUM GRAY, LIGHT BLUISH GRAY,
 LIGHT GRAYISH RED PURPLE, DARK YELLOWISH
 ORANGE; CRUMBLY TO PULVERULENT TENACITY;
 IRREGULAR EARTHY FRACTURE; PLATY TO
 WEDGELIKE WITH SOME ELONGATED CUTTINGS
 HABIT; WAXY EARTHY LUSTER; CLAYEY
 TEXTURE; THIN STRUCTURE.
 SILTSTONE = LIGHT TO MEDIUM BROWN, LIGHT
 BLUISH GRAY, SOME PURPLISH HUE; VERY
 FINE GRAIN; MODERATE HARD TO FRIABLE;
 GRITTY, SILTY TEXTURE; EARTHY LUSTER;
 THINLY BEDDED WITH SHALE.
 NOTE: SAMPLES ARE APPROX. 80% LCM.

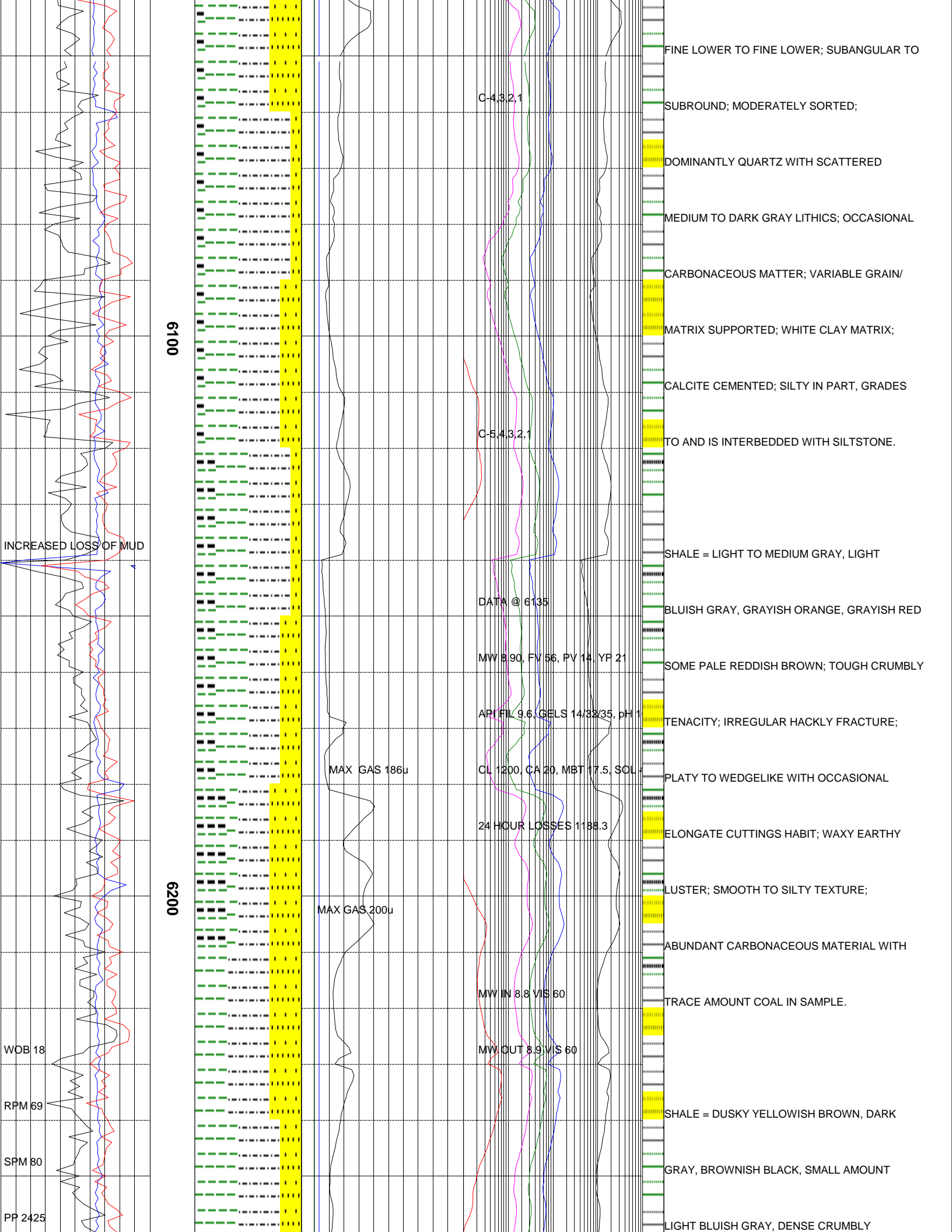
ROP
 Avg WOB
 Depth of Cut
 CHANGE TO DSF
 MUD AT 5500'

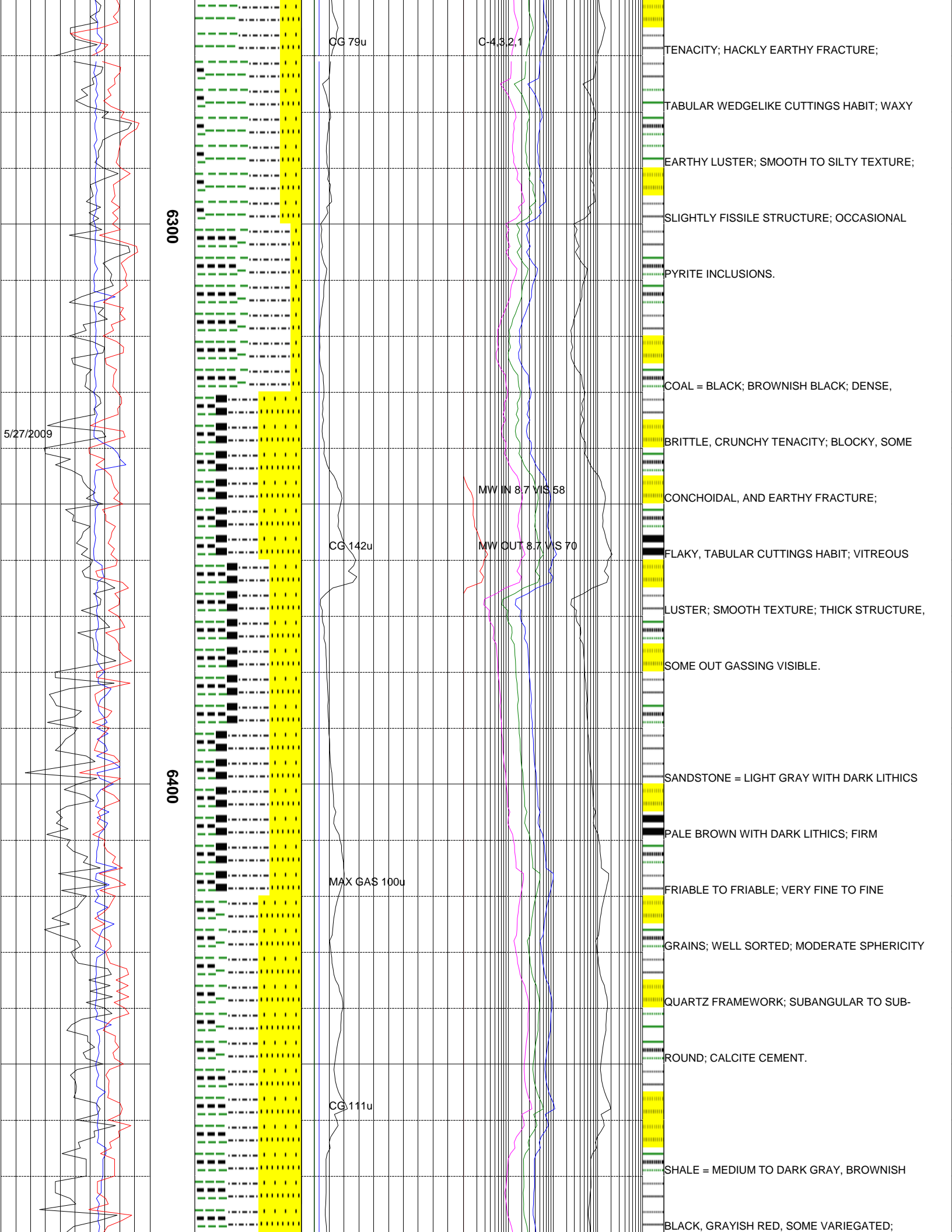
WASATCH G @ 5595'

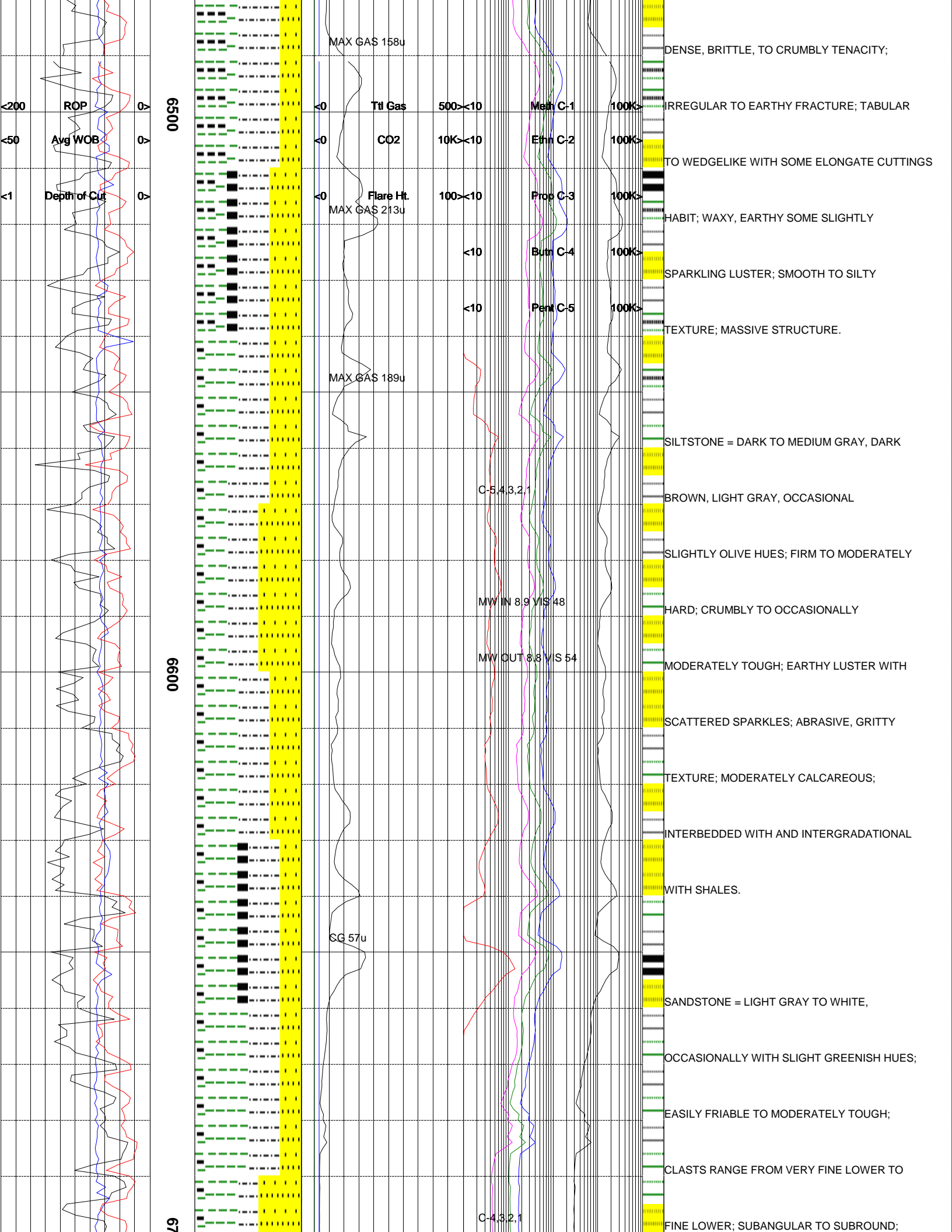
5/25/2009

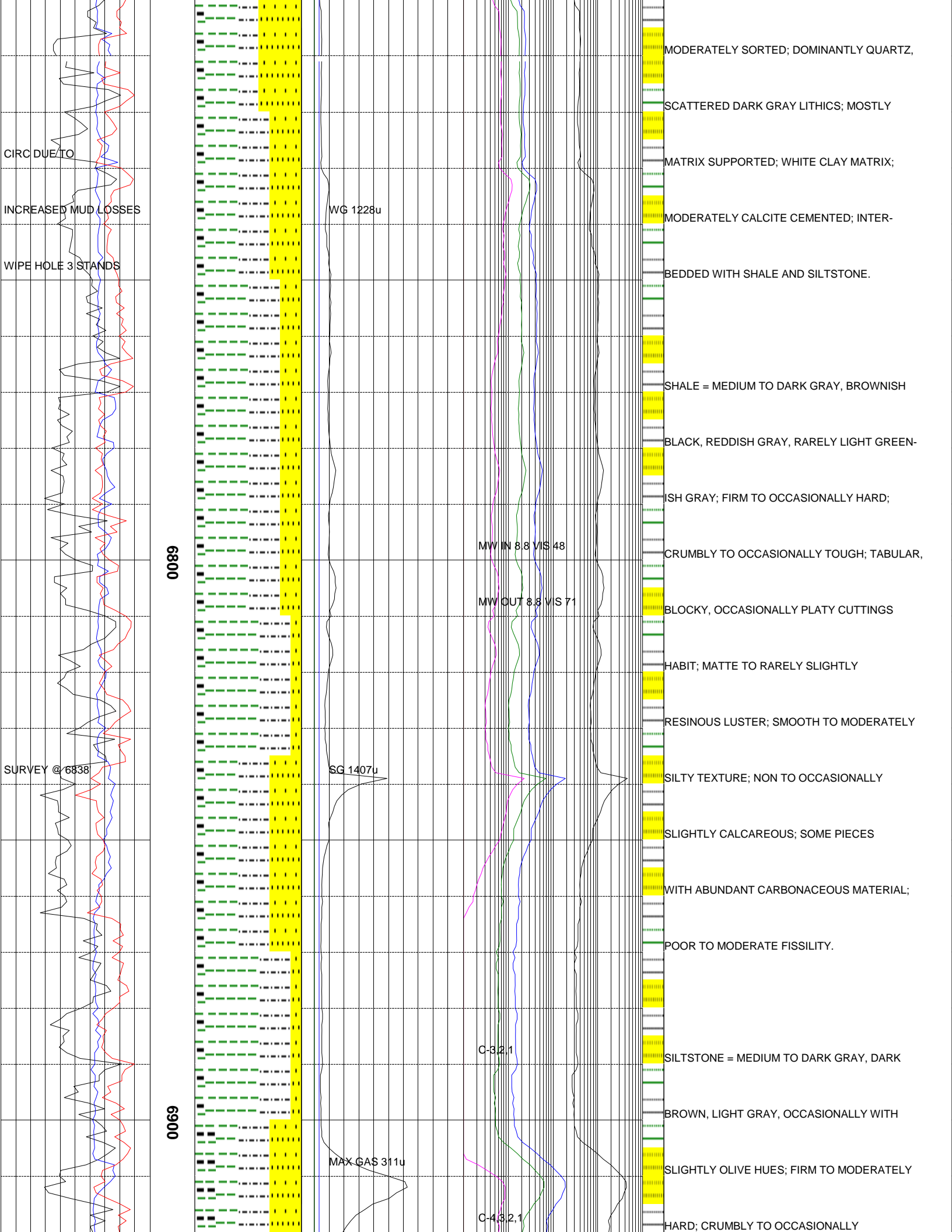












0089

0069

CIRC DUE TO
INCREASED MUD LOSSES
WIPE HOLE 3 STANDS

SURVEY @ 6838

WG 1228u

SG 1407u

MAX GAS 311u

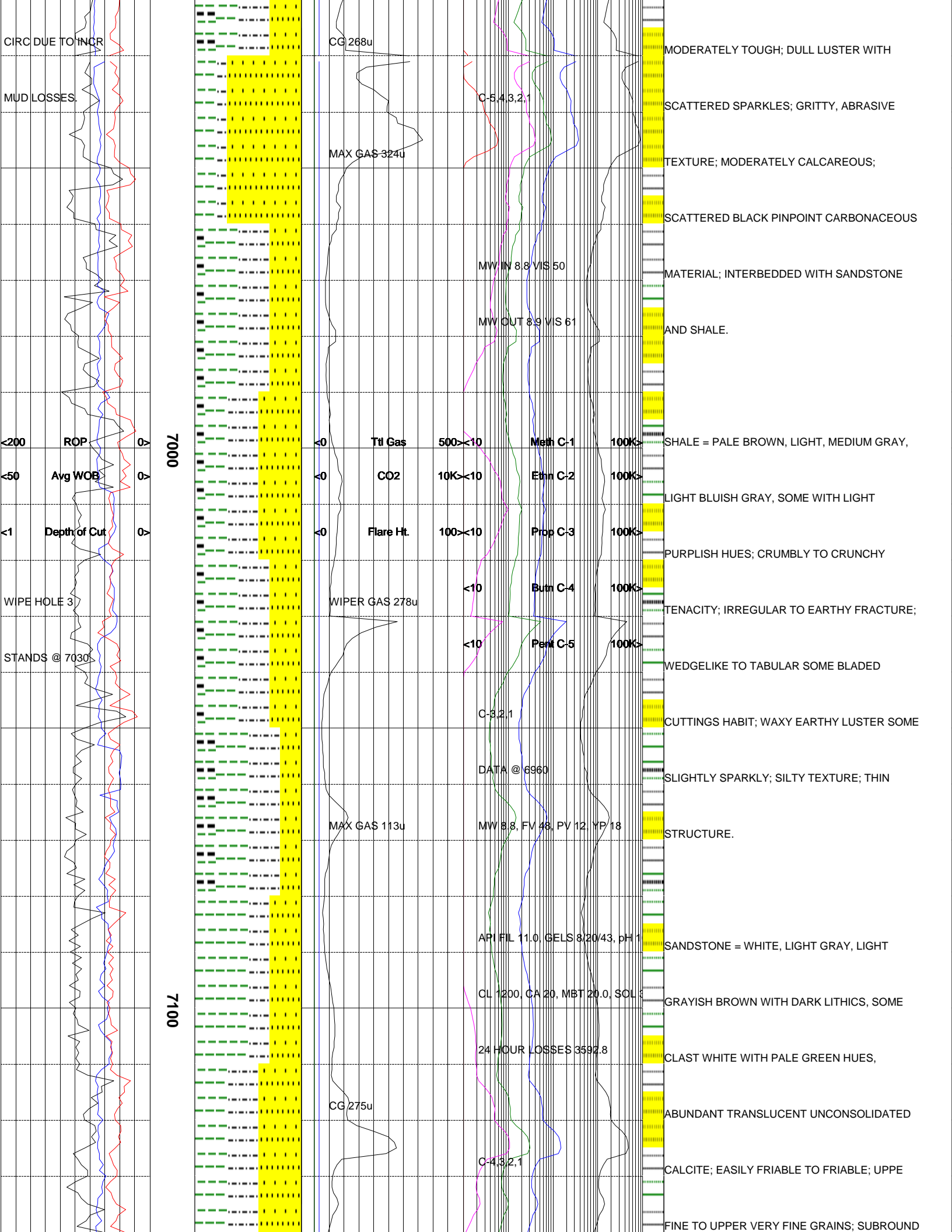
MW IN 8.8 VIS 48

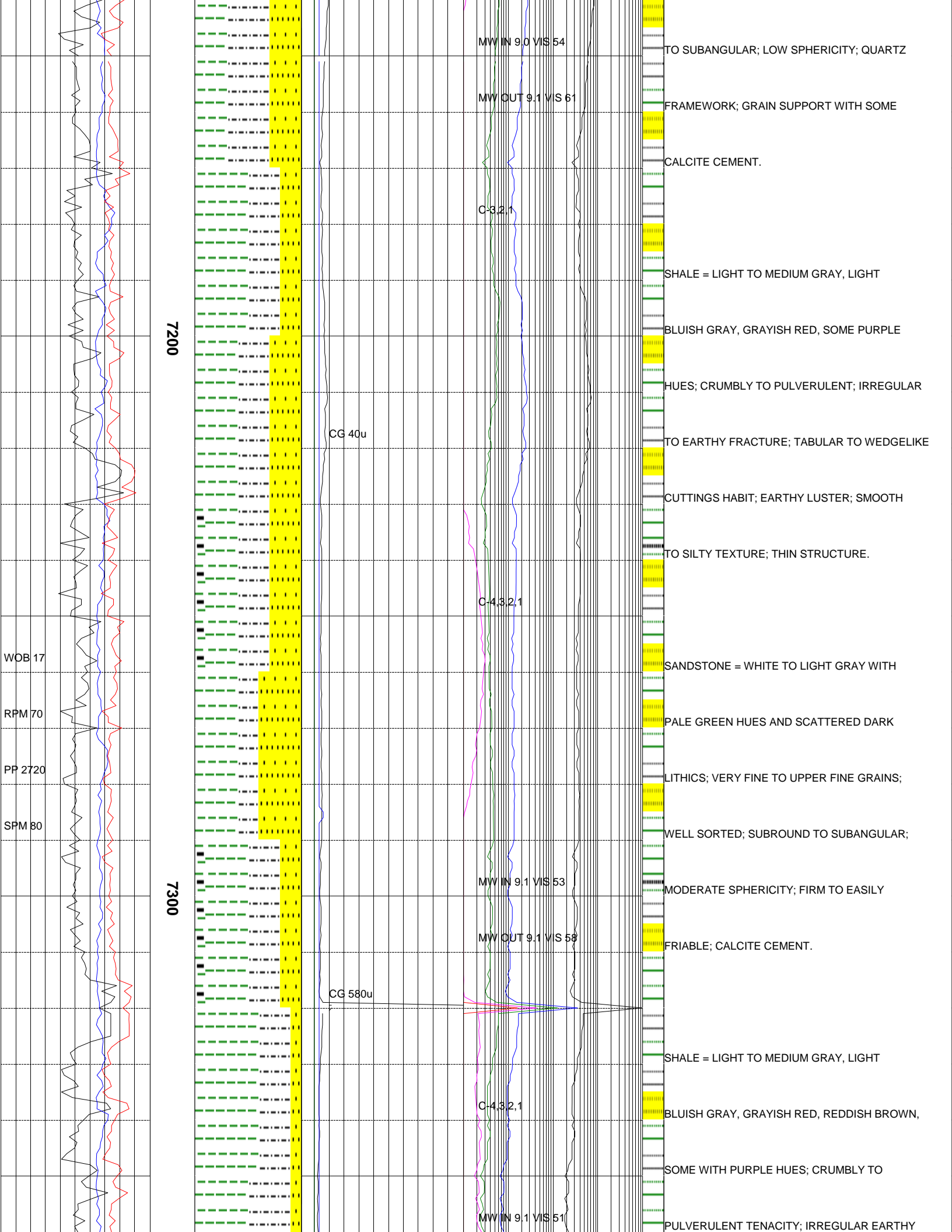
MW OUT 8.8 VIS 71

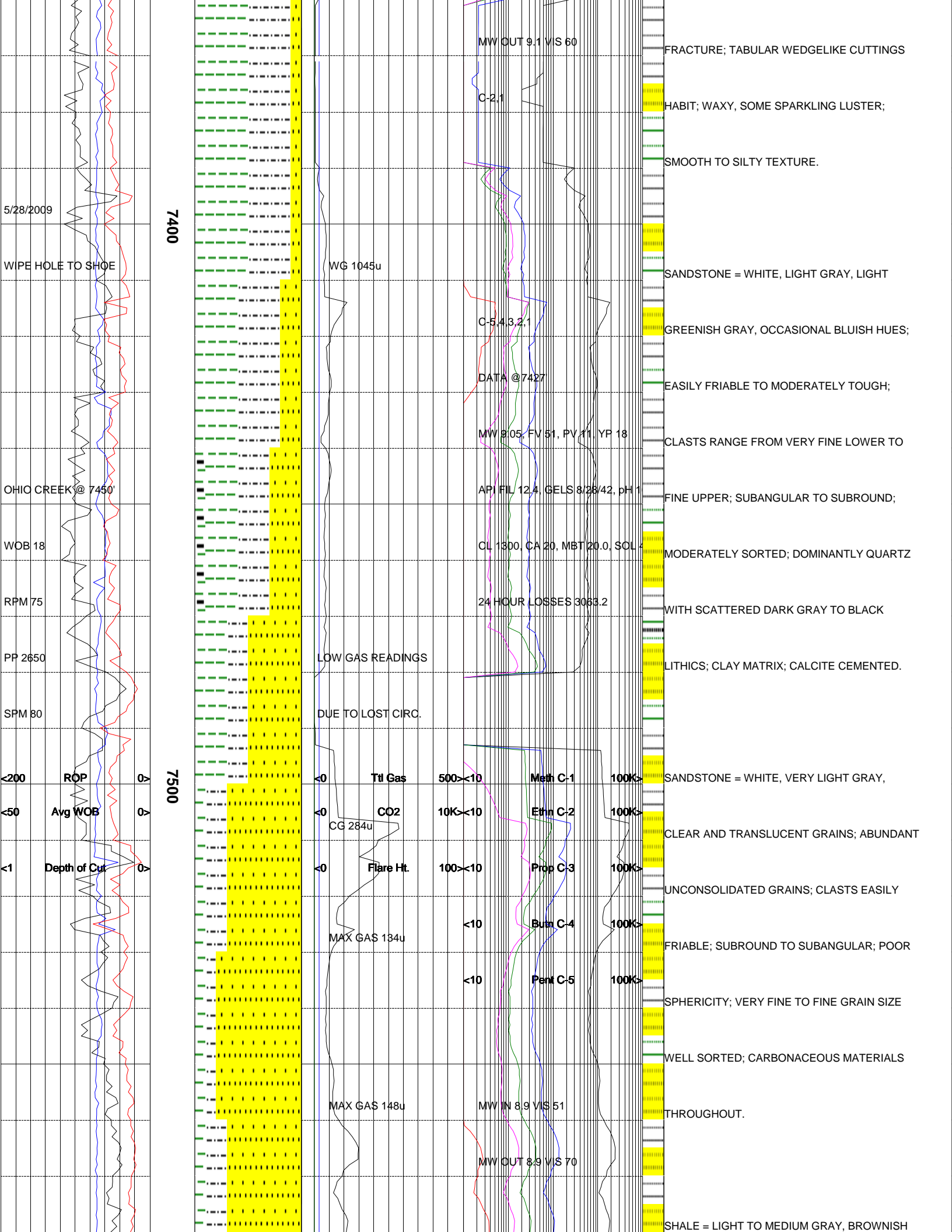
C-32.1

C-432.1

MODERATELY SORTED; DOMINANTLY QUARTZ,
SCATTERED DARK GRAY LITHICS; MOSTLY
MATRIX SUPPORTED; WHITE CLAY MATRIX;
MODERATELY CALCITE CEMENTED; INTER-
BEDDED WITH SHALE AND SILTSTONE.
SHALE = MEDIUM TO DARK GRAY, BROWNISH
BLACK, REDDISH GRAY, RARELY LIGHT GREEN-
ISH GRAY; FIRM TO OCCASIONALLY HARD;
CRUMBLY TO OCCASIONALLY TOUGH; TABULAR,
BLOCKY, OCCASIONALLY PLATY CUTTINGS
HABIT; MATTE TO RARELY SLIGHTLY
RESINOUS LUSTER; SMOOTH TO MODERATELY
SILTY TEXTURE; NON TO OCCASIONALLY
SLIGHTLY CALCAREOUS; SOME PIECES
WITH ABUNDANT CARBONACEOUS MATERIAL;
POOR TO MODERATE FISSILITY.
SILTSTONE = MEDIUM TO DARK GRAY, DARK
BROWN, LIGHT GRAY, OCCASIONALLY WITH
SLIGHTLY OLIVE HUES; FIRM TO MODERATELY
HARD; CRUMBLY TO OCCASIONALLY







7600

7700

78

C-5432.1

CG 650u

MAX GAS 226u

WIPER GAS 185u

CG 250u

C-432.1

MW IN 9.0 VIS 51

MW OUT 9.0 VIS 70

MAX GAS 151u

GRAY; BRITTLE TO CRUNCHY; HACKLY, EARTHY

FRACTURE; WEDGELIKE CUTTINGS HABIT; DULL

EARTHY LUSTER; SILTY TEXTURE; THIN

STRUCTURE.

SANDSTONE = WHITE WITH DARK LITHICS,

LIGHT GRAY WITH DARK LITHICS, SOME WITH

PALE GREEN HUES; ABUNDANT UNCONSOLIDATED

GRAINS; CLASTS HARD TO FRIABLE; VERY

FINE TO UPPER FINE GRAINS; WELL SORTED;

SUB ANGULAR TO ANGULAR; POOR SPHERICITY;

QUARTZ FRAMEWORK; GRAIN SUPPORTED;

CALCITE CEMENT.

SILTSTONE = MEDIUM TO DARK GRAY, LIGHT

GRAY, DARK BROWN, OCCASIONALLY WITH

SLIGHTLY OLIVE HUES; FIRM TO MODERATELY

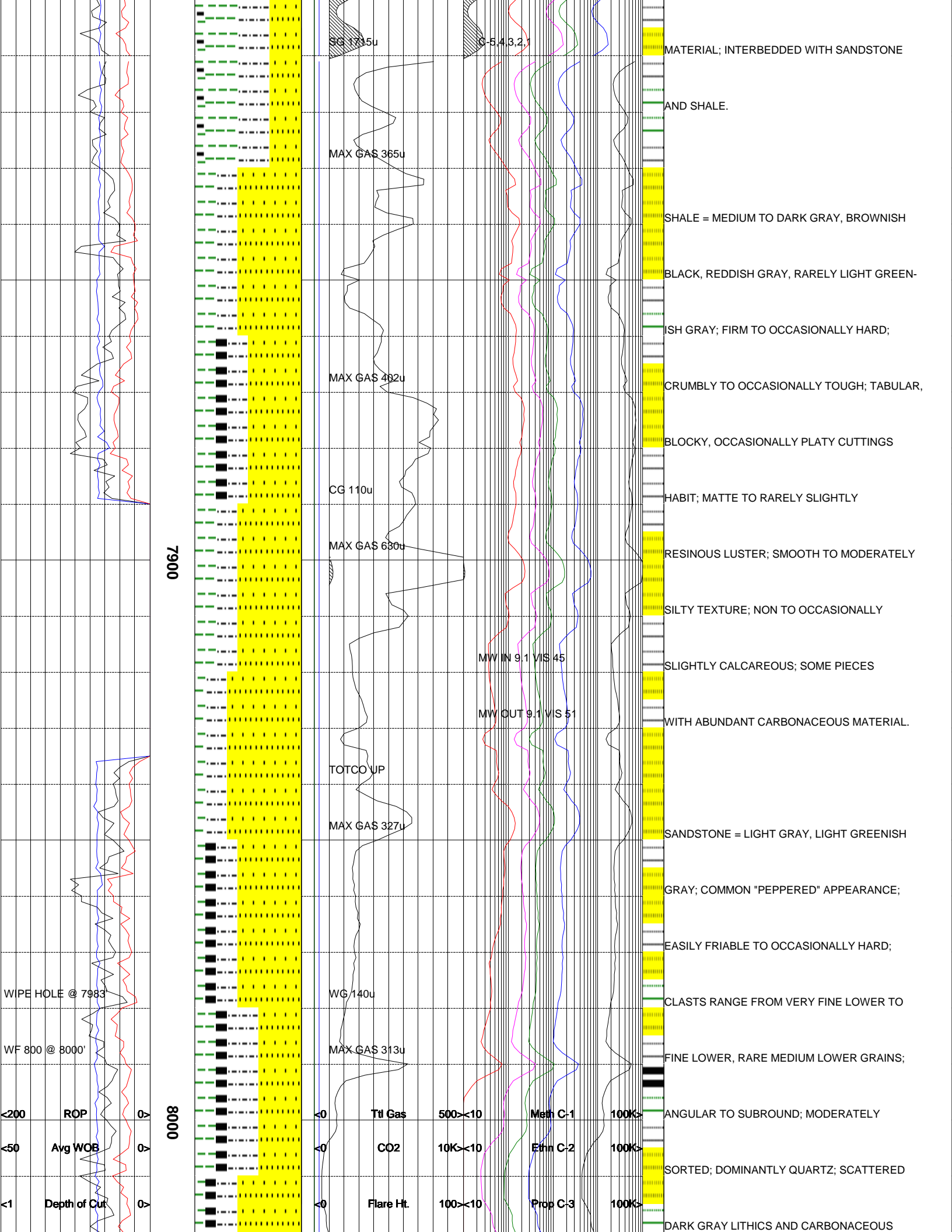
HARD; CRUMBLY TO OCCASIONALLY

MODERATELY TOUGH; DULL LUSTER WITH

SCATTERED SPARKLES; GRITTY, ABRASIVE

TEXTURE; MODERATELY CALCAREOUS;

SCATTERED BLACK PINPOINT CARBONACEOUS



7900

8000

SG 1735u

CG 543.2u

MAX GAS 365u

MAX GAS 492u

CG 110u

MAX GAS 630u

MW IN 9.1 VIS 45

MW OUT 9.1 VIS 51

TOTCO UP

MAX GAS 327u

WIPE HOLE @ 7983

WF 800 @ 8000'

WG 140u

MAX GAS 313u

<200 ROP

<50 Avg WOB

<1 Depth of Cur

<0 Ttl Gas 500<10 Meth C-1 100K>

<0 CO2 10K<10 Ethn C-2 100K>

<0 Flare Ht. 100<10 Prop C-3 100K>

MATERIAL; INTERBEDDED WITH SANDSTONE

AND SHALE.

SHALE = MEDIUM TO DARK GRAY, BROWNISH

BLACK, REDDISH GRAY, RARELY LIGHT GREEN-

ISH GRAY; FIRM TO OCCASIONALLY HARD;

CRUMBLY TO OCCASIONALLY TOUGH; TABULAR,

BLOCKY, OCCASIONALLY PLATY CUTTINGS

HABIT; MATTE TO RARELY SLIGHTLY

RESINOUS LUSTER; SMOOTH TO MODERATELY

SILTY TEXTURE; NON TO OCCASIONALLY

SLIGHTLY CALCAREOUS; SOME PIECES

WITH ABUNDANT CARBONACEOUS MATERIAL.

SANDSTONE = LIGHT GRAY, LIGHT GREENISH

GRAY; COMMON "PEPPERED" APPEARANCE;

EASILY FRIABLE TO OCCASIONALLY HARD;

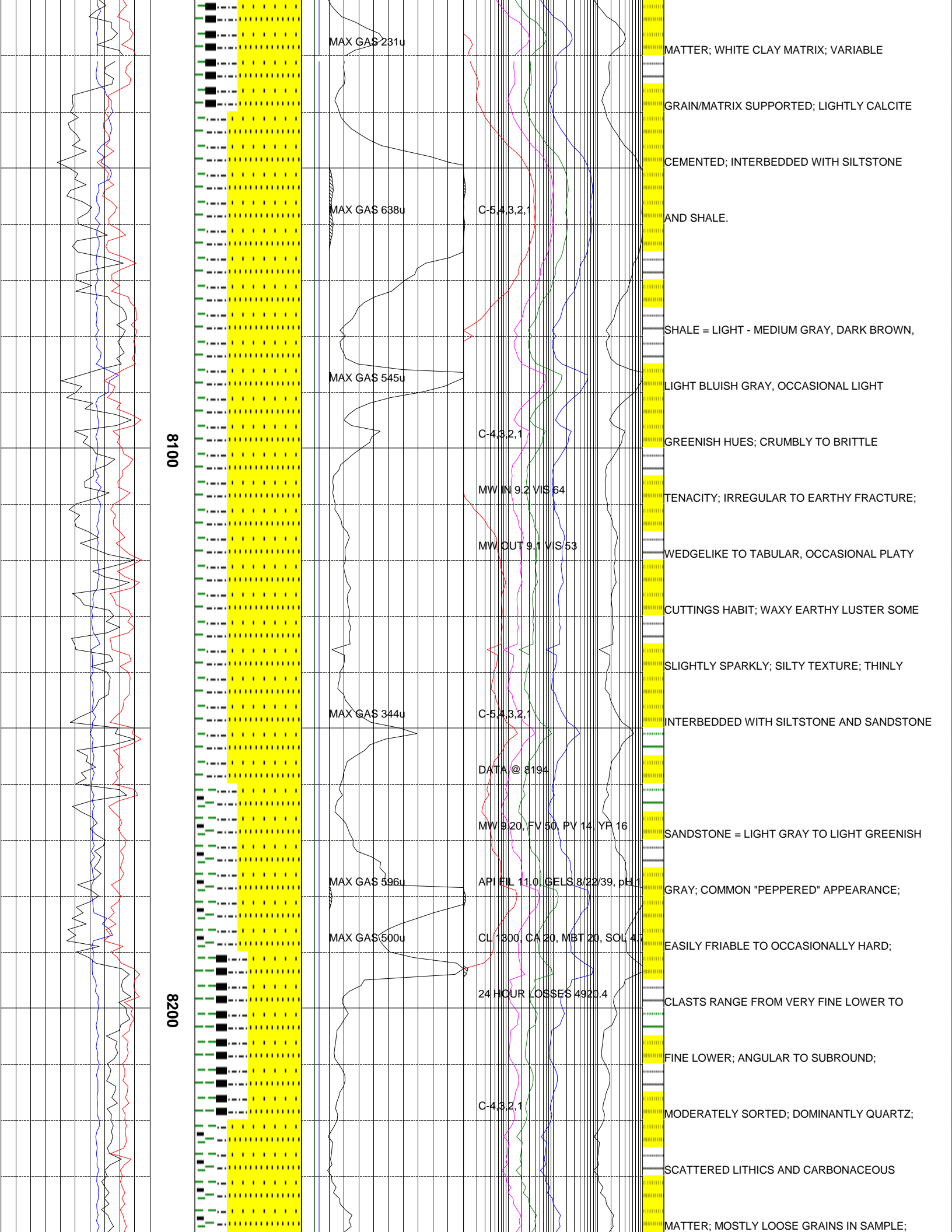
CLASTS RANGE FROM VERY FINE LOWER TO

FINE LOWER, RARE MEDIUM LOWER GRAINS;

ANGULAR TO SUBROUND; MODERATELY

SORTED; DOMINANTLY QUARTZ; SCATTERED

DARK GRAY LITHICS AND CARBONACEOUS



MAX GAS 231u

MATTER; WHITE CLAY MATRIX; VARIABLE

GRAIN/MATRIX SUPPORTED; LIGHTLY CALCITE

CEMENTED; INTERBEDDED WITH SILTSTONE

MAX GAS 638u

C-5.43.2.1

AND SHALE.

SHALE = LIGHT - MEDIUM GRAY, DARK BROWN,

MAX GAS 545u

LIGHT BLUISH GRAY, OCCASIONAL LIGHT

8100

C-4.32.1

GREENISH HUES; CRUMBLY TO BRITTLE

MW IN 9.2 VIS 64

TENACITY; IRREGULAR TO EARTHY FRACTURE;

MW OUT 9.1 VIS 53

WEDGELIKE TO TABULAR, OCCASIONAL PLATY

CUTTINGS HABIT; WAXY EARTHY LUSTER SOME

SLIGHTLY SPARKLY; SILTY TEXTURE; THINLY

MAX GAS 344u

C-5.43.2.1

INTERBEDDED WITH SILTSTONE AND SANDSTONE

DATA @ 8194

MW 9.20, FV 50, PV 14, YP 16

SANDSTONE = LIGHT GRAY TO LIGHT GREENISH

MAX GAS 596u

API FIL 11.0, GELS 8/22/39, pH 1

GRAY; COMMON "PEPPERED" APPEARANCE;

MAX GAS 500u

CL 1300, CA 20, MBT 20, SOL 4.7

EASILY FRIABLE TO OCCASIONALLY HARD;

8200

24 HOUR LOSSES 4920.4

CLASTS RANGE FROM VERY FINE LOWER TO

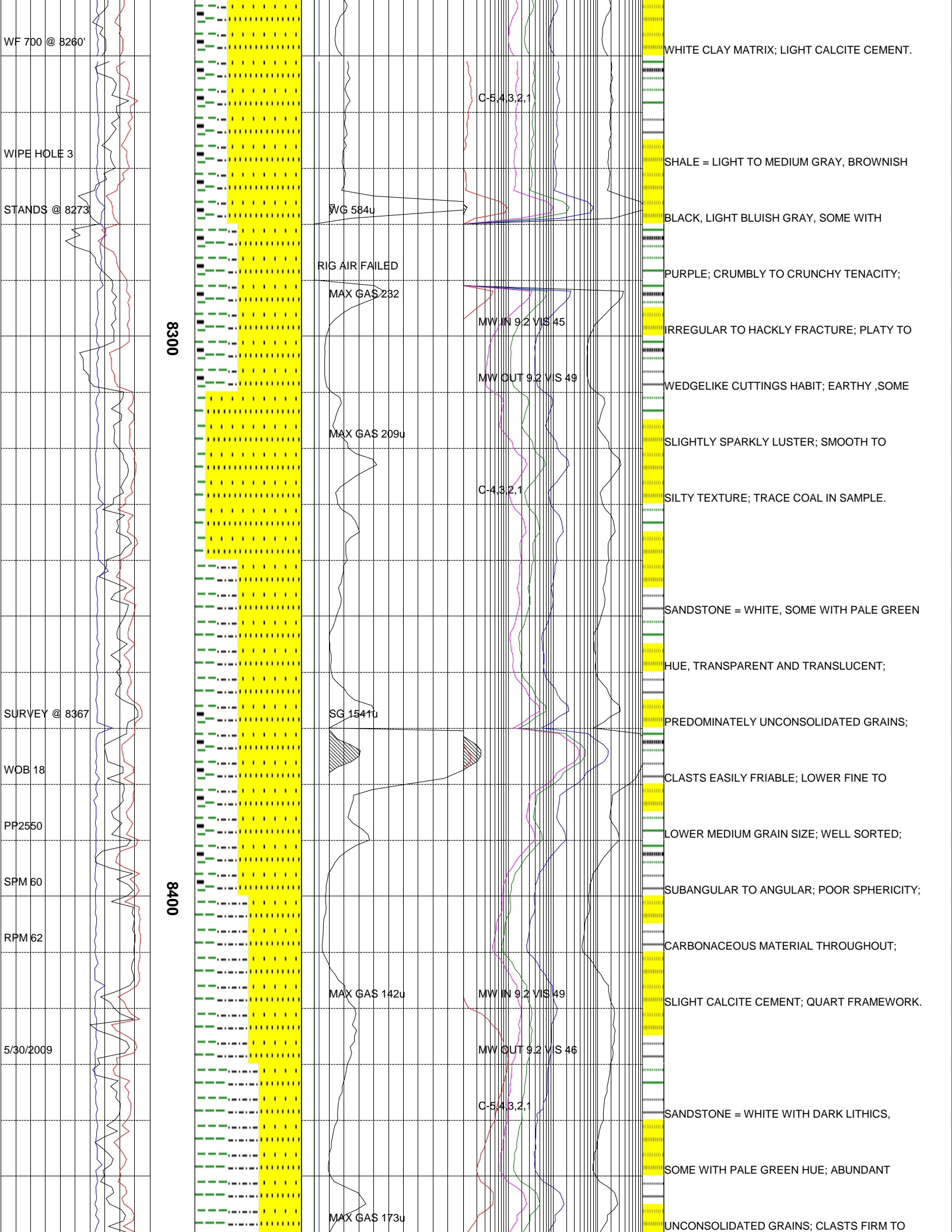
FINE LOWER; ANGULAR TO SUBROUND;

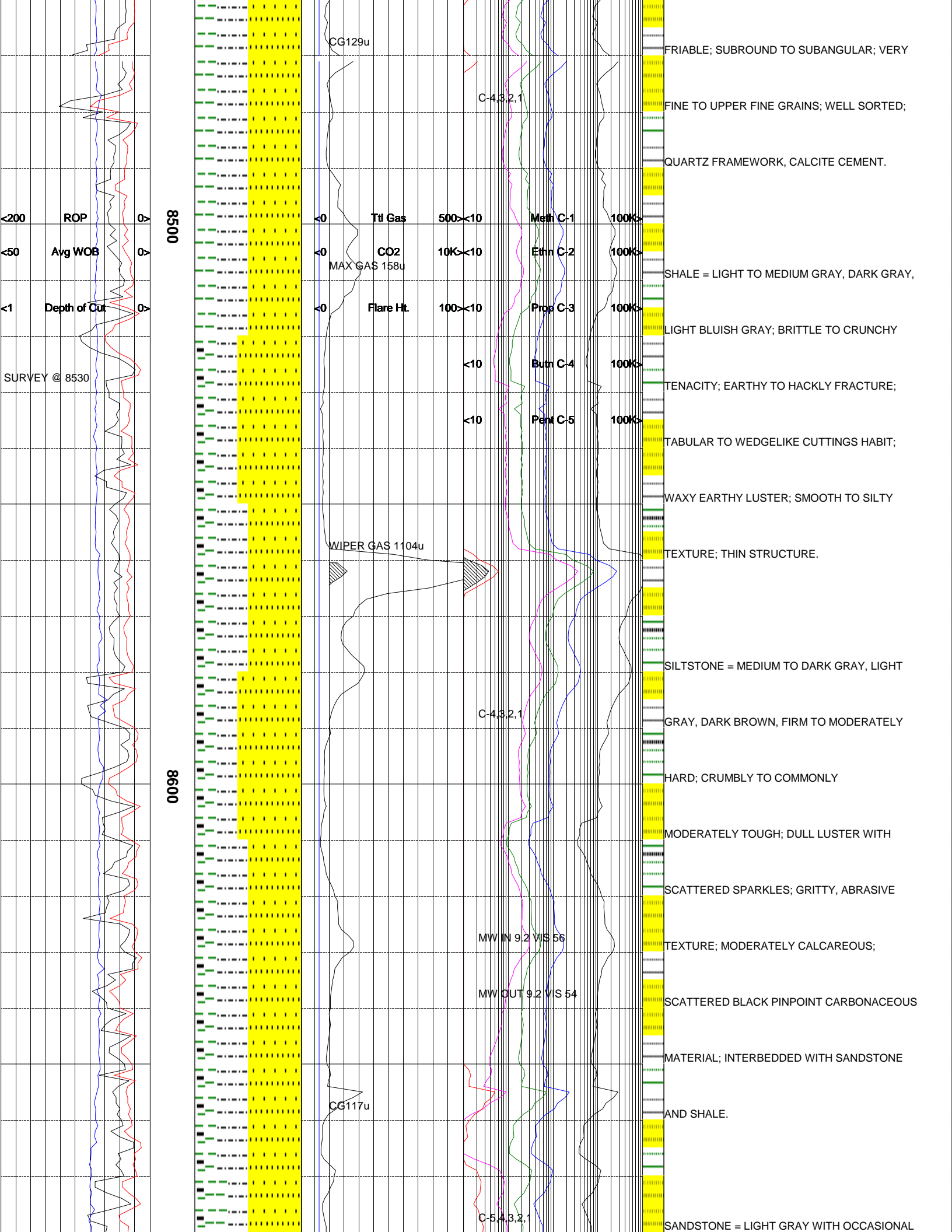
C-4.32.1

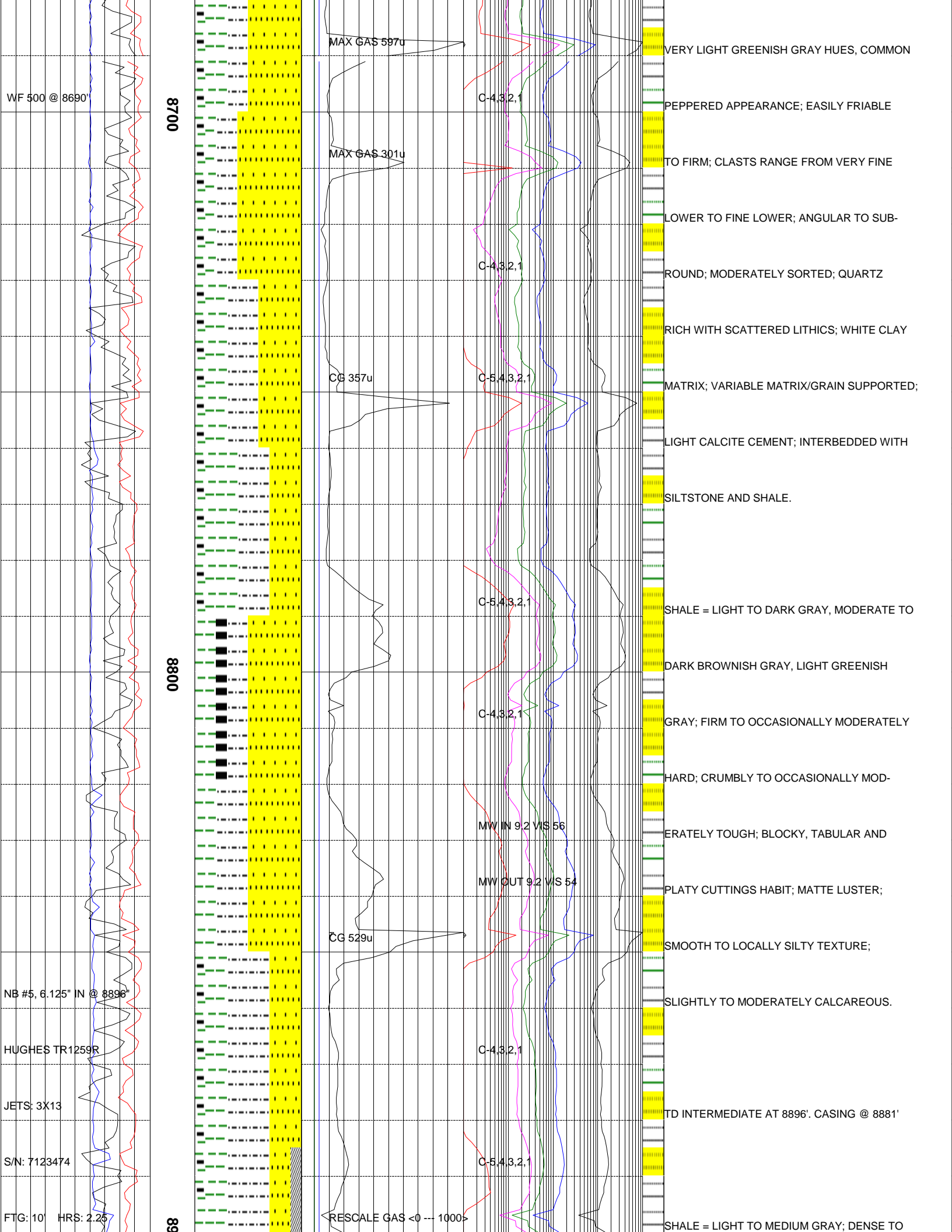
MODERATELY SORTED; DOMINANTLY QUARTZ;

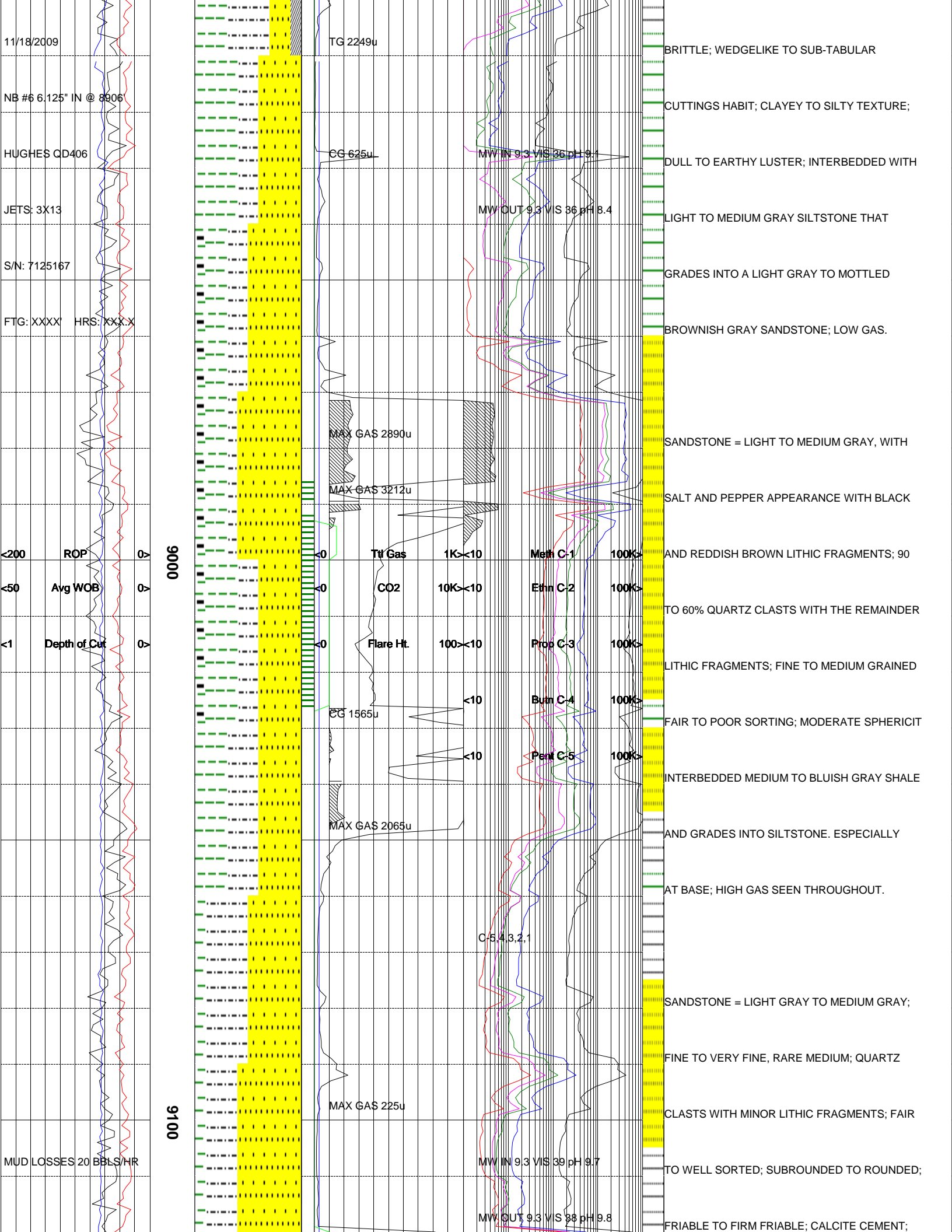
SCATTERED LITHICS AND CARBONACEOUS

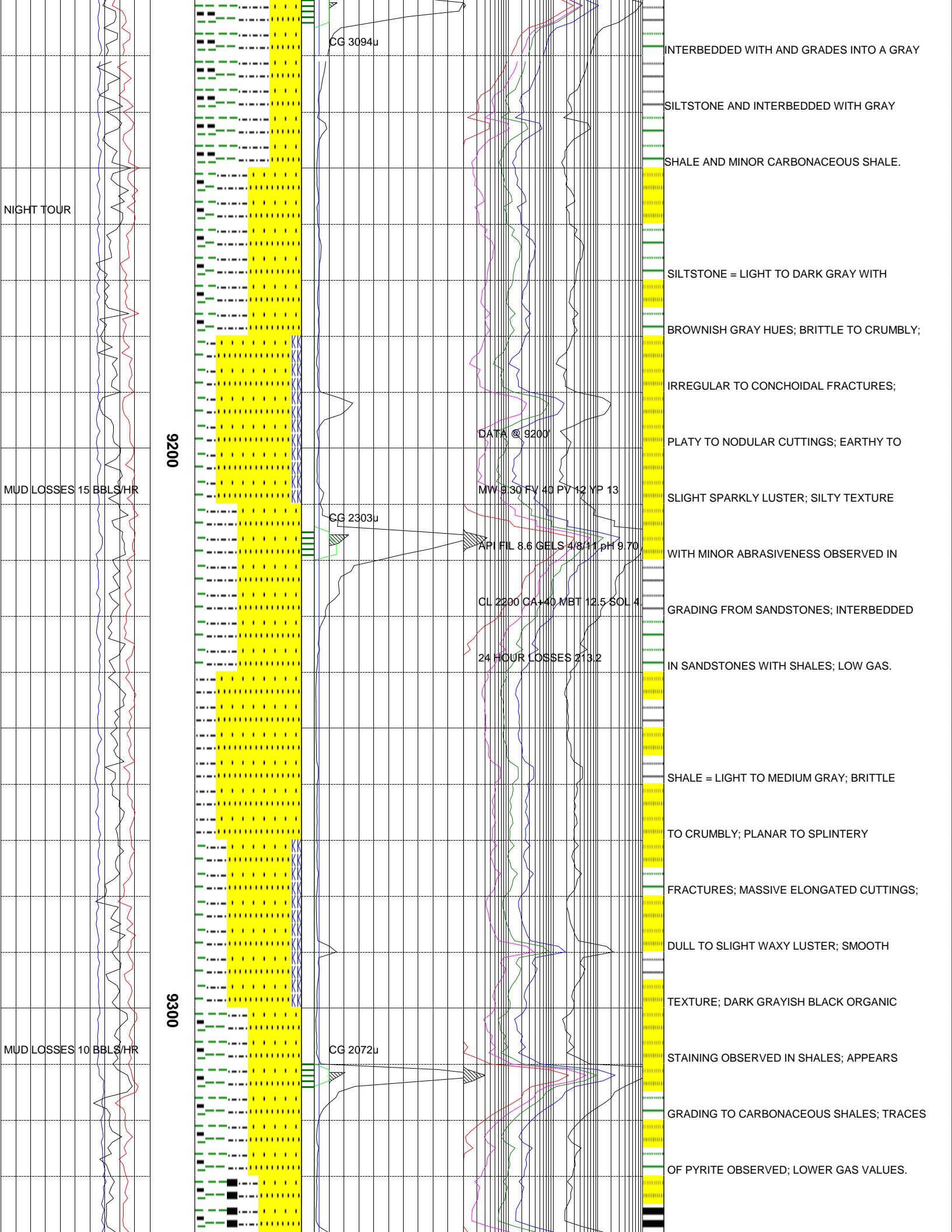
MATTER; MOSTLY LOOSE GRAINS IN SAMPLE;

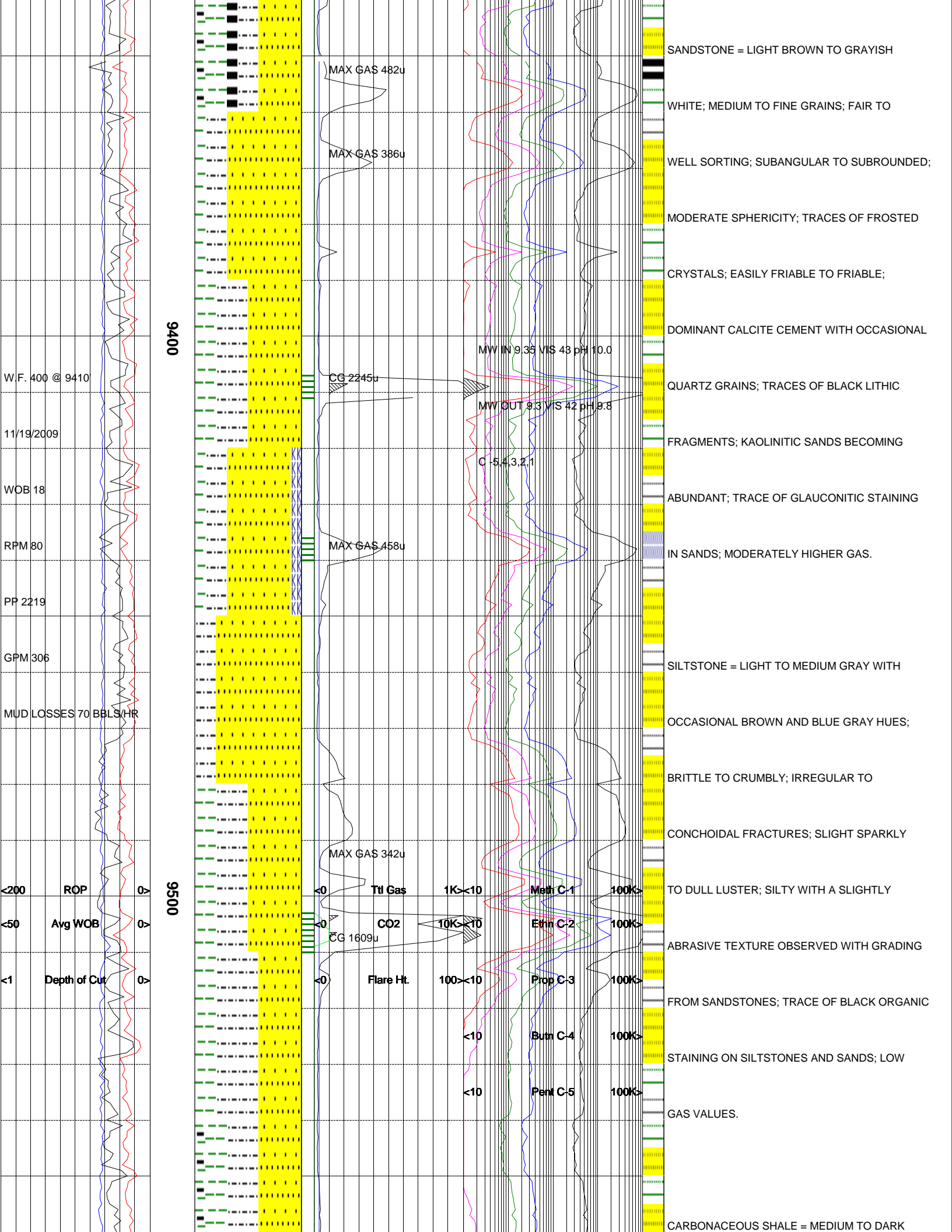


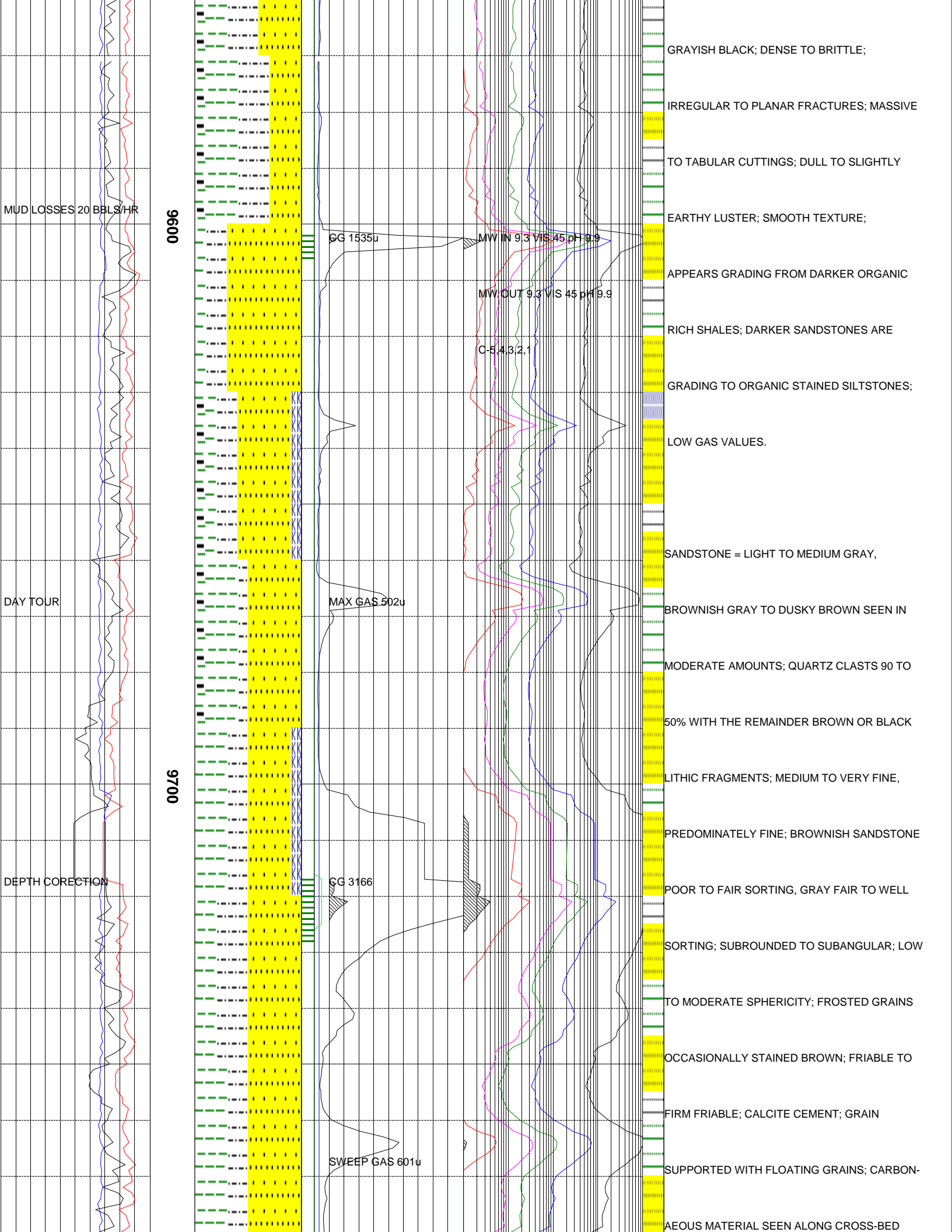












0060

09700

MUD LOSSES 20 BBL/HR

DAY TOUR

DEPTH CORECTION

SG 1535u

MW IN 9.3 VIS 45 pH 9.9

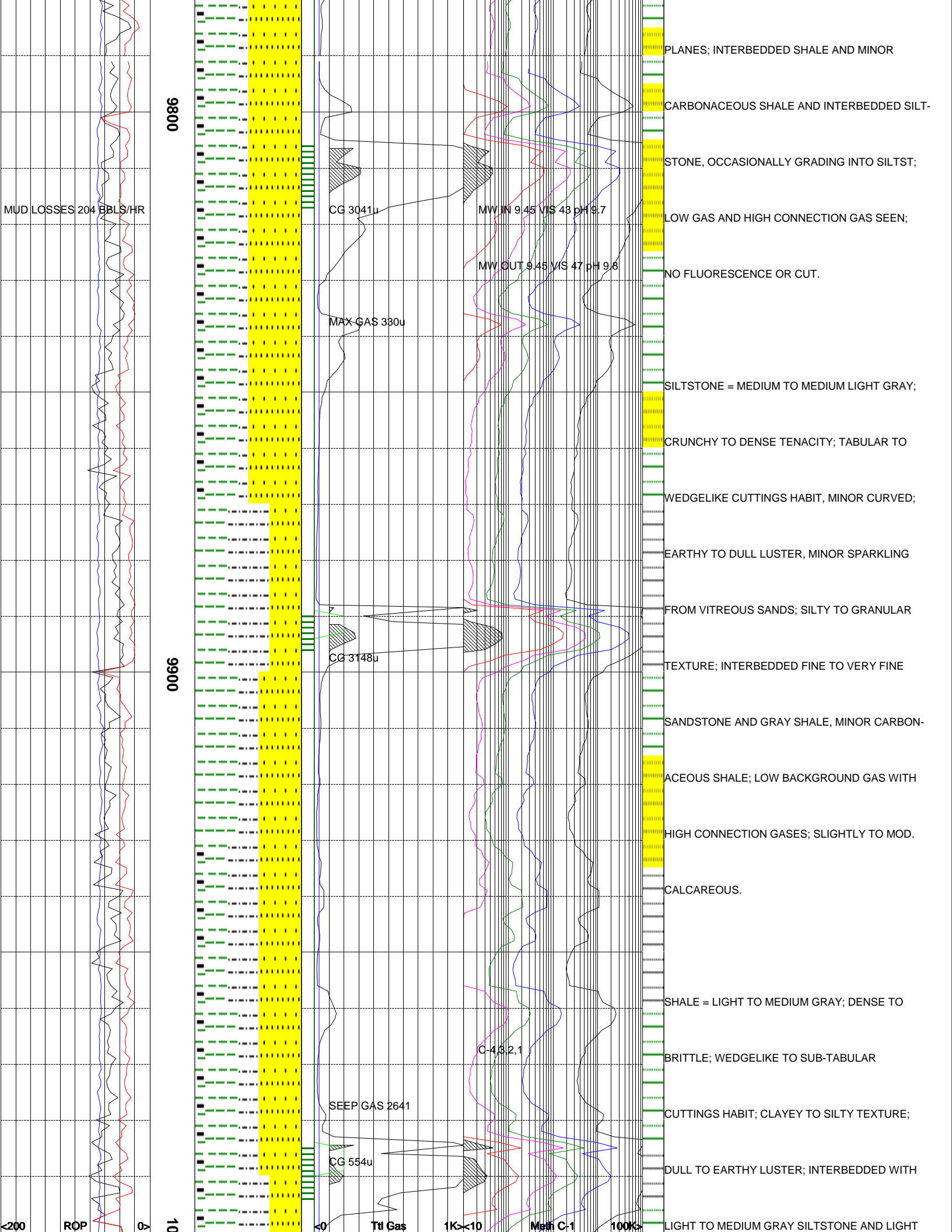
MW OUT 9.3 VIS 45 pH 9.9

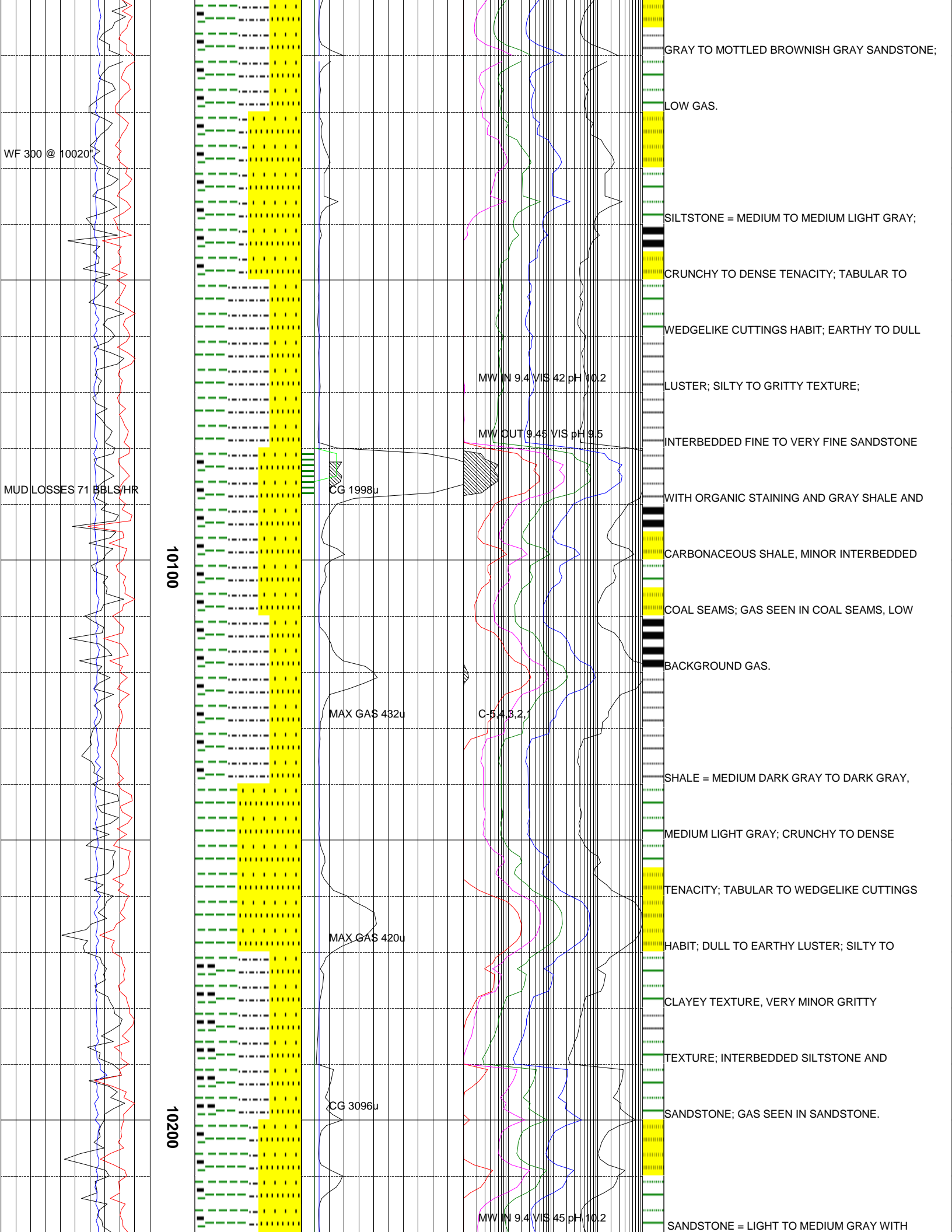
C-5.432.1

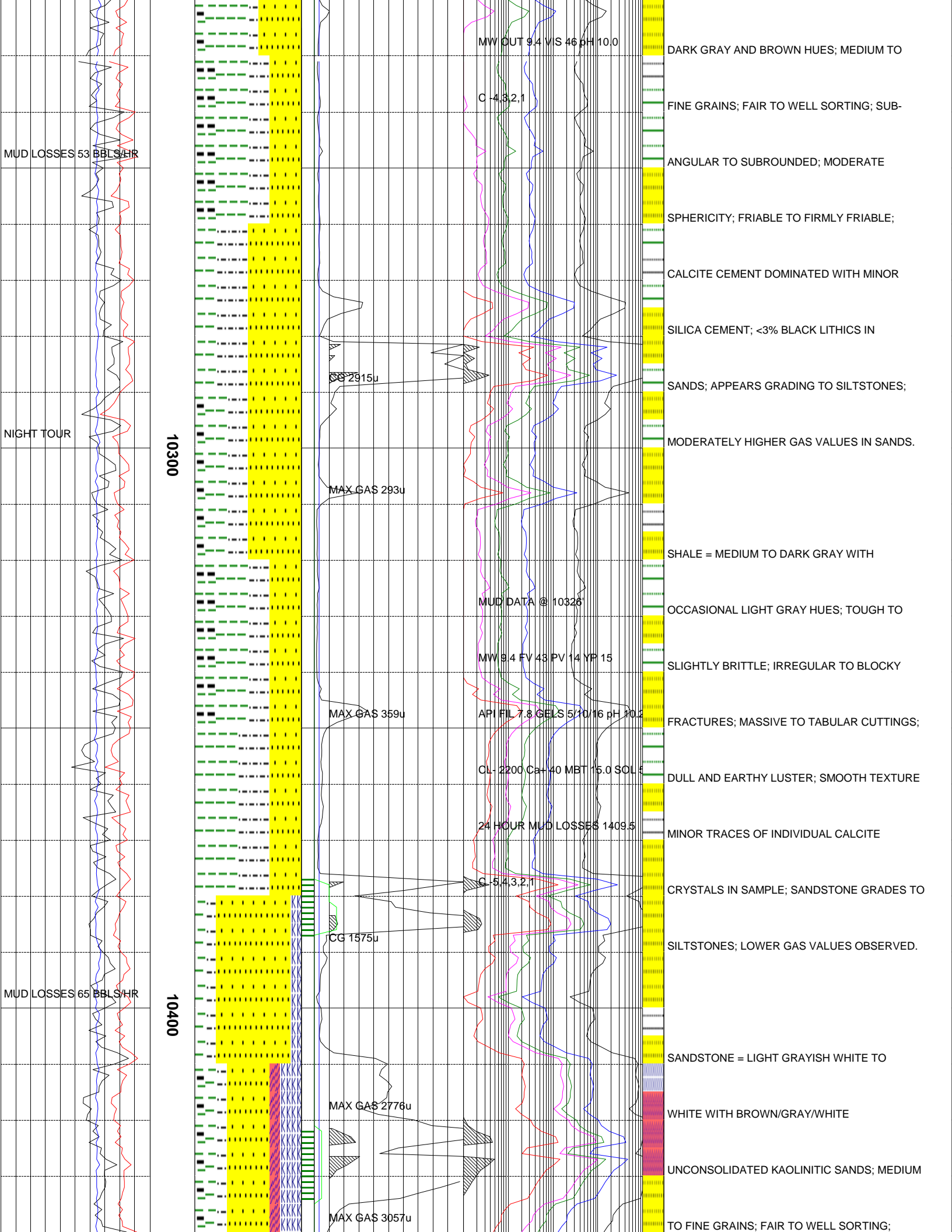
MAX GAS 502u

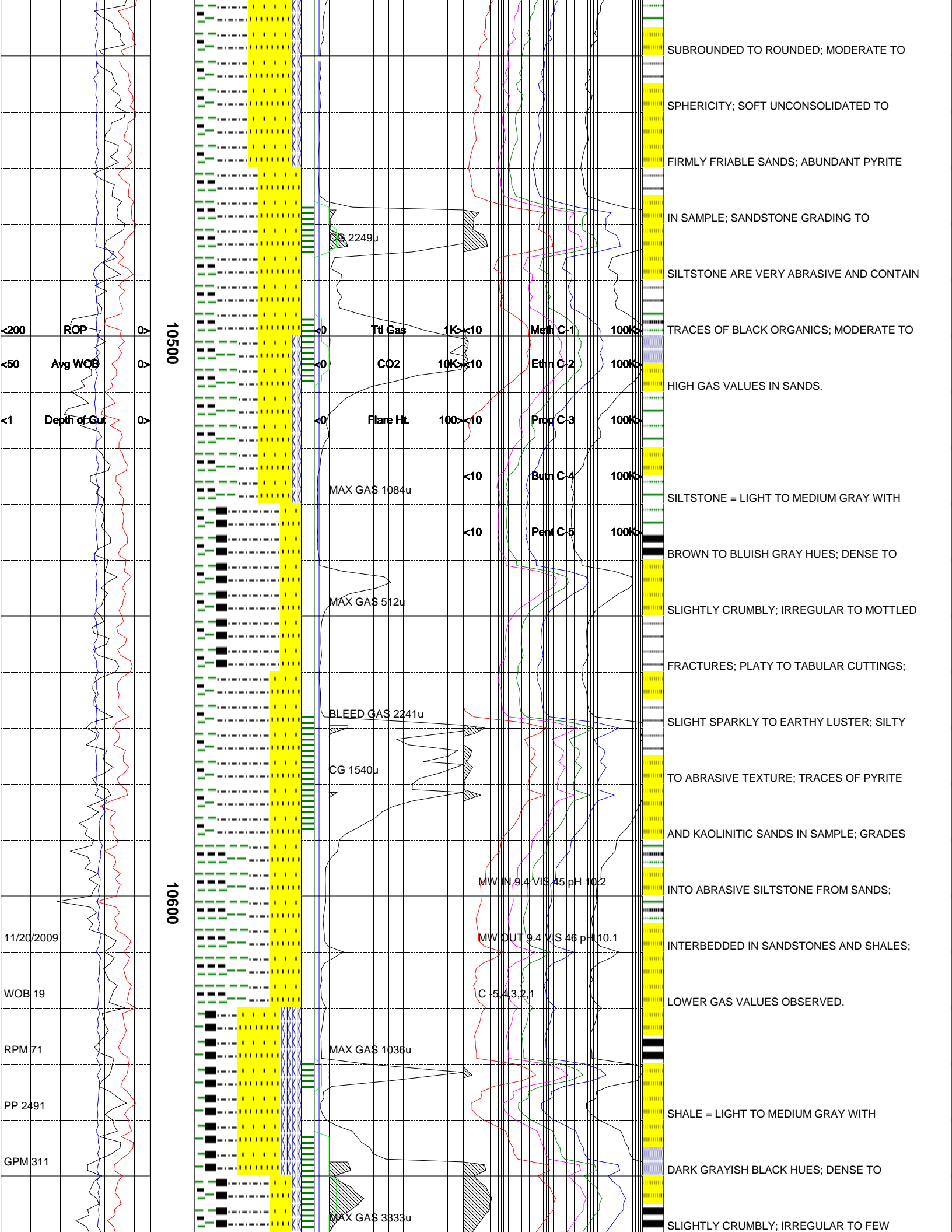
SG 3166

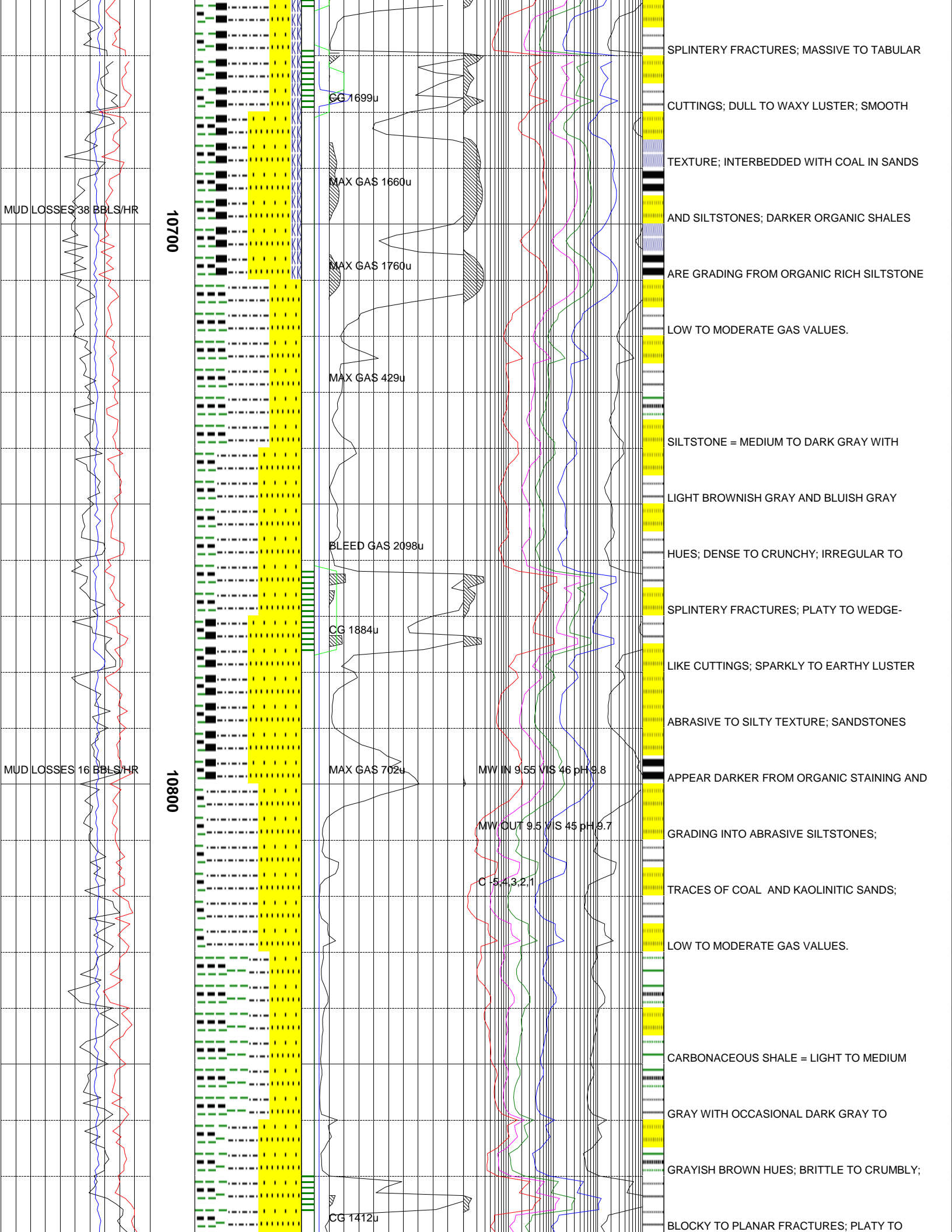
SWEEP GAS 601u

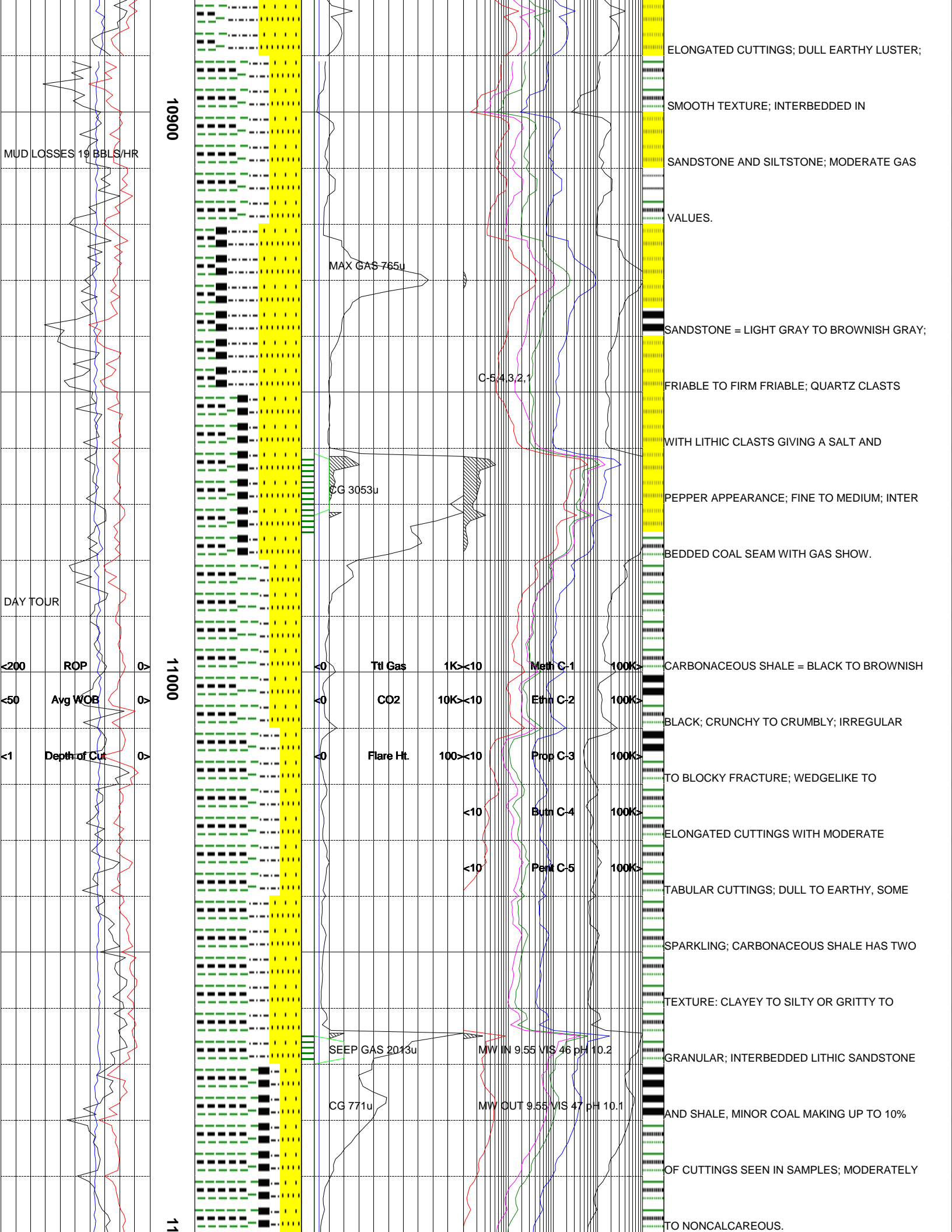


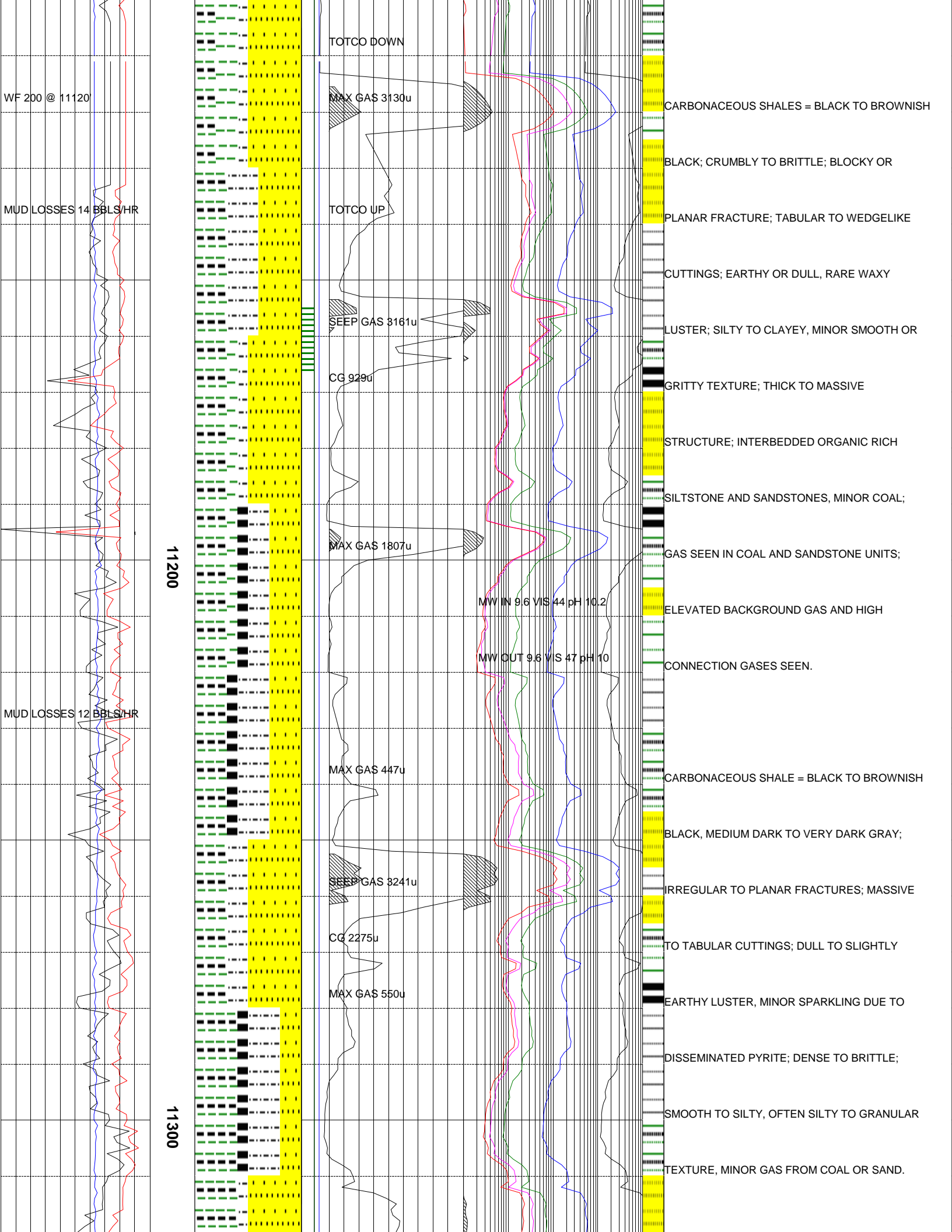


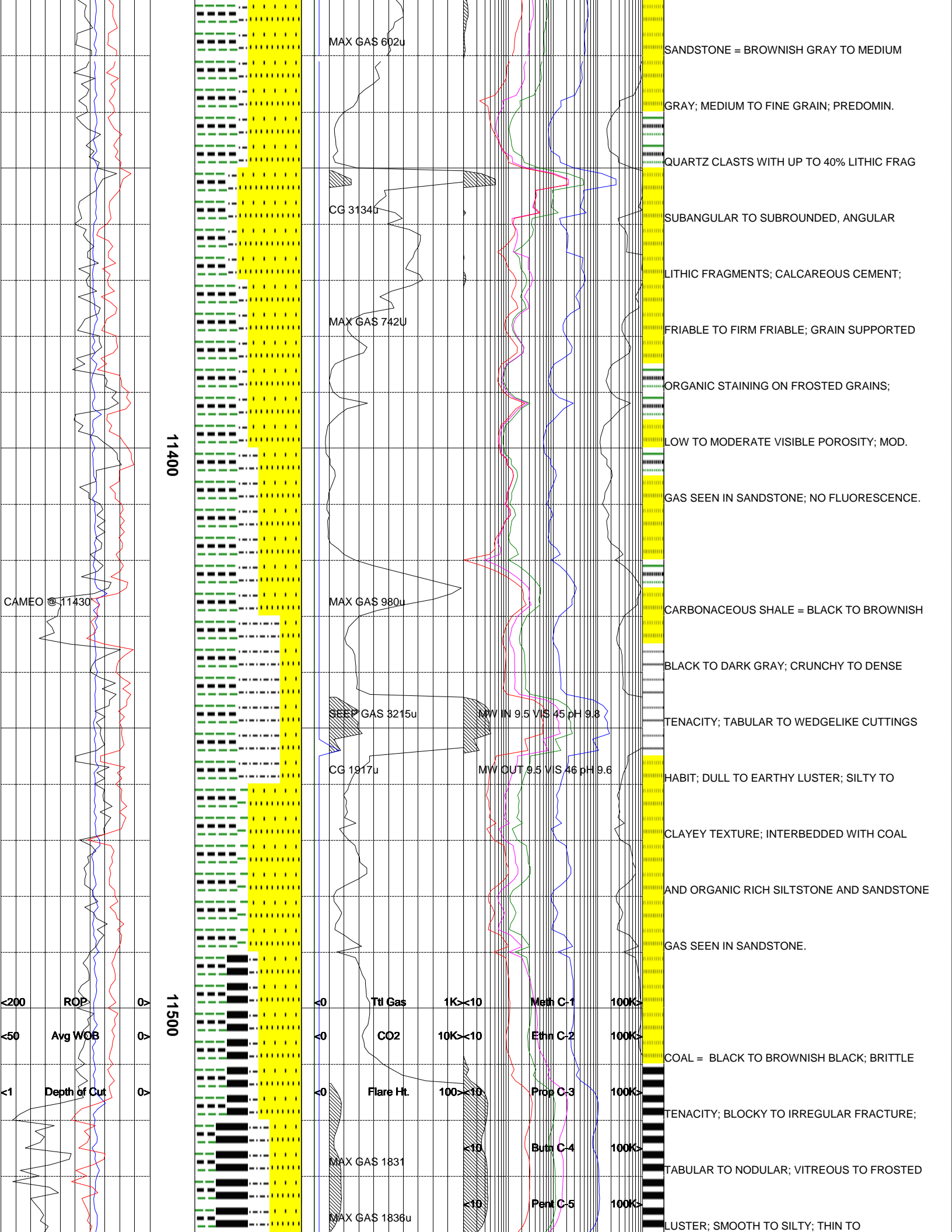


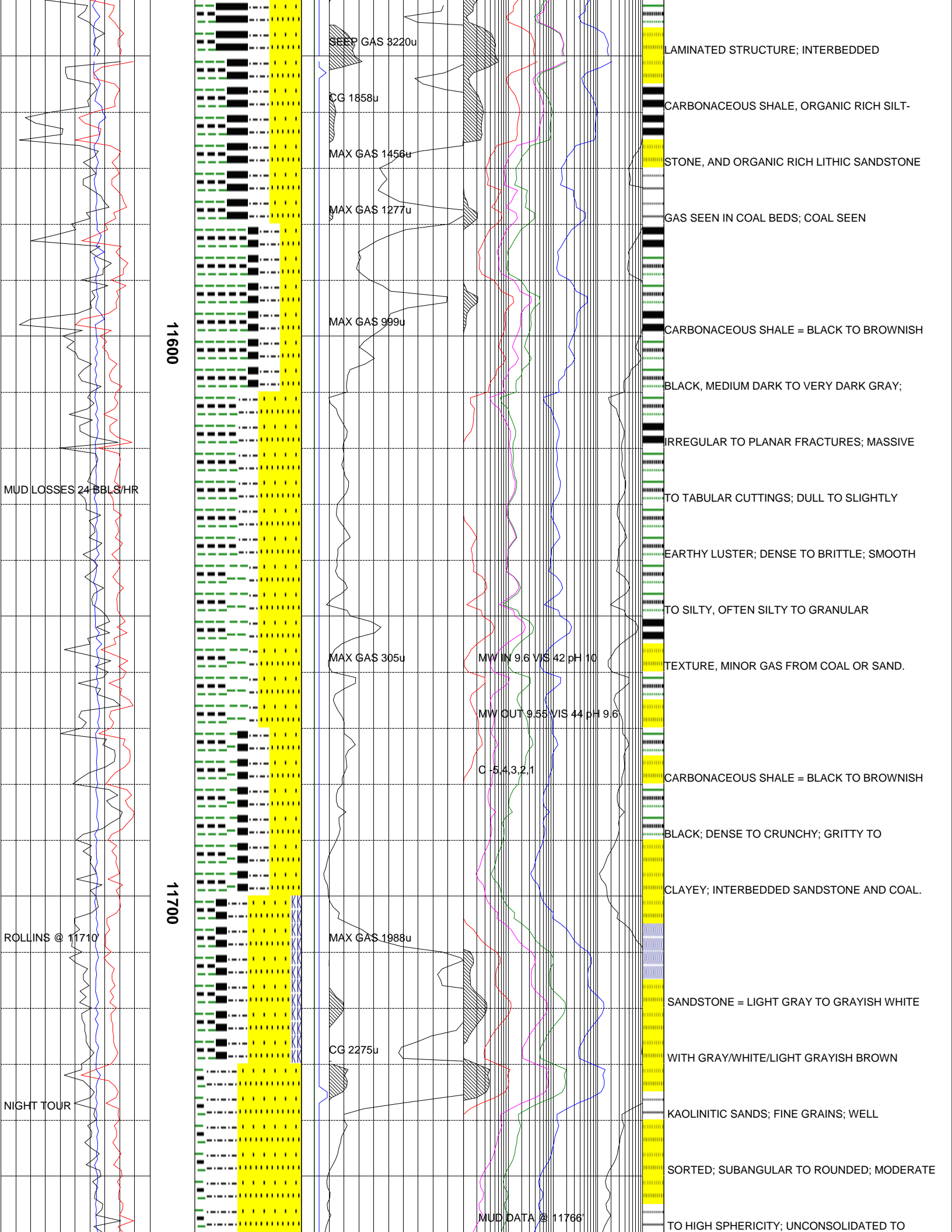












11600

11700

SEEP GAS 3220u

CG 1858u

MAX GAS 1456u

MAX GAS 1277u

MAX GAS 999u

MAX GAS 305u

MAX GAS 1988u

CG 2275u

LAMINATED STRUCTURE; INTERBEDDED

CARBONACEOUS SHALE, ORGANIC RICH SILT-
STONE, AND ORGANIC RICH LITHIC SANDSTONE

GAS SEEN IN COAL BEDS; COAL SEEN

CARBONACEOUS SHALE = BLACK TO BROWNISH

BLACK, MEDIUM DARK TO VERY DARK GRAY;

IRREGULAR TO PLANAR FRACTURES; MASSIVE

TO TABULAR CUTTINGS; DULL TO SLIGHTLY

EARTHY LUSTER; DENSE TO BRITTLE; SMOOTH

TO SILTY, OFTEN SILTY TO GRANULAR

TEXTURE, MINOR GAS FROM COAL OR SAND.

CARBONACEOUS SHALE = BLACK TO BROWNISH

BLACK; DENSE TO CRUNCHY; GRITTY TO

CLAYEY; INTERBEDDED SANDSTONE AND COAL.

SANDSTONE = LIGHT GRAY TO GRAYISH WHITE

WITH GRAY/WHITE/LIGHT GRAYISH BROWN

KAOLINITIC SANDS; FINE GRAINS; WELL

SORTED; SUBANGULAR TO ROUNDED; MODERATE

TO HIGH SPHERICITY; UNCONSOLIDATED TO

MUD LOSSES 24 BBLS/HR

ROLLINS @ 11710

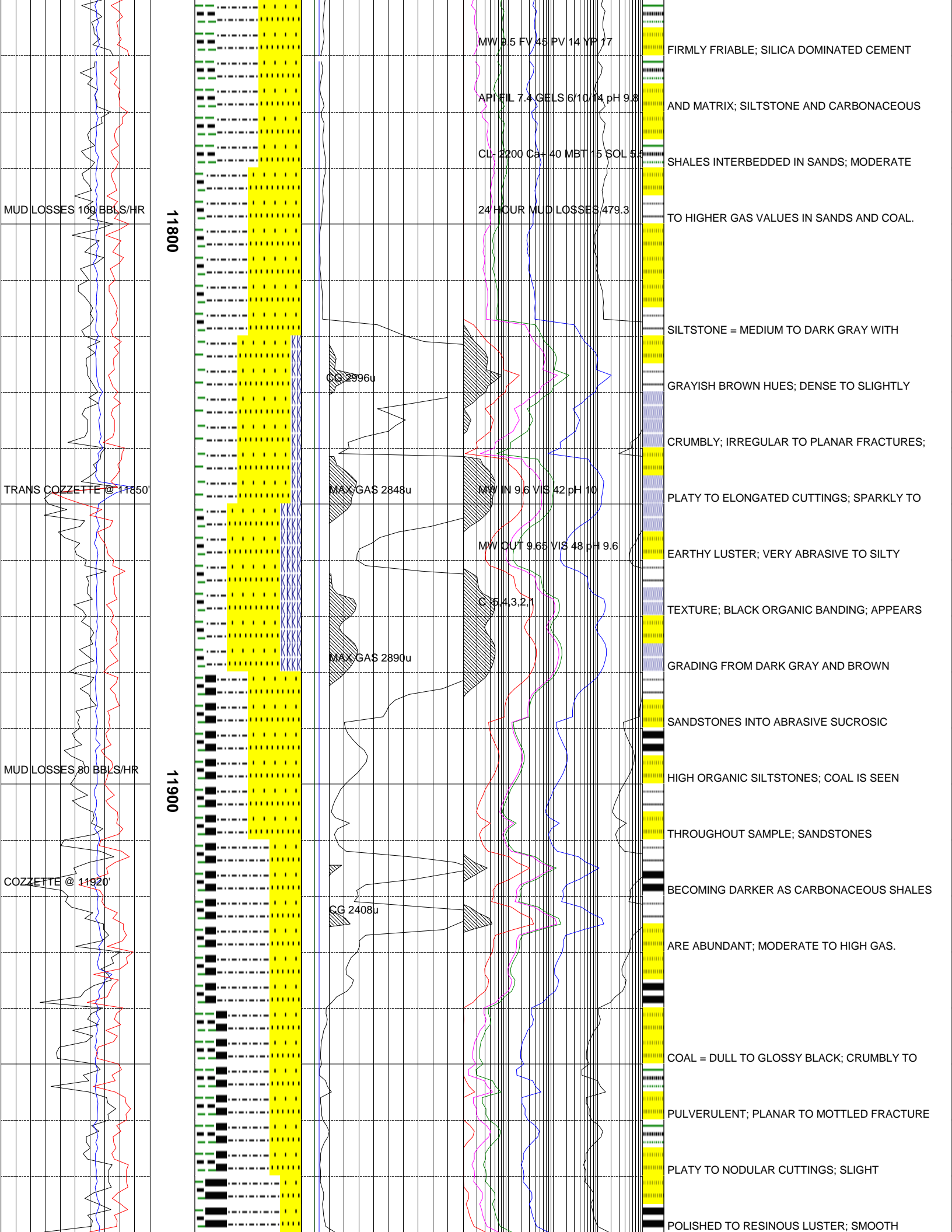
NIGHT TOUR

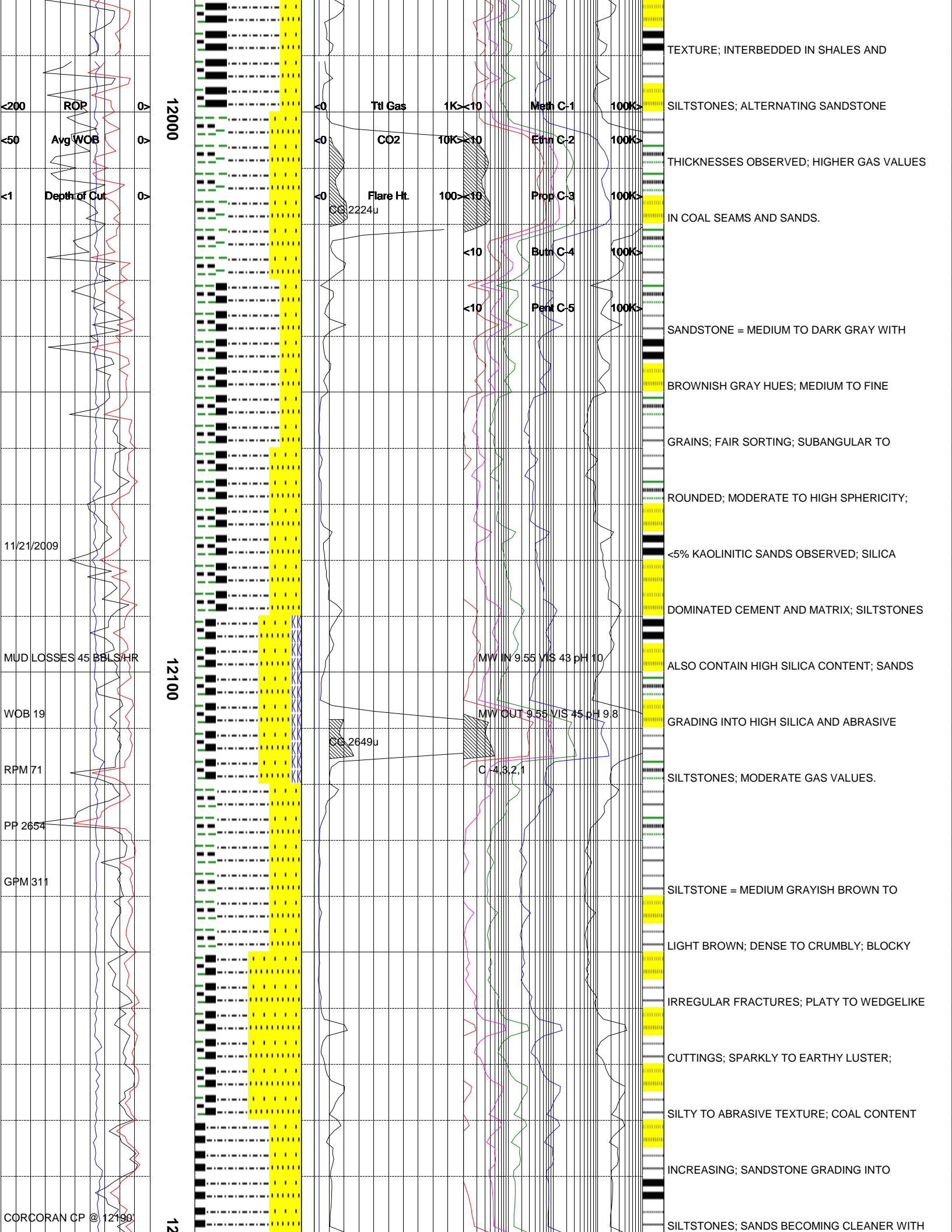
MW IN 9.6 VIS 42 pH 10

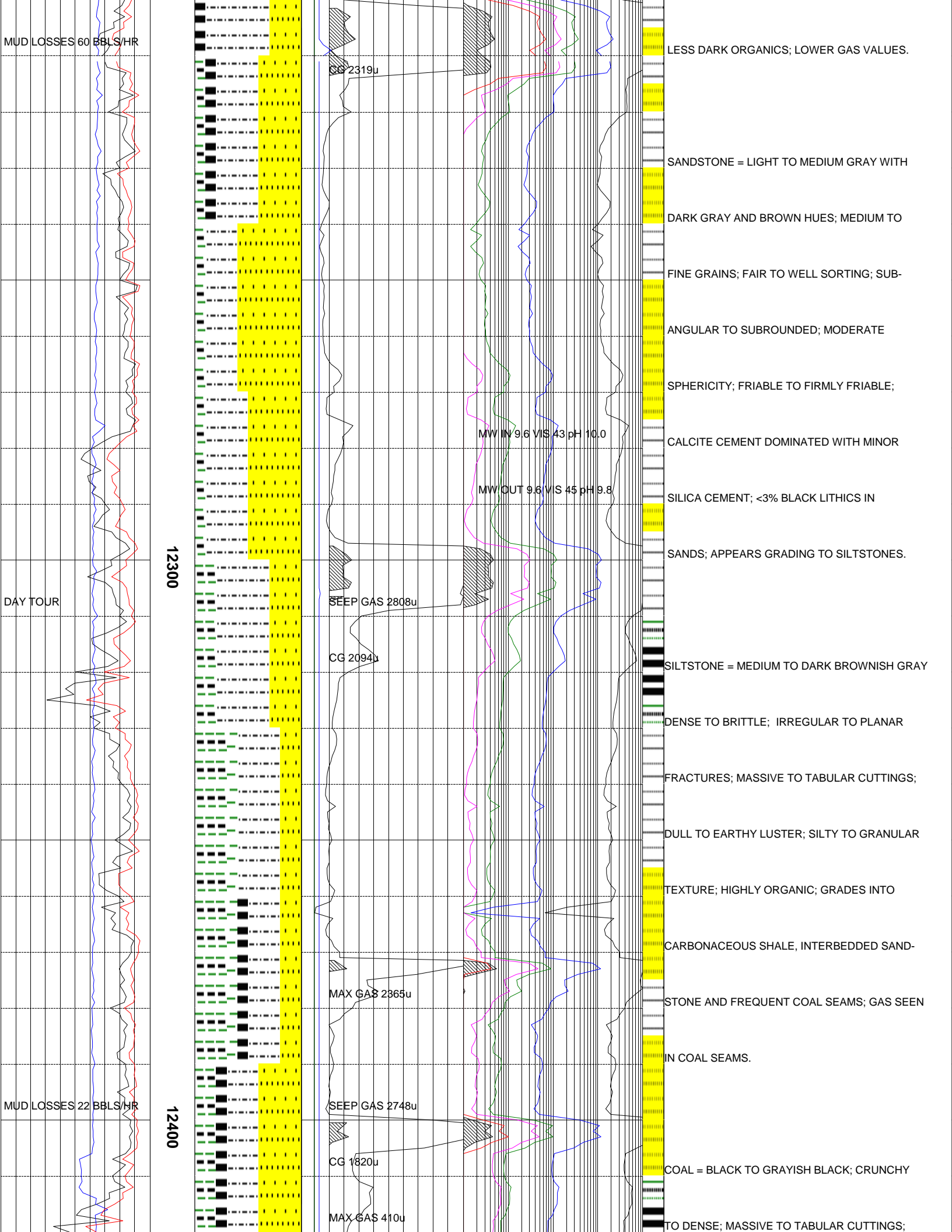
MW OUT 9.55 VIS 44 pH 9.6

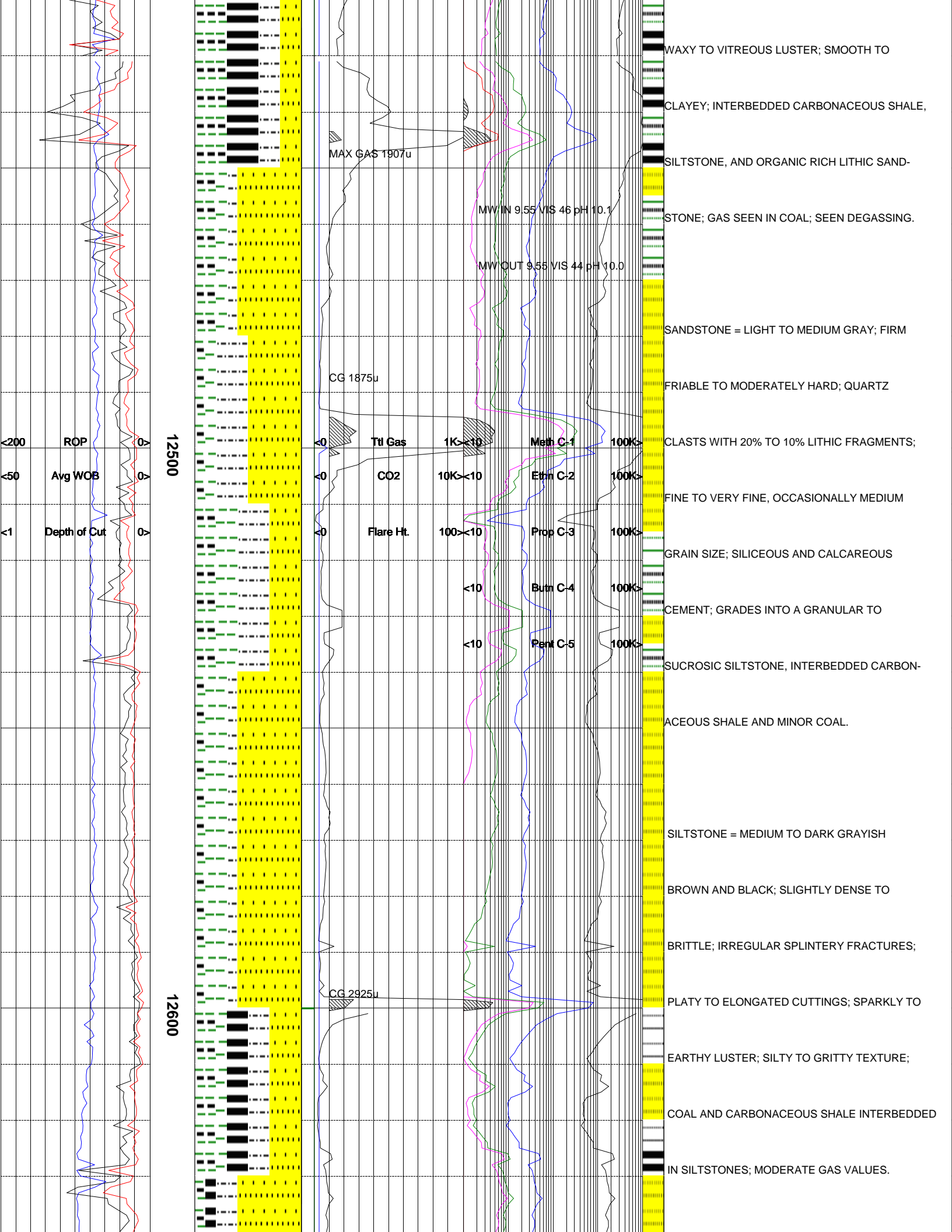
C-5.4, 3.2, 1

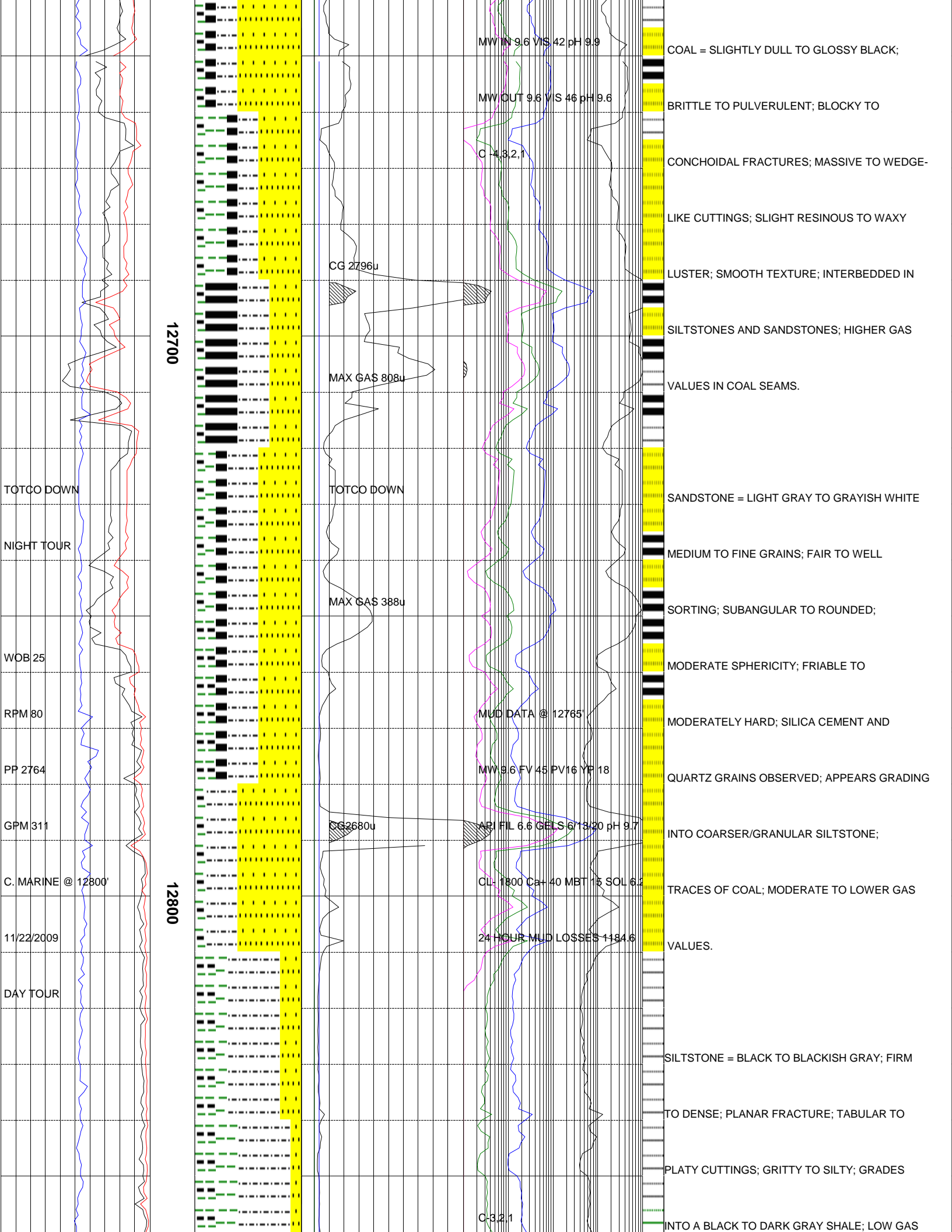
MUD DATA @ 11766











12700

12800

MW IN 9.6 VIS 42 pH 9.9

MW OUT 9.6 VIS 46 pH 9.6

C 4.3.2.1

CG 2796u

MAX GAS 808u

TOTCO DOWN

MAX GAS 388u

MUD DATA @ 12765'

MW 9.6 FV 45 PV 16 YP 18

CG 2680u

API FIL 6.6 GELS 6.15/20 pH 9.7

CL: 1800 Ca+ 40 MBT 15 SOL 6.2

24 HOUR MUD LOSSES 1154.6

C-32.1

COAL = SLIGHTLY DULL TO GLOSSY BLACK;

BRITTLE TO PULVERULENT; BLOCKY TO

CONCHOIDAL FRACTURES; MASSIVE TO WEDGE-

LIKE CUTTINGS; SLIGHT RESINOUS TO WAXY

LUSTER; SMOOTH TEXTURE; INTERBEDDED IN

SILTSTONES AND SANDSTONES; HIGHER GAS

VALUES IN COAL SEAMS.

SANDSTONE = LIGHT GRAY TO GRAYISH WHITE

MEDIUM TO FINE GRAINS; FAIR TO WELL

SORTING; SUBANGULAR TO ROUNDED;

MODERATE SPHERICITY; FRIABLE TO

MODERATELY HARD; SILICA CEMENT AND

QUARTZ GRAINS OBSERVED; APPEARS GRADING

INTO COARSER/GANULAR SILTSTONE;

TRACES OF COAL; MODERATE TO LOWER GAS

VALUES.

SILTSTONE = BLACK TO BLACKISH GRAY; FIRM

TO DENSE; PLANAR FRACTURE; TABULAR TO

PLATY CUTTINGS; GRITTY TO SILTY; GRADES

INTO A BLACK TO DARK GRAY SHALE; LOW GAS

TOTCO DOWN

NIGHT TOUR

WOB 25

RPM 80

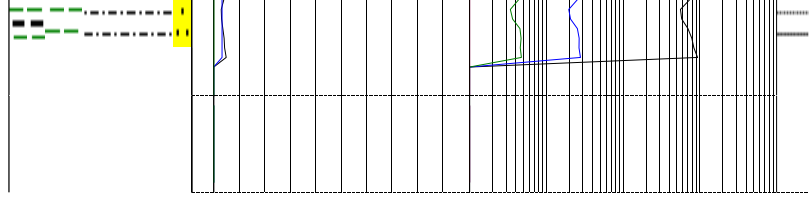
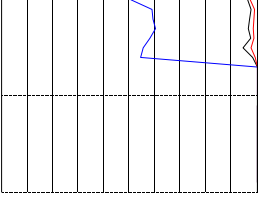
PP 2764

GPM 311

C. MARINE @ 12800'

11/22/2009

DAY TOUR



TD @ 12866', 11717' TVD @ 04:56 11/22/09

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