



Santa Rosa, CA

COMPANY Calpine Corporation
 WELL GDCF 36A-28
 FIELD Geysers
 COUNTY/STATE Sonoma County California
 WELL HEAD COORDINATES
 N:404486 E:1785624
 ELEVATION 2427.8 GL KB=30'
 RIG ON DAY RATE 10/16/08
 TD DATE 12/29/08
 TOTAL DEPTH 8425'
 TRUE VERTICAL DEPTH 8076'
 TD LOCATION N 722', W 1888'
 CONTRACTOR/RIG Kenai Rig #6
 COMPANY REPRESENTATIVE Powers, Potter

LOG INTERVAL

DATE LOGGED 10/15/08 TO 12/29/08
 DEPTH LOGGED 070' TO 8425'
 MUD DRILLING 0' TO 3188'
 AIR DRILLING 3188' TO 8425'
 LOG SCALE 1:600 UNIT NO. 326

LOGGING GEOLOGISTS
 Booker, Richardson, ter Weele, Hardwick, Pollard
 Schepflin, Boschmann, Dobbs, Blazina, Broderick

HOLE

17.5 TO 1807
 12.25 TO 3188
 8.5 TO 8425
 TO
 TO

CASING

13.375 FROM 0 TO 1802
 9.625 FROM 0 TO 3179
 7 FROM 0 TO 3360
 8.125 FROM 3324 TO 3385
 7 FROM 3385 TO 8425
 FROM TO

ABBREVIATIONS

NB New Bit **BHT** Bottom Hole Temp
RRB Re-run Bit **C** Carbide Test
CB Core Bit **NR** No Returns
WOB Weight On Bit **LAT** Logged After Trip
SPM Strokes per Minute **CFM** Cubic Feet per Min
PP Pump Pressure **BUT** Bottoms Up Temp
RPM Revolutions per Min

SYMBOLS

Wireline Log Casing Shoe
 Steam/Water Entry Flow Test
 Deviation Survey Cored Interval
 No Recovery

LITHOLOGY

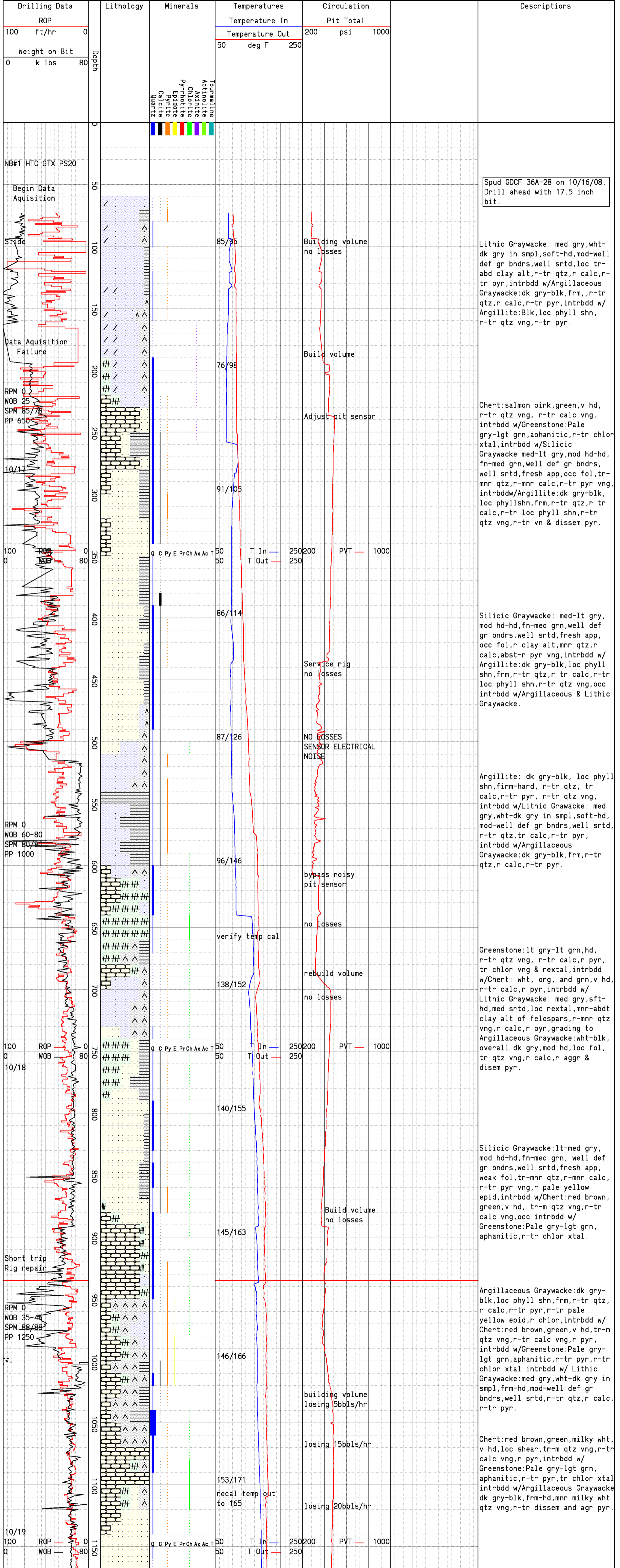
Argillite Argillaceous Graywacke
 Chert Volcanic Graywacke
 Phyllite Siliceous Graywacke
 Greenstone Weak Foliation
 Serpentine Strong Foliation
 Blueschist Marginal Alteration
 Felsite Pervasive Alteration
 Rhyolite Weakly Hornfelsic
 Clay Strongly Hornfelsic
 Lithic Graywacke

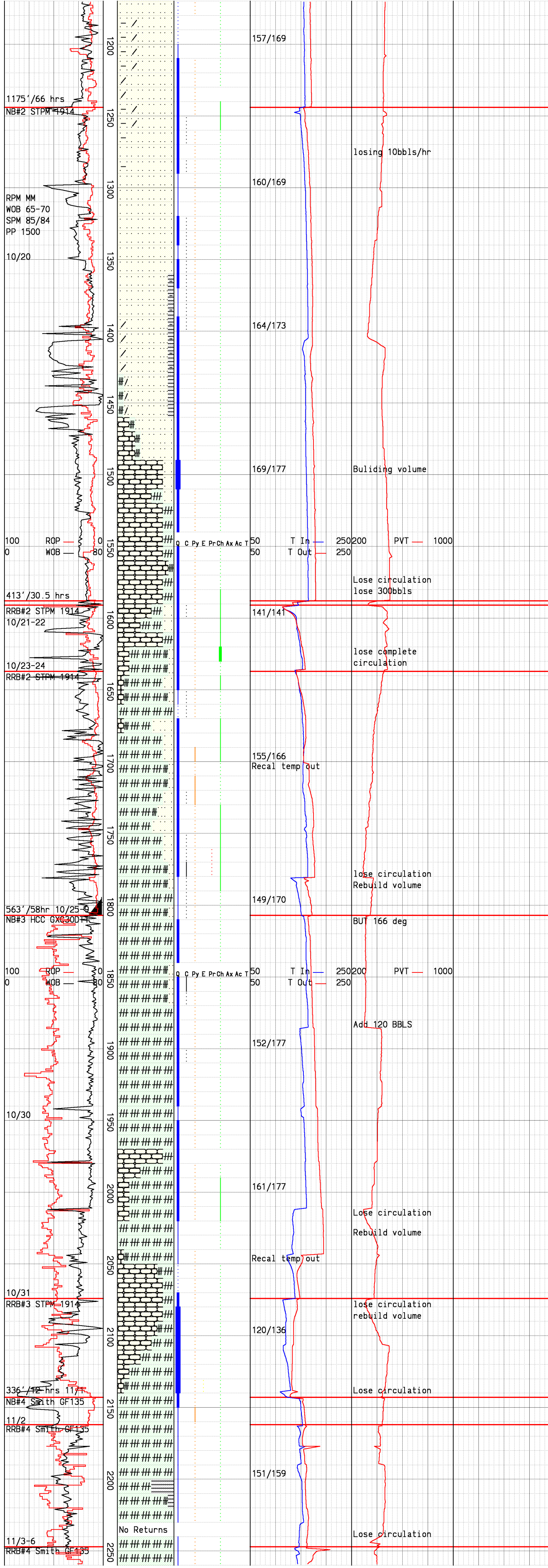
REMARKS

All depths from Kelly Bushing. KB=30'
 7" Liner fell during run, top was tagged at 3324'.
 7" liner is blank and slotted from 3385 to 8425.
 7" liner is blank from 0 to 3360.
 8.125" casing is setting collar.

SECONDARY MINERALS

Q = Quartz Rare << 1%
 C = Calcite Trace < 1%
 P = Pyrite
 E = Epidote Minor 1% to 4%
 R = Pyrrhotite Common 4% to 7%
 Ch = Chlorite Abundant 7% to 10%
 X = Axinite > 10%
 A = Actinolite
 T = Tourmaline





Silicic Graywacke: lt-med gry, com pale grn cast,firm-hd,fn-med grn,pr-mod def gr bndrs,pr-mod srted,com wk fol,mod clay alt,r-mnr vn & frac fill qtz,abst calc,abst-r pyr vng,occ Chert and Greenstone frags,occ intbdd w/r Argillite:dk gry-blk,mass,r phyl shn.

Silicic Graywacke: lt-med gry, com pale grn cast,firm-hd,com britt,fn-med grn,pr def gr bndrs,pr-mod srted,loc wk fol, com clay alt,tr-mnr milky wht vn & frac fill qtz,abst-r calc vng,r pyr vng,occ intbdd w/ Argillite:dk gry-blk,mass,r phyl shn,r-tr milky wht qtz vng,r disse & vn pyr,intbdd w/Greenstone:pale grn,hd,loc britt,clr qtz vng.

Chert:red brown,green,milky wht, and pink, h-v hd,tr-m qtz vng, r-tr disem pyr,intrbdd w/ Greenstone:Pale gry-lgt grn, aphanitic,r-tr disem pyr,soft, friable intrbdd w/Argillaceous Graywacke:dk gry-blk,frm-hd, mnr milky whtqtz vng,r-tr disse and agr pyr.

Note:lost circulation @ 1588', POH,RIH & drill ahead w/bit #2, lose circulation @ 1591' & POH.

Note:set cement f/1460-1637' in zone of lost circulation. C/O cement and drill ahead f/1637'.

Greenstone:Pale gry,lgt-med grn, aphanitic,r-tr disem & vn pyr, occ firm,com v hd,r-mnr milky wht & clr qtz vng,r-tr disse & vn pyr,intrbdd w/Silicic Graywacke:med-dk gry,occ green, frm-v hd,com clay alt,r-mnr milky wht & clr qtz vng,r-tr disse and agr pyr,occ intrbdd w/Chert:milky wht,tan, h-v hd, r qtz vng,r pyr vng.

Drill 17.5" hole t/1807'. Run and install 13.375", 72#, N-80 Butress casing f/surface t/1807'. Drill ahead with 12.25" bit

Greenstone:Pale gry,lgt-med grn, aphanitic,r-tr disem & vn pyr, occ firm,com v hd,r-mnr milky wht & clr qtz vng,r-tr disse & vn pyr,r chlorite vng,intrbdd w/Silicic Graywacke:lt-dk gry, occgreen,frm-v hd,com clay alt, r-mnr milky wht & clr qtz vng,r -tr disse and agr pyr.

Greenstone:Pale gry,lgt-med grn, aphanitic,r-mnr disem & vn pyr, v hd,r-mnr milky wht & clr qtz vng,r clear terminated qtz xtls, r disse & vn pyr,r chlortzd grn & vng,intrbdd w/Chert:milky wht, light green, v hd,micro xtln,r qtz vng,r pyr vng,r-com foliated silicic graywacke & argillite frags.

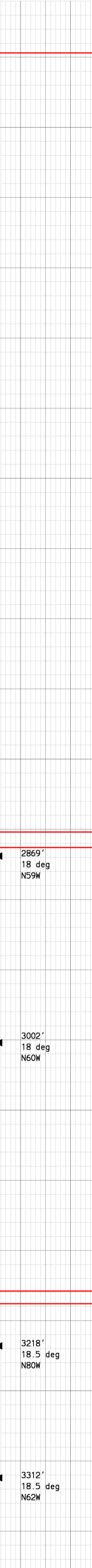
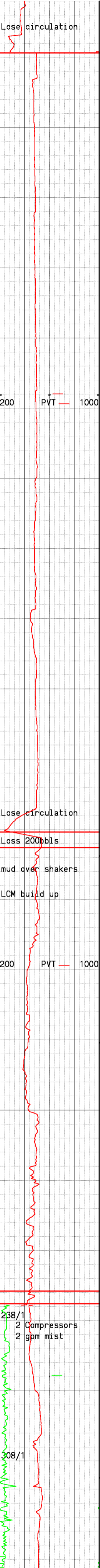
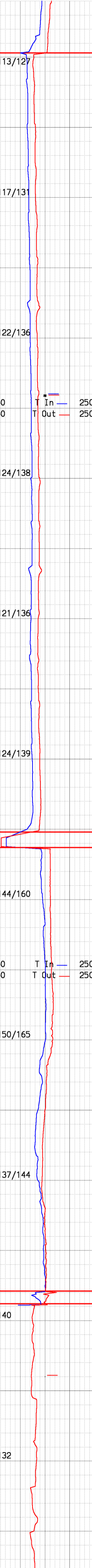
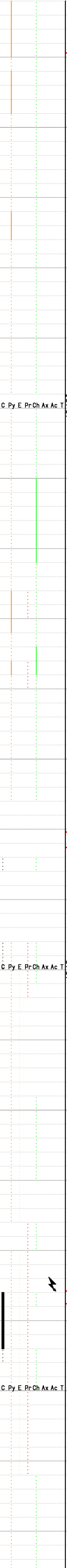
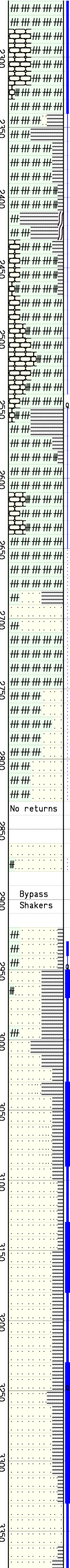
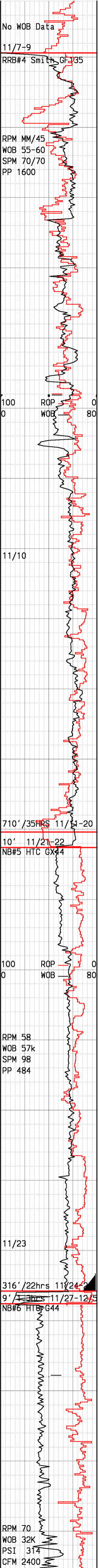
Note:begin losing mud at 2011' Drill t/2074' and POH. Set cement plug.

Chert:milky wht,r grn frags,v hd micro xtln,r qtz vng,r pyr vng, intrbdd w/Greenstone:lgt grn,gry aphanitic,r-mnr disem & vn pyr, v hd,r-mnr milky wht qtz vng,r rose qtz,r disse & vn pyr,r epid,r-com foliated silicic graywacke & argillite frags.

Note:Cement plugs in areas of lost circulation @ 2143', 2162' & 2247'.

Argillite:dk gry-blk,hd,mass,r qtz vng.

Note:set cement plug @ 1814'



Note: set cement plug @ 1805'

Greenstone: Pale gry, lgt-med grn, aphan, r-tr disem & vn pyr, hd-v hd, r-mnr milky wht & smokey qtz vng, r-tr disse & vn pyr, intrbdd w/Chert: milky wht, pale green, v hd, r qtz vng, r pyr vng, occ intbdd w/Argillite: dk gry-blck, firm, com phyl shn, r qtz vng.

Greenstone: Pale gry, lgt-dk grn, aphanitic, r-tr disem & vn pyr, hd-v hd, r-mnr milky wht & smky qtz vng, r-tr disse & vn pyr, intrbdd w/Chert: milky wht, pale green, dk red, tan, v hd, r qtz vng, r pyr vng, occ intbdd w/Argillite: dk gry-blck, firm, com phyl shn, r qtz vng.

Greenstone: Pale gry, lgt-dk grn, aphanitic, r-tr disem & vn pyr, hd-v hd, r-mnr milky wht & smky qtz vng, r-tr disse & vn pyr, intrbdd w/Chert: milky wht, pale green, dk red, tan, v hd, r qtz vng, r pyr vng, occ intbdd w/Argillite: dk gry-blck, firm, com phyl shn, r qtz vng.

Greenstone: Lt-med green, hd-v hd, aphan, com med grn, r clr, smky, milky wht & rose qtz vng & frac fill, occ term qtz xtls, r-tr disem & vn pyr, rchlor vng, intrbdd w/Graywacke: med gry, com pale-dk green cast, r qtz vng, r disse & vn pyr vng, occ intbdd w/Argillite: dk gry-blck, firm, com phyl shn, r qtz vng.

Greenstone: Lt-med green, hd-v hd, aphan, com med grn, r clr, smky, milky wht & rose qtz vng & frac fill, occ term qtz xtls, r-tr disem & vn pyr, rchlor vng, intrbdd w/Graywacke: med gry, com pale green cast, frm-v hd, prly srttd, indist grn bndrs, com fol, r qtz vng, r disse & vn pyr vng.

Note: Large area of loss circ. Fracture Zone. Set cement plugs at 2853', 2751', 2521', 2232', 1974', 2373', 1838', 2863'

Silicic Graywacke: lt-drk gry, com brn, com blchd app, hd-v hd, fn-med gr, prly-srttd, mod dist-indist gr bndrs, mod rxln, r cl qtz vng, r milky qtz vn frags, loc r chlortzd grs, r grn epid, r pyr vng, r pyrho, intrbdd w/Argillite: dk gry-blk, frm, silty-sandy texture, mass, pred wk phyll shn, dull, loc r qtz vng, r pyr vng, grading to Argillaceous Graywacke: dk gry-blk, hd-v hd med gr, r qtz vng.

Silicic Graywacke: lt-drk gry, com brn, com blchd app, hd-v hd, fn-med gr, prly-srttd, mod dist-indist gr bndrs, mod rxln, mod altrd, com milky-clr qtz vng & vn frags, occ chlortzd grs, r pist grn epid, loc r pyrho, intrbdd w/Argillite: dk gry-blk, frm, silty texture, mass, pred wk phyll shn, dull, r qtz vng, loc r pyr vng.

Jar on stuck pipe @ 3174' Run Free Point

Loss Circulation in Wellbore Set Cement Plugs at 3188', 2723', 2450'.

Drill 12.25" hole to a total depth of 3188'. Run 81 joints of 9-5/8", 43.5# L-80, and 1 joint 9-5/8", 40.5# K-55 buttress casing from surface to a depth of 3179'. Drill ahead on air w/ 8.5" bit.

Silicic Graywacke: lt-med gry, occ blchd app, hd-v hd, v fn-fn grn, mod srttd, mod dist-dist gr bndrs, str relict tex, mnr-com qtz vns/vugs, r disse & vein pyr, r epid, loc r pyrhh, r chlortzd grs, intrbdd w/Argillite: dk gry-blk, frm, aphan, mass, loc wk phyll shn, dull, r qtz vng, r disse & vein pyr.

Lose circulation

Lose circulation

Loss 200bbls

mud over shakers

LCM build up

2 Compressors
2 gpm mist

2 Compressors
2 gpm mist

113/127

117/131

122/136

124/138

121/136

124/139

144/160

150/165

137/144

140

132

2869'
18 deg
N59W

3002'
18 deg
N60W

3218'
18.5 deg
N80W

3312'
18.5 deg
N62W

238/1

308/1

12/7

RPM 60
WOB 30-35K
PSI 330
CFM 2600

12/8

200
WOB 80

795' / 33hrs 12/5-12/8
NB#7 HTC G-44

12/9

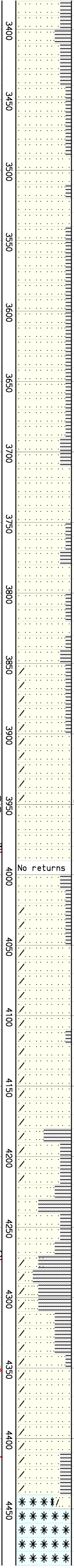
RPM 60
WOB 20-25K
PSI 300-350
CFM 2600

12/11

190' / 12.5hrs 12/9-10
NB#8 BTC FH-45
slide
rotate
slide
Adjust WOB Reading
rotate
slide

140' / 17hrs 12/10-12
NB#9 HSC G-44

RPM 60
WOB 30K
PSI 330
CFM 2400



126
127
129
139
147
147
127
142
146
140
125

336/1
316/1
309/1
290/2
295/2
337/1
329/1
360/1
360/2
444/1
415/1

3408'
18.0 deg
N89W

3532'
18.00 deg
N58W

3694'
17.00 deg
N60W

3725'
17.00 deg
N60W

3820'
17.00 deg
N76W

3978'
15.00 deg
N84W

4065'
14.50 deg
N84W

4220'
13.75 deg
N84W

4282'
13.50 deg
N79W

4345'
12.75 deg
N66W

4416'
14.00
N59W

Drilling break of 56'/hr
f/3392' t/3395'. Drilling
break of 51'/hr f/3487'
t/3488'.

Silicic Graywacke:lt-med gry,
wht,com-dom blchd app,hd-v hd,
v fn-fn gr,mod well srted,prly
dist-mod dist grn bndrs,mod
rxln,loc wk fol,r cl qtz vng &
frags,r disse & vein pyr,r
epid,r chlor,r pink axinite,
intrbddd w/Argillite:dk gry-blk,
loc brn,firm,pred aphan,loc
silty,mass,loc r qtz vng,r
dissem & vein pyr.

Silicic Graywacke:lt-med gry,
occ dk gry,occ wht,com blchd
app,hd-v hd,v fn-fn grs,mod-
well srted,prly-mod dist gr
bndrs,mod rxln,loc wk fol,r
clr & milky qtz vng,r disse
& agg pyr,r chrltzd grs,
intrbddd w/Argillite:dk gry-blk
occ dk brn,firm-hd,v fn grs,
loc silty,mass occ r qtz vng,
r disse pyr.

Silicic Graywacke:lt-drk gry,
occ brn, com blchd app,hd-v hd,
fn-med gr,mod-well srted,indist-
mod dist gr bndrs,mod rxln,
mod altrd,com milky-clr qtz vng
& vn frags,occ chlortzd grs,r
pist grn epid, loc r pyrho,
intrbddd w/Argillite:dk gry-blk,
frm, silty texture,mass,pred wk
phyl shn,dull,r qtz vng,loc r
pyr vng.

Silicic Graywacke:lt-med gry,
wht,com-dom blchd app,hd-v hd,
v fn-fn gr,mod well srted,
indist-mod dist grn bndrs,mod
rxln,loc wk fol,r cl qtz vng &
frags,r disse & vein pyr,r
canary ylw epid,r chlor vng &
chltzd grns,r pink axinite,
intrbddd w/Argillite:dk gry-blk,
loc brn,firm,pred aphan,loc
silty,mass,loc r qtz vng,r
dissem & vein pyr.

Silicic Graywacke:lt-med gry,
com blchd app,hd-v hd,v fn-fn
grs,mod-well srted,prly dist-mod
dist grn bndrs,mod rxln,loc wk
fol,r cl qtz vng & frags,r
dissem & agg pyr,r epid,r chlor,
intrbddd w/Argillite:dk gry-blk,
loc brn,firm,pred aphan,loc
silty,mass,loc r qtz vng,r
dissem & vein pyr.

Silicic Graywacke:lt-med gry,
wht,com-dom blchd app,loc v
pale grn cast,hd-v hd,v fn-fn
gr,mod well srted,indist-mod
dist grn bndrs,mod rxln,loc wk
fol,loc wk hornfelsic txt,r cl
qtz vng & frags,r disse & vein
pyr,r chlor vng & chltzd grns.

Silicic Graywacke:lt-med gry,
wht,com-dom blchd app,loc v
pale grn cast,hd-v hd,v fn-fn
gr,mod well srted,indist-mod
dist grn bndrs,mod rxln,loc wk
fol,loc wk hornfelsic txt,r cl
qtz vng & frags,r disse & vein
pyr,r chlor vng & chltzd grns,
intrbddd w/Argillite:lt-dk gry,
blk,brn,hard,britt,pred aphan,
loc silty,r qtz vng,r disse
& vein pyr.

Trace steam when OOH despite
no obvious steam entries.

Begin directional work @ 4272'
w/8.5" bit & ~130 bph mud.

Silicic Graywacke:lt-med gry,
wht,dom blchd app,loc v ,hd-v
hd,v fn-fn gr,mod well srted,
indist-mod dist grn bndrs,mod-
str rxln,loc wk hornfelsic txt,
r-tr cl qtz vng & frags,r
dissem pyr,r chlor vng & chltzd
grns,intrbddd w/Argillite:lt-dk
gry,blk,brn,hard,britt,pred
aphan,r qtz vng,r disse & vein
pyr.

Directional drill T/4413'.Lay
down directional tools & drill
ahead w/conventioal setup.

Cross lease line at 4471'.

2 compressors
2 gpm mist

2 compressors
gpm mist

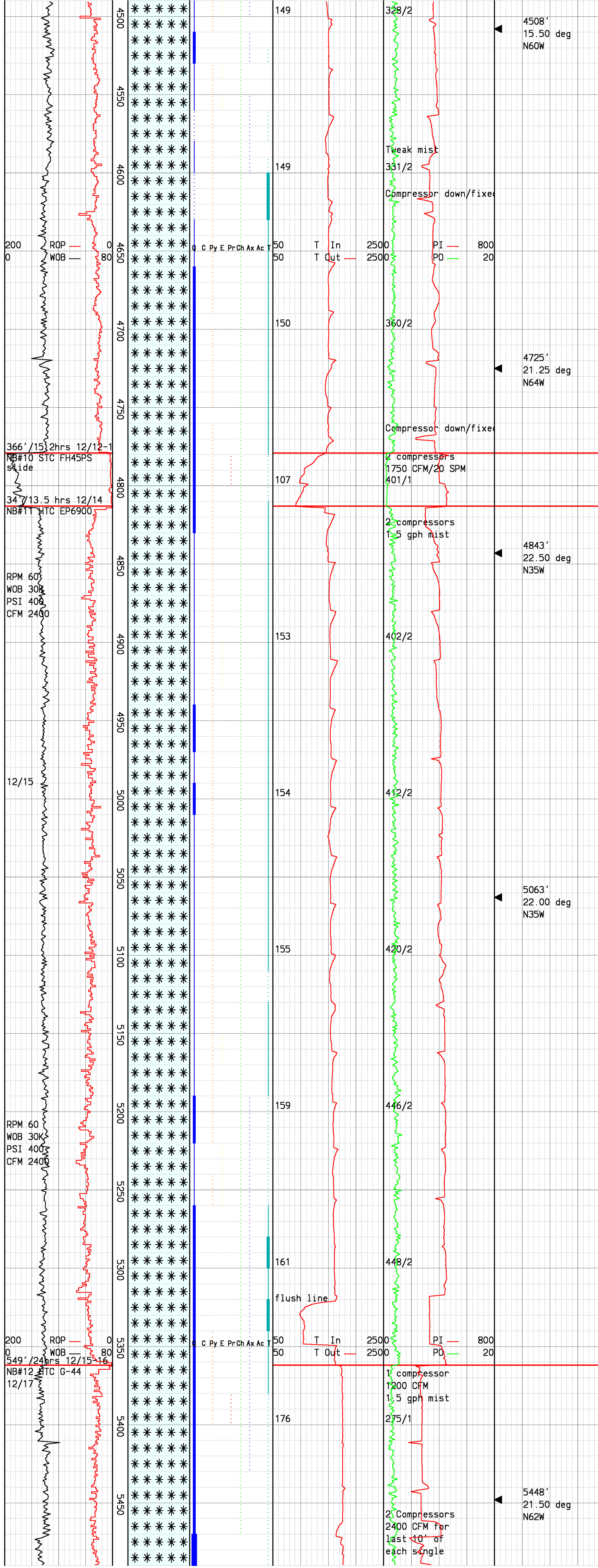
2 compressors
750 CFM/9 SPM
444/1
750 CFM/20 SPM

Compressor down
Compressor fixed
Compressor down
Compressor fixed

2 compressors
1.5 gpm mist

50 T In 2500 PI 800
50 T Out 2500 PD 20

No returns



4508' 15.50 deg N60W
 Felsite: milky wht-wht, clr, opq, hd, brit, fn disagg smpl, frsh-sl altrd, aphan microxln grndmass, r-mnr anhed-subhed clr qtz, r clr/opq qtz vng, r disse pyr, r epidote, r chlortzd biot, r axin, r fn dk brn-blk disem & tourm.

4600 Tweak mist
 331/2
 Compressor down/fixe
 Felsite: milky wht-wht, clr, opq, v lt gry grn, hd, brit, fn disagg smpl, frsh-sl altrd, occ mod altrn, aphan microxln grndmass, r-t euhed-anhed clr qtz, r clr/opq qtz vng, occ disse pyr, com chlortzd biot, tr-mnr fn dk brn-blk disem & agg tourm.

4725' 21.25 deg N64W
 Compressor down/fixe
 2 compressors
 1750 CFM/20 SPM
 401/1
 Drill t/4779', POOH. Make up motor, RIH. Directional drill t/4813', POOH. Lay down directional tools & drill ahead w/conventional setup.

4843' 22.50 deg N35W
 2 compressors
 1.5 gph mist
 Felsite: milky wht-wht, clr, loc pale grn cast, hd, brit, dom fn disagg smpl, aphan microxln grndmass r-m euhedral clr qtz, loc r disem pyr, r agg epid, r-t tourm, r hem stng & vng.

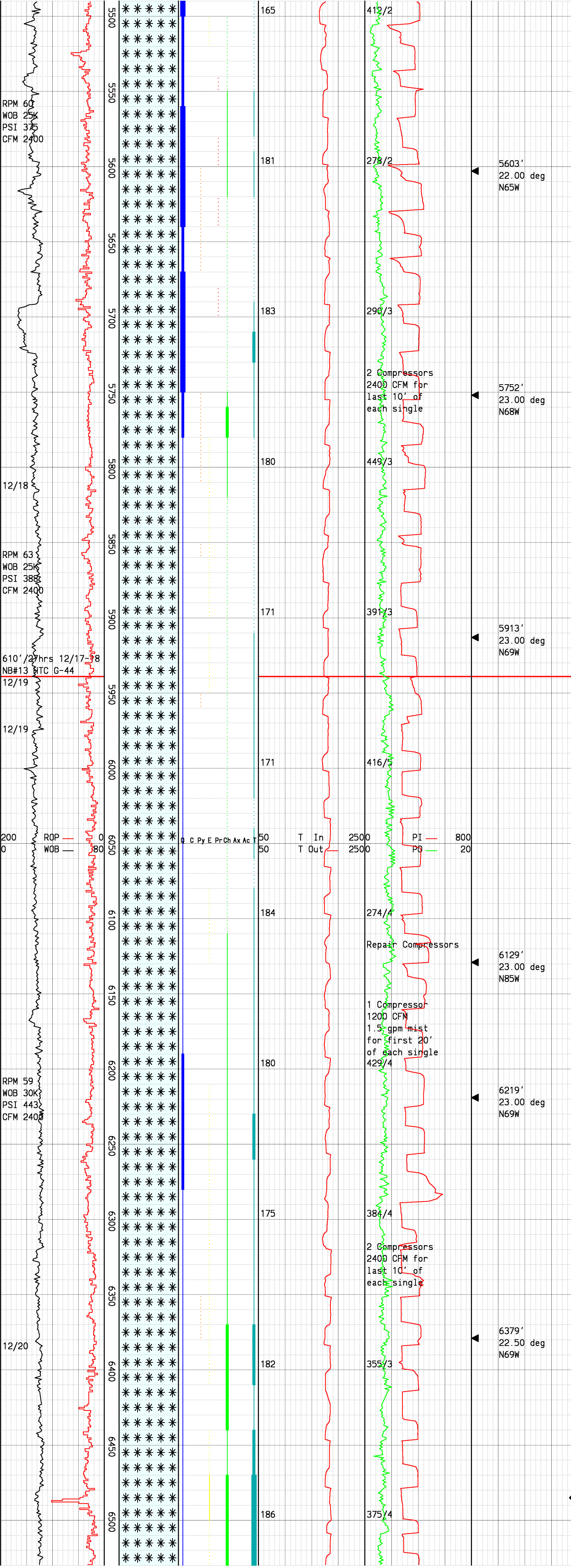
5063' 22.00 deg N35W
 Felsite: milky wht-lt, opq, loc pale grn cast, hd-v hd, brit, fn disagg smpl, frsh, aphan microxln grndmass, r-mnr anhed clr qtz, r clr/opq qtz vng, r disse pyrite, loc r epidote, r chltzd grns, loc r axin, r fn dk brn-blk disse & agg tourm, loc r hem stng/vng, r blueschist.

Drilling break of 58'/hr f/5020' t/5022'. Drilling break of 57'/hr f/5048' t/5049'.

Drilling breaks of 59'/hr f/5207' t/5208', 63'/hr f/5209' t/5212', 60'/hr f/5220' t/5221', 68'/hr f/5232' t/5234' & 61'/hr f/5254' t/5260'.

Drilling breaks of 61'/hr f/5254' t/5255' & 64'/hr f/5313' t/5320'.

5448' 21.50 deg N62W
 2 Compressors
 2400 CFM for last 10' of each single
 Felsite: milky wht-lt, opq, loc pale grn cast, v hd, brit, fn disagg smpl, frsh, aphan microxln grndmass, tr-mnr anhed clr qtz, tr clr/opq qtz vng, abs-r disse pyrite, loc r epidote, abs-r pyr, r chltd grns, r axin, r-tr fn dk brn-blk disse & agg tourm, loc hem stng/vng.



Drilling break of 64'/hr
f/5523' t/5530'.

Drilling break of 53'/hr
f/5615' t/5618'.

Felsite: milky wht-lt, opq, loc pale grn cast, hd-v hd, brit, frsh, aphan microxln grndmass, tr-cmn anhed and eudral clr qtz, tr clr/opq qtz vng, abs-r dissem pyrite, loc r epidote, loc r disem pyrrhotite, r-tr chltzd grns, r-mnr fn dk brn-blk dissem & agg tourm, loc hem stng/vng.

Felsite: milky wht-lt, opq, loc pale grn cast, hd-v hd, brit, frsh, aphan microxln grndmass, tr-cmn anhed and eudral clr qtz, tr clr/opq qtz vng, abs-r dissem pyrite, loc r epidote, loc r disem pyrrhotite, r-tr chltzd grns, r-mnr fn dk brn-blk dissem & agg tourm, loc hem stng/vng.

Drilling break of 49'/hr
f/5944' t/5946'.

Felsite: milky wht-lt, opq, loc pale grn cast, hd-v hd, brit, frsh, aphan microxln grndmass, tr anhed and eudral clr qtz, abs-r dissem pyrite, r bleached lt grn chlor grns, r-mnr fn dk brn-blk dissem & agg tourm.

Felsite: milky wht-lt, opq, loc pale grn cast, hd-v hd, brit, frsh, aphan microxln grndmass, tr anhed and eudral drzy qtz, r bleached lt grn chlor grns, r-mnr fn dk brn-blk dissem & agg tourm.

Felsite: lt gry-v blchd wht, opq, loc pale grn cast, hd-v hd, brit, frsh, aphan microxln grndmass, r-mnr drusy qtz, r disem pyr, r yellow-green epidote, r-tr bleached lt grn chlor grns, r chlor vng, r-mnr fn dk brn-blk dissem & agg tourm.

Felsite: lt gry-v blchd wht, opq, loc pale grn cast, hd-v hd, brit, frsh, aphan microxln grndmass, tr drusy qtz, abs-r disem pyr, r-tr yellow-green epidote, r-tr bleached lt grn-jade grn chlor grns, tr-com fn dk brn-blk dissem & agg tourm.

Possible steam entry
f/6484' t/6487', 8# incr.
in standpipe pressure,
5 deg increase in temp
out, ROP incr. to 103'/hr.

