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Geothermal Formation Log

COMPANY	Coso Operating Co.
WELL	BLM North 33A-7 RD
FIELD	Coso Geothermal
REGION	Coso Mountains
COORDINATES	258551.47' N 2351542.02' E
ELEVATION	4183.20'
COUNTY, STATE	Inyo, California
API INDEX	NA
SPUD DATE	12/20/2009
CONTRACTOR	Kenai Drilling, U.S.A
CO. REP.	
RIG/TYPE	Kenai #6/Rotary Triple
LOGGING UNIT	ML039
GEOLOGISTS	Josiah Failing Matt Uddenburg
ADD. PERSONS	Scot Clark Marquel Mosebay
CO. GEOLOGIST	Mike Krahmer

LOG INTERVAL

DEPTHS: 100' TO 10,190'
DATES: 12/20/2009 TO 3/25/2010
SCALE: 5" = 100'

CASING DATA

20" AT 807'
13 3/8" AT 4041'
9 5/8" AT 7024'
7" Liner AT 10190'

MUD TYPES

SPUD/GEL TO 817'
GEL/Bentonite TO 10190'
TO
TO

HOLE SIZE

26" TO 817'
17 1/2" TO 4061'
12 1/4" TO 7030'
8 1/2" TO 10190'

ABBREVIATIONS

NB NEWBIT	PP PUMP PRESSURE	CO CIRCULATE OUT
RRB RERUN BIT	SPM STROKES/MIN	NR NO RETURNS
CB CORE BIT	PR POOR RETURNS	TG TRIP GAS
WOB WEIGHT ON BIT	LAT LOGGED AFTER TRIP	WG WIPER GAS
RPM ROTARY REV/MIN	LC LOST CIRCULATION	CG CONNECTION GAS

ALTERED ZONE	DIORITE
ANDESITE	DOLOSTONE
ANHYDRITE	FELSIC SILIC DIKE
BASALT	GABBRO
BRECCIA	GLASSY TUFF
CALCAREOUS TUFF	GRANITE
CALCILUTITE	GRANITE WASH
CARBONATES	GRANODIORITE
CARBONACEOUS MAT	GYPSUM
CARBONACEOUS SH	HALITE
CEMENT CONTAM.	HORNBL-QTZ-DIO
CRYSTALLINE TUFF	INTRUSIVES
CHERT - UNDIFF	LIMESTONE
CLAY	LITHIC TUFF
CLAY-MUDSTONE	MARL - CALC
CLYST-TUFFACEOUS	METAMORPHICS
COAL	OBSIDIAN
CONGLOMERATE	PORCELANITE
DACITE	PORCELANEOUS CLYST

PYRITE
PYROCLASTICS
QUARTZ DIORITE
QUARTZ LATITE
QUARTZ MONZONITE
RECRYSTALLIZED CALCITE
RHYOLITE
SAND
SANDSTONE
SANDSTONE-TUFFACEOUS
SERPENTINE
SHALE
SHALE TUFFACEOUS
SHELL FRAGMENTS
SILTSTONE
SILTST-TUFFACEOUS
TUFF
VOLCANICLASTICS SEDS
VOLCANICS

MINERAL PERCENTAGE

< 1% 1-3% 4-6% 7-9% > 10%

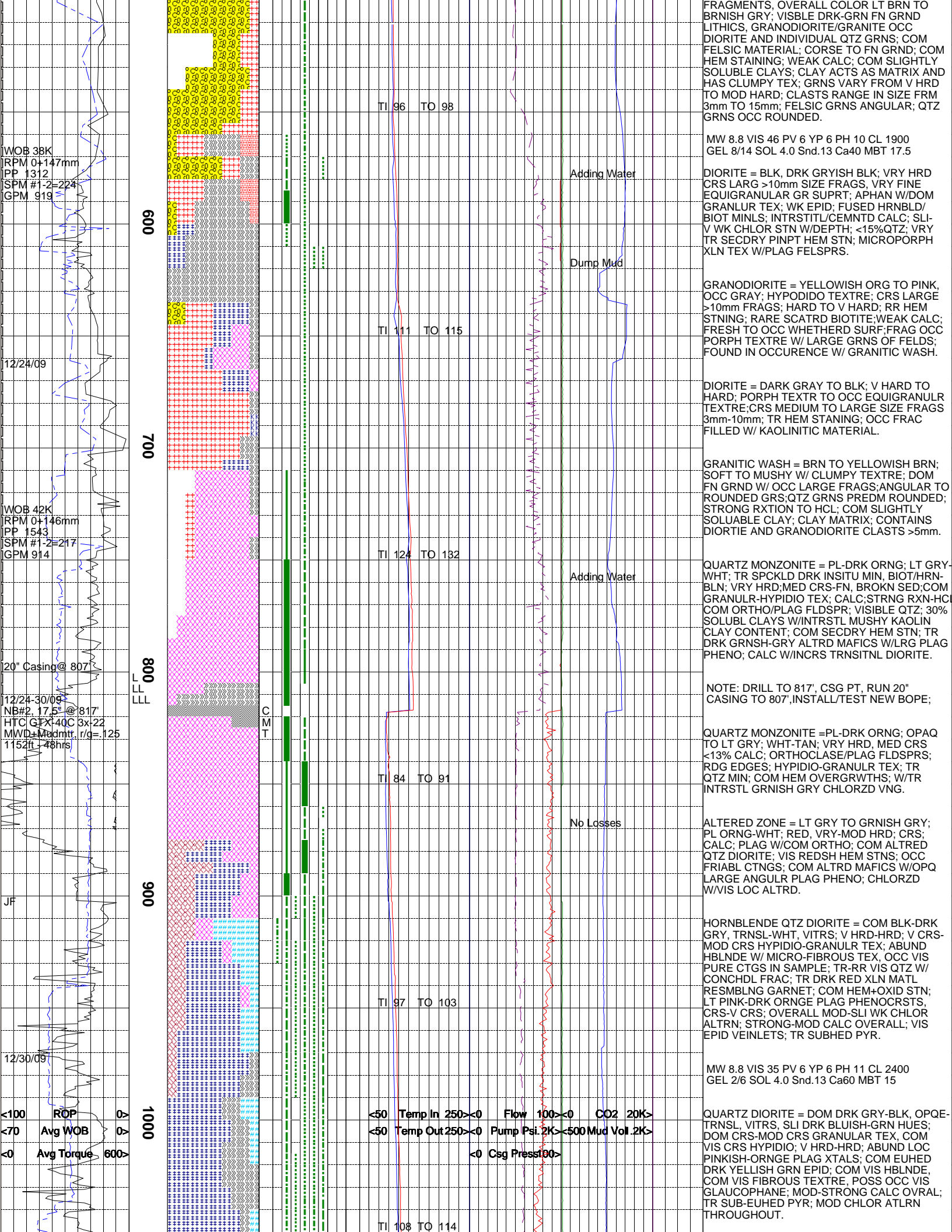
ALTERATION TYPES

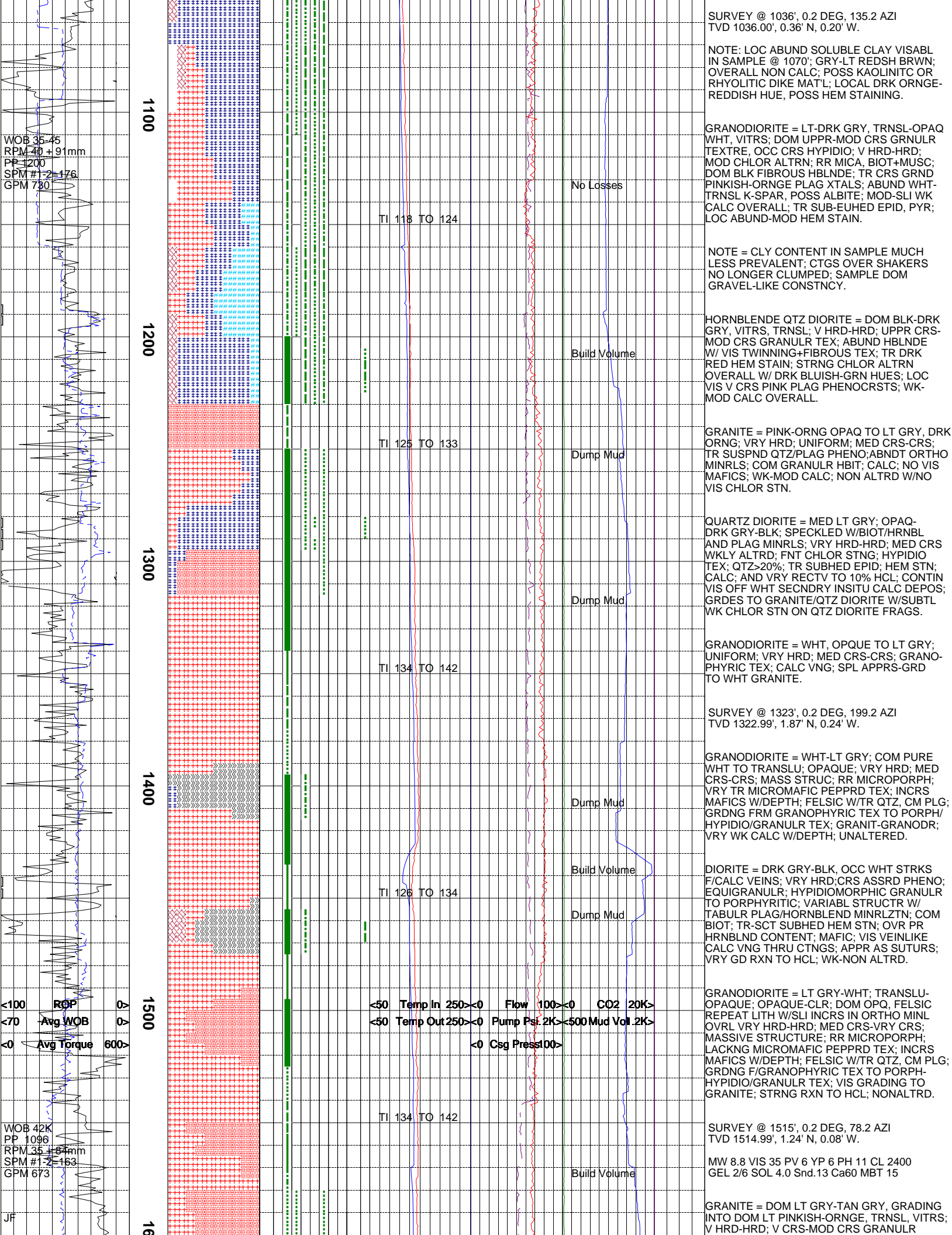
SERICITIZATION	BIOTITIC
SILICIFICATION	CHLORITIC
	KAOLINITIC

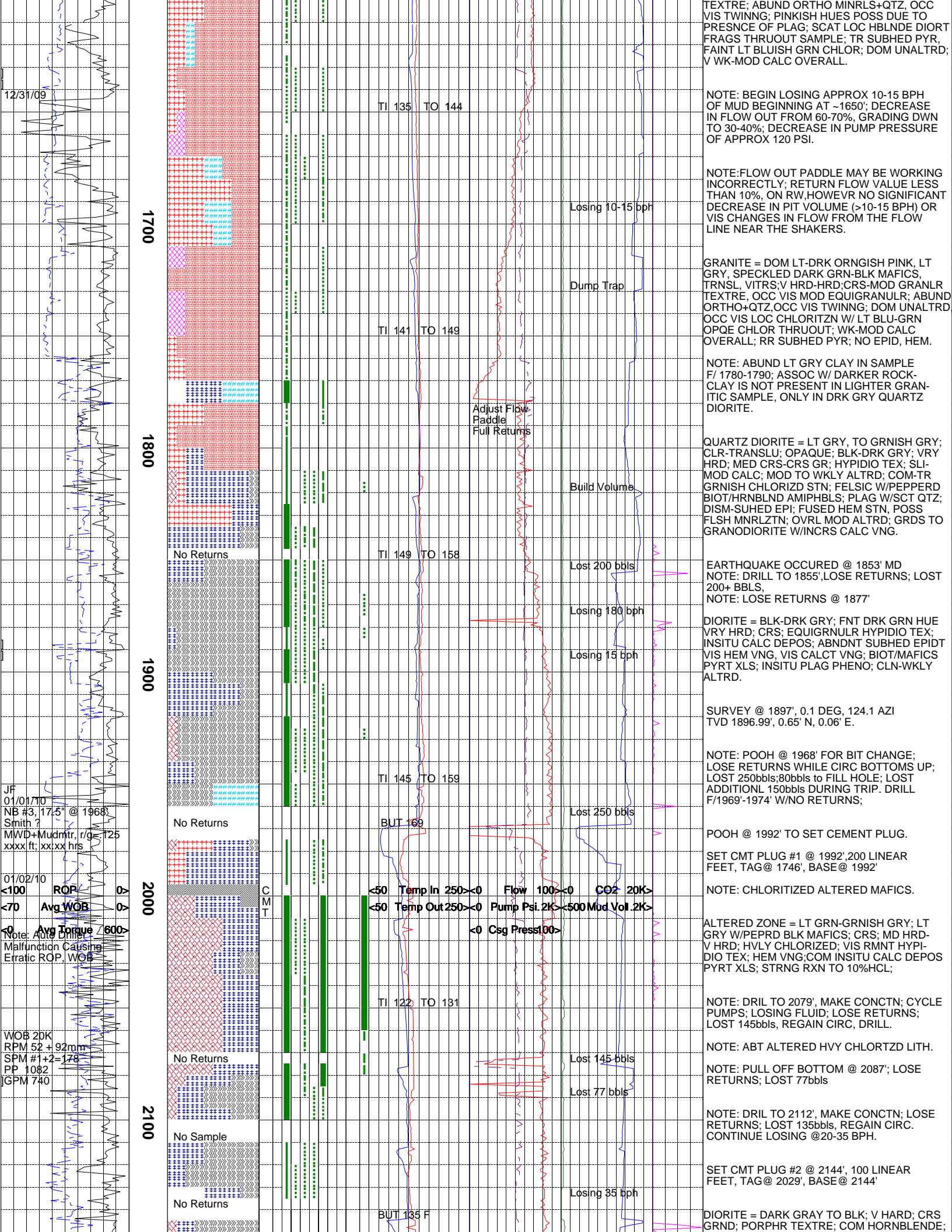
ALTERATION INTENSITY

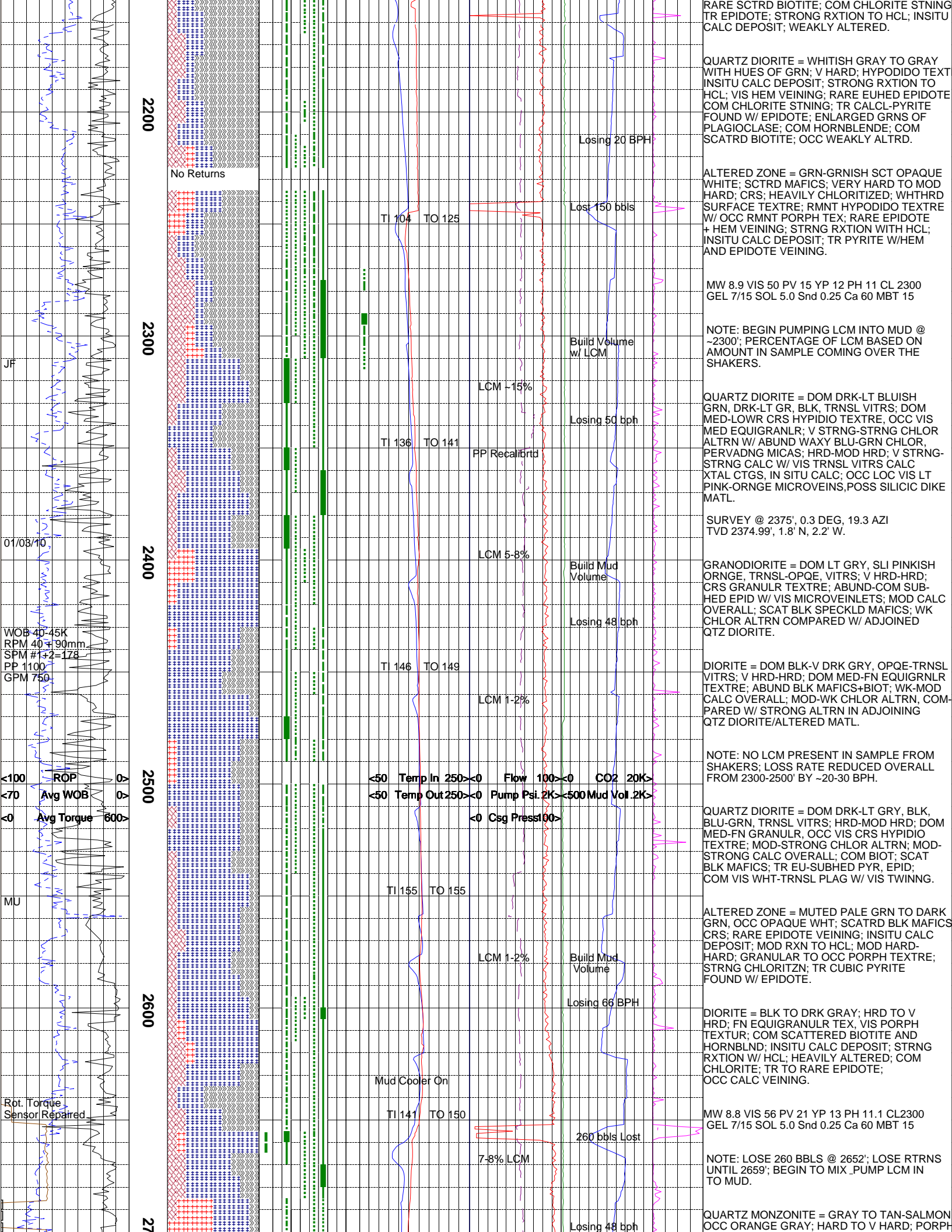
WEAK MODERATE STRONG

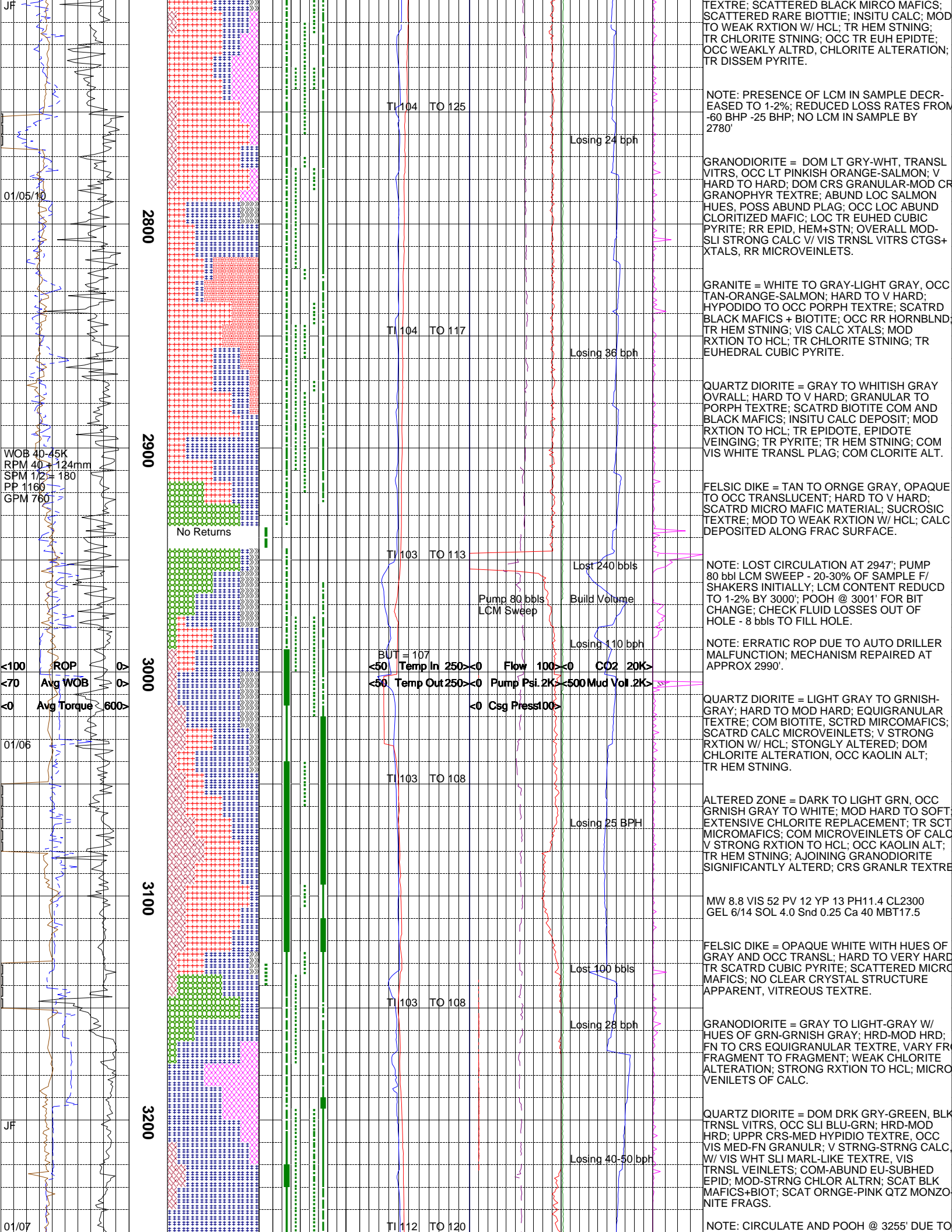
Depth			Lithology	MINERALS	ALTERATION	<50 Temp In 250>	<0 Flow 100>	<0 CO2 20K>	Mud Loss	Remarks
<70 Avg WOB 0>				quartz	calcite	degrees F	<0 Pump Psi. 2K>	ppm	<0 20>	Survey Data, Mud Reports, Other Info
<0 Avg Torque 600>				feldspar	phyllosilicates	<50 Temp Out 250>	<0 Csg Press 100>	<500 Mud Vol. 2K>	bbl/min	
						degrees F	psi	bbls		
30" Casing @ 80'										CO2 CALIBRATED 5% = 50,000 PPM; TEMPERATURE REPORTED IN DEGREES FAHRENHEIT; MUD LOSSES REPORTED IN BBL/MIN; LITHOLOGY COLORS ARE FROM WET CUTTINGS, AND ARE REFERENCED TO THE GEOLOGICAL SOCIETY OF AMERICA'S ROCK COLOR CHART.
NB#1, 26" @ 80' Smith G28YCPS, 3x-30 1-16 MWD+Mudmtr, r/g=.16 737ft - 40hrs						BUT = Bottoms up Temperature (°F)		BU = Bottoms up CO2 Gas (ppm)		BEGIN LOGGING OUTSIDE 30" CONDUCTOR SET @ 80'. START RETRIEVING SAMPLES @ 100 FT WITH 26" BIT AND 9.5" DC'S ON 12/21/09 @ 22:24 HRS.
12/22/09										NOTE: GLASSY TUFF SYMBOL DENOTES RHYOLITE; ALL DEPTHS ARE DRILLER'S DEPTHS.
						TI 68 TO 59				SANDSTONE= WHITISH GRAY TO GRAY; UNCONSOLIDATED; ANGULAR TO SUBRNDND GRNS; CLEAR QTZ GRAINS TO OPOQUE FELD GRNS; WEAK HCL; OCC HEM STAINING; TR PYRITE; DARK MAFIC LITHICS; TR CHLR STAINING; POORLY SORTED; POLISHED TO ROUGH SURFACE; MED GRND TO COARSELY GRND.
										SANDSTONE = GRAY-WHTISH GRAY W/ HUES OF ORG. GRN; SOFT-MUSHY; DOM ANGULAR CORSE GRNS, OCC MED SUBROUNDED GRNS; WEAK HCL; CLR QTZ GRNS; DARK GRN/BLK LITHICS; PRLY SRTD; FELD DOM OCC QTZ CLEAR TO OPAQ GRNS; TR SMOKY QTZ; TR EPIDOTE; TR CHLORITE STNING; COM HEM STNING; COM CLASTS OF QTZ DIORITE AND DIORTIE, MAY BE DRILLING ALONG CONTACT. KAOLINITIC MATRIX.
MM						TI 81 TO 85		Adding Water		GRANITIC WASH = VARIABLE COLR; ORNG-LT GRY; BLK-CLR; CONGLOMERITIC; FN GR-VRY CRS, COM>10mm CLAST;ABUNDNT LIMONITE STNG; ENFERD COLLUM BOULDR DEPOS; OXIDZD BROKEN/WASHED SEDIMENT; COM QTZ/FELSIC; TR DIORITE/QTZ DIORITE FRAC; HYPID QTZ DIORITE W/CHLOR STN.
										RHYOLITE = LT GRY TO SIMI OFF WHT; OPAQ VRY HRD; CRS; MICROXLN TEX; GRNLUR SURF TEX; TR BEDDING/VIBROUS APPRNC; NON CALC;REMNT KAOLNITIC SUPRT MATRX; VRY LT-TR HEM STN.
						TI 89 TO 92				GRANITIC WASH SEDIMENT = VARIED COLRD FRAGMNTS; BLK-LT GRY; GRN-YEL; OPAQUE W/ORGS-H YEL LIMONITE STN; ASRTD LITH DIORITE/GRANDORT+QTZ W/ABNDNT FELSC LITHICS; VRY HRD, CRS; ANGULAR; NON CALC; INCRS SOLUBLE CLAYS @ 335'; CONTINUED LRG >15mm SIZE CLAST; COM CLUMPY/ MUSHY SOL CLAYS W/SUSPEND FN GRAIND DETRITL SEDIMENTS; UNIFORM NONCALC.
Brnsh Clay										CLAY = SOLUBLE GREENISH GRY CLAYS; VRY MUSHY-CLUMPY; DRK GRN-BLK VRY FN GRAINS MATRL SUSPND IN CLAY MASS.
Grnsh Clay										GRANODIORITE/GRANITE = YELISH ORNG PINK, LT GRY; OPAQUE; GRANITIC; VRY HRD MED CRS-GRNLUR; FUSED ORTHO; VIS WEATHR SURFS; GRANITIC WASH SEDIMNT W/UNIFORM HYPIDIO TEX+LIM STN.
MU						TI 91 TO 94				MW 8.8 VIS 46 PV 14 YP 20 PH 10 CL 1900 GEL 8/14 SOL 3.2 Snd. 10 Ca40 MBT 17.5
12/23/09										CLAY = SLIGHTLY SOL YELWISH BRN CLAY; VRY MUSHY-CLUMPY; FN DRK GRN-BLK GRNS -MED WHITE-YELLOWISH GRNS SUSPND IN CLAY MASS.
										DIORTIE = BLK TO BLUISH GRAY; V HARD; OPAQUE; FN GRND; PORPH TEXTRE; SCAT OCC HEM STAINING; SCATTERED MICAS; WK RTION TO HCL; FRAGMENTS RANGE IN SIZE FROM 5 TO 20 mm; FOUND W/GRANITIC WASH SEDIMENT.
<100 ROP 50>						<50 Temp In 250>	<0 Flow 100>	<0 CO2 20K>		GRANITIC WASH SEDIMENT = VARIED COLOR



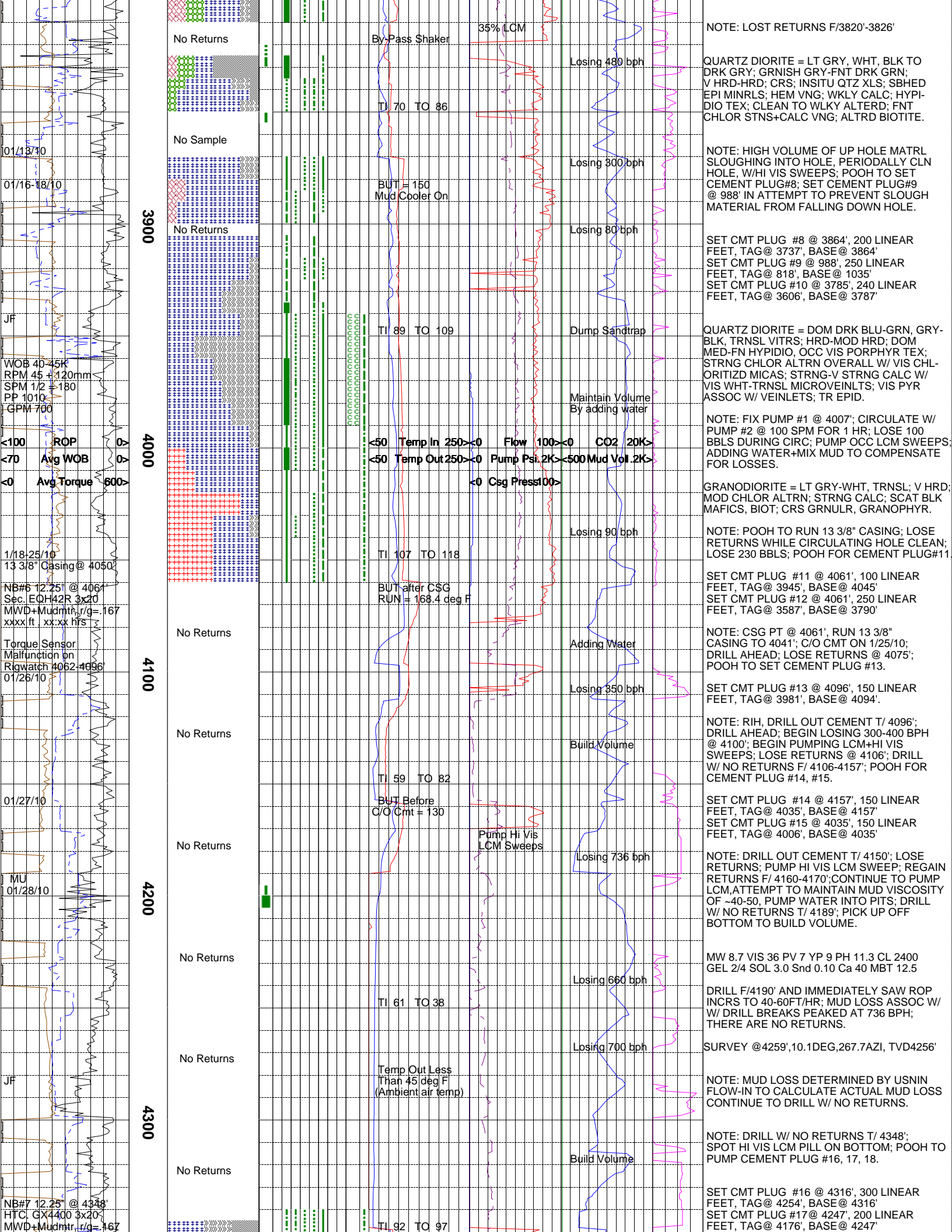


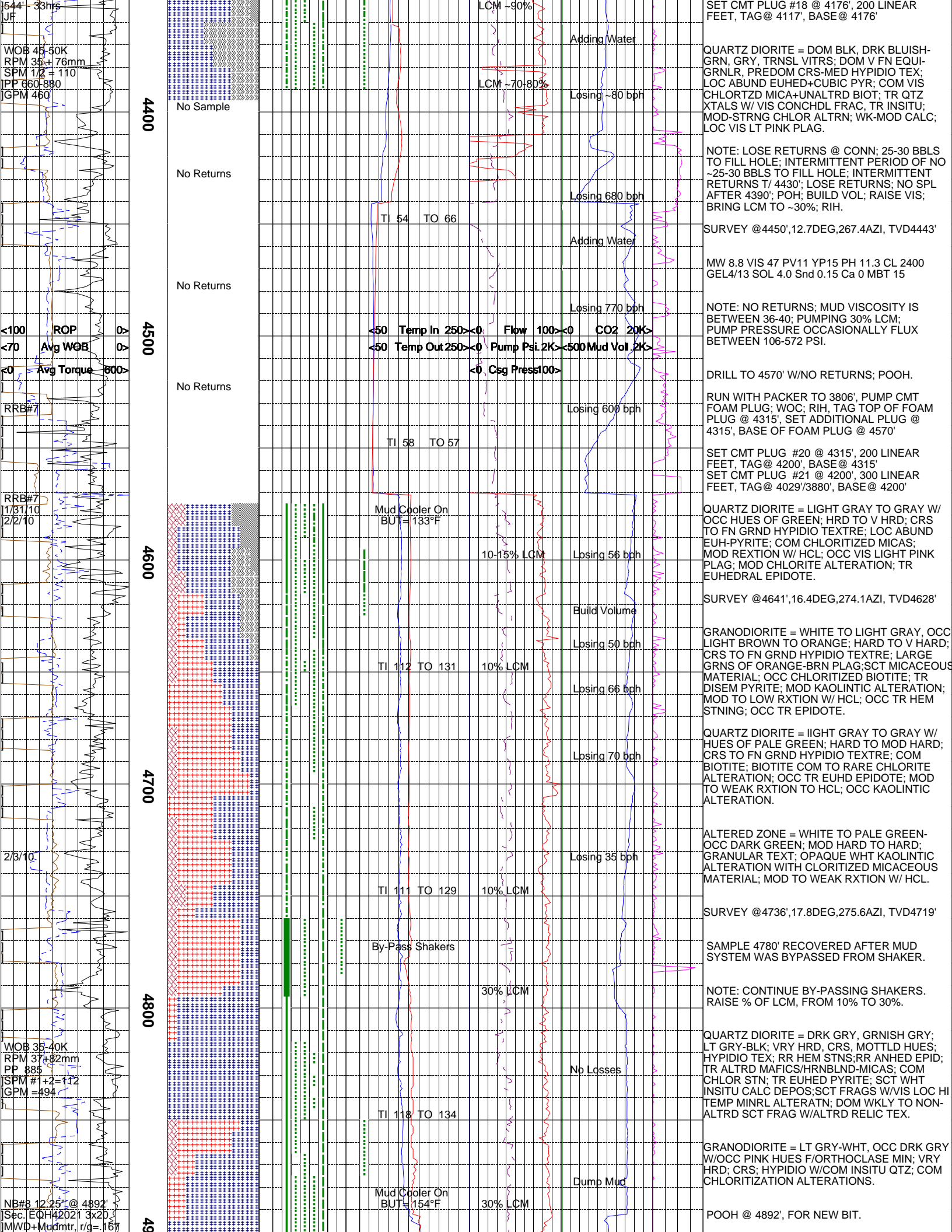


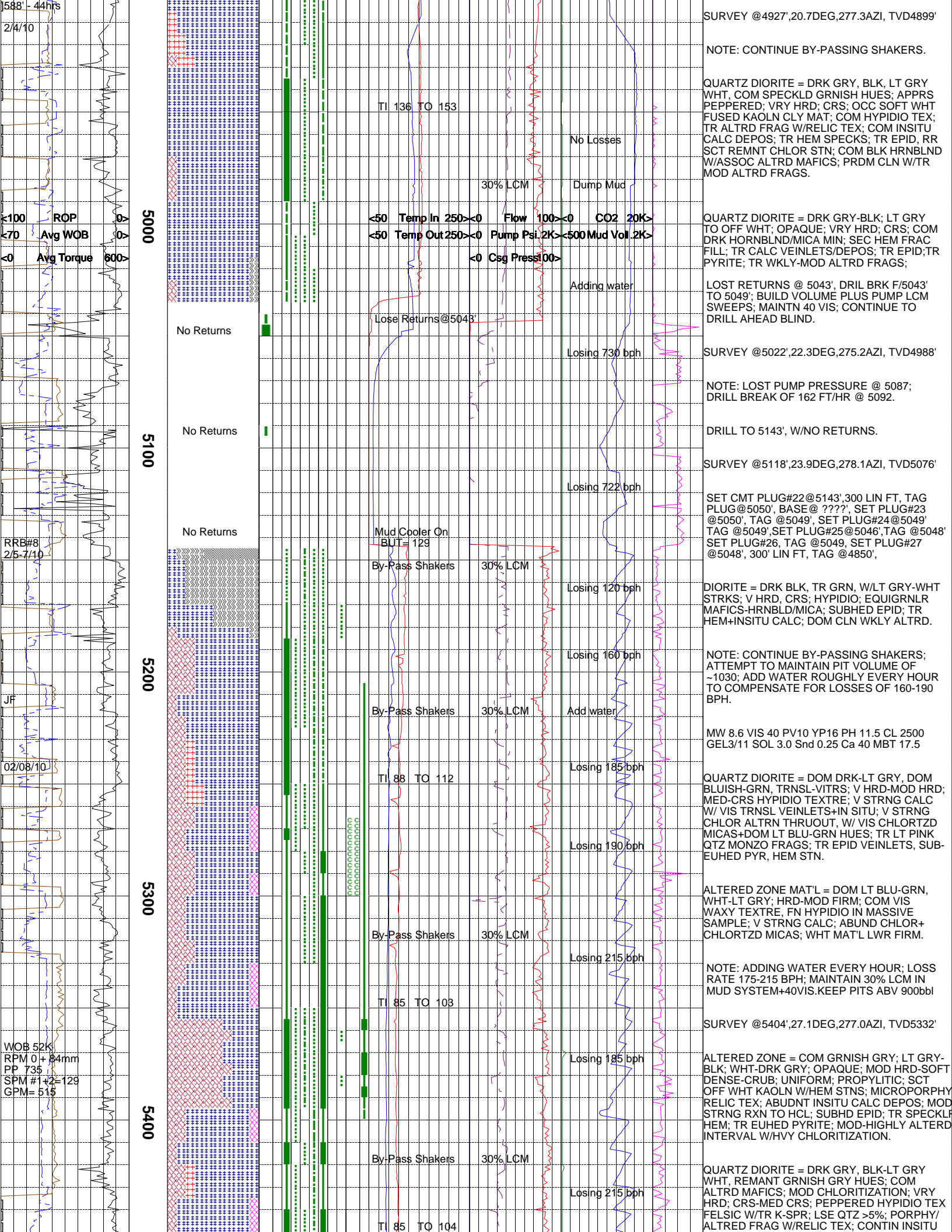


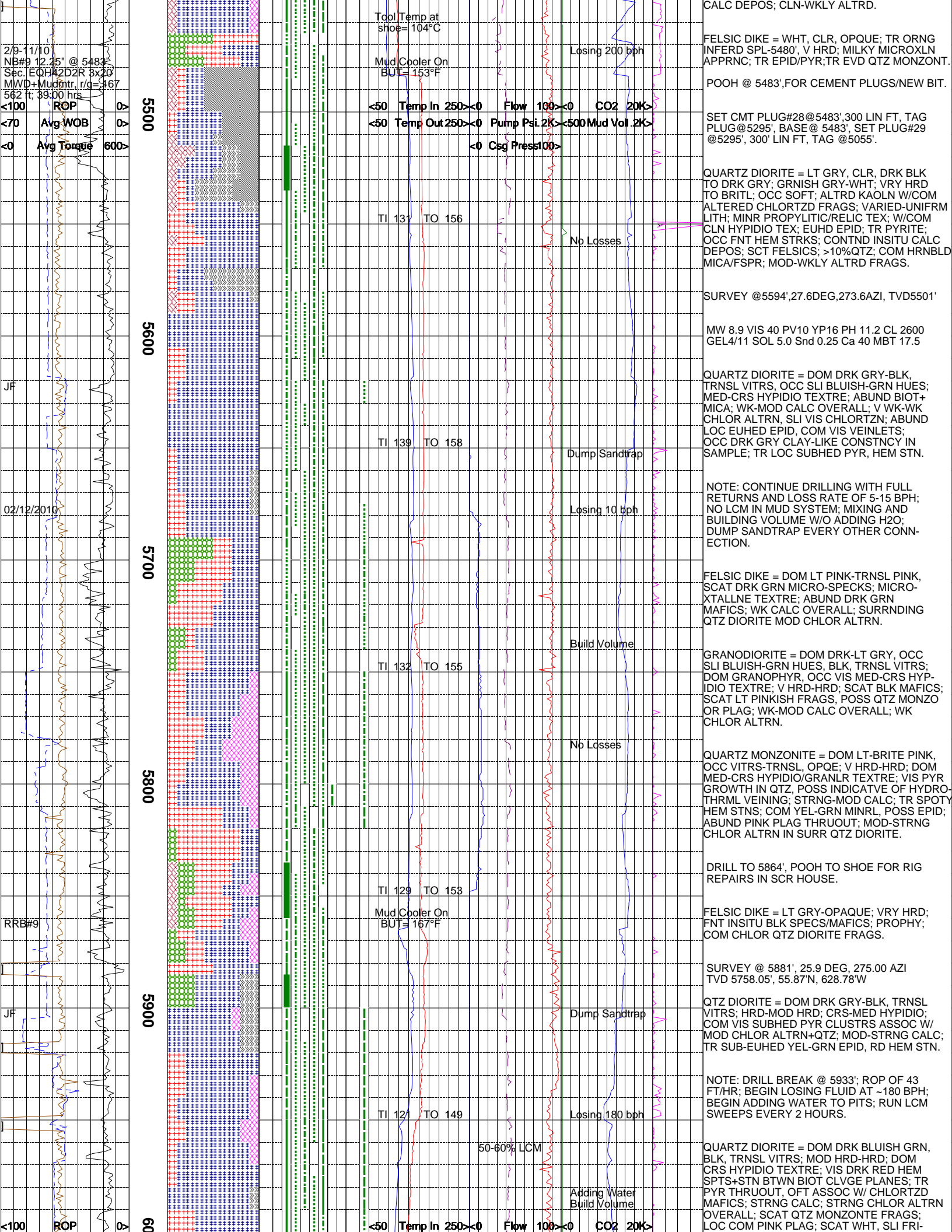


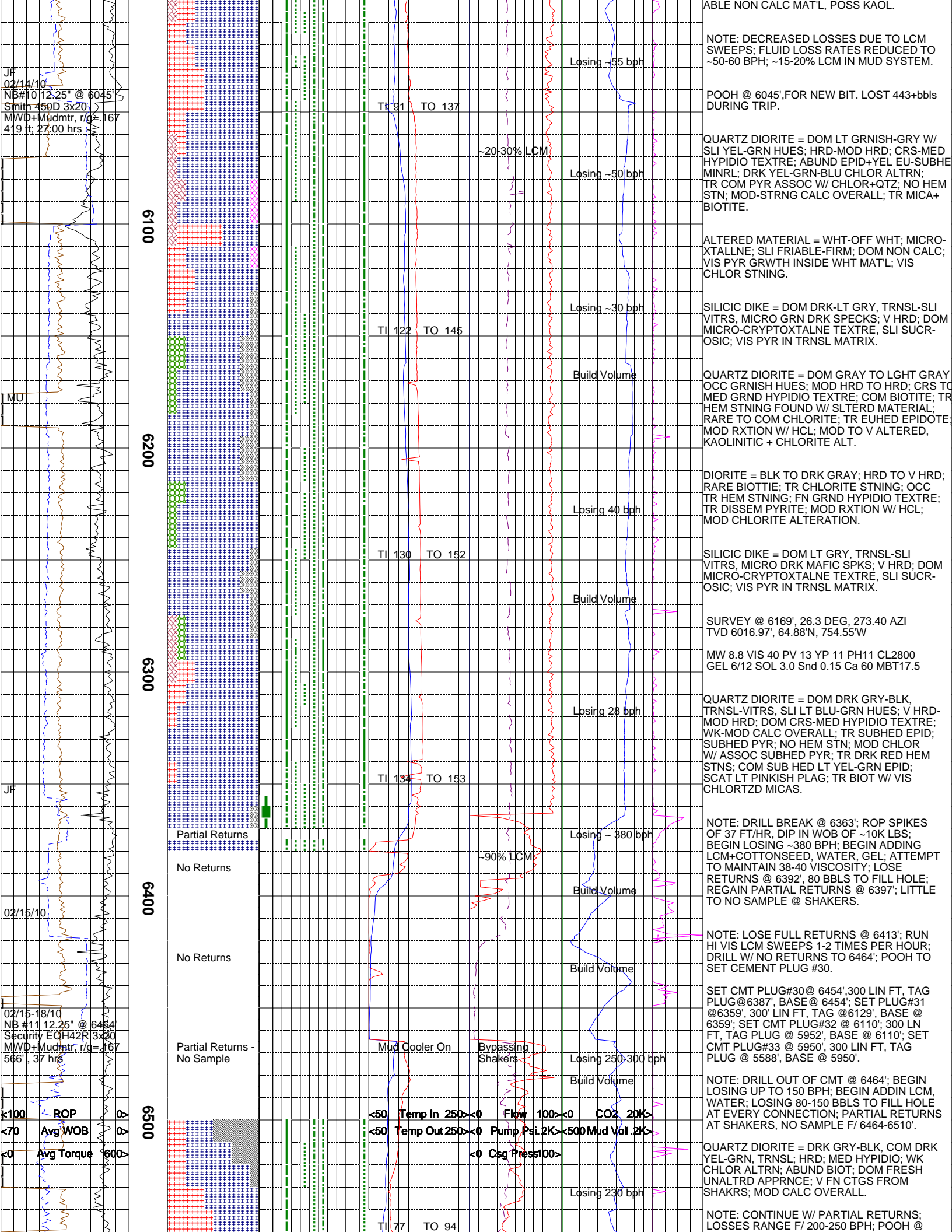
Depth (ft)	WOB (k)	RPM	SPM	PP (psi)	GPM	Torque (ft-lb)
3300	40-50	39	90/89	1130	744	
3400						
3500						
3600	55	45 + 120mm	1/2" = 180	1150	770	
3700						
3800						

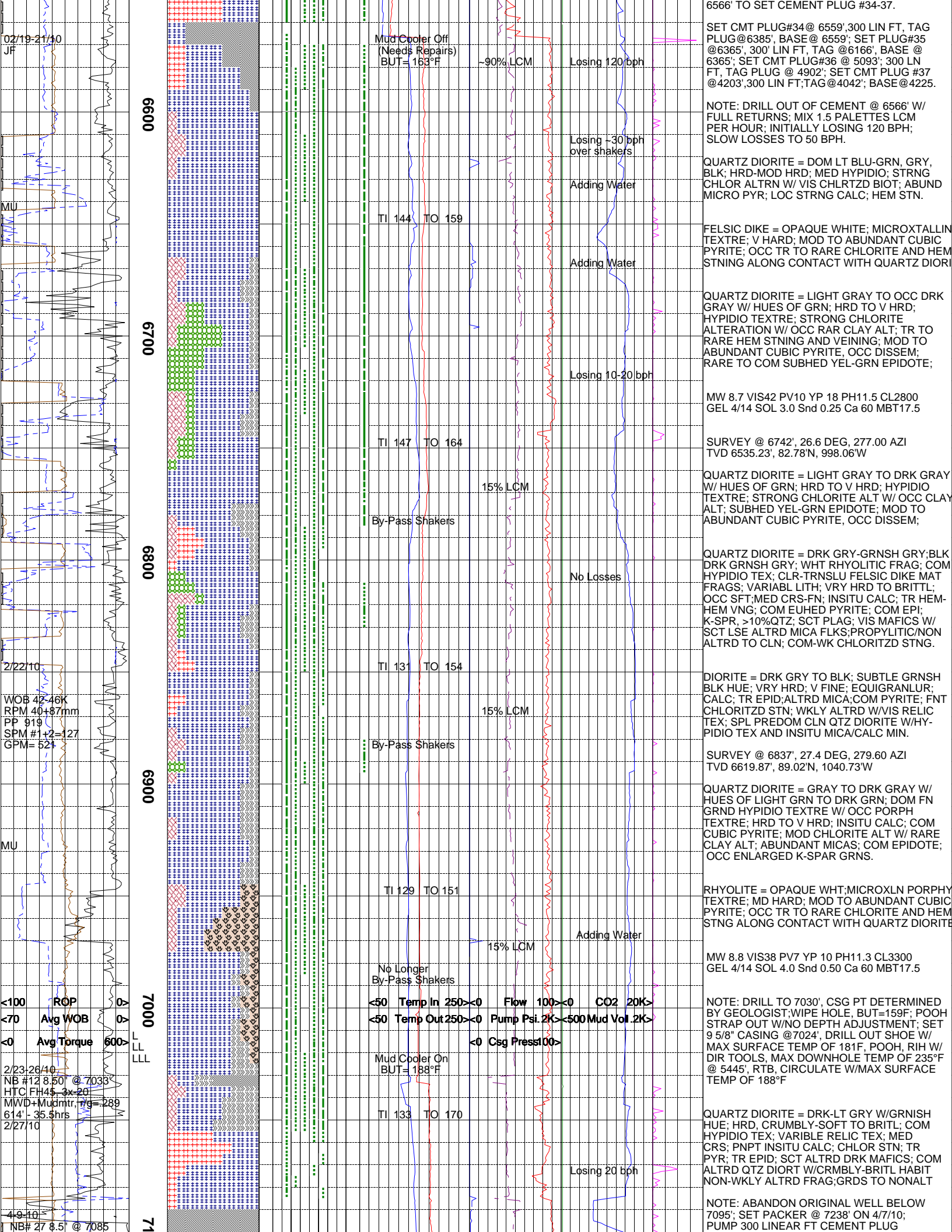












Security FH45, 3x20
Mudmotee+MWD
207 ft. 05:00 hrs

04/11/10
JF
NB# 28 8.5' @ 7293
Security FH45 3x18
Mudmotor + MWD
823 ft. 33:00 hrs

SC

>100 ROP
<70 Avg WOB
<0 Avg Torque

WOB 25-30K
RPM 35-40 120mm
#2 = 115 SPM
PP 1250
GPM 465

7200

7300

7400

7500

7600

TI 147 TO 167

TI 137 TO 163

TI 132 TO 154

TI 133 TO 156

TI 133 TO 154

TI 114 TO 147

Dump Sandtrap

No Losses

Dump Sandtrap

No Losses

No Losses

Lost 21 bbls

Lose 30 bbls

<50 Temp In 250><0 Flow 100><0 CQ2 20K>
<50 Temp Out 250><0 Pump Psi 2K><500 Mud Vol 2K>
<0 Csg Press 100>

NOTE: BEGIN TIME DRILLING @ 7095';
SLIDE @ 1-5 FT/HR, 1-5K LBS ON BIT;
CATCH SAMPLES EVERY 30 MINS OR 2.5-5
FEET; BEGIN SEEING CUTTINGS @ 7110';
CUTTINGS ~100% BY 7140'; BEGIN ROT-
ATING; DRILL AHEAD.

QUARTZ DIORITE = DOM BLK, DRK BLU-GRN,
SMOKY TRNSL, OPQE, GRY; V HRD-HRD;
DOM CRS HYPIDIO, MED-FN EQUIGRNLR TEX-
TURE; STRONG-V STRONG CHLOR ALTRN
OVERALL, CHLORTZN OF MICAS; LT TAN-
OFF WHT SPECKS THRUOUT + IN SCAT
FELSIC DIKE FRAG; ABUND EPID W/ VIS
DRK YEL-GRN VEINLETS; COM PYR; TR
DRK RED/PURPLE HEM+STN; STRNG-MOD
CALC OVERALL W/ V SCAT RCTVE XTALS.

FELSIC DIKE = DOM TRNSL-WHT, OPQE, DRK
GRY, DRK GREEN SPECKS; V HRD-HRD; DOM
MICROXTLLNE TEXTRE; ABUND FN GRN
MAFIC SPECKS; OVERALL NON CALC, W/ TR
IN SITU RXN W/ HCL; OCC DRK GRY BAND-
ING/FOLTN; TR VIS LT GRY-TAN SPECKS IN
FOLIATD SAMPLE.

DIORITE = DOM BLK TO DARK GRAY;
OCC HUES OF GREEN + BLUE; V HRD-HRD
DOM CRYS HYPIDIO; FN EQUIGRANULAR
TEXTRE; MOD-STRG CHLOR ALT; MOD-WK
CALC; TR PYR, EPID, HEM STN.

POOH @ 7293' TO REMOVE EM TOOL AND
REPLACE BIT; STAGE IN HOLE TO COOL DIR.
TOOLS.

QUARTZ DIORITE = DOM BLK-V DRK GRY,
TRNSL VITRS, GRADES INTO DOM DRK
BLU-GRN; V HRD-MOD HRD; DOM CRS
HYPIDIO, PREDOM MED-FN EQUIGRNLR,
OCC PORPHYR TEXTRE; ABUND EPID W/
VIS DRUSY MICRO-COLUMNAR HABIT;
ABUND-COM EU-SUBHED PYR; V STRNG
CHLOR ALTRN OVERALL W/ ABUND 2NDRY
MINRLZTN; WK-MOD CALC OVERALL.

MW 8.8 VIS38 PV7 YP 10 PH11.3 CL3300
GEL 4/14 SOL 4.0 Snd 0.50 Ca 60 MBT17.5

SURVEY @ 7364', 18.9 DEG, 288.20 AZI
TVD 7104.34', 129.5' N, 1241.3' W

FELSIC DIKE = TRANSLCNT WHT, OPQE, DRK
GRY, DRK GREEN SPECKS; V HRD-HRD; DOM
MICROXTLLNE TEXTRE; ABUND FN GRN
MAFIC SPECKS; DOM NON CALC, W/ TR
IN SITU RXN W/ HCL; OCC DRK GRY BAND-
ING/FOLTN; TR VIS LT GRY-TAN IN SMPL.

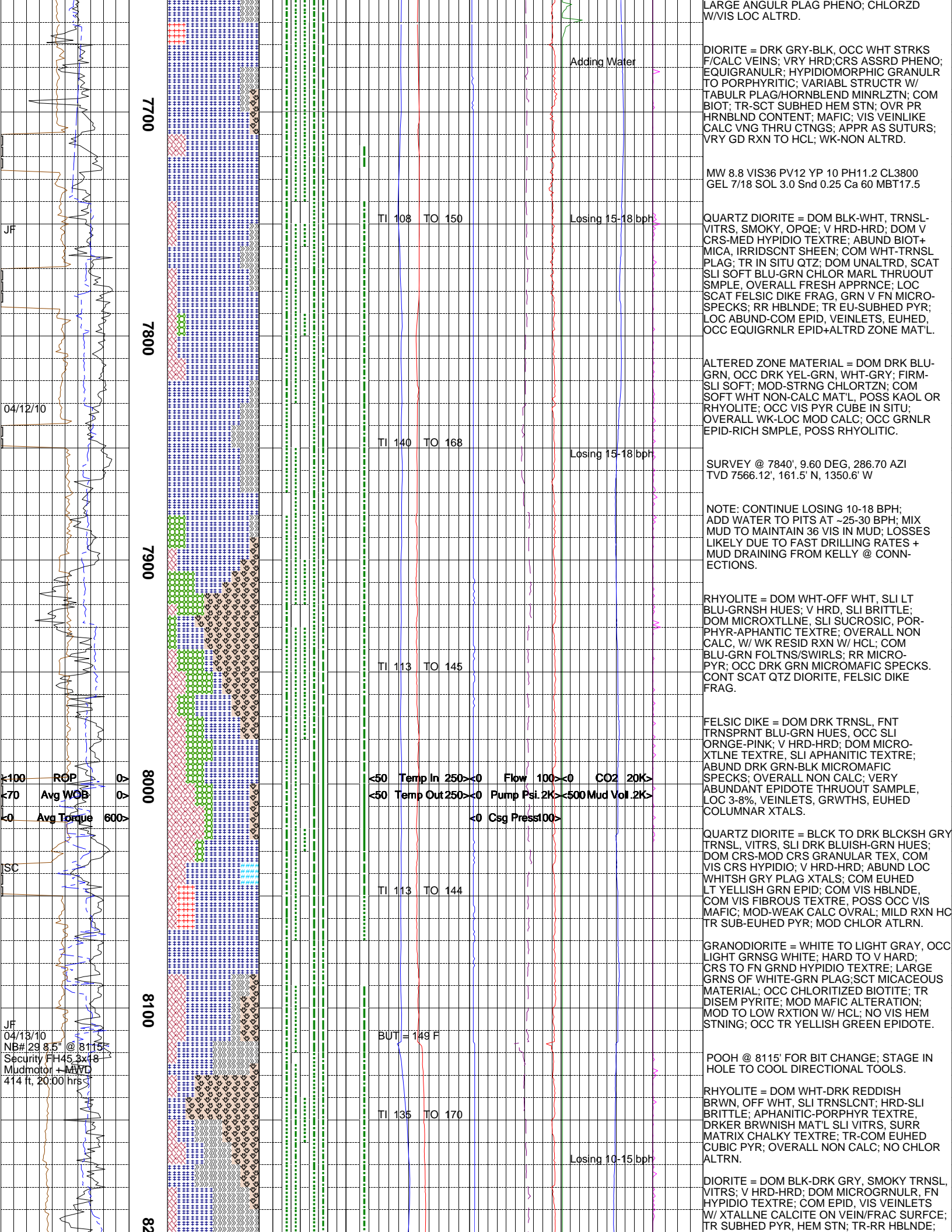
QUARTZ DIORITE = DRK BLUESH GRN, BLACK,
SMOKY TRNSL, OPQE, GRY; V HRD-HRD;
OCC CRS HYPIDIO, MED-FN EQUIGRNLR TEX-
TURE; STRONG-V STRONG CHLOR ALTRN
OVERALL, CHLORTZN OF MICAS; LT TAN-
OFF WHT SPECKS THRUOUT + IN SCAT
FELSIC DIKE FRAG; ABUND EPID W/ VIS
DRK YEL-GRN VEINLETS; COM PYR; TR
DRK RED/PURPLE HEM+STN; STRNG-MOD
CALC OVERALL W/ V SCAT RCTVE XTALS.

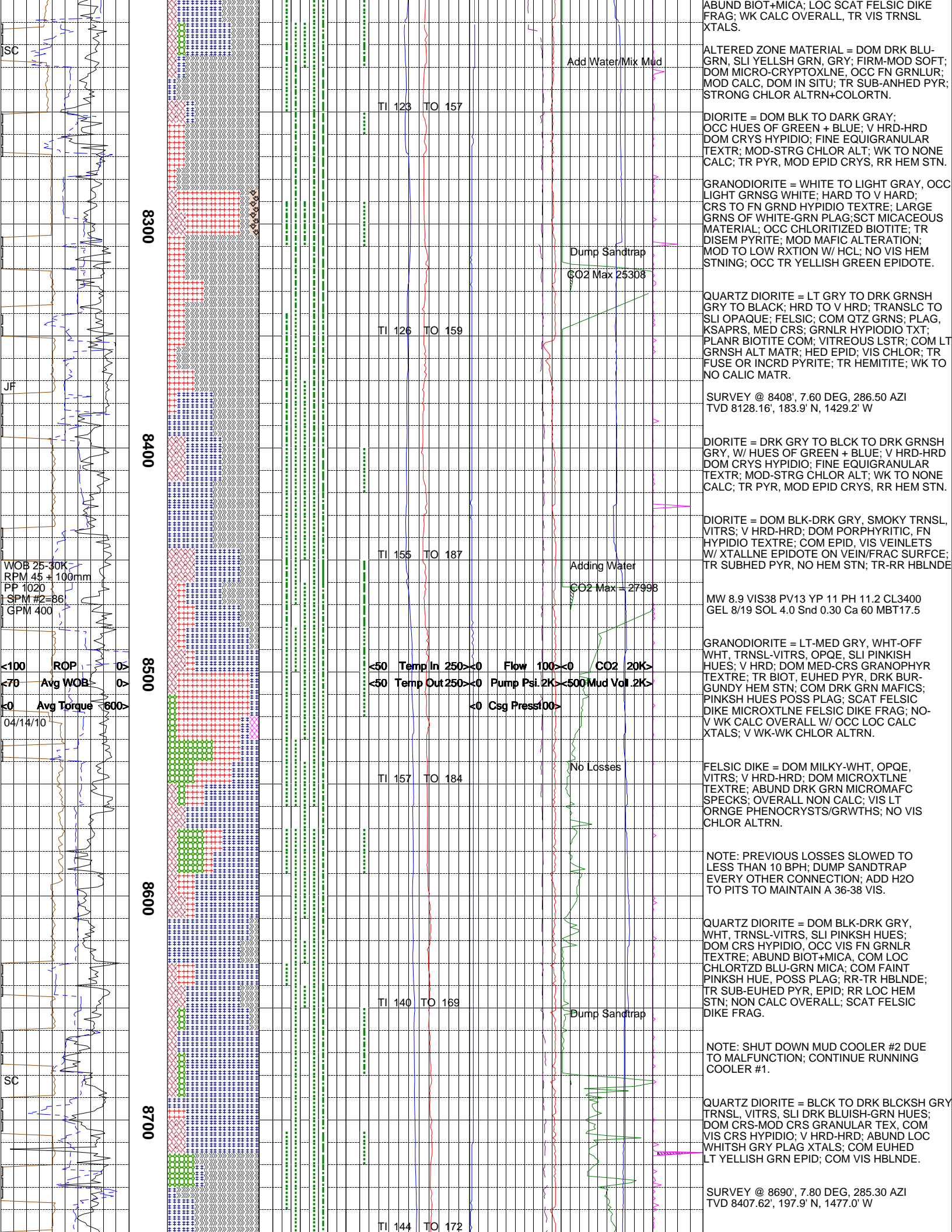
GRANDODIORITE = WHT OPAQ TO CLR TRNSL
WITH GRYSH HUES; HARD TO V HARD; GRDS
TO QTZ DIORITE; MED CRS GRNS; HYPIDIO
TXT; SPECKLD LGR INSITU MAFIC CLAST; V
WEAK RXN HCL; DOM NON CALC; TR EUHED
TO SUBHED EPI; DISSEM BLK MAFICS; FN GRN
BIOTITES; TR PYRITE, TR HEMITITE; PREDOM
UNALTRD;

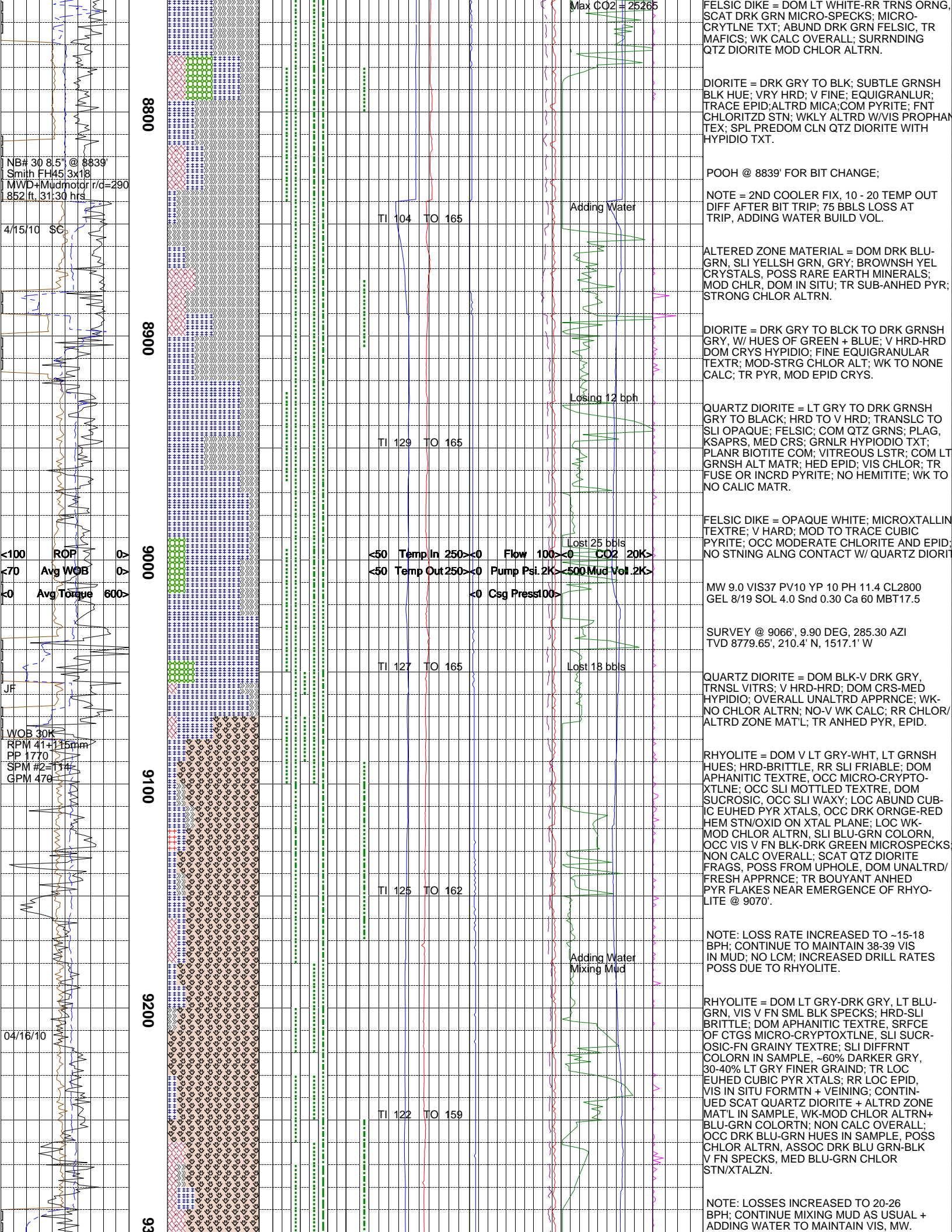
SURVEY @ 7554', 14.5 DEG, 286.20 AZI
TVD 7286.85', 143.7' N, 1291.9' W

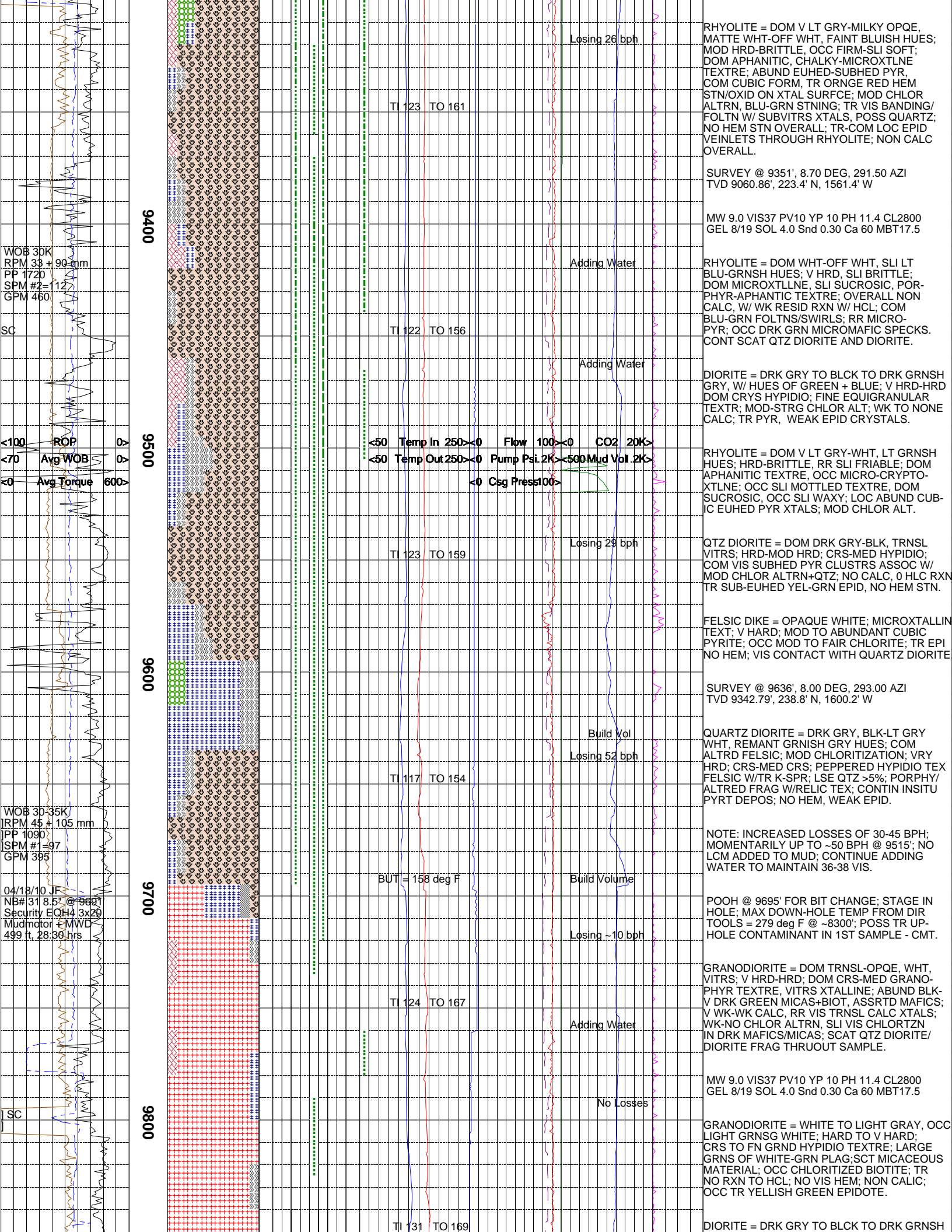
QUARTZ DIORITE = LT GRY TO DRK GRNSH
GRY TO BLACK; HRD TO V HRD; TRANSLC TO
SLI OPAQUE; FELSIC; COM QTZ GRNS; PLAG,
KSAPRS, MED CRS; GRNLR HYPIDIO TXT;
PLANR BIOTITE COM; VITREOUS LSTR; COM LT
GRNSH ALT MATR; HED EPID; VIS CHLOR; TR
FRUSE OR INCRD PYRITE; TR HEMITITE; WK TO
NO CALC MATR; OCC VIS ALT.

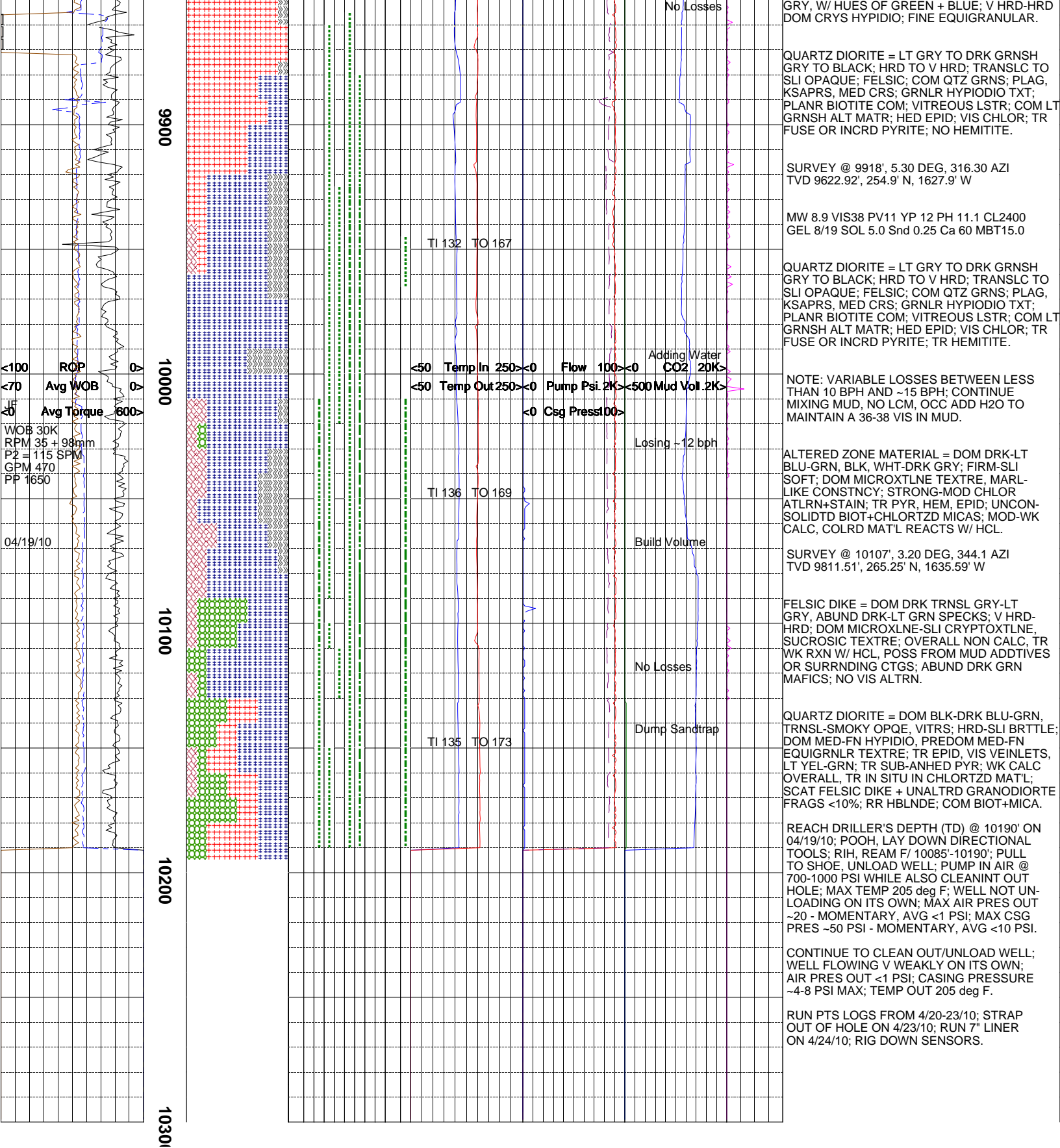
ALTERED ZONE = LT GRY TO GRNISH GRY;
PL ORNG-WHT; RED, VRY-MOD HRD; CRS;
CALC; PLAG W/COM ORTHO; COM ALTRED
QTZ DIORITE; RR REDSH HEM STNS; OCC
FRIABL CTNGS; COM ALTRD MAFICS W/OPQ











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